NORTH ELECTRIC CATALOG BULLETINS, 1904 TO 1907

A collection of 14 bulletins bound in a loose leaf string binder. The cover was embossed with B.L. STRATTON, a sales engineer for North Electric.

Selective Ringing System, Magneto Telephone Sets, Cook Protection Equipment, Wall Mount Switchboards, Construction Supplies, Common Battery Telephone Sets, Cross Arms, Type K Magneto Telephones, Receivers, Bridging Telephones, Divided Circuit Two and Four Party Equipment, Cut-In Stations and Telephone Booths.

www.jklmuseum.com

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26 December 2009

THE NORTH ELECTRIC CO.

CLEVELAND, OHIO.

Bulletin No. 23. **December, 1904.**

CROSS ARMS.

Standard Cross Arms.

Size 3¼x4¼ inches, bored for 1½ inch pins and two ½ inch lag bolts and two ⅜ inch brace bolts distant from center 16½ inches. Special borings to order. Painted two coats red or black paint.

Number Pins.	Length, Feet.	Approximate Weight Each, Pounds.	SPACING.			Code Word.
			End, Inches.	Center, Inches.	Side, Inches.	
2	3	9	4	28	....	Abuse.
4	4	12	4	16	12	Abandon.
4	5	15	4	18	17	Abound.
4	6	18	4	24	20	Absorb.
6	6	18	4	16	12	Acorn.
6	8	24	4	18	17½	Actor.
8	8	24	4	16	12	Afloat.
8	10	30	4	17½	15¾	Assist.
10	10	30	4	16	12	Admire.
10	8½x1¼	25½	4	16	10	Agree.
10	10 x1¼	30	4	16	12	Captor.

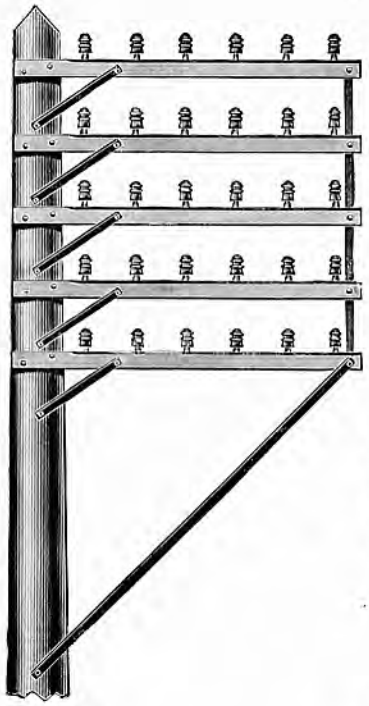
Telephone Cross Arms.

Size 2¾x3¾ inches, bored for 1¼ inch pins, two ½ inch lag bolts and two ⅜ inch brace bolts distant from center 16½ inches. Special borings to order. Painted two coats red or black paint.

Number Pins.	Length, Feet.	Approximate Weight Each, Pounds.	SPACING.			Code Word.
			End, Inches.	Center, Inches.	Side, Inches.	
2	2 ft.	5	4	18	....	Cambric
2	2 ft. 8 in.	7	4	26	....	Cabinet.
4	3 ft. 6 in.	9	4	16	10	Camera.
6	5 ft. 2 in.	13	4	16	10	Canary.
8	6 ft. 10 in.	17	4	16	10	Canteen.
10	8 ft. 6 in.	21	4	16	10	Capital.
12	10 ft.	25	4	14	10	Chastise.

STANDARD SIDE ARMS.

3¼x4¼ Bored for 1¼ in. Pins.



	Approx. Weight.	Code Word.
6 pin, 6 ft. 4 in	24 lbs.	Arouse.
8 pin, 8 ft. 4 in	29 lbs.	Agate.

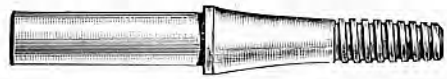
Side spacing on side arms..... 12 in.
End spacing on side arms..... 4 in.
End spacing on 8½ feet standard arms..... 4 in.
Side arms are not bored for lags nor bolts.

CROSS ARM BRACES.

	Approx. Wt. per 100.	CODE WORD. Plain.	Galv.
20x1x$\frac{3}{16}$	103	Aam	Abacus
20x1$\frac{7}{32}$x$\frac{7}{32}$	141	Aardrark	Abalone
22x "	151	Aardwolf	Abandoning
24x "	168	Aaronic	Abandonment
26x "	181	Aaronicly	Abash

WOOD PINS.

Pins, Standard Specifications.



		Code Word.
1¼ in. Oak Pins	Approx. weight per 1,000, 280 lbs.	Abashed
1½ in. Oak Pins	" " " " 370 "	Abashing
1¼ in. Locust Pins	" " " " 290 "	Abate.
1½ in. Locust Pins	" " " " 380 "	Abatement

DUPLEX PINS.

To be used with Duplex Pony and Duplex Deep Groove Insulators.

	Code Word.
1¼ in. Oak, painted	Abater
1½ in. Oak, painted	Abatton
1¼ in. Locust, not painted	Abba
1½ in. Locust, not painted	Abbacy

WOOD CORNER PINS.

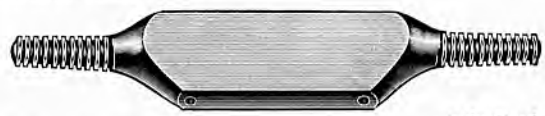
	Code Word.
1¼ in. Oak, with bolt and washer	Abbe
1½ in. Oak, with bolt and washer	Abbes

WOOD BRACKETS.

	Weight per 1000	Code Word.
12 in. Oak Brackets	720 lbs.	Abbreviate

DUPLEX BRACKETS.

To be used with Duplex Pony and Duplex Deep Groove Insulators.



	Code Word.
Oak, painted	Abcissa

Minimum weight for 36-foot car 30,000 lbs.

LAG SCREWS.

Price per 100, Plain, Not Galvanized. Length.

Diameter.	1½	2	2½	3	3½	4	4½	5	5½
5-16	$ 2 25	$ 2 45	$ 2 65	$ 2 85	$ 3 05	$ 3 25	$ 3 45	$ 3 65	$ 3 85
⅜	2 70	2 96	3 22	3 48	3 74	4 00	4 26	4 52	4 78
7-16	3 15	3 47	3 79	4 11	4 43	4 75	5 07	5 39	5 71
½	3 75	4 11	4 47	4 83	5 19	5 55	5 91	6 27	6 63
9-16 and ⅝	....	5 00	5 50	6 00	6 50	7 00	7 50	8 00	8 50
¾	....	....	7 90	8 60	9 30	10 00	10 70	11 40	12 10
⅞	....	....	.....	12 50	13 50	14 50	15 50	16 50	17 50
1	....	....	....	....	18 20	19 50	20 80	22 10	23 40

Diameter.	6	6½	7	7½	8	9	10	11	12
5-16	$ 4 05	$ 4 25	$ 4 45	$ 4 65	$ 4 85	$ 5 25	$ 5 65	$ 6 05	$ 6 45
⅜	5 04	5 30	5 56	5 82	6 08	6 60	7 12	7 64	8 16
7-16	6 03	6 35	6 67	6 99	7 31	7 95	8 59	9 23	9 87
½	6 99	7 35	7 71	8 07	8 43	9 15	9 87	10 59	11 31
9-16 and ⅝	9 00	9 50	10 00	10 50	11 00	12 00	13 00	14 00	15 00
¾	12 80	13 50	14 20	14 90	15 60	17 00	18 40	19 80	21 20
⅞	18 50	19 50	20 50	21 50	22 50	24 50	26 50	28 50	30 50
1	24 70	26 00	27 30	28 60	29 90	32 50	35 10	37 70	40 30

MACHINE BOLTS.

With Square Heads and Square Nuts, Finished Points.

Price per 100, Plain, Not Galvanized. Length.

Diameter.	¾–1½	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½
¼	$ 1 70	$ 1 78	$ 1 86	$ 1 94	$ 2 02	$ 2 10	$ 2 18	$ 2 26	$ 2 34	$ 2 42	$ 2 50	$ 2 58	$ 2 66
5-16	2 00	2 12	2 24	2 36	2 48	2 60	2 72	2 84	2 96	3 08	3 20	3 32	3 44
⅜	2 40	2 56	2 72	2 88	3 04	3 20	3 36	3 52	3 68	3 84	4 00	4 16	4 32
7-16	2 80	3 00	3 20	3 40	3 60	3 80	4 00	4 20	4 40	4 60	4 80	5 00	5 20
½	3 60	3 86	4 12	4 38	4 64	4 90	5 16	5 42	5 68	5 94	6 20	6 46	6 72
9-16 and ⅝	5 20	5 58	5 96	6 34	6 72	7 10	7 48	7 86	8 24	8 62	9 00	9 38	9 76
¾	7 20	7 70	8 20	8 70	9 20	9 70	10 20	10 70	11 20	11 70	12 20	12 70	13 20
⅞	10 50	11 20	11 90	12 60	13 30	14 00	14 70	15 40	16 10	16 80	17 50	18 20	18 90
1	15 10	16 00	16 90	17 80	18 70	19 60	20 50	21 40	22 30	23 20	24 10	25 00	25 90

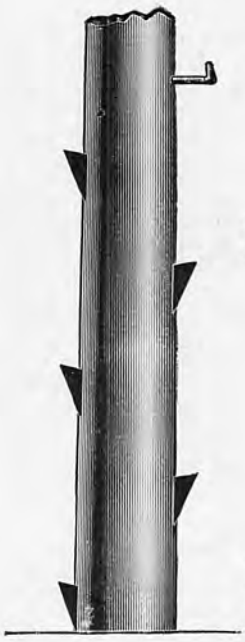
Diameter.	8	9	10	11	12	13	14	15	16	17	18	19	20
¼	$ 2 74	$ 2 90	$ 3 06	$ 3 22	$ 3 38	$ 3 54	$ 3 70	$ 3 86	$ 4 02	$ 4 18	$ 4 34	$ 4 50	$ 4 66
5-16	3 56	3 80	4 04	4 28	4 52	4 76	5 00	5 24	5 48	5 72	5 96	6 20	6 44
⅜	4 48	4 80	5 12	5 44	5 76	6 08	6 40	6 72	7 04	7 36	7 68	8 00	8 32
7-16	5 40	5 80	6 20	6 60	7 00	7 40	7 80	8 20	8 60	9 00	9 40	9 80	10 20
½	6 98	7 50	8 02	8 54	9 06	9 58	10 10	10 62	11 14	11 66	12 18	12 70	13 22
9-16 and ⅝	10 14	10 90	11 66	12 42	13 18	13 94	14 70	15 46	16 22	16 98	17 74	18 50	19 26
¾	13 70	14 70	15 70	16 70	17 70	18 70	19 70	20 70	21 70	22 70	23 70	24 70	25 70
⅞	19 60	21 00	22 40	23 80	25 20	26 60	28 00	29 40	30 80	32 20	33 60	35 00	36 40
1	26 80	28 60	30 40	32 20	34 00	35 80	37 60	39 40	41 20	43 00	44 80	46 60	48 40

COMMON CARRIAGE BOLTS.

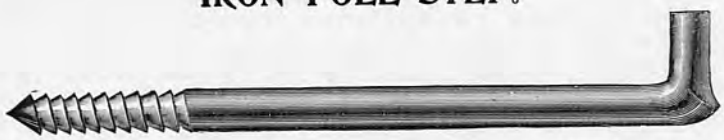
Price per 100, Plain, Not Galvanized. Length.

Diameter	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4¼	4½	4¾	5	5½	6	6½
¼	1 00	1 04	1 08	1 12	1 16	1 20	1 24	1 28	1 32	1 36	1 40	1 44	1 48	1 52	1 56	1 64	1 72	1 80
5-16	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	1 60	1 65	1 70	1 75	1 80	1 85	1 90	2 00	2 10	2 20
⅜	1 60	1 68	1 76	1 84	1 92	2 00	2 08	2 16	2 24	2 32	2 40	2 48	2 56	2 64	2 72	2 88	3 04	3 20
7-16	2 20	2 29	2 38	2 47	2 56	2 65	2 74	2 83	2 92	3 01	3 10	3 19	3 28	3 37	3 46	3 64	3 82	4 00
½	.. ....	.....	.....	.....	3 00	3 11	3 22	3 33	3 44	3 55	3 66	3 77	3 88	3 99	4 10	4 32	4 54	4 76
9-16 & ⅝	.....	.....	.....	.....	5 20	5 37	5 54	5 71	5 88	6 05	6 22	6 39	6 56	6 73	6 90	7 24	7 58	7 92
¾	.....	.....	.....	.....	7 20	7 43	7 66	7 89	8 12	8 35	8 58	8 81	9 04	9 27	9 50	9 96	10 42	10 88

Diameter	7	7½	8	8½	9	9½	10	11	12	13	14	15	16	17	18	19	20
¼	1 88	1 96	2 04	2 12	2 20	2 28	2 36	2 52	2 68	2 84	3 00	3 16	3 32	3 48	3 64	3 80	3 96
5-16	2 30	2 40	2 50	2 60	2 70	2 80	2 90	3 10	3 30	3 50	3 70	3 90	4 10	4 30	4 50	4 70	4 90
⅜	3 36	3 52	3 68	3 84	4 00	4 16	4 32	4 64	4 96	5 28	5 60	5 92	6 24	6 56	6 88	7 20	7 52
7-16	4 18	4 36	4 54	4 72	4 90	5 08	5 26	5 62	5 98	6 34	6 70	7 06	7 42	7 78	8 14	8 50	8 86
½	4 98	5 20	5 42	5 64	5 86	6 08	6 30	6 74	7 18	7 62	8 06	8 50	8 94	9 38	9 82	10 26	10 70
9-16 & ⅝	8 26	8 60	8 94	9 28	9 62	9 96	10 30	10 98	11 66	12 34	13 02	13 70	14 38	15 06	15 74	16 42	17 10
¾	11 34	11 80	12 26	12 72	13 18	13 64	14 10	15 02	15 94	16 86	17 78	18 70	19 62	20 54	21 46	22 38	23 30



IRON POLE STEP.



	CODE WORD. Plain.	Galv.
$\frac{9}{16}$x9 in. .....Approx. weight per 1,000, 650 lbs.	Abutment	Abysm
$\frac{5}{8}$x9 in..... " " " " 820 "	Abuttal	Abysmal

WOODEN POLE STEPS.

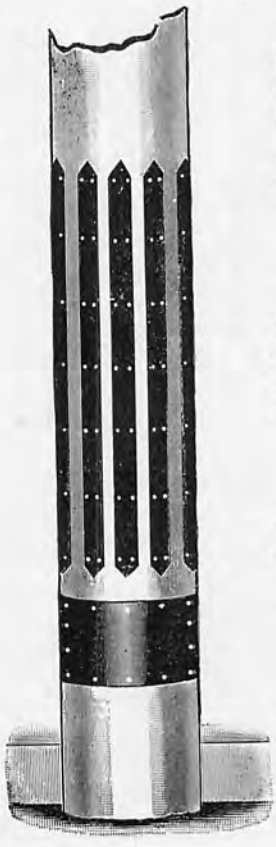
Save Carrying Ladders.

Code Word:--Abyss

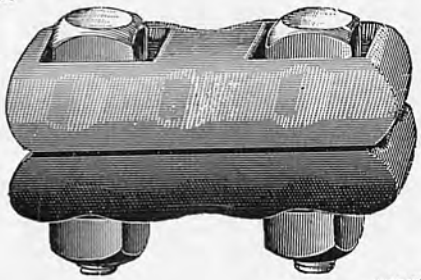
EYE BOLTS.

	Code Word.
½x 6 inches.....	Abyssal
½x 8 inches.....	Abraham
½x10 inches.....	Absalom
½x12 inches.....	Acacia

This is a regular eye bolt, with eye at one end, and long thread with nut at other end.



GUY CLAMPS.



	Code Word.
2 bolt, malleable, galv.....	Academic
3 bolt, malleable, galv.....	Academical

Weight per 100 { 2-Bolt 150 lbs. / 3-Bolt 250 lbs.

	CODE WORD. Plain.	Galv.
¼ in. Cincinnati Clips.....	Academicals	Abrogation
$\frac{5}{16}$ in. Cincinnati Clips.....	Academician	Abruptly
⅜ in. Cincinnati Clips.....	Academy	Abscess
½ in. Cincinnati Clips.....	Acaleph	Abscind

POLE STRIPS.

Galvanized.

Concaved to conform approximately with shape of pole. Approximate weight per 100, 120 pounds. Code Word.

Size 2 inch wide by 4 feet long, 22 gauge..... Acanaceous

HUB OR BUTT PLATES.

Galvanized.

Rolled to a diameter of 14 inches. Punched for 20 penny wire nails.

Size.	Approximate Weight, Each.	Code Word.
15x18x$\frac{3}{16}$ inches.....	15 pounds	Acanthine
18x20x$\frac{3}{16}$ inches.....	20 pounds	Acanthus

POLE SHIMS.

Galvanized.

	Code Word.
1¼x$\frac{3}{16}$x8 in., per M.....	Acariasis

ROUND WASHERS FOR LAG SCREWS.

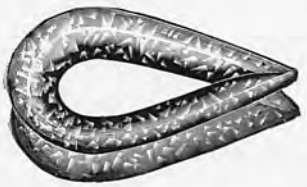
	Code Word.
3/8 inch, for 5/16 inch bolt, average 65 to pound	Acarida
7/16 " " 3/8 " " " 42 "	Acatalectic
9/16 " " 1/2 " " " 22 "	Accede
3/4 " " 5/8 " " " 10 "	Accelerate

SQUARE WASHERS.

	Approx. Weight Per 100	Code Word
For Cross Arm Bolts 2 1/4 x 2 1/4 x 3/16 inch	25 lbs	Accent
For Guy rods, 5x5x 3/16 inch	130 lbs	Acceptant

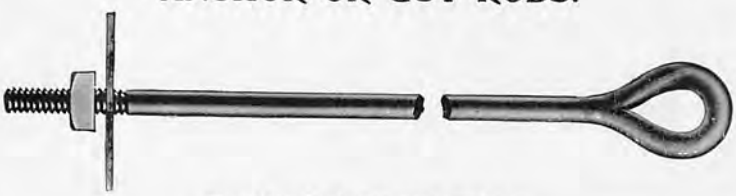
WIRE ROPE THIMBLES.

Galvanized.



Circumference of Rope.	Diameter of Rope.	Code Word.
5/8	3/16	Acceptation
3/4	1/4	Acceptor
7/8	5/16	Accentual
1	3/8	Accentuate
1 1/4	7/16	Accept
1 1/2	1/2	Acceptable

ANCHOR OR GUY RODS.



Furnished with square washers.

Size.	WEIGHT PER 100 RODS. Plain Rods Lbs.	Code Word.	Galv. Rods Lbs.	Size.	WEIGHT PER 100 RODS. Plain Rods Lbs.	Code Word.	Galv. Rods Lbs.
1/2 in. by 6 ft.	479	Acceptance	503	3/4 in. by 6 ft	1000	Accident	1025
" " 7 "	545	Accepter	572	" " 7 "	1150	Accidental	1200
" " 8 "	611	Access	641	" " 8 "	1275	Accipter	1320
" " 9 "	677	Accessary	711	" " 9 "	1425	Acclaim	1485
" " 10 "	743	Accessible	780	" " 10 "	1575	Acclamation	1640
5/8 in. by 6 "	700	Accession	720	1 in. by 10 "		Acclamatory	
" " 7 "	800	Accessional	820	1 1/8 " " 10 "		Acclimate	
" " 8 "	900	Accessorial	940	1 1/4 " " 10 "		Acclimatize	
" " 9 "	1000	Accessory	1050	1 1/4 " " 12 "		Acclivity	
" " 10 "	1100	Accidence	1155				

We carry in stock all regular sizes of Anchor and Guy Rods, and are prepared to furnish all other sizes on very short notice. When ordering state whether plain or galvanized.

TELEPHONE GROUND RODS.

	Code Word.
1/2 x 6 ft. galvanized, and pierced for ground wire	Accolade

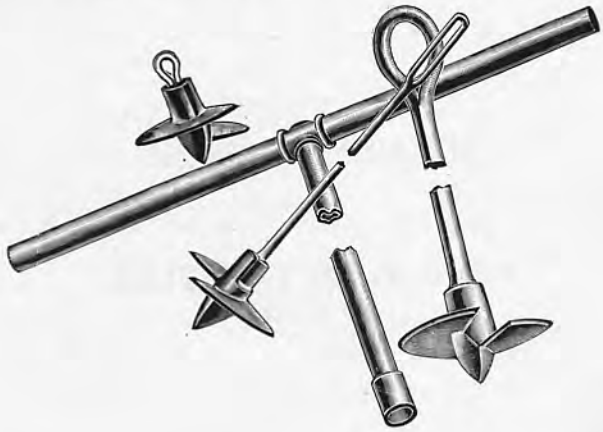
DOUBLE LOOP GALVANIZED ANCHOR RODS.

Made with 4-inch loop at ground end for looping over iron or other cross-bar.

	Code Work.
5/8 inch by 6 feet long.	Accommodate

Other sizes furnished on order

STOMBAUGH LAND ANCHORS.



No.				Code Word.
350	3½ in. without rod	weight 1 lb., per 100	$35.00	Skull
500	5 in. " "	" 2½ lbs., "	70.00	Thorax
600	6 in. " "	" 4½ " "	125.00	Abdomen
351R	3½ in. with $\frac{5}{16}$ in. 5 foot round rod	" 2½ " "	70.00	Brain
502R	5 in. " ⅜ in. 5 " " "	" 4 " "	115.00	Lung
603R	6 in. " ½ in. 5 " " "	" 7¼ " "	225.00	Stomach
800	8 in. with 1⅛ in. square rod and forged eye, shank 5½ foot,	weight 30 lbs., each	10.00	Hip
1000	10 in. " 1¼ in. " " " " " " 5½ "	" 48 " "	15.00	Knee
1200	12 in. " 1½ in. " " " " " " 5½ "	" 78 " "	20.00	Ankle

(3½ in. rods have no eye. 5 and 6 in., eye 3 in. long by ½ in. spread.)
(8, 10 and 12 in. have eyes 2½ in. inside diameter.)

354	Wrench for 3½ in. anchor, both with and without rod	weight 13 lbs., each	2.40	Arm
505	" " 5 in. " " " " " "	" 13 " "	3.00	Wrist
606	" " 6 in. " " " " " "	" 13 " "	5.10	Hand

The regular finish is black paint but will be finished galvanized, if preferred, at an advance.

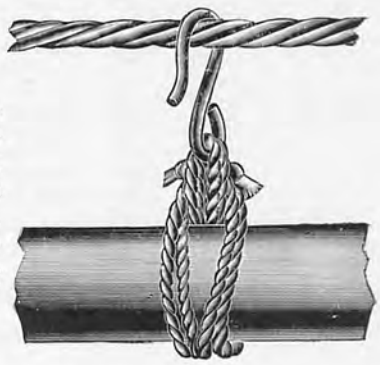
MARLINE CABLE HANGERS.

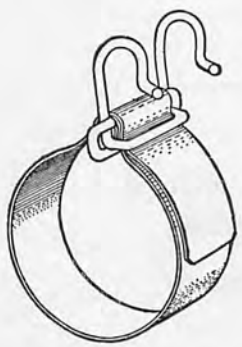
Made to Fit Any Size Cable.

We have samples of marline, cut down after 7, 8, and 11 years service in Chicago, the worst possible exposure, and which show on the outside the effect of the weather, but which inside are bright and strong, and good for many more years. The hooks were rotten but the marline was practically untouched.

Made to fit any size of cable and any size of messenger stand. In ordering give diameter of each.

Code word, Acerbity.





BOSTON CABLE CLIP.

A three-piece hanger, consisting of steel wire and strap of sheet metal. The absence of bolts, buttons or rivets makes it an extremely easy clip to use and makes it possible to use many times over. It is simple and strong, and can be adjusted to any size cable. It is adjusted entirely without the use of tools of any kind, and will hold more firmly than other clips that are fitted with pliers. Strap 6½ inches long. Code word, Acerbitude.

GLASS INSULATORS.

No. 4 Pony.

No. 9 Pony.

No. 11 and 12 D. G. Pony

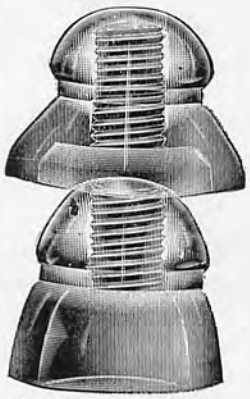
Long Distance.

Double Groove.

	Wgt. per 1,000 Packed.	No. per bbl.	Code Word
No. 4. Pony, for telephone	775	300	Absence
" 9. "	725	400	Absent
" 11 and 12. Double Groove Pony	750	400	Absentee
Long Distance Regular	1100	300	Absinth
Double Groove	1350	200	Absinthium

TRANSPOSITION INSULATORS.

Regular Transposition

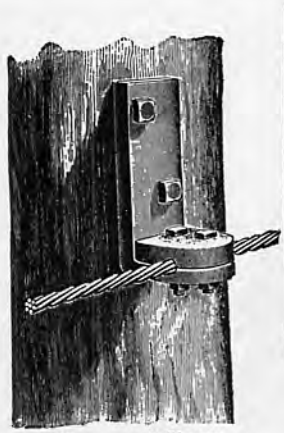

Two-Piece Transposition

No. 2 Transposition.

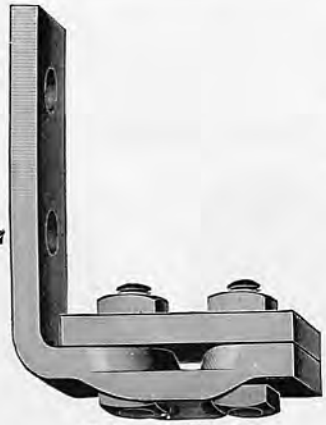
	Wgt per 1,000 Packed.	No. per bbl.	Code Word.
Regular Transposition	2400	100	Absolutary
Two piece "	2025	125	Absolution
No. 2. "	2400	125	Absoluted

No. 4 PORCELAIN KNOBS.

Heigth.	Width.	Hole.	Groove	Standard Package.
$1\frac{11}{16}$ in.	$1\frac{1}{2}$ in.	$\frac{7}{16}$ in.	$\frac{7}{16}$ in.	2000



"Messenger" Clamp.



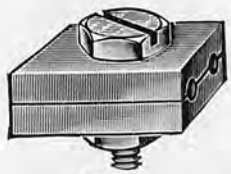
Universal Hanger.

DOUBLE CROSS ARMING BOLTS.

5½ inch thread on each end. Fitted with four square nuts only.

	CODE WORD	
	Plain.	Galvanized.
½ x 12.....	Accusative	Accustom
½ x 13.....	Accusatorial	Acentric
½ x 14.....	Accusatory	Acephala
½ x 16.....	Accuse	Acephalous
½ x 18.....	Accused	Acerate
⅝ x 14.....	Accuser	Acerb

Guy Wire Hook



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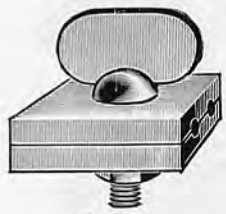

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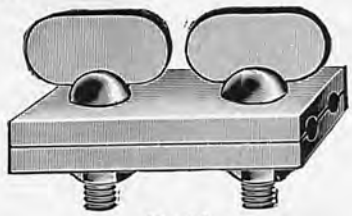

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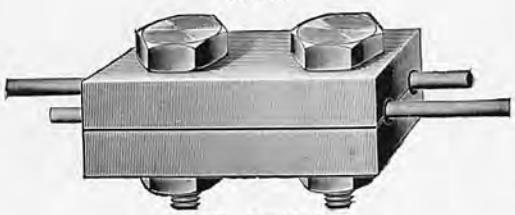


No. 257. Double Bolt.

GALVANIZED MESSENGER HANGERS.

	Each.	Code Word.
⅜x2 in., regular wgt. 3 lbs..	$0.34	Migrate
½x2 " " " 4 " ...	.38	Migrating

UNIVERSAL MESSENGER HANGER.

For straight lines and corners. Solid forged steel. Japanned or galvanized.

		Code Word.
No. 1 Light, 1½x½....each,	$0 38	Migration
" 2 Medium, 1¾x½ "	40	Mild
" 3 Heavy, 2x½..... "	42	Milder

GALVANIZED GUY WIRE HOOKS.

	Code Word.
1½x⅜x6 inches.....per 100, $10.00	Mileage

MILLER ANCHORS AND AUGERS.

Anchors With Rods.

		Code Word.
No. 2 anchor, 6x13 in., ½ in. rod, 7 feet long.	$0.80	Military
No. 3 anchor, 7x16 in., ⅝ in. rod, 7 feet long.....	1.25	Mimetic
No. 4 anchor, 8x19 in , ¾ in. rod, 8 feet long.....	2.50	Mimetical
No. 5 anchor, 10x25 in., 1 in. rod, 9 feet long.....	4.00	Mimicker

Augers for Setting Anchors.

	Code Word.
Auger with 7 foot stem will set No. 2 anchor. Price...$3.00	Mimora

Combination Auger.

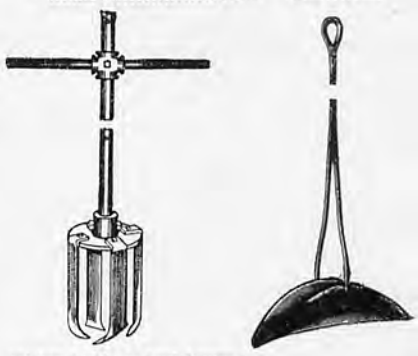
The combination auger has an 8 foot stem, one inch in diameter. This auger is fitted with two boring heads—the small one for anchor No. 2, the large head has adjustable blades, and will set anchors No. 3 and 4.

	Code Word.
Price.... .....$5.00	Minatory

All augers have adjustable handles. As the auger goes down, the handle can be moved up the stem.

COPPER TEST CONNECTORS.

		Code Word.
No. 255.	Single Bolt.....	Ornament
" 261.	" " with wing head	Ornate
" 257.	Double Bolt.....	Muster
" 262.	" " with wing head	Mustiness



Miller Anchors and Augers.

Paper Sleeves in Box.

PAPER INSULATORS FOR CABLES.

Paper tubes are used almost universally as Insulators in the splicing of cables. The tubes while cheap and simple, must be good and well made. They are constructed of strong, tough paper, tightly rolled. 110 are packed in a neat pasteboard box, that number being what is ordinarily required for the splicing of a 50 pair cable. The Insulators, when packed, present an appearance like this cut.

	Price.	Code Word.
3 in. Paper Sleeves, per 1000,	$1.50	Mishear
18 " " " "	7.50	Misjoin

Paper Sleeve, Full Size.

SUNDRIES FOR CABLE SPLICING.

	Code Word.
Paraffine	Misjudge
Ozite, 1 gal. cans	Misjudged
Chatterton Compound	Misjudging
W. D. Cable Compound	Mislay
Shave Hooks	Ornomet
Boxwood Dressers	Orology
Boxwood Turn Pins	Orotund

Shave Hook for Scraping Lead Sleeve.

Boxwood Turn Pin for Expanding ends of Lead Sleeve.

Boxwood Dresser for Shaping Lead Sleeves.

AMERICAN WIRE JOINTS.

Connector—Before twisting.

Connector—After twisting.

					Price.	Code Word.
Double Joint for	6	Copper	Wire, per	100	$9.00	Mislead
" "	7	"	"	100	8.00	Misleader
" "	8	"	"	100	7.50	Misleading
" "	9	"	"	100	7.00	Mismanage
" "	10	"	"	100	6.50	Misname
" "	12	"	"	100	6.00	Misplace
" "	14	"	"	100	5.50	Misplead
" "	16	"	"	100	5.00	Misquote
" "	10	Iron	"	100	5.50	Misrecite
" "	12	"	"	100	5.50	Misrule
" "	14	"	"	100	5.50	Misshape

GALVANIZED STEEL WIRE STRAND.

(Sometimes called Signal Strand.)

These galvanized steel strands are largely employed as span wire in electric railway work, as guys, and as messengers or suspension cables for hanging aerial telephone and other cables.

Composed of seven galvanized wires twisted together.

Diameter, Inches.	Seven Wires.	Weight 100 Feet.	Breaking Strength.	List per 100 Feet.	Code Word. Single Galvanized	Code Word. Double Galvanized.
1/2	8 B. W. G.	52	8320	3.15	Horseradish	Landholder
15/32	9 "	46	7100	2.82	Horsefly	Leased
7/16	10 "	40	5900	2.50	Horseshoe	Leasehold
3/8	11 "	30	4700	2.00	Horsewhip	Leash
5/16	12 "	22	3275	1.60	Horsewomen	Lar
1/4	15 "	13	1725	1.15	Horsing	Landlot

Diameter, Inches.	Extra High Strength.			High Strength.			Siemens-Martin.		
	Breaking Strength.	Per 100 Feet.	Code Word.	Breaking Strength.	Per 100 Feet.	Code Word.	Breaking Strength.	Per 100 Feet.	Code Word.
1/2	27000	5.50	Hortation	18000	3.95	Hovel	11000	2.70	Kursaal
15/32	24750	5.05	Hose	16500	3.70	Hover	10000	2.45	Kyriologic
7/16	22500	4.60	Hosca	15000	3.45	Howl	9000	2.20	Labarum
3/8	17250	3.55	Hospodor	11500	2.70	Howlet	6800	1.75	Labefaction
5/16	12100	2.70	Host	8100	2.10	Kriss	4860	1.30	Label
9/32	10900	2.10	Hot	7300	1.75	Kuflux	4380	1.05	Labeler
1/4	7600	1.90	Hour	5100	1.50	Kumiss	3050	.95	Labor
11/64	4900	1.60	House	3300	1.30	Kummel	2000	.80	Labored

DOUBLE GALVANIZED TELEPHONE WIRE.

There are three grades of Telephone Wire, classified as follows:

EXTRA BEST BEST (E. B. B.)
BEST BEST (B. B.)
STEEL.

Extra Best Best (E. B. B.) wire is made from a special stock of great purity, producing wire of absolutely uniform quality, in which the elements of softness and elongation are combined with low electrical resistance to a marked degree. It is largely employed in long lines or service where low electrical resistance is both desirable and necessary.

Best Best (B. B.) wire is made from a stock of high quality, producing a wire somewhat less uniform and of higher resistance than E. B. B., but of greater tensile strength. This grade is used almost exclusively for the constructfon of subscribers' lines in exchanges, and on account of its great tensile strength is best adapted for rural or farmer lines.

Steel wire has a greater tensile strength than either E. B. B. or B. B., but on account of its greater electrical resistance, is not very generally used.

As indicated by heading, the different grades of wire are double galvanized, each coat being uniform in its application, thereby insuring uniform durability. Having thoroughly tested the product of various manufacturers, we have found Roebling's wire unequalled. The fact that it is used exclusively by the leading telephone and telegraph companies throughout the United States and foreign countries, is sufficient proof of its quality. Each coil is sealed with metal tag, specifying gauge, grade and the name of manufacturer.

B. W. G.j	Diameter.	Length of Coils.	Weight per Mile	Resistance per Mile.		
				Extra Best Best.	Best Best.	Steel
10	.134	½ Mile.	250 Lbs.	18.83 Ohms.	22.04	26.04
11	.120	½ "	200 "	23.48 "	27.48	32.47
12	.109	½ "	165 "	28.46 "	33.3	39.36
14	.083	½ "	96 "	49.08 "	57.44	67.88

WEATHER PROOF IRON LINE WIRE.

This is sometimes classified as tree wire. Its use is advised where branches of trees interfere with line.

This wire is guaranteed genuine double galvanized B. B. Iron Wire.

This wire can be furnished with double or triple braid. In either case the braid is thoroughly saturated with weather proof compound, which gives it a highly polished finish.

Put up in half mile coils only.

Size of Wire. B. & S. Gauge.	Lbs. per Mile. Double Braid.	Lbs. per Mile. Triple Braid.
No. 10	350	410
No. 12	240	265
No. 14	150	176

WEATHER PROOF COPPER WIRE.

Especially adapted for drops or leads from main line to telephone. No. 16 is best adapted.

This wire is furnished in coils weighing from 12 to 15 pounds each, or a less quantity may be ordered, in which case price per pound is 2c. higher than in coil.

Furnished with double or triple insulation, as ordered.

Size. B. & S.. Gauge.	Feet per Pound.		Pounds per 1000.	
	Double Braid.	Triple Braid.	Double Braid.	Triple Braid.
No. 14	56	38	18	26
No. 16	76	48	13	21
No. 18	100	67	10	15

WEATHER-PROOF DUPLEX.

Center of two double braided weather-proof wires twisted together.

	Code Word.		Code Word.
No. 18 W. P. Duplex.....	Favor.	No. 19 W. P. Duplex.....	Fagot.

Hard Drawn Duplex for Drops.

Braided and Twisted.

Composed of two hard drawn copper conductors, each insulated with a strong, extra quality rubber, and covered with a smooth finished saturated weatherproof braid, then twisted. This wire is most desirable for drops from pole to house, and is now being used by all large companies for that purpose. Its use reduces trouble calls, and prevents all humming of instruments.

	Code Word.
No. 16. Hard Drawn Duplex, external diameter of rubber 4-32 inch.....	Fictitious
" 14. " " " " " " " 5-32 "	Fidelity
" 18. " " " " " " " 3-32 "	Ficklepaw

ANNUNCIATOR WIRE.

Covered with double cotton wrap, reverse windings. Insulation saturated thoroughly in paraffine.

Furnished on spools containing from 5 to 7 pounds. When ordered in less quantity there is an advance of 2c. per pound.

Sizes carried in stock :—No. 18 blue insulation. No. 20 brown insulation.

SWITCHBOARD WIRE.

No. 22. Tinned Copper, single conductor. Insulation one silk and two cotton wraps, beeswaxed. Mixed colors as follows: blue and white, orange and white, green and white, brown and white, slate and white.

No. 24. Single conductor. tinned copper switchboard wire. Insulation one silk and one cotton wind, beeswaxed. Solid and mixed colors.

No. 22. Tinned copper, twisted pair jumper wire. Insulation one silk wind and one cotton braid, beeswaxed. One conductor red and one conductor white.

No. 20. Same as No. 22.

No. 19. Tinned copper, twisted pair. Insulation one silk and two cotton wraps, beeswaxed. Colors, blue and white, orange and white, green and white, brown and white, slate and white. Each conductor solid color.

No. 24. Double conductor, twisted pair, tinned copper switchboard wire. Insulation one silk and one cotton wind, beeswaxed. Colors, blue and white, orange and white, green and white, brown and white, slate and white.

RUBBER COVERED COPPER WIRE.

No. 18, 19, 20—Single conductor, no braid, insulated with 1-32 inch of rubber.

No. 18, 19, 20—Twisted two conductor, no braid. Each conductor insulated with 1-32 inch of rubber.

No. 18, 19, 20—Single conductor, glazed or dry braid, insulated with rubber to diameter of 5-64 inches inside of braid.

No. 19—Standard Interior Duplex Wire, oak color, glazed braid over each conductor. Insulated with rubber to diameter of 5-64 inches inside of braid. One conductor distinguished by red thread in braid. This is a special style of interior wire handled by us and very popular with our customers.

OKONITE WIRE.

No. 20. Single conductor, $\frac{3}{32}$ inch, plain black rubber insulation.

No. 20. Double conductor, twisted, $\frac{3}{32}$ inch, plain black rubber insulation, one black, one red.

LAMP CORD.

No. 20. Cotton covered conductor, 10 x 30 wires; used on telephone transmitters.

INSULATING SADDLE STAPLES.

No Driving Tool Required. Cuts Actual Size.

The Insulating Saddle Staples supply a long-felt want for a safe staple to be used in fastening electric-light conductors and telephone and district-messenger wires in mouldings, on timbers, back-boards and switch-boards; also, telegraph wires in towers and offices; also, burglar-alarm, annunciator and all other low-pressure wires within the walls of buildings, especially in basements and places liable to moisture.

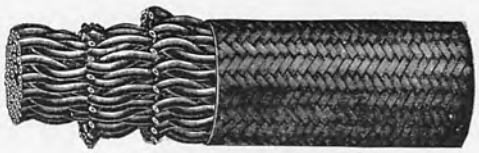
½ inch Electricians Staples, plain.

MAGNET WIRE.

Wound with cotton or silk.

No. B. & S. Gauge.	COTTON.		SILK.	
	Single.	Double.	Single.	Double.
24	.90	1.14	1.56	2.13
26	1.10	1.38	2.10	2.88
30	1.65	2.07	2.95	4.02
31	1.80	2.23	3.25	4.40
32	1.95	2.28	3.45	4.53
36	4.37	4.93	7.00	8.88
37	6.75	7.25	11.00	13.63
38	9.00	9.50	13.00	14.50
40	13.00	15.00	20.00	23.00

RUBBER COVERED TELEPHONE CABLES.



Braided Cable.

Braided and Leaded.

Braided only and braided and leaded cables shown have No. 19 Copper, rubber covered conductors, twisted in pairs. This cable furnished in the following sizes:

25-pair, 50-pair, and 100-pair.

RATTLESNAKE SWITCHBOARD CABLE.

For interior installation. Outside covering red and white. The following cable is carried in stock by us:

Size of Cable.	Outside Covering.	Size Wire.	Kind of Insulation.	Color of Insulation.	Feet per Pound.	Pounds per Foot.
50–Pairs.	Braided. Cotton. Beeswaxed.	No. 22	2 Cottons. Beeswaxed.	Code.	3.0000	.3333
42–Pairs.	Do.	No. 24	1 Cotton. 1 Silk.	Code.	6.5000	.154
21–Pairs. 21–Singles.	Do.	No. 24	1 Cotton. 1 Silk.	Code.	7.7669	.1287
21–Pairs.	Do.	No. 22	1 Cotton. 1 Silk.	Code.	7.2727	.1357
10–Pairs.	Do.	No. 22	2 Cottons. Beeswaxed.	Code.	12.0000	.0833

CORDS AND CORDAGE.

SWITCHBOARD CORDS.

We carry a complete line of all cords used in connection with switchboard work, but strongly recommend our linen braided spiral switchboard cord as the most efficient and durable cord of this type upon the market.

This is made of double or triple conductor, the conductors being composed of tinsel, insulated with a wind and braid of fine cotton. They are encased in spiralled brass wire and heavily braided with polished linen thread of any desired standard color; white, red or brown being more commonly used. The plug end of cord has a re-enforcing braid and the ends are properly tipped for connecting to plug and board. No. 11 Terminal being used on board end.

We carry in stock 6-foot and 7-foot cords, both double and triple conductor. Cords of lengths other than those specified are made to order. Cords made to order are same as those carried in stock, except that plug end has no re-enforcing braid.

RECEIVER CORDS.

For No. 3 Receiver.

24 inch, Worsted covered—Terminals No. 15 one end, and No. 7 other end.
36 inch, Worsted covered—Terminals No. 15 one end, and No. 7 other end.
30 inch, Silk covered—Terminals No. 12 both ends, (Desk phones only.)
36 inch, Silk covered—Terminals No. 12 both ends, (Desk phone only.)

For No. 6 Receiver.

36 inch, Worsted covered—Terminals No. 15 both ends.
30 inch, Silk covered—Terminals No. 15 both ends, (Desk phone only.)

For No. 21 Receiver.

6 foot, Worsted—Terminals No. 15—one end only, (Switchboard only,)
6 foot, Silk—Terminals No. 15—one end only, (Switchboard only.)
6 foot, Silk, 3 conductor—Terminals No. 15—one end only, (Switchboard only.)

The standard length for Telephone Receiver Cord is 36 inches,

Type "F" Desk Set Cords (local battery) 4½ feet long, 5 conductor, green silk covering, No. 15 clips, one end only.

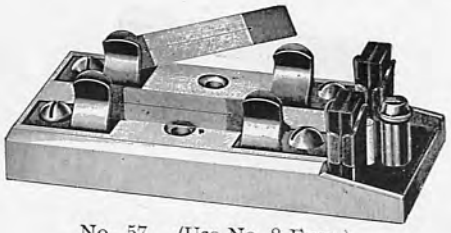
Type "F" Desk Set Cords (common battery) 7 feet long, 4 conductor, green silk covering, No. 15 clips one end, No 12 clips one end.

Type "N" Desk Set Cords, 8 feet long, 4 conductor, green silk covering, No. 15 clips both ends.

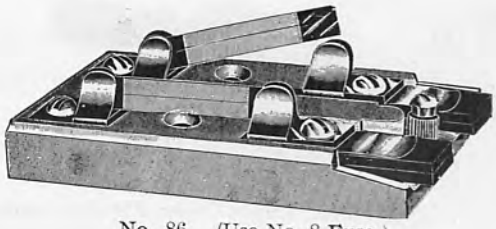
CORDAGE.

One, two, three, four or five conductor Cordage in any length, green silk covering.

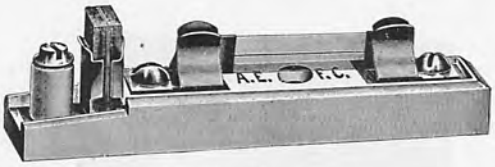
TELEPHONE FUSE BLOCKS AND FUSES.



No. 57. (Use No. 8 Fuse.)

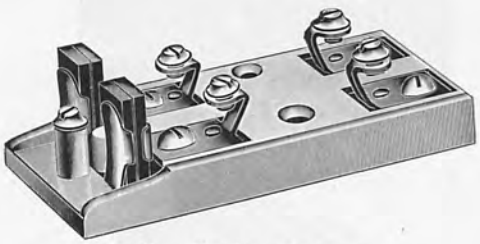


No. 86. (Use No. 8 Fuse.)

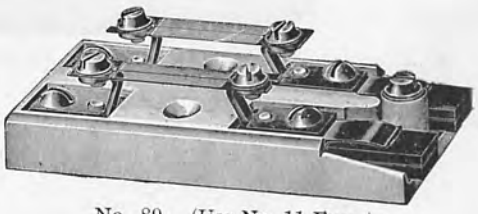


No. 42. (Use No. 8 Fuse.)

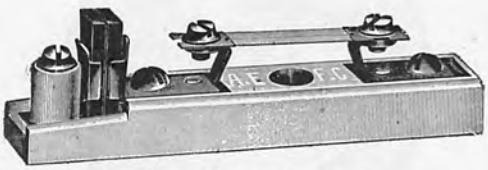
No. 18. (Use No. 19 Fuse.)



No. 59. (Use No. 11 Fuse.)



No. 89. (Use No. 11 Fuse.)



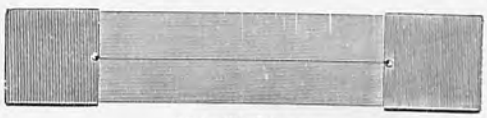
No. 47. (Use No. 11 Fuse.)

No. 20. (Use No. 11 Fuse.)

No. 8. Fuse.

No. 21 Fuse.

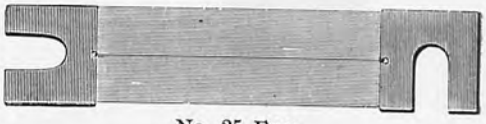
No. 11 Fuse.



No. 22 Fuse.

No. 19 Fuse.

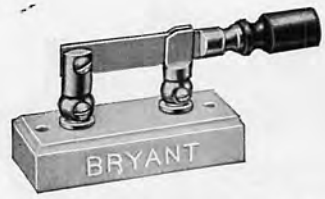
Actual Sizes.



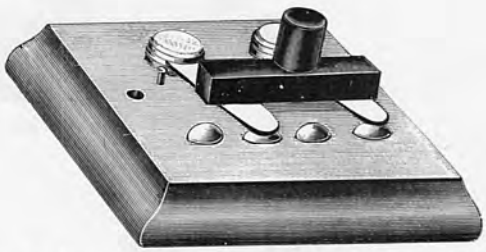
No. 25 Fuse,

SWITCHES.

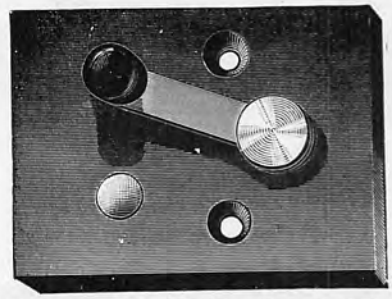
Double Pole, Single Throw, Porcelain Base,
Double Pole, Double Throw, Porcelain Base.



Single Pole, Single Throw, Porcelain Base.
Single Pole, Double Throw, Porcelain Base.

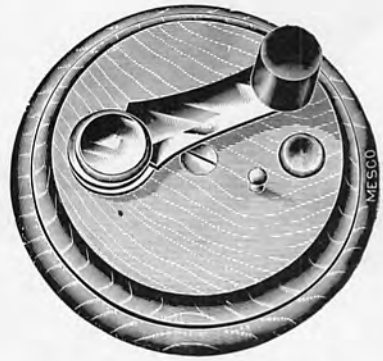


Four-Point or Pole Changing Switch, with Wood Base.



Two-Point Hard Rubber Base Switch.

Four-Point or Pole Changing Switch, with
Binding Post on Hard Rubber Base.



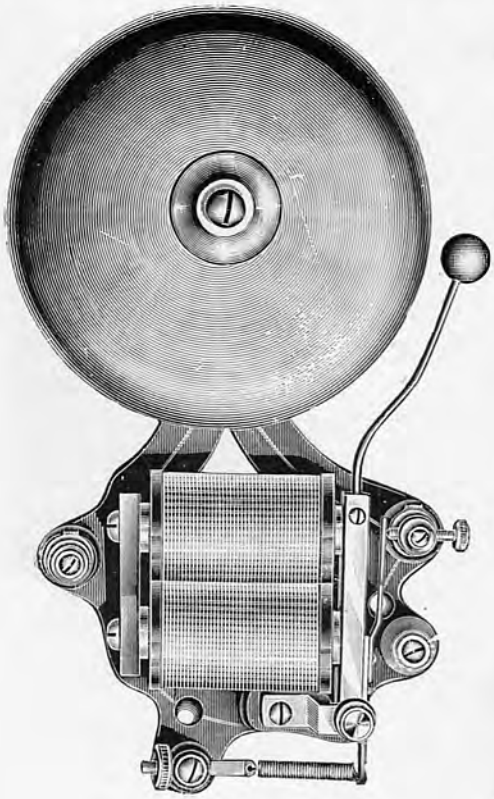
Round Wood Base Switch.
1, 2, 3, 4, 5 and 6-Points.

PUSH BUTTONS.

No. 1.
Fits ¾ in. Hole, Pearl Center.

No. 2.
Fits ⅝ in. Hole, Pearl Center.

No. 3.
Fits ½ in. Hole, Pearl Center.



Style "F" Bells.

IRON BOX BELL.

The illustration shows common iron box bell, such as is used for door bells. It may be used in connection with push button attachment for signaling telephones not equipped with generator and bells.

Always state size of gongs when ordering. 2½ inch gong, 3 inch gong, 4 inch gong.

The vital points are pure platinum and so constructed that they are always in ther proper position,

They are especially adapted for Hotels, Fire Alarms, Railroad Signals, Public Buildings, etc., as they have a powerful blow and clear ringing tone.

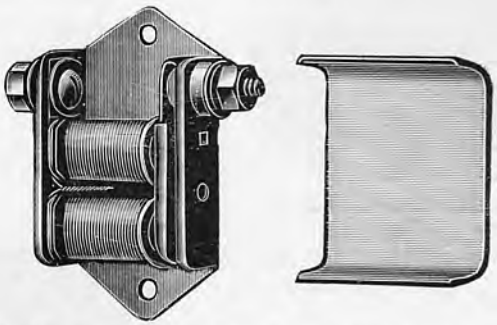
For reliability they are unsurpassed.

They have our improved non-turning binding and contacts posts.

3, 4, 5, 6, 7, 8, 9, 10 and 12 inch gongs.

In ordering always specify size of gong wanted.

ECO BUZZERS.



Needs no adjusting. Will operate equally well on one or ten cells of battery. There are no adjustment screws to be displaced.

Contact points are platinized. The ribbed edges over the cover spring tightly over the base, making this buzzer absolutely dust and bug proof.

No. 0, Approx. 1½ x 1¾ inch, ...	$0.66
No. 1, Approx. 2 x 1 inch, ...	.56
No. 2, Approx. 2½ x 1¼ inch, ...	.70
No. 3, Approx. 2¾ x 1⅜ inch, ...	.60
No. 4, Approx. 3¼ x 1⅝ inch, ...	.64

IMPROVED MONITOR BELL.

Fitted with 3 inch Gong only.

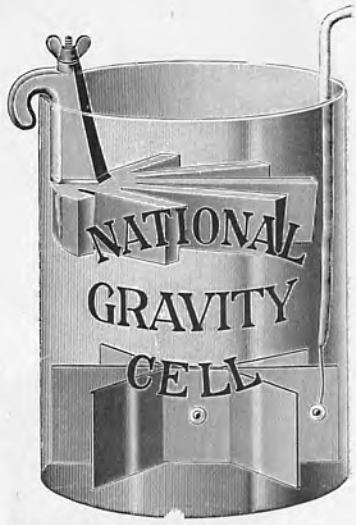
This bell has a very clear and penetrating tone. May be used in place of iron box bell.

BATTERIES.

National No. 7 Wet Cell Battery.

PARTS OF NO. 7 CELL.

Glass Jar.
Pencil Zinc.
Carbon.
Cover.
Porcelain Bushing.
Rubber Washer.
Thumb Screw.
Thumb Nut.

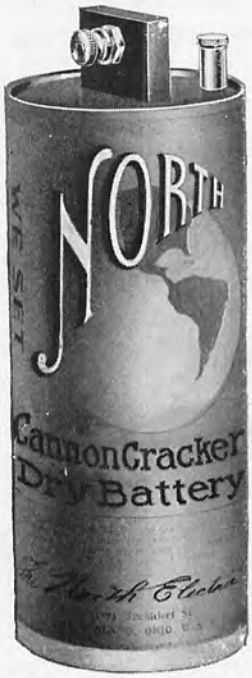


National Gravity Cell Battery.

PARTS—Jar.
Copper.
Zinc.
Thumb Nut.

National No. 2 Battery.

PARTS—Jar.
Circular Zinc.
Carbon Cup.
2 Rubber Washers.
Cover.
Porcelain Insulator.
Thumb Nut.



North Cannon Cracker Dry Batteries.

NORTH CC Dry Cells are manufactured from highest grade material.

BATTERY GAUGES.

Eldredge Battery Volt Meters, for testing the efficiency of either dry or liquid batteries.

LONG HANDLE SHOVELS.

	Code Word.
7 foot Steel, Long Strap	Acescent
8 " " " "	Acetate
Handles, 7 foot	Acetic
" 8 "	Acetify

LONG HANDLE SPOONS.

	Code Word.
7 foot Extra Heavy Steel	Acatous
8 " " " "	Acetum
Handles, 7 foot	Achieve
" 8 "	Achievement

CROW AND DIGGING BARS.

Solid Steel.

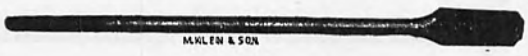
	Code Word.
Octagon, 1 inch x 7 feet	Acquiesce
" 1⅛ " x 8 "	Acquire

TAMPING AND DIGGING BARS.

Solid Steel.

	Code Word.
Octagon, 1 inch x 7 feet	Acquit
" 1⅛ " x 8 "	Acquittal

TAMPING BARS.



	Code Word.
8 foot Wood Handle, Iron Shoe	Acquittance

COMMON PAY-OUT REELS.

	Code Word.
Complete with Pins.....	Acting

COMBINATION PAY-OUT REELS

	Code Word.
Regular, for Electric Light work.....	Actinic
Light, for Telephone work.	Actinism
Straps for line Reel.....	Action

"Jenney" Pole Support.

POLE SUPPORTS.

			Code Word.
Jenney Pattern, 6	foot	.....	Adactyl
" " 7½	"	.....	Adage
Mule " 4½	"	.....	Adagio
" " 6	"	.....	Adalid
" " 7½	"	.....	Adam

"Mule" Pole Support.

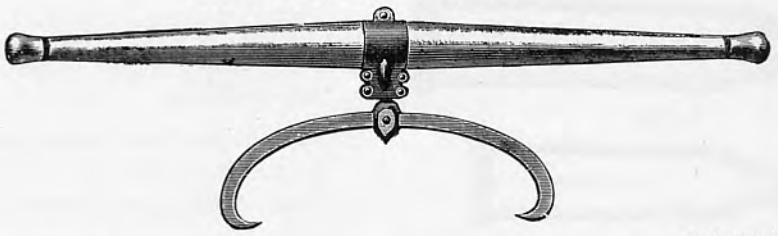
PLAIN PIKES.

	Code Word.
12 foot Ash or Spruce Handles.....	Acre
14 " " " " "	Acrid
16 " " " " "	Acrimony
18 " " " " "	Acritude
20 " " " " "	Acro

GUARDED PIKES.

	Code Word.
12 foot Ash or Spruce Handles.....	Acronych
14 " " " " "	Acropolis
16 " " " " "	Across
18 " " " " "	Acrostic
20 " " " " "	Act

CARRYING HOOKS.

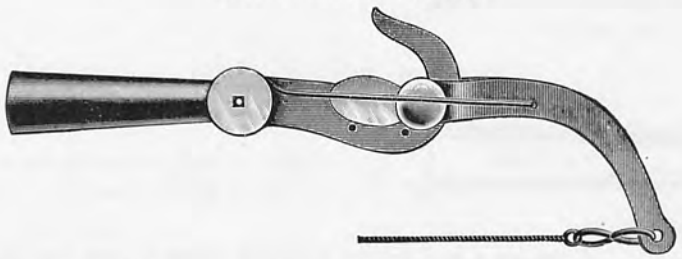


	Code Word.
5 foot, with swivel	Adamant
6 " " "	Adamantine
7 " " "	Adamic

CANT HOOKS.

	Code Word.
With handle, 6 foot	Adamites

TREE TRIMMER.



	Code Word.
Trimmers, only, 18 inch	Adapt
" " 21 "	Adapted
" and saw	Adapter
Handles, only, 16 foot	Adapting
" " 18 "	Adaunt

EASTERN CLIMBERS.

	Code Word.
382. Klein Eastern	Add
110. Dicke "	Addable
Straps, set of 4	Adder

WESTERN CLIMBERS.

	Code Word.
380. Klein Western	Addict
106. Dicke "	Adding
Straps, set of 4	Addition

SPLICING CLAMPS.

No. 307.

No. 308.

No. 301

No. 302

No. 302-A

No. 307. Klein, for McIntire Sleeves.. Adfected
Nos. 8, 10, 12 and 14 B. & S.

No. 105B. Dicke, for 10, 12 and 14
McIntire Joints ..... Adhere

No. 308. Klein, 7-inch Baby Clamp
for No. 12 and finer..... Adherence

No. 105C. Dicke pattern as above..... Adherent

No. 308A. Klein, 7-inch Baby Clamp
for 12 and 14 wire and 12 and 14
sleeves . ..... Adhibit

Code Word

301. Klein, for Nos. 4, 6, 8 and 9 wire,
Two oval and two round holes.....Addle

104. Dicke pattern as above..... Address

302. Klein, for Nos. 8, 10, 12 and 14 wire,
Four round holes.....Addresser

103. Dicke pattern as above. .....Addressing

302-A. Klein, for Nos. 6, 8, 10, 12 and 14
wire. Five round holes... .....Adduce

COMBINATION CLAMPS.

No. 309-A

309-A. 9 inch, 4 holes for 8 to 14 wire and
10, 12 and 14 sleeves,

MALLEABLE IRON PULLEY BLOCKS.

Galvanized, With Hook.

For ⅜ inch Rope.

		Code Word.
No. 2333.	2¼ inch shell, single, with hook	Advance
" 2333-A.	2¼ " " " " " and eye	Advanced
" 2334.	2¼ " " double, " "	Advantage
" 2334-A.	2¼ " " " " " and eye	Advene

For ½ inch Rope.

No. 2335.	3 inch shell, single, with hook	Adventist
" 2335-A.	3 " " " " " and eye	Adventure
" 2336.	3 " " double, " "	Adventurer
" 2336-A.	3 " " " " " and eye	Abverb

Galvanized, Without Hook.

For ⅜ inch Rope.

		Code Word.
No. 331.	2¼ inch shell, single, one eye	Adverse
" 331-A.	2¼ " " " two eyes	Advertise
" 331-B.	2¼ " " double, one eye	Advice
" 331-C.	2¼ " " " two eyes	Advisable

For ½ inch Rope.

No. 332.	3 inch shell, single, one eye	Advised
" 332-A.	3 " " " two eyes	Advocasy
" 332-B.	3 " " double, one eye	Advocate
" 332-C.	3 " " " two eyes	Advocation

320.

KLEIN STEEL TIE WRENCH.

		Code Word.
320.	For hard drawn copper	Adjoin

321-322-323.

KLEIN STEEL SPLICING WRENCH.

		Code Word.
321.	For 4 and 6 wire	Adjoining
322.	" 8 " 9 "	Adjourn
323.	" 10 " 12 "	Adjournal

325 and 214.

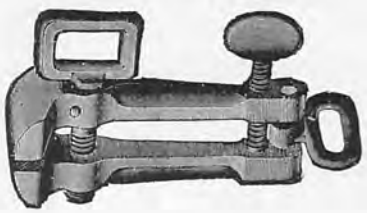
KLEIN LAG SCREW WRENCHES.

		Code Word.
325.	Taper jaw	Adjournment
326.	Combination lag and nut, ⅜ to ⅝ bolt	Adjudge

326 and 215.

DICKE LAG SCREW WRENCH.

		Code Word.
214.	Taper jaw	Adjudging
215.	Combination lag and nut, ⅜ to ⅝ bolt	Adjudicate



LINEMEN'S VISES.

