

# STROMBERG-CARLSON TEL MFG. CO

ROCHESTER, NEW YORK, U.S.A.

CHICAGO, ILL.

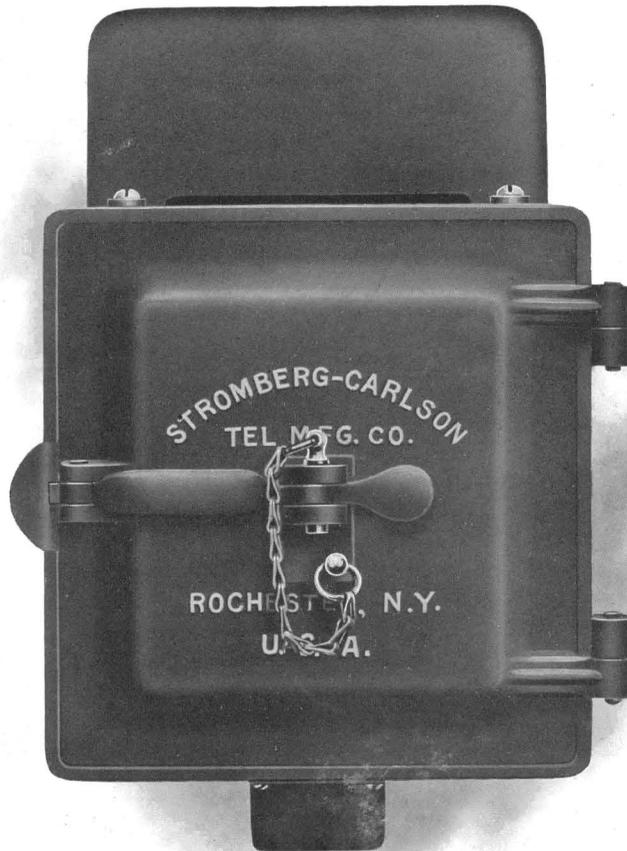
KANSAS CITY, MO.

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JUNE 1910

## Mine Telephones



No. 890 Type Telephone

## Mine Telephones

## The Value of Telephone Service in Mines

It is universally admitted that the popular demand for telephone service has reached a degree of advancement that commands the attention of every well organized mine whether its operations extend over a large or comparatively small area of property. Preeminently important from the mine operator's viewpoint in considering telephone service in the mine, is the saving of time and the facility with which orders and messages may be verbally despatched to the employees located in the various departments of the workings. The savings to be effected by the use of mine telephones are numberless and may be readily appreciated when considering the variety of characteristic accidents, such as explosions, water freshets and landslides, which make mining a hazardous business. Mine officials frankly say that the presence of this protection is worth the initial cost of the system and is repeatedly earned by the reliable performances at just such times as we vaguely mention. The operation of almost every mine is dependent upon a variety of these uncertain conditions, rendering it almost impossible to anticipate a temporary suspension of work in advance of its actual occurrence. The fact that the superintendent of a mine may remain in his office and be in direct talking communication with every corner of the entire mine system at all times is of such paramount importance that it seems unlikely that any mine owner will conscientiously avoid giving this matter serious consideration.

The cost of constructing the line underground for a mine telephone system is usually less than for surface systems, because no poles are required and there are no holes to dig. The nature of this construction for the mine system eliminates the numerous supporting and building appliances characteristic of all pole lines. Our mine telephone system does not require an expert to install it, and about all the work required of the mine owner is the placing of the instruments to advantage and stringing line wire to these points. This single feature of construction is simply and quickly done by running wires through the rifts and down the shafts on standard wood brackets equipped with regular common glass insulators. In a large number of mines, rope haulage is used to convey the ore to the surface. Where such is the case, a metallic signal line is usually run along the side of the entry to transmit signals to the engineer usually located at the surface entry. If such a condition exists, it is only necessary to connect any required number of bridging telephones to the circuit, the haulage strand and the signal wire. In this case no expense is incurred beyond the first cost of connecting them at each station. The expense of maintenance is usually very light, because the lines being underground are not subject to atmospheric conditions that are present outside, and trouble from lightning is, of course, unknown.