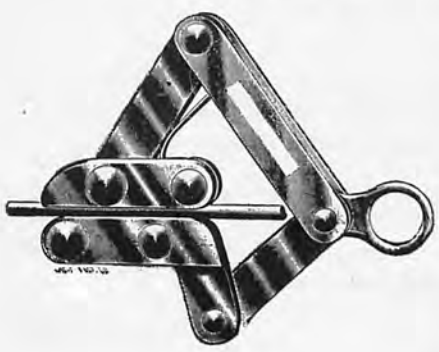
	Code Word.
5½ inch, with loop	Adjunct.
6 " " "	Adjunction
Vise Straps	Adjunctive

HOWE IMPROVED WIRE TOOL.

	Code Word.
With Strap, without vise	Adjure
" " with 5½ in. vise.	Adjured

HAVEN CLAMPS.

		Code Word.
368.	No. 8 and finer	Adjuring
369.	" 6 to ½ inch cable	Adjust

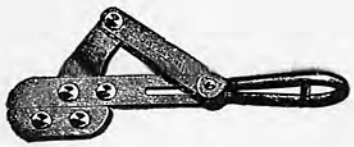


AMERICAN GRIP.

The "American Grip" Wire Clamp is made of steel. It is light and compact and takes up but little space between the blocks and wire, thus allowing the greatest amount of slack within lineman's reach to be brought up. It is operated with one hand, is easily placed on the wire, and is self-locking by spring pressure and readily released.

This grip is equally efficient on iron or copper wire. The jaws are parallel and perfectly smooth, and will positively not injure the wire. The draft being close on the center, it will pull straight and not kink the wire. Clamp is nickel plated and polished.

		Code Word.
359.	6 and finer	Adjustant
359A.	0 " "	Adjusted



BUFFALO GRIPS.

The Buffalo Grip is one of the most popular tools of its class ever placed on the market. It will instantaneously grip the wire, and will not drop off. It will not slip under the severest tension, and will not injure the softest wire.

		Code Word.
No. 1.	For No. 6 wire and finer	Adjustive
" 3.	Trolley size	Adjutage

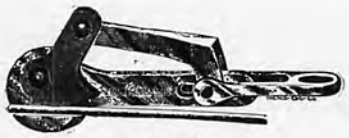
PARALLEL SCREW CLAMP.

Length of grip 11 inches, made for No. 0 and No. 00 wire. Particularly adapted for stretching trolley wire.

Code Word—Adjutrix.

COMMON ECCENTRIC CLAMP.

		Code Word.
No. 360.	Brass, No. 8 and finer	Adjuvant
" 361.	Steel, " 8 " "	Admeasure



Klein A.

KLEIN CLAMP.

Style A.

		Code Word.
No. 366.	For No. 8 and finer wire	Administer
" 367.	" ½ inch and finer	Admirable

Klein B.

Style B.

For Hard Drawn Copper Wire.

		Code Word.
No. 370.	For No. 6 and finer wire	Admiral

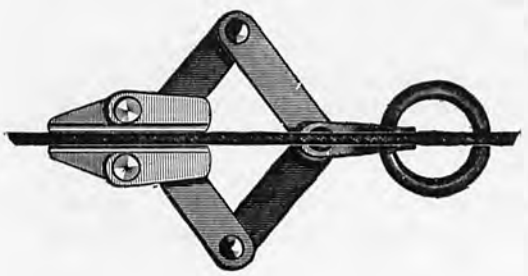
Style C.

For Bare Copper Wire.

		Code Word.
No. 371.	For No. 4 and finer wire	Admirality
" 372.	" " 4 to 000 "	Admiration

Klein C.

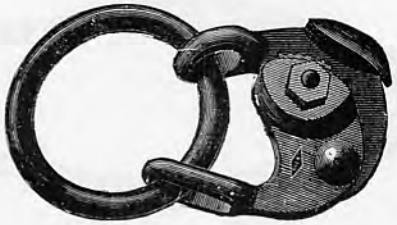
In style B and C Clamp the wire is held between two flat brass jaws which open and close automatically. Will hold the wire without nicking or kinking.

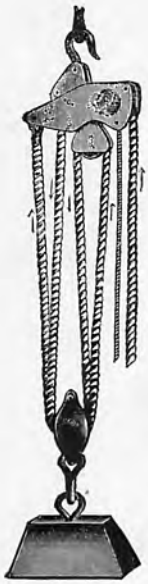


PARALLEL WIRE SQUEEZERS.

Particularly adapted for insulated wire. Very long jaws and without teeth. Made of steel.

		Code Word.
No. 237.	Dicke	Admirer





COME ALONGS.

			Code Word.
No. 126.	Dicke, No. 9 and finer		Admissive
" 127.	" " 3	" "	Admit
" 128.	" " 000	" "	Admittance

BURR SAFETY LIFTS.

			Code Word.
No. 2.	¼ in. rope, capacity	600 lbs.	Admix
" 3.	⅜ " " "	800 "	Admixtion
" 4½.	½ " " "	3000 "	Admixture

WOOD PULLEY BLOCKS.

With Eccentrics Attached.

			Code Word.
No. 337.	4 in. for ½ in. rope		Admonition
" 338.	5 " " ¾ "	"	Admonitory

METAL BLOCKS.

With Eccentrics Attached,

			Code Word.
No. 349.	Brass 2¼ inch		Admonish
" 350.	Galvanized 2¼ inch		Adnascent

HOLLOW STEEL BLOCKS.

Ford's Patent.

			Code Word.
3 inch	single, for ⅜ rope		Adnate
3 "	double, " ⅜ "		Adolescence
4 "	single, " ½ "		Adolphus
4 "	double, " ½ "		Adonic

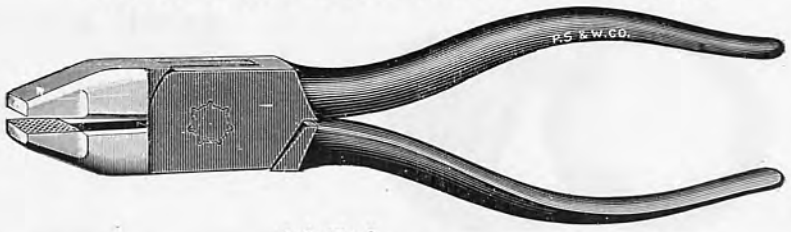
COMMON WOOD BLOCKS.

Iron Strapped.

Size.	Diam. Rope.	Single.	Double.	Triple.	Code Word.
3 inch	⅝	.70	1.30	1.75	Adonis
4 "	½	.85	1.60	2.15	Adopt
5 "	⅝	.90	1.75	2.25	Adoptable
6 "	¾	1.10	2.00	2.90	Adoption
7 "	⅞	1.30	2.40	3.50	Adoptive
8 "	1	1.65	2.85	4.25	Adorable

When ordering specify whether single, double or triple is wanted.

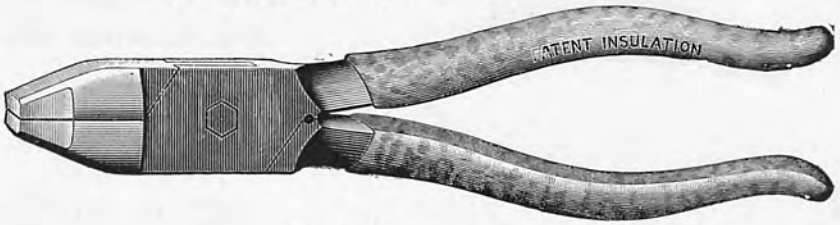
ALL STEEL SIDE CUTTING PLIERS.



	Code Word.		Code Word.
4 inch Swedish	Advowson	6 inch P. S. & W. Nickel	Afar
4 " " Nickel	Aerate	7 " "	Afaul
5 " P. S. & W.	Aerial	7 " " Nickel	Afear
5 " " Nickel	Aerie	8 " "	Afeared
5 " P. S. & W.	Aeronaut	8 " " Nickel	Affected

INSULATED HANDLE SIDE CUTTERS.

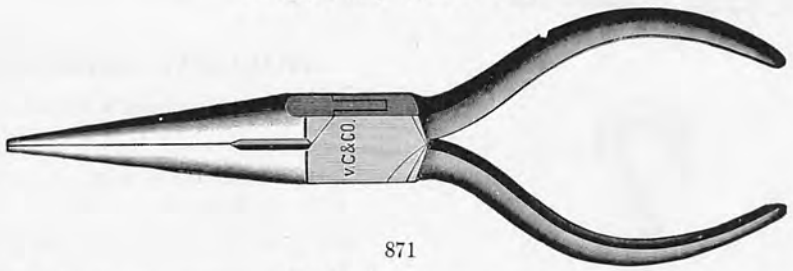
Tested to Insulate Against 2500 Volts.



	Code Word.		Code Word.
No. 300. 6 inch P. S. & W.	Afflatus	No. 300. 8 inch P. S. & W.	Affliction
" 300. 7 " "	Afflict		

SIDE CUTTING PLIERS.

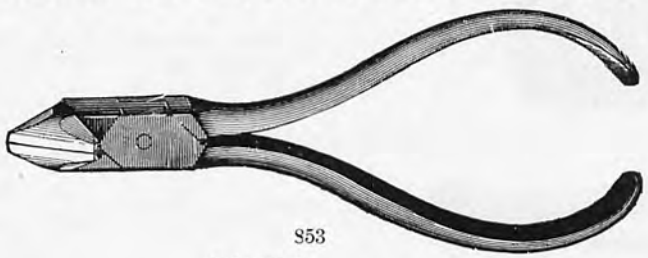
Long Nose, Oval Point.



871

	Code Word.		Code Word.
No. 871. 5½ inch, black, side cutting	Afflictive	No. 1813 5½ inch nickel without cutters	Affluent
" 1813-S 5½ " " without cutters	Affluence		

DIAGONAL CLOSE CUTTING NIPPERS.



853

	Code Word.		Code Word.
No. 853. 4 inch plain	Afflue	No. 853. 5 inch nickel	Afford
" 853. 4 " nickel	Afflux	" 853. 6 " plain	Affore
" 853. 5 " plain	Affluxing	" 853. 6 " nickel	Afforest

YANKEE RATCHET SCREW DRIVERS.

No. 11.

The friction in ratchet mechanism is so slight as to be hardly felt; the backward movement is as easy as in a good "Stem-winder" and just as noiseless. The construction of ratchet and pawls is such that neither can bend nor break, wear or get out of order, and permits a very compact arrangement. The adjustment for right or left hand is exceedingly simple. If the slide is placed midway between ends of slot, the blade is held rigidly and the driver can be used as an ordinary screw driver with fixed blade.

	Code Word.		Code Word.
No. 11. 2 inch	Agaze	No. 11. 5 inch	Agency.
" 11. 3 "	Age	" 11. 6 "	Agent.
" 11. 4 "	Aged	" 11. 8 "	Ageratum

CHAMPION SCREW DRIVER.

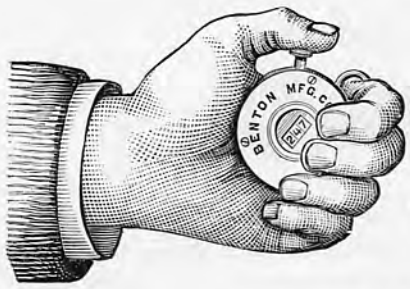
	Code Word.
2½ inch Champion	Afoot
3 " "	Afore
4 " "	Afraid
6 " "	Afresh
8 " "	African

CABINET SCREW DRIVER.

	Code Word
2½ inch Cabinet	Africander
3½ " "	After
4½ " "	Afterward
5½ " "	Agamic
6½ " "	Again

SYRACUSE KNURLED SCREW DRIVER.

	Code Word.
Polished Steel	Agave



POLE COUNTER.

For counting poles, broken insulations, making tallies of materials, etc. Two inches in diameter, and weighs about four ounces. Carried in the hand, each pressure records one, which is shown in the dial.

Code Word—Agglutinate.

LINEMEN'S TOOL BELT.

With loops for tools.

No. 383.

		Code Word.
No. 383.	Plain belt.....	Aggrandize
" 383A.	Belt with rings for safety strap.....	Aggrandizement

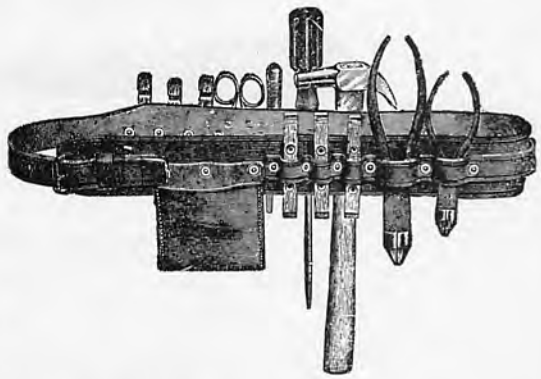
Above belt is 2¼ inches wide. State if wanted for 38, 40 or 44 inch waist.

No. 383A.

With Pouch.

		Code Word.
No. 152.	Belt with pouch..	Aggravate

State if wanted for 38, 40 or 44 inch waist.



No. 384.

No. 386.

LINEMEN'S BODY BELT.

For Strapping to Pole.

		Code Word.
No. 386.	Body belt.....	Aggregation

BELT AND SAFETY STRAP.

This belt is No. 383A. The safety strap is 1½ inch wide, 6 feet long, and provided with strong snap at each end. Strap may be shortened or lengthened by adjusting buckle. State if tool belt is wanted for 38, 40 or 44 inch waist.

		Code Word.
No. 384.	Belt and safety strap	Aggravation
" 385.	Safety strap only.	Aggregate

COMBINED SAFETY AND JACK STRAP.

		Gode Word.
No. 384B.	Combined safety and jack strap.....	Aggregative

BELL HANGERS' DRILLS.

Code Word—Alive

No.	12 Inch Per Dozen	18 Inch Per Dozen	No.	24 Inch Per Dozen	30 Inch Per Dozen	No.	36 Inch Per Dozen
6	$ 5.00	$ 7.00	6	$ 9.00	$11.00	6	$13.00
8	5.00	7.00	8	9.00	11.00	8	13.00
10	5.50	7.50	10	9.50	12.00	10	13.00
12	6.00	8.00	12	10.00	12.00	12	13.00
14	7.00	9.00	14	11.00	13.00	14	14.00
16	8.00	10.00	16	12.00	14.00	16	15.00
18	9.00	11.00	18	13.00	15.00	18	16.00
20	10.00	12.00	20	14.00	15.00	20	16.00
22	11.00	13.00	22	15.00	16.00	22	17.00
24	12.00	14.00	24	16.00	17.00	24	18.00
26	13.00	15.00	26	17.00	18.00	26	18.00
28	14.00	16.00	28	18.00	19.00	28	19.00
30	15.00	17.00	30	19.00	20.00	30	20.00
32	16.00	18.00	32	20.00	20.00	32	20.00
34	17.00	19.00	34	20.00	20.00	34	20.00
36	18.00	20.00	36	21.00	21.00	36	21.00

The numbers indicate the sizes in thirty-seconds of an inch. Use the numbers and lengths in ordering these drills.

HOLLOW BRICK DRILL.

This drill is hollow and will hold the dust and dirt. On that account is preferred for interior work, where it is desired to drop as little dirt as possible.

		Code Word.
No. 351.	Hollow, 26 inches long, 5/8 hole	Altered
" 352.	" 26 " " 7/8 "	Altercade

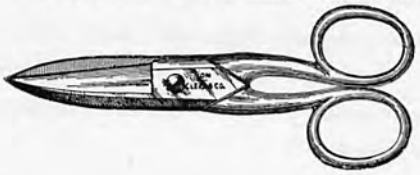
SOLID STEEL BRICK DRILL.

		Code Word.
No. 353.	Solid Steel, 26 inches long, 5/8 hole	Alternate
" 354.	" " 26 " " 7/8 "	Alternately
" 355.	" " 10 " " 1 "	Although

JUMPER BRICK DRILL.

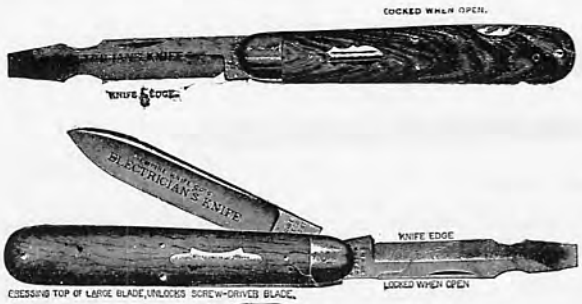
This is the best brick drill yet devised for drilling a hole through masonry of any kind. Made of the best steel. Length of drill, 26 inches.

		Code Word.
No. 164.	Drill and handle complete	Altitude



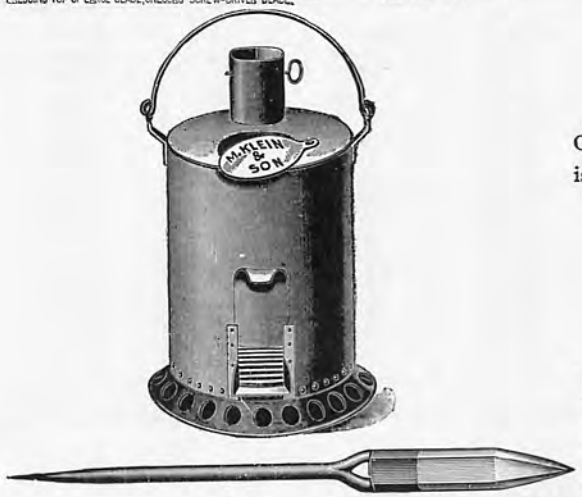
ELECTRICIANS SCISSORS.

	Code word.
5¼ inches long	Ahead



EMPIRE KNIFE.

	Code Word.
With combination blade	Ail
" " " and 1 knife blade	Ailantus



Soldering Copper.

CHARCOAL SOLDERING FURNACE.

For melting solder and heating soldering irons. Opening in top admits 6 inch melting pot. Furnace is provided with grate.

Code Word—Ambushed.

SOLDERING COPPERS.

Pointed.

				Code Word.
2½	pounds	to	the pair	Amen
3	"	"	"	Amenable
4	"	"	"	Amend
5	"	"	"	Amends
6	"	"	"	Amenity
7	"	"	"	Amerce
8	"	"	"	American

MELTING POT.

	Code Word.
5 inch	Amount
6 "	Amounting
8 "	Ample

MELTING LADLES.

	Code Word.
2½ inch	Amplify
3 "	Amply
4 "	Amputate
5 "	Amule

No. 2 TORCH.

In the No. 2 we are offering you a quart size torch fitted with a round burner that has great generating power which makes it economical to use, soon saving its cost in the saving of gasoline. It is light, well balanced, easily handled, and is sure to please. A careful inspection will convince you that only the best of workmanship and materials have been used. It is supplied in polished brass or nickel plated, as desired.

No. 6 TORCH.

In the No. 6 we offer the trade a first-class torch that will enable the user to do any work that can be accomplished with a round-burner torch, and in addition it will quickly heat soldering coppers—an advantage that will be appreciated by the users of torches who use soldering coppers.

The tank, like the No. 2, is quart size, made in one piece out of heavy brass, and is fitted with brass air pump and our improved burner, which will save you its cost in a short time in the saving of gasoline.

No. 20 COIL FIRE POT.

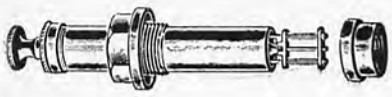
The generator used on No. 20 is large and powerful, producing a large volume of gas which gives a pure blue flame that is intensely hot, and consumes less gasoline than other makes.

The tanks are made of heavy galvanized iron, fitted with a galvanized cast iron bottom ring which protects the bottom from wear or bruises. The top is made of galvanized cast iron, and all small or light castings are malleable iron, which makes them light and strong. The coil is made of extra heavy pipe, and the burner of steel which we have prepared especially for this work. The valves are fitted with needle points, which are much better than ground keys such as other makers use, as they give the user better control of the fire and are always tight.

Fitted with latest improved brass air pump.

THE No. 12 TORCH.

Burns either gasoline or alcohol. It is made on new principles by which the air blast is passed through a chamber charged with gasoline or alcohol gas, which makes a much stronger fire than can be had in any other way. When blow tube is not used the torch makes a fine candle, which the user will find valuable when working in dark places. A hook is provided so that it may be hung up. The No. 12 is well made, all parts being brass, nickel plated, and finely finished all over, size being ⅞ in. diameter and 6 in. high—just fits the vest pocket. As this torch does first-class work using gasoline for fuel, which is much cheaper than alcohol, it will save its cost in a short time in cost of fuel alone. We warrant it to please you.



AIR PUMP.

The pump illustrated can be used on No. 2 and No. 6 torch, also on No. 20 coil fire pot.

Usually torches and fire pots become worthless when air pump is worn out. The interchangeable pump is a great saving.

INDEX.

BULLETIN No. 23.

THE NORTH ELECTRIC CO.

CLEVELAND, OHIO.

Bulletin No. 24 July, 1905

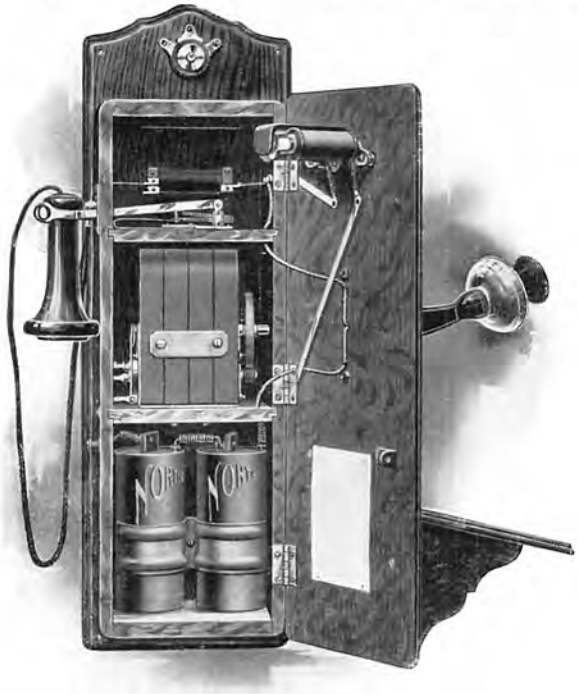
Type "K" Magneto Telephones

The purpose of this bulletin is to call attention to NORTH'S Type "K," a compact form of magneto telephone, which has met with universal favor.

All working parts are NORTH'S standard and interchangeable, of guaranteed efficiency and durability. Furnished in either oak or walnut cabinets. Quarter sawed oak is the standard and furnished unless otherwise specified.

All cabinets are thoroughly seasoned, filled and hand polished.

In the selection of telephone apparatus, the quality is far more important than first cost. This is particularly true in telephones used on rural lines, as they are generally



TYPE "K" OPEN

TYPE "K" CLOSED

widely scattered, and to reach them in most cases involves loss of time and frequently livery hire. Then again, it is seldom that the small or isolated rural system employs an inspector capable of making repairs which are required, particularly in the case of a cheap telephone. The additional cost of repairing a cheap telephone will, within a short time, more than counterbalance the higher first cost of a superior one. In addition to this the service derived from a high grade telephone, requiring little if any attention from an inspector, is much more satisfactory than it is possible to obtain by use of an inferior telephone, which is often disabled until it receives the attention of some one who is capable of again placing it in working order.

A matter of great importance in the selection of telephones for rural lines is their adaptability for both local and long-distance service. A few years ago when the first rural telephone lines were built, the fact was not considered that they would ultimately become tributaries or branches of systems covering counties and even states, and as a result the lines were very often buil of low grade material, and telephones used were generally worthless for service beyond a few miles.

The rapid development and extension of lines within the last few years has made it possible for subscribers on rural lines having exchange connections to talk to large cities or other points, in some cases several hundred miles distant.

In designing NORTH'S telephones for either exchange or rural service, the first thought has been to produce an efficient and durable telephone, wherein the item of repairs or attention after its installation has been reduced to the minimum. It is very seldom that these telephones require other attention than the replacing of exhausted batteries after one or two years. This does not require the services of an experienced person, as it is a very simple operation which can, and should be, done by the user of the telephone.

The greatest mechanical and electrical skill are combined in designing and constructing NORTH'S telephones. As a result, they are recognized, by all the leading independent exchanges, as unexcelled in quality of service and durability.

Standard type "K" magneto telephones, designated below, are carried in stock:

Code Numbers

FOR EXCHANGE SERVICE.

No. 2—Series telephone; 80 Ohm ringer; 3 bar generator.

For exchange service, can be used in connection with series clearing-out drops or on series party lines where not to exceed ten telephones are on one line. Not designed or recommended for rural lines.

No. 12—Bridging telephone; 500 Ohm ringer; 3 bar generator.

For exchange service, can be used with series or bridged clearing-out drops where not to exceed two telephones are on one line.

No. 22—Bridging telephone; 1000 Ohm ringer; 3 bar generator.

For exchange service with bridged clearing-out drops or bridged party lines where not to exceed six telephones are on one line.

FOR BRIDGING OR RURAL LINES.

No. 32—Bridging telephone; 1000 Ohm ringer; 4 bar generator.

For use on bridged party lines where not to exceed fifteen telephones are on one line.

No. 42—Bridging telephone; 1600 Ohm ringer; 4 bar generator.

For use on bridged party lines where not to exceed twenty telephones are on one line.

No. 52—Bridging telephone; 1000 Ohm ringer; 5 bar generator.

For use on bridged party lines where not to exceed thirty telephones are on one line.

No. 62—Bridging telephone; 1600 Ohm ringer; 5 bar generator.

For use on bridged party lines where not to exceed forty telephones are on one line.

No. 72—Bridging telephone; 2000 Ohm ringer; 5 bar generator.

For use on bridged party lines where not to exceed forty-five telephones are on one line.

No. 82—Bridging telephone; 2500 Ohm ringer; 5 bar bridging generator.

For use on bridged party lines where not to exceed fifty telephones are on one line.

No. 92—Bridging telephone; 3500 Ohm ringer; 5 bar generator.

For use on bridged party lines where not more than fifty telephones are on one line, or where the character of line is such as to require the use of a most powerful telephone obtainable, or where a large margin over the actual requirements is particularly desirable.

It will, of course, be understood that the length of line has some influence upon the number of telephones that can be used on it.

Classification of Code Numbers outlined above apply to average conditions, and if the line upon which telephones are to be used is an extremely long one, or if the conditions are exceptional, these facts should be taken into consideration in making a selection of telephones.

It is absolutely essential that the ringers of all telephones used on any one line should be wound to the same resistance.

Instructions for Installing

For line wire, the use of No. 12 or 14 B.B. galvanized iron is recommended. Although cheaper grades of wire are sometimes offered, it is not economical to use them for they are of lower conductivity than the wire above specified and are much more liable to breakage under extreme changes of temperature, resulting in an increased cost of maintenance. For any portion of the line coming in contact with trees or foliage it is well to use Weatherproof iron or tree wire.

Line wire should ordinarily be used for drops reaching from main lines to buildings. If an insulated or covered wire is required, either tree wire or rubber covered copper wire may be used.

The best interior wire is rubber covered copper, about No. 19 B. & S. Gauge. For

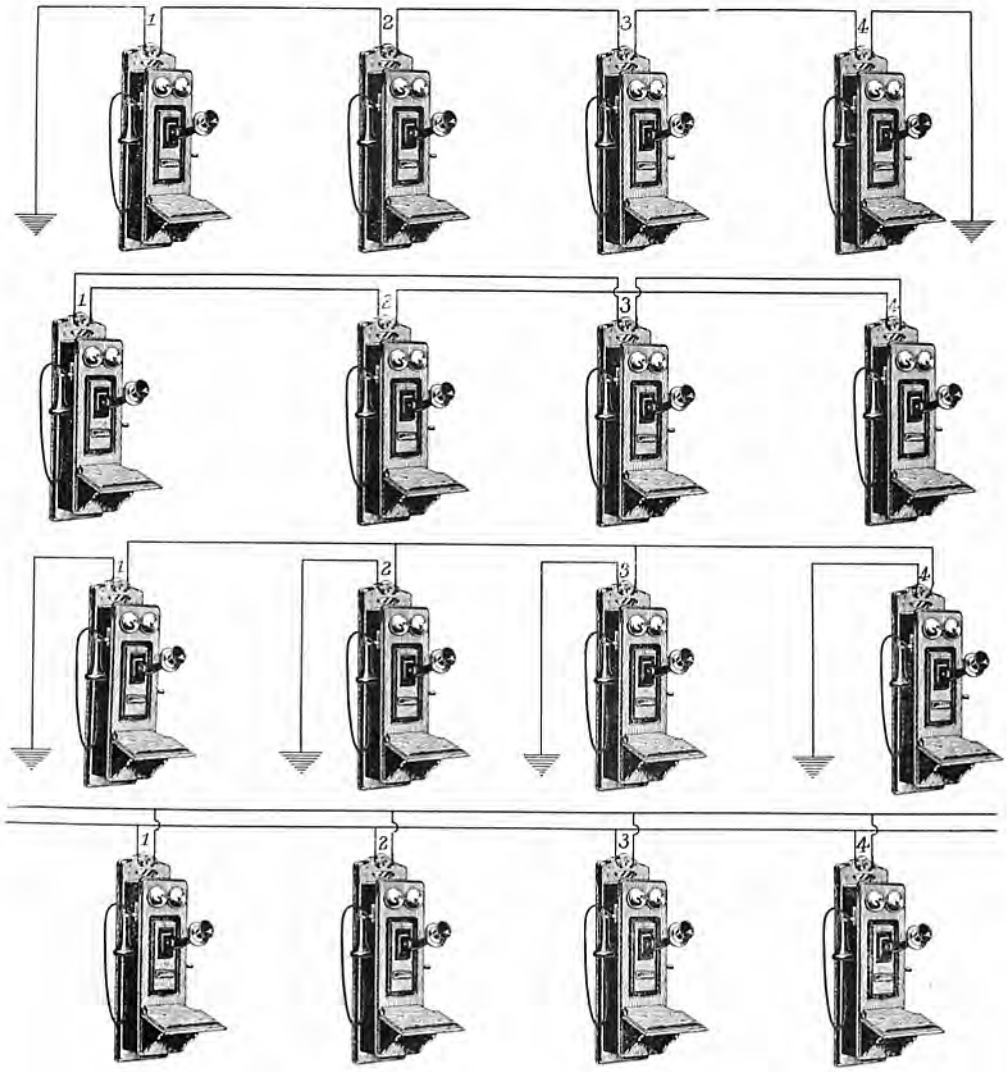
metallic circuits the two interior wires should be braided and twisted. Cotton covered annunciator wire is sometimes used for this purpose.

On grounded or single-wire systems where the use of ground rods are necessary, the rods should reach to a sufficient depth to come in contact at all times with moist earth.

The standard ground rod is one-half inch in diameter and six feet in length.

All of our telephones are equipped with carbon lightning arresters, but an additional arrester and fuse or a switch is sometimes placed in the line near the telephone.

The following circuit diagrams illustrate, in order shown, the manner of connecting telephones; first, to series grounded lines; second, to series metallic lines; third, to bridging grounded lines; fourth, to bridging metallic lines.



THE NORTH ELECTRIC CO.

CLEVELAND, OHIO

Bulletin No. 25 December, 1904

The North Permanently Adjusted Receiver

Patented December 4, 1900, March 26, 1901.

The thoughtful buyer of telephone equipment properly expects and should demand to know the reason why individual parts of such equipment as may be offered for his consideration by one manufacturer, should be preferred and accepted before similar parts made and offered by another. To this end the North Permanently Adjusted Receiver is herein described and illustrated in detail.

To center the reader's interest in various features of excellence incorporated in this Receiver they are here enumerated and forth-with treated in order:

1st. Positive and permanent adjustment.
2nd. Simplicity of construction.
3rd. Standard binding-posts and cord-tips.
4th. Freedom from the accumulation of foreign matter upon the pole pieces.
5th. Reliability of Permanent Magnet.
6th. Continuity of magnet structure.
7th. No exposed metal parts.
8th. Ease of inspection and repair.
9th. Interchangeability of parts.
10th. Superior quality of material and workmanship.
11th. Excellence of design and beauty of outline.
12th. Great mechanical strength and consequent durability.

Positive and Permanent Adjustment

The term "Adjustment," as applied to a receiver, refers to the distance between the diaphragm and the

projecting magnetic poles, and to the means employed to maintain this distance. The proper adjustment for a receiver varies with the work it has to perform and the condition under which it is to be used, but ordinarily is about eighteen one-thousandths of an inch. A variation of one one-thousandth of an inch, more or less, from the proper adjustment results in indistinct articulation or loss in volume of reproduced sound.

The difference in expansion or contraction between hard rubber and its imitations, and any of the common metals, is so great that a variation of but a few degrees in temperature is sufficient to, and *does cause serious trouble* in receivers. But as a cardinal feature in the North receiver, the construction and arrangement of posts is such as to render the adjustment absolutely *independent of the shell.* This is accomplished by providing a solid metal cup upon which all parts are mounted, including the diaphragm, hence the working parts and mounting both being of metal and having practically the same co-efficient of expansion, no amount of temperature variation can have the slightest ill effect.

Simplicity of Construction

A glance at the illustrations will render comment under this head unnecessary. There are no superfluous parts, each part having its duty to perform and being designed for the proper performance of that duty.

Standard Binding-Posts and Cord-Tips

The use of a standard binding-post for each of the terminal connections permits the use of any make of receiver cords having standard tips. Thus, the manufacturer of the receiver has no monopoly on the supply of cords. Also, the user is exempt from petty annoyances such as "short circuits" and "cut outs," usually caused by the frayed ends of the conducting material of the cords coming in contact with either the magnet or its support.

This annoyance obtains in receivers in which the terminal connection consists simply of a screw and washer. The pressure of the washer upon the yielding cord conductors will invariably force out small strands of the cord conductors, not only in a manner most annoying to the one making needed cord repairs, but the difficulty is liable to occur at any time thereafter during the life of the cord. Special cord tips but partly overcome the difficulty, and are liable to be crowded to one side or the other and thus cause a source of trouble of their own. The standard binding-post *overcomes all these troubles*, and a new cord can be put in place in a fraction of the time required by any other method.

Freedom From Accumulation of Foreign Matter on the Pole Pieces

Foreign matter of whatever character that finds its way inside of a receiver shell will eventually find lodgement between the pole pieces of the magnet and the diaphragm, aligning itself in the direction of the magnetic flux, thus impeding the action of the diaphragm, and until removed, destroying the usefulness of the receiver. Every receiver manufacturer knows the absolute impossibility of manufacturing and assembling receivers without a vast number of infinitesimal metallic particles becoming attracted by and attached to the interior portions of the receiver, due to the magnetic attraction of its own permanent magnet. Receivers are commonly assembled on clean benches in rooms free from all forms of dust, and are carefully blown out, etc., but no amount of care nor blowing will eradicate the trouble. It is caused by the fact that under the common methods of construction, the pole pieces, spacing block, permanent magnet and whatever form of mounting is used, are all held together by a single machine screw, thus the magnetic attraction of its own permanent magnet is continually present throughout the entire process of assembling. The troublesome particles are almost too small to be seen and cannot be guarded against. About the last operation in the manufacture of a receiver is to grind the pole pieces to a depth corresponding to the adjustment below the diaphragm seat. No amount of previous care is of any avail, for at once the process of grinding sets free millions of particles, which attach to every conceivable part of the mechanism and no amount of blowing will entirely remove them from the magnets and the numerous recesses necessarily present.

In the North receiver a separate screw is used to hold the permanent magnet, and as the magnet is the last part to be attached to the balance of the receiver, *no difficulty is experienced* from the causes named, as the remaining parts are free from magnetic attraction.

Should foreign matter of any kind ever find its way into the interior of the shell of North receivers during use, it is necessary to take out only one screw and remove the permanent magnet, and in most cases the foreign matter will then fall out of itself, for with the magnet removed, the other parts have no attraction for it.

The bottom of the metal diaphragm bearing cup is tightly closed, so that foreign matter which might find its way inside the shell can never affect the efficiency of the receiver by lodging between the poles of the magnets and the diaphragm.

Reliability of Permanent Magnet

The steel used in North receivers is not imported. It is made in the United States and is guaranteed to be *better steel for the purpose* for which it is used than any imported steel obtainable.

There is not a manufacturer of receivers in the country today using imported steel. In our earliest experiments of more than 20 years ago, in the manufacture of permanent magnets, we were compelled to use imported steel for there was at that time no magnet steel made in this country. But today the best steels are found here. All of the magnet steel used in North receivers is made in accordance with a prescribed analysis, and each car of steel is *carefully analyzed* as it reaches the factory to insure its compliance with that analysis. The steel is handled by men skilled in the work and the results are as near absolute uniformity as it is possible to obtain.

It is not claimed that the magnets of these receivers will lift a ridiculously heavy weight of a given number of pounds. There is more danger in making the magnet too strong than there is in making it too weak. The diaphragm of a receiver must accurately reproduce the rapid vibrations of the human voice. To accomplish this it must necessarily be light and flexible. To place permanently in close proximity to the center of such diaphragm the poles of an excessively strong magnet means that the *diaphragm will gradually yield* to the strain and be dished toward the magnet. This not only interferes with the free vibration of the diaphragm but alters the adjustment of the receiver. A powerful magnet is not only not required, it *is a positive detriment* to a good receiver. The point of highest efficiency is a degree of magnetism in the permanent magnet sufficient to render sensitive the soft iron pole pieces upon which the wire is wound. That degree of magnetism will be found in the North receiver and will be retained during its life under ordinary service conditions.

Continuity of Magnet Structure

Particular attention is called to the continuity of the magnet structure. By reference to the illustrations it will be noted that the permanent magnet is made from one piece of steel, the cross section of which is of such form as to admit of its being bent without checks or cracks. This steel, after being bent, is carefully inspected, and if entirely free from imperfections, is then hardened and magnetized, after which it is again inspected and tested. In this way magnets of uniform cross section and strength are produced. To make a magnet of two or more straight pieces of steel clasped together at their neutral or bow end, with a small separating iron block between, is equivalent to using a magnet broken into three pieces with one of the pieces, corresponding to the separating block, demagnetized. The best results cannot be expected under such circumstances.

No Exposed Metal Parts

We were the first to place upon the market a receiver having no exposed metal parts, and realizing the importance of this method of construction, letters patent covering this principle, also the principle of mounting all parts of the receiver upon the diaphragm supporting cup, were applied for and granted to Mr. North in 1900.

The use of receivers having exposed metal parts constitutes a needless source of danger to the user and has been the cause of a number of accidental deaths, due to the user of the telephone having come in contact with the metallic portion of the receiver at a time when the telephone line was in contact with or crossed with a high-tension electric-light line. In several cases operating telephone companies using such receivers have been obliged to pay heavy damages on this account, and the trial courts have invariably held their use to be inexcusable negligence.

Ease of Inspection and Repair

The internal cup which supports all the various parts is provided with an outwardly projecting flange and this flange is securely clamped between the insulating shell and the ear piece or cap. The simple act of unscrewing the cap instantly releases the interior parts *as a unit,* when they can be examined and further dissected at will, ample provision having been made for this purpose. After examination the parts can be readily reassembled, no other tool than a common screwdriver being required.

Interchangeability of Parts

All parts are made in accordance with standards which are prescribed at the factory, and every part is an absolutely exact duplicate of every other like part. Duplication of parts requires an initial outlay for tools and appliances seldom appreciated by those lacking in manufacturing experience, but every user appreciates the extreme importance and the advantage of being able to secure an exact duplicate of a damaged part at once, and at a reasonable cost.

Superior Quality of Materials and Workmanship

An examination of the receiver itself will verify this claim, as it is clearly impossible to produce the result attained except by the use of the best material handled in the most skillful manner. As an instance we may say that while the lower cost of composition shells and caps, or shells and caps made from a substitute for hard rubber, has led to their being very generally used, we have here, as in the remainder of the receiver, consistently declined to admit the use of anything of an inferior quality, and for this reason all North receiver shells are of the best and purest grade of hard rubber which is entirely free from metallic substances and other impurities found in composition. The higher cost of hard rubber is more than compensated for by its greater mechanical strength and more attractive appearance. Neither material nor workmanship could be better.

Excellence of Design and Beauty of Outline

The electrical and mechanical advantages of the present day type of North receivers are the valuable attainment of long years of experience in manufacturing receivers. Improvements have been made from time to time, as by incisive study their need has been made manifest. The claim is offered that it now attains as near perfection as human effort can devise. Reference to the illustration is invited, to its graceful contour of outline, secured not at the expense of strength and durability of the shell, but actually lending itself to those prime requirements.

Great Mechanical Strength and Consequent Durability

It has been customary to place in some makes of receivers a lead weight inside of the receiver shell, usually forcing the same between the projecting ledges of the permanent magnet in order that these receivers might have sufficient weight to successfully operate an automatic switch with spring tension sufficient for the completion of reliable contacts.

The advanced construction and distribution of material in the North receiver is along the line of strictest economy and simplicity of parts. For that reason there is in it no need for adding dead material to secure weight alone. On the contrary its needed weight is so distributed over the working parts as to be also available as added mechanical strength to these parts.

As an instance, attention is invited to the cross sectional diagram on page 8, showing the receiver. Note the provision for *maximum strength* at the points where the cutting of threads on common receivers *invariably weakens the cap.* The experienced telephone man knows the large item of breakage at these points. The nature of the usage a receiver must endure demands that adequate strength in the cap which is apparent in the North receiver. Note, too, the specially long, strong, sharp threads to withstand unlimited use without weakening or loosening. It safeguards a perfect fit of the cap continuously. Its improvement over others is apparent the moment an inspector unscrews the cap.

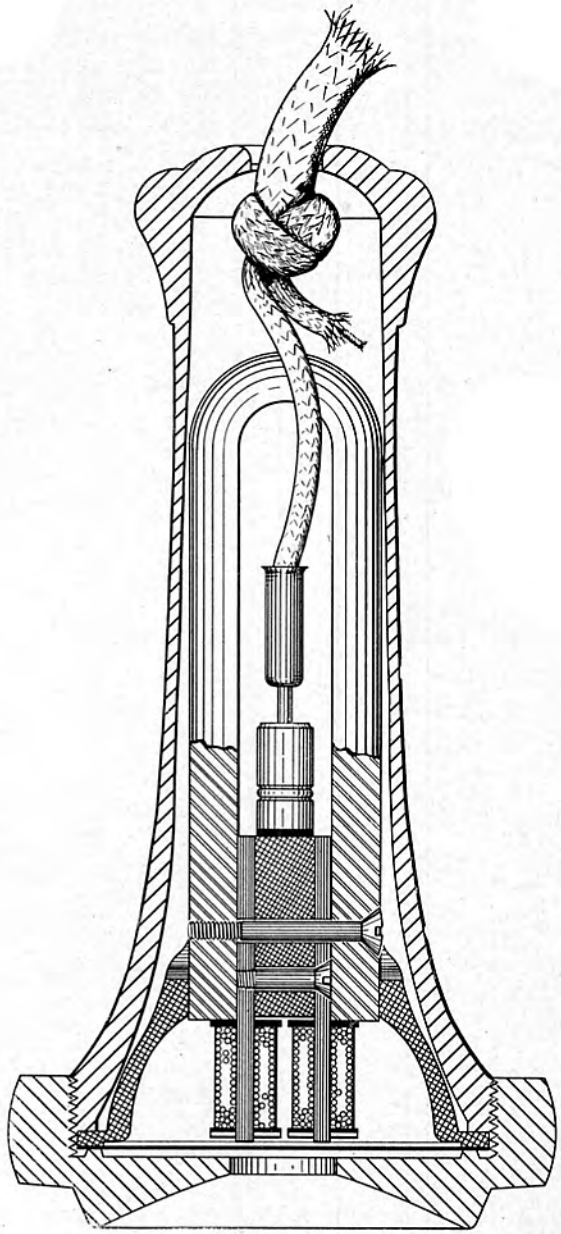
To Sum Up

This receiver is the final word when you question as to high efficiency; as to long wear with freedom from trouble; as to maximum resistance to careless handling by subscribers and others; as to accessibility of parts and simplicity of repairs. The much sought high efficiency of service, insofar as that relates to receivers, is assured by the introduction of the North Permanently Adjusted Receiver. Maximum economy of operation and maintenance, which is increasingly being demanded, *requires its use.*

We invite correspondence from all who are in any wise interested in telephone equipment that thoroughly qualifies as among the best.

Code Numbers

No. 6 Receiver with pure hard rubber shell.



Cross Sectional Diagram of North Receiver

THE NORTH ELECTRIC CO.

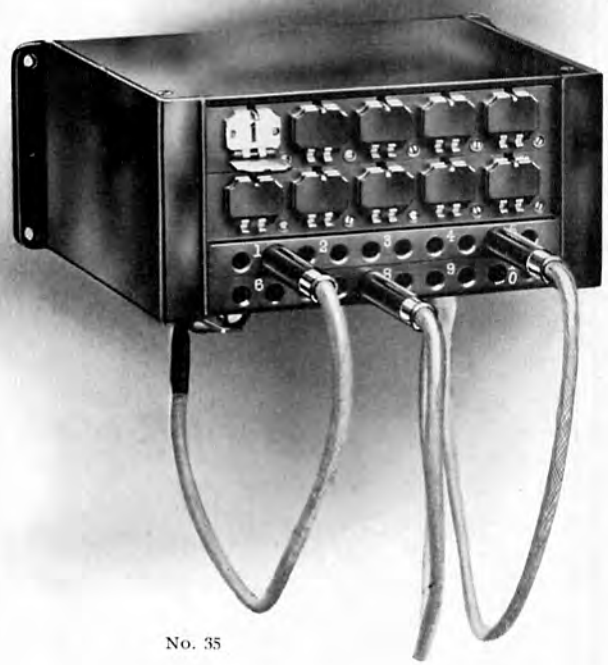
CLEVELAND, OHIO

Bulletin No. 26 December, 1904

Switching Stations for Small or Isolated Exchanges

Auxiliary Cord Equipments

The small or isolated exchange, usually located at a remote point, or one not easily reached by a competent inspector, and of necessity frequently in charge of a person of limited experience, should be so constructed as to require very little, if anything, in the way of repairs.



No. 35

Although the above statement has always been true, as applied to apparatus of this character, the fact remains, nevertheless, that heretofore the manufacturers have not offered a standard high grade line of apparatus for this class of service. The rapid growth of rural systems has been such as to entitle them to the best apparatus which it is possible to produce, and in order to meet this imperative and increasing demand, we have designed the line of switching appliances herein illustrated and described.

In making up this apparatus we have used nothing but the highest quality, standard interchangeable parts, the drops, jacks and plugs being the same

as those used in our most efficient and most carefully constructed magneto switchboards, and these parts are mounted upon and enclosed by dust proof iron cases, carefully enameled and presenting a very handsome appearance. The end plates to which the drops and jacks are fastened and by which the switches are secured to the wall or backboard are of cast iron, while the top and bottom covers are of Russia iron. The top and bottom covers can easily be removed, exposing the interior apparatus and wiring for purposes of inspection and repair.

The element of flexibility has also been kept in mind, and while these small switching stations are in standard units of five, ten, and twenty lines, further increase can readily be provided for by using two or more of the units in conjunction with each other.

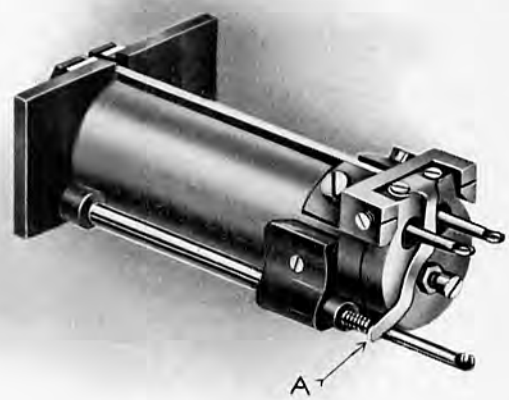
Each switch is provided with a speaker's plug and cord and connecting plugs and cords. It is designed to connect the speaker's cord to a standard telephone of the wall or desk type so that this telephone can be used for calling and communicating with the various stations on the lines connecting to the switch. The connecting plugs and cords are used for connecting the various lines to each other.

Standard Drops

The drops used in these switches are our standard tubular drops of the magneto or relay types, both of which are illustrated. These drops are bored from solid rods of Norway iron, leaving the head and shell in one piece. The shells are thoroughly and carefully annealed, and are then heavily electro-plated with copper and nickel. While this method of constructing the drop requires the use of very accurate and costly machinery and for this reason is seldom employed, it is admitted by all manufacturers that in no other manner can so highly efficient a drop be produced.

The shell when made in this manner forms a return path of least resistance to the magnetic lines, rendering the drop extremely sensitive while at the same time it constitutes a perfect magnetic and electric shield, eliminating entirely the annoying element commonly described as cross talk, in so far as the switch is concerned.

The cores of the drops are made of the best quality Norway iron and are wound



Relay Drop

with silk covered magnet wire, the windings being thoroughly insulated from the cores. The terminals of the windings are led out from the rear of the drop, through the moveable armature, the inner ends of the terminals being secured to the core heads.

In all high grade modern switchboards bridged line and clearing out drops are used. In ordering switchboards a mistake very commonly made is in specifying drops of extremely high resistance. In the inefficient switchboards made a few years ago by many and still made by some manufacturers, bridging drops having a resistance of from eight hundred to twenty-five hundred Ohms were necessary. This is not true, however, of modern high grade switchboards equipped with properly designed and efficient tubular drops as these drops offer great impedence to the passage of the high frequency voice currents, thereby allowing very little current to pass through them. Our standard drops are wound to a comparatively low resistance and

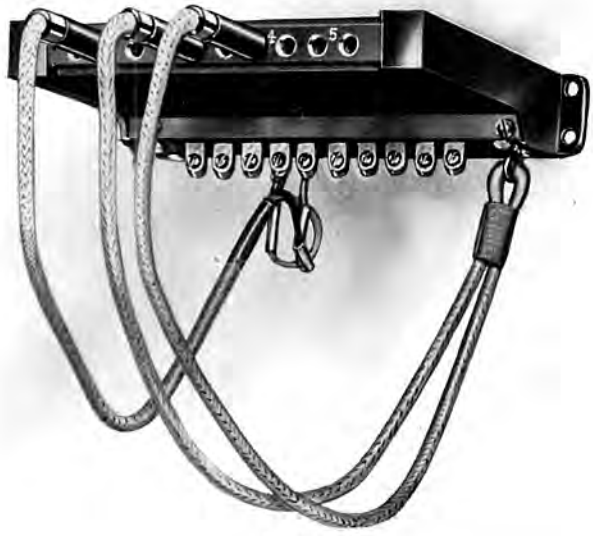
Details of Relay Drop

are perfectly adapted for use in connection with telephones of any ringer resistance regardless of the number of telephones used on a line. The standard tubular magneto drop is provided with a night bell circuit, this circuit being closed by the dropping of the shutter. If this circuit is connected to a battery and vibrating bell, the bell will ring from the time the shutter drops until it is again restored.

Relay Drops

The essential difference between the standard tubular drop and the relay drop is that the latter is provided with an auxiliary circuit, which is closed at point "A" when the drop responds to an impulse of current from the line, and is opened when the current ceases to flow. If this circuit is connected to a battery and vibrating bell, the bell will duplicate the number of signals or rings received from the line, thus indicating to the switch attendant whether the call is for the switch or for another subscriber on the line. At the same time the drop shutter falls showing from which line the call was received.

This feature is particularly valuable where the constant services of the attendant are not required at the switch or where the attendant is called upon to perform other duties, as the signal from the bell can be heard for a considerable distance. The relay drop can also be provided with a night bell circuit at a slight increase in cost, but



No. 30

this double signalling arrangement is not required. Relay switchboards were originally introduced by us about three years ago and have been found much more satisfactory than ringer boards, at one time largely used.

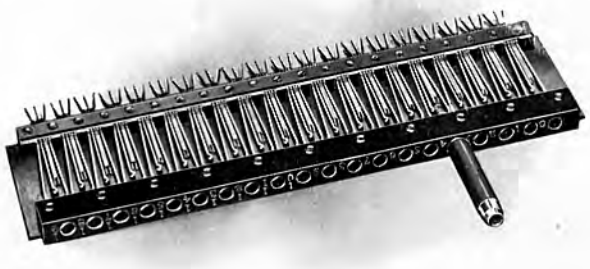
Jacks

The jacks in these switches are mounted on aluminum plates in banks of five, ten or twenty. The jack springs are of German silver, are provided with platinum contacts, and are securely supported and held in place by hard rubber mounting strips as shown. Individual springs are insulated from each other by mica. These springs, like all other flexible contact springs made by us, are of greater length than ordinary, thus adding to their flexibility and reducing liability to breakage or displacement from failure to resume their normal position after subjection to unusual or frequent strain. No holes are drilled or punched through the jack springs at the point of support, as is frequently done for the purpose of fastening them, as this latter method of construction weakens the spring at the point where it should be strongest. If a spring is thus weakened the strain will always center at the weak point instead of being equally distributed over its entire length. Another objection to fastening springs by means of insulated screws passing through them is that it is extremely difficult to properly insulate springs so fastened from each other and from the screw, as the

insulating sleeve around the screw cannot be seen and is frequently cracked or broken in the process of assembling. Defects of this character have been responsible for much trouble caused by lightning and heavy losses by fire due to short circuits.

The sleeve of the jack through which the plug is inserted is a continuation of the outside German silver spring, perfectly formed for the purpose, making it impossible for the sleeve to work loose or be drawn out of place by a tight fitting plug,— a cause of frequent trouble in many switchboards and one of a nature extremely difficult to repair.

Duplicate jacks, or two jacks for each drop are installed with these switches, the jacks being so connected that inserting the plug in the answering jack, or jack to the right of its number, leaves the drop bridged across the line, while inserting the plug in the calling jack, or jack to the left of its number, opens the drop or cuts it off of the line. In connecting two lines together one of the connecting plugs should be placed in the answering jack to the right of its number and the other connecting



Strip of Jacks

plug in the calling jack to the left of its number, thus leaving but one of the drops bridged across the line while the parties are talking. This drop will then respond to the ring off or clearing-out signal and will indicate when the parties are through talking. Another advantage of the duplicate jack is that the speaker's plug can be inserted in one of the jacks of the connected lines without disturbing the connection, for the purpose of ascertaining whether the parties have completed their conversation and have failed to ring off, as is sometimes the case.

Wiring

All of these switches are neatly and carefully wired with the best grade of tinned copper switchboard wire. All interior connections are thoroughly tinned and soldered, the flux used being resin which is entirely free from acid and all terminals are soldered to the inner end of outside binding posts, which are plainly numbered. These switches, like all of our standard switchboards, are wired for metallic circuits, and can be used in connection with metallic, common return, or grounded lines.

Plugs

The plugs are made from drawn brass, of a quality which resists wear, they possess great strength, are accurately turned to size, carefully insulated, conveniently arranged for replacing cords and are provided with perfectly fitting fibre sleeves.

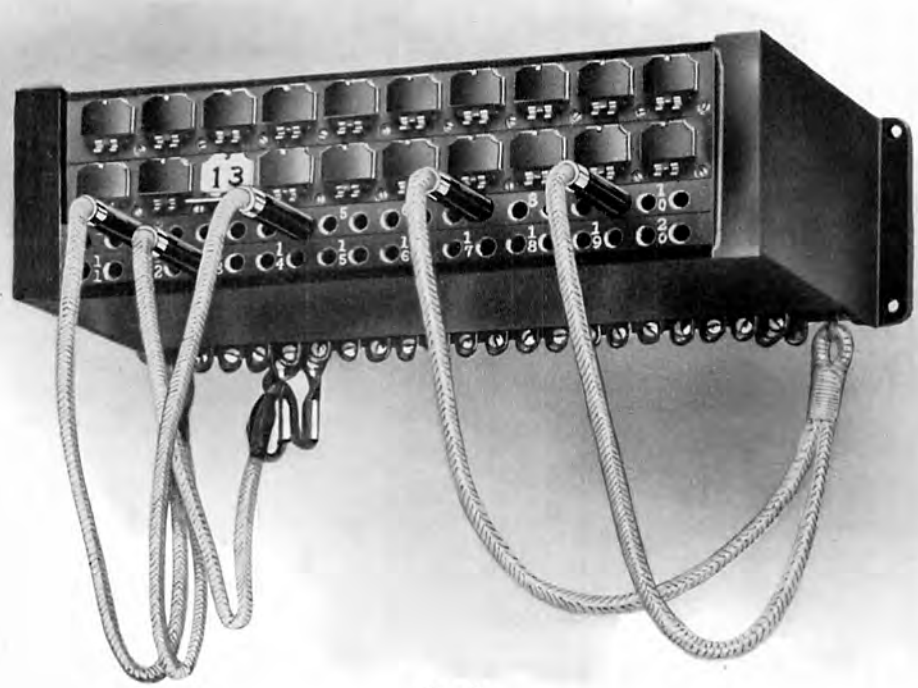
Cords

Speaker's and connecting cords have tinsel conductors, insulated with reverse layers of silk and cotton, are protected by a spiral wire winding, the whole being covered by a strong and durable linen braid. The ends of the conductors are separated, well bound, and provided with proper terminals.

Method of Operation

The method of operation of switches No. 32 to No. 39 inclusive is as follows:

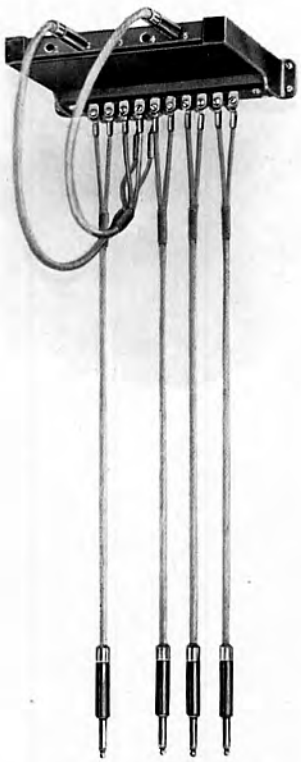
A ring from the line is indicated by the falling of the drop and the ringing of the night or relay bell, if connected. The attendant inserts the speaker's plug in one jack of the calling line and ascertains the name or number of subscriber wanted. The attendant then removes his plug from the calling line, inserts it in one of the jacks of



No. 39

the line wanted and rings the subscriber desired by means of his telephone generator. The attendant then connects the calling line and the line called by means of one of the pairs of connecting cords, inserting one of the plugs in the jack of the calling line to the left of its number and the other plug in the jack of the line called, to the right of its number. When the parties connected, after completing their conversation, ring off, the disconnecting signal is indicated by the falling of the drop shutter of the line having the plug in the jack to the right of its number. The lines should then be disconnected.

Switches No. 30 and No. 31 are not provided with drops but their operation will be understood from the above.



No. 31

Code Numbers

No. 30—5-Line, duplicate jacks, without drops. Designed to be used in connection with extension bells or other line signals. Provided with one speaker's cord and plug, and two connecting cords and plugs.

No. 31—5-Line, single jacks, without drops. Designed to be used in connection with extension bells or other line signals. Provided with one speaker's cord and plug, and five connecting cords and plugs, one connecting cord and plug being bridged to each line.

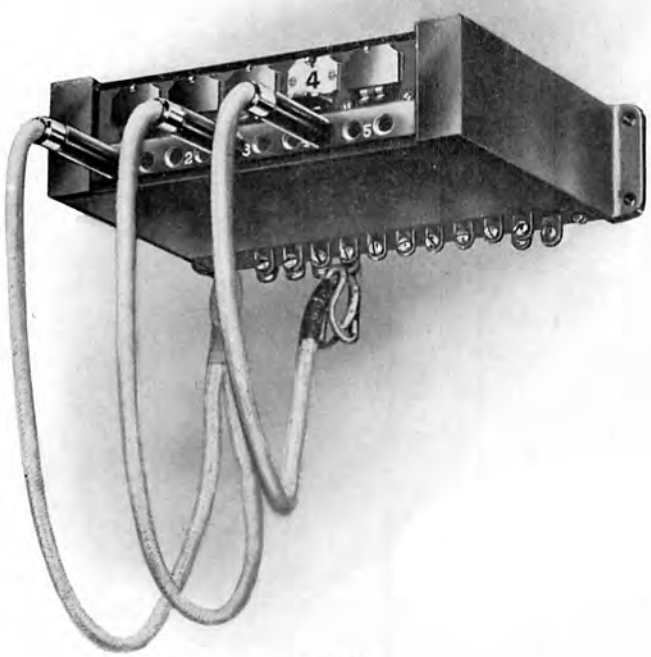
No. 32—5-Line, magneto drops, duplicate jacks. Provided with one speaker's cord and plug, two connecting cords and plugs, switch, night bell, and two cells of dry battery. Outward appearance same as No. 33, illustrated.

No. 33—5-Line, relay drops, duplicate jacks. Provided with one speaker's cord and plug, two connecting cords and plugs, relay bell, switch, and two cells of dry battery.

No. 34—10-Line (2, 5-line strips or banks), magneto drops, duplicate jacks. Provided with one speaker's cord and plug, two connecting cords and plugs, night bell, switch, and two cells of dry battery. Outward appearance same as No. 35, illustrated.

No. 35—10-Line (2, 5-line strips or banks) relay drops, duplicate jacks. Provided with one speaker's cord and plug, two connecting cords and plugs, relay bell, switch, and two cells of dry battery.

No. 36—10-Line (1 bank or strip) magneto drops, duplicate jacks. Provided with one speaker's cord and plug, two connecting cords and plugs, night bell, switch, and two cells of dry battery.



No. 33

No. 37—10-Line (1 bank or strip) relay drops, duplicate jacks. Provided with one speaker's cord and plug, two connecting cords and plugs, relay bell, switch, and two cells of dry battery.

No. 38—20-Line (2, 10-line strips or banks) magneto drops, duplicate jacks. Provided with one speaker's cord and plug, four connecting cords and plugs, night bell, switch, and two cells of dry battery. Outward appearance same as No. 39, illustrated.

No. 39—20-Line (2, 10-line strips or banks) relay drops, duplicate jacks. Provided with one speaker's cord and plug, four connecting cords and plugs, relay bell, switch, and two cells of dry battery.

Instructions for Installing

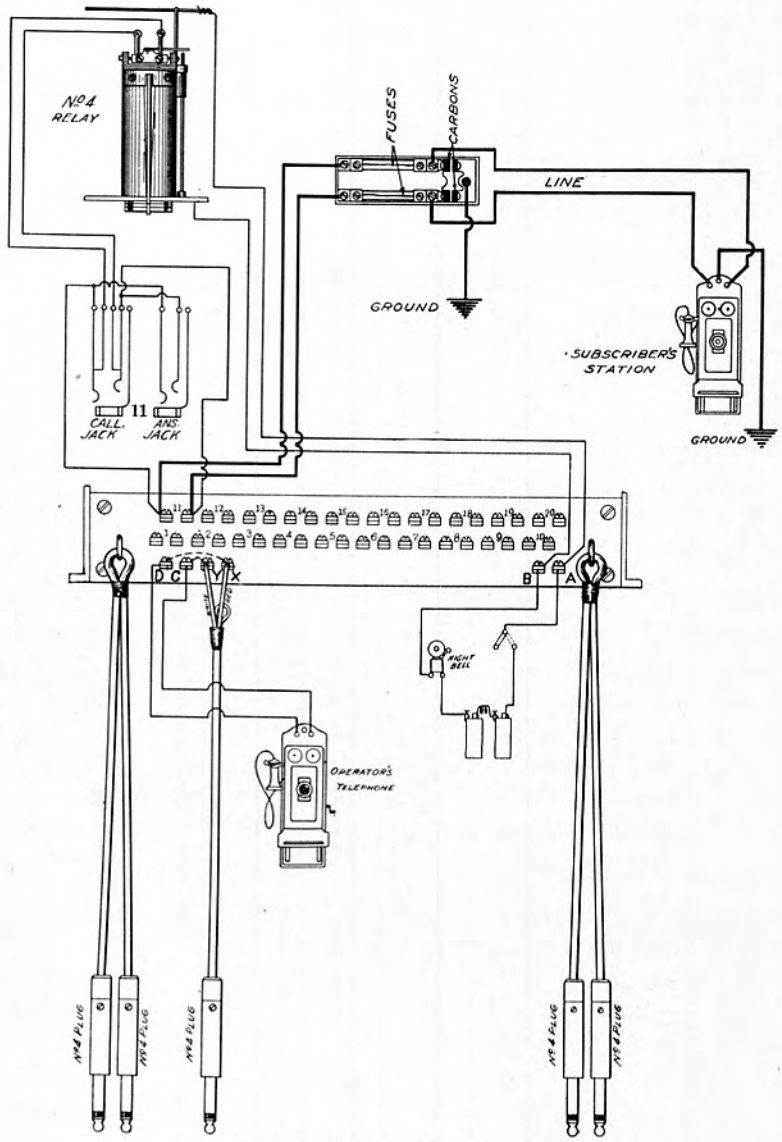
The switch should be securely fastened to the wall or backboard by means of screws. Insulated wires, preferably twisted in pairs, should then be run from the binding posts on the bottom of the switch numbered 1, 2, 3, 4, 5, etc., to lightning arresters and fuses placed in a convenient location, as shown in circuit diagram on Page 10. The line wire should then be connected to the opposite terminals of the lightning arresters as shown. If the lines are grounded or common return, the line should be connected to one of the lightning arrester terminals, and the remaining line terminal should be connected to ground or common return.

The circuits should be metallic from the switch to the lightning arresters.

Wires should then be run from the binding posts "D" and "C" to the telephone to be used in connection with the switch and if it is desired to use the night or relay bell, a wire should be run from the binding post "A" to the switch, if a switch is used, or direct to the battery if no switch is used. The batteries should be connected together as shown and a wire should then be led from the opposite side of the battery to one of the posts of the vibrating bell and another wire from the remaining post of the bell to the binding post "B" of the switch.

The speaker's cord should be connected to the binding posts "X" and "Y."

It is always advisable to use a switch in the night bell circuit when magneto drops are used in order that the night bell can be connected and disconnected at will. The night bell switch should be opened whenever the switch attendant expects to be absent for a considerable time, as otherwise the falling of a magneto drop shutter will cause the bell to ring until the drop is restored or until the battery becomes exhausted. This does not apply with equal force if relay drops are used as the relay circuits opens automatically when the subscriber stops ringing. The use of the switch is recommended in either case, however.

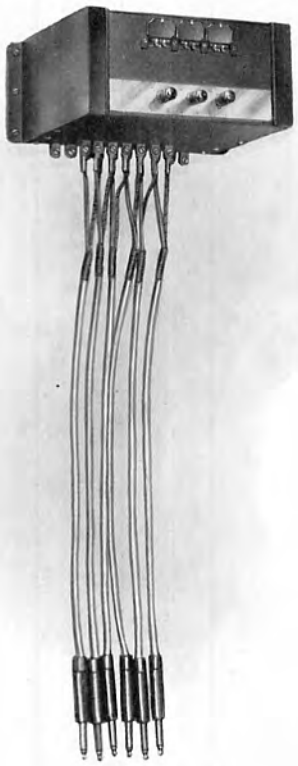


CIRCUIT DIAGRAM-SWITCH AND LINE CIRCUITS

Auxiliary Cord Equipments

In order to facilitate the operation of the switching stations for small or isolated exchanges described in the foregoing pages we have designed the auxiliary cord equipment units illustrated herein.

These cord equipments are mounted in enameled iron cases very attractive in appearance and compact in style. When it is desired to use them in connection with the switches described they should be mounted on the wall or backboard in close proximity to the switch so that the cords will reach any of the jacks in the switch.



No. 40

Standard Auxiliary Cord Equipments consist of ringing and listening keys, cords, plugs, clearing out drops and master keys for two and four party selective ringing when desired.

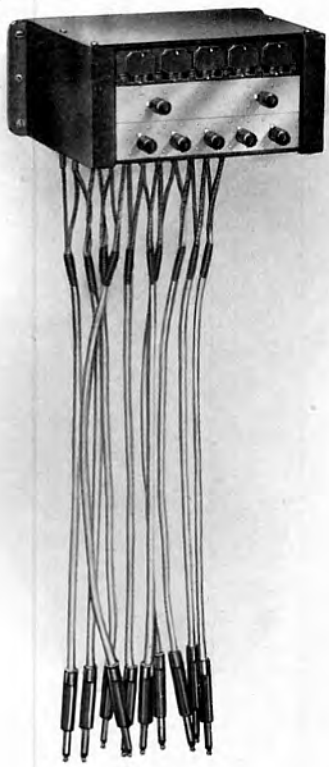
Keys

The keys are of our standard long spring type, with roller bearings and platinum contacts. The springs are of German silver, are mounted in hard rubber insulating blocks, rigidly supported by a brass frame. They are provided with hard rubber handles and are mounted upon escutcheons which are finely nickel plated. Al-

though we have thousands of keys of this type in use we have yet to receive the first complaint regarding them.

Drops, Plugs and Cords

The drops, plugs and cords used in these equipments are the same as those used in connection with our switching stations for small or isolated exchanges.

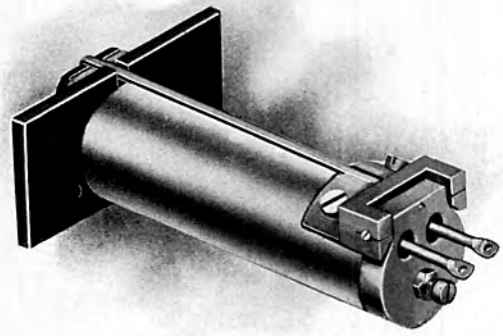


No. 41

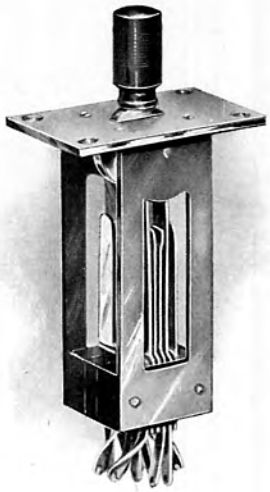
Method of Operation

When a call is indicated by the falling of a drop of the switch the black or answering plug of one of the cord pairs is inserted in jack of calling line. The key of this cord pair is then pressed down until it locks in position and the name or number of the subscriber wanted is ascertained. The red or calling plug of the cord pair is then inserted in jack of line wanted and the key is raised until it locks in position when the subscriber wanted is called in the usual manner by means of the telephone generator. The key is then restored to the normal or horizontal position.

When using these cord equipments in connection with the switching stations described, the plugs should be inserted in the calling jacks of the switches, in order that the switch drops may not be left bridged across the line during a conversation.



MAGNETO OR CLEARING-OUT DROP



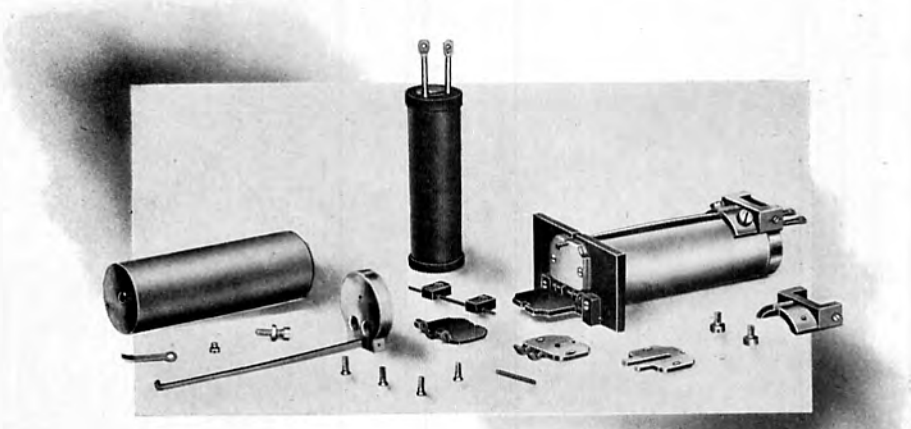
KEY

For selective ringing, the master key will be thrown in proper position before ringing. For selective ringing it is necessary to use a generator delivering positive and negative pulsating currents.

Code Numbers

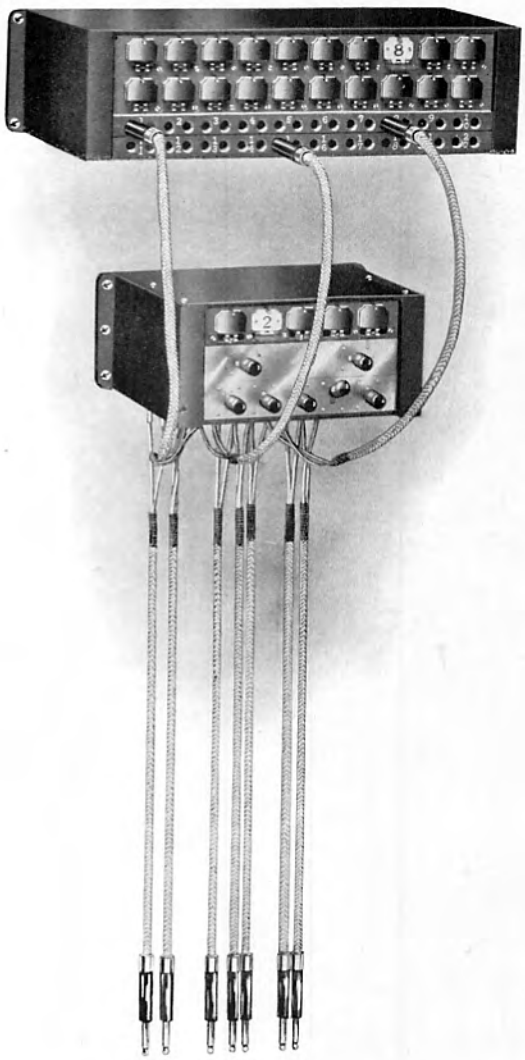
No. 40. Three cord pairs each consisting of ringing and listening key, clearing out drop, two plugs and cords.

No. 41. Five cord pairs each consisting of ringing and listening key, clearing out drop, two plugs and cords; also provided with master keys for selective ringing.



DETAILS OF
CLEARING-OUT DROP

A greater or less number of cord pairs than specified above can be furnished if desired.



SWITCHING STATION
AND AUXILIARY CORD EQUIPMENT

Instructions for Installing

The box should be securely fastened to the wall or backboard in close proximity to the switch so that either of the cords will reach any of the switch jacks. The black or answering plug cords are connected to the first or front row of binding posts as follows: White conductor to left binding post of each pair, red and white conductor

to right binding post of each pair. The red or calling plug cords are connected to the second row of binding posts in the same order.

Wires should then be connected from the rear row of binding posts as follows:

No. 40

Binding post A to switch, switch to battery, battery to vibrating bell, bell to binding post B.

Binding post C to right hand binding post of telephone, left hand post of telephone to binding post D.

No. 41

Binding posts A and B same as above.

Binding post C to binding post No. 4 of telephone.

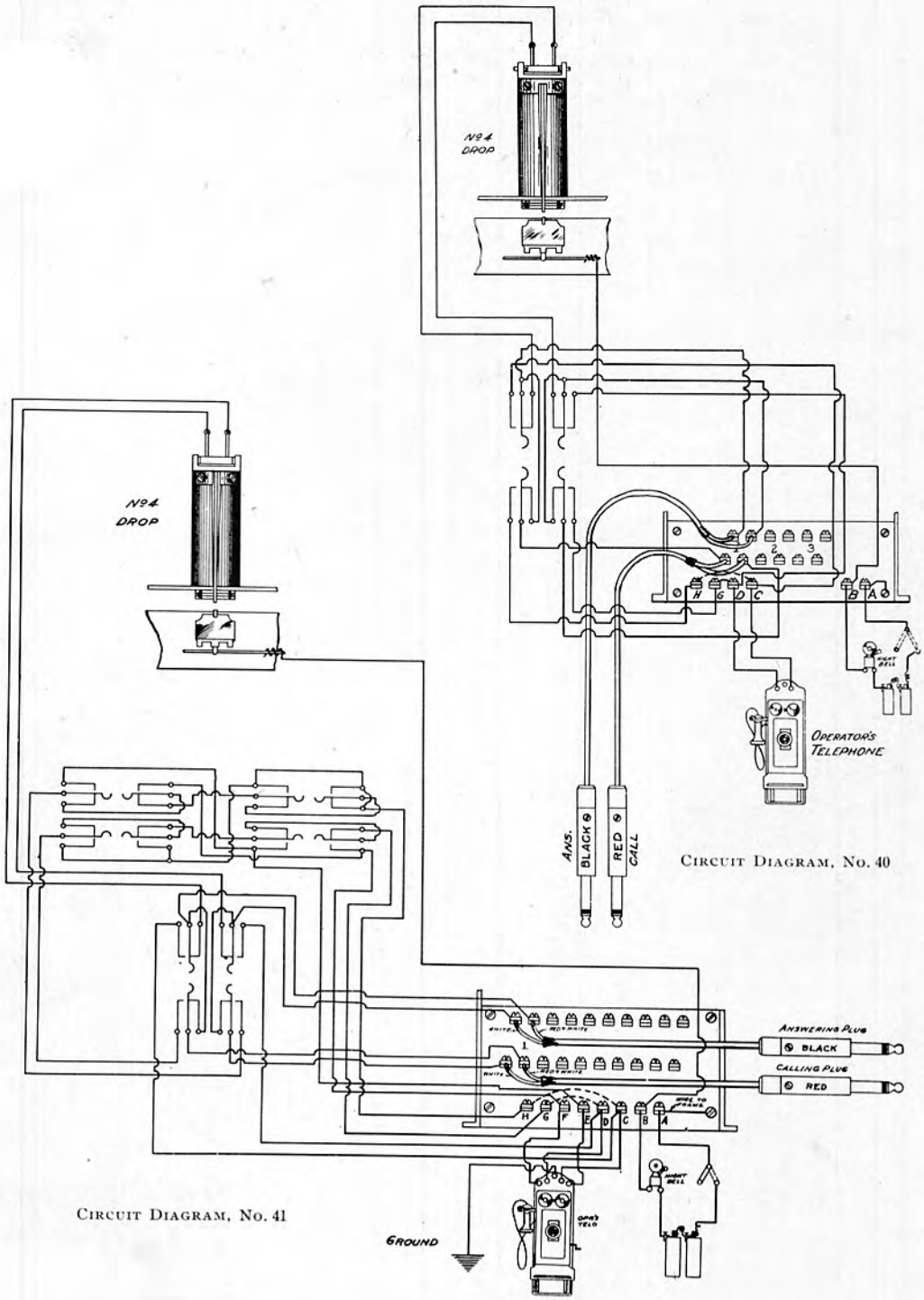
Binding post D to binding post No. 2 of telephone.

Binding post E to binding post No. 5 of telephone.

Binding post F to binding post No. 1 of telephone.

Binding post No. 3 of telephone to ground.

The above instructions will be clearly understood by reference to the circuit diagrams shown on page 16.



CIRCUIT DIAGRAM, No. 40

CIRCUIT DIAGRAM, No. 41

THE NORTH ELECTRIC CO.

CLEVELAND, OHIO

Bulletin No. 28 April, 1905

Bridging Telephones with Grounding Keys
And Silent Ringing Telephones

On rural systems a large percentage of the calls are from one subscriber to another on the same line, and should require no attention on the part of the switchboard attendant, as such calls need not pass through the switchboard. On rural lines equipped with ordinary bridging telephones where the various subscribers answer to a different number of rings or signals, it is possible for one subscriber to call up any other subscriber on the line, but, in doing so, the switchboard drop at the exchange is thrown, making it necessary for the attendant to ascertain whether the call is for the switchboard or for another subscriber on the same line, and to also restore the drop. Also, on these lines a signal for the switchboard rings all bells on the line.

The advantages of a system whereon it would be possible for one subscriber to signal another on the same line, without signaling the switchboard, or to signal the switchboard without ringing the other telephones on the line are clearly apparent, as such a system would obviate much unnecessary ringing of bells, the switchboard would only be signaled when actually wanted, and could be called by any one of the subscribers without the knowledge of the others.

These advantages are embodied in the telephones herein illustrated and described. The telephones supplied for this purpose are our type "K" bridging telephones equipped with grounding keys, as shown. By reference to circuit diagram, page 2, it will be noted that when the key is in normal position the ringer is bridged across the lines and the telephone is free from grounds.

TYPE "K" TELEPHONE WITH GROUNDING KEY

If the generator is turned with the key in normal position the ringer will be shunted by the generator springs, and the current from the generator will pass out on the metallic line ringing all other bells on it. This will not signal the switchboard as the tip side of the line is open at the switchboard jack.

By depressing the key, however, one side of the ringer is connected to ground, the tip side of line being opened in the telephone. By turning the generator with the key depressed the ringer will be shunted by the generator springs, one side of generator connected to the ground and the other side of generator connected through the hook switch to sleeve side of line. The ringing current will now pass from ground at the telephone, over sleeve side of line to jack, thence through drop to ground at switchboard.

It will be further observed that inserting a plug in the switchboard jack will open or cut off the drop and ground at the switchboard so that the signalling current from the switchboard will pass out over the metallic lines. It will also be noted that when one of these lines is connected through the switchboard to another line the switchboard grounds on the connected lines are removed, thus leaving the lines entirely free from grounds and capable of rendering the best of service.

The grounding keys are provided with German silver springs, and are equipped with front and back platinum contacts.

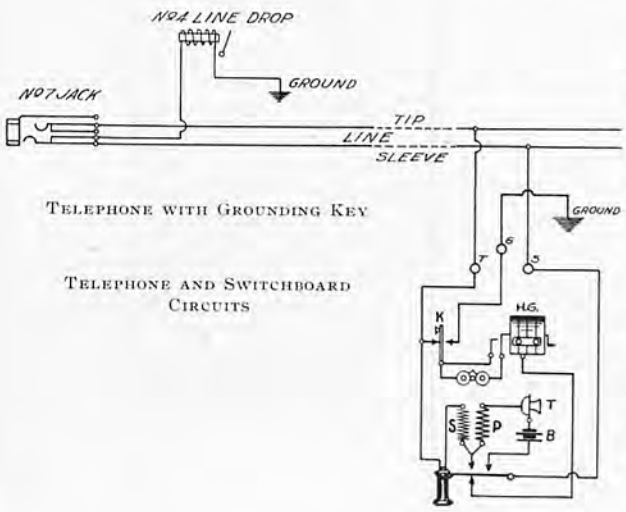
The telephones are made up from standard interchangeable parts of guaranteed efficiency and durability.

Code Numbers

No. 332-K, 4-bar generator, 1000-ohm ringer.
No. 342-K, 4-bar generator, 1600-ohm ringer.
No. 352-K, 5-bar generator, 1000-ohm ringer.
No. 362-K, 5-bar generator, 1600-ohm ringer.

Oak or walnut cabinets. Will be furnished in oak unless otherwise specified. Ringers of resistances other than specified above can be furnished.

Can also be furnished in type A cabinets if desired, although type K is our standard.



TELEPHONE WITH GROUNDING KEY

TELEPHONE AND SWITCHBOARD CIRCUITS

Method of Operation

When it is desired to call another subscriber on the line, allow the grounding key to stand in normal position and give the necessary number of rings or signals. When you wish to call the switchboard, depress the grounding key and ring.

Instructions for Installing

One side of switchboard drop must be connected to ground and the other side connected to cut-off spring, making contact with sleeve spring of jack, as shown.

Connect left-hand binding post of 'phone T to tip side of line; right-hand binding post S to sleeve side of line; and center binding post G to ground.

Silent Ringing Telephones

Silent ringing telephones are for rural toll lines or where for any reason it is desired that the exchange record all subscriber calls.

With this device it is not possible for any one of a number of subscribers on one line to call another without first ringing the exchange.

The subscriber's telephone of a silent ringing system is equipped with a direct current generator (an ordinary telephone is equipped with an alternating current generator), and the subscriber's ringer is polarized to respond to an alternating current only; the switchboard drop is not polarized, and will respond to either an alternating or direct current, and it is thus obvious that subscribers with direct current generators can only call the exchange. The switchboards use their alternating current generators, with which they are commonly equipped, for calling subscribers whose ringers respond only to that character of current.

TYPE "K" TELEPHONE

The device very materially reduces the amount of ringing on the line; for the bells are silent, not only in calling the exchange, but in ringing off after a conversation.

It is possible to place one or more silent ringing instruments on the same line with ordinary bridging telephones, the silent ringers for pay stations, and the ordinary equipment for regular subscribers entitled to full service.

Silent ringing telephones admit of a very inexpensive method of classifying ordinary and toll subscribers according to distances. For example: Where there are a number of subscribers entitled to full service in a thickly settled farming community, and who are connected with a market town exchange, it is possible to extend this same line in order to reach a few isolated and distant toll subscribers. The expense of constructing a separate circuit between the thickly settled community and the market town exchange is thus saved. The isolated toll telephone can be bridged to any line running through to the exchange without inconveniencing subscribers entitled to full service.

The telephone is standard and in all respects like our Type "K," save that it is equipped with a direct current generator, and with a spring to hold one side of the armature when at rest to the pole towards which it will naturally be drawn by a direct current. This spring is not essential, although in its absence the bell will sometimes give one tap in response to another subscriber on the line calling the exchange.

All "NORTH" ringers for silent ringing telephones are absolutely noiseless when a subscriber is calling the exchange.

Code Numbers

No. 33K—4 bar generator—1000 ohm ringer.
No. 43K—4 bar generator—1600 ohm ringer.
No. 53K—5 bar generator—1000 ohm ringer.
No. 63K—5 bar generator—1600 ohm ringer.
No. 73K—5 bar generator—2000 ohm ringer.
No. 83K—5 bar generator—2500 ohm ringer.
No. 93K—5 bar generator—3500 ohm ringer.

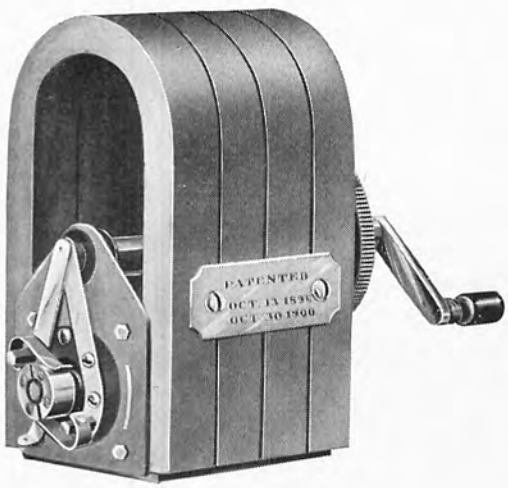
Oak or walnut cabinets. Furnished in oak unless otherwise specified.

Method of Operation

Call the exchange in the usual way. If a party on your own line is wanted, give the name or number and hang up the receiver while the exchange is calling the subscriber.

Instructions for Installing

Connect right hand binding post of all telephones to sleeve side of line. Connect left hand binding post of all telephones to tip side of line, or to ground if not a metallic circuit.



DIRECT CURRENT GENERATOR

THE NORTH ELECTRIC CO.

CLEVELAND, OHIO

Bulletin No. 29 December, 1904

Divided Circuit Two and Four Party Selective Magneto Telephones

A condition, quite general, confronting the Independent exchange manager, is a demand on the part of the public for telephone service far in excess of that expected at the time of laying out and building the exchange and for want of sufficient cable and pole line capacity he finds himself unable to take care of this business without being obliged to make an expenditure out of proportion to the returns to be derived.

In many cases the manager has resorted to the expedient of placing two or more series or bridging instruments on one line, thereby increasing the number of subscribers, but seriously affecting the quality of the service, as all of the bells on the line respond to the signal for each subscriber.

There is also a rapidly growing demand, principally on the part of residence subscribers, for a class of service which can be furnished at a lower rate than independent line service.

To meet this condition, we have brought out and are prepared to furnish the divided circuit two party and four party selective signaling telephones illustrated in this bulletin.

In principle these telephones are similar, the only difference being that the four party selective phones are equipped with biased ringers, whereas the two party selective phones are equipped with ordinary alternating ringers. The four party selective can be converted into a two party selective by removing the biasing spring, and the two party selective can be changed to a four party by the addition of a biasing spring. For the

benefit of those who may not be familiar with the principle and construction of biased ringers we might state that a biased ringer is one having a spring attached to the armature in such a manner as to draw the armature in a direction opposed to that in which it is drawn by the pulsating current by which it is actuated. Biased ringers respond to positive or negative pulsations of current, dependent upon the direction of the current around the coils and upon the direction in which the armature is drawn by the spring.

The principle of the biased ringer is not a newly discovered one, but past practice has been to make the biased ringer identical in form with the alternating ringer, simply adding the spring to carry the armature in one direction. Such ringers have been the source of a great deal of dissatisfaction, however, due to the rapidly intermittent shifting of magnetic lines in the cores of the electro-magnets, energized directly by the current and in the armature whose polarity is induced by the cores of the electro-magnets and by the permanent magnet.

This complex shifting of magnetic lines produces what is ordinarily termed "chattering" or ringing of the bell in response to a current of opposite direction to that which was intended to operate it.

To overcome the difficulty, we have, as the result of a long series of tests and thorough investigation designed a biased ringer on lines scientifically correct with a result that the only trouble heretofore experienced is no longer present.

By reference to the circuit diagrams shown on page four, the term divided circuit will readily be understood as it will be seen that in the case of the two party selective system one of the ringers, station A, is bridged from tip side of line to ground while in the case of station B the ringer is bridged from sleeve side of line to ground, whereas in the four party selective system two of the ringers, stations K and L are bridged from sleeve side of line to ground while stations R and W are bridged from tip side of line to ground. It will also be observed in relation to the four party selective system that the ringer connections of stations K and L, likewise R and W, are reversed with reference to each other between the points of connection 4 and 5 and the ringer, the K and R stations being straight whereas the L and W stations are crossed. The ringers used in connection with this system, it will be remembered, are biased ringers responding to positive and negative pulsating currents and the reversal is made so that one of the ringers leading from each side of the line will respond to a positive pulsation, while the other will respond to a negative pulsation. As a result of this arrangement either one of the two parties on the two party selective or either one of the four parties on the four party selective can be called without ringing the other bells on the line.

These telephones can be used to very good advantage on rural lines containing a greater number of telephones than can be operated selectively, making what is commonly called a semi-selective system.

For example: If twelve of the four party phones were to be used on one line they would constitute three sets of four party selective phones or, in other words, three of them would respond to any one of the four selective ringing currents. Either one of these sets of three phones can then be selected by one, two or three rings.

In connection with either of these systems the telephone ringers should be wound to a high resistance — standard 2,500 Ohms—and the line and clearing out drops should be of low resistance in order that the ringing current is practically all absorbed by or passed through the drop while the quantity of current passing through the ringers is insufficient to cause them to respond to a ring over the metallic line.

Master Keys

With either of these systems the use of a master key, as shown in circuit diagrams, or other means of selective signalling are required at the switchboard. If a master key is used it is made common to all the cord pairs of an operator's position. In the two party selective system a single master key only is required for grounding one side of the generator and connecting the other side of generator to tip or sleeve of line as required. In the four party selective system double master keys are required as in this case it is not only necessary to be able to throw the generator current out on either side of the line but also necessary to control its direction.

Generator

In the two party system an ordinary alternating generator only is required at the switchboard, but in the four party system a pulsating generator is necessary. This can be a hand or power generator, or a Warner generator, delivering positive and negative pulsating currents.

Method of Operation

Two party.— Lock the master key in desired position — ring in the usual manner by means of the ringing key on the cord pair employed.

Four party.— Lock the proper master key in desired position — ring in the usual manner by means of the ringing key on cord pair employed.

It will of course be understood that indicating or non-indicating selective keys can be used in each cord circuit in lieu of the master keys shown.

The indicating selective keys constitute an ideal arrangement but are necessarily more expensive than the master keys.

Code Numbers

Two Party Selective. No. 224-K, 3 Bar Generator, 2,500 Ohm Ringer.
Two Party Selective. No. 234-K, 4 Bar Generator, 2,500 Ohm Ringer.
Four Party Selective. No. 424-K, 3 Bar Generator, 2,500 Ohm Ringer.
Four Party Selective. No. 434-K, 4 Bar Generator, 2,500 Ohm Ringer.
Oak or Walnut cabinets. Furnished in oak unless otherwise specified.

Instructions for Installing—Master Keys

The master key should be placed on the keyboard table in close proximity to the regular ringing and listening keys and connected in accordance with the circuit diagrams shown. The wiring of the generators for pulsating ringing is also shown.

Two Party Selective Telephones

Station A. Connect left hand binding post to tip side of line, right hand binding post to sleeve side of line and middle binding post to ground.

Station B. Connect left hand binding post to sleeve side of line, right hand binding post to tip side of line and middle binding post to ground.

Four Party Selective

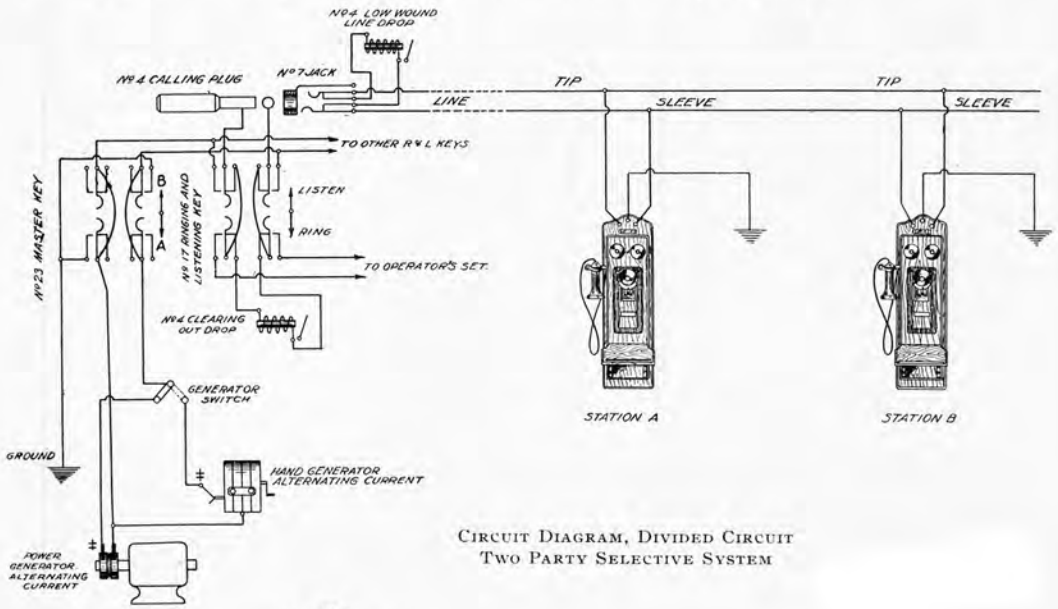
Station K. Connect binding post No. 1 to sleeve side of line, No. 3 to tip side of line, No. 2 to ground.

Station L. Connect binding post No. 1 to sleeve side of line, No. 3 to tip side of line, No. 2 to ground.

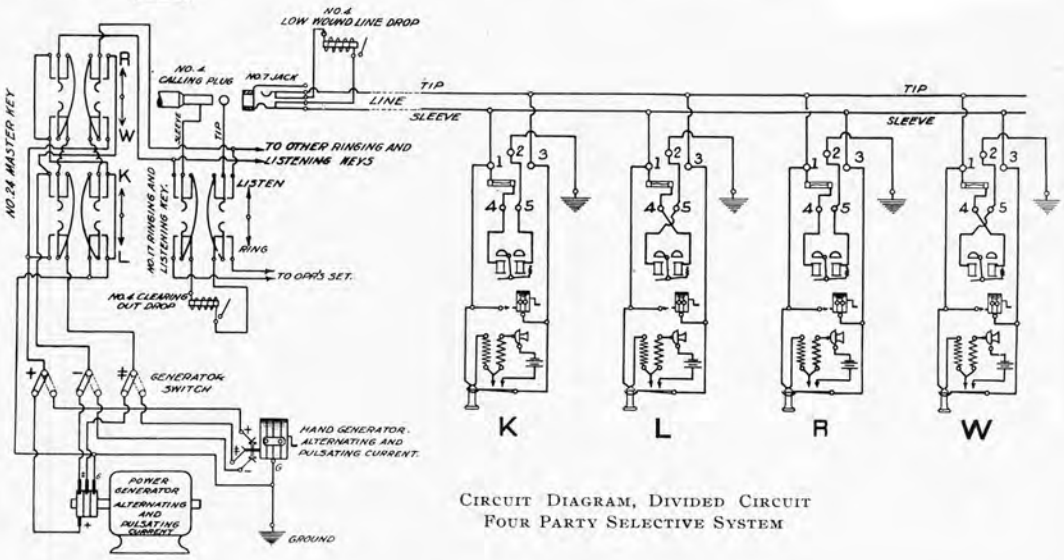
Station R. Connect binding post No. 1 to tip side of line, No. 3 to sleeve side of line, No. 2 to ground.

Station W. Connect binding post No. 1 to tip side of line, No. 3 to sleeve side of line, No. 2 to ground.

It will be apparent from a study of the circuits that any one of these phones can be made to work at either of the four stations by reversing the line connections at binding posts 1 and 3 and the ringer connections at clips 4 and 5.



CIRCUIT DIAGRAM, DIVIDED CIRCUIT
TWO PARTY SELECTIVE SYSTEM



CIRCUIT DIAGRAM, DIVIDED CIRCUIT
FOUR PARTY SELECTIVE SYSTEM

THE NORTH ELECTRIC CO.

CLEVELAND, OHIO

Bulletin No. 30 December, 1904

Cut-In Stations

In the operation of rural or toll lines it is frequently desirable to be able to separate them into two or more sections in order that each of the several sections may be used independently of the others. Any arrangement for accomplishing this result, however, should be one whereby it is impossible to so divide the line as to leave it without a ringer or bell connected to the terminus of each section at the point of division. To perform these functions it is necessary to use, in addition to the telephone at this point, a switch and ringer. For convenience, these parts are usually mounted in one box, constituting what is known as a cut-in station.

No. 28

As accomplishing the desired results in a wholly satisfactory manner, we offer the cut-in stations herein illustrated and described; the illustrations showing the individual cut-in stations, also the stations as used in connection with the intermediate telephones. These cut-in stations are made up in two forms, No. 28, wherein the necessary switching is done by means of a double throw key, and No. 29 wherein the switching is accomplished by the use of three jacks mounted in the box to be used in connection with a standard switchboard plug and cord.

A cut-in station to be used on any line should have a ringer of the same resistance as the telephone ringers on the line.

Cut-In Station No. 28

By reference to the circuit diagram, showing a three station line, it will be observed that when the lever of the cut-in station key located at the intermediate or No. 2 telephone station is thrown to the left, the ringer of the cut-in station will be bridged on the section of the line with station No. 3, while the intermediate or No. 2 telephone will be bridged on the section of the line with station No. 1. If, on the other hand, the lever of the cut-in station key is thrown to the right, the relative positions of the cut-in station ringer and the intermediate or No. 2 telephone will be reversed. If the cut-in station key is allowed to stand in the central or normal position, the two sections of the line will be connected together with the intermediate station bridged upon it and the cut-in station ringer open.

No. 29

Cut-In Station No. 29

The intermediate station in this case is connected by means of a double conductor cord to a standard switchboard plug. If the plug is inserted in jack No. 1, the intermediate telephone will be bridged on the section of the line with station No. 1, while the cut-in station ringer will be bridged on the section of the line with station No. 3.

If the plug is inserted in jack No. 3, the relative positions of the intermediate telephone and cut-in station will be reversed. If the plug is inserted in jack No. 2, the intermediate station will be bridged on the line, leaving the cut-in station ringer open while if the plug is not inserted in either of the jacks, the cut-in station ringer will be bridged on the line, leaving the intermediate telephone open or disconnected.

Code Numbers

No. 28 cut-in station with No. 23 Key. Resistance of ringers, 1,000, 1,600, 2,000, 2,500 or 3,500 Ohms.

No. 29 cut-in station with three jacks, cord and plug. Resistance of ringers same as above.

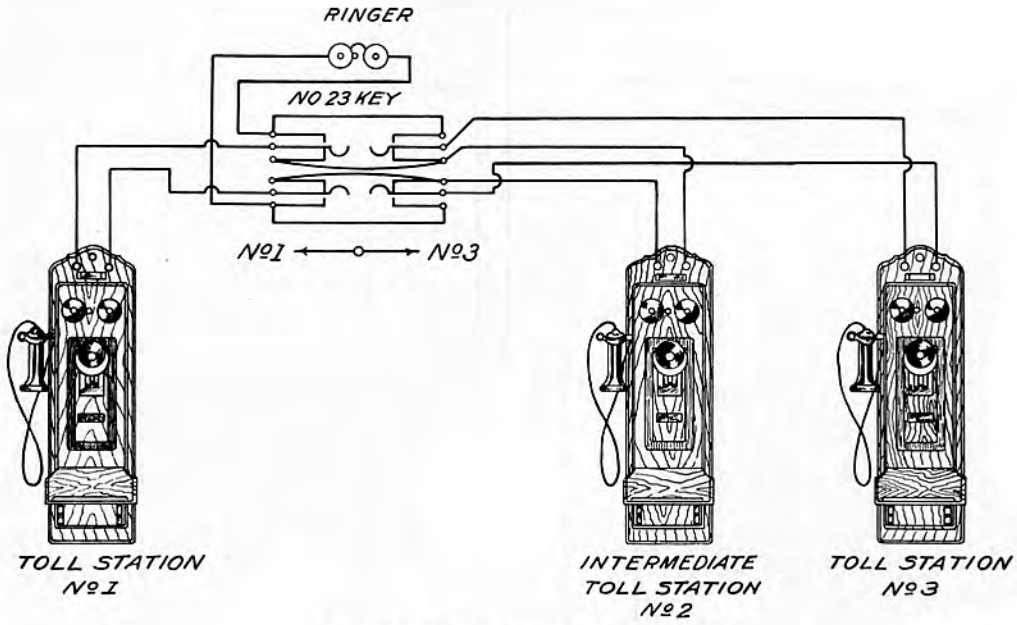
Oak or Walnut cabinets — furnished in oak unless otherwise specified.

Instructions for Installing

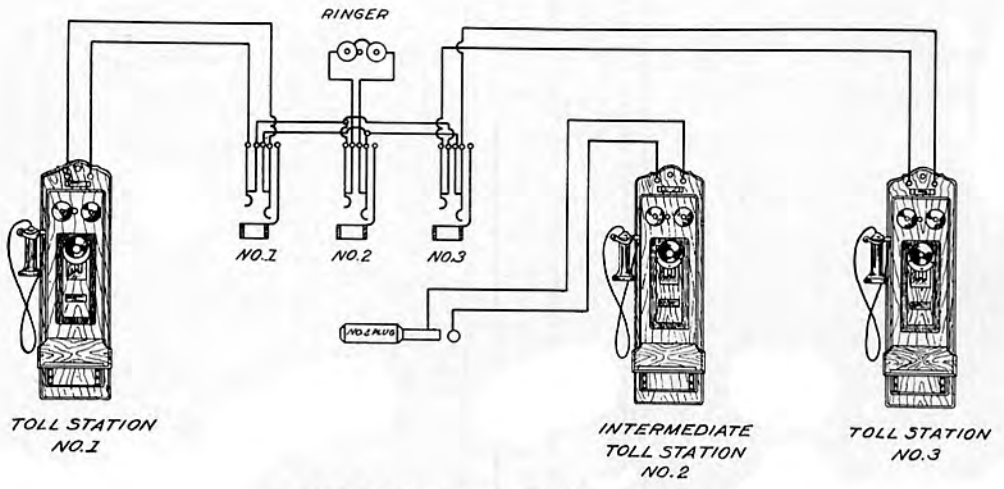
By reference to the cuts and circuit diagrams, the manner of connecting these cut-in stations will readily be understood.

CUT-IN STATION NO. 28, WITH TYPE K TELEPHONE

CUT-IN STATION NO. 29, WITH TYPE K TELEPHONE



Circuit Diagram, Cut-In Station No. 28



Circuit Diagram, Cut-In Station No. 29

THE NORTH ELECTRIC CO.

CLEVELAND, OHIO.

Bulletin No. 31. April, 1905.

TELEPHONE BOOTHS.

GENERAL CONSTRUCTION.

The sound-proof qualities of these booths are obtained by double walls, tops and double simultaneous swing doors. The outer and inner walls extend to the floor of the room in which the booths are placed. Cushion blocks placed at each corner separate the two walls the proper distance, and the whole is drawn tight with screws. The ceiling rests on the inner wall, and the roof on the outer wall, thus giving free air circulation.

Double simultaneous swinging doors are separate; they act on different sets of hinges and are equipped with a specially devised extension lock.

Double doors, on some of the less expensive booths, are fastened together and separated by small cushion blocks, and act on the same hinges.

All are well constructed of selected, carefully dressed kiln-dried woods; amply filled, varnished and rubbed inside and out.

Outside knobs and hinges of bronze.

Furnished in American double strength glass and plain oak unless otherwise specified. Chipped glass; birch, cherry or mahogany finish; quartered oak, or additional glass sides at an additional cost.

Constructed in series, with continuous cornice and roof for hotels and public buildings at a relatively less cost of about five per cent per unit.

Executed from architect's drawings, conforming to the school of design in room for which they are intended, at special prices.

CODE NUMBERS 789 AND 810

No. 789 Single wall. Shipping weight 300 lbs.
No. 810 Double wall and door.

Front of glass.

DIMENSIONS.

No. 789

Floor, outside	2 ft. 6 in. x 2 ft. 8 in.
Floor, inside	2 ft. 4 in. x 2 ft. 7 in.
Top	2 ft. 8 in. x 3 ft. 0 in.
Height, outside	6 ft. 9½ in.
Height, inside	6 ft. 6½ in.

Shipping weight 300 lbs.

No. 810

Floor, outside	2 ft. 8 in. x 3 ft 2 in.
Floor, inside	2 ft. 3 in. x 3 ft. 9 in.
Top	3 ft. 0 in. x 3 ft. 5½ in.
Height, outside	7 ft. 0 in.
Height, inside	6 ft. 6 in.

Shipping weight 500 lbs.

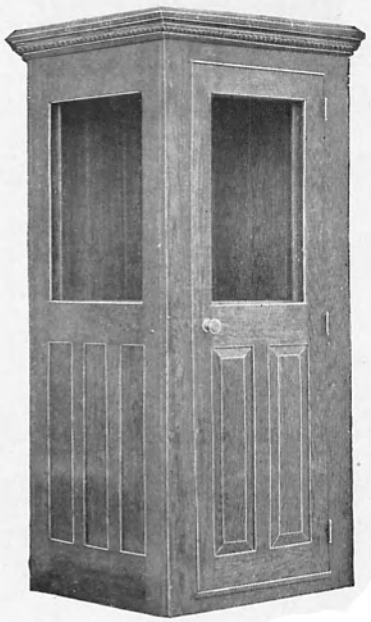
CODE NUMBERS.

No. 811 Inside wall of matched and beaded ceiling.
No. 812 Inside wall paneled.

Front and one side of glass. Double doors and walls. Shipping weight about 500 lbs.

DIMENSIONS.

Floor, outside	2 ft. 8 in. x 3 ft. 1 in.
Floor, inside	2 ft. 3 in. x 2 ft. 8 in.
Top	2 ft. 10 in. x 3 ft. 3 in.
Height, outside	6 ft. 11½ in.
Height, inside	6 ft. 5¾ in.



CODE NO. 791

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 550 lbs.

DIMENSIONS.

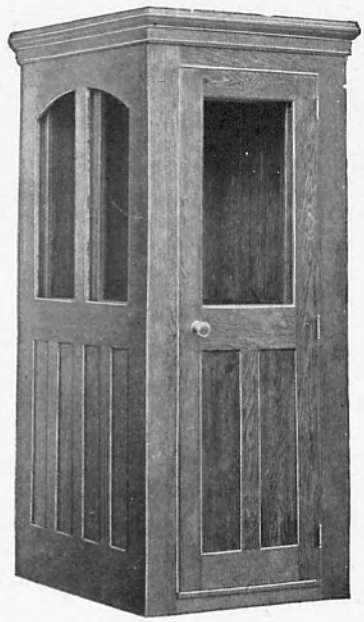
Floor, outside	2 ft. 8 in. x 3 ft. 2	in.
Floor, inside	2 ft. 2 in. x 2 ft. 8	in.
Top	3 ft. 0 in. x 3 ft. 5½	in.
Height, outside	7 ft. 0	in.
Height, inside	6 ft. 6	in.

CODE No. 790

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 500 lbs.

DIMENSIONS.

Floor, outside	2 ft. 8 in. x 3 ft. 2 in.
Floor, inside	2 ft. 3 in. x 2 ft. 9 in.
Top	3 ft. 0 in. x 3 ft. 5½ in.
Height, outside	7 ft. 0 in.
Height, inside	6 ft. 6 in.

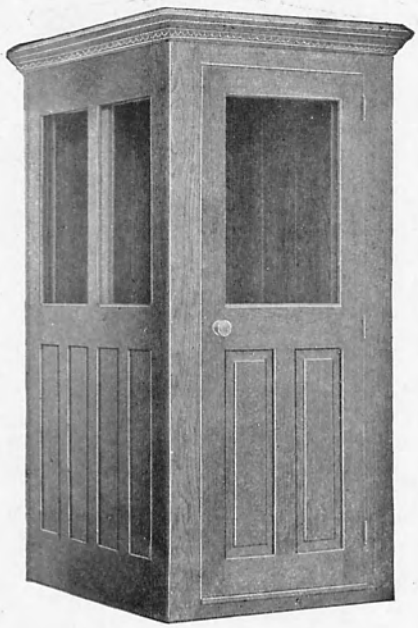


CODE NO. 792

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 550 lbs.

DIMENSIONS.

Floor, outside	2 ft.	10	in. x 3 ft.	3	in.
Floor, inside	2 ft.	4	in. x 2 ft.	9	in.
Top	3 ft.	1½	in. x 3 ft.	6¾	in.
Height, outside			7 ft.	0	in.
Height, inside			6 ft.	5	in.

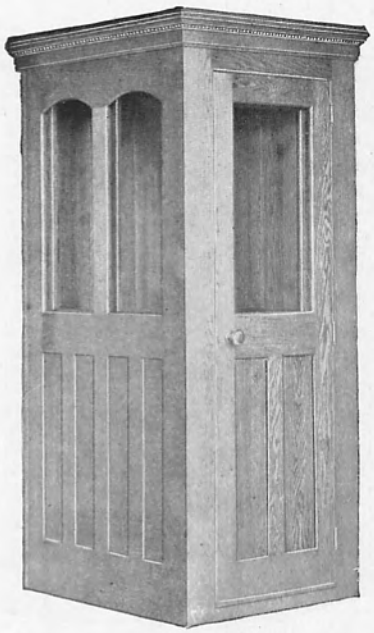


CODE No. 799

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 650 lbs.

DIMENSIONS.

Floor, outside	3 ft. 2 in. x 3 ft. 8½ in.
Floor, inside	2 ft. 8 in. x 3 ft. 2½ in.
Top	3 ft. 7 in. x 4 ft. 2 in.
Height, outside	7 ft. 3 in.
Height, inside	6 ft. 9 in.

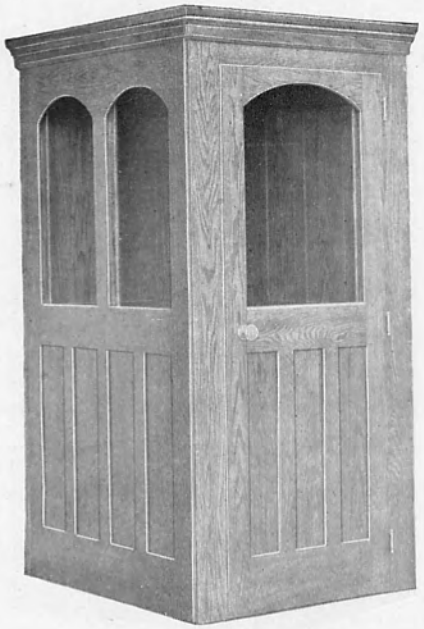


CODE NO. 793

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 550 lbs.

DIMENSIONS.

Floor, outside	2 ft. 10 in. x 3 ft. 3 in.
Floor, inside	2 ft. 4 in. x 2 ft. 9 in.
Top	3 ft. 1 in. x 3 ft. 6 in.
Height, outside	7 ft. 0 in.
Height, inside	6 ft. 4 in.

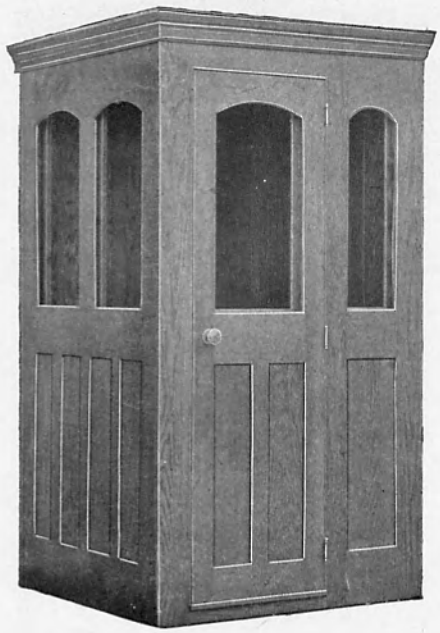


CODE NO. 800

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 650 lbs.

DIMENSIONS.

Floor, outside	3 ft. 4 in. x 3 ft. 9 in.
Floor, inside	2 ft. 10 in. x 3 ft. 3 in.
Top	3 ft. 9 in. x 4 ft, 2 in.
Height, outside	7 ft. 0 in.
Height, inside	6 ft. 5½ in.

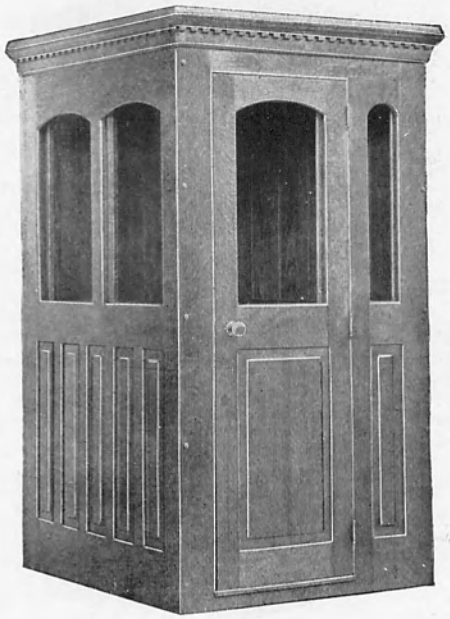


CODE No. 802

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 800 lbs.

DIMENSIONS.

Floor, outside	3 ft. 6½ in. x 4 ft. 0½ in.
Floor, inside	3 ft. ½ in. x 3 ft. 6 in.
Top	3 ft. 9 in. x 4 ft. 3 in.
Height, outside	7 ft. 1 in.
Height, inside	6 ft. 7½ in.

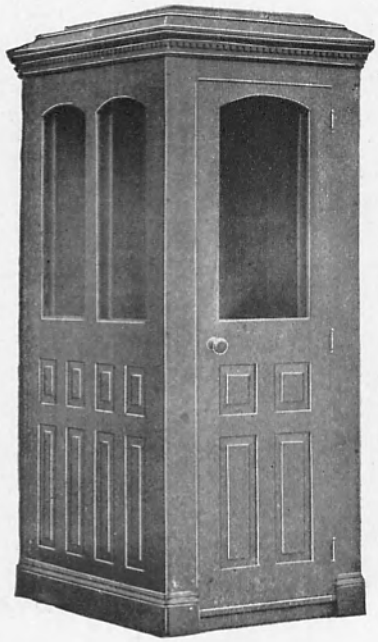


CODE No. 803

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 750 lbs.

DIMENSIONS.

Floor, outside	3 ft. 8	in. x	4 ft. 0	in.
Floor, inside	3 ft. 2	in. x	3 ft. 6	in.
Top	4 ft. 1½	in. x	4 ft. 4½	in.
Height, outside			7 ft. 3	in.
Height, inside			6 ft. 9½	in.



CODE NO. 798

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 600 lbs.

DIMENSIONS.

Floor, outside	2 ft.	10	in. x 3 ft.	3	in.
Floor, inside	2 ft.	5	in. x 2 ft.	10	in.
Top	3 ft.	1½	in. x 3 ft.	6½	in.
Height, outside				7 ft. 0	in.
Height, inside				6 ft. 5	in.

CODE NO. 801

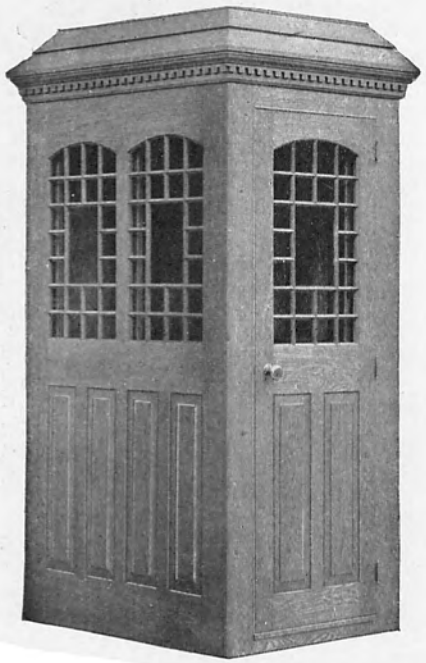
Front and one side of Glass. Double simultaneous swinging doors and double walls.
Shipping weight about 600 lbs.

DIMENSIONS.

Floor, outside	2 ft. 10 in. x 3 ft. 3 in.
Floor, inside	2 ft. 4 in. x 2 ft. 9 in.
Top	3 ft. 1 in. x 3 ft. 6 in.
Height, outside	7 ft. 0 in.
Height, inside	6 ft. 4 in.

CODE NO. 797

Same general design and dimensions as 801 with window muntins omitted.

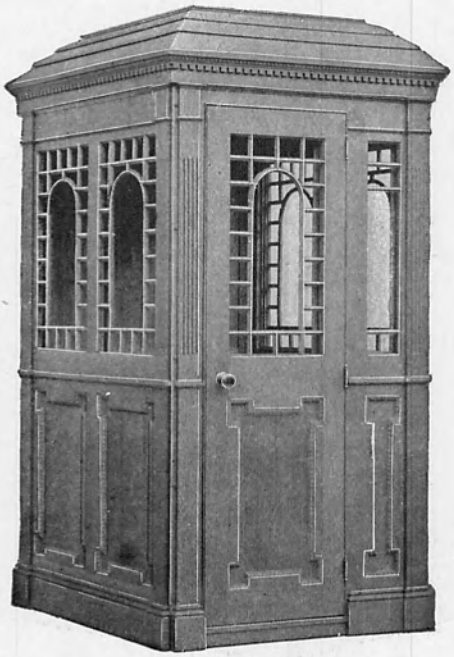


CODE No. 804

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 650 lbs.

DIMENSIONS.

Floor, outside	3 ft. 0 in. x 3 ft. 9 in.
Floor, inside	2 ft. 6 in. x 3 ft. 3 in.
Top	3 ft. 2 in. x 4 ft. 1 in.
Height, outside	7 ft. 7 in.
Height, inside	6 ft. 8 in.



CODE NO. 805

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 900 lbs.

DIMENSIONS.

Floor, outside	3 ft. 10½ in. x 4 ft. 1 in.
Floor, inside	3 ft. 2 in. x 3 ft. 8 in.
Top	4 ft. 0 in. x 4 ft. 6 in.
Height, outside	8 ft. 0 in.
Height, inside	6 ft. 9 in.

CODE NO. 806

Front and one side of glass. Double simultaneous swinging doors and double walls.
Shipping weight about 950 lbs.

DIMENSIONS.

Floor, outside	4 ft. 2½ in. x 4 ft. 11 in.
Floor, inside	3 ft. 7½ in. x 4 ft. 4 in.
Top	4 ft. 8 in. x 5 ft. 4½ in.
Height, outside	7 ft. 5 in.
Height, inside	6 ft. 6½ in.

THE NORTH ELECTRIC CO.

DALLAS, TEXAS CLEVELAND, OHIO KANSAS CITY, MO.

Bulletin No. 35 December, 1906

Common Battery Telephones.

Our common battery telephones are simple in design,—plain outlines,—graceful in their simplicity. We put the money that might otherwise be expended for non-essentials into material, labor and expert services.

These telephones are built for service—continuous and efficient. The first thought in their design has been to produce a first class telephone that will transmit and reproduce vocal sounds with perfect fidelity and without appreciable loss of vol-

ume—a durable instrument wherein the item of repairs and attention after installing has been reduced to the minimum. To produce this result requires the best design, material and workmanship that can be had.

We sell these telephones solely on their merits and guarantee them unconditionally and indefinitely against inherent defects.

Your attention is called briefly to the different types of instruments which we have described more in detail in the following pages.

The word "Type" with the designating letter "L" "M" "R" and "N" indicates the style of cabinet (wall or desk, wood or steel).

TYPE L is our standard wall telephone, oak or walnut cabinet for office and general use.

TYPE R is our compact type STEEL cabinet wall telephone for residence and hotel service.

TYPE M is our compact type WOOD cabinet wall telephone for residence and hotel service.

TYPE N is our standard portable desk telephone for all classes of service.

These instruments are furnished with our standard equipment parts as required for each type. They will operate in connection with any standard common battery switchboard.

Common Battery Telephone Parts.

A really high-class telephone must have high class parts. Our apparatus is the product of our best efforts; the result of fifteen years progressive striving.

Your critical attention is called to the brief description and illustrations of these parts as shown on pages 8 to 14 of this bulletin.

CODE LIST.

COMMON BATTERY WALL TELEPHONES.

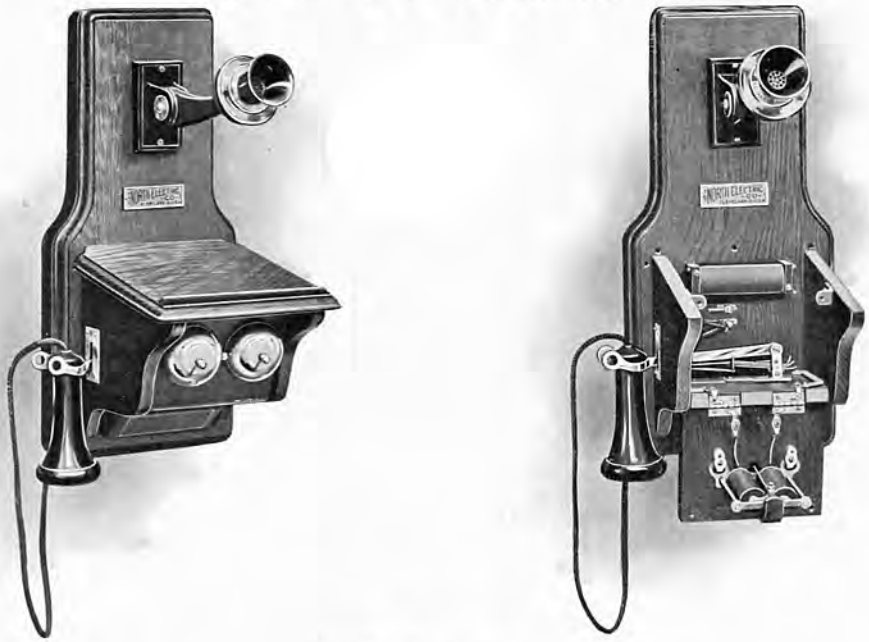
TYPE	NO.	CABINET	RINGER	COND'SER	REMARKS
L	804	Standard—Oak	1000 Ohm	No. 1	See Page 3
R	804	Compact—Steel	1000 Ohm	No. 8	" " 4
M	804	Compact—Oak	1000 Ohm	No. 1	" " 5

COMMON BATTERY DESK TELEPHONES.