Although ordinary iron line wire has been used with success in some mines, the safest construction can be furnished at little additional cost by supplementing rubber-covered wire for all the underground circuits, which are in any way subject to moisture or dampness from contact with fresh earth and timbers used as supporting members in rifts. Some earth's conditions are so uncertain that it has been considered good practice to use lead-covered cable, providing the installation warrants the expense. In any

*STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY*

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event, this part of the equipment should not be slighted, and the best is always the cheapest. By installing cable an increased degree of certainty is assured.

¶ Our principal mine telephone, of the magneto type, contains especially constructed talking and signalling apparatus, accessibly arranged in an air-tight cast iron case as will thoroughly protect the equipment, purposely designed to give re-

**Telephones  
and  
Switchboards**

liable service under unusually severe conditions. Several forms of wall and portable desk telephones are provided for use in offices and departments located on the surface of a mine property. Where the number and importance of the stations to be served by a telephone system justify it, a central office equipped with a switchboard is provided. The line wires terminate in the building designated as the central office, on which the signals are received and connections made between the different lines, by an operator. We make many kinds of switchboards with different capacities, but illustrate in this bulletin only one of the smaller types, which meets the requirements for a mine telephone system not having more than fifteen stations.

¶ The most satisfactory signaling devices are those highly efficient and dependable at all times. Such service can only be maintained economically when you use iron-clad, water proof and rust proof bells and hand generators as fully described on Pages 11 and 12 in this issue. There is no economy in using cheap protective apparatus.

**Mine  
Signaling  
Sets**

¶ Our policy is to provide first-class apparatus, adaptable for a mine telephone system, that will give reliable and efficient service at all times at the lowest maintenance expense. Your selection of "Quality Apparatus" provides all these desirable features and gives you the additional benefit of our many years' experience as manufacturers of the only complete Mine-a-Phone System.

**STROMBERG-CARLSON TELEPHONE MFG. CO.**

**ROCHESTER, NEW YORK, U. S. A.  
CHICAGO, ILL.                      KANSAS CITY, MO.**

MANUFACTURERS OF

**TELEPHONE APPARATUS  
AERIAL AND UNDERGROUND CABLE**

## Mine Telephones

## No. 890 Iron-Clad Magneto Telephones

☐ The Stromberg-Carlson Mine Telephone is unlike any other magneto telephone because it is waterproof, acid proof and gases proof—especially built for mines, outdoor use and places where an instrument is subject to the severest atmospheric conditions, and in fact, for use wherever connecting wires may be taken to a telephone. In placing our improved No. 890 Type Mine Telephone on the market, we are offering “Quality Apparatus” in a design which incorporates every worthy suggestion, of a great many which have come to us from the mine engineers in the several countries where Stromberg-Carlson equipments have been installed. This experience prompts us to believe that we are offering you the most practicable and efficient telephone that has been designed for use in mines.

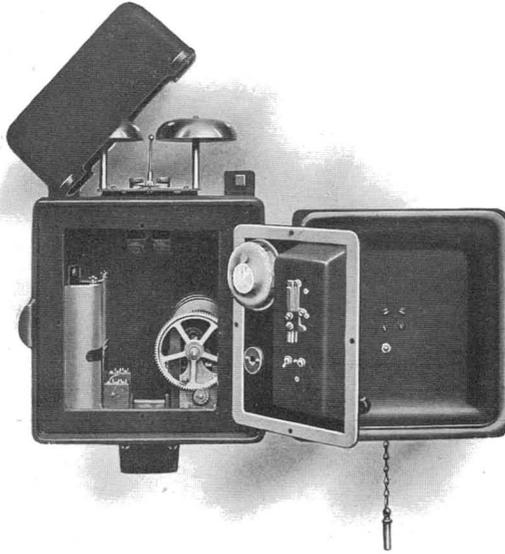


Fig. 2—No. 890 Telephone—Both Doors and Hood Open  
Waterproof Gaskets on Both Doors