TYPE	NO	DESK SET BOX	EXT. BELL	RINGER	COND'SER	REMARKS
N	804	Enamelled Steel	None	1000 Ohm	No. 8	See Page 6
N	804	Oak or Walnut	None	1000 Ohm	No. 1	" " 7
N	804	None	Oak	1000 Ohm	No. 8	" " 7

The standard wood cabinet is quarter sawed oak; Walnut furnished to order only. The Steel cabinets are furnished in black finish only. These remarks apply to desk set boxes and extension bells also. Unless otherwise specified Type N Desk set will be furnished with the enamelled steel desk set box. The other styles to order only.

Type "L" Wall Telephone.



TYPE "L" TELEPHONE

This is our standard wall instrument for office and general use.

The woodwork is the best that can be had, besides we know it to be thoroughly seasoned. The material, work and finish are of the highest quality. They are given a rubbed finish involving seven processes. The cabinets are varnished inside as an extra precaution against warping. They will not warp, check, blister nor become white.

The hinged backboard renders the condensers and wiring accessible without removing the instrument from the wall.

The hinged front and removable shelf permits inspection of the parts without the least difficulty.

The cabinet is provided with a specially constructed screw catch guarding against any possibility of working loose or the instrument being tampered with.

The terminals and lightning arresters are completely covered and protected by a close fitting iron case.

Equipped with the following standard parts:—New solid back transmitter and pressed steel hollow arm, permanently adjusted receiver, new ringer with knife edge bearing armature and horizontal lever adjustable tension hook-switch. Circuit diagram on page 16.

Order by code and avoid delay.

CODE

804-L COMMON BATTERY WALL TELEPHONE complete with:—No. 34-D Transmitter, No. 6 Receiver and cord, No. 20 Hook-switch, No. 122 ringer (1000 Ohm), No 1 Condenser (2 M.F.), No. 16 Induction Coil and No. 3 Arrester.

The above telephone will be furnished in OAK unless otherwise ordered. WALNUT or MAHOGANY WOODWORK TO ORDER ONLY; not carried in stock.

Type "R" Wall Telephones.

TYPE "R" TELEPHONE

TYPE "R" OPEN

This compact steel cabinet wall instrument is designed for hotels, apartment houses and residences, also for the office and factory in connection with private branch exchanges.

They are self-contained, light and easily installed. They occupy small wall space and are practically vandal proof. Their extreme simplicity, the accessibility of the terminals and their lightness makes their installation very economical—an installer can carry and place a number of these instruments on a single trip to one of the ordinary type.

The cabinet is of heavy drawn steel finished in a hard black enamel. It is carefully made and assembled; all edges and corners are rounded. The door is fastened with a spring catch and can not work loose or come open. All the terminals are inside with nothing exposed that can be tampered with.

While the cabinet is compact, yet all the parts are so arranged that they may be easily inspected. The terminals are near the front and accessible as the illustration shows. The receiver cord terminals are inside. The cord is brought into the cabinet through a hard rubber thimble. The line terminals are brought in through hard rubber bushings in the back of the case.

For the wiring a specially insulated copper wire is used. It is formed into a cable and beeswaxed, preventing any chance of making contact with the metal frame.

The simple lines and well balanced proportions of this instrument present a neat and pleasing appearance.

Each instrument is equipped with the following standard parts:—New solid back transmitter, permanently adjusted receiver, new ringer with knife edge bearing armature, and vertical lever adjustable tension hook-switch.

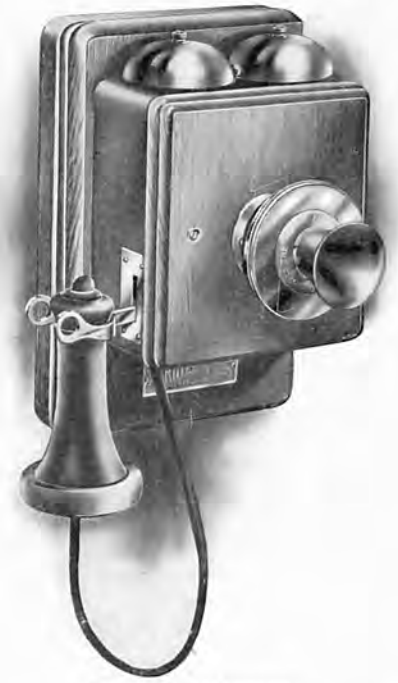
Furnished in black finish only. Circuit diagram on page 15. Dimensions of cabinet 5⅛" x 6⅝". Wall space 6" x 7½". Shipping weight, not including packing, 7½ lbs.

Order by code and avoid delay.

CODE.

804-R COMMON BATTERY STEEL CABINET. WALL TELEPHONE complete with:—No. 37 Transmitter Head, No. 6 Receiver and Cord, No. 21 Hook-switch No. 122 Ringer (1000 Ohm), No. 8 Condenser and No. 16 Induction Coil.

Type "M" Wall Telephones.



TYPE "M" TELEPHONE

Type "M" telephones are designed for the same purpose as Type "R". They are equipped with the same standard parts and differ only in the cabinet which is oak or walnut, oak being the standard. In addition the transmitter is mounted on an adjustable arm. Circuit diagrams on page 15.

Order by code and avoid delay.

CODE

804-M COMMON BATTERY COMPACT WALL TELEPHONE, WOOD CABINET complete with:—No. 34-G Transmitter having short adjustable arm, No. 6 Receiver and Cord, No. 20 Hook-switch, No. 122 Ringer (1000 Ohm), No. 1 Condenser and No. 16 Induction Coil.

The above telephone is furnished in OAK unless otherwise ordered. WALNUT OR MAHOGANY WOOD-WORK TO ORDER ONLY; not carried in stock.

Type "N" Desk Telephones.

TYPE "N" DESK SET

Our desk telephones are a departure from the usual and the number in service proves their popularity. Extreme lightness permits their use as hand telephones with comfort.

The column is of metal and so plated as not to become brassy with handling. The base is standard enamel or nickel plated. A leather belt cord around the bottom prevents marring the desk.

The mechanism is dust proof and easy of inspection, being located in the column and removeable as a unit. The hook-switch is the vertical lever adjustable tension type, one contact only—platinum points. The hook-switch and terminals are mounted on a hard rubber base and so arranged that by the removal of a screw they may be taken out for inspection without disconnecting the line wires.

The transmitter and all electrical connections are insulated from the stand avoiding any chance of accidental shock.

The lines of the stand are simple and graceful and together with the highly polished finish make a neat and attractive appearance.

The stand is equipped with the following standard parts:—Solid back transmitter, permanently adjusted receiver, vertical lever adjustable tension hook-switch and eight-foot four conductor green silk cord with standard tips.

This desk stand is intended to be used in connection with any of the desk set boxes shown on Page 11 of this bulletin. These boxes have an induction coil mounted inside.

By using an induction coil mounted on a separate base with proper terminals the stand may be used as an extension telephone, in connection with a wall instrument or another desk set.

Another combination, preferred by some, can be secured by using the separately mounted induction coil with an extension bell and condenser as shown on page 16 making a complete telephone.

With each combination we furnish our new ringer with knife edge bearing armature.

For circuit diagrams see page 16.

Order by code and avoid delay.

CODE.

DESK STANDARDS ONLY.

TYPE "N" COMMON BATTERY DESK STANDARD only, with:—No. 34 Transmitter head, No. 6 Receiver and cord, No. 16 Switch-hook, No. 16-A Induction Coil, and eight foot, four conductor green silk cord with standard tips.

COMPLETE DESK TELEPHONES.

Our Standard Common Battery Desk Telephone *complete* is a Type "N" common battery desk standard with a steel cabinet desk set box. This combination will be furnished on all orders not otherwise specified.

804-N STANDARD COMMON BATTERY PORTABLE DESK TELEPHONE consisting of:—Type "N" Common Battery desk standard, and No. 1 STEEL DESK SET BOX with No. 8 condenser and No. 16 Induction Coil.

A Type "N" standard with a wood cabinet desk set box—oak or walnut—can be furnished to order. When ordering this style it is necessary to specify, in addition to the code number, "Special—with No. 2 desk set box."

804-N "SPECIAL" COMMON BATTERY PORTABLE DESK TELEPHONE consisting of:—Type "N" Common Battery Desk standard and No. 2 OAK (or WALNUT) DESK SET BOX with No. 1 condenser and No. 16 Induction coil.

If the combination consisting of the desk standard, mounted induction coil, and extension bell is wanted, specify in addition to the code number "Special with No. 16-A Induction coil and No. 804 extension bell."

804-N "SPECIAL" COMMON BATTERY PORTABLE DESK TELEPHONE consisting of:—Type "N" Common Battery Desk Standard, No. 16-A Induction Coil and No. 804 EXTENSION BELL with No. 8 Condenser.

TYPE "N" SHOWING INTERIOR CONSTRUCTION

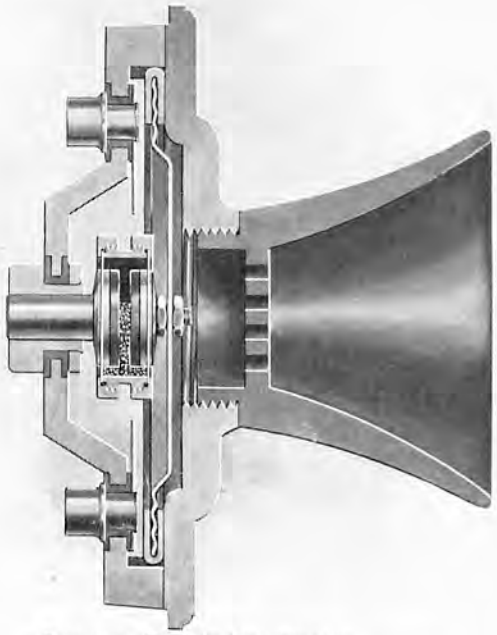
NOTE—This cut shows desk standard for magneto telephones. The common battery standard has two springs only in the hook switch.

The Transmitter.

SOLID BACK TRANSMITTER

In making a transmitter it is very essential that all parts should be made with extreme accuracy so that in assembling each of the various parts will occupy precise relations with the other parts. The construction should be so exact and so rigid that no unnatural distortion or relaxation of the metal parts can occur, producing thereby a permanent change of the relative position of the parts.

To meet these requirements, The North Carbon Cell, which is the most vital part of a solid back transmitter, is turned from solid brass stock instead of being formed from flat stock. A cell made from flat stock cannot be depended upon for accuracy and rigidity—there is always a tendency to straighten out and readjust itself.



SECTIONAL VIEW OF TRANSMITTER

The cell is provided with double mica diaphrams and highly polished carbon electrodes. The double mica diaphram permits a wider and freer amplitude of vibration and insulates both electrodes from the cell proper.

Any chance of packing is eliminated by the rigid mounting of the cell, the peculiar form of the cell and the small capacity of its chamber. A small amount only of a very light regular surfaced and highly polished carbon is used. By this method it can not shake down and settle as in the case where the cell is supported by the diaphragm.

All the vibrating parts are extremely light and the greatest care is exercised so that they will work with perfect freedom. The supporting parts are massive in construction and of materials that are not affected by changes in temperature or other causes.

This transmitter combines ample volume, deep penetration, perfect articulation and natural pitch, the essential qualities necessary to reproduce the voice, high or low, loud or soft, with perfect fidelity—a loud voice without breaking or blurring.

The full volume is attained by entirely eliminating dampening springs. There is no unequal pressure on one side of the diaphragm, which is dish-shaped for confining its action directly in the path of the voice vibrations.

Order by code and avoid delay.

CODE.

TRANSMITTER HEADS ONLY

No. 34 TRANSMITTER HEAD—solid back Common Battery. Used with Types "L", "M" and "N" Telephones, and on Transmitter mountings "D" and "G" (see page 13.)

No. 37 TRANSMITTER HEAD—solid back Common Battery—used with Type "R" Telephone.

For transmitters complete with arms specify code number for head as above, also code letter for mountings, as given on page 13, For example, No. 34 "D" Transmitter consists of a No. 34 Head and a "D" mounting .

The Receiver.

We have issued a bulletin (No. 25) describing our receiver in detail. We will confine ourselves to a brief enumeration of its many good points.

The adjustment is positive and permanent. The diaphragm rests on a bell shaped metal cup seat and can not be thrown out of adjustment by unequal expansion of hard rubber and magnet metal.

The construction is simple with no superfluous parts. Standard binding posts and cord tips are used. You can use any cord having a standard pin tip.

Our method of assembling prevents any possibility of foreign matter accumalating on the pole pieces.

The magnet steel is the best to be had, made up according to our special formula. The magnet is made from one piece. After it is bent it is carefully inspected, hardened and then magnetized This process gives the best form of permanent magnet made.

No. 6. Receiver

There are no exposed metal parts --no chance for accidental shocks.

The internal cup slips out of the shell when the cup is unscrewed, permitting inspection of all parts. All parts are standard and interchangeable, every like part is an exact duplicate. You can get repairs that will fit.

The superior quality of materials and workmanship, the excellence of design and beauty of outline, together with the great mechanical strength makes a receiver that will give the highest efficiency of service and the maximum of economy in operation.

CODE.

No. 6 PERMANENTLY ADJUSTED RECEIVER with cord. Used with all Common Battery Telephones.

No. 6. Receiver Shell Removed.

The Ringer.

Our new ringer is a radical departure from the usual.

The armature has knife edge bearings—no friction—cannot tighten or drop out of place. Adjusted by one screw.

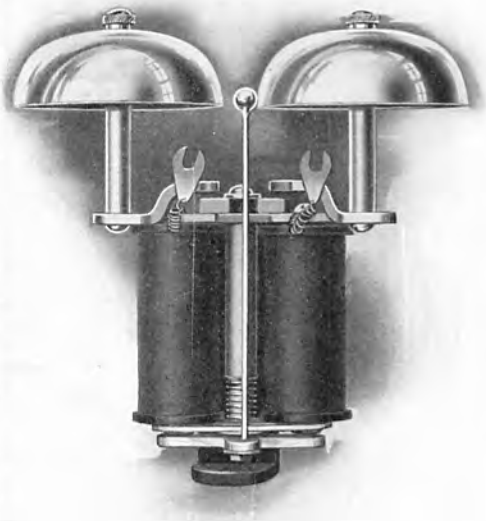
It is entirely self-contained—the gong stand is on the ringer base. The ringer is mounted on the cabinet by two extension lugs very close together. There is no chance of any wood shrinkage throwing them out of alignment.

Order by code numbers and avoid delay.

CODE.

No. 122. REGULAR ALTERNATING CURRENT RINGER 1000 ohms—used in all Common Battery Telephones except selective party line instruments.

No. 124. BIASED PULSATING CURRENT RINGER 1000 ohms—used in selective party line telephones.



Ringer with Knife Edge Bearing Armature.

Desk Set Boxes.

No. 1. Steel Cabinet Desk Set Box

Desk Set Box Open

Our steel cabinet desk set box, black enamelled finish is the standard type, furnished regularly with desk set telephones unless otherwise specified. The cabinet is of heavy drawn steel, carefully made and handsomely finished. Provided with hinged door and

No. 2. Oak Cabinet Desk Set Box

spring lock. The line wires are brought in through bushings in the back; the cord through a hard rubber bushing in the side. All terminals are inside where they will not be tampered with.

The wood cabinet desk set box is preferred by some and will be furnished when specified. This box is made of quarter sawed oak and is well finished. The terminals are outside. The condenser is mounted in the base.

These boxes are equipped with North's Standard apparatus, the same as furnished with the wall types of instruments.

Order by code and avoid delay.

CODE.

No. 1 COMMON BATTERY STEEL CABINET DESK SET BOX, equipped with:—No. 122 Ringer (1000 Ohms), No. 8 condenser and No. 16 Induction Coil.

No. 2 COMMON BATTERY OAK CABINET DESK SET BOX, equipped with:—No. 122 Ringer (1000 Ohms), No. 1 condenser and No 16 Induction Coil.

Condensers.

The finest quality of rice paper and pure tin foil is used in the manufacture of North's Condensers. Each condenser is mounted in a japanned metal case carefully sealed.

Each condenser is carefully tested, both for capacity and insulation resistance. They will stand indefinitely a pressure of 250 volts alternating current.

CODE.

No. 1	Condenser	2M.F.	Size—4¾ x 8¾ x ⅝	Inches
" 3	"	2M.F.	" —4¾ x 4½ x ⅝	"
" 4	"	1M.F.	" —4¾ x 4½ x ⅝	"
" 6	"	½M.F.	" —4¾ x 4½ x ⅝	"
" 7	"	1M.F.	" —2¼ x 4½ x ¾	"
" 8	"	2M.F.	" —2¼ x 4½ x ¾	"

Induction Coils.

CODE.

No. 16 INDUCTION COIL—Common Battery, not mounted. Used with Types "L", "R" and "M" Telephones also with desk set boxes Nos. 1 and 2.

No. 16-A INDUCTION COIL—mounted on maple base with binding post terminals. Used with "Special" Type "N" desk set combination as described on page 7 and furnished regularly with Type "N" Desk standards when the standard only is ordered.

Receiver and Desk Set Cords.

No. 6	Receiver Cord	Worsted,	30	inch.
" 6	"	"	36	"
" 6	"	" Green Silk	30	"

Type "N" Desk Stand Cord—Green Silk 8 foot 4 conductor.

Cordage—Green Silk—1 to 5 conductors by the yard.

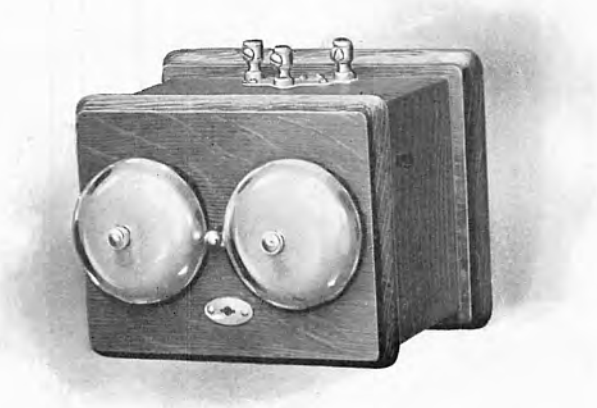
Extension Bells.

CODE.

No. 804 OAK EXTENSION BELL—No. 122 ringer (1000 Ohms) with No. 8 condenser, mounted in box. Used with special desk set combination page 1.

No. 122 OAK EXTENSION BELL—No. 122 ringer (1000 Ohms) without condenser. Used where condenser is mounted separately. See circuit page 16.

NOTE—Extension Bells cannot be furnished in walnut or mahogany.



EXTENSION BELL.

Transmitter Arms.

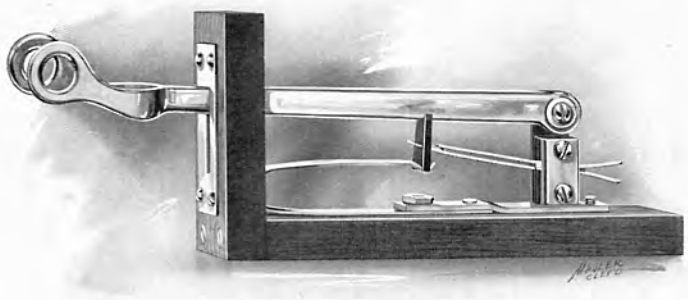
CODE.

"D" TRANSMITTER MOUNTING—as illustrated. Hollow pressed steel arm with oval base—enameled finish. Used on Type "L" telephone; takes transmitter head No. 34.

"G" TRANSMITTER MOUNTING—short rocker arm with circular mounting plate, nickel plated finish. Used on Type "M" telephone; take transmitter head No. 34.

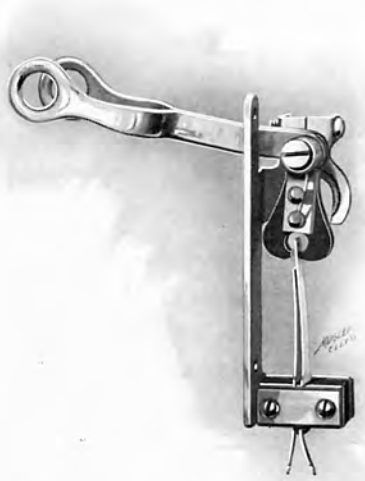
Transmitter heads shown on page 8.

Hook Switches.



No. 20. Horizontal Lever Hook Switch

North Hook Switches are strong, simple and reliable. The horizontal long-lever adjustable tension type is entirely self-contained. It has a heavy base made in one piece; the lever has a journal bearing hinge—does not depend on a screw to support it. The lever base and hinge form no part of the circuit. The controlling spring is German silver, long and flexible and capable of adjustment. The contact springs are German silver with pure platinum contacts.



No. 21. Vertical Spring Hook-Switch.

The Vertical Type is built along the same general plan as the long lever and in the use of a coiled controlling spring. The action of this hook is positive and perfect. It is entirely self-contained.

CODE.

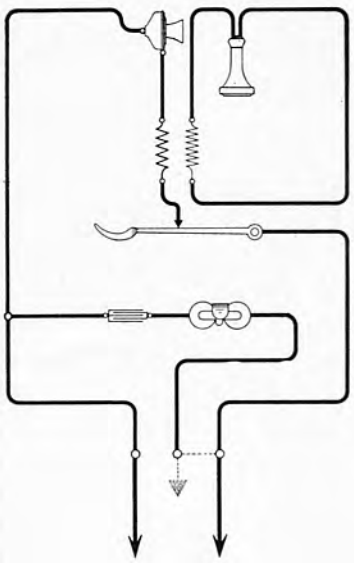
No. 20. HORIZONTAL LEVER HOOK SWITCH—used with Type "L" and "M" Telephones.

No. 21 VERTICAL SPRING HOOK-SWITCH—used with Type "R" Telephones.

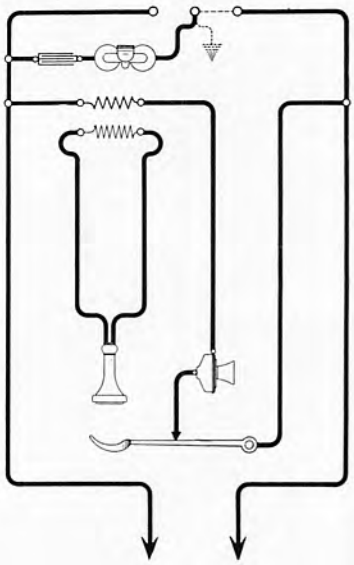
No. 16 VERTICAL SPRING HOOK-SWITCH—used with Type "N" desk set.

Circuit Diagrams.

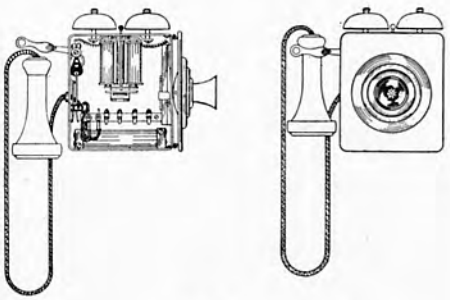
The circuit diagrams of instruments show the exact wiring of each type of telephone described herein. They are practically self-explanatory. The simplified diagrams will be found useful in tracing the more complex circuits.

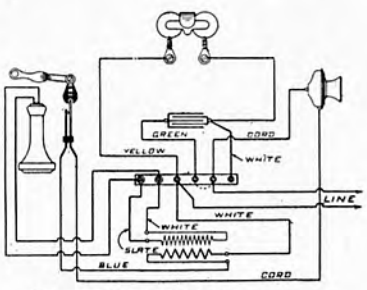


SIMPLIFIED CIRCUIT DIAGRAM OF WALL TELEPHONES

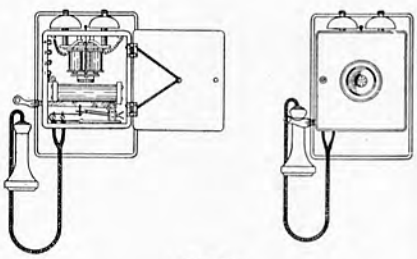


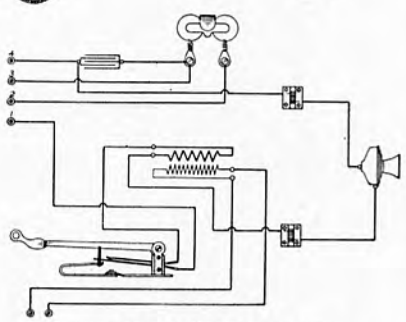
SIMPLIFIED CIRCUIT DIAGRAM OF DESK SET TELEPHONES.





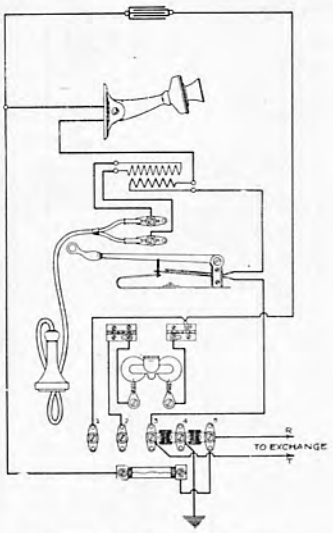
CIRCUIT NO. 804 "R" TELEPHONE.



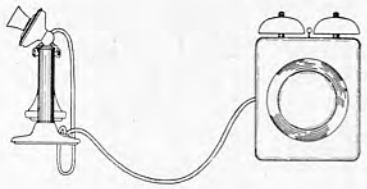


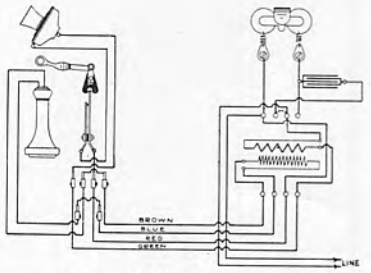
CIRCUIT NO. 804 "M" TELEPHONE.

Circuit Diagrams.

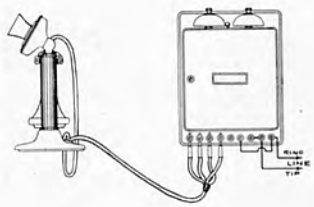


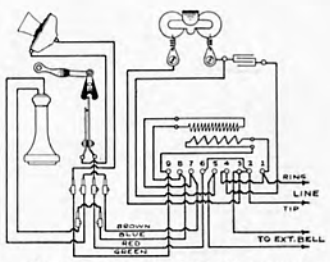
CIRCUIT 804 "L" TELEPHONE



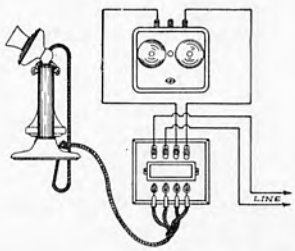


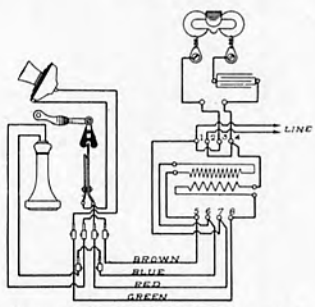
CIRCUIT 804 "N" TELEPHONE,
USING NO. 1 STEEL DESK SET BOX.





CIRCUIT NO. 804 "N" TELEPHONE.
USING NO. 2 WOOD DESK SET BOX.





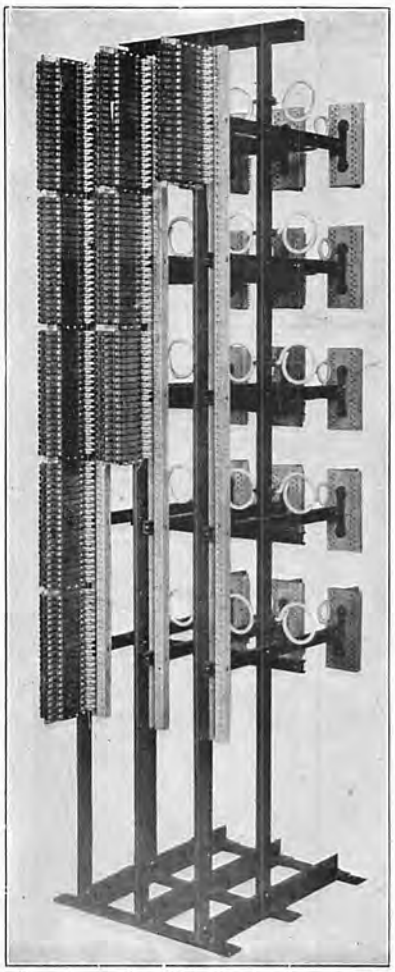
CIRCUIT NO. 804 "N" TELEPHONE
USING NO. 804 EXTENSION BELL.

THE NORTH ELECTRIC CO.

CLEVELAND, OHIO

Bulletin No. 36 May, 1906

Cook Protectors



TYPE L, Sectional Distributing Frame with strong and sneak current protectors arranged in banks of 20 pairs.

The purpose of this bulletin is to call attention to a well known line of apparatus providing a complete system of protection for:

1. Telephone Exchanges.
2. Subscribers Instruments.
3. Cables and Open Wires.

In the following pages will be found a detailed description of the construction and operation of these devices. Particular attention is called to the sectional construction of the exchange protectors and terminals. This makes them suitable for the smaller exchanges as well as the largest. It places the price of high class protectors within the reach of the small user, as it is necessary for them to purchase for their immediate needs only, and additions can easily be made from time to time as required.

Like our Unit Type Switchboards, you cannot outgrow them.

Exchange Protectors

TYPE L.

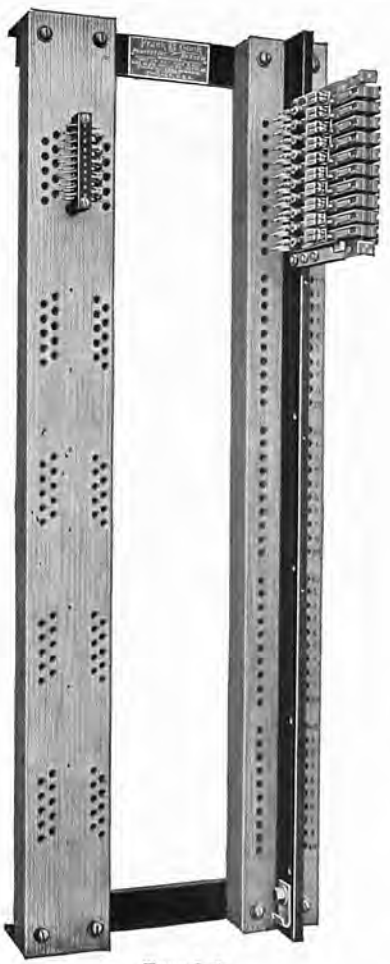
A combined distributing and protector frame consisting of an angle iron frame built in vertical sections of 100 to 200 pairs and protectors of the strong and sneak current type mounted in banks of twenty pairs.

New vertical frame sections can be

added at any time. The protectors can be readily attached to the frame as needed. Standard or self-soldering heat coils can be furnished as desired.

The frame is shown in the illustration on the first page. The uprights are of angle iron and are securely bolted to an angle iron base making a rigid and substantial frame work. To the uprights are secured horizontal strips of channel iron extending from front to back. To the front end of these strips are fastened vertical mounting bars to which protectors are secured.

Directly back of the protectors are mounted maple fanning strips extending full length of the rack. Each strip is drilled and numbered to correspond to the protector pairs directly in front of it.



TYPE L-3.
Capacity 50 and 100 pairs each.

At the back end of the horizontal strips directly opposite the protectors are the cable terminal blocks, mounted vertically in strips of twenty or twenty-five pairs each.

For distributing the cross-connecting wires a small insulated ring is placed directly back of each cable block and larger ones are secured to the vertical angle irons.

A set of horizontal channel irons extending lengthwise of the sections provides ready means of joining additional sections.

This protector is suitable for any size exchange, and is the standard type for 100 or more lines up to any capacity.

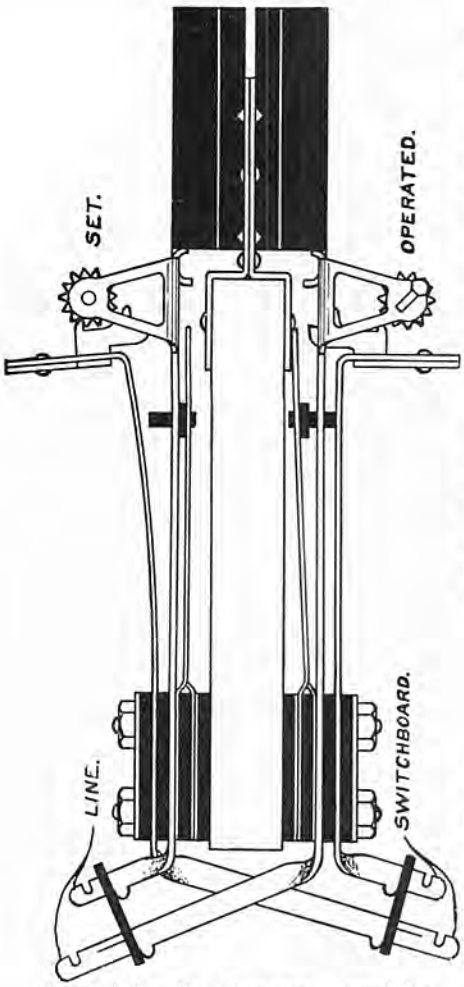
TYPE L-3.

For small installations of 100 lines or less, a special distributing board—Type L-3—is furnished. This board can be made up for either 50 or 100 pairs ultimate capacity.

The protectors are mounted in sectional banks of 10 pairs each. An initial capacity of only 10 pairs can thus be secured, and the capacity may be increased at any time by additions of 10-pair banks of protectors.

This board combines all the desirable features of the large distributing frame (Type L), but is intended to be fastened to the wall. It can be equipped with either the standard or self-soldering heat coil protectors.

Cook No. 8 Self-Soldering Protector



Sectional View No. 8 Protector. Actual Size.

The distributing frame (Type L or Type L-3) may be fitted with either the standard or the self-soldering heat coil. The No. 8 is the latest form of self-soldering protector. The self-soldering coil possesses many advantages over the old type. It repairs itself immediately after operation, and consequently costs nothing to maintain. It is a very simple matter to restore the springs to position after operating. This will be readily appreciated by examining the diagram.

The test plug and apparatus shown in the diagram (page 6) is designed to permit of testing every possible circuit or combination, by one insertion of the plug, without removing the heat coils or lightning arresters. The test plug is furnished with the protector, without extra charge.

No. 8 Heat Coil

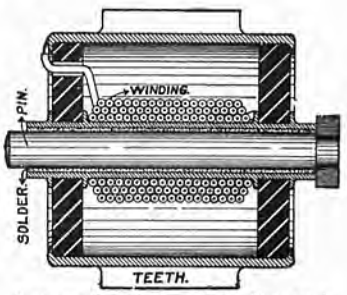
The heat coil itself is so constructed that it has no solder points exposed to the atmosphere at any time. This decreases the liability of corrosion and insures resoldering of the coil after operating. This coil never sticks.

The heat producing coil is concentrated around a fusible solder so that heat is applied directly to the solder. This insures quick and uniform operation of the coil.

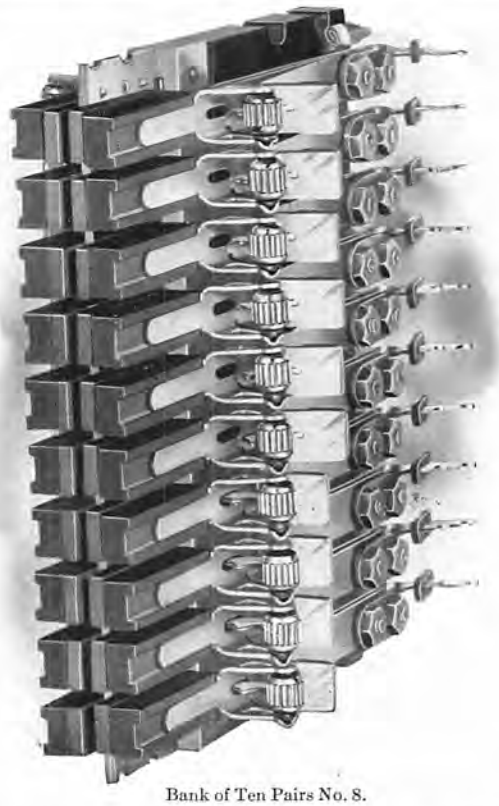
The winding, spool and all parts are enclosed so that no heat is lost. Variation in outside temperature, or air drafts will not affect operation.

When the coil operates it turns through only a small arc of a circle. This allows the solder to give or stretch slightly, without actually breaking the solder connection. This insures quick and permanent resoldering.

The low fusing point of the solder used will insure its melting before the winding becomes heated enough to injure the coil. The coil being completely enclosed in metal, is practically fire proof.



Section of No. 8 Heat Coil—Enlarged.



Bank of Ten Pairs No. 8.

The No. 8 is the only self-soldering protector made in which the circuit controlling spring can be reset in one operation.

The protector uses no bolts or pieces of wire in transposing line and switchboard terminals, thus removing all chance of loose connections in the circuit.

In point of construction it is the most simple protector made. It has few springs and only two contacts in the line circuit. It has a reliable automatic alarm, closed through one contact only.

INSTRUCTIONS FOR RESETTING.

To reset No. 8 protector, grasp end of spring between thumb and finger and pull it sideways.

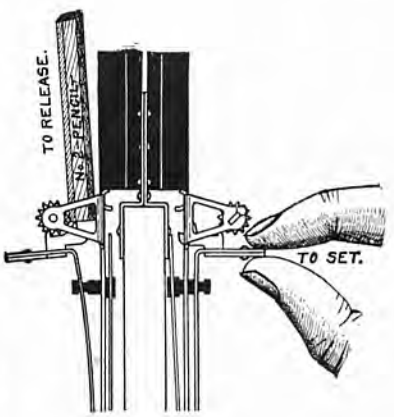
To trip protector, insert blunt end of a pencil or blade of a screw driver and push slightly.

To remove coil, take a thin piece of metal, like the point of a small screw driver, and insert it between the spring and the end of the coil; then spread apart enough to tip the coil out of the recess.

To insert a coil, place the round end of pin in first and press forward until the shouldered end snaps into position. It is sometimes necessary to turn the coil slightly to have it enter recess in spring.

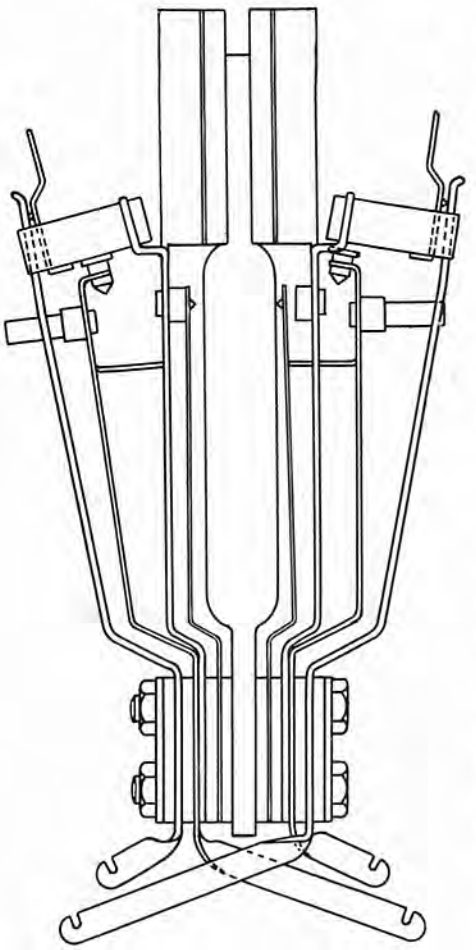
LIST PRICES.

TYPE L FRAME, with fanning strips and jumper rings, without protectors or cable terminals, 100 pair sections. . . .	$10.00
200 pair sections . . .	20.00
TYPE L-3 FRAMES, without protectors or cable terminal strips, 50 pair capacity	5.00
100 pair capacity	10.00
NO. 8. PROTECTORS, with heat coils and carbon arrester, 10 pair banks.	8.00
20 pair banks.	16.00
CABLE TERMINAL STRIPS TYPE L, per pair	.10
" " TYPE L-3 per pair	.10
NO. 8 HEAT COILS, each.	.10



Write for Discounts on Quantities.

Cook No. 14 Protector



Sectional View No. 14

The No. 14 Protector is not equipped with self soldering heat coils, but it is a protector which has given very general satisfaction. Mechanically it is very strong and rigid, and its operation has been uniformly reliable.

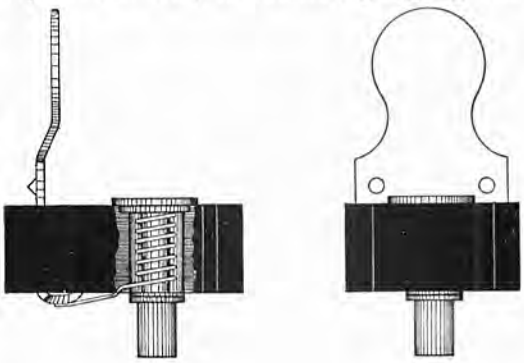
It may be seen from the diagram that no bolts or pieces of wire are used in transposing the line and the switchboard terminals. As no part of the circuit is carried on the bolts that attach the springs to the mounting bar, all chance of a loose connection in the circuit is removed.

The No. 14 Protector has a thoroughly reliable automatic alarm.

The heat coil (front and side views of which are shown) consists of a block of hard rubber, in which are mounted the spool with its windings, and a clip for removing or inserting the coil.

In the sectional view of the protector, one side shows the position of the springs before the coil has operated; the other side shows the position of the springs after the coil has operated. It will be seen that the tip, which is soldered to the end of the spool, is unsoldered and released when the solder melts, allowing the springs to operate.

The line spring, which engages the tip of the coil, is slotted, gripping the tip securely, and holding it in place so it will not drop down into the lower banks of springs.



The indicator, which shows when a certain coil has operated, is large and easily seen.

The springs are mounted on a plate of formed sheet metal, which is unusually strong, and so light that it greatly reduces the weight on the frame and mounting bar.

BANK OF 25 PAIRS, No. 14.

The coils can be repaired at a very slight expense, as it is necessary simply to resolder the tip to the spool.

The test plug and testing apparatus shown is designed to permit of testing every possible circuit or combination by one insertion of the plug, without removing the heat coils or lightning arresters.

The plug is furnished without extra charge.

CARBON LIGHTNING ARRESTERS.

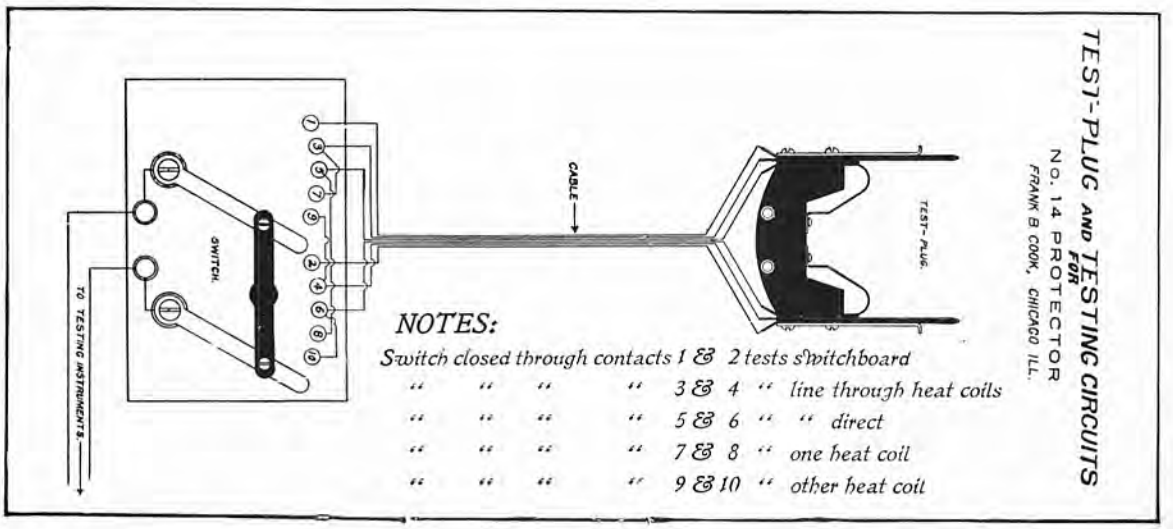
The No. 8 and the No. 14 Protector will be equipped with the regular form of carbon block arrester with mica separator or with the improved form of carbon arrester with a perforated celluloid dialectric, as desired.

The improved form is fully described in the description of Subscribers Station Protector, page 7

LIST PRICES.

No. 14, PROTECTOR, with heat coils and arresters, 10 pair banks	$ 8.00
20 pair banks	16.00
No. 14 HEAT COILS, each	.10
CARBON BLOCKS, sets (2 pieces)	.03
MICA SEPARATORS, per 100	1.00
CELLULOID SEPARATORS, per 100	.50

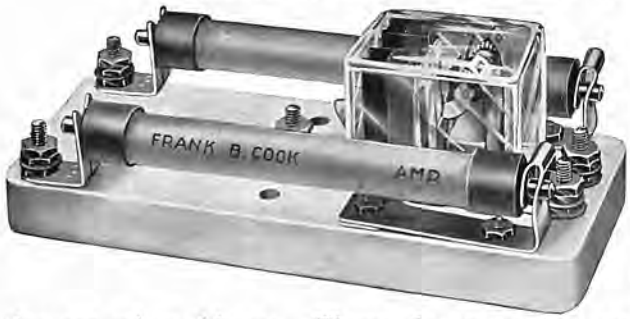
Write for Discounts on Quantities.



Cook Subscriber's Station Protectors

TYPE B-4.

Approved by the National Board of Fire Underwriters.



The Type B-4 Protector is equipped with Cook's new tubular fuses, with improved carbon lightning arresters, and with sensitive heat coils. All parts are mounted on a heavy porcelain base.

The new tubular fuse does not explode, does not give a flash, and does not continue the arc when blown. These fuses protect against heavy currents.

The improved carbon lightning arrester is provided with a perforated celluloid dialectric, in which the perforations are so small and so numerous that the discharge is greatly broken up, and is forced to pass through the arresters at many points. This prevents particles of carbon from breaking off and short circuiting the arrester. The celluloids do not vary in thickness, and are consequently uniform and reliable in their operation.

If an arc continues through the arrester, due to a cross with a high voltage circuit, the celluloid will melt and allow the springs to press the carbon blocks together and form a dead ground through the arrester. This stops the arc, after which, if the circuit increases sufficiently, the tubular fuse will blow and entirely cut out the instrument from the circuit.

The exposed surface of one carbon is insulated with an enamel, which prevents a short circuit from occurring at the exterior surface of the arrester. The fuses are clamped in place by a very simple spring device which holds them securely and insures perfect contact.

The sensitive heat coils protect against sneak currents. It is a very simple matter to reset the coils after they have operated.

The lightning arresters and heat coils are protected from dust and dirt by a glass cover. The cover also protects curtains and other inflammable material from coming in contact with the arrester, and prevents the subscriber from meddling with the heat coils or carbons.

Cook's Type B-4 Protector furnishes complete protection from lightning and from all forms of electric currents which may come over the line. It is designed to be placed inside of the building, and is so well made that it is really an ornament to any house or office.

LIST PRICES.

TYPE B-4 SUBSCRIBERS STATION PROTECTOR with heat coils and fuses, each	$1.00
Same without heat coils	.85
HEAT COILS, each	.10
TUBULAR FUSES, each	.15
CARBON BLOCKS, sets (2 pieces)	.03
CELLULOID SEPARATORS, per 100	.50

Write for Discounts on Quantities.

Pole Cable Terminals

There are certain original features common to all Cook Terminals.

Each type has a galvanized sheet metal cover, equipped with special springs which automatically lock the cover in place when it is raised, and hold it up. It is unnecessary to take off the cover and hang it up, when working on the terminal.

All terminals have a combination of fuses and carbon lightning arresters, furnishing complete protection against currents or electric discharges of all kinds.

The fuses are clamped in place by a very simple spring device, which holds them securely, and insures perfect contact. All the old style nuts and screws are done away with, and it is impossible even for a careless man to leave a loose connection.

All terminals are mounted on heavy malleable-iron brackets thoroughly galvanized.

All terminals can be mounted on either the pole or the cross arm, and they will go where the old style polehouse would not—between the wires if necessary.

No balcony is necessary with these terminals. All connections are easy of access. The cable and the line conductors feed through separate holes in the base plate.

All terminals which are for use without pot-heads, and all junction boxes, are equipped with self-soldering nozzles.

Type S. W. Pole Cable Terminal

TYPE S. W.—FRONT VIEW.

NO POT-HEAD NECESSARY WITH THIS TERMINAL.

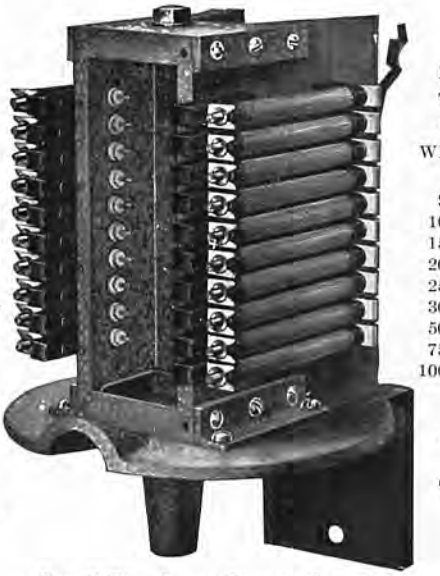
Has tubular fuses and carbon lighting arresters mounted on moisture-proof cable box.

Galvanized iron sliding cover makes it weather-proof.

Equipped with self-soldering nozzle.

No extra charge for nozzle.

All sizes, 10 pairs up.



TYPE S. W.—INSIDE, SHOWING CABLE CLIPS.

PRICES OF TYPE S. W. COMPLETE WITH COVER

SIZE	PRICE
10 Pair. .	$12.00
15 Pair. .	15.00
20 Pair. .	17.50
25 Pair. .	20.00
30 Pair. .	24.50
50 Pair. .	35.00
75 Pair. .	47.50
100 Pair. .	70.00

Prices on other sizes on application.

Write for Discounts on Quantities.

Type T-5 Pole Cable Terminal

TYPE T-5.—FRONT VIEW.

This terminal is the same in size and exterior appearance as the Type S. W., the difference being that the protectors are mounted upon hard maple strips, instead of on the sheet-metal box. THIS TERMINAL IS FOR USE WITH POT-HEAD ONLY.

PRICES.

COMPLETE WITH COVER.

SIZE.	PRICE.
10 Pair	$ 7.50
15 Pair	10.50
20 Pair	13.50
25 Pair	15.00
30 Pair	17.50
50 Pair	25.00
75 Pair	37.50
100 Pair	50 00

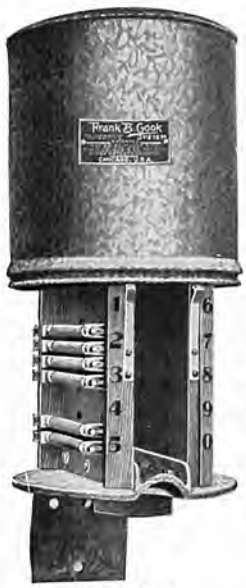
Prices on other sizes on application.

All sizes, 10 pairs up.

Type T-4 Pole Cable Terminal

This terminal is designed especially with a view to economy in first cost, and is particularly recommended for multiple tap cable work. The protectors are arranged on individual mountings, so that one pair can be added at a time. Any initial capacity can thus be secured, and the capacity can be increased as desired, by simply adding protector mounts. The terminals are made for either solder or screw connections. The uprights on which the protectors are mounted are hard maple strips.

THIS TERMINAL FOR USE WITH POT-HEAD.



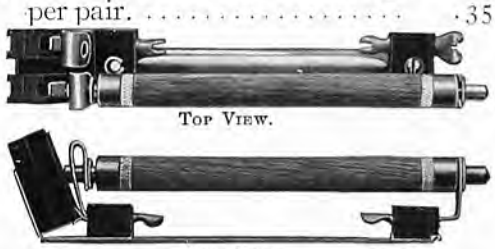
TYPE T 4

PRICES.

NOTE. These prices are for terminals only, complete with cover, but without individual protector mountings.

SIZE.	PRICE.
5 Pair	$3.50
10 Pair	3.50
15 Pair	4.00
20 Pair	4.50
25 Pair	5.00
30 Pair	5.50
35 Pair	6.00
40 Pair	6.50
45 Pair	7.00
50 Pair	7.50

Individual Protector Mountings, per pair. ..... .35



TOP VIEW.

SIDE VIEW.
INDIVIDUAL PROTECTOR MOUNTS.

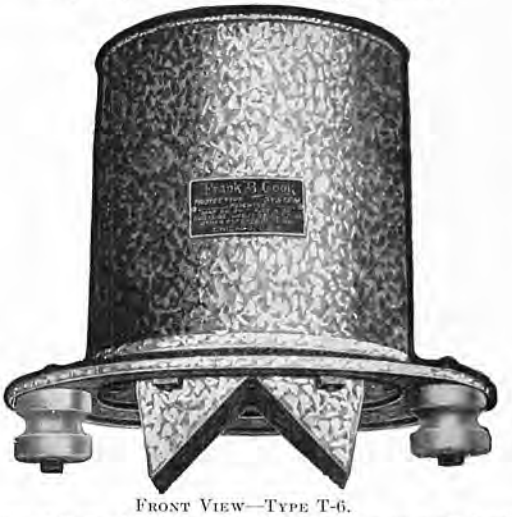
Write for Discounts on Quantities.

Type T-6 Pole Cable Terminal

This combines the terminal and distributing ring and is much neater, better and very much more economical than the old style distributing ring. As in T-4, the protectors can be mounted one pair at a time, and the porcelain knobs can also be added one at a time. Any initial capacity can be furnished and the capacity increased as desired.

Any capacity from 10 to 50 pairs.

TYPE T-6.
Showing cover raised. Three pairs of protectors mounted.



FRONT VIEW—TYPE T-6.
With cover down, showing saddle for mounting on roof of pole Also can be arranged for mounting on side of pole or cross arm.

THIS TERMINAL FOR USE WITH POT-HEAD.

PRICES.

NOTE. These prices are for terminals only, complete with cover, but without individual protector mountings, porcelain knobs or bolts.

SIZE.	PRICE.	SIZE.	PRICE.	SIZE.	PRICE.	SIZE.	PRICE.
5 Pair..	$4.50	20 Pair..	$6.00	35 Pair..	$8.00	45 Pair...	$9.00
10 Pair..	4.50	25 Pair..	6.50	40 Pair..	8.50	50 Pair...	9.50
15 Pair..	5.50	30 Pair..	7.00				

Individual Protector Mountings, per pair. 35
Porcelain Knobs, each. 02
Galvanized Bolt and Nut. . . .01

TYPE H.

Write for Discounts on Quantities.

Type H Protector Strip

Designed to be mounted in the ordinary pole house. Has the combination of the tubular line fuse and carbon lightning arresters mounted on hard rubber and maple strips. New style spring fuse contact clip insures positive contacts and prevents loose connections at the fuse. Any number of pairs per strip.

Price, per pair. $0.35

Type S. M. Pole Cable Terminal

TYPE S. M.—SIDE VIEW.

This terminal is practically the same in construction and design as the Type S. W. Instead of using the tubular fuses, a mica fuse is substituted, either the Postal or Western Union type being furnished. Type S. M. is designed to supply the demand for an inexpensive terminal, superior to any other mica terminal on the market.

All sizes, 10 pairs up.

NO POT-HEAD NECESSARY WITH THIS TERMINAL.

PRICES.

COMPLETE WITH COVER.

SIZE.	PRICE.
10 Pair	$ 8.00
15 Pair	9.50
20 Pair.	12.00
25 Pair	15.00
30 Pair.	17.50
50 Pair.	22.50
75 Pair.	35.00
100 Pair.	45.00

Prices on other sizes on application.

Type T. M. Pole Cable Terminal

TYPE T. M.
FRONT VIEW.

Same in design and appearance as Type T-5. Equipped with mica fuses and carbon lightning arresters.

FOR USE WITH POT-HEAD.

All sizes, 10 pairs up.

PRICES.

COMPLETE WITH COVER.

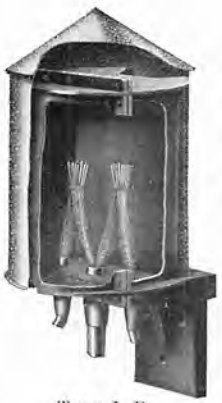
SIZE.	PRICE.
10 Pair.	$ 6.00
15 Pair.	7.50
20 Pair.	9.50
25 Pair.	11.00
30 Pair.	12.50
50 Pair.	18.50
75 Pair.	25.00
100 Pair.	35.00

Prices on other sizes on application.

Write for Discounts on Quantities

Cable Junction Boxes

TYPE J-B.



TYPE J. B.

Cook's Junction Box furnishes a most economical and simple means for installing and splicing main leads of cable, and extending branches of smaller cable to other distributing points. It renders sleeve splicing or wiped joints unnecessary. It makes cable testing a very simple matter, as the box can be opened more easily than can a cable joint. It is absolutely moisture-proof, and has a sliding galvanized sheet-metal cover which furnishes added protection. The Junction Box is equipped with self-soldering nozzles, and is made of two pieces of malleable-iron casting, a rubber gasket rendering the joint moisture-proof.

Combined Junction Boxes & Pole Cable Terminals

The Junction Box can be furnished separate (Type J. B.) or combined with any type of terminal. If desired the Junction Box may be installed and the terminal added at any future time. This is a new and original feature of the Cook box.

PRICES.

Junction Box only, no hood	$4.00
Junction Box for attaching terminal	4.50
Galvanized hood	.50

To get price of Combination Terminal and Junction Box, add price of Junction Box only to price of the particular size and style of terminal wanted.

COMBINED TERMINAL AND JUNCTION BOX.

Self-Soldering Nozzles

	EACH.
10 pair to 25 pair cable	$0.75
30 pair to 50 pair cable	1.00
60 pair to 100 pair cable	1.25
Larger than 100 pair cable	1.50

Write for Discounts on Quantities.

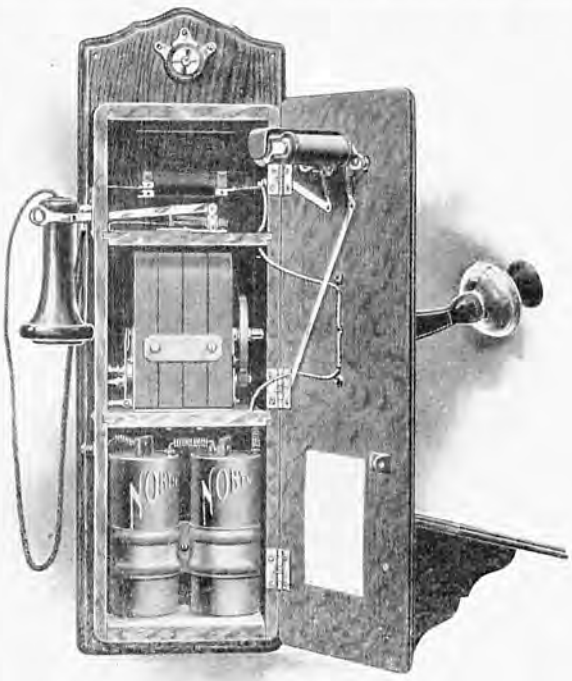
THE NORTH ELECTRIC CO.

KANSAS CITY, MO. CLEVELAND, OHIO DALLAS, TEXAS

Bulletin No. 39 September, 1907

Standard Magneto Telephones.

In the selection of telephone apparatus, quality is far more important than first cost. This is particularly true in telephones used on rural lines, as they are generally widely scattered, and to reach them in most cases involves loss of time and frequently livery hire. Then again, it is seldom that the small or isolated rural system employs an inspector capable of making repairs which are required, particularly in the case of a cheap telephone. The additional cost of repairing a cheap telephone will, within a short time, more than counterbalance the higher first cost of a superior one. In addition to this the service derived from a high grade telephone, requiring little if any attention from the inspector, is much more satisfactory than it is possible to obtain by use of an inferior telephone, which is often disabled until it receives the attention of some one who is capable of again placing it in working order.



TYPE "K" OPEN

A matter of great importance in the selection of telephones for rural lines is their adaptability for both local and long-distance service. A few years ago when the first rural telephone lines were built, the fact was not considered that they would ultimately become tributaries or branches of systems covering counties and even

states, and as a result the lines were very often built of low grade material, and telephones used were generally worthless beyond a few miles.

The rapid development and extension of lines within the last few years has made it possible for subscribers of rural lines having exchange connections to talk to large cities or other points, in some cases several hundred miles distant.

In designing NORTH'S telephones for either exchange or rural service, the first thought has been to produce an efficient and durable telephone, wherein the item of repairs or attention after its installation has been reduced to the minimum. It is very seldom that these telephones require other attention than the replacing of exhausted batteries after one or two years. This does not require the services of an experienced person, as it is a very simple operation which can, and should be, done by the user of the telephone.

The greatest mechanical and electrical skill are combined in designing and constructing NORTH'S telephones. As a result, they are recognized, by all the leading independent exchanges, as unexcelled in quality of service and durability.

The standard cabinets are genuine quarter sawed oak. They are strong and well built from thoroughly seasoned material. The corners are dove-tailed—the back and shelves are securely attached with screws. Every cabinet is filled, varnished and hand polished.

All exposed metal parts are given a polished nickeled or hard black enamel finish.

All working parts are NORTH'S standard and interchangeable, of guaranteed efficiency and durability. These parts are described and illustrated on pages 14 to 24 of this bulletin. Furnished in either oak or walnut cabinets. Quarter sawed oak is the standard and furnished unless otherwise specified.

Types of Cabinets.

Briefly stated our Standard Magneto Telephones are made up in three different styles or types—two wall and one desk. Each of these types have the same talking equipment and for the same service are furnished with practically identical signalling apparatus. Either type can be furnished for series or bridging service as desired and with three, four or five bar generators and 80 to 3500 ohm ringers.

The word "Type" with a designating letter indicates the style of cabinet or outside appearance only, and has no reference to the character of the ringer and generator with which the telephone is equipped.

Numbers are used exclusively to designate variations in generator strength and ringer resistance. A complete catalogue code for a telephone consists of a letter and a number, indicating thereby both the style of telephone and signalling equipment. Both the letter and the number should always be given when ordering.

TYPE "K" is our standard compact cabinet dry battery wall telephone which we recommend as being the best style adapted for general service. For illustrations and description see page 8.

TYPE "A" is our standard wide battery box cabinet, not so well known as our Type K—but equally as good and preferred by some, especially where the use of two wet batteries are desired. Fully described on page 10.

Type "N" is our standard desk set telephone for general use. Described on page 12.

Series and Bridging Telephones.

Series and Bridging telephones differ as to the manner in which the apparatus is connected and the size of the generators and resistance of their ringers.

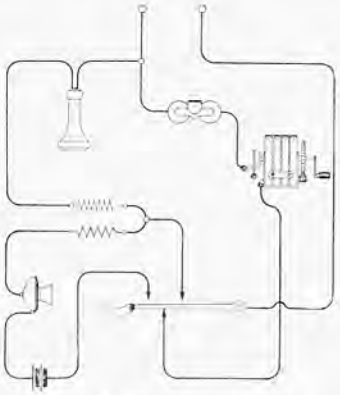


FIG. 1. SIMLIFIED CIRCUIT SERIES TELEPHONE.

The apparatus of a series telephone is connected as shown in the "Simplified Circuit Diagram," Fig. 1. They are intended to be used for exchange and private line service and are connected to the line as shown in circuit diagrams Fig. 2 and Fig. 3. As will be seen by these diagrams, it is necessary for the voice currents to pass through the windings of each ringer and as the coils connected in this manner have a tendency to impair the talking efficiency of the line, it is recommended that they be limited to individual exchange lines and private lines having not more than three or four stations. The ringers of series instruments are wound to 80 ohms resistance and they are equipped with three bar generators. This enables them to be sold at a comparatively low price and quite a saving in cost may be affected by using them for individual exchange service.

The apparatus of a bridging telephone is connected as shown in the Simplified Circuit Fig. 4. They are intended to be used for Rural Systems and Toll Line Service where a number of instruments are used on one line. They are connected to the line as shown in the circuit diagrams Fig. 5 and Fig. 6. These instruments are so arranged that the ringers are connected across instead of in the line as with the series

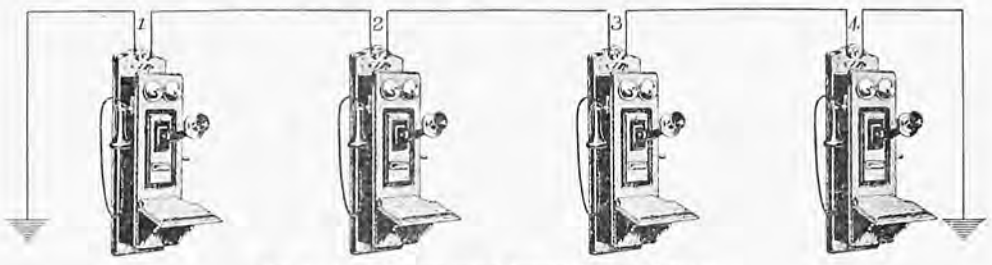


FIG. 2. LINE CONNECTIONS SERIES GROUND CIRCUIT.

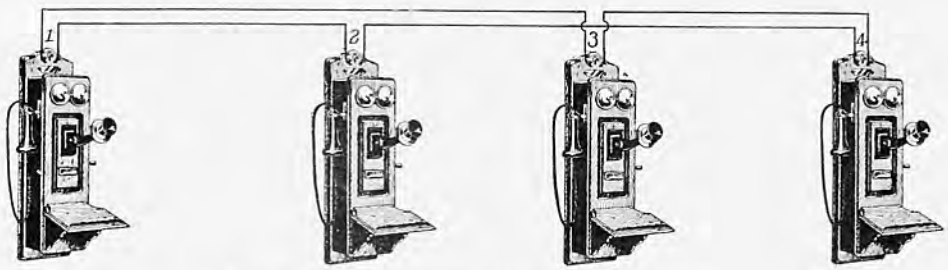


FIG. 3. LINE CONNECTIONS SERIES METALLIC CIRCUIT.

telephone. By this arrangement the voice currents will not pass through or be impaired by the ringer coils. This arrangement also affords more efficient signalling on heavily loaded lines. Bridging telephones are furnished with three, four or five bar generators and with ringers from 500 to 3500 ohms resistance depending upon the number of telephones that will be placed on the line.

Series and bridging telephones will not work well on the same line. It is absolutely essential that the ringers of all telephones used on any one line be wound to the same resistance.

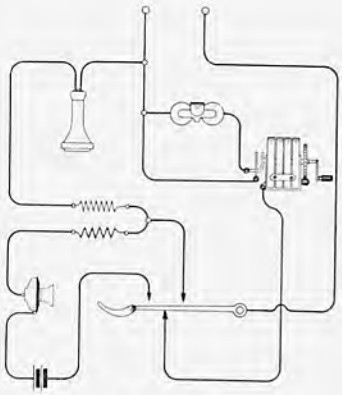


FIG. 4. SIMPLIFIED CIRCUIT BRIDGING TELEPHONE.

Selecting a Telephone.

The choice of cabinet depends entirely upon the style preferred by the purchaser and the place it is to be used. As to the circuit and class of equipment with which the telephone is to be fitted, the following estimates as to the number of telephones which can be used on the line under ordinary conditions, will be found well within the limits insuring reliable and satisfactory service.

FOR EXCHANGE SERVICE.

No. 2 SERIES TELEPHONE; 80 ohm ringer; 3 bar generator.

For exchange service, can be used in connection with series clearing out drops or can be used on series party lines where not to exceed ten telephones are used on one line. It is not designed or recommended for rural lines.

No. 12 Bridging telephone; 500 ohm ringer; 3 bar generator.

For exchange use, can be used in connection with series or bridging clearing out drops where not to exceed two telephones are used on one line.

No. 22 Bridging telephone; 1000 ohm ringer; 3 bar generator.

Can be used for exchange service in connection with bridged clearing out drops or bridged party lines where not to exceed six telephones are used on one line.

FOR BRIDGING RURAL OR TOLL LINES.

No. 32 Bridging telephone; 1000 ohm ringer; 4 bar generator.

Can be used on bridged party lines where not to exceed fifteen telephones are used on one line.

No. 42 Bridging telephone; 1600 ohm ringer; 4 bar generator.

Can be used on bridged party lines where not to exceed twenty telephones are used on one line.

No. 52 Bridging telephone; 1000 ohm ringer; 5 bar generator.

Can be used on bridged party lines where not to exceed thirty telephones are used on one line.

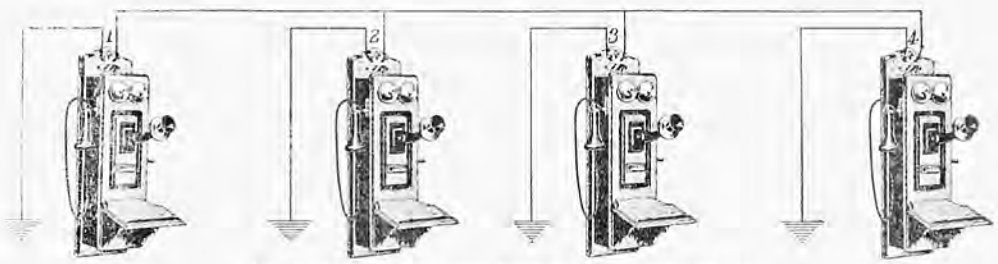


Fig. 5. Line Connections Bridging Grounded Circuit.

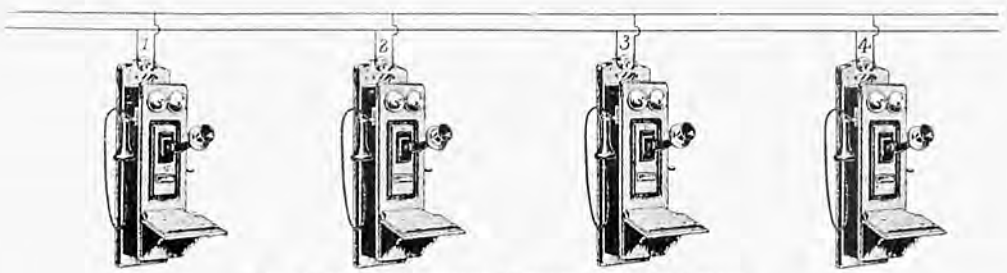


Fig. 6. Line Connections Bridging Metallic Circuit.

No. 62 BRIDGING TELEPHONE; 1600 ohm ringer; 5 bar generator.

Can be used on bridged party lines where not to exceed forty telephones are used on one line.

No. 72 BRIDGING TELEPHONE; 2000 ohm ringer; 5 bar generator.

Can be used on bridged party line where not to exceed forty-five telephones are used on one line.

No. 82 BRIDGING TELEPHONE; 2500 ohm ringer; 5 bar generator.

Can be used on bridged party lines where not to exceed fifty telephones are used on one line.

No. 92 BRIDGING TELEPHONE; 3500 ohm ringer; 5 bar generator.

Can be used on bridged party lines where more than fifty telephones are used on one line, or where the character of the line is such as to require the use of the most powerful telephone obtainable, or where a large margin over the actual requirements is particularly desirable.

It will, of course, be understood, that the length of the line has some influence upon the number of telephones which can be used on it.

Classifications of code numbers outlined above is that applying to average conditions, and if the line upon which telephones are to be used is an extremely long one, or if the conditions are exceptional, these facts should be taken into consideration in making a selection of telephones.

Condensed Code List.

TYPE "K" COMPACT WALL TELEPHONE.

TYPE "A" WIDE WALL TELEPHONE.

TYPE "N" PORTABLE DESK TELEPHONE.

No.	CABINET		GENERATOR	RINGER
2	K-A-or-N	Series	3 Bar	80 ohms
12	" " "	Bridging	3 "	500 "
22	" " "	"	3 "	1000 "
32	" " "	"	4 "	1000 "
42	" " "	"	4 "	1600 "
52	" " "	"	5 "	1000 "
62	" " "	"	5 "	1600 "
72	" " "	"	5 "	2000 "
82	" " "	"	5 "	2500 "
92	" " "	"	5 "	3500 "

Important.

Always give both CODE NUMBER and CODE LETTER when ordering.

OAK is the standard woodwork and will be furnished on all orders not otherwise specified.

WALNUT or MAHOGANY finish not carried in stock; furnished to special order only.

Unless otherwise specified all telephones will be equipped with receivers having PURE HARD RUBBER SHELLS. Composition shells carried in stock and furnished to order.

All telephones will be equipped with the carbon back transmitter unless otherwise ordered. Solid Back Transmitter furnished if desired, no extra charge.

Special Telephones.

Standard telephones only are shown in this bulletin. Special telephones, with biased ringers, direct current generators, telephones with grounding key, silent ringing and two and four party selective telephones, also non-interfering telephones fully described and illustrated in Bulletin No. 40. A copy of this bulletin will be mailed on application.

Type "K" Wall Telephones.

TYPE "K" TELEPHONE.
(See open view on first page.)

This type of telephone has a wide popularity which it well deserves. We have been selling many thousands of these annually and our sales continue to increase.

The popularity of this instrument is due in part to its simplicity, its symmetrical and pleasing appearance and the accessibility of parts. More than anything else, however, that has given it such a prestige over other types and makes is the extreme care and attention to details in its manufacture, the thoroughly honest and conscientious effort that is continually being put forth, in the selection of the very best material, and the making and assembling the various parts. The product is a telephone built for service—continuous and efficient—a high grade, first-class, durable instrument.

We recommend this type for general use—for exchange and rural service—for long distance toll circuits and private lines.

The battery compartment is designed to accommodate two cells of standard dry batteries.

Each instrument is equipped with the following standard parts—Carbon back transmitter No. 9 or new solid back transmitter No. 31. Pressed steel hollow transmitter arm No. "D"; Permanently adjusted receiver No. 6 with cord; Horizontal lever

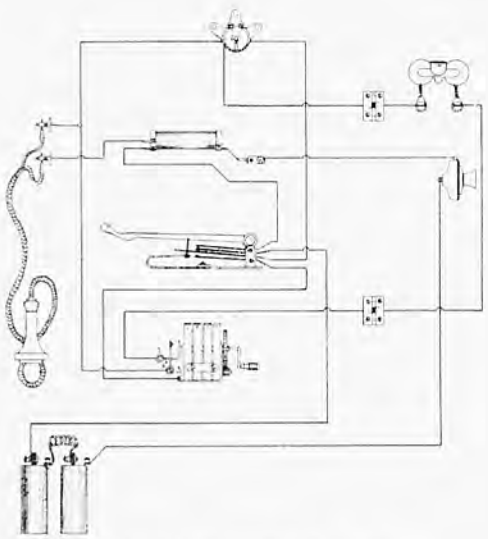
adjustable tension hook switch No. 11; Induction coil No. 10 and Carbon Plate Lightning Arrester No. 3—also New ringer with knife edge bearing armature and generator as listed below.

Order by code and avoid delay.

CODE

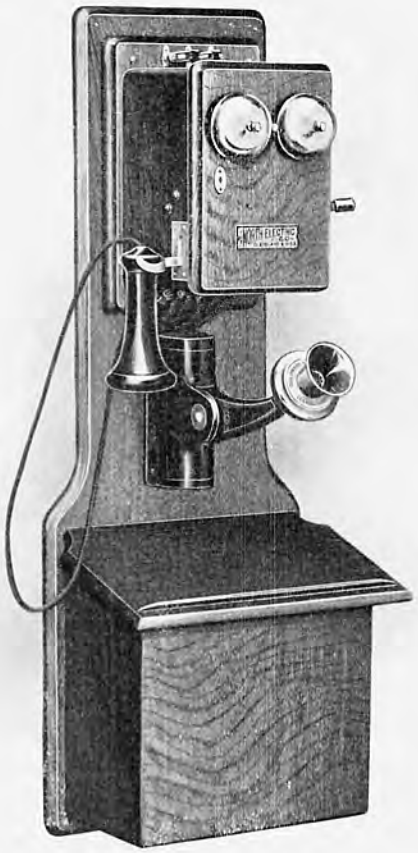
No.		Generator	Ringer
2 K	Series	No. 2 3 bar	No. 102 80 ohm
12 K	Bridging	No. 12 3 "	No. 112 500 "
22 K	"	No. 12 3 "	No. 132 1000 "
32 K	"	No. 42 4 "	No. 132 1000 "
42 K	"	No. 42 4 "	No. 142 1600 "
52 K	"	No. 52 5 "	No. 132 1000 "
62 K	"	No. 52 5 "	No. 142 1600 "
72 K	"	No. 52 5 "	No. 172 2000 "
82 K	"	No. 52 5 "	No. 182 2500 "
92 K	"	No. 52 5 "	No. 192 3500 "

NOTE—Please read remarks on page 7 when ordering.



Circuit Type "K" Telephone.
Series or Bridging.

Type "A" Wall Telephones.



TYPE "A" TELEPHONE.

Wide battery box, conventional form of telephone—designed to accommodate two cells of wet batteries where desired. Built with the same care and attention to detail as the Type K and equipped with practically identical apparatus.

The standard cabinet is quarter sawed oak—walnut or mahogany finish to order. Furnished regularly with two cells of dry batteries. Wet batteries will be furnished to order at a slight additional cost.

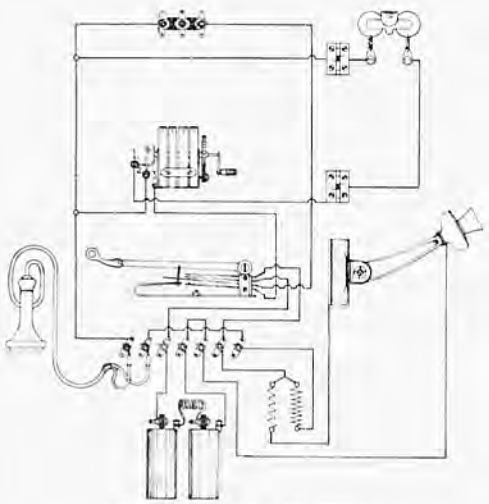
Each instrument equipped with the following standard parts:—Carbon back transmitter No. 5 (solid back transmitter No. 32 supplied when specified), Enamelled transmitter arm No. "A" with No. 1 Induction coil mounted in base; permanently adjusted receiver No. 6 with cord; Horizontal lever adjustable tension hook-switch No. 11, and Carbon block arrester No. 1—also New ringer with knife edge bearing armature and generator as listed below.

Order by code and avoid delay.

CODE

No.		Generator	Ringer	
2 A	Series	No. 2 3 Bar	No. 102	80 ohm
12 A	Bridging	No. 12 3 "	No. 112	500 "
22 A	"	No. 12 3 "	No. 132	1000 "
32 A	"	No. 42 4 "	No. 132	1000 "
42 A	"	No. 42 4 "	No. 142	1600 "
52 A	"	No. 52 5 "	No. 132	1000 "
62 A	"	No. 52 5 "	No. 142	1600 "
72 A	"	No. 52 5 "	No. 172	2000 "
82 A	"	No. 52 5 "	No. 182	2500 "
92 A	"	No. 52 5 "	No. 192	3500 "

NOTE—Please read remarks on page 7 when ordering.



Circuit Type "A" Telephone
Series or Bridging.

TYPE "N" DESK STANDARD.

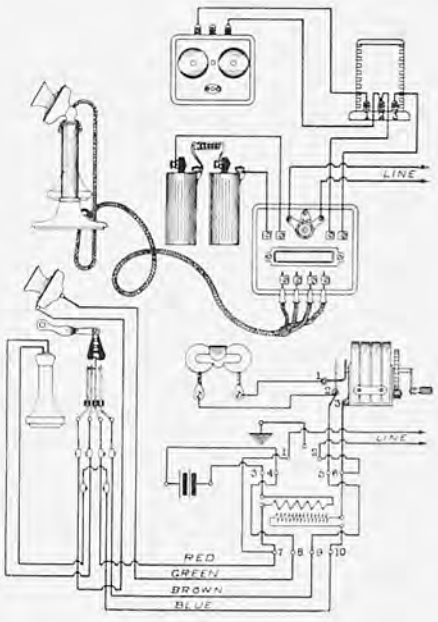
Type "N" Desk Set Telephone.

The simple and graceful outlines of this portable telephone—its highly polished finish and extreme lightness makes a very attractive instrument and one that has become very popular since its introduction.

The column is of metal and so plated as not to become brassy with handling. The base is standard enamel or nickel plated. A leather belt cord around the bottom prevents marring the desk.

The mechanism is dust proof and easy of inspection, being located in the column and removable as a unit. The hook-switch is the vertical lever adjustable tension type—platinum points. The hook-switch and terminals are mounted on a hard rubber base and so arranged that by the removal of a screw they may be taken out for inspection without disconnecting the line wires.

The transmitter and all electrical connections are insulated from the stand avoiding any chance of accidental shock.



CIRCUIT TYPE "N" TELEPHONE SERIES OR BRIDGING

The stand is equipped with the following standard parts:—Carbon back transmitter No. 9 (new solid back transmitter No. 31 supplied when specified); permanently adjusted receiver No. 6 with cord; Vertical lever adjustable tension hookswitch No. 7 and eight foot four conductor green silk cord with standard tips; Induction Coil and Terminal Block No. 12 A, and two cells of dry battery.

A complete Portable desk telephone consists of a Type "N" stand with generator and ringer. In the standard form these are mounted in separate boxes as shown on pages 21 and 22. This arrangement is furnished regularly on all orders not otherwise specified. Another form as shown on page 22 with generator, ringer and induction coil mounted in one box will be furnished to order.

The standard boxes are oak. Walnut or mahogany to order, not carried in stock.

Order by code and avoid delay.

CODE

No.		Generator		Extension Bell	
2 N	Series	No. 12 3 Bar	Mounted	No. 102	80 ohm
12 N	Bridging	No. 12 3 "	"	No. 112	500 "
22 N	"	No. 12 3 "	"	No. 132	1000 "
32 N	"	No. 12 4 "	"	No. 132	1000 "
42 N	"	No. 12 4 "	"	No. 142	1600 "
52 N	"	No. 52 5 "	"	No. 132	1000 "
62 N	"	No. 52 5 "	"	No. 142	1600 "
72 N	"	No. 52 5 "	"	No. 172	2000 "
82 N	"	No. 52 5 "	"	No. 182	2500 "
92 N	"	No. 52 5 "	"	No. 192	3500 "

Type "N" Showing Interior Construction.

Carbon Back Transmitter.

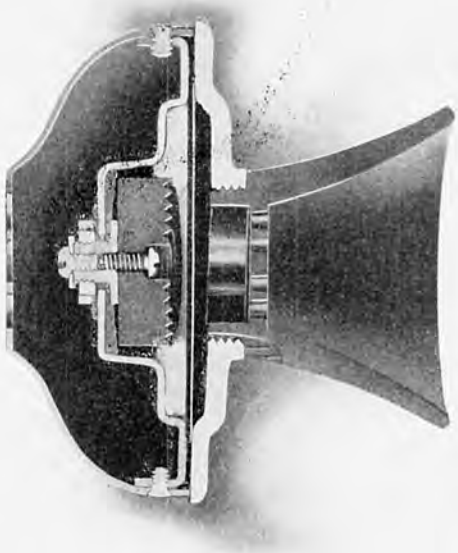
This well known form of transmitter is so familiar to all telephone users that a detailed description would be superfluous. The NORTH Carbon Back Transmitter is the standard type that we have been furnishing with our telephones for several years. The universal good service which it has given and its proven ability to stand continued and hard usage has confirmed our opinion that for general service it would be difficult to devise a more simple, better talking and durable instrument.

Its large number of satisfied users attest its popularity.

This form of transmitter is furnished regularly with our standard magneto telephones. The solid back type will be furnished to order and at the same price.

Order by code and avoid delay.

CARBON BACK TRANSMITTER.



CARBON BACK TRANSMITTER.
SECTIONAL VIEW.

CODE

TRANSMITTER HEADS ONLY.

No. 9 TRANSMITTER HEAD—carbon back—local battery. Used with Type "K" and "N" telephones and on Transmitter mounting "D."

No. 5 TRANSMITTER HEAD—carbon back—local battery. Used with Type "A" telephones and on Transmitter mounting "A."

NOTE—For transmitter complete with arms, specify code number for head as above, also code letter for mounting as given on page 23. For example No. 9 "D" transmitter consists of a No. 9 head and a "D" mounting.

Solid Back Transmitter.

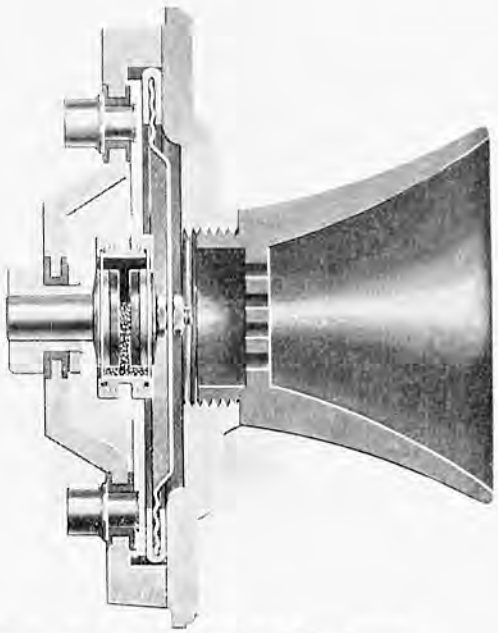
In making a solid back transmitter it is very essential that all parts should be made with extreme accuracy so that in assembling each of the various parts will occupy precise relations with the other parts. The construction should be so exact and so rigid that no unnatural distortion or relaxation of the metal parts can occur, producing thereby a permanent change of the relative position of any of the parts.

SOLID BACK TRANSMITTER HEAD SPELL REMOVED.

To meet these requirements, the NORTH Carbon Cell, which is the most vital part of a solid back transmitter, is turned from solid brass stock instead of being formed from flat stock. A cell made from flat stock cannot be depended upon for accuracy and rigidity—there is always a tendency to straighten out and re-adjust itself.

The cell is provided with double mica diaphragms and highly polished carbon electrodes. The double mica diaphragm permits of a wider and freer amplitude of vibration and insulates both electrodes from the cell proper.

Any chance of packing is eliminated by the rigid mounting of the cell, the peculiar form of the cell and the small capacity of its chamber. A small amount only of a very light regular surfaced and highly polished carbon is used. By this method it can not shake down and settle as in the case where the cell is supported by the diaphragm.



SECTIONAL VIEW OF SOLID BACK TRANSMITTER.

All the vibrating parts are extremely light and the greatest care is exercised so that they will work with perfect freedom. The supporting parts are massive in construction and of materials that are not affected by changes in temperature or other causes.

This transmitter combines ample volume, deep penetration, perfect articulation and natural pitch, the essential qualities necessary to reproduce the voice high or low, loud or soft, with perfect fidelity—a loud voice without breaking or blurring.

The full volume is attained by entirely eliminating dampening springs. There is no unequal pressure on one side of the diaphragm, which is dish shaped for confining its action directly in the path of the voice vibrations.

Order by code and avoid delay.

CODE

TRANSMITTER HEADS ONLY.

No. 31 TRANSMITTER HEAD—solid back—local battery. Used with type "K" and "N" telephones and on transmitter mounting "D."

No. 32 TRANSMITTER HEAD—solid back—local battery. Used with type "A" telephone—and on transmitter mounting "A."

NOTE—For transmitters complete with arms specify code number for head, as above, also code letter for mounting as given on page 23. For example No. 31 "D" transmitter consists of No. 31 head and "D" mounting.

No. 6. RECEIVER.

The Receiver.

We have issued a bulletin (No. 25) describing our receiver in detail. We shall, therefore, confine ourselves to a brief enumeration of its many good points.

The adjustment is positive and permanent. The diaphragm rests on a bell shaped metal cup seat and cannot be thrown out of adjustment by unequal expansion of hard rubber and magnet metal.

The construction is simple with no superfluous parts. Standard binding posts and cord tips are used. You can use any cord having a standard pin tip.

Our method of assembling prevents any possibility of foreign matter accumulating on the pole pieces.

The magnet steel is the best to be had, made up according to our own special formula. The magnet is made from one piece. After it is bent it is carefully inspected, hardened and then magnetized. This process gives the best form of permanent magnet made.

There are no exposed metal parts—no chance for accidental shocks.

The internal cup slips out of the shell when the cup is unscrewed, permitting inspection of all parts. All parts are standard and interchangeable, every like part is an exact duplicate. You can get repairs that will fit.

The superior quality of materials and workmanship, the excellence of design and beauty of outline together with the great mechanical strength, makes a receiver that will give the highest efficiency of service and the maximum of economy in operation.

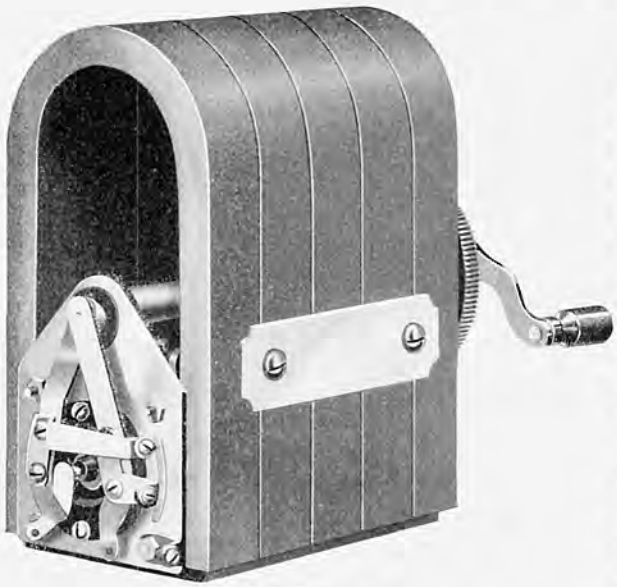
CODE

No. 6 Permanently adjusted receiver with cord. Used with all Standard Magneto telephones.

No. 7 Same as No. 6 except shell is composition. Furnished with telephones when specially ordered and at a slight reduction in price.

No. 6. Receiver Shell Removed.

The Generator.



FIVE BAR GENERATOR.

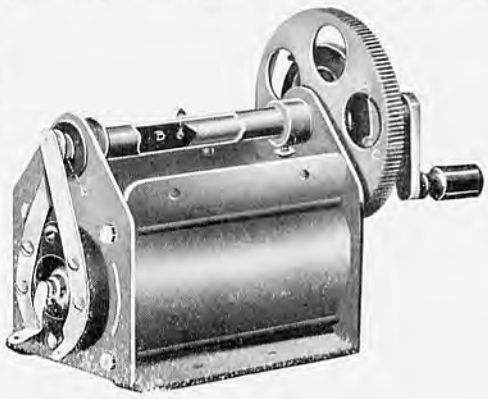
The generator is the largest and heaviest part of a magneto telephone and performs the hardest and most exacting labor. Consequently, unless it be carefully designed and constructed it will depreciate more rapidly and develop trouble earlier than any other part. Therefore it is essential that special attention be given this important piece of apparatus.

The generator that will give the most satisfactory results is the one that will produce a large volume of current of the proper wave form and at the correct voltage under the most exacting conditions of line load. These results depend upon the strength and permanency of the magnets and the correct design and construction of the armature and pole pieces. To insure noiseless running and positive action requires well balanced and carefully fitted parts made from the best material suited to the purpose.

North's generators are scientifically constructed and of carefully selected material, much of it being made up by our own special formula.

The end pieces are clamped to the pole pieces by full length bolts forming a very rigid frame. The armature and driving shafts and their bearings are milled accurately. The gear wheel has an extra wide face with accurately cut teeth of a peculiar form, guaranteed to run smoothly and noiselessly—insuring long life.

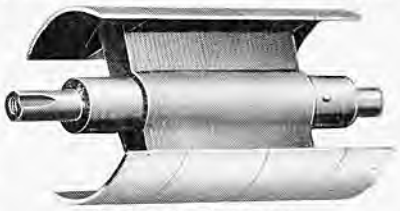
The automatic shunt mechanism is of the direct thrust type with special hardened steel shoulders insuring smooth and positive action. The shunt springs are of German silver—mounted in hard rubber and provided with platinum contacts.



GENERATOR FRAME.

The strength of a generator depends not so much on the number of the magnet bars as the quality of steel from which they are made. Our steel is our own special

formula. The magnets are cut and bent cold, then hardened by a careful process. They are then given a heavy magnetic charge before assembling on the frame. After the generator is complete they are again drawn over the poles of the magnetizer. We do not nickel plate the magnets as it has a tendency to weaken them. They are given a coat of red enamel instead.



GENERATOR ARMATURE.

The armature is made up of thin disks of soft iron assembled on a shaft and securely clamped in place. The extra large winding space and the peculiar construction of the end pieces permits of the use of larger wire than is usual—thereby increasing the current output of the generator.

Each generator is self-contained and complete in itself—no parts depending on any other part of the telephone for support, thus avoiding any chance of getting out of alignment.

Order by code numbers and avoid delay.

	CODE.	
No. 2	Series	3-bar
No. 12	Bridging	3-bar
No. 42	Bridging	4-bar
No. 52	Bridging	5-bar

Any of these generators can be furnished with pulsating or direct current attachment at a slight additional cost.

THE RINGER.

The Ringer.

Our new ringer is a radical departure from the usual.

The armature has knife edge bearings—no friction, cannot tighten or drop out of place. Adjusted by one small screw.

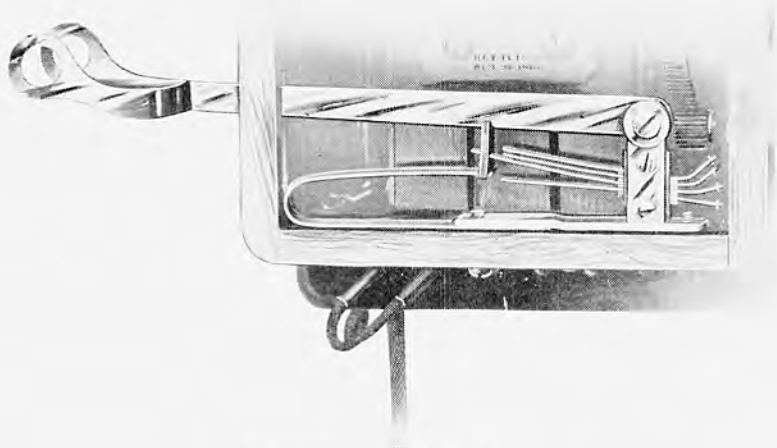
It is entirely self-contained—the gong stand is on the ringer base. The ringer is mounted on the cabinet by two extension lugs very close together. There is no chance of any wood shrinkage throwing them out of alignment.

Order by code number and avoid delay.

			CODE				
No. 102	80	ohms	complete	No. 172	2000	ohms	complete
No. 112	500	"	"	No. 182	2500	"	"
No. 132	1000	"	"	No. 192	3500	"	"
No. 142	1600	"	"				

Above furnished complete with gongs. Any of these can be furnished with biasing attachment for pulsating current.

Automatic Hook Switches.



No 11. Automatic Hook Switch.

NORTH Hook Switches are strong, simple and reliable. The horizontal long-lever adjustable tension type is entirely self-contained. It has a heavy base made in one piece; the lever has a journal bearing hinge—does not depend on a screw to support it. The lever base and hinge form no part of the circuit. The controlling spring is German silver, long and flexible and capable of adjustment. The contact springs are German silver with pure platinum contacts.

The Vertical Type is built along the same general plan as the long lever type, modified only in the shape of the lever and in the use of a coiled controlling spring. The action of this hook is positive and perfect. It is entirely self-contained. See illustration on page 13.

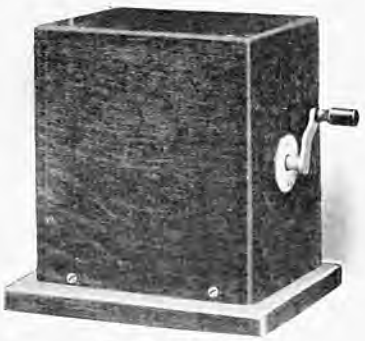
CODE

No. 11 HORIZONTAL LEVER HOOK SWITCH—used with Type "K" and "A" telephones.

No. 17 VERTICAL LEVER HOOK SWITCH—used with Type "N" magneto telephones.

Desk Set Accessories.

The standard form of magneto desk telephone consists of a portable desk standard, cord and induction coil with the generator and ringer mounted in separate boxes. Equipment for this style of instrument is carried in stock and can be furnished promptly. The extension bells are shown on page 22. The illustration on this page shows the separately mounted generators, known as:



Desk Set Generator.

DESK SET GENERATORS.

These consist of the regular North generators as shown on page 18, mounted on a base provided with the necessary terminals and screw holes for attaching to the desk. A handsome quartered oak cover is placed over the generator, protecting the mechanism and the line terminals. The standard box is oak. Walnut or mahogany to order only—not carried in stock.

Order by code and avoid delay.

Desk Set Magneto.

CODE

No.	Desk set generator			3-bar	Series
"	"	"	"	3- "	Bridging
"	"	"	"	4- "	"
"	"	"	"	5- "	"

DESK SET MAGNETOS

A form of desk set preferred by some has the generator, ringer, and induction coil mounted in the same box. To meet the demand for this style, we furnish to order the Desk Set Magneto here shown. The standard box is quartered oak—walnut or mahogany finish to order—not carried in stock.

Order by code and avoid delay.

Generator Extension Rod.

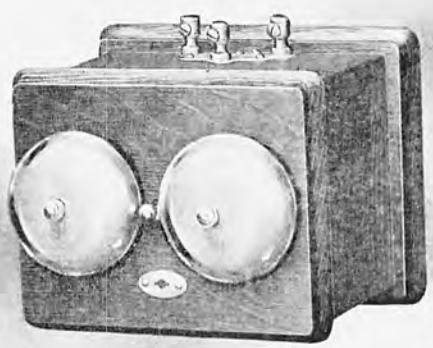
CODE—Desk Set Magnetos—Described on page 2.

					Generator		Ringer		
No. 2½	Desk	Set	Magneto	Series	No. 2	3-bar	No. 102	80	ohm
No. 12½	"	"	"	Bridging	No. 12	3-bar	No. 112	500	"
No. 22½	"	"	"	"	No. 12	3-bar	No. 132	1000	"
No. 32½	"	"	"	"	No. 42	4-bar	No. 132	1000	"
No. 42½	"	"	"	"	No. 42	4-bar	No. 142	1600	"
No. 52½	"	"	"	"	No. 52	5-bar	No. 132	1000	"
No. 62½	"	"	"	"	No. 52	5-bar	No. 142	1600	"
No. 72½	"	"	"	"	No. 52	5-bar	No. 172	2000	"
No. 82½	"	"	"	"	No. 52	5-bar	No. 182	2500	"
No. 92½	"	"	"	"	No. 52	5-bar	No. 192	3500	"

Extension Bells.

New style ringer mounted in a quartered oak box, provided with binding post terminals. Walnut or mahogany furnished to order—not carried in stock. Extension bells have the same code numbers as their ringers.

Order by code and avoid delay.



Extension Bell.

CODE

No. 102	Extension	Bell	80	ohm	ringer
No. 112	"	"	500	"	"
No. 132	"	"	1000	"	"
No. 142	"	"	1600	"	"
No. 172	"	"	2000	"	"
No. 182	"	"	2500	"	"
No. 192	"	"	3500	"	"

Transmitter Arms.

"D" Pressed Steel Transmitter Mounting.

"A" TRANSMITTER MOUNTING — hollow cast arm and base—black enamel finish Used on Type "A" telephone—takes transmitter head No. 5 or No. 32. Furnished with No. 1 Induction coil mounted in base.

CODE

"D" TRANSMITTER MOUNTING—hollow pressed steel arm with oval base—black enamel finish. Used on Type "K" telephone—takes transmitter head No. 9 or No. 31.

See Pages 14 & 15 for transmitter heads.

Induction Coils.

CODE

No. 1 INDUCTION COIL—Local Battery—not mounted. Used with Type "A" telephones and magneto Type Desk set boxes.

No. 10 INDUCTION COIL—Local Battery—not mounted. Used with Type "K" telephones.

No. 12 INDUCTION COIL—Local Battery—mounted on base—provided with binding post terminals. Used with Type "N" telephones.

Receiver and Desk Set Cords.

No. 6 RECEIVER CORD worsted—thirty inch.

No. 6 RECEIVER CORD worsted—thirty-six inch.

No. 6 RECEIVER CORD Green Silk—thirty-six inch.

Type "N" Desk Stand Cord—Green Silk—eight foot—four conductor.

Green Silk Cordage—1 to 5 conductors by the yard.

Lightning Arresters

No. 3. Lightning Arrester.

The illustration shows the carbon plate air gap arrester with which all type K and N phones are equipped. This is conceded to be one of the most efficient forms of arresters known. The carbon block is unusually large and forms a non-fusible ground terminal—indestructible and permanent. The thin mica disc separates the line terminal from the ground plate—the perforations affording a low resistance air gap to lightning discharges or high potential currents.

Nothing to get out of order—easy of inspection—just loosen the center screw and move the block back a little when the loose carbon dust may be blown out.

CODE

No. 3 CARBON PLATE ARRESTER used on type "K" and "N" telephones.
No. 1 CARBON AND FUSE ARRESTER used on type "A" telephones.

Batteries.

All North telephones are equipped regularly with two cells of North Cannon Cracker Dry Battery. These cells are absolutely guaranteed. They are made from pure materials by improved machinery with the most careful workmanship and rigid inspection.

We recommend the use of dry batteries in preference to wet cells, as they require no attention during life, are cleaner, do not freeze and there is no liability of breaking them. They will give good service for one to three years, depending upon the amount of usage the telephone has. They cannot readily be recharged, but when exhausted the average person can replace them with very little difficulty. They are inexpensive.

Circuit Diagrams.

The circuit diagrams of instruments show the exact wiring of each type of telephone described herein. They are practically self explanatory. The simplified diagrams on pages 3 & 4 will be found useful in tracing the more complex circuits.

THE NORTH ELECTRIC CO.

DALLAS, TEXAS. CLEVELAND, OHIO. KANSAS CITY, MO.

Bulletin No. 41. January, 1907.

Telephone Construction Supplies and Tools.

CROSS ARMS.

Telephone Cross Arms.

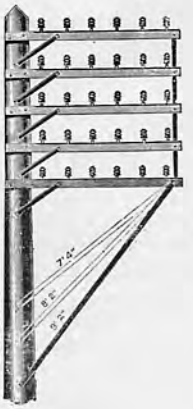
Size 2¾x3¾ inches, bored for 1¼ inch pins, two ½ inch lag bolts and two ⅜ inch brace bolts distant from center 16½ inches. Special borings to order.

Number Pins.	Length, Feet.	Approximate Weight Each, Pounds.	SPACING. End, Inches.	SPACING. Center, Inches.	SPACING. Side, Inches.	Code Word.
2	2 ft.	5	4	18	.....	Cambric
2	2 ft. 8 in.	7	4	26	....	Cabinet.
4	3 ft. 6 in.	9	4	16	10	Camera.
6	5 ft. 2 in.	13	4	16	10	Canary.
8	6 ft. 10 in.	17	4	16	10	Canteen.
10	8 ft. 6 in.	21	4	16	10	Capital.
12	10 ft.	25	4	14	10	Chastise.

Standard Cross Arms.

Size 3¼x4¼ inches, bored for 1¼ inch pins and two ½ inch lag bolts and two ⅜ inch brace bolts distant from center 16½ inches. Special borings to order.

Number Pins.	Length, Feet.	Approximate Weight Each, Pounds.	SPACING. End, Inches.	SPACING. Center, Inches.	SPACING. Side, Inches.	Code Word.
2	3	9	4	28	....	Abuse.
4	4	12	4	16	12	Abandon.
4	5	15	4	18	17	Abound.
4	6	18	4	24	20	Absorb.
6	6	18	4	16	12	Acorn.
6	8	24	4	18	17½	Actor.
8	8	24	4	16	12	Afloat.
8	10	30	4	17½	15¾	Assist.
10	10	30	4	16	12	Admire.
10	8½x1¼	25½	4	16	10	Agree.
10	10 x1¼	30	4	16	12	Captor.



STANDARD SIDE ARMS.

3¼x4¼ Bored for 1¼ in. Pins.

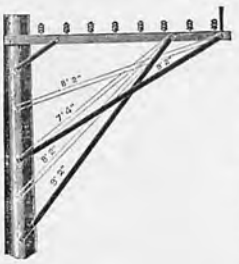
	Approx. Weight.	Code Word.
6 pin, 6 ft. 4 in.	24 lbs.	Arouse
8 pin, 8 ft. 4 in.	29 lbs.	Agate

Side spacing on side arms.....12 in.
End spacing on side arms..... 4 in.
End spacing on 8½ feet standard arms..... 4 in.

Side arms are not bored for lags nor bolts.

CROSS ARM BRACES.

	Approx. Wt. per 100.	CODE WORD. Plain.	Galv.
20x1 x3-16	100	Aam	Abacus
20x1 7-32x7-32	142	Aardrark	Abalone
22x1 x3-16	110	Aardster	Abanuta
22x1 7-32x7-32	156	Aardwolf	Abandoning
24x1 x3-16	120	Aardzak	Abandero
24x1 7-32x7-32	170	Aaronic	Abandonment
24x1¼ x ¼	200	Aaronical	Abando
26x1 7-32x7-32	184	Aaronita	Abarique
26x1¼ x ¼	216	Aaronicly	Abash



SIDE OR ALLEY ARM BRACES.

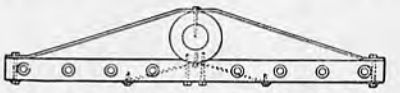
	Code Word.
1½x1½x¼x7⅓ feet, weight 17 pounds	Mesenteric
1½x1½x¼x8⅙ " " 19 "	Meshed
1½x1½x¼x9⅙ " " 21 "	Meshing
2 x2 x¼x7⅓ " " 24 "	Meslin
2 x2 x¼x8⅙ " " 26 "	Mess
2 x2 x¼x9⅙ " " 29 "	Message

VERTICAL BRACES FOR ENDS OF ARMS.

Punched, each 16¼ inch, and 1 inch from each end. Punched to order without extra charge. Please specify when ordering.

	Code Word.
1½x1½x¼x67 inches, weight 13 pounds, Plain	Messenger
1½x1½x¼x67 " " 13 " Galvanized	Missula

DOUBLE ARMING BRACES.



Double Arming Braces are really stronger than Double Arms, much cheaper, and look better. Old style double arms give like a box with top and bottom gone. Our braces are bridge construction and can't give.

	Code Word.
1½x⅜x6, painted black, weight each 11 pounds	Messiah
1½x⅜x6, galvanized " " 11 "	Meuzian

WOOD PINS.

OAK PINS.

	Code Word.
1¼x8, painted	Abashed
1¼x9, "	Abashment
1½x8, "	Abashing
1½x9, "	Abasicarpe

BOIS D'ARC PINS.

Made from hedge, and when seasoned become very hard and tough; are not affected by exposure to weather.

	Code Word.
1¼x8, not painted	Abbaitis
1¼x9, "	Abballammo
1½x8, "	Abballando
1½x9, "	Abballassi

DUPLEX PINS.

To be used with Duplex Pony and Duplex Deep Groove Insulators.

	Code Word.
1¼ in. Oak, painted	Abater
1½ in. Oak, painted	Abatton
1¼ in. Locust, not painted	Abba
1½ in. Locust, not painted	Abbacy

PATENT STEEL PINS.

					Code Word.
Pin with	½	inch	plain	bolt, complete	Abdicate
"	⅝	"	"	"	Acerose
"	½	"	galv.	"	Abduct
"	⅝	"	"	"	Abduction

WOOD BRACKETS.

	Weight per 1000	Code Word.
12 in. Oak Brackets	720 lbs.	Abbreviate

DUPLEX BRACKETS.

To be used with Duplex Pony and Duplex Deep Groove Insulators.

	Code Word.
Oak, painted	Abcissa

LOCUST PINS.

	Code Word.
1¼x8, not painted	Abate
1¼x9, "	Abatedor
1½x8, "	Abatement
1½x9, "	Atatiendo

KREKOSE PINS.

Designed to take the place of Locust Pins. Made of selected hard maple, from which the moisture has been exhausted. Boiled in a preservative of creosote and carbolinium with other ingredients. Much superior to oak pins.

	Code Word.
1¼x8	Abballato
1¼x9	Abballeni
1½x8	Abballotti
1½x9	Abballerdo

WOOD CORNER PINS.

	Code Word.
1¼ in. Oak, with bolt and washer	Abbe
1½ in. Oak, with bolt and washer	Abbes

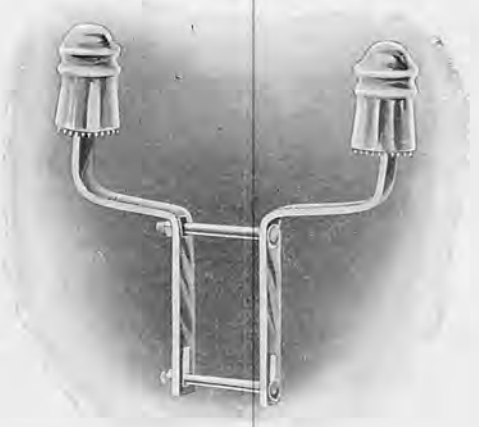
STEEL HOUSE BRACKETS.

A wall or window bracket, or for a break iron on cross arms. This bracket meets the most exacting requirements. It is strong, non-corrosive and practically indestructive. It is more quickly and securely attached than any other form of bracket; cheaper than a wood bracket when the cost of installation is considered, and much more sightly.

	Code Word. Plain.	Galv.
1 Pt. Bracket	Abbambagia	Abbandeln
2 "	Abbambino	Abbaratto

Furnished complete with split pins.

STEEL BREAK ARM.



Patented.

FOR BREAKING A THROUGH WIRE FOR SERIES DROP; FOR DROPPING FROM THE END OF A ROUTE ARM, OR FOR A TRANSPOSITION.

These Break Arms cost less than others, are more easily put up and no extra tools are required. They do not weaken the arm with holes, and are adjustable to any size arm. When used to drop from the end of an arm they leave the end route pin available; whereas, common break arms use this space. Insulators cannot pull off.

	Code Word.
2 Pt. Galvanized	Abbarbico

Complete with bolts and split pins.

DOUBLE CROSS ARMING BOLTS

5½ inch thread on each end. Fitted with square washer and two square nuts each end, as shown.

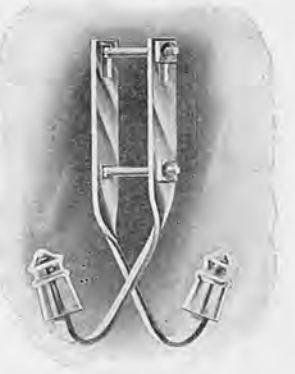
	Code Word. Plain.	Galvanized.
½x12	Accusative	Accustom
½x13	Accusatorial	Acentric
½x14	Accusatory	Acephala
½x16	Accuse	Acephalous
½x18	Accused	Acerate
⅝x14	Accuser	Acerb

STEEL UNDERHANG BRACKET.

USED FOR TEMPORARILY OR PERMANENTLY DOUBLING THE CAPACITY OF CROSS ARMS.

They do not weaken the arms with bolt holes. They are adjustable for any size arm; are easier put up than porcelain knobs, and afford the best of insulation.

These Brackets are used principally for temporary work, and the ease with which they may be put up or taken down recommends them for this use. Only a small stock is necessary, as they may be used over and over again.



Patented.

	Code Word.
2 Pt. Galvanized	Abbaino

Complete with bolts and split pins.

IRON POLE STEP.

	Code Word.
⅝x9 in. Plain. Approximate weight per 1,000, 650 lbs	Abutment
⅝x9 in. Galv. Approximate weight per 1,000, 650 lbs	Abysm

WOODEN POLE STEPS.

Saves Carrying Ladders.

Code Word, Abyss

Made of painted oak. Bored for two spikes.

1½x2x7 inches. Weight, 40 pounds per 100.

ROUND WASHERS FOR LAG SCREWS AND CARRIAGE BOLTS.

	Code Word.
⅜ inch, for ⅝ inch bolt, average 65 to pound	Acarida
7/16 " " ⅜ " " 42 "	Acatalectic
½ " " ½ " " 22 "	Accede
¾ " " ⅝ " " 10 "	Accelerate

SQUARE WASHERS.

	Approx. Weight Per 100.	Code Word.
For Cross Arm Bolts, 2¼x2¼x3/16 inch	25 lbs.	Accent
For Guy Rods, 4x4x3/16 inch	200 "	Accedu
" " " 5x5x3/16 "	130 "	Acceptant

LAG SCREWS.

Price per 100, Plain, Not Galvanized. Length.

Diameter.	1½	2	2½	3	3½	4	4½	5	5½
5-16	$ 2 25	$ 2 45	$ 2 65	$ 2 85	$ 3 05	$ 3 25	$ 3 45	$ 3 65	$ 3 85
⅜	2 70	2 96	3 22	3 48	3 74	4 00	4 26	4 52	4 78
7-16	3 15	3 47	3 79	4 11	4 43	4 75	5 07	5 39	5 71
½	3 75	4 11	4 47	4 83	5 19	5 55	5 91	6 27	6 63
9-16 and ⅝	.....	5 00	5 50	6 00	6 50	7 00	7 50	8 00	8 50
¾	.....	.....	7 90	8 60	9 30	10 00	10 70	11 40	12 10
⅞	.....	.....	.....	12 50	13 50	14 50	15 50	16 50	17 50
1	.....	.....	.....	.....	18 20	19 50	20 80	22 10	23 40

Diameter.	6	6½	7	7½	8	9	10	11	12
5-16	$ 4 05	$ 4 25	$ 4 45	$ 4 65	$ 4 85	$ 5 25	$ 5 65	$ 6 05	$ 6 45
⅜	5 04	5 30	5 56	5 82	6 08	6 60	7 12	7 64	8 16
7-16	6 03	6 35	6 67	6 99	7 31	7 95	8 59	9 23	9 87
½	6 99	7 35	7 71	8 07	8 43	9 15	9 87	10 59	11 31
9-16 and ⅝	9 00	9 50	10 00	10 50	11 00	12 00	13 00	14 00	15 00
¾	12 80	13 50	14 20	14 90	15 60	17 00	18 40	19 80	21 20
⅞	18 50	19 50	20 50	21 50	22 50	24 50	26 50	28 50	30 50
1	24 70	26 00	27 30	28 60	29 90	32 50	35 10	37 70	40 30

MACHINE BOLTS.

With Square Heads and Square Nuts, Finished Points.

Price per 100, Plain, Not Galvanized. Length.

Diameter.	¾–1½	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½
¼	$ 1 70	$ 1 78	$ 1 86	$ 1 94	$ 2 02	$ 2 10	$ 2 18	$ 2 26	$ 2 34	$ 2 42	$ 2 50	$ 2 58	$ 2 66
5-16	2 00	2 12	2 24	2 36	2 48	2 60	2 72	2 84	2 96	3 08	3 20	3 32	3 44
⅜	2 40	2 56	2 72	2 88	3 04	3 20	3 36	3 52	3 68	3 84	4 00	4 16	4 32
7-16	2 80	3 00	3 20	3 40	3 60	3 80	4 00	4 20	4 40	4 60	4 80	5 00	5 20
½	3 60	3 86	4 12	4 38	4 64	4 90	5 16	5 42	5 68	5 94	6 20	6 46	6 72
9-16 and ⅝	5 20	5 58	5 96	6 34	6 72	7 10	7 48	7 86	8 24	8 62	9 00	9 38	9 76
¾	7 20	7 70	8 20	8 70	9 20	9 70	10 20	10 70	11 20	11 70	12 20	12 70	13 20
⅞	10 50	11 20	11 90	12 60	13 30	14 00	14 70	15 40	16 10	16 80	17 50	18 20	18 90
1	15 10	16 00	16 90	17 80	18 70	19 60	20 50	21 40	22 30	23 20	24 10	25 00	25 90

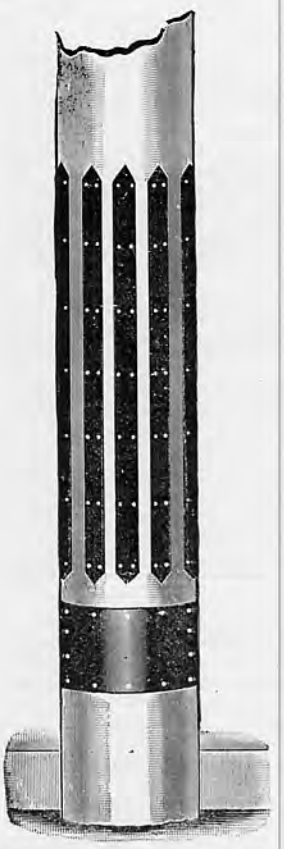
Diameter.	8	9	10	11	12	13	14	15	16	17	18	19	20
¼	$ 2 74	$ 2 90	$ 3 06	$ 3 22	$ 3 38	$ 3 54	$ 3 70	$ 3 86	$ 4 02	$ 4 18	$ 4 34	$ 4 50	$ 4 66
5-16	3 56	3 80	4 04	4 28	4 52	4 76	5 00	5 24	5 48	5 72	5 96	6 20	6 44
⅜	4 48	4 80	5 12	5 44	5 76	6 08	6 40	6 72	7 04	7 36	7 68	8 00	8 32
7-16	5 40	5 80	6 20	6 60	7 00	7 40	7 80	8 20	8 60	9 00	9 40	9 80	10 20
½	6 98	7 50	8 02	8 54	9 06	9 58	10 10	10 62	11 14	11 66	12 18	12 70	13 22
9-16 and ⅝	10 14	10 90	11 66	12 42	13 18	13 94	14 70	15 46	16 22	16 98	17 74	18 50	19 26
¾	13 70	14 70	15 70	16 70	17 70	18 70	19 70	20 70	21 70	22 70	23 70	24 70	25 70
⅞	19 60	21 00	22 40	23 80	25 20	26 60	28 00	29 40	30 80	32 20	33 60	35 00	36 40
1	26 80	28 60	30 40	32 20	34 00	35 80	37 60	39 40	41 20	43 00	44 80	46 60	48 40

COMMON CARRIAGE BOLTS.

Price per 100, Plain, Not Galvanized. Length.

Diameter	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4¼	4½	4¾	5	5½	6	6½
¼	1 00	1 04	1 08	1 12	1 16	1 20	1 24	1 28	1 32	1 36	1 40	1 44	1 48	1 52	1 56	1 64	1 72	1 80
5-16	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	1 60	1 65	1 70	1 75	1 80	1 85	1 90	2 00	2 10	2 20
⅜	1 60	1 68	1 76	1 84	1 92	2 00	2 08	2 16	2 24	2 32	2 40	2 48	2 56	2 64	2 72	2 88	3 04	3 20
7-16	2 20	2 29	2 38	2 47	2 56	2 65	2 74	2 83	2 92	3 01	3 10	3 19	3 28	3 37	3 46	3 64	3 82	4 00
½	.....	.....	.....	.....	3 00	3 11	3 22	3 33	3 44	3 55	3 66	3 77	3 88	3 99	4 10	4 32	4 54	4 76
9-16 & ⅝	.....	.....	.....	.....	5 20	5 37	5 54	5 71	5 88	6 05	6 22	6 39	6 56	6 73	6 90	7 24	7 58	7 92
¾	.....	.....	.....	.....	7 20	7 43	7 66	7 89	8 12	8 35	8 58	8 81	9 04	9 27	9 50	9 96	10 42	10 88

Diameter	7	7½	8	8½	9	9½	10	11	12	13	14	15	16	17	18	19	20
¼	1 88	1 96	2 04	2 12	2 20	2 28	2 36	2 52	2 68	2 84	3 00	3 16	3 32	3 48	3 64	3 80	3 96
5-16	2 30	2 40	2 50	2 60	2 70	2 80	2 90	3 10	3 30	3 50	3 70	3 90	4 10	4 30	4 50	4 70	4 90
⅜	3 36	3 52	3 68	3 84	4 00	4 16	4 32	4 64	4 96	5 28	5 60	5 92	6 24	6 56	6 88	7 20	7 52
7-16	4 18	4 36	4 54	4 72	4 90	5 08	5 26	5 62	5 98	6 34	6 70	7 06	7 42	7 78	8 14	8 50	8 86
½	4 98	5 20	5 42	5 64	5 86	6 08	6 30	6 74	7 18	7 62	8 06	8 50	8 94	9 38	9 82	10 26	10 70
9-16 & ⅝	8 26	8 60	8 94	9 28	9 62	9 96	10 30	10 98	11 66	12 34	13 02	13 70	14 38	15 06	15 74	16 42	17 10
¾	11 34	11 80	12 26	12 72	13 18	13 64	14 10	15 02	15 94	16 86	17 78	18 70	19 62	20 54	21 46	22 38	23 30



POLE STRIPS.

Galvanized.

Concaved to conform approximately with shape of pole. Approximate weight per 100, 120 pounds.

	Code Word.
Size 2 inch wide by 4 feet long, 22 gauge	Acanaceous

HUB OR BUTT PLATES.

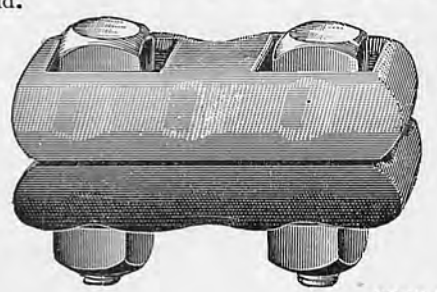
Rolled to a diameter of 14 inches. Punched for 20 penny wire nails.

Size.	Approximate Weight, Each.	Code Word.
15x18x$\frac{3}{16}$ inches	15 pounds	Acanthine
18x20x$\frac{3}{16}$ "	20 "	Acanthus

EYE BOLTS.

	Code Word.
½x 6 inches	Abyssal
½x 8 inches	Abraham
½x10 inches	Absalom
½x12 inches	Acacia

This is a regular eye bolt, with eye at one end, and long thread with nut at other end.



GUY CLAMPS.

	Code Word.
2 bolt, malleable, galv.	Academic
3 bolt, malleable, galv.	Academical

Weight per 100 { 2-Bolt 150 lbs. / 3-Bolt 250 lbs.

GUY WIRE HOOKS OR SHIMS.

	Code Word.
1½x⅜x6 in. Plain.	Acapalties
1½x⅜x6 " Galv.	Acaparabos
2½x⅜x12" Plain.	Acaparader
2½x⅜x12" Galv.	Acaparais

CODE WORD.

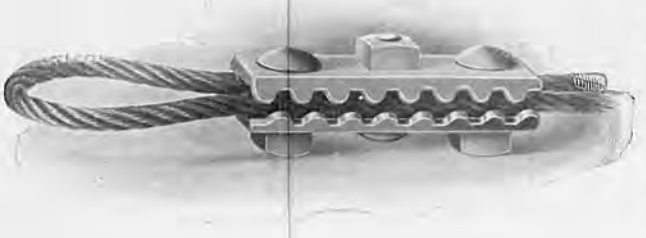
	Plain.	Galv.
¼ in. Cincinnati Clips	Academicals	Abrogation
$\frac{5}{16}$ in. Cincinnati Clips	Academician	Abruptly
⅜ in. Cincinnati Clips	Academy	Abscess
½ in. Cincinnati Clips	Acaleph	Abscind

POLE SHIMS.

Galvanized.

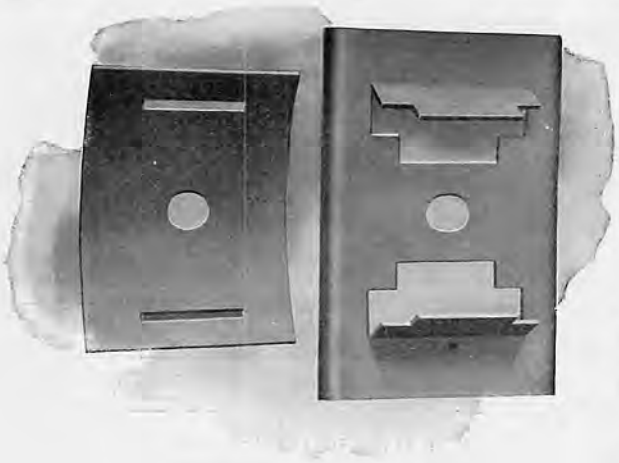
	Code Word.
1¼x$\frac{3}{16}$x8 in.	Acanasis

UNIVERSAL GUY CLAMP.



This Clamp is preferred by many to the old style Clamp, and is in some ways superior. It will take any size strand commonly used, from $\frac{3}{16}$ to ½ inch. Unnecessary to carry a stock of different sizes. Made of malleable iron thoroughly galvanized.

	Code Word.
1 Bolt Clamps	Acantono
2 " "	Acanutados
3 " "	Acapolti



BULL DOG STEEL GAIN.

Saves rotting of poles; saves weakening poles by cutting gains. Its use makes a five-inch top as strong as a six-inch top with a cut gain, stronger and neater than braces. Saves cutting gains that are never used; can be used for mounting cross arms on old poles having rotted gains. Can be bought for the same amount or even less than it cost to cut a gain on a pole.

Made of heavy Bessemer steel. To attach a cross arm it is simply necessary to clamp it in place with a steel gain by means of a through bolt. Use a 2¼ in. washer under the head of the bolt.

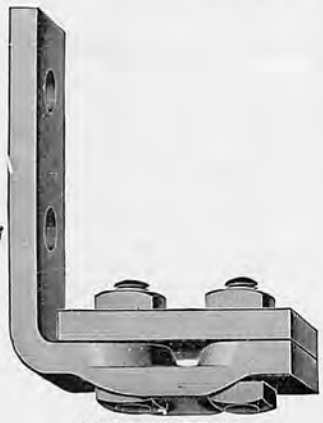
Shipped completely assembled ready for use. Bolts and washers are extra.

		Code Word.
No. 1.	For Telephone Cross Arm, Plain	Acantofero
No. 1.	" " " " Galvanized	Acantordi
No. 2.	" Standard " " Plain	Acantologo
No. 2.	" " " " Galvanized	Acantonado

GALVANIZED MESSENGER HANGER.

	Code Word.
⅜x2 in., regular weight 3 lbs.	Migrate
½x2 " " " 4 "	Migrating

"Messenger" Clamp.



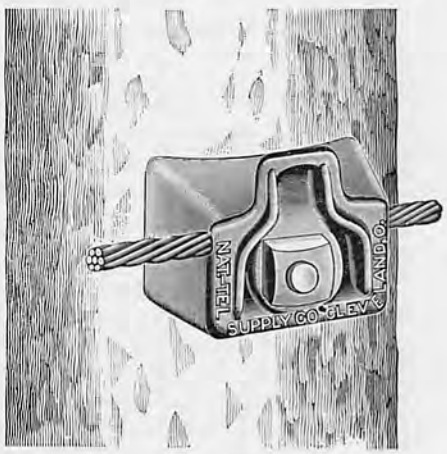
Universal Hanger.

UNIVERSAL MESSENER HANGER.

For straight lines and corners. Solid forged steel. Galvanized.

	Code Word.
No. 1 Light, 1½x½	Migration
" 2 Medium, 1¾x½	Mild
" 3 Heavy, 2x½	Milder

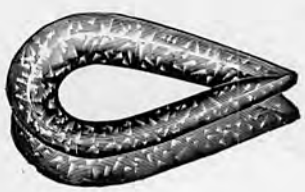
J. C. C. HANGER.



J. C. C. Hanger.

	Code Word.
Galvanized	Mildest

WIRE ROPE THIMBLES.



Circumference of Rope.	Diameter of Rope.	Code Word.
⅝	3/16	Acceptation
¾	¼	Acceptor
⅞	5/16	Accentual
1	⅜	Accentuate
1¼	7/16	Accept
1½	½	Acceptable

ANCHOR OR GUY RODS.

Furnished with square washers.

Size.	WEIGHT PER 100 RODS.			Size.	WEIGHT PER 100 RODS.		
	Plain Rods Lbs.	Code Word.	Galv. Rods Lbs.		Plain Rods Lbs.	Code Word.	Galv. Rods Lbs.
½ in. by 6 ft.	479	Acceptance	503	¾ in. by 6 ft	1000	Accident	1025
" " 7 "	545	Accepter	572	" " 7 "	1150	Accidental	1200
" " 8 "	611	Access	641	" " 8 "	1275	Accipter	1320
" " 9 "	677	Accessary	711	" " 9 "	1425	Acclaim	1485
" " 10 "	743	Accessible	780	" " 10 "	1575	Acclamation	1640
⅝ in. by 6 "	700	Accession	720	1 in. by 10 "		Acclamatory	
" " 7 "	800	Accessional	820	1⅛ " " 10 "		Acclimate	
" " 8 "	900	Accessorial	940	1¼ " " 10 "		Acclimatize	
" " 9 "	1000	Accessory	1050	1¼ " " 12 "		Acclivity	
" " 10 "	1100	Accidence	1155				

We carry in stock all regular sizes of Anchor and Guy Rods, and are prepared to furnish all other sizes on very short notice. When ordering state whether plain or galvanized.

TELEPHONE GROUND RODS.

Code Word.

½x6 ft. galvanized, and pierced for ground wire.....Accolade

⅜x5 ft. galvanized, and pierced for ground wire.....Accolamb

MILLER ANCHORS AND AUGERS

From the very first the Miller Safety Anchor "caught on" with the trade, and the demand is constantly increasing. It is everything a good anchor should be—cheap, easy to install, and "Never pulls up." It has been bought and thoroughly tested by many of the largest telephone, electric light and railway companies. Those who have given the anchor a trial use no other kind, which is the best proof of its worth. If you are not using the Miller Anchor, we ask that you give it a test. A trial order will convince you that it is both a time and money saver

Anchors With Rods.

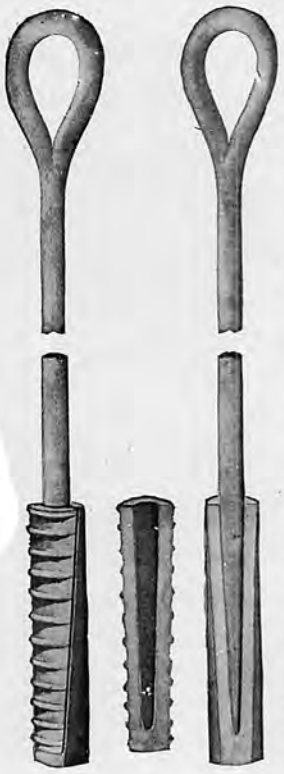
Code Word.

No. 1 anchor, 5x10 in., ½ in. rod, 6 feet long...Milkan
No. 2 anchor, 6x13 in., ½ in. rod, 7 feet long...Milliary
No. 3 anchor, 7x16 in., ⅝ in. rod, 7 feet long...Mimetic
No. 4 anchor, 8x19 in., ¾ in. rod, 8 feet long...Mimetical
No. 5 anchor, 10x25 in., 1 in. rod, 9 feet long. .Mimicker

Augers for Setting Anchors.

Code Word.

Auger with 7 foot stem will set No. 2 anchor...Mimora



Combination Auger.

The combination auger has an 8-foot stem, one inch in diameter. This auger is fitted with two boring heads—the small one for anchor No. 2; the large head has adjustable blades, and will set anchors No. 3 and 4.

Cord Word, Minatory

All augers have adjustable handles. As the auger goes down the handle can be moved up the stem.

Patented.

Combination Auger.

Miller Rock Anchor.

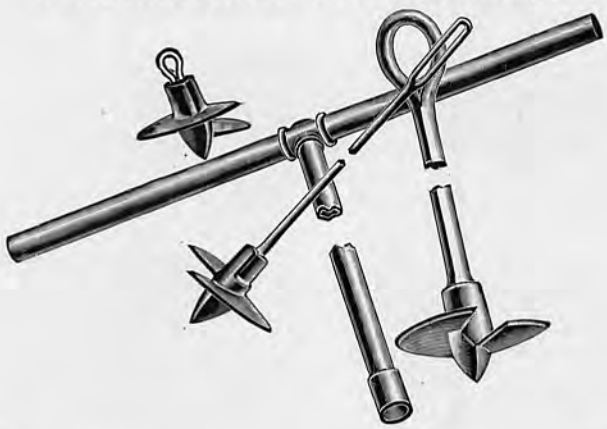
These anchors can be used in any kind of rock. They are 3½ feet long, with ⅝-inch rod. They will stand a strain of 15,000 lbs.

The corrugations in the wedges make them "take hold" of the rock, and the greater the strain the tighter they get. These anchors will not lift over ½ inch to become tight. The harder the strain the larger the anchors will become at the bottom. A trial of a few will soon convince you that they are the best rock anchors made.

We can make all sizes of these anchors to your specifications.

	Code Word.
1⅜ inch Black	Mincingly
1⅜ inch Galvanized	Mineral

STOMBAUGH LAND ANCHORS.



No.				Code Word.
350	3½ in. without rod	weight 1	lb.	Skull
500	5 in. " "	" 2½	lbs.	Thorax
600	6 in. " "	" 4½	"	Abdomen
351R	3½ in. with ⅝ in. 5 foot round rod	" 2½	"	Brain
502R	5 in. " ⅜ in. 5 " " "	" 4	"	Lung
603R	6 in. " ½ in. 5 " " "	" 7¼	"	Stomach
800	8 in. " 1⅛ in. square rod and forged eye, shank 5½ foot	" 30	"	Hip
1000	10 in. " 1¼ in. " " " " " 5½ "	" 48	"	Knee
1200	12 in. " 1½ in. " " " " " " 5½ "	" 78	"	Ankle

(3½ in. rods have no eye. 5 and 6 in., eye 3 in. long by ½ in. spread.)
(8, 10 and 12 in. have eyes 2½ in. inside diameter.)

354	Wrench for 3½ in. anchor, both with and without rod	Weight 13	lbs.	Arm
505	" " 5 in. " " " " " "	" 13	"	Wrist
606	" " 6 in. " " " " " "	" 13	"	Hand

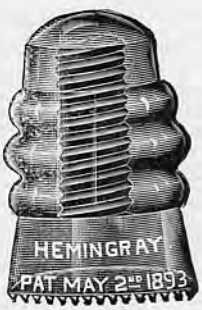
The regular finish is black paint but will be finished galvanized, if preferred, at an advance.

GLASS INSULATORS.

No. 9 Pony.

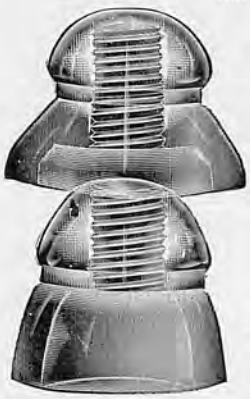
No. 11 and 12 D. G. Pony

Long Distance.

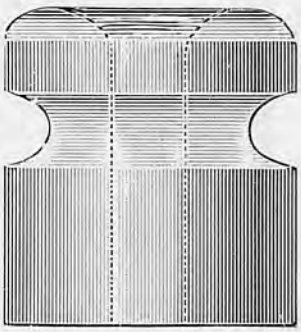


Double Groove.

Regular Transposition


Two-Piece Transposition

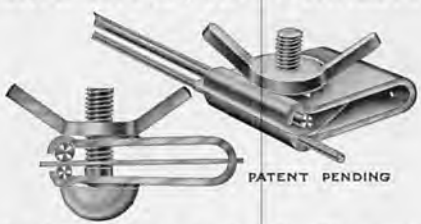
	Wgt. per 1000 Packed.	No. per bbl.	Code Word.
No. 9. ¾ Pony	725	400	Absent
" 11 and 12. Double Groove Pony	750	400	Absentee
Long Distance Regular	1100	300	Absinthi
Double Groove	1350	200	Absinthium
Regular Transposition	2400	100	Absolutary
Two-piece "	2025	125	Absolution



PORCELAIN KNOBS.

	Height.	Width.	Hole.	Gr've.	Standard Pkge.	Code Word.
No. 4	$1\frac{11}{16}$ in.	1½ in.	$\frac{5}{16}$ in.	$\frac{7}{16}$ in.	2000	Salwate
" 4½	$1\frac{7}{16}$ "	1½ "	$\frac{5}{16}$ "	$\frac{17}{16}$ "	2000	Vendor
" 5	1¼ "	1 "	¼ "	$\frac{15}{16}$ "	5000	Salmagunda
" 5½	$1\frac{9}{16}$ "	1 "	¼ "	$\frac{15}{16}$ "	5000	Sacque

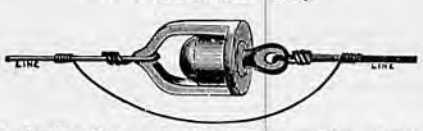
PIERCE COPPER TEST CONNECTOR.



Simple and easy to install. The outside clamp is made of spring brass and is always open to receive the wires. Wires of unequal diameter can be clamped without chance of any rocking motion as the wires are centered directly one above the other. The bolt is provided with a lug on the shank which prevents its turning. A wrench or pair of pliers is all that is needed to tighten both the clamp and lock nut.

	Code Word.
Pierce Test Connector, for copper wires	Oversleep
Pierce Test Connector, for iron wires	Overspread

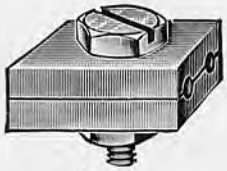
ANTI-HUMMER.



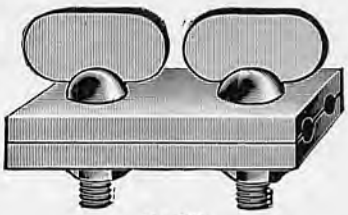
A device for preventing humming of wires when placed upon wall brackets.

Code Word, Miffter

COPPER TEST CONNECTORS.


No. 255.


No. 261.


No. 262.


No. 257, Double Bolt.

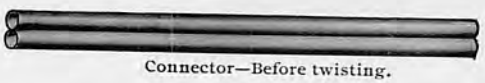
		Code Word.
No. 255.	Single Bolt	Ornament
" 261.	" " with wing head	Ornate
" 257.	Double Bolt	Muster
" 262.	" " with wing head	Mustiness

TYPE O. O. COPPER TEST CONNECTOR.

Multiple Contact Test Connector for Copper or Iron Wires. One or two Bolts. Takes any size Wire from No. 6 to 22 B. & S. Gauge.

	Code Word.		Code Word.
One bolt for copper wires	Overpoise	One bolt for iron wires	Overreach
Two " " " "	Overpower	Two " " " "	Overred

AMERICAN WIRE JOINTS.



Connector—Before twisting.

Connector—After twisting.

	Code Word.
Double Joint for 6 Copper Wire	Mislead
" " 7 "	Misleader
" " 8 "	Misleading
" " 9 "	Mismanage
" " 10 "	Misname
" " 12 "	Misplace
" " 14 "	Mislead
" " 16 "	Misquote
" " 10 Iron Wire	Misrecite
" " 12 "	Misrule
" " 14 "	Misshape

GALVANIZED STEEL WIRE STRAND.

(Sometimes called Signal Strand.)

These galvanized steel strands are largely employed as span wire in electric railway work, as guys, and as messengers or suspension cables for hanging aerial telephone and other cables.

Composed of seven galvanized wires twisted together.

Diameter, Inches.	Seven Wires.	Weight 100 Feet.	Breaking Strength.	List per 100 Feet.	Code Word. Single Galvanized.	Code Word. Double Galvanized.
1/2	8 B. W. G.	52	8320		Horseradish	Landholder
15/32	9 "	46	7100		Horsefly	Leased
7/16	10 "	40	5900		Horseshoe	Leasehold
3/8	11 "	30	4700		Horsewhip	Leash
5/16	12 "	22	3275		Horsewomen	Lar
1/4	15 "	13	1725		Horsing	Landlot

Diameter, Inches.	Extra High Strength.			High Strength.			Siemens-Martin.		
	Breaking Strength.	Per 100 Feet.	Code Word.	Breaking Strength.	Per 100 Feet.	Code Word.	Breaking Strength.	Per 100 Feet.	Code Word.
1/2	27000		Hortation	18000		Hovel	11000		Kursaal
15/32	24750		Hose	16500		Hover	10000		Kyriologic
7/16	22500		Hosca	15000		Howl	9000		Labarum
3/8	17250		Hospodor	11500		Howlet	6800		Labefaction
5/16	12100		Host	8100		Kriss	4860		Label
9/32	10900		Hot	7300		Kuflux	4380		Labeler
1/4	7600		Hour	5100		Kumiss	3050		Labor
9/16	4900		House	3300		Kummel	2000		Labored

DOUBLE GALVANIZED STEEL GUY WIRE.

Size B. W. G.	Weight per Mile.	Code Word.
4	787 pounds	Ladybird
6	573 "	Ladylike
8	378 "	Ladylove

Galvanized Steel Guy Wire weights vary from 90 to 145 pounds to the bundle.

GALVANIZED TWISTED DUPLEX GUY WIRE.

Code Word, Ladyship

Composed of two No. 8 B. W. G. wires twisted together.

Approximate weight per mile, 792 pounds; approximate weight per 1,000 feet, 150 pounds; tensile strength, 2,150 pounds to 1,000 feet.

DOUBLE GALVANIZED TELEPHONE WIRE.

There are three grades of Telephone Wire, classified as follows:

EXTRA BEST BEST (E. B. B.)
BEST BEST (B. B.)
STEEL.

Extra Best Best (E. B. B.) wire is made from a special stock of great purity, producing wire of absolutely uniform quality, in which the elements of softness and elongation are combined with low electrical resistance to a marked degree. It is largely employed in long lines or service where low electrical resistance is both desirable and necessary.

Best Best (B. B.) wire is made from a stock of high quality, producing a wire somewhat less uniform and of higher resistance than E. B. B., but of greater tensile strength. This grade is used almost exclusively for the constructfon of subscribers' lines in exchanges, and on account of its great tensile strength is best adapted for rural or farmer lines.

Steel wire has a greater tensile strength than either E. B. B. or B. B., but on account of its greater electrical resistance, is not very generally used.

As indicated by heading, the different grades of wire are double galvanized, each coat being uniform in its application, thereby insuring uniform durability. Having thoroughly tested the product of various manufacturers, we have found Roebling's wire unequalled. The fact that it is used exclusively by the leading telephone and telegraph companies throughout the United States and foreign countries, is sufficient proof of its quality. Each coil is sealed with metal tag, specifying gauge, grade and the name of manufacturer.

B. W. G.	Diameter.	Length of Coils.	Weight per Mile	Resistance per Mile.		
				Extra Best Best.	Best Best.	Steel
10	.134	½ Mile.	250 Lbs.	18.83 Ohms.	22.04	26.04
11	.120	½ "	200 "	23.48 "	27.48	32.47
12	.109	½ "	165 "	28.46 "	33.3	39.36
14	.083	½ "	96 "	49.08 "	57.44	67.88

Code Words for Above.

No.	B. B.	B. B. B.	Steel.
10	Laconism	Lacerated	Laceristal
11	Lacquered	Lacerating	Ladanum
12	Lactation	Laceration	Ladder
14	Laclean	Lacerative	Ladify

HARD DRAWN COPPER WIRE.

B. & S. G.	Diameter.	Weight per Mile.	Res. per Mile.	Code Word.
10	.102	166 pounds	5.28	Haling
12	.080	105 "	8.39	Haloid
14	.064	65 "	13.34	Hallelulah

INSULATED WIRES FOR TELEPHONE PURPOSES.

How to Order—Important.

On all orders for wire extreme care should be taken to give the correct name, size and gauge. Avoid giving any other name than that given in the catalogue. Local names such as "duplex" wire, "tree" wire, "drop" wire may mean one thing in one locality and something else in another. If the following instructions are followed you will get your order filled more promptly and with less chance for error:

1. Always state whether wire is iron or copper.

2. Give correct gauge number. Iron wire is measured by Birmingham Wire Gauge, commonly designated B. W. G. The Brown and Sharpe Gauge (B. & S. G.) is used for copper wire.

3. Always state kind of insulation. Wires for outdoor use have either weatherproof or rubber insulation. Weather proof wires are made up of single, double or triple braids. Be sure to state which is wanted.

4. Rubber covered wires for outdoor use usually have an outside saturated braid or protective covering. The tables show that the rubber insulation is furnished in varying thicknesses. This is indicated in the tables by the diameter of the wire measured over the rubber and under the braid. Unless you state diameter over rubber we will, of necessity, be compelled to use our own judgment in what to send you, and cannot be held responsible if we do not send you what is desired.

5. The use of the word "twin" indicates to us that you want two wires having a desired insulation and braided, then twisted together in pairs, and has no outside braid over the two.

6. The word "duplex" indicates two wires insulated, then laid up paralell or twisted together, and having an outside braid over all.

7. When ordering annunciator wire always state whether the copper wire is to be plain or tinned. When it is desirable to have soldered connections, tinned wire should be used. We will always send the plain wire if not otherwise ordered.

8. Flame proof jumper wire will be sent when you specify such. Otherwise we will always send the regular kind.

9. Do not forget to state whether wire is to be single or double conductor.

10. In ordering switchboard wire always state gauge number and the kind of insulation, i. e. whether silk or cotton wraps or both, and how many of each. Specify if you want any special colors given in thecode list. Otherwise, we will use our own judgment.

11. Rubber-covered wire is always sold by the foot.

12. Weather proof wire and all cotton and silk-covered wires are sold by the pound; also all bare wires.

WEATHER PROOF IRON LINE WIRE.

Generally Known as "Tree Wire,"

The use of this wire is advised where branches of trees interfere with the line. It is the genuine double galvanized BB Iron Wire, covered with double or triple braid, as ordered. In either case the braid is thoroughly saturated with a weather proof compound, which gives it a highly-polished finish. Furnished in single conductor only. Put up and sold in half-mile coils only.

DOUBLE BRAID.			TRIPLE BRAID.		
Size of Wire. B. W. G.	Pounds Per Mile.	Code Word.	Size of Wire. B. W. G.	Pounds Per Mile.	Code Word.
No. 10	350	Laideron	No. 10	410	Lambda
No. 12	240	Lardonite	No. 12	265	Lambert
No. 14	150	Laconage	No. 14	176	Lambiner

WEATHER PROOF COPPER WIRE—SINGLE.

Saturated Braid.

Used as "tree wire" for copper circuits. Adapted for "drop wire" or branches from the main line to the house. No. 14 is the best size to use. The No. 18 is sometimes used for "bridle" or "spider" wire on cable poles and for "jumper" wire on "buck arm" poles in dry climates. In all cases where this wire is connected to iron wire the joint should be carefully soldered or else tinned copper sleeves used.

Furnished with double or triple braid, as ordered. The braid is thoroughly saturated with a weather proof compound, which gives it a smooth finish. Put up in coils weighing from 12 to 15 pounds each; a less quantity may be ordered, but the price per pound will be slightly higher than for full coils.

DOUBLE BRAID.				TRIPLE BRAID.			
Size of Wire. B. & S. G.	Feet per Pound.	Pounds Per 1000 Feet.	Code Word.	Size of Wire. B. & S. G.	Feet Per Pound.	Pounds Per 1000 Feet.	Code Word.
No. 12	32	31	Guaranteed	No. 12	29	20	Gyrate
No. 14	44	18	Guardian	No. 14	39	26	Habit
No. 16	67	13	Guerdon	No. 16	48	21	Habitancy
No. 18	91	10	Guess	No. 18	67	15	Habitant

RUBBER COVERED COPPER WIRE.

Soft Drawn—Saturated Braid.

Smaller Sizes Known as "Bridle" or "Spider" Wire.

The copper conductor is tinned and then covered with a strong, extra quality rubber; over this is a smooth finished saturated weather proof braid. When twisted in pairs one conductor is marked distinctively.

This is a high grade wire used for "tree wire," "drop wire," etc., on copper circuits exposed to moisture, or that run near electric light or trolley circuits. The smaller sizes—No. 18, No. 19 and No. 20—both single and double conductor, make the best "spider" or "bridle" wire for cable poles and "buck arm" poles.

Sizes No. 14 to No. 18 put up in coils of 1000 feet; No. 19 and No. 20 in coils of 500 feet; No. 18 can also be furnished in 500-foot coils.

SINGLE CONDUCTOR.			DOUBLE CONDUCTOR—"TWIN."		
Size of Wire. B. & S. G.	Diam Over Rubber Under Braid.	Code Word.	Size of Wire. B. & S. G.	Diam. Over Rubber Under Braid.	Code Word.
No. 14	11-64 in.	False	No. 14	11-64 in.	Fadeless
No. 14	5-32 "	Fallibility	No. 14	5-32 "	Fad
No. 16	5-32 "	Fall	No. 16	5-32 "	Factious
No. 16	4-32 "	Faithful	No. 16	4-32 "	Factionist
No. 18	4-32 "	Fairness	No. 18	4-32 "	Facsimile
No. 18	7-64 "	Fairly	No. 18	7-64 "	Facing
No. 19	7-64 "	Fairest	No. 19	7-64 "	Facility
No. 19	3-32 "	Fair	No. 19	3-32 "	Facilitate
No. 20	3-32 "	Faint	No. 20	3-32 "	Facet

HARD DRAWN RUBBER COVERED WIRE—"TWIN."

Saturated Braid.

Known as Hard Drawn Duplex—For Drops.

Composed of two hard drawn copper conductors, each insulated with a strong extra quality rubber and covered with a smooth finished saturated weather proof braid, then twisted. This wire is most desirable for drops from pole to house, and is now being used by all large companies for that purpose. It reduces trouble calls and prevents all humming of instruments. Put up in coils of 1000 feet each.

	Code Word.
No. 14. B. & S. G., diameter over rubber under braid, 5-32 inch	Fidelity
No. 16. " " " " " " 4-32 "	Fictitious
No. 18. " " " " " " 7-64 "	Ficklepaw

PLAIN RUBBER COVERED COPPER WIRE.

Used for "Pot Heads." No Braid.

The tinned copper conductor is insulated with a strong extra quality rubber—no braid. The double conductor "twin" wire has a distinctive marking or color on one of the wires.

Used for pot heads, etc. Sometimes used for interior wiring. Put up in coils of 500 feet each.

SINGLE CONDUCTOR.

DOUBLE CONDUCTOR—TWIN.

Size of Wire. B. & S. G.	Diam. Over Rubber.	Code Word.	Size of Wire. B. & S. G.	Diam. Over Rubber.	Code Word.
No. 19. Single	3-32 in.	Frat	No. 19. Twin	3-32 in.	Fibrous
No. 19. "	5-64 "	Frated	No. 19. "	5-64 "	Fibrously

PLAIN OKONITE WIRE.

No Braid. For Pot Heads.

SINGLE CONDUCTOR.			DOUBLE CONDUCTOR—TWIN.		
Size of Wire. B. & S. G.	Insulation.	Code Word.	Size of Wire. B. & S. G.	Insulation.	Code Word.
No. 20. Single	3-32 in.	Healthy	No. 20. Twin	3-32 in.	Hissing
No. 20. "	4-32 "	Highland	No. 20. "	4-32 "	Hollow
No. 20. "	3-32 "	Highness	No. 20. "	5-32 "	Holly
No. 19. "	3-32 "	Highroad	No. 19. "	3-32 "	Hollyhock
No. 19. "	4 32 "	Highway	No. 19. "	4-32 "	Homeless
No. 19. "	5-32 "	Himself	No. 19. "	5-32 "	Homelike

RUBBER COVERED COPPER WIRE.

Dry Glazed Braid.

For Interior or House Wiring.

The Standard wire for interior or house wiring for telephones. Each conductor is covered with a strong extra quality rubber insulation; over this is a dry glazed colored braid. For double conductors the wires are then twisted together, the braid of one conductor having a distinctive marking. This is a special style of interior wire handled by us, and very popular with our customers. Put up in coils of 500 feet each.

SINGLE CONDUCTOR.

DOUBLE CONDUCTOR—TWIN.

Size of Wire. B. & S. G.	Diam. Over Rubber.	Code Word.	Size of Wire. B. & S. G.	Diam. Over Rubber.	Code Word.
No. 19. Single	3-32 in.	Homely	No. 19. Twin	3 32 in.	Honeycomb
No. 19. "	5-64 "	Homespun	No. 19. "	5-64 "	Honeyed

TWIN WEATHER PROOF COPPER WIRE.

Triple Saturated Braid.

Sometimes Used for Interior Wiring.

A double conductor weather proof wire sometimes used for interior wiring in places not subject to moisture. Composed of two copper wires, each insulated with a triple, smooth finished saturated braid, then twisted. Put up in coils of 12 to 15 pounds each.

	Ft. Per Lb.	Lbs. Per 1000 Ft	Code Word.
No. 19. Twin T. B. Weather Proof Copper Wire	.....	.....	Trusty

DAMP PROOF OFFICE WIRE.

Sometimes Used for Interior Wiring.

The copper conductor is covered with a strong weather proof inner braid with a waxed, paraffined outer braid, highly finished. With the double conductor the inner braid is put on and the wires laid parallel. The outer braid is then put on. Sometimes used for interior wiring, generally in telegraph work. In coils of approximately 20 pounds each.

SINGLE CONDUCTOR.

Size Wire. B. & S. G.	Approximate Ft. Per Lb.	Code Word.
No. 14.	52	Lambkin
No. 16.	72	Lamboarde
No. 18.	100	Lambrequin

DOUBLE CONDUCTOR—"DUPLEX."

Size Wire. B. & S. G.	Approximate Ft. Per Lb.	Code Word.
No. 14.	30	Lamenting
No. 16.	42	Lamenable
No. 18.	52	Lamenage

ANNUNCIATOR WIRE.

Made of pure soft copper wire, plain or tinned, and insulated with a double cotton wrap, colored. Furnished in single conductor or twisted pairs. Used for inside wiring, such as bell work, private telephones and intercommunicating systems. Where connections are to be soldered use the tinned wire. Put up in spools of about 10 pounds, in coils of one pound and coils of 100 feet. Assorted colors.

Not Tinned.

SINGLE CONDUCTOR.

Size Wire. B. & S. G.		Ft. Per Lb.	Code Word.
No. 18.	Single	160	Lamperon
No. 20.	"	225	Lamplighter
No. 22.	"	340	Lampoen

TWISTED PAIR.

Size Wire. B. & S. G.		Ft. Per Lb.	Code Word.
No. 18.	Twin	80	Lanceatate
No. 20.	"	112	Lancet
No. 22.	"	170	Lanceward

Tinned.

SINGLE CONDUCTOR.

Size Wire. B. & S. G.	Ft. Per Lb.	Code Word.
No. 18.	160	Lanciers
No. 20.	225	Lancenant
No. 22.	340	Lancenatinge

TWISTED PAIR.

Size Wire. B. & S. G.	Ft. Per Lb.	Code Word.
No. 18.	80	Land
No. 20.	112	Landeau
No. 22.	170	Landaulet

BARE COPPER WIRE, TINNED.

For Instrument Wiring and Switchboard Work.

Size of Wire. B. & S. G	Feet Per Pound.	Code Word.	Size of Wire. B. & S G.	Feet Per Pound.	Code Word.
No. 19.	256	Handmade	No. 22.	514	Hendson
No. 20.	323	Handorgan			

CROSS-CONNECTING OR JUMPER WIRE.

For making cross-connections on terminals, racks, etc. Consists of a tinned copper wire with one silk wrap and one cotton braid. Furnished in double and triple conductors, twisted. The braid of each wire colored distinctively. Put up on spools weighing about 10 pounds each.

DOUBLE CONDUCTOR.			TRIPLE CONDUCTOR.		
Size of Wire. B. & S. G.	Feet Per Pound.	Code Word.	Size of Wire. B. & S. G.	Feet Per Pound.	Code Word.
No. 20. Twin	.....	Landgravix	No. 20. Triple	.....	Landed
No. 22. "	.....	Landgravoz	No. 22. "	.....	Landfall

FLAME PROOF JUMPER WIRE.

Better than insurance, as it prevents loss of service revenue as well as property. A tinned copper wire with an inside rubber insulation to 3-32 inch diameter, and an outside braid treated with a fire-repellant composition. Furnished in double and triple conductors, twisted. The braid of each wire colored distinctively. Put up in coils of 500 feet each.

DOUBLE CONDUCTOR.			TRIPLE CONDUCTOR.		
Size of Wire. B. & S. G	Feet Per Pound.	Code Word.	Size of Wire. B. & S. G.	Feet Per Pound.	Code Word.
No. 20. Twin	170	Landgrave	No. 20. Triple	110	Landless
No. 22. "	240	Landgrevine	No. 22. "	160	Landlord

SWITCHBOARD WIRE.

The conductor is drawn from pure copper; is smooth, round, uniform, and thoroughly annealed, and is smoothly and evenly coated with tin. The several insulations are wound in reverse directions, beeswaxed finish. Furnished in single conductor or twisted pairs. Can be furnished in any color combinations of the Standard Code. The following are usually carried in stock at Cleveland:

No. 24 Single—1 S, 1 C.

With Red Mate.
1. Blue.
2. Orange.
3. Green.
4. Brown.
5. Slate
6. Blue and White.
7. Blue and Orange.
8. Blue and Green.
9. Blue and Black.
10. Blue and Slate.
11. Orange and White.
12. Orange and Green.
13. Orange and Black.
14. Orange and Slate.
15. Green and White.
16. Green and Black.
17. Green and Slate.
18. Brown and White.
19. Brown and Slate.
20. Slate and White.

No. 24 Paired—1 S, 1 C.

Each with White Mate.
1. Blue.
2. Orange.
3. Green.
4. Brown.
5. Slate.

With Red and White Mate.
6. Blue.

No. 24 Paired—1 S, 2 C.

Each with White Mate.
1. Blue.
2. Orange.
3. Green.
4. Brown.
5. Slate.

No. 22 Single—1 S, 2 C.

1. Blue and White.
2. Orange and White.
3. Green and White.
4. Brown and White.
5. Slate and White.

No. 22 Paired—1 S, 2 C.

Each with White Mate.
1. Blue. 3. Green.
2. Orange. 4. Black.
5. Slate.

No. 19 Paired—1 S. 2 C.

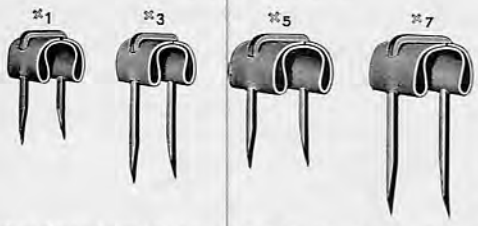
Each with White Mate.
1. Blue. 3. Green.
2. Orange. 4. Brown.
5. Slate.

With Red Mate.
12. Blue.

Numbers to left of colors indicate conductor numbers in Standard Color Code.

BLAKE INSULATED STAPLES.

¾-inch Staple, Exact Size.



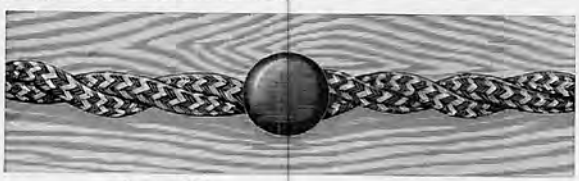
Double fibre insulation, securely attached. Square head. Put up 100 in package.

		Code Word.
No. 1.	½ inch long, for hardwood	Panned
No. 3.	¾ " " " general use	Pannade
No. 5.	⅝ " " " hardwood	Pansy
No. 7.	⅞ " " " general use	Pant

PERFECTION INSULATING NAILS.

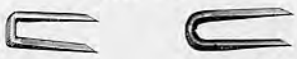
No. 22. No. 20. No. 18. No. 15.

The "Milonite" Perfection Insulating Nail has a strong fibre head. It is recommended for installing double conductor twin interior wire. Easy to handle, prevents short circuits, inconspicuous. Wire can be taken down without cutting or injuring insulation.



Size.	Aprox. No. Per Package.	Code Word.
No. 22.	1,000	Pantegraph
No. 20.	1,000	Pantalets
No. 18.	1,000	Pantaloons
No. 15.	1,000	Panther

COPPERED ANNUNCIATOR WIRE STAPLES.



		Code Word.
⅜	inch slot, round top	Pannicle
½	" " "	Pannier
½	" square head	Panning

LEATHER NAIL HEADS OR WASHERS.

A small leather ring or washer. For use with porcelain insulators and cleats where it is desired to fasten them with nails instead of screws.

Code Word, Panorama

COTTON SLEEVING.

	To Cover.	Yards per lb.	Code Word.
No. 1.	No. 11, 12, 13 wire,	280	Outcast
No. 2.	" 7, 8, 9 "	180	Outclass
No. 3.	" 9, 10 "	230	Outcome
No. 4.	" 5, 6, 7 "	260	Outcrop
No. 5.	" 5 "	145	Outcry
No. 6.	" 3, 4 "	140	Outdo
No. 7.	" 3, 4 "	135	Outdoor
No. 8.	" 1, 2 "	100	Outwell

HARD FIBRE CLEATS.

Style "A" Style "B" Style "C" Style "D"

They are neat, durable, easy to install, good insulators, and on account of the finished appearance they make, they are just the thing for office or residence installation.

They were originally designed for telephone wiring only, but are now being used all over the country for bell wiring, annunciator systems, time clocks, telegraph outfits, etc.

STYLE "A"	STYLE "B"	STYLE "C"	STYLE "D"
¾ in. long, $\frac{13}{32}$ in. wide. ¼ in. thick, ¼x⅛ in. groove.	¾ in. long, $\frac{13}{32}$ in. wide. ¼ in. thick, ⅛x⅛ in. groove.	$\frac{11}{16}$ in. long, $\frac{13}{32}$ in. wide. ¼ in. thick, ¼x⅛ in. groove.	1⅛ in. long, $\frac{13}{32}$ in. wide. ¼ in. thick, ⅛x⅛ in. groove.

	Code Word.
Style "A," single groove cleat	Pantile
Style "B," double groove cleat	Pantler
Style "C," corner cleat	Panto
Style "D," three wire cleat	Pantofle

WARRANTED ½ NATIONAL LEAD CO. ½ WARRANTED

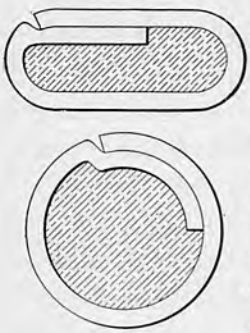
Resin Core Solder.

Wire Solder.

SOLDER.

	Code Word.
Warranted half and half bar	Outter
Extra Wiping Solder	Outface
No. 8 Wire Solder	Outfield

RESIN CORE SOLDER.



For soldering on switchboards and all fine electrical work. Absolutely no danger from corrosion. Makes neat, reliable, soldered joint with a minimum amount of labor and solder. The only kind of solder that should be used for switchboards.

	Code Word.
Flat, for switchboard work	Outpour
Round, for larger joints	Outflank

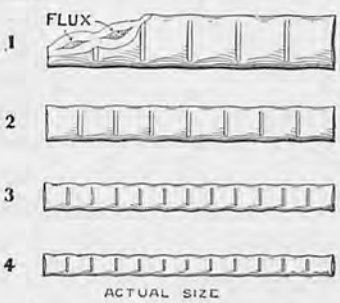
TALLOW CORE SOLDER.

Our tallow core solder is very popular, being especially recommended for switchboard work.

Also useful for small lead cable repairs.

Code Word, Outfit

KESTER FLUX SOLDER.



A self-fluxing solder. The flux is contained in single cells, as shown in cut, and only enough flux for a single joint will flow at a time.

	Code Word.
No. 1, in strips 2 feet long	Outflow
No. 2, " 2 "	Outgeneral
No. 3, " 2 "	Outgrow
No. 4, " 2 "	Outguard

MANSON TAPE.

Put up in tin boxes containing one-half pound roll.

	Code Word.
¾ inch White Manson Tape	Osteology
¾ " Black " "	Ostracean

FRICTION TAPE.

A high grade friction tape made from selected stock. Put up in half-pound rolls in paper boxes.

	Code Word.
¾ inch, ½ pound rolls	Ostander
1 " ½ " "	Ostensible

HIGHLAND SOLDERING PASTE.

The Highland Soldering Paste is absolutely free from acid or any ingredient injurious to insulation. It is condensed to such a degree that one pound of it will do as much work as three gallons of ordinary soldering solution. It will save solder and make a better joint than any other soldering flux on the market. It is convenient and always ready for use, with nothing to break and nothing to spill.

	Code Word.
2-ounce box	Outman
1-pound can	Outmarch
5- " "	Outmeasure

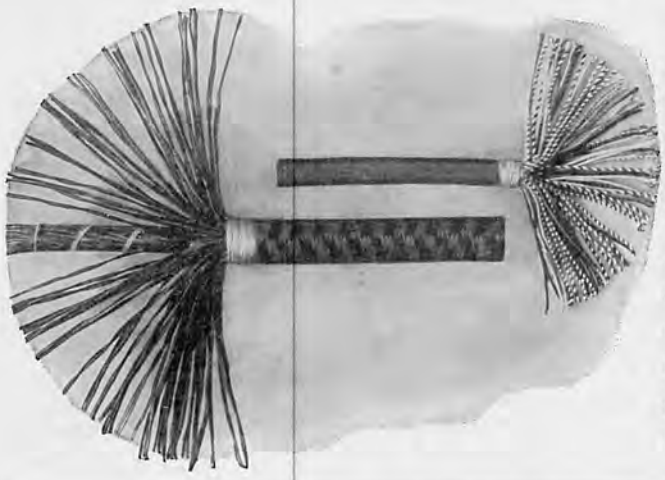
CRESCENT SOLDERING STICK.

Put up in square sticks, 6 in. long and ⅞ in. square.
Code Word, Outmost

ALLEN SOLDERING STICK.

It is put up regularly in round sticks 6 inches long and 1 inch in diameter, in individual wooden boxes. Code Word, Outlaw

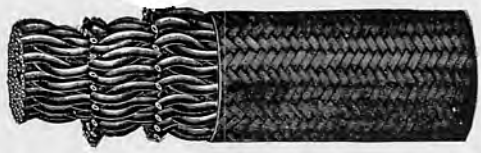
SWITCHBOARD CABLE.



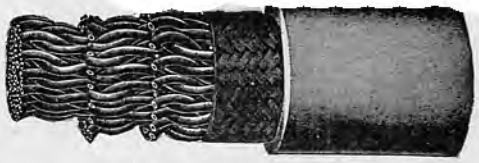
For connecting switchboard terminals to the cross-connecting rack, etc. Made up of twisted pairs of silk and cotton insulated wires formed spirally into a cable, the whole covered with two reverse wrappings of very heavy dry Manilla paper. Over the paper is a braiding of red and white cotton saturated with beeswax and polished. The covering of the different wires is insulated with distinctive colors according to the Standard Code Color to facilitate identification.

Size of Cable.	Outside Covering.	Size Wire.	Kind of Insulation.	Color of Insulation.	Feet Per Pound.	Pounds Per Foot.	Code Word.
50–Pairs.	Braided Cotton. Beeswaxed.	No. 22.	2 Cottons. Beeswaxed.	Code.	3.0000	.3333	Lapicide
42–Pairs.	Do.	No. 24.	1 Cotton. 1 Silk.	Code.	6.5000	.154	Lapidary
21–Pairs. 21–Singles.	Do.	No. 24.	1 Cotton. 1 Silk.	Code.	7.7669	.1287	Lapideous
26–Pairs.	Do.	No. 22.	2 Cottons. Beeswaxed.	Code.	.....	.172	Lapidific
21–Triples.	Do.	No. 19.	1 Silk. 2 Cottons.	Code.	.....	.....	Lapididt
21–Pairs.	Do.	No. 22.	1 Cotton. 1 Silk.	Code.	7.2727	.1357	Lappet
11–Pairs.	Do.	No. 24.	1 Cotton. 1 Silk.	Code.	.....	.....	Lappingly
11–Pairs.	Do.	No. 22.	2 Cottons. Beeswaxed.	Code.	12.0000	.0833	Lapsable
11–Pairs.	Do.	No. 19.	1 Silk. 2 Cottons.	Code.	.....	.....	Lapstone

RUBBER COVERED TELEPHONE CABLES.



Braided Cable.



Braided and Leaded.

For outdoor use. Useful for bringing wires from terminal pole into building. Does not require a cable expert or plumber to put it up.

Braided only and braided and leaded cables shown have No. 19 Copper, rubber covered conductors, twisted in pairs. This cable furnished in the following sizes:

Braided Only.

	Code Word.
5 Pair	Terminus
10 "	Termite
15 "	Termly
20 "	Ternany
25 "	Terrace
50 "	Terestial
100 "	Terrific

Braided and Leaded.

	Code Word.
5 Pair	Testable
10 "	Testaceous
15 "	Testament
20 "	Testate
25 "	Testator
50 "	Tester
100 "	Testily

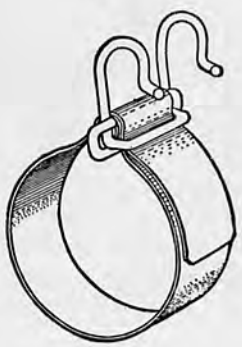
MARLINE CABLE HANGERS.

Made to Fit Any Size Cable.

We have samples of marline, cut down after 7, 8 and 11 years service in Chicago, the worst possible exposure, and which show on the outside the effect of the weather, but which inside are bright and strong, and good for many more years. The hooks were rotten but the marline was practically untouched.

No. 9 Hook is of No. 9 steel wire. No. 7 of No. 7 steel wire. Hooks are galvanized after they are formed.

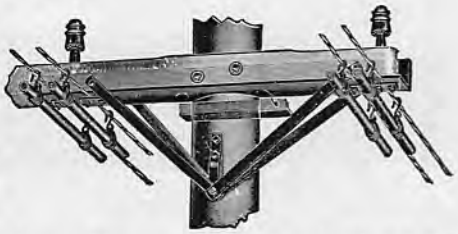
						Code Word.
25 Pair	No. 1	Marline,	with	No. 9	Hook	Acerbity
50 "	No. 1	"	"	No. 9	"	Aisfield
75 "	No. 1	"	"	No. 9	"	Aisle
100 "	No. 1	"	"	No. 9	"	Aisiness
150 "	Housline,		"	No. 7	"	Airmy
200 "	"		"	No. 7	"	Airless
300 "	"		"	No. 7	"	Airly



BOSTON CABLE CLIP.

A three-piece hanger, consisting of steel wire and strap of sheet metal. The absence of bolts, buttons or rivets makes it an extremely easy clip to use and makes it possible to use many times over. It is simple and strong, and can be adjusted to any size cable. It is adjusted entirely without the use of tools of any kind, and will hold more firmly than other clips that are fitted with pliers. Strap 6½ inches long. Code word, Acerbitude.

ANGLE IRON CABLE ARMS.



Made for 4, 6 and 8 cables, and with 2 or 4 braces as ordered.

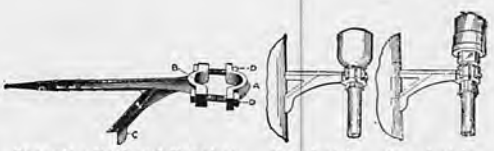
The stirrup is a necessity and is always included

Angle Iron Cable Arms positively and permanently support all messengers and cables, and receive all strains. The wooden cross-arm may be placed in the iron arm, as shown in cut, requiring no extra pole room. The iron arm is held by a very heavy rear clamp with two bolts, and also by two lags in front of pole. It has two or four braces, as preferred, and the heel bolt is reinforced by a stirrup held by two more lags. The arm will neither twist nor tilt under the heaviest strains.

These cable arms may be used with the braces above if preferred.

								Code Word.
3x3x¼x30 inches;	1	pair braces,	4	clips,	weight	24	lbs.	Meteor
3x3x¼x33 "	1	"	4	"	"	26	"	Metered
3x3x¼x33 "	1	"	6	"	"	26	"	Methiglin
3x3x¼x42 "	1	"	6	"	"	30	"	Method
3x3x¼x42 "	1	"	8	"	"	30	"	Methodic
	2	"	additional					Methodist

POTHEAD BRACKETS.



Security Pothead Bracket. Bracket in Position Old Style Pothead. Bracket in Position "Novelty" Pothead.

The old style of pothead block is not as innocent as it looks; it costs money; it is never on hand when wanted; never adjustable.

The method of fastening wooden blocks is very unsatisfactory. The method of fastening the cable to the wooden block is always rough and not satisfactory

The Security Bracket is of malleable iron. Its attachment to the pole is easy. A ⅜ hole is started 3 or 4 inches deep, into which is driven a barbed shank. Remove the outside clamp "A" and you will find a head "B" on which to pound. Drive it in until the foot of the brace "C" enters the pole; hit "C" with your hammer to make sure of a firm step.

Put the cable in the bracket and put clamp "A" around it, loosely fastening the two bolts "D."

Slip shims of lead or leather between the bracket and the cable so that the lead cable is cushioned; tighten the bolts "D" firmly but not enough to crush the cable.

The clamp should be put around the cable itself and the pothead should be just above it. This puts the strain on the lead sheath and not on the pothead.

Linemen can swing or stand on this bracket without injury to it or to themselves. It neither breaks nor decays.

	Code Word.		Code Word.
1⅝ in. opening	Midadusty	2 in. opening	Misaduzzo

BRIDLE RINGS.

Our Bridle Rings are made of best quality iron twisted like key rings, and heavily coated with tough glass enamel.

Wires are easily inserted or removed at the opening on the side.

These Bridle Rings are made in six sizes, as below:

No.						Code Word.
3580, 1⅝	eye,	¼	opening,	1¼	shank	Midnight
3780, 1⅝	"	¼	"	⅞	"	Midway
3980, 1¼	"	¼	"	1½	"	Midwife
4380, 1¼	"	¼	"	⅞	"	Midwifery
4580, ⅝	"	5/16	"	⅞	"	Midwinter
4780, 3	"	¼	"	1¼	"	Miff

WAXED LACING TWINE OR LOCK STITCH.

Used for Lacing Switchboard Cable.

Put up in One Pound Balls. Code Word, Horseman

MARLINE TWINE.

Put up in One and Five Pound Balls.

Code Word, Horent

LACING TWINE.

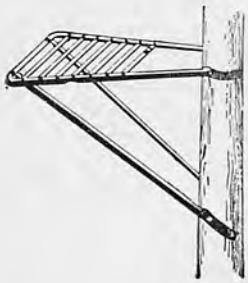
Not Waxed.

For Lacing Wires into Cables and for Lacing Cable Ends when "Fanned Out."

Put up in One Pound Balls.

Code Word, Horsechair

POLE SEATS.



These seats are tested to one thousand pounds and will carry a ton. This may with advantage be tried on all competitive samples. The cross slats are heavy and solidly machine riveted to the under side of the rim, leaving a smooth exterior. The pole braces are of angle iron and very light and strong. Lightness is an advantage, because cable poles are generally overloaded, a point sometimes not considered when buying seats, but nevertheless important if lightness can be obtained along with rigidity and strength.

The particular claims for this pole seat are light weight, great strength, neatness and low cost to you.

	Code Word.
Pole Seats, weight 28 pounds, plain	Merrily
" " 28 " galvanized	Midden

POLE PLATFORMS

Are intended for important points and may be required to carry several men at once.

The guard rails go around the pole and fasten to it by lags. This makes the rail very staunch.

For shipment the platform and rail are wired to each other. All the braces, posts and lag-screws are boxed and are complete. A foreman puts one platform and one box in the wagon and he is ready. He needs no further requisition for lags, bolts, etc. This is a handy feature.

Weight complete, 90 pounds. Weight, without railing, 62 pounds.

	Code Word.
With Rail Galvanized	Merriment
Without Rail Galvanized	Merriners

PAPER INSULATORS FOR CABLES.

Paper Sleeve, Full Size.

Paper tubes are used almost universally as Insulators in the splicing of cables. The tubes, while cheap and simple, must be good and well made. They are constructed of strong, tough paper tightly rolled.

	Code Word.		Code Word.
3 in. Paper Sleeves	Mishear	18 in. Paper Sleeves	Misjoin

LEAD SLEEVES.

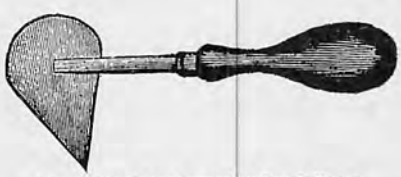
Inside Diam.	Thickness of Wall.	Weight Per Foot.	Code Word.	Inside Diam.	Thickness of Wall.	Weight Per Foot.	Code Word.
1¼ inches	⅛ inch	2.69 lbs.	Mishap	2 inches	⅛ inch	4.15 "	Mineralizer
1½ "	⅛ "	3.18 "	Mincingly	2½ "	⅛ "	5.14 "	Mingler
1¾ "	⅛ "	3.67 "	Mineral	3 "	⅛ "	6.10 "	Mineate

Code Word, Misjumper

SUNDRIES FOR CABLE SPLICING.

	Code Word.
Paraffine	Misjudge
Beeswax	Organize
North's Cable Compound	Misjumper
Chatterton Compound	Misjudging
Ozite, 1 gal. cans	Misjudged
W. D. Cable Compound	Mislay
Wiping Solder	Outface

SPLICERS' TOOLS.



Shave Hook for Scraping Lead Sleeve.

Code Word, Ornomet

Boxwood Turn Pin for Expanding ends of Lead Sleeve.

Code Word, Orotund

Boxwood Dresser for Shaping Lead Sleeves.

Code Word, Orology

TELEPHONE RECEIVER CORDS.

Cord Number.	Kind of Braid.	No. Conductors.	Terminals.	Length.	Code Word.
1	Green Silk	2	No. 15 each end	30 inches	Fie
2	" "	2	" 15 one end No. 12 other end	30 "	Field
4	" "	2	" 12 each end	30 "	Fieldpiece
23	" "	2	Four bare ends, no terminals	30 "	Fiend
5	Maroon Worsted	2	No. 15 one end No. 7 other end	36 "	Fiendish
6	" "	2	" 15 each end	36 "	Fierce
24	" "	2	Four bare ends, no terminals	36 "	Fiercely

NOTE.—Green silk receiver cords can be furnished in 24 and 36 inch lengths, worsted in 24 and 30 inch lengths to special order. The lengths specified above are standard and will be furnished on all orders not otherwise specified.

DESK STAND CORDS (CABLES).

Cord Number.	Kind of Braid.	No. Conductors.	Terminals.	Length.	Code Word.
9	Green Silk	4	No. 15 each end	8 feet	Fierceness
10	" "	4	" 15 one end No. 12 other end	6 "	Final
11	" "	5	" 15 each end	6 "	Finally
12	" "	5	" 12 one end other end bare	4½ "	Financial
13	" "	6	" 15 " " " "	6 "	Finish
25	" "	4	All ends bare, no terminals	8 "	Finished
	" "	4	" " " " "	6 "	Finishes
26	" "	5	" " " " "	4½ "	Finishing
	" "	5	" " " " "	6 "	Finiter
27	" "	6	" " " " "	6 "	Finitely

CORDS USED WITH NORTH TELEPHONES.

Receiver Cords.

KIND OF TELEPHONE.	KIND OF RECEIVER.	
	No. 6, Permanently Adjusted.	No. 3, Adjustable.
Desk Set Type "N"	Uses No. 1 Cord	Uses No. 2 Cord
" " "F"	" 3 "	" 4 "
Wall Telephones	" 6 "	" 5 "

IMPORTANT.—When ordering receiver cords be sure to find out whether the telephone is equipped with No. 6 Permanently Adjusted, or No. 3 Adjustable receiver, and order accordingly.

Desk Stand Cords (Cables).

Type "N," Desk Set, Local or Common Battery, uses No. 9 Desk Stand Cord.
" "F," " " Battery, uses No. 12 Desk Stand Cord.
" "F," " Common Battery, uses No. 10 Desk Stand Cord.

SWITCHBOARD TRANSMITTER CORDS.

Cord Number.	Kind of Braid.	No. Conductors.	Terminals.	Length.	Code Word.
18	Green Silk	1	Bare tinsel, twisted and tinned	8 feet	Flitted

OPERATOR RECEIVER CORDS.

Cord Number.	Kind of Braid.	No. Conductors.	Terminals.	Length.	Code Word.
16	Green Silk	2	No. 15 one end, other end bare	6 feet	Floculour
28	Green Silk	2	All ends bare, no terminals	6 "	Filthy
17	" "	3	" 15 " " " "	6 "	Flogster
22	Maroon Worsted	2	" 15 " " " "	6 "	Fight
20	" "	2	" 15 each end	6 "	Filthiness
29	Maroon Worsted	2	All ends bare, no terminals	6 "	Filtrate

CORDAGE.

Tinsel Conductor Cordage, one to six conductors, cabled together and covered with a substantial green silk braid, each conductor having a distinctive marking. Any length.

	Code Word.		Code Word.
Single Conductor	Finagog	4 Conductor	Flowy
2 "	Finalout	5 "	Flay
3 "	Flavored	6 "	Fleak

SWITCHBOARD CORDS.

Tinsel Conductor Cord.

"Neco" Steel Cord.

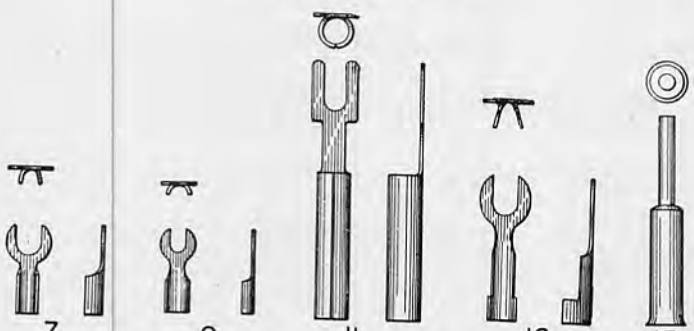
We carry a complete line of all cords used in connection with switchboard work, and strongly recommend our hard finished glazed cotton braided spiral switchboard cord as the most efficient and durable cord of this type upon the market. This is made of double or triple conductor. The conductors consist of strands of copper tinsel braided. One conductor is insulated with two reverse wrappings of silk, then with a two-ply thread. The second conductor is placed alongside of the first conductor, and both are incased in a spiral of brass wire, the whole being covered with a braiding of a hard finished glazed cotton. Plug end strongly reinforced, each end provided with strain loop.

The "Neco" steel cord is a very high grade cord, the best of this type. The conductors are made of steel music wire of great strength, on which are wound copper wire to reduce the resistance. Insulated with first a cotton wind, second a silk wind, and third a wax cotton braid, conductors are spirally wound and provided with a reinforcing spring at plug end. The outside braid is made of best waxed linen thread which wears smooth and makes the cord run easy and wear well.

Cord Number.	Style of Cord.	Kind of Braid.	No. Conductors.	TERMINALS.				Length.	Code Word.
				Plug End			Switchboard End.		
				Tip.	Ring.	Sleeve.			
4	Tinsel	Cotton	2	No. 9	.....	Bare	2–No. 11	6 feet	Fittralim
4	"	"	3	" 9	No. 9	"	3– " 11	6 "	Fittialinor
7	"	"	2	None	None	"	None	6 "	Filtralize
8	"	"	3	"	"	"	"	6 "	Filtration
5	"Neco" Steel	Linen	2	No. 9	.....	"	2–No. 11	6 "	Fimbricate
6	" "	"	3	" 9	No. 9	"	3– " 11	6 "	Fin
9	" "	"	2	None	None	"	None	6 "	Finable
10	" "	"	3	"	"	"	"	6 "	Finacure

NOTE.—Any of the above cords can be furnished in 4, 5 or 7 foot lengths to special order. The 6 foot lengths are standard and will be furnished on all orders not otherwise specified. Always order by code number.

CORD TERMINALS.



Cuts Actual Size.

The cord terminals here shown are used on the cords listed in this bulletin as indicated in the tables. A supply of these will be found useful for repairs or for making up special cords. If interested in other styles of terminals or binding posts write for Bulletin No. 27.

	Code Word.		Code Word.
No. 7 Terminal.....	Fleeche	No. 12 Terminal.....	Flaume
No. 9 "	Flection	No. 15 "	Flighter
No. 11 "	Fleerd		

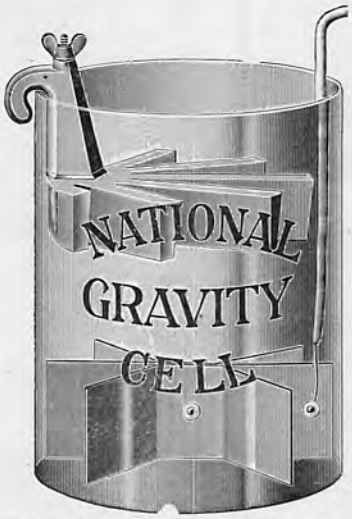
BATTERIES.

National No. 7 Wet Cell Battery.

Code Word, Neoplastic

PARTS OF NO. 7 CELL.

Glass Jar.
Pencil Zinc.
Carbon.
Cover.
Porcelain Bushing.
Rubber Washer.
Thumb Screw.
Thumb Nut.
Sal-ammoniac



National Gravity Cell Battery.
Furnished in 2 sizes.

	Code Word.
6x8 inches	Negative
5x7 "	Neediness

PARTS—Jar.
Copper.
Zinc.
Thumb Nut.
Blue Vitriol.

National No. 2 Battery.

PARTS—Jar.
Circular Zinc.
Carbon Cup.
2 Rubber Washers.
Cover.
Porcelain Insulator.
Thumb Nut.

Code Word, Nerval

North Cannon Cracker Dry Batteries.

NORTH CC Dry Cells are manufactured from highest grade material.
Every Battery guaranteed.
Code Word, Cannon

Edison Battery, Type " RR."

Code Word, Monastery

Capacity, 300 Ampere-Hours.

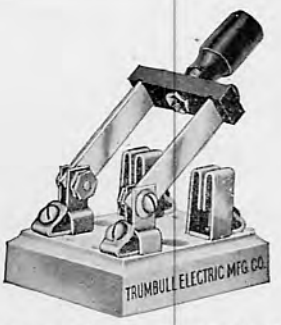
Size over all, 7¼x10½ in.; Jar only, 7⅛x8¾ in.

Renewal Parts.

(Capacity, One Charge.)

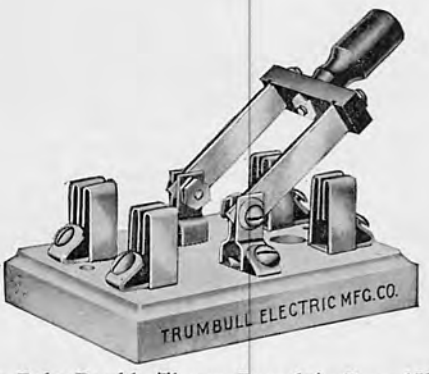
	Code Word.
2 Zinc Plates	Monition
1 Copper Oxide Plate	Monitive
1 Can Caustic Soda	Monitor
Bottle Special Battery Oil	Monitress
Complete renewal	Mongrel

SWITCHES.

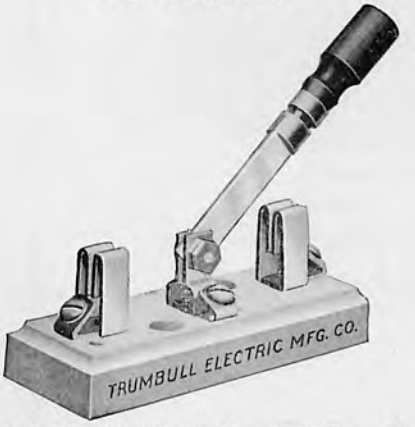


Double Pole, Single Throw, Porcelain Base, 15 amp.
Code Word, Baby

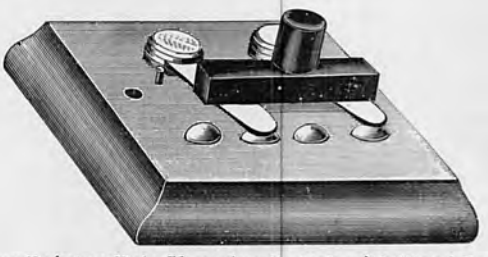
Single Pole, Single Throw, Porcelain Base, 15 amp.
Code Word, Babble



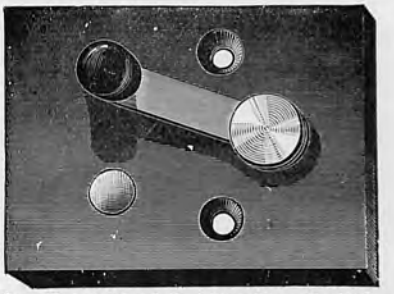
Double Pole, Double Throw, Porcelain Base, 15 amp.
Code Word, Back



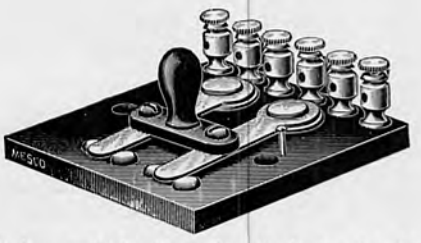
Single Pole, Double Throw, Porcelain Base, 15 amp.
Code Word, Babel



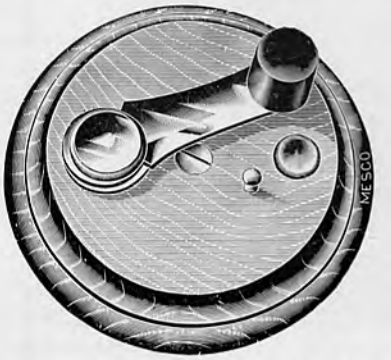
Four-Point or Pole Changing Switch, with Wood Base,
Back Connected. Code Word, Saggitary



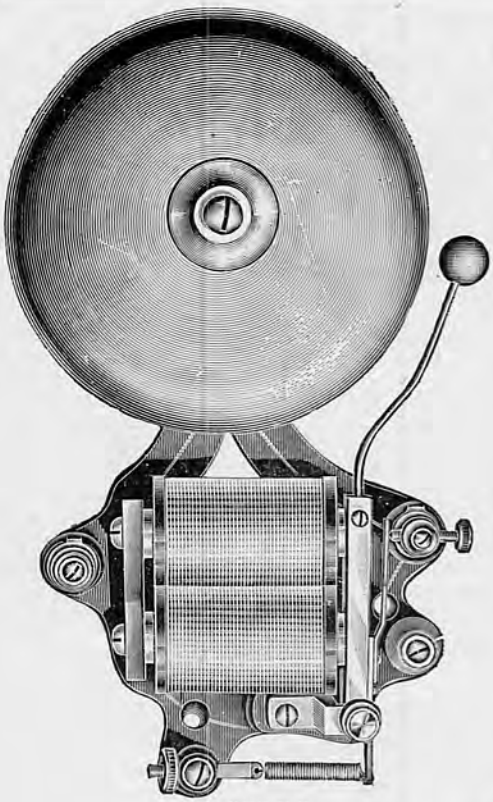
Two-Point Hard Rubber Base Switch.
Code Word, Sacrum



Four-Point or Pole Changing Switch, with Binding
Post on Hard Rubber Base. Code Word, Sagamor



Round Wood Base Switch. 1, 2, 3, 4, 5 and
6-Points.



Style "F" Bells.

IRON BOX BELL.

The illustration shows common iron box bell, such as is used for door bells. It may be used in connection with push button attachment for signaling telephones not equipped with generator and bells.

Always state size of gongs when ordering. 2½ inch gong, 3 inch gong, 4 inch gong.

The vital points are pure platinum and so constructed that they are always in their proper position.

They are especially adapted for Hotels, Fire Alarms, Railroad Signals, Public Buildings, etc., as they have a powerful blow and clear ringing tone.

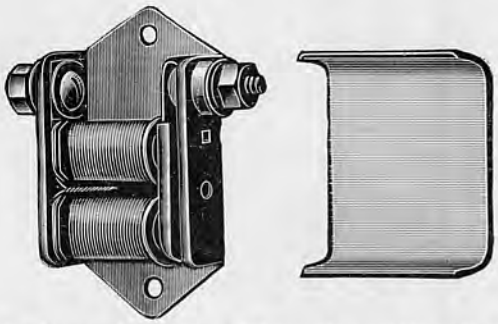
For reliability they are unsurpassed.

They have our improved non-turning binding and contacts posts.

3, 4, 5, 6, 7, 8, 9, 10 and 12 inch gongs.

In ordering always specify size of gong wanted.

ECO BUZZERS.

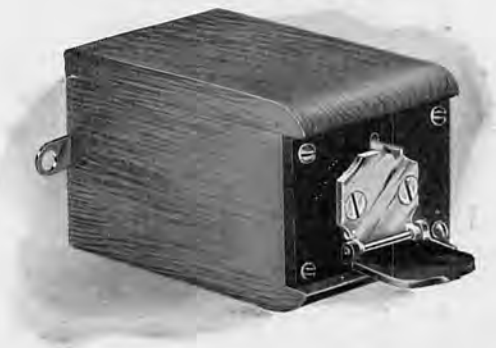


Needs no adjusting. Will operate equally well on one or ten cells of battery. There are no adjustment screws to be displaced.

Contact points are platinized. The ribbed edges over the cover spring tightly over the base, making this buzzer absolutely dust and bug proof.

		Code Word.
No. 0.	Approx. 1½x1¾ inch	Rein
No. 1.	" 2 x1 "	Reindeer
No. 2.	" 2½x1¼ "	Reinforce
No. 3.	" 2¾x1⅜ "	Reinstall
No. 4.	" 3¼x1⅝ "	Reinstate

EXTENSION DROPS.



This device is used as an extension drop, or constant ringing attachment. The shutter when down closes a local circuit, to which an electric bell and battery may be connected, and which will ring constantly until the drop shutter is replaced.

	Code Word.		Code Word.
80 ohms	Resultant	500 ohms	Resumond
1000 "	Resumat	1600 "	Resumatic

XXX IRON BOX BUZZER.

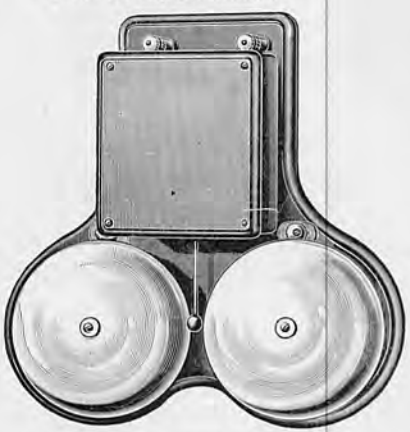
Japanned iron cover. Code Word, Regular

PUSH BUTTONS.

No. 1.
Fits ¾ in. Hole, Pearl Center.
Code Word, Relational

No. 2.
Fits ⅝ in. Hole, Pearl Center.
Code Word, Relator

No. 3.
Fits ½ in. Hole, Pearl Center.
Code Word, Relaxable



LOUD RINGING EXTENSION BELLS.

Magneto.

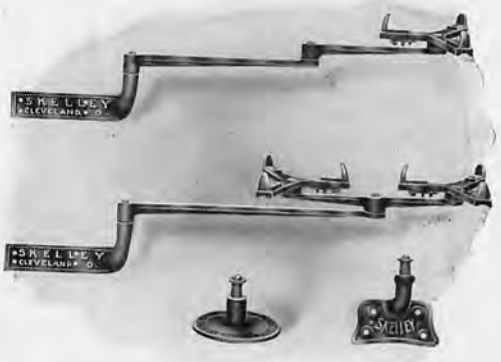
The coil is wound directly on the armature, which is pivoted at one end, the other end playing between the poles of a powerful horseshoe magnet. A heavy ball is attached to end of striker rod, which insures a clear, sharp stroke. Equipped with six-inch steel gongs. The cabinet is of golden oak, with space provided in the base for mounting a condenser.

	Code Word.
80 ohm	Resident
500 "	Residual
1000 "	Residuary
1600 "	Residuum
2000 "	Resign
2500 "	Respectively
3500 "	Respel
1000 ohm with 2 M F condenser in base	Resperation

THE SKELLEY TELEPHONE HOLDERS.

For One or Two Telephones.

Save Time, Trouble and Temper.



In making a choice of telephone holders, action, finish and durability are important factors. The Skelley Telephone Holder is the best, cheapest and most convenient and will fit any size base, will save you time, money and a vast amount of annoyance. It is as much a necessity as the telephone itself and is as invaluable in the home as in the business office. It is so simple it cannot get out of order, and it is so handy you cannot do without it. It is adjustable to any position and stays where you put it. Your telephone is always where you want it, when you want it; and when you don't want it, it is out of the way. You don't have to move the phone every time you open or close your desk, and the telephone cannot fall and break, as it is securely clamped in place.

Where two telephone systems are in use, the double holder carrying both phones is especially invaluable. These holders are nickel-plated or oxidized copper finish, and are arranged for either roll or flat top desks or wall surface.

	Code Word. Single.	Double.
For Roll Top Desk	Respire	Response
For Flat Top Desk	Respite	Respond
For Wall Surface	Respirator	Rest

SWITCHBOARD OPERATOR'S HIGH CHAIR.

No. 78M.
Revolving and Adjustable.

For the operator's use, nothing more suitable, comfortable, convenient and lasting could be devised. Every possible adjustment. Back can be raised or lowered, thrown in or out, as desired, to suit occupant. Back is springy, and at all times give supporting ease to occupant. Seat is revolving and adjustable in height, being susceptible of being raised or lowered as desired. Metal foot rest. Made in two sizes, one that seat adjusts from 24 to 28 inches in height, the other seat adjusts from 28 to 34 inches in height.

	Code Word.
24 to 28 inch extension	Harem
28 to 34 " "	Harequin

OPERATOR'S CHAIR 334½.

This chair is furnished in quarter-sawed oak, finished in golden oak, hand polished. This chair can be furnished with best quality cane seat or perforated leather over cane, as desired. The back consists of seven flat spindles, bent so as to ensure comfort and is secured to the seat with strong brace arms. The casting is of the best quality of iron and enables one to adjust the seat to a suitable height from 25 to 30 inches from the floor. The chair is equipped with a foot rest which is an additional comfort.

Code Word, Harlan

VEEDER SWITCHBOARD COUNTER.

Style 8.

Show rate of increase, so that exact calculations for the future may be made. They likewise show how better to divide the work on the board among the operators. Number of calls during each hour of the day can be shown. Valuable statistics are easily obtained by their use. Sockets fit in keyboard permanently. Counter can be inserted or removed at will.

Code Word, Harridan

CHIEF OPERATOR'S OR TOLL BOARD CHAIR

No. 83M.

This chair is constructed on the same lines as our No. 78M, with adjustable back that can be raised or lowered and extended from seat. Revolving seat, made in oak or birch, mahogany finish. Metal parts Japanese copper finish. One height, 18 to 24 inches.

Code Word, Hark

PAY STATION SIGNS.

Indorsed by the National Association.

They are unlike the lithographed steel signs. The enamel is fused into the steel (18 gauge) with a blast furnace in 1,500 degrees heat. They are guaranteed never to fade or tarnish from effects of the weather. They will last a business life-time.

Code Word, Harold

GRAY AUTOMATIC PAY STATIONS.

(NEW MODEL.)

No. 8=A

FOR NICKELS ONLY.

Size, 7 inches high, 3½ inches wide, 3⅛ inches deep.

Code Word, Capobanda

This station is a local toll collector, of extra heavy castings. Money drawer sets flush with the front of case. It has large coin capacity and loud positive signals. No electrical connections, and, owing to its not having buttons to push or levers to pull, affords the companies the most rapid and satisfactory results with the lowest cost in maintenance. For common battery or magneto system.

NOTE.—This station will always be furnished without mounting plate unless otherwise stated.

No. 10=A

HAS SLOTS FOR NICKEL, DIME AND QUARTER.

Mounted directly on the backboard.

Code Word, Carebiteer

Including complete swivel for transmitter.

(NEW MODEL.)

No. 22

FOR NICKELS ONLY.

Size, 8¾ inches high, 4½ inches wide, 3¼ inches deep.

Code Word, Capocroce

For a local toll collector this is an ideal piece of apparatus. It is designed to go directly on the backboard and has a complete swivel to mount the transmitter on. Has separate compartments for both the repair men and collector, under different locks. The signals are loud and clear; has large coin capacity.

This illustration shows use of mounting plate.

These Shield Pay Stations carry the automatic feature of all Gray Pay Stations: Simply drop in the coin. They are regularly furnished in red, white and blue enamel. Other colors to order.

No. 11

HAS SLOTS FOR NICKEL, DIME AND QUARTER.

Code Word, Caneciente

Including mounting plate.

This illustration shows the No. 11 attached to wall set by the use of a mounting plate, of which we make several styles, making it necessary that you state what style wall set you use when ordering.

No. 11-A

HAS SLOTS FOR NICKEL, DIME AND QUARTER.

Size, 9¼ inches high, 4½ inches wide, 4¼ inches deep.

Code Word, Canforata

This station has extra large money drawer. Can be drilled to take the transmitter on front same as No. 7, or can be mounted to one side same as No. 11.

This station will always be furnished with mounting plates unless otherwise specified.

NOTE.—As we make various styles of mounting plates, in ordering state what equipment you use, that we may be guided accordingly.

(PORTABLE.)

No. 14.

HAS SLOTS FOR NICKEL, DIME AND QUARTER.

Code Word, Cangosta

For a general portable business this is an ideal piece of apparatus, and is being used extensively throughout the country. Our Pay Stations can be had to fit any make of apparatus.

(NEW MODEL.)

No. 13-A

FOR NICKELS ONLY.

Size (over all), 8¼ inches high, 3⅜ inches wide, 3⅛ inches deep.

Code Word, Caneamusa

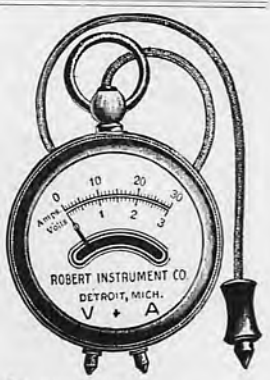
Local portable set. For supplying service at tables in hotels, restaurants, etc.

BATTERY GAUGES.

Eldredge Battery Volt Meters, for testing the efficiency of either dry or liquid batteries.

Code Word, Newyear

ROBERTS POCKET METERS



These little meters are carefully made, each one being thoroughly tested and calibrated before leaving the factory.

The voltmeters may be used on storage batteries as well as dry cells, but the ammeters are not adapted for storage batteries.

Type A, Combination Volt-ammeters.

	Code Word.
0- 3 Volts, 0-30 Amperes, with leather case	Cernuous
0- 6 " 0-30 " " " "	Ceromanza
0-12 " 0-30 " " " "	Cerostroto

Type B, Ammeters.

	Code Word.
0-30 Amperes, with leather case	Cerquillo

Type C, Volt-meters.

	Code Word.
0- 3 Volts, with leather case	Cerretano
0- 6 " " " "	Cerrumado
0-10 " " " "	Certabas
0-12 " " " "	Cortandum
0-15 " " " "	Certissimo

WARNER POLE CHANGER.

Dry Battery Outfit, complete, including 60 Best Dry Batteries, Edison Type RR Closed-circuit Battery, Cabinet and Pole Changer, mounted.

Cabinet Style Dry Battery Outfit.

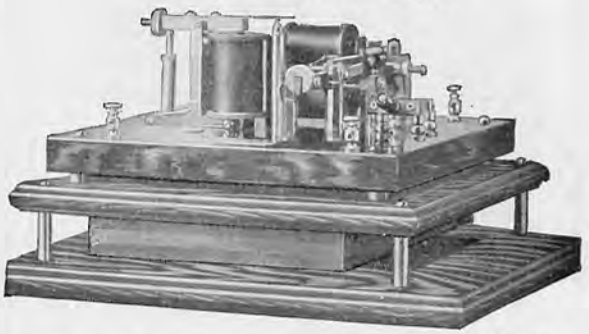
This outfit consists of sixty best quality dry batteries, one Type "RR" Edison battery, one special condenser and one Warner Pole Changer, all contained in a handsome paneled Oak Cabinet, having glass cover as shown. The cabinet occupies a space of about 18 x 20 inches, and is about 40 inches high over all. When crated for shipment, it weighs about 200 lbs.

Thirty batteries will meet most requirements, leaving a reserve of thirty.

This outfit is tested ready for immediate use, so that all there is to do to install it is to carefully remove the crate from around the outfit and charge the closed battery according to directions.

Code Word, Ceruchus

Standard Pole Changer.



	Code Word.
Standard Pole Changer, complete, without Batteries	Cervateca
Cabinet for holding 60 Dry Batteries and one Closed Circuit Lalande Battery	Cervecero
Edison or Gladstone 300 ampere hour, complete, closed circuit	Monastery

LINEMAN'S PORTABLE TEST SET.

A Complete Telephone in Polished Oak Case with Carrying Strap.

Our Standard No. 3 Test Set is equipped with 1000 Ohm ringer and a generator delivering either alternating or pulsating current as desired, this feature being controlled by means of a five point switch, which admits of various combinations and meets all the requirements for which a test set can be used. This is without doubt the most practical and complete test set on the market.

No. 10 Test Set is equipped with 500 Ohm ringer and generator delivering alternating current only.

	Code Word.
No. 3. Test Set..	Cedrilate
No. 10. "	Cedrostino

MESSENGER CABLE CAR.

The pipe is continuous, without joints, except for one elbow at each roller on the hook side, where it carries no weight, and even if it broke and dropped off a man could still work along to the pole without injury. The rollers are of malleable iron, thin and light, but very strong, and which will not chip like wood.

The seat is wood, with dovetail at ends. Wood is more comfortable than iron, and is an insulator. Its adjustable feature makes it fit any lineman and any kind of work.

The table holds all tools and materials. It can be adjusted to suit the man using it. Nothing handier is made.

	Code Word
With adjustable wood seat and table, weight 53 pounds	Metacarpel
With adjustable wood seat, no table, weight 37 pounds	Metacarpus

MESSENGER CABLE CAR, JUNIOR.

Too Cheap to be Without.

Safer than a sling, also much more convenient and comfortable. So inexpensive that one can be furnished with each wagon.

They will pay for themselves quickly.

Weight, 7½ pounds without safety belt.

Code Word, Mitage

TROLLEYS FOR STRINGING CABLES.

(Patented.)

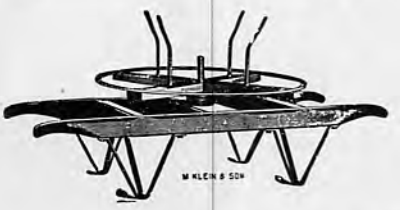
A thousand feet of cable is easily pulled **In ten minutes** by only two men after trolleys are in position. The trolleys can be attached by two men in one hour. The record for one gang of men in one day is over ten thousand feet—call it two miles. It is easy to see the economy.

The wheels are made 9 inches in diameter to roll easily, and of malleable iron which is only a little heavier than wood, and does not break, and stands rough usage and exposure to the weather. Wood rollers are furnished at same price if desired.

The deep two-inch groove easily guides the cable into the pulley. The frame is large so the cable does not strike it.

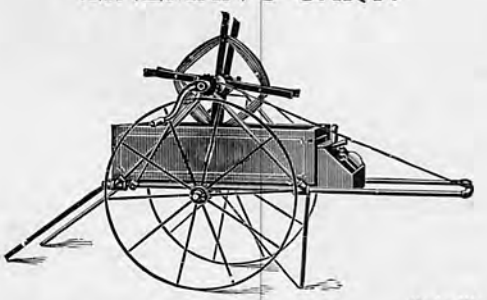
	Code Word.
Weight, 12 pounds each	Matching

COMBINATION PAY-OUT REELS



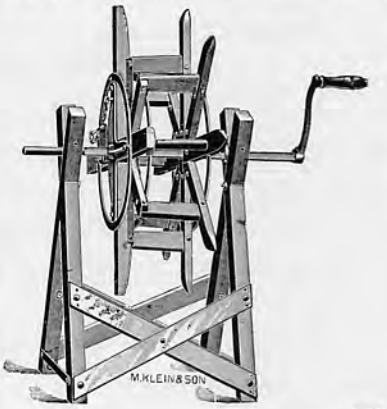
	Code Word.
Regular, for Electric Light work....	Actinic
Light, for Telephone work.	Actinism
Straps for line Reel.....	Action

LINEMAN'S CART.



	Code Word.
Lineman's Cart.....	Activeness

IMPROVED TAKE-UP REEL.

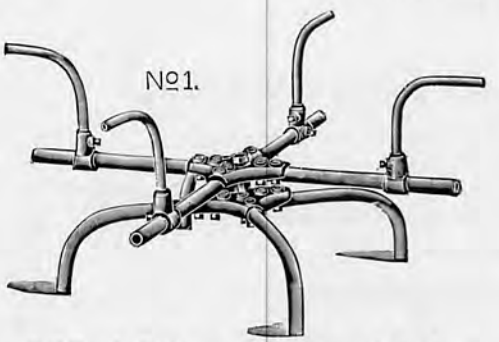


	Code Word.
18 inch coil.....	Actively

COMMON PAY-OUT REELS.

	Code Word.
Complete with Pins.....	Acting

ALL IRON PAY-OUT REELS.



	Code Word.
No. 1 "Ready" Pay-out Reel, Plain.....	Activity
No. 2 "Ready" Pay-out Reel, tension, same style as No. 1, but Tension attachment for Telephone use.....	Actress
No. 3 "Ready" Band Pay-out Reel	Actuation
No. 4 "Ready" Band Tension Pay-out Reel, same style as No. 3, but with Tension attached for Telephone use.....	Actual
No. 7 "Ready" Band Tandem Pay-out Reel	Actually
No. 8 "Ready" Band Tension Tandem Pay-out Reel	Actuary
No. 9 "Ready" Barrow Plain Pay-out Reel.....	Actuate
No. 10 "Ready" Barrow Tension Pay-out Reel	Acumen
No. 11 "Ready" Barrow Band Pay-out Reel	Acuminate
No. 12 "Ready" Barrow Band Tension Pay-out Reel.....	Acuminous

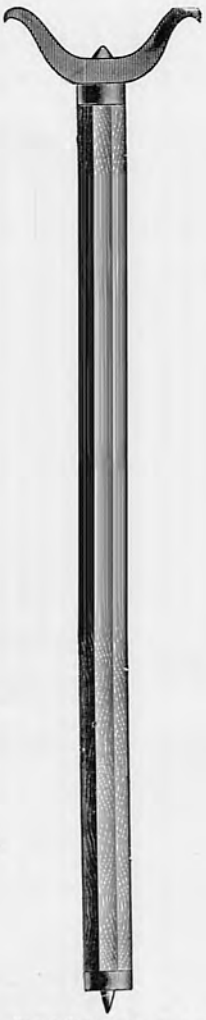
CANT HOOKS.

	Code Word.
With handle, 6 foot,.....	Adamites

"Jenney" Pole Support.

POLE SUPPORTS.

			Code Word.
Jenney Pattern,	6	foot	Adactyl
" "	7½	"	Adage
Mule "	4½	"	Adagio
" "	6	"	Adalid
" "	7½	"	Adam



"Mule" Pole Support.

PLAIN PIKES.

	Code Word.
12 foot Ash or Spruce Handles	Acre
14 " " " " "	Acrid
16 " " " " "	Acrimony
18 " " " " "	Acritude
20 " " " " "	Acro

GUARDED PIKES.

	Code Word.
12 foot Ash or Spruce Handles	Acronych
14 " " " " "	Acropolis
16 " " " " "	Across
18 " " " " "	Acrostic
20 " " " " "	Act

LONG HANDLE SHOVELS.

	Code Word.
7 foot Steel, Long Strap	Acescent
8 " " " "	Acetate
Handles, 7 foot	Acetic
" 8 "	Acetify

LONG HANDLE SPOONS.

	Code Word.
7 foot Extra Heavy Steel	Acatous
8 " " " "	Acetum
Handles, 7 foot	Achieve
" 8 "	Achievement

CROW AND DIGGING BARS.

Solid Steel.

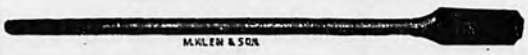
	Code Word.
Octagon, 1 inch x 7 feet	Acquiesce
" 1⅛ " x 8 "	Acquire

TAMPING AND DIGGING BARS.

Solid Steel.

	Code Word.
Octagon, 1 inch x 7 feet	Acquit
" 1⅛ " x 8 "	Acquittal

TAMPING BARS.

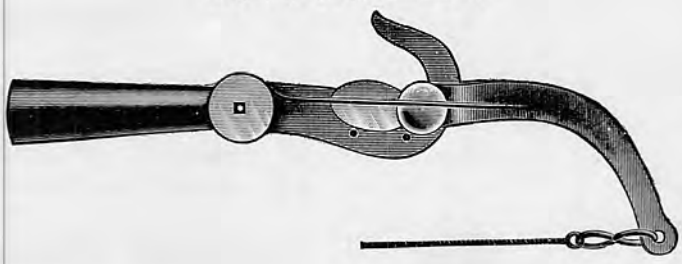


	Code Word.
8 foot Wood Handle, Iron Shoe	Acquittance

SLICK DIGGING TOOL.

	Code Word.
8 foot Wood Handle, Steel Point	Acidify

TREE TRIMMER.



	Code Word.
Trimmers, only, 18 inch	Adapt
" " 21 "	Adapted
" and saw	Adapter
Handles, only, 16 foot	Adapting
" " 18 "	Adaunt

EASTERN CLIMBERS.

		Code Word.
382.	Klein Eastern	Add
110.	Dicke "	Addable

WESTERN CLIMBERS.

		Code Word.
380.	Klein Western	Addict
106.	Dicke "	Adding

CLIMBER STRAPS.

	Code Word.
For Eastern Climbers, Right and Left, in pairs, set of 4	Adder
For Western " " " " " 4	Addition

MALLEABLE IRON PULLEY BLOCKS.

Galvanized, With Hook.

For ⅜ inch Rope.

		Code Word.
No. 2333.	2¼ inch shell, single, with hook	Advance
" 2333-A.	2¼ " " " " " and eye	Advanced
" 2334.	2¼ " " double, " "	Advantage
" 2334-A.	2¼ " " " " " and eye	Advene

For ½ inch Rope.

No. 2335.	3 inch shell, single, with hook	Adventist
" 2335-A.	3 " " " " " and eye	Adventure
" 2336.	3 " " double, " "	Adventurer
" 2336-A.	3 " " " " " and eye	Abverb

Galvanized, Without Hook.

For ⅜ inch Rope.

		Code Word.
No. 331.	2¼ inch shell, single, one eye	Adverse
" 331-A.	2¼ " " " two eyes	Advertise
" 331-B.	2¼ " " double, one eye	Advice
" 331-C.	2¼ " " " two eyes	Advisable

For ½ inch Rope.

No. 332.	3 inch shell, single, one eye	Advised
" 332-A.	3 " " " two eyes	Advocasy
" 332-B.	3 " " double, one eye	Advocate
" 332-C.	3 " " " two eyes	Advocation

Hollow Steel Blocks.

HOLLOW STEEL BLOCKS.

Ford's Patent.

	Code Word.
3 inch single, for ⅜ rope	Adnate
3 " double, " ⅜ "	Adolescence
4 " single, " ½ "	Adolphus
4 " double, " ½ "	Adonic

Common Wood Blocks.

COMMON WOOD BLOCKS.

Iron Strapped.

Size.	Diam. Rope.	Single.	Double.	Triple.	Code Word
3 inch	⅝	.70	1.30	1.75	Adonis
4 "	½	.85	1.60	2.15	Adopt
5 "	⅝	.90	1.75	2.25	Adoptable
6 "	¾	1.10	2.00	2.90	Adoption
7 "	⅞	1.30	2.40	3.50	Adoptive
8 "	1	1.65	2.85	4.25	Adorable

When ordering specify whether single, double or triple is wanted.

320.

KLEIN STEEL TIE WRENCH.

		Code Word.
320.	For hard drawn copper	Adjoin

321-322-323.

KLEIN STEEL SPLICING WRENCH.

		Code Word.
321.	For 4 and 6 wire	Adjoining
322.	" 8 " 9 "	Adjourn
323.	" 10 " 12 "	Adjournal

325 and 214.

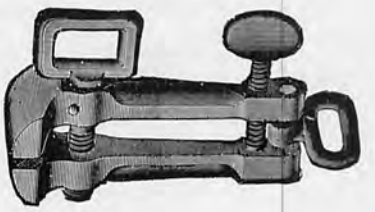
KLEIN LAG SCREW WRENCHES.

		Code Word.
325.	Taper jaw	Adjournment
326.	Combination lag and nut, ⅜ to ⅝ bolt	Adjudge

326 and 215.

DICKE LAG SCREW WRENCH.

		Code Word.
214.	Taper jaw	Adjudging
215.	Combination lag and nut, ⅜ to ⅝ bolt	Adjudicate



LINEMEN'S VISES.

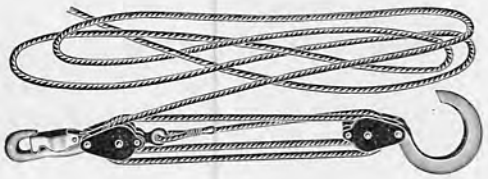
	Code Word.
5½ inch, with loop	Adjunct.
6 " " "	Adjunction
Vise Straps	Adjunctive

HOWE IMPROVED WIRE TOOL.

	Code Word.
With Strap, without vise	Adjure
" " with 5½ in. vise.	Adjured

BUFFALO LINEMAN'S TOOL.

		Code Word.
No. 3715 D.	For No. 6 wire and smaller.....	Aquatus
" 3715 E.	" " 0 " " "	Aquator



LINEMAN'S SLACK TACKLE.

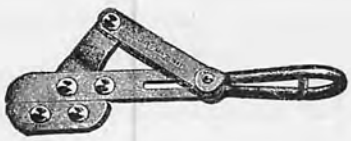
Has light 2 inch steel blocks with anchor hook at one end and spring snap hook for attaching a grip at other end. Complete with 25 feet ¼ inch rope.

		Code Word.
No. 419.	Weight 1¾ pounds.....	Acquitting

BUFFALO GRIP WITH PULLEY.

Pulleys made for ⅜ inch rope.

		Code Word.
No. 3713 A.	For No. 6 wire and smaller..	Aquat
" 3714 A.	" " 0 " " "	Aquaris



BUFFALO GRIPS.

The Buffalo Grip is one of the most popular tools of its class ever placed on the market. It will instantaneously grip the wire, and will not drop off. It will not slip under the severest tension, and will not injure the softest wire.

		Code Word.
No. 1.	For No. 6 wire and finer...	Adjustive
" 3.	Trolley size	Adjutage

PARALLEL SCREW CLAMP.

Length of grip 11 inches, made for No. 0 and No. 00 wire. Particularly adapted for stretching trolley wire.

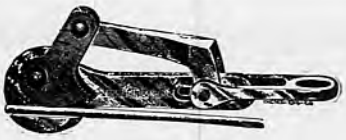
Code Word—Adjutrix.

COMMON ECCENTRIC CLAMP.

		Code Word.
No. 360.	Brass, No. 8 and finer..	Adjuvant
" 361.	Steel, " 8 " "	Admeasure

COME ALONGS.

		Code Word.
No. 126.	Dicke, No. 9 and finer.....	Admissive
" 127.	" " 3 " "	Admit
" 128.	" " 000 " "	Admittance



Klein A.

Klein B.

Klein C.

KLEIN CLAMP.

Style A.

		Code Word.
No. 366.	For No. 8 and finer wire	Administer
" 367.	" ½ inch and finer	Admirable

Style B.

For Hard Drawn Copper Wire.

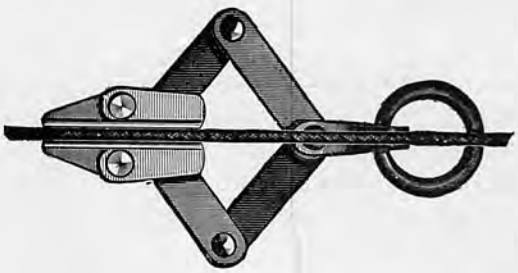
		Code Word.
No. 370.	For No. 6 and finer wire	Admiral

Style C.

For Bare Copper Wire.

		Code Word.
No. 371.	For No. 4 and finer wire	Admirality
" 372.	" " 4 to 000 "	Admiration

In style B and C Clamp the wire is held between two flat brass jaws which open and close automatically. Will hold the wire without nicking or kinking.



PARALLEL WIRE SQUEEZERS.

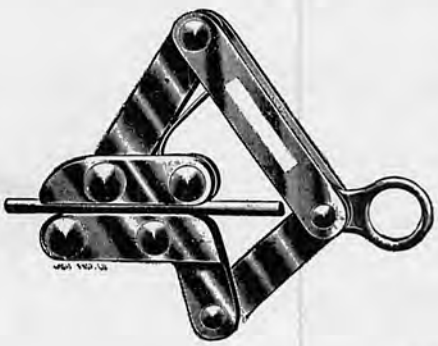
Particularly adapted for insulated wire. Very long jaws and without teeth. Made of steel.

		Code Word.
No. 237.	Dicke	Admirer

HAVEN CLAMPS.

		Code Word.
368.	No. 8 and finer	Adjuring
369.	" 6 to ½ inch cable	Adjust

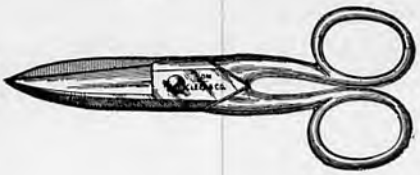
AMERICAN GRIP.



The "American Grip" Wire Clamp is made of steel. It is light and compact and takes up but little space between the blocks and wire, thus allowing the greatest amount of slack within lineman's reach to be brought up. It is operated with one hand, is easily placed on the wire, and is self-locking by spring pressure and readily released.

This grip is equally efficient on iron or copper wire. The jaws are parallel and perfectly smooth, and will positively not injure the wire. The draft being close on the center, it will pull straight and not kink the wire. Clamp is nickel plated and polished.

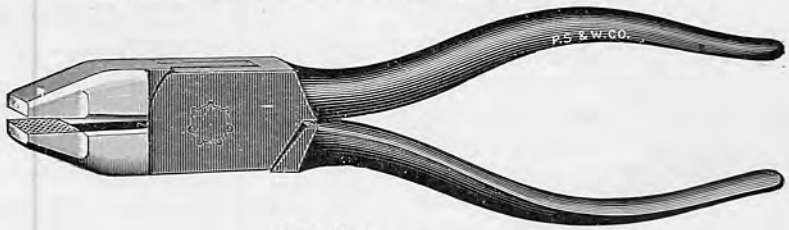
		Code Word.
359.	6 and finer	Adjustant
359A.	0 " "	Adjusted



ELECTRICIANS SCISSORS.

	Code word.
5¼ inches long	Ahead

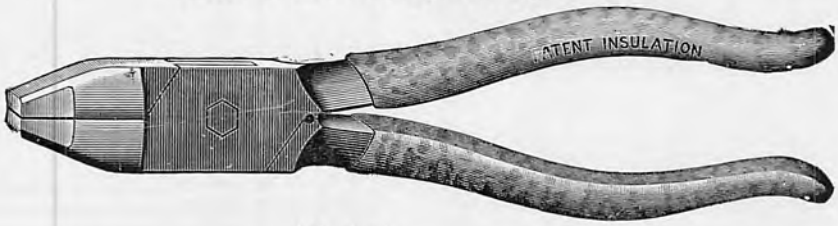
ALL STEEL SIDE CUTTING PLIERS.



	Code Word.		Code Word.
4 inch Swedish	Advowson	6 inch P. S. & W. Nickel	Afar
4 " " Nickel	Aerate	7 " "	Afaul
5 " P. S. & W.	Aerial	7 " " Nickel	Afear
5 " " Nickel	Aerie	8 " "	Afeared
6 " P. S. & W.	Aeronaut	8 " " Nickel	Affected

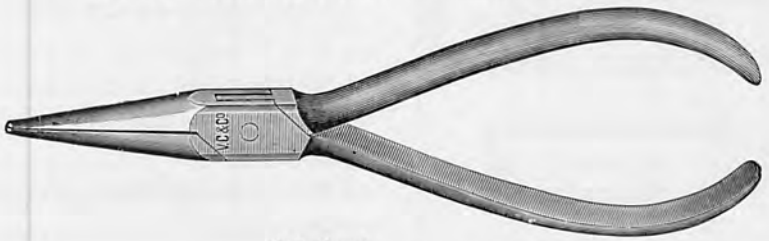
INSULATED HANDLE SIDE CUTTERS.

Tested to Insulate Against 2500 Volts.



	Code Word.		Code Word.
No. 300. 6 inch P. S. & W.	Afflatus	No. 300. 8 inch P. S. & W.	Affliction
" 300. 7 " "	Afflict		

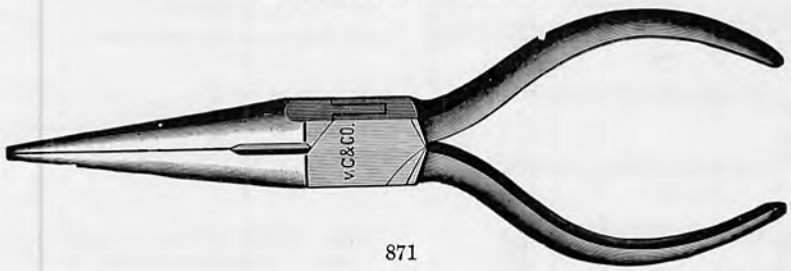
LONG NOSE, OVAL POINT PLIERS.



	Code Word.		Code Word.
5 inch Plain	Affluence	5 inch Nickel-plated	Affluent

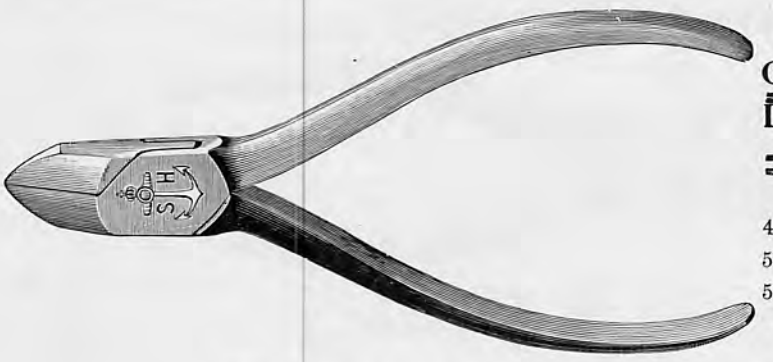
SIDE CUTTING PLIERS.

Long Nose, Oval Point.



871

	Code Word.
No. 871. 5½ inch Plain	Affective

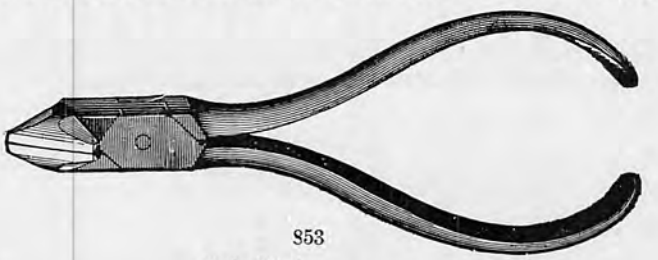


GENUINE SWEDISH DIAGONAL PLIERS.

Polished.

	Code Word.
4½ inch, polished	Anatop
5 " "	Anatopsis
5½ " "	Anatype

DIAGONAL CLOSE CUTTING NIPPERS.



853

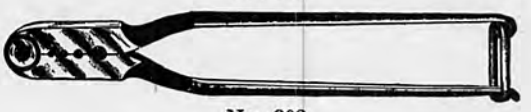
		Code Word.
No. 853.	4 inch plain	Afflue
" 853.	4 " nickel	Afflux
" 853.	5 " plain	Affluxing
No. 853.	5 inch nickel	Afford
" 853.	6 " plain	Affore
" 853.	6 " nickel	Afforest

SPLICING CLAMPS.

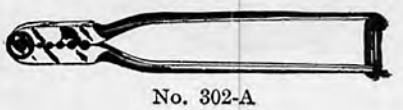
No. 307.

No. 308.

No. 301



No. 302



No. 302-A

No. 307. Klein, for McIntire Sleeves.. Adfected
Nos. 8, 10, 12 and 14 B. & S.

No. 105B. Dicke, for 10, 12 and 14 McIntire Joints ..... Adhere

No. 308. Klein, 7-inch Baby Clamp for No. 12 and finer ..... Adherence

No. 105C. Dicke pattern as above ..... Adherent

No. 308A. Klein, 7 inch Baby Clamp for 12 and 14 wire and 12 and 14 sleeves ..... Adhibit

	Code Word.
301. Klein, for Nos. 4, 6, 8 and 9 wire, Two oval and two round holes	Addle
104. Dicke pattern as above	Address
302. Klein, for Nos. 8, 10, 12 and 14 wire, Four round holes	Addresser
103. Dicke pattern as above	Addressing

302-A. Klein, for Nos. 6, 8, 10, 12 and 14 wire. Five round holes ..... Adduce

COMBINATION CLAMPS.

No. 309-A.

309-A. 9 inch, 4 holes for 8 to 14 wire and 10, 12 and 14 sleeves.
Code Word, Adit

YANKEE RATCHET SCREW DRIVERS.

No. 11.

The friction in ratchet mechanism is so slight as to be hardly felt; the backward movement is as easy as in a good "Stem-winder" and just as noiseless. The construction of ratchet and pawls is such that neither can bend nor break, wear or get out of order, and permits a very compact arrangement. The adjustment for right or left hand is exceedingly simple. If the slide is placed midway between ends of slot, the blade is held rigidly and the driver can be used as an ordinary screw driver with fixed blade.

	Code Word.		Code Word.
No. 11. 2 inch	Agaze	No. 11. 5 inch	Agency.
" 11. 3 "	Age	" 11. 6 "	Agent.
" 11. 4 "	Aged	" 11. 8 "	Ageratum

YANKEE SPIRAL RATCHET SCREW DRIVERS.

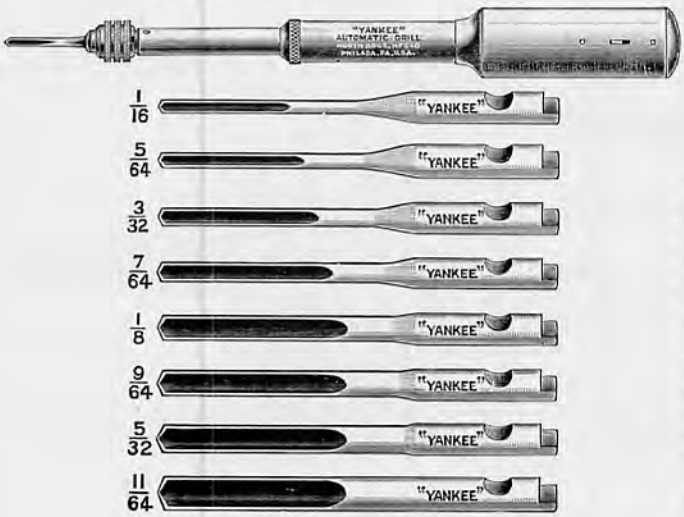
No. 30.

Right or Left Hand Rachet, or Right at Variable Lengths.

The change from right to left hand for either push or ratchet is made by simply moving the slide to either end of the slot. The ratchet movement can be used in any part of the length of tool for either right or left hand. When slide is placed in center of slot the rod is held rigidly and tool can be used as an ordinary screw driver, and this at any point in length of rod. When extended, this gives a very long screw driver.

Code Word.

No. 30. Nickel-plated, stained cherry handle, length with bit 11 inches, extended 19½ inches, 3 forged steel bits ..... Agger



YANKEE AUTOMATIC DRILL.

No. 40.

This tool embodies improvements over those now in the market in the magazine for drills which is found in handle. The chuck is of new design, is stronger and will last longer than any now used in such tools. In hard or tough woods this drill can be operated as a ratchet. The tool is made of brass, nickel-plated and finely finished. The material and workmanship throughout are of the best. Eight drills are furnished with each tool, one each $\frac{1}{16}$, $\frac{5}{64}$, $\frac{3}{32}$, $\frac{7}{64}$, $\frac{1}{8}$, $\frac{9}{64}$, $\frac{5}{32}$, $\frac{11}{64}$ in., shown full size in cut. The entire length of tool, inclusive of drill, as in illustration, is 10¼ in.

Code Word.

No. 40. Automatic Drill ..... Abode

CHAMPION SCREW DRIVER.

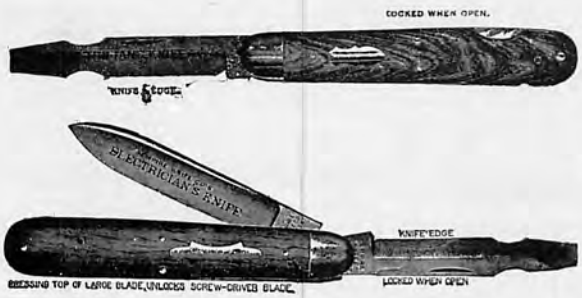
	Code Word.
2½ inch Champion	Afoot
3 " "	Afore
4 " "	Afraid
6 " "	Afresh
8 " "	African

CABINET SCREW DRIVER.

	Code Word
2½ inch Cabinet	Africander
3½ " "	After
4½ " "	Afterward
5½ " "	Agamic
6½ " "	Again

SYRACUSE KNURLED SCREW DRIVER.

	Code Word.
Polished Steel	Agave



EMPIRE KNIFE.

	Code Word.
With combination blade	Ail
" " " and 1 knife blade	Ailantus

Yankee Pocket Magazine Screw Driver.

No. 60.

The need and usefulness of this tool will be instantly recognized. There is nothing just like it or that can be compared with it in the market to-day. It is made with four detachable blades of varying widths and thicknesses to suit different size screws.

The blades are kept in magazine formed by handle.

The tool is small and convenient to carry in the pocket, measuring when closed only 3 inches long and ⅝ inch in diameter, and weighing only two ounces.

The illustration above shows the tool of half size.

It is made of steel, handsomely polished and nickel-plated.

	Code Word.
No. 60 Magazine Screw Driver	Agnosticism

LINEMAN'S TOOL BAGS.

		Code Word.
No. 393.	Tool bags, canvas, 20 inch leather bottom	Aggression
" 393-C.	Leather, with shoulder strap	Aggress

LINEMEN'S TOOL BELT.

With loops for tools.

No. 383.

			Code Word.
No. 383.	Plain belt		Aggrandize
" 383A.	Belt with rings for safety strap		Aggrandizement

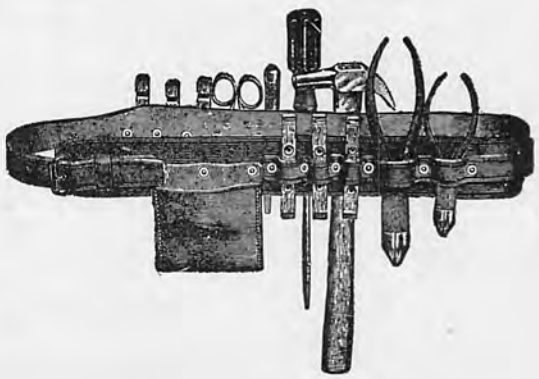
Above belt is 2¼ inches wide. State if wanted for 38, 40 or 44 inch waist.

No. 383A.

With Pouch.

		Code Word.
No. 152.	Belt with pouch	Aggravate

State if wanted for 38, 40 or 44 inch waist.



No. 386.

No. 384.

LINEMEN'S BODY BELT.

For Strapping to Pole.

		Code Word.
No. 386.	Body belt	Aggregation

BELT AND SAFETY STRAP.

This belt is No. 383A. The safety strap is 1½ inch wide, 6 feet long, and provided with strong snap at each end. Strap may be shortened or lengthened by adjusting buckle. State if tool belt is wanted for 38, 40 or 44 inch waist.

		Code Word.
No. 384.	Belt and safety strap	Aggravation
" 385.	Safety strap only	Aggregate

COMBINED SAFETY AND JACK STRAP.

		Code Word.
No. 384B.	Combined safety and jack strap	Aggregative

JACK OR VISE STRAP.

		Code Word.
No. 377.	Weight 13 ounces, without snap	Agitation
" 377-A.	" 18 " with "	Agitator

BELL HANGERS' DRILLS.

Code Word—Alive

No.	12 Inch Per Dozen	18 Inch Per Dozen	No.	24 Inch Per Dozen	30 Inch Per Dozen	No.	36 Inch Per Dozen
6	$ 5.00	$ 7.00	6	$ 9.00	$11.00	6	$13.00
8	5.00	7.00	8	9.00	11.00	8	13.00
10	5.50	7.50	10	9.50	12.00	10	13.00
12	6.00	8.00	12	10.00	12.00	12	13.00
14	7.00	9.00	14	11.00	13.00	14	14.00
16	8.00	10.00	16	12.00	14.00	16	15.00
18	9.00	11.00	18	13.00	15.00	18	16.00
20	10.00	12.00	20	14.00	15.00	20	16.00
22	11.00	13.00	22	15.00	16.00	22	17.00
24	12.00	14.00	24	16.00	17.00	24	18.00
26	13.00	15.00	26	17.00	18.00	26	18.00
28	14.00	16.00	28	18.00	19.00	28	19.00
30	15.00	17.00	30	19.00	20.00	30	20.00
32	16.00	18.00	32	20.00	20.00	32	20.00
34	17.00	19.00	34	20.00	20.00	34	20.00
36	18.00	20.00	36	21.00	21.00	36	21.00

The numbers indicate the sizes in thirty-seconds of an inch. Use the numbers and lengths in ordering these drills.

HOLLOW BRICK DRILL.

This drill is hollow and will hold the dust and dirt. On that account is preferred for interior work, where it is desired to drop as little dirt as possible.

		Code Word.
No. 351.	Hollow, 26 inches long, 5/8 hole	Altered
" 352.	" 26 " " 7/8 "	Altercade

SOLID STEEL BRICK DRILL.

		Code Word.
No. 353.	Solid Steel, 26 inches long, 5/8 hole	Alternate
" 354.	" " 26 " " 7/8 "	Alternately
" 355.	" " 10 " " 1 "	Although

JUMPER BRICK DRILL.

This is the best brick drill yet devised for drilling a hole through masonry of any kind. Made of the best steel. Length of drill, 26 inches.

		Code Word.
No. 164.	Drill and handle complete	Altitude

SOLDERING COPPERS.

Pointed.

Soldering Copper.

	Code Word.
2½ pounds to the pair	Amen
3 " " "	Amenable
4 " " "	Amend
5 " " "	Amends
6 " " "	Amenity
7 " " "	Amerce
8 " " "	American

Above without Handles.

SOLDERING COPPER HANDLES.

	Code Word.
5½ x 1½ inch	Amint

JEWELER'S SOLDERING COPPERS.

	Code Word.
For light work, complete with handle	Amiss

MELTING POT.

	Code Word.
5 inch	Amount
6 "	Amounting
8 "	Ample

MELTING LADLES.

	Code Word.
2½ inch	Amplify
3 "	Amply
4 "	Amputate
5 "	Amule

No. 2 TORCH.

In the No. 2 we are offering you a quart size torch fitted with a round burner that has great generating power which makes it economical to use, soon saving its cost in the saving of gasoline. It is light, well balanced, easily handled, and is sure to please. A careful inspection will convince you that only the best of workmanship and materials have been used. It is supplied in polished brass or nickel plated, as desired.

No. 6 TORCH.

In the No. 6 we offer the trade a first-class torch that will enable the user to do any work that can be accomplished with a round-burner torch, and in addition it will quickly heat soldering coppers—an advantage that will be appreciated by the users of torches who use soldering coppers.

The tank, like the No. 2, is quart size, made in one piece out of heavy brass, and is fitted with brass air pump and our improved burner, which will save you its cost in a short time in the saving of gasoline.

No. 20 COIL FIRE POT.

The generator used on No. 20 is large and powerful, producing a large volume of gas which gives a pure blue flame that is intensely hot, and consumes less gasoline than other makes.

The tanks are made of heavy galvanized iron, fitted with a galvanized cast iron bottom ring which protects the bottom from wear or bruises. The top is made of galvanized cast iron, and all small or light castings are malleable iron, which makes them light and strong. The coil is made of extra heavy pipe, and the burner of steel which we have prepared especially for this work. The valves are fitted with needle points, which are much better than ground keys such as other makers use, as they give the user better control of the fire and are always tight.

Fitted with latest improved brass air pump.

THE No. 12 TORCH.

Burns either gasoline or alcohol. It is made on new principles by which the air blast is passed through a chamber charged with gasoline or alcohol gas, which makes a much stronger fire than can be had in any other way. When blow tube is not used the torch makes a fine candle, which the user will find valuable when working in dark places. A hook is provided so that it may be hung up. The No. 12 is well made, all parts being brass, nickel plated, and finely finished all over, size being ⅞ in. diameter and 6 in. high—just fits the vest pocket. As this torch does first-class work using gasoline for fuel, which is much cheaper than alcohol, it will save its cost in a short time in cost of fuel alone. We warrant it to please you.

AIR PUMP.

The pump illustrated can be used on No. 2 and No. 6 torch, also on No. 20 coil fire pot.

Usually torches and fire pots become worthless when air pump is worn out. The interchangeable pump is a great saving.

IMPORTANT NOTICE TO PURCHASERS.

Delays and misunderstandings will be avoided if you will carefully note the following:

ORDERS.

1. Address all correspondence plainly to the Company and not to individuals connected with same.
2. Our main office and factory is at Cleveland, Ohio. We have branch offices and warehouses at Dallas, Texas, and Kansas City, Mo. Send your orders to the nearest office.
3. Write your name and address plainly. Give your Post Office address in full, including county. Also give correct railroad name of your shipping point.
4. If you are ordering for a company be sure to give its corporation name in full, also your name and official title. This will avoid the error of shipping goods on your personal account.
5. Write plainly giving full name and trade number, as well as code word of article as is printed in this bulletin. This is important and will enable us to fill your order promptly and correctly. We are often at a loss to know what is wanted when other names and descriptions are employed.
6. Always tell us how to ship—by freight—mail or express; also state what route, otherwise we will use our best judgment in making a selection of route.

7. Write your order on a separate sheet. If information or quotations are wanted, write a letter separate from the order and you will get both goods and information more promptly. We furnish complimentary blank order sheets for use of our customers. If your supply is getting low, write for more.

8. We would impress upon purchasers the advantage of ordering articles of standard material and dimensions, which we aim to carry in stock. Shipments of special articles are always slower.

9. All verbal orders and instructions should be confirmed in writing.

TERMS.

10. Our terms to customers of established credit are net 30 days from date of invoice. On supplies, except galvanized telephone wire, a cash discount of 2% for remittances within 10 days from date of invoice.

11. Terms on galvanized telephone wire are net 30 days.

12. Customers not having established commercial rating should give bank references if possible. Personal references usually cause delay.

13. When goods are ordered shipped C. O. D. the purchaser must pay collection and return charges. Goods may be forwarded by freight with sight draft attached to Bill of Lading or by Express, collect.

14. All remittances should be made by Draft, Express or Post Office Money Order or Certified Check. We cannot be responsible for remittances lost in transit.

PRICES.

15. All prices are f. o. b., shipping point, unless otherwise specified.

16. We issue price lists giving the lowest quotations upon all standard goods handled, but all prices are subject to change without notice.

17. In asking for prices always specify exactly the quantities desired, as the price in many cases depends upon the amount purchased.

18. We do not charge for boxing, except in such cases where special packing and handling is required for safety in transportation.

SHIPMENTS.

19. All orders will be executed with greatest possible dispatch, but are received subject to delays due to fires, strikes or other causes beyond our control.

20. We employ experienced packers, and all possible care is taken to prevent mistakes and shortages, and to pack articles securely. All claims for errors will have our prompt attention, but we cannot consider claims for errors made later than five days from receipt of goods. All claims for errors or shortages should be accompanied by the packing slip, which will be found in the package.

21. We assist our customers in having claims adjusted with transportation companies, but our express and freight receipts relieve us of any responsibility for safe transportation of goods.

22. Do not give transportation companies a receipt when you know your shipment is short or damaged in transit without first having noted such loss or damage on your expense bill by the agent.

23. Goods shipped by mail will be at customer's risk. We cannot be responsible for such losses.

RETURNING GOODS.

24. Never return goods without our permission, otherwise we will refuse to receive them. We stand ready to correct any errors on our part, and expect customers to accept liability for their own mistakes. If it be proper to return goods, we must have advice beforehand, as we may wish to forward goods to factory direct, thus saving freight. GET OUR SHIPPING INSTRUCTIONS FIRST.

25. Transportation charges on returned goods should always be prepaid.

26. When you return goods, write our name and address plainly. Also mark package with **your name and address,** and on the same day write us stating when and by what route you made shipment, and inclose shipping receipt. If you will do this it will save both of us much time.

REELS.

27. Reels are always billed at cost and must be included in remittances at maturity of invoice. Credit, however, will be allowed when returned to FACTORY, freight prepaid. Always ask for shipping instructions on reels, because they must be returned to the wire or cable factory from which they were originally shipped—not to our warehouse.

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INDEX.--Bulletin No. 41 (Continued.)

THE NORTH ELECTRIC CO.

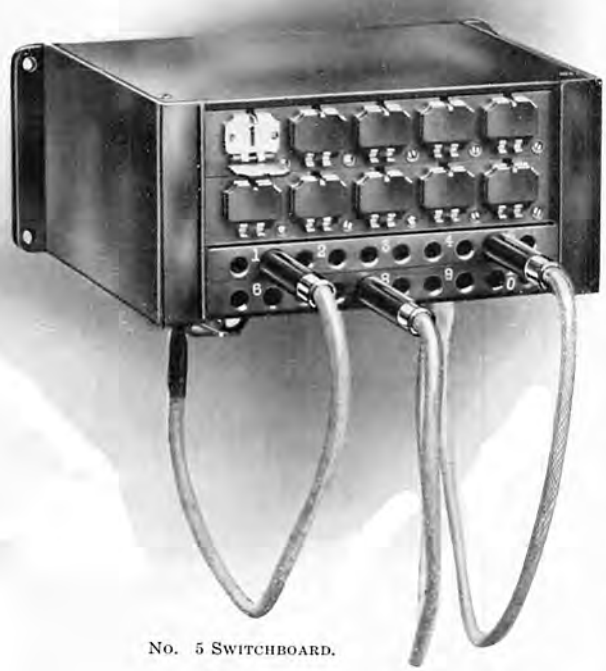
DALLAS, TEXAS CLEVELAND, OHIO KANSAS CITY, MO.

Bulletin No. 42 January 1907.

Switchboards for Small or Isolated Exchanges.

Auxiliary Cord Equipments.

The small or isolated exchange, usually located at a remote point, or one not easily reached by a competent inspector, and of necessity frequently in charge of a person of limited experience, should be so constructed as to require very little, if anything, in the way of repairs.



No. 5 Switchboard.

Although the above statement has always been true, as applied to apparatus of this character, the fact remains, nevertheless, that heretofore the manufacturers have not offered a standard high grade line of apparatus for this class of service. The rapid growth of rural systems has been such as to entitle them to the best apparatus which it is possible to produce, and in order to meet this imperative and increasing demand, we have designed the line of switching appliances herein illustrated and described.

In making up this apparatus we have used nothing but the highest quality, standard interchangeable parts, the drops, jacks and plugs being the same

as those used in our most efficient and most carefully constructed magneto switchboards, and these parts are mounted upon and enclosed by dust proof iron cases, carefully enameled and presenting a very handsome appearance. The end plates to which the drops and jacks are fastened and by which the switches are secured to the wall or backboard are of cast iron, while the top and bottom covers are of Russia iron. The top and bottom covers can easily be removed, exposing the interior apparatus and wiring for purposes of inspection and repair.

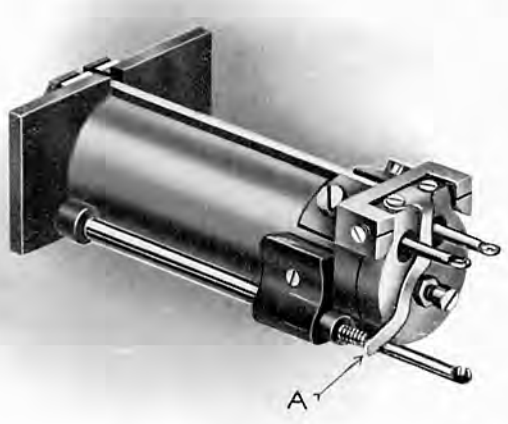
The element of flexibility has also been kept in mind, and while these small switching stations are in standard units of five, ten, and twenty lines, further increase can readily be provided for by using two or more of the units in conjunction with each other.

Each switch is provided with a speaker's plug and cord and connecting plugs and cords. It is designed to connect the speaker's cord to a standard telephone of the wall or desk type so that this telephone can be used for calling and communicating with the various stations on the lines connecting to the switch. The connecting plugs and cords are used for connecting the various lines to each other.

Standard Drops.

The drops used in these switches are our standard tubular drops of the magneto or relay types, both of which are illustrated. These drops are bored from solid rods of Norway iron, leaving the head and shell in one piece. The shells are thoroughly and carefully annealed, and are then heavily electro-plated with copper and nickel. While this method of constructing the drop requires the use of very accurate and costly machinery and for this reason is seldom employed, it is admitted by all manufacturers that in no other manner can so highly efficient a drop be produced.

The shell when made in this manner forms a return path of least resistance to the magnetic lines, rendering the drop extremely sensitive while at the same time it constitutes a perfect magnetic and electric shield, eliminating entirely the annoying element commonly described as cross talk, in so far as the switch is concerned.



RELAY DROP.

The cores of the drops are made of the best quality Norway iron and are wound with silk covered magnet wire, the windings being thoroughly insulated from the cores. The terminals of the windings are led out from the rear of the drop, through the movable armature, the inner ends of the terminals being secured to the core heads.

In all high grade modern switchboards bridged line and clearing out drops are used. In ordering switchboards a mistake very commonly made is in specifying drops of extremely high resistance. In the inefficient switchboards made a few years ago by many and still made by some manufacturers, bridging drops having a resistance of from eight hundred to twenty-five hundred Ohms were necessary. This is not true, however, of modern high grade switchboards equipped with properly designed and efficient tubular drops as these drops offer great impedence to the passage of the high frequency voice currents, thereby allowing very little current to pass through them. Our standard drops are wound to a comparatively low re-

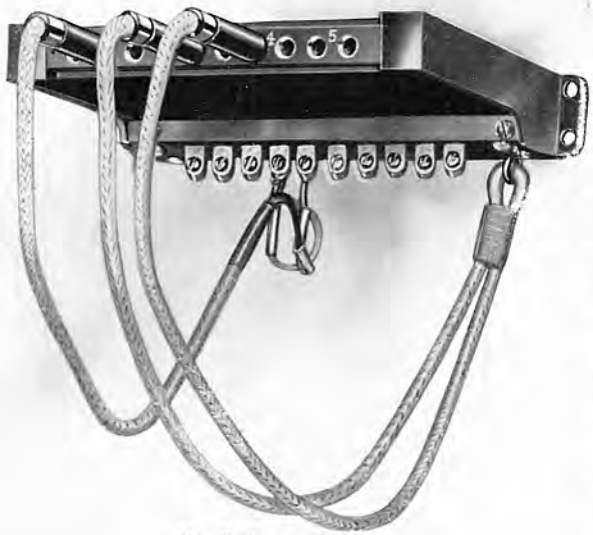
DETAILS OF RELAY DROP.

sistance and are perfectly adapted for use in connection with telephones of any ringer resistance regardless of the number of telephones used on a line. The standard tubular magneto drop is provided with a night bell circuit, this circuit being closed by the dropping of the shutter. If this circuit is connected to a battery and vibrating bell, the bell will ring from the time the shutter drops until it is again restored.

Relay Drops.

The essential difference between the standard tubular drop and the relay drop is that the latter is provided with an auxiliary circuit, which is closed at point "A" when the drop responds to an impulse of current from the line, and is opened when the current ceases to flow. If this circuit is connected to a battery and vibrating bell, the bell will duplicate the number of signals or rings received from the line,

thus indicating to the switch attendant whether the call is for the switch or for another subscriber on the line. At the same time the drop shutter falls, showing from which line the call was received.



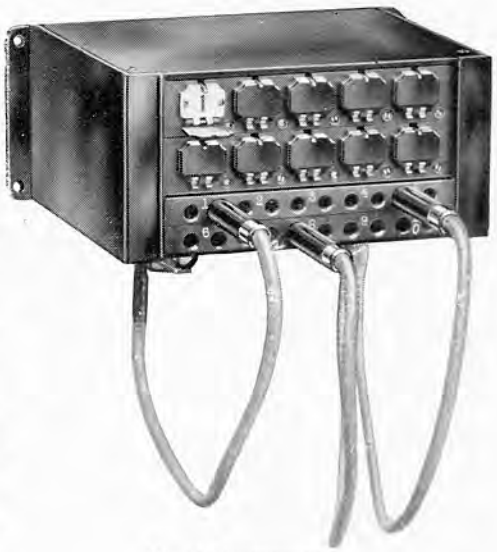
No. 39 Switchboard.

This feature is particularly valuable where the constant services of the attendant are not required at the switch or where the attendant is called upon to perform other duties, as the signal from the bell can be heard for a considerable distance. The relay drop can also be provided with a night bill circuit at a slight increase in cost, but this double signalling arrangement is not often required. Relay switchboards were originally introduced by us about three years ago and have been found much more satisfactory than ringer boards, at one time largely used.

Jacks

The jacks in these switches are mounted on aluminum plates in banks of five, ten or twenty. The jack springs are of German silver, are provided with platinum contacts, and are securely supported and held in place by hard rubber mounting strips as shown. These springs, like all other flexible contact springs made by us, are of greater length than ordinary, thus adding to their flexibility and reducing liability to breakage or displacement from failure to resume their normal position after subjection to unusual or frequent strain. No holes are drilled or punched through the jack springs at the point of support, as is frequently done for the purpose of fastening them, as this latter method of construction weakens the spring at the point where it should be strongest. If a spring is thus weakened the strain will always center at the weak point instead of being equally distributed over its entire length. Another objection to fastening springs by means of insulated screws passing through them is that it is extremely difficult to properly insulate springs so fastened from each other and from the screw, as the insulating sleeve around the screw cannot be seen and is frequently cracked or broken in the process of assembling. Defects of this character have been responsible for much trouble caused by lightning and heavy losses by fire due to short circuits.

Strip of Jacks.



No 35 SWITCHBOARD.

Duplicate jacks, or two jacks for each drop are installed with these switches, the jacks being so connected that inserting the plug in the answering jack, or jack to the right of its number, leaves the drop bridged across the line, while inserting the plug in the calling jack, or jack to the left of its number, opens the drop or cuts it off of the line. In connecting two lines together one of the connecting plugs should be placed in the answering jack to the right of its number and the other connecting plug in the calling jack to the left of its number, thus leaving but one of the drops bridged across the line while the parties are talking. This drop will then respond to the ring-off or clearing-out signal and will indicate when the parties are through talking. Another advantage of the duplicate jack is that the speaker's plug can be inserted in one of the jacks of the connected lines without disturbing the connection, for the purpose of ascertaining whether the parties have completed their conversation and have failed to ring off, as is sometimes the case.

Wiring

All of these switches are neatly and carefully wired with the best grade of tinned copper switchboard wire. All interior connections are thoroughly tinned and soldered, the flux used being resin which is entirely free from acid and all terminals are soldered to the inner end of outside binding posts, which are plainly numbered. These switches, like all of our standard switchboards, are wired for metallic circuits, and can be used in connection with metallic, common return, or grounded lines.

Plugs

The plugs are made from drawn brass, of a quality which resists wear, they possess great strength, are accurately turned to size, carefully insulated, conveniently arranged for replacing cords and are provided with perfectly fitting fibre sleeves.

Cords

Speaker's and connecting cords have tinsel conductors, insulated with reverse layers of silk and cotton, are protected by a spiral wire winding, the whole being covered by a strong and durable linen braid. The ends of the conductors are separated, well bound, and provided with proper terminals.

Method of Operation

The method of operation of switchboards No. 32 to No. 39 inclusive is as follows:

A ring from the line is indicated by the falling of the drop and the ringing of the night or relay bell, if connected. The attendant inserts the speakers' plug in the right hand jack of the calling line and ascertains the name or number of subscriber wanted. The attendant then removes his plug from the calling line, inserts it in the left hand of the jacks of the line wanted and rings the subscriber desired by means of his telephone generator. The attendant then connects the calling line and the line called by means of one of the pairs of connecting cords, inserting one of the plugs in the jack of the calling line to the right of its number and the other plug in the jack of the line called, to the left of its number. When the parties connected, after completing their conversation, ring off, the disconnecting signal is indicated by the falling of the drop shutter of the calling party's line. The lines should then be disconnected.

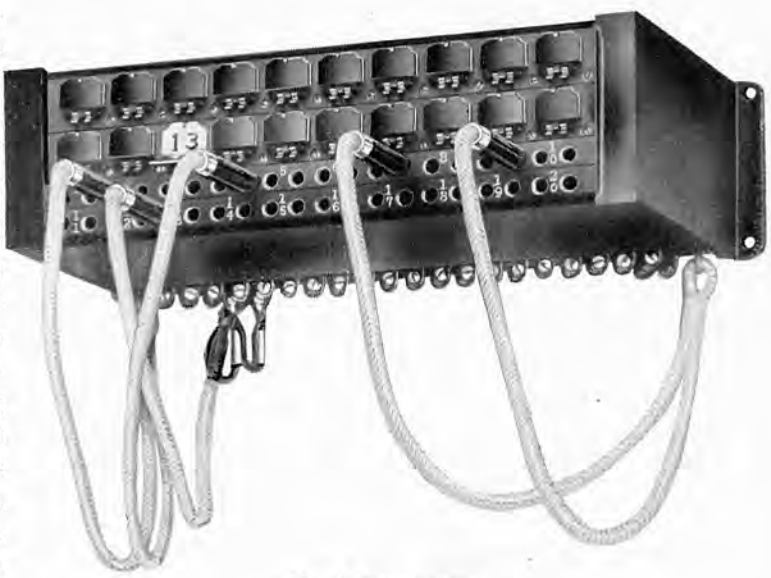
Switches No. 30 and No. 31 are not provided with drops, but their operation will be understood from the above.

CODE NUMBERS

No. 30—5-Line, duplicate jacks, without drops. Designed to be used in connection with extension bells or other line signals. Provided with one strip of five No. 83 jacks, one speaker's cord with one No. 4 plug attached. Two connecting cords, each with two No. 4 plugs attached.

No. 31—5-Line, single jacks, without drops. Designed to be used in connection with extension bells or other line signals. Provided with one strip of five No. 69 jacks, one speaker's cord with one No. 4 plug attached. Five connecting cords, each with two No. 4 plugs attached. One connecting cord and plug being bridged to each line.

No. 32—5-Line, magneto drops, duplicate jacks. Outward appearance same as No. 33, illustrated. Provided with one bank of five No. 4D drops, one strip of five No. 83 jacks, one speaker's cord with one No. 4 plug attached, two connecting cords, each with two No. 4 plugs attached, one 2-pt. switch, one night bell, two cells dry battery.



No. 39 Switchboard.

No. 33—5-Line relay drops, duplicate jacks. Provided with one bank of five No. 4D relay drops, one strip of five No. 83 jacks, one speaker's cord with one No. 4 plug attached, two connecting cords, each with two No. 4 plugs attached, one 2-pt. switch, one relay bell, two cells dry battery.

No. 34—10-Line, magneto drops, duplicate jacks. Outward appearance same as No. 35, illustrated. Provided with two banks of five each No. 4D drops, two strips of five each No. 83 jacks, one speaker's cord with one No. 4 plug attached, two connecting cords, each with two No. 4 plugs attached, one 2-pt. switch, one night bell, two cells dry battery.

No. 35—10-Line, relay drops, duplicate jacks. Provided with two banks of five each No. 4D relay drops, two strips of five each No. 83 jacks, one speaker's cord with one No. 4 plug attached, two connecting cords, each with two No. 4 plugs attached, one 2-pt. switch, one relay bell, two cells dry battery.

No. 36—10-Line, magneto drops, duplicate jacks. Provided with one bank of ten No. 4D drops, one strip of ten No. 84 jacks, one speaker's cord with one No. 4 plug attached, two connecting cords, each with two No. 4 plugs attached, one 2-pt. switch, one night bell, two cells dry battery.

No. 37—10-Line, relay drops, duplicate jacks. Provided with one bank of ten No. 4D relay drops, one strip of ten No. 84 jacks, one speaker's cord with one No. 4 plug attached, two connecting cords, each with two No. 4 plugs attached, one 2-pt. switch, one relay bell, two cells dry battery.

No. 38—20-Line, magneto drops, duplicate jacks. Outward appearance same as No. 39, illustrated. Provided with two banks of ten each No. 4D drops, two strips of ten each No. 84 jacks, one speaker's cord, with one No. 4 plug attached, four connecting cords, each with two No. 4 plugs attached, one 2-pt. switch, one night bell, two cells dry battery.

No. 39—20-Line, relay drops, duplicate jacks. Provided with two banks of ten each No. 4D relay drops, two strips of ten each No. 84 jacks, one speaker's cord with one No. 4 plug attached, four connecting cords, each with two No. 4 plugs attached, one 2-pt. switch, one relay bell, two cells dry battery.

Instructions for Installing

The switch should be securely fastened to the wall or backboard by means of screws. Insulated wires, twisted in pairs, should then be run from the binding posts on the bottom of the switch numbered 1, 2, 3, 4, 5, etc., to lightning arresters and fuses placed in a convenient location, as shown in circuit diagram on Page 9. The line wire should then be connected to the opposite terminals of the lightning arresters as shown. If grounded or common return lines are used, the line should be connected to the lightning arrester terminal, which is in connection through the fuse with the left hand binding post of the line when viewed from the bottom of the switchboard, and the other arrester terminal should be connected to ground or common return.

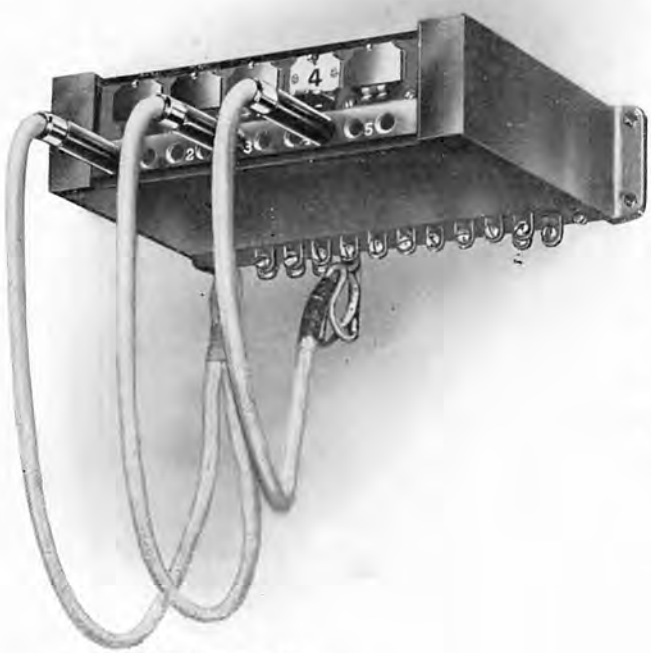
The circuits should be metallic from the switch to the lightning arresters.

Wires should then be run from the binding posts "D" and "C" to the telephone to be used in connection with the switchboard and if it is desired to use the night or relay bell, a wire should be run from the binding post "A" to one terminal of the cut-out switch, and then from the other terminal of the switch to the other side of the battery. The batteries should be connected together as shown and a wire should then be run from the opposite side of the battery to one of the posts of the vibrating bell and another wire from the remaining post of the bell to the binding post "B" of the switchboard.

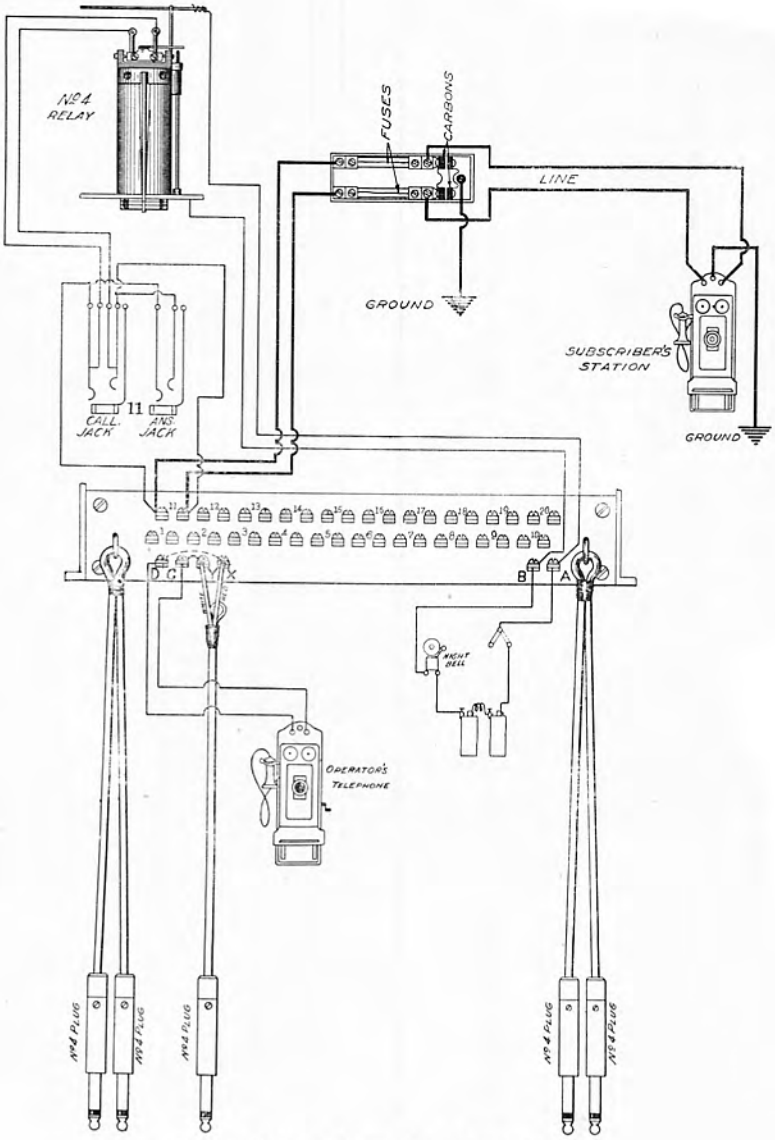
The speaker's cord should be connected to the binding posts "X" and "Y."

It is always advisable to use a switch in the night bell circuit when magneto drops are used in order that the night bell can be connected and disconnected at will. The night bell switch should be opened whenever the switch attendant expects to be absent for a considerable time, as otherwise the falling of a magneto drop shutter will cause the bell to ring until the drop is restored or until the battery becomes exhausted. This does not apply with equal force if relay drops are used as the relay circuits open automatically when the subscriber stops ringing. The use of the switch is recommended in either case, however.

No. 21 Switchboard.



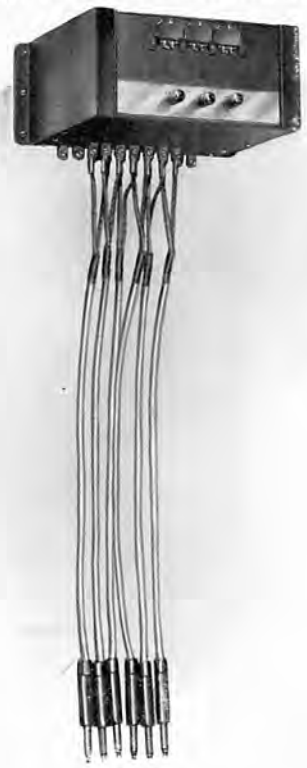
No 33 Switchboard.



CIRCUIT DIAGRAM-SWITCH AND LINE CIRCUITS.

Auxiliary Cord Equipments

In order to facilitate the operation of the switching stations for small or isolated exchanges described in the foregoing pages we have designed the auxiliary cord equipment units illustrated herein.



No. 40.

These cord equipments are mounted in enameled iron cases very attractive in appearance and compact in style. When it is desired to use them in connection with the switches described they should be mounted on the wall or backboard in close proximity to the switch so that the cords will reach any of the jacks in the switch.

Standard Auxiliary Cord Equipment consist of ringing and listening keys, cords, plugs, clearing out drops and master keys for two and four party selective ringing when desired.

Keys

The keys are of our standard long spring type, with roller bearings and platinum contacts. The springs are of German silver, are mounted in hard rubber insulating blocks, rigidly supported by a brass frame. They are provided with hard rubber handles and are mounted upon escutcheons which are finely nickel plated. Although we have thousands of keys of this type in use we have yet to receive the first complaint regarding them.

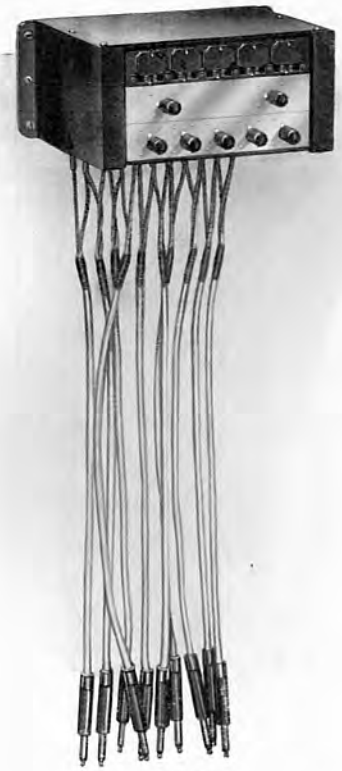
KEY

Drops, Plugs and Cords

The drops, plugs and cords used in these equipments are the same as those used in connection with our switching stations for small or isolated exchanges.

Method of Operation

When a call is indicated by the falling of a drop of the switch the black or answering plug of one of the cord pairs is inserted in jack of calling line. The key of this cord pair is then pressed down until it locks in position and the name or number of the subscriber wanted is ascertained. The red or calling plug of the cord pair is then inserted in jack of line wanted and the key is raised until it locks in position, when the



No. 41

subscriber wanted is called in the usual manner by means of the telephone generator. The key is then restored to the normal or horizontal position.

When using these cord equipments in connection with the switching stations described, the plugs should be inserted in the calling jacks of the switches, in order that the switch drops may not be left bridged across the line during a conversation.

For selective ringing, the master key will be thrown in proper position before ringing. For selective ringing it is necessary to have the telephone generator equipped to deliver positive and negative pulsating currents.

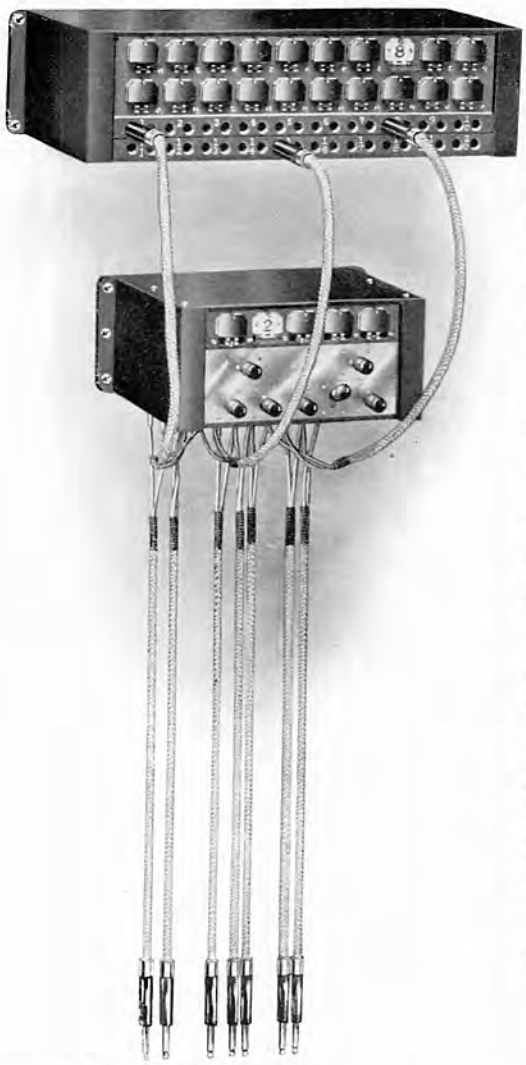
CODE NUMBERS

No. 40. Three cord pairs each consisting of ringing and listening key, clearing out drop, two plugs and cords.

No. 41. Five cord pairs each consisting of ringing and listening key, clearing out drop, two plugs and cords; also provided with master keys for selective ringing.

A greater or less number of cord pairs than specified above can be furnished if desired.

DETAILS OF MAGNETO AND CLEARING-OUT DROP.



SWITCHING STATION
AND AUXILIARY CORD EQUIPMENT.

Binding post D to binding post No. 2 of telephone.

Binding post E to binding post No. 5 of telephone.

Binding post F to binding post No. 1 of telephone.

Binding post No. 3 of telephone to ground.

The above instructions will be clearly understood by reference to the circuit diagrams shown on page 13.

Instructions for Installing

The box should be securely fastened to the wall or backboard in close proximity to the switchboard, so that either of the cords will reach any of the switchboard jacks. The black or answering plug cords are connected to the first or front row of binding posts as follows: White conductor to left binding post of each pair, red and white conductor to right binding post of each pair. The red or calling plug cords are connected to the second row of binding posts in the same order.

Wires should then be connected from the rear row of binding posts as follows:

No. 40

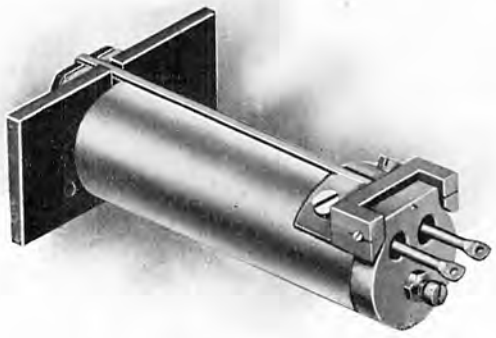
Binding post A to switch, switch to battery, battery to vibrating bell, bell to binding post B.

Binding post C to right hand binding post of telephone, left hand post of telephone to binding post D.

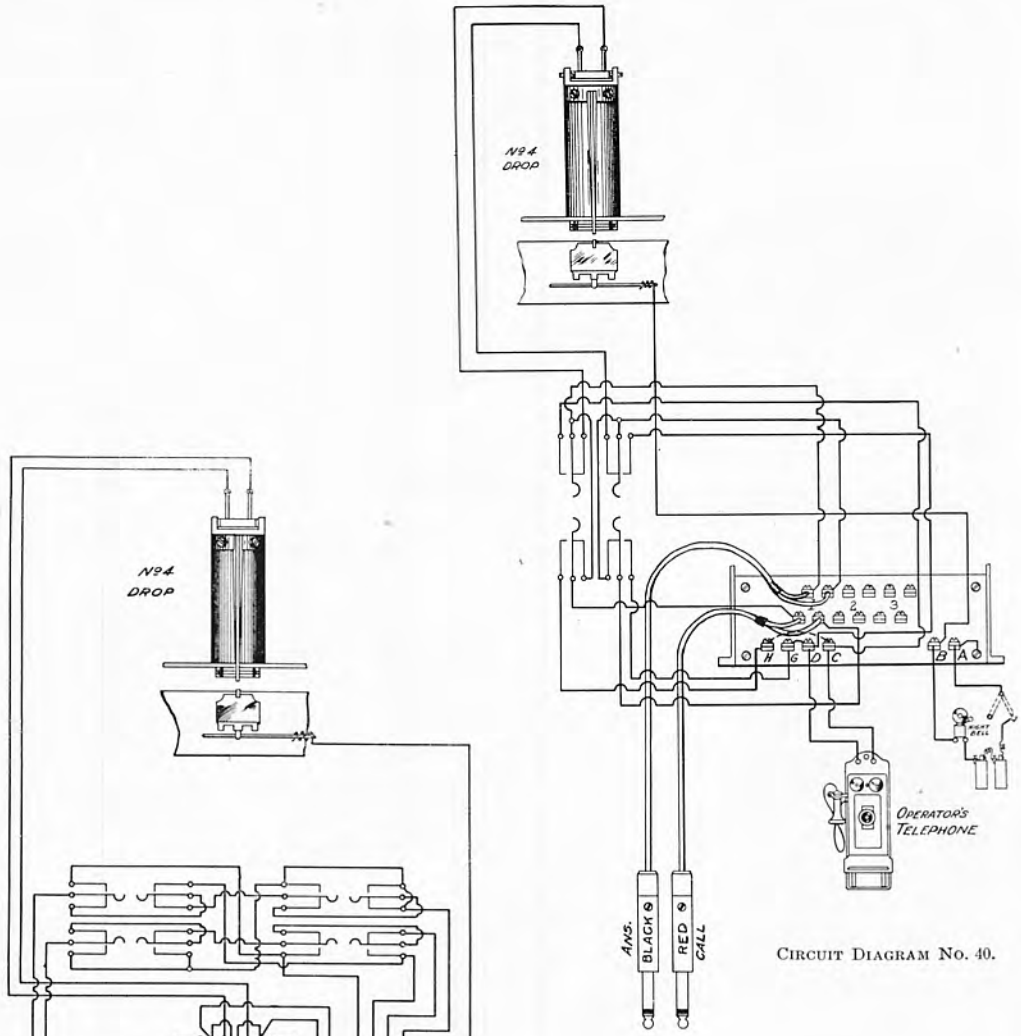
No. 41

Binding posts A and B same as above.

Binding post C to binding post No. 4 of telephone.



MAGNETO OR CLEARING-OUT DROP



CIRCUIT DIAGRAM NO. 40.

CIRCUIT DIAGRAM NO. 41.

Combined Switchboard and Telephone

Twenty-five Line Wall Cabinet.

No. 48 Switchboad

This switchboard is designed for exchanges requiring a larger capacity than the switching stations shown or where it is desired to have the switching apparatus and operator's telephone combined in one cabinet.

The cabinet is built for mounting on the wall in the same manner as a telephone instrument and is of somewhat smaller dimensions and lesser weight than our well known floor type cabinets of larger capacity.

The cabinet is made from kiln dried, selected, quartered oak, hard oil finish, and hand polished.

The back panel is hinged in such a manner that when it is screwed to the wall securely the entire front part of the cabinet may swing around, so as to admit of access to all wiring and parts.

The drops, jacks and keys are mounted on a rigid steel frame. This frame has a capacity for twenty-five line drops and jacks and three keys and clearing-out drops.

The switchboard is carefully wired with the best grade of tinned copper, silk and cotton insulated switchboard wire, twisted in pairs, laced and saturated with beeswax. The interior connections are thoroughly tinned and soldered.

All lines are wired for metallic circuits, but can be used for grounded or common return lines. The line circuits are brought to a terminal strip mounted on the backboard and carefully numbered, and each board is wired to the full capacity of twenty-five lines, so that a person comparatively inexperienced may set up and install future drops and jacks.

The line drops and jacks are separate and are each put up in strips or banks of five, so that an initial installation having as low as five lines can be had and can be increased from time to time as desired by installing a strip of drops and jacks.

The board is wired and equipped with three cord circuits each circuit consisting of a pair of cords and plugs—a ringing and a listening key and a clearing-out drop. The plugs rest in the plug shelf, the keys and clearing-out drops being mounted on the face of the board.

The drops, jacks, keys, plugs, etc., are the same standard apparatus as used with the smaller switching stations and the large floor type cabinets. They are described on pages 3, 4, 5 and 7 of this bulletin.

The operator's transmitter is a long distance adjustable suspended type. A standard receiver, hook-switch and five bar generator are used. A night bell and switch and batteries for operator's set and night bell are provided.

The cabinet is 40 inches high, 9 inches wide and 13 inches deep, outside measurement.

No. 48—25-Line oak cabinet with five banks of five each No. 4D drops, five strips of five each No. 85 jacks, three pairs of connecting cords, each having two No. 4 plugs, one No. 4E clearing-out drop, one No. 23 ringing and listening key, one operator's set complete with suspended type transmitter No. 38 transmitter support; No. 6 receiver; No. 29 hook-switch; one five-bar generator, night bell and switch, necessary batteries for night bell and operator's set.

No. 49—25-Line oak cabinet, with the same equipment as above, excepting the line drops are No. 4D relay type.

No. 42 Fifty Line Unit Type Switchboard

Floor Cabinet.

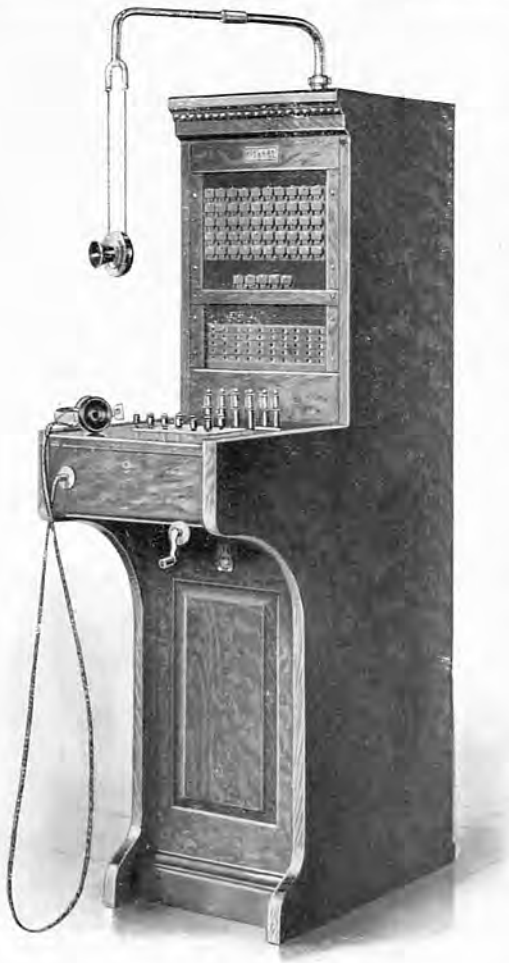
This switchboard has a normal capacity for fifty lines—but will accommodate twenty more with a little crowding. (See illustration page 16.) The cabinet can be purchased wired to its full capacity and equipped with as few as ten lines. The capacity can be increased at any time by additions of ten line banks of drops and jacks. When the cabinet is equipped to the full capacity other identical cabinets may be set up alongside, giving the effect of a continuous switchboard. This can be done without any cutting or marring whatever of the cabinets or changing of the original installation. The only change necessary is to move the operator's transmitter support to a central position if so desired.

Each cabinet, being complete in itself and ready for immediate installation, may be set up and additional equipment may be installed by a person of comparatively little experience.

The cabinet is selected quartered oak, kiln-dried, hard oil finish, hand polished. The front and back panels are removable and the keyboard is hinged for easy access to all wiring and parts.

All drops and jacks are mounted on a rigid steel frame. The frame has a normal capacity for fifty line drops and jacks—but there is room for twenty more when desired.

The plug shelf is covered with oak tanned belt leather and each plug rests on rubber cushions so that they drop noiselessly into place. The keyboard is laminated and will not warp or crack.



No. 42 Switchboard.

These switchboards are carefully wired with the best grade of tinned copper, silk and cotton insulated, switchboard wire, twisted in pairs, laced and saturated with beeswax. The interior connections are thoroughly tinned and soldered, a resin flux is used, which is free from acid.

All boards are wired for metallic circuits, but can be used with grounded or common return lines.

All circuits are brought to a terminal rack in the rear of the cabinet and carefully numbered and tagged.

The line drops and jacks are separate and are each put up in strips or banks of ten, thus an initial installation having as low as ten lines can be had and the capacity can be increased from time to time as desired by installing strips of drops and jacks.

The board is wired and equipped with six cord circuits—each circuit consisting of a pair of cords and plugs—a ringing and listening key and a clearing-out drop.

The drops, jacks, keys, plugs, etc., are the same standard apparatus as used with the smaller switchboards and the largest floor type switchboards. They are described on pages 3, 4, 5 and 7 of this bulletin.

The board will be equipped with standard or relay drops, as desired.

The operator's set consists of a solid back, long distance, suspended transmitter, adjustable in all directions; a receiver of bi-polar type, neat, very light and efficient. The receiver cord is attached by concealed posts, terminating in a standard plug. A special jack is provided, which opens the transmitter battery circuit when the plug is withdrawn, thus saving battery. The operator's set is provided with gravity cells.

A powerful, noiselessly running hand generator of great current output is placed in each cabinet.

A high-grade platinum pointed relay or night bell is mounted in the cabinet, and properly connected.

An extra testing jack, connected with battery, is installed when ordered, for testing open or short circuited cords. A buzzer is always connected in the generator circuit, for testing subscriber's lines.

The cabinet is 56½ inches high, 14 inches wide, and 30 inches deep from front of key table.

THE NORTH ELECTRIC CO.

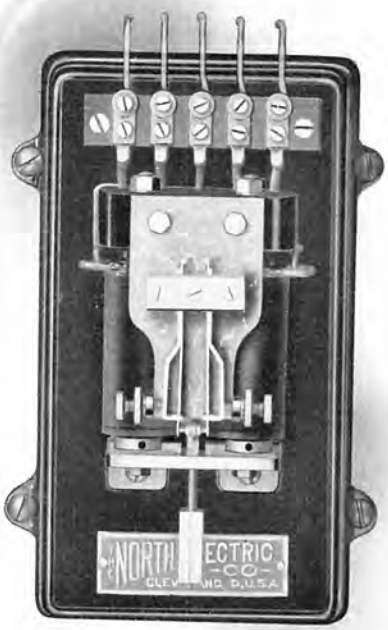
DALLAS, TEXAS CLEVELAND, OHIO KANSAS CITY, MO.

Bulletin No. 45 August 1907

The North Synchromonic System

A Selective Ringing System Based on Synchronisms and Discords.

As a means of increasing the percentage of revenue of the exchange and of enabling an exchange of limited capacity to largely increase its volume of service with a very small addition to its investment, we take pleasure in offering to the Telephone Public the North Synchromonic System.



While the North Synchromonic System bears some relation to the Selective Harmonic Systems with which the Telephone Public is more or less familiar, it is still fundamentally different from these systems in that the several frequencies employed for ringing do not bear an harmonic relation to each other, but, on the other hand, each of the frequencies employed is at discord with any other frequency. Aside from this the design of the apparatus is radically different from anything heretofore seen in the harmonic line. The North Synchromonic System can be furnished to ring selectively a maximum of five subscribers on a

metallic circuit without the use of grounds, or upon a grounded or common return circuit, or a maximum of ten subscribers on a metallic line by the introduction of grounds at each of the subscribers' stations; five of these subscribers being signalled selectively from either side of the line to ground. Inasmuch however, as the demand seems to be for a four-party selective system when used in connection with metallic circuits without the use of grounds, or an eight-party selective system when used for ringing from either side of line to ground, it is this system which we shall describe herein.

Frequencies.

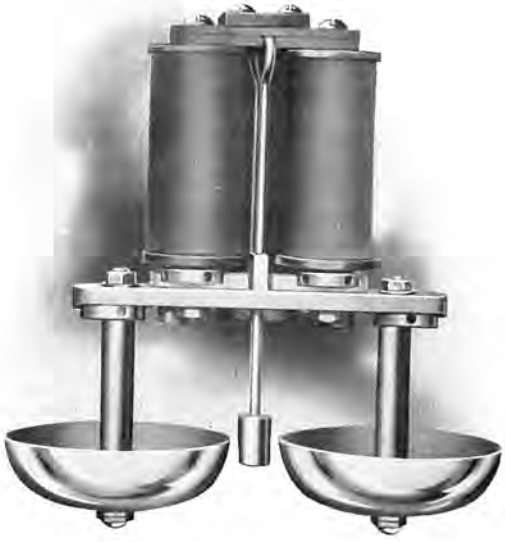
In a Synchromonic four-party system the frequencies used are 30, 42, 54 and 66 cycles per second, while in an Harmonic System the standard frequencies are 16⅔, 33⅓, 50, and 66⅔ cycles per second. It will be noticed by comparing the above frequencies that the lowest frequency of the Synchromonic System is approximately the same as the next lowest frequency of the Harmonic System, and approximately twice as high as the lowest frequency of the Harmonic System. It is a well known fact that the use of a frequency as low as 16⅔ cycles per second is open to serious objection. First, for the reason that any harmonic ringer tuned to respond to a ringing current of 16⅔ cycles per second will respond to the ringing from an ordinary hand generator such as is used in connection with switchboards or magneto telephones. For example a subscriber on a rural line, or one who is using a magneto telephone, signals the exchange and calls for a subscriber on a Harmonic line. The exchange signals the subscriber called by impressing upon the line the current of the proper frequency to ring the called subscriber. The called subscriber, however, does not answer and the calling party, in again undertaking to attract the attention of the exchange, turns his generator, and in doing so, signals the subscriber on the Harmonic line whose ringer is tuned for the 16⅔ cycle current. He will also signal the same telephone when ringing off after having completed a conversation. This is due to the fact that a hand generator is ordinarily turned with sufficient rapidity to impress upon the line a current of 16⅔ cycles or higher. The only method recommended up to this time by the manufacturers of Harmonic Systems wherein a frequency of 16⅔ cycles is employed is the installation of direct current generators in all of the magneto telephones upon the system. This means a very considerable expense; in most cases an expense much greater than the cost of the Harmonic System itself.

When frequencies of 30 cycles per second or higher are employed it is impossible to ring any of the selective telephones by means of a hand generator for the reason that it is impossible to turn the hand generator with sufficient rapidity to produce a current of high enough frequency to cause any of the bells to respond. It is therefore unnecessary to equip magneto telephones with direct current generators when the North Synchromonic System is employed.

Another objection to the 16⅔ cycle ringer is the fact that it really does not give forth a ring, but merely a series of taps or strokes of a very uncertain and annoying character, the vibrations do not follow each other with sufficient rapidity to produce a continuous ring.

Harmonics and Discords.

Upon further comparison of the frequencies employed in the two systems under discussion, it will be noted as stated above that the frequencies employed in the Synchromonic System bear the relation of discords to each other, whereas the frequencies employed in the Harmonic System bear, as the name would indicate, the relation of Harmonics to each other. For example, reduced to their lowest terms it will be observed that the Synchromonic frequencies bear the relation to each other of 5, 7, 9, and 11, while the Harmonic frequencies bear the relation to each other of 1, 2, 3, and 4. One of the chief difficulties encountered in the operation of the Harmonic System has been due to the liability to cross ring. This tendency has been particularly noticeable between the 16⅔ cycle and the 50 cycle ringers, although the other frequencies have not been entirely free from the same character of trouble. Upon analyzing the waves of the various cycles or frequencies the reason for this interference is quite obvious. The laws governing the vibration of Synchromonic and Harmonic ringers, vibrators or pole changers are the same as those governing the vibration of musical reeds or springs. It is well known that if a reed of any pitch or frequency is vibrated, all other reeds in close proximity to it or which are subjected to the same force which actuates the reed in question and which are either in synchronism or harmony with the reed vibrated are also caused to vibrate. When one vibrating reed in close proximity to another causes the latter to vibrate, it is known as sympathetic vibration. Sympathetic vibration is most pronounced between two synchronous reeds, or reeds vibrating in the same period, as between these two reeds perfect harmony exists. Next in matter of harmony is the octave, or where one reed vibrates twice as rapidly as the other. Afterwards follows the fifth with a ratio of two to three. It will be observed by reference to the ordinary harmonic frequencies that we have the ratio both of octaves and fifths between the several frequencies, and when a current of any given frequency is impressed on the line it naturally follows that any ringer tuned in synchronism with the ringing current will respond. This is as it should be, as this is the principle upon which the system is based, but it also follows that any ringer in harmony with the impressed current will also respond to a greater or less degree dependent upon the ratio of coincidence. This latter application of the principles involved is the real root of the cross-ringing trouble experienced in harmonic systems, and to make one reed of such a system in harmony with another reed of a different frequency is in violation of the very principle upon which the system is based and upon which it depends for its margin of safety.



Uniformity and Inter=changeability.

In order to overcome the difficulty due to the violation of the basic principle as explained above, and the consequent cross-ringing of reeds in harmony with other reeds, the factors of impedence, resistance and capacity have been introduced, but the results have not been by any means satisfactory, and the margin of safety is altogether too small to be considered the commercial margin. It is also customary to employ different voltages for ringing the different frequencies on harmonic systems, but this plan is open to serious objection for the reason that in many of the smaller exchanges where a duplicate set of machines is not considered necessary if the voltages were uniform, one extra transformer could be kept for emergencies and could in case of necessity be used upon any of the frequencies employed. When the voltages of these transformers must vary, however, it is necessary to keep a complete duplicate set of transformers in order to be prepared for such emergencies. In the North Synchromonic System the secondary voltages of the transformers are uniform, and any transformer furnished can be used upon any frequency during such emergencies.

In Harmonic Systems the margins are so small as to make it necessary to wind the ringers to different resistances. The 16⅔ cycle ringer is wound to 2500 ohms; the 33⅓ cycle from 500 to 2250 ohms, and the 50 cycle and 66⅔ cycle ringers are usually wound to 500 ohms each, although the margin of safety could be made somewhat wider by varying these windings somewhat from those usually employed. In the North Synchromonic System all ringers are wound to the uniform resistance of 1000 ohms, and are in all other respects precisely alike with the exception of the weight on the armature. The armatures for the various frequencies are interchangeable, and if it should be desired to change a ringer from one frequency to another the only thing which it is necessary to do is to remove the armature from the ringer and replace it by an armature properly adjusted for the frequency upon which the ringer is to be used. This makes it unnecessary to keep stock of ringers for the different frequencies on hand, but instead a supply of these interchangeable armatures can be kept in stock at a small fraction of the expense as compared to the complete ringers.

The margin of safety in the Harmonic System is so slight as to make extremely accurate adjustment of the ringers necessary, and it is also essential that the condensers used in series with the ringers are of uniform capacity. With the Synchromonic System having much wider margins, this extreme care in adjustment and in the selection of condensers is not required. In the case of the North Synchromonic System it will be noticed as stated above that the frequencies employed bear the relation of discords to each other, and by using these frequencies the element of sympathetic vibration and consequent cross-ringing is eliminated.

The Synchromonic Ringer.

By reference to the illustration, it will be noticed that the ringer is very massive and substantial in construction. The adjustment of the pole pieces is very easily and quickly accomplished by means of the eccentric shown, and the gong posts are adjusted in like manner. The vibrating reed is composed of steel piano wire, which can be depended upon for uniformity of fibre and temper. These ringers can be applied to the magneto or common battery telephones of any manufacture.

We are prepared to furnish complete telephones either common battery or magneto equipped with our synchromonic ringer, or the ringer for equipping your present instruments. The ringer is of such size that it will fit any telephone cabinet that is large enough to admit the usual type of long spool alternating current ringer. As this system does not require a special condenser, and no condenser at all in magneto work, all that is necessary to equip your present instruments for selective ringing is to substitute a synchromonic ringer for your alternating current ringer. The generator now in your magneto phone will not have to be changed or altered in any manner.

Our ringers are readily regulated to any frequency employed by the various "Harmonic Systems" and on account of its simple, massive construction, excellent design, and reliable adjustment of pole pieces and gongs will be found superior to the usual types, giving not only more positive and dependable selection, but also requiring less care and attention—a double gain. Complete phones or ringers only—let us send you a sample set—to compare.

The Synchromonic Converter.

In designing a converter, we have endeavored to produce a machine that would be durable and efficient, and above all, absolutely reliable and dependable and that would run continuously at the proper speed and without variation—without sparking and without noise. That would consume a minimum quantity of current and would require the least possible amount of care and attention. We are pleased to announce that our efforts have been crowned with unqualified success.

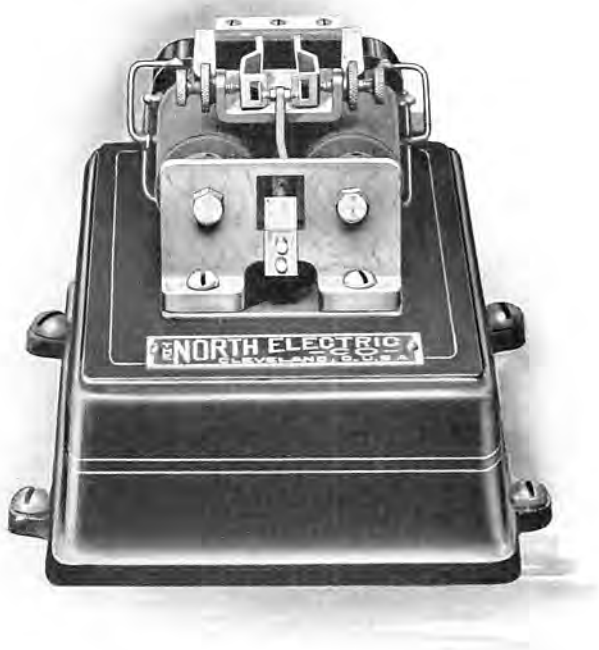
The illustration gives a good idea of the general appearance and arrangement of parts. The base is a heavy casting handsomely enamelled, and supports the coils and moving parts in such manner that all vibration and noise is eliminated. The pole pieces have a wide range of adjustment which is accomplished by means of an eccentric. Lock nuts are provided for clamping the pole pieces firmly.

Two contact springs engage a platinum contact pin on the vibrator, thus there are but two make and break contacts in the circuit. The arrangement of the contacts and the design of the circuit is such that sparking at the contact points is almost completely eliminated even under heavy load. The arrangement of the contact springs is such that the contacts are in full view and the adjusting screw easily accessible.

The vibrating reed is composed of steel piano wire which can be depended upon for uniformity in fibre and temper. Various sizes of brass weights are employed in tuning the vibrator to the desired frequency.

The vibrator has a wide amplitude and the circuit is such that as the load on any converter is increased the amplitude of its vibrator is increased. This causes the primary circuit of the transformer to be closed an increased length of time, allowing the transformer more time to build up, and in consequence there is less drop in the voltage of the secondary current than in the case of a vibrator having a uniform amplitude. The increased amplitude of the vibrator in no way affects its frequency. When these converters and their transformers are working on no load the current consumption at 24 volts is approximately 1-10 ampere per converter.

Each set of converters consists of four vibrators and the same number of transformers. The standard frequencies for North's Synchromonic System are 30, 42, 54, and 66 cycles per second. They can be quickly regulated, however, to operate on any desired frequency, thus being adapted for use with any variable frequency system of selective party lines.



For signalling ordinary alternating ringers the 30-cycle current is employed. The Synchromonic vibrators or pole changers can be constructed to be used with any primary or battery voltage. They can be used in connection with storage battery, dry battery, or any other primary source of current. The standard construction, unless otherwise specified, is for operation from a 24-volt circuit.

When primary batteries are used a starting relay operated by an extra contact spring on the regular ringing keys or else a separate starting switch is used as desired. By this means the vibrators are idle except when in actual use and no current is consumed except when ringing.

Dry Battery Outfit.

A complete dry battery outfit consists of four vibrators, four transformers, and two sets of dry batteries, each set of batteries consisting of thirty-six cells, connected in series multiple—eighteen in each series. The whole outfit is housed in a polished oak cabinet with glass cover over the vibrators. All necessary switches, fuses, etc., are provided, each set being complete, self-contained and wired ready to connect with the switchboard.

Converters for Ringing Individual Lines.

A single converter furnishes an ideal ringing device for any exchange, even where no party line service is given. The thirty cycle vibrator is used for ringing ordinary polarized ringers. The Synchromonic Converter will be found peculiarly well adapted for heavily loaded rural lines or long toll lines on account of the fact that there is no appreciable drop in the voltage of the ringing current even under heavy load. The converter is automatically self-regulating, maintaining constant potential under varying loads.

On account of its extreme simplicity and massive construction, also the fact that a single converter consumes but 1/10 ampere of current and only when actually ringing, it will be found extremely reliable, efficient and economical.

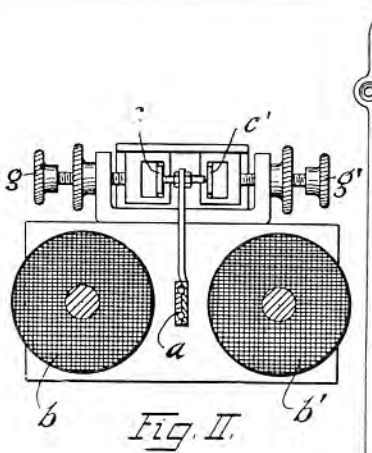


Fig. II.

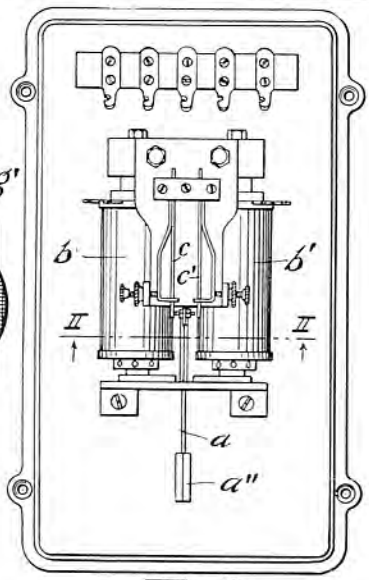


Fig. I.

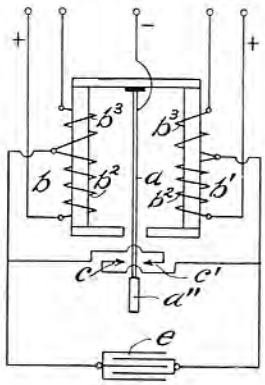


Fig. III.

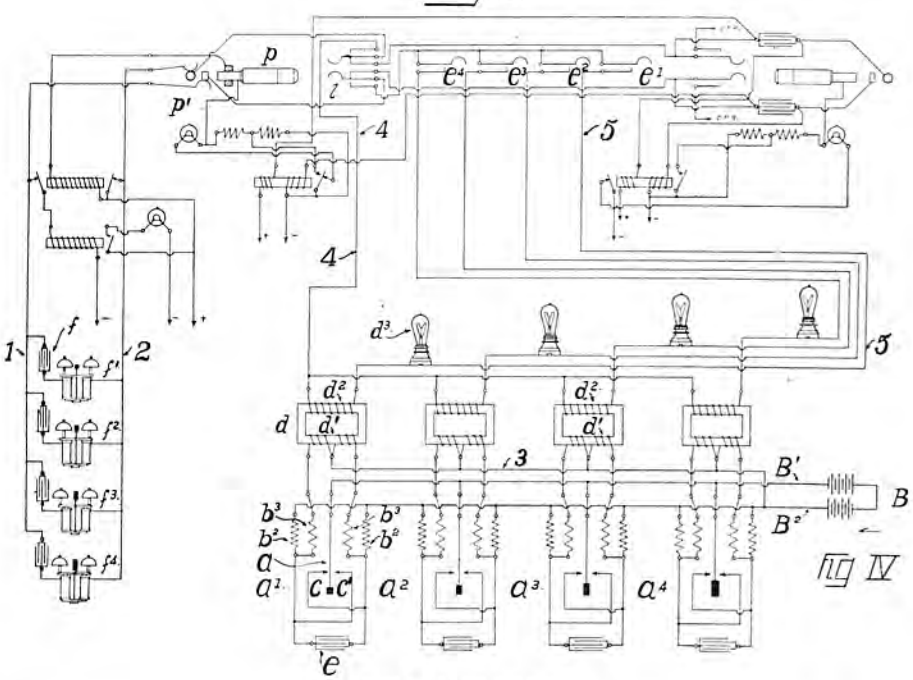


Fig IV

Circuit Diagrams.

The diagrams on this page show details and circuit connections of the synchromonic converter, also manner in which synchromonic telephones are connected to common battery switchboards.

Fig. 1 shows a top view of the converter; b indicates the controlling coils; c the contact springs; a the vibrator armature; a" the regulating weight. The adjusting screws for the contact springs are shown at Fig. 2. The circuit connections of the converter are shown in Fig. 3. Fig. 4 shows method of connecting converters and their transformers. The converters are represented by a 1, a 2, a 3 and a 4. The trans-

formers by d1, d2, d3 and d4. The secondary of the transformers are connected to the ringing springs of the four-party indicating key in the cord circuits through the usual form of resistance lamp. A set of synchromonic ringers are shown at left of the circuit. Note that no grounds, relays, or impedence coils of any sort are employed.

Instructions for Adjustment of North Synchromonic Vibrators.

The adjustment of the North Synchromonic vibrators can be very easily, quickly and accurately accomplished. The amplitude of the vibrating reeds can be varied by the adjustment of the magnetic pole pieces, being increased or widened as the pole pieces are brought in nearer to the armature. It should be understood, however, that the vibrating armature should not even under maximum load, strike against the pole pieces, and the pole pieces should be kept back a sufficient distance to always insure clearance.

To adjust the pole pieces, first loosen the hexagon nut on the base plate, then by turning the eccentric on the back of the base plate, the pole piece can be adjusted as desired, then locked by tightning the hexagon nut. There are but two make and break contacts to be adjusted, and these are regulated by means of the knurled set screw on the contact supports. To adjust these contacts, first back both contacts away, so that the spring contacts will clear the armature contacts on either side. Then switch the current on to the vibrator, then run one of the set screws up until the spring contact barely touches the armature contact which will be indicated by the armatures beginning to vibrate. Then back this set screw away one-quarter turn, which will break the contact when the armature resumes its position of rest.

After the armature has been allowed to come to a position of complete rest, which can be affected by disconnecting the battery current for a few seconds, the contact on the other side should be brought forward until it makes connection with armature, which will be denoted by the armatures again beginning to vibrate. This contact should be allowed to remain in this position without having been backed away, as in the case of the first contact, the set nuts then being tightened firmly. The vibrator is now ready for use and is self-starting as soon as the current is thrown on. The pole pieces should be adjusted so as to give the armature an extreme movement, or amplitude of from one-quarter to three-eighths of an inch. The amplitude of this armature increases as the load upon the transformer is increased, and if upon no load it is adjusted for an amplitude of one-quarter inch, it will under maximum load vibrate three-eighths of an inch or more.

To Adjust the Synchromonic Ringer.

In adjusting the Synchromonic ringer the weight on the end of the armature should have an amplitude of from one-quarter to three-eighths of an inch. The pole pieces of the ringer are adjusted in the same manner as are those of the Synchromonic vibrator, except that the ringer pole pieces should be so adjusted that the armature will strike the pole piece on either side, which is clearly indicated by the sound, it being understood that the gongs previous to the adjustment of the armature have been thrown aside a sufficient distance so that the armature weight does not strike them. After the pole pieces are properly adjusted they should be fixed in position by tightening the hexagon nut on the base plate. The gong posts are loosened and tightened by means of the hexagon nut on the base plate, and given their lateral movement by the means of the eccentric on the opposite side of the base plate from the hexagon nut. After the pole pieces have been properly adjusted, the gongs should be brought in to a point so that they will barely clear the armature weight when the armature is pressed against the pole piece of the magnet nearest the gong which is being adjusted. In pressing the armature over for securing this adjustment, the finger should be placed against the armature above the base plate, and near the pole pieces of the magnet. The other gong will be adjusted in like manner and the ringer can then be further tested by adjusting one gong at a time while the ringer is in operation, as by this means it can be readily determined as to whether the armature is striking both of the gongs with equal force.