☐ Our No. 890 Type Mine Telephone consists of a complete magneto equipment compactly assembled in a comparatively small, strong cast-iron box, coated with a handsome finish, which acid fumes and moisture cannot penetrate. All of the talking and signalling apparatus is accessibly arranged inside the roomy inner compartment, temporarily sealed tight by a door having a wide overlap, covered with a felt-cloth gasket. The inner compartment is sufficiently roomy to allow any part to be removed without interfering with the general assembly. All openings through the inner case for the ringer cores and the generator crank are sealed by gaskets and felt washers, as is the inner door. The terminal box, mounted on the bottom side of the telephone, conceals three terminal posts for the incoming line wires, and is threaded to receive an iron pipe for bringing the line wires from the ground to the telephone.

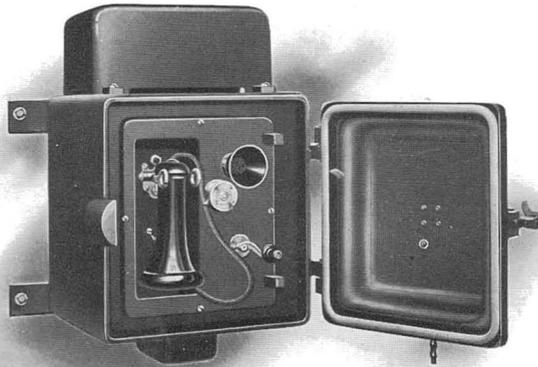
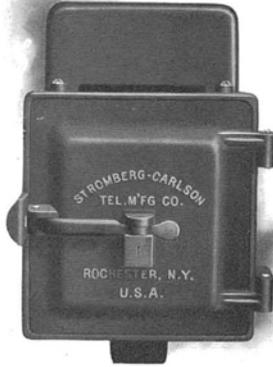


Fig. 3—No. 890 Telephone—Outer Door Open  
Showing Cord Take-up Device

Mine Telephones

¶ The ringer armature and gongs, under the hood, are accessible for adjustment from the outside of inner compartment, causing no reason for this compartment to be opened at any time, except when replacing batteries, which is very seldom. Opening the outer door exposes the receiver and weather-proof linen cord and take-up device and the handle of the magneto generator. As additional protection from atmospheric conditions, all insulated wire windings are especially insulated with our high-grade Quality Magnet Wire, and boiled in beeswax. The metal parts, necessarily of steel or iron, are zinc and copper-plated, while other parts, such as screws, are of brass, preventing all chances of corrosion and rust.



No. 4—No. 890 Telephone with Spring Snap Lock

¶ The proportions of this telephone are well defined, as shown in the several illustrations accompanying this description. Actual dimensions of the box are: 10 inches wide, 10¾ inches high, 8¼ inches deep. The hood, mounted on top of the box, protects the large ringer gongs, and has an opening of sufficient height at bottom edges to permit the ringer to be plainly heard at a distance. Two forms of locks are provided—the standard pin lock, which is furnished unless otherwise specified, and the spring snap lock, which is interchangeable and intended for an instrument installed in an isolated place where access is not desired, except by a regular attendant. Detachable mounting bars permit the telephone to be mounted on most any shaped surface, fastened in horizontal position when shipped with telephone. The Standard No. 890 Type Telephone will be furnished with bridging equipments including the 5-bar generator, 1600-ohm ringer and the pin lock.

¶ One of the special features we provide is a “cut-out” push-button key, for disconnecting the telephone from the line when outer door is shut and telephone not in use. The key, mounted in the inner compartment, engages a lug on inside surface of outer door under upper hinge (Fig. 3) and presses against protruding plunger of key in the act of closing the outer door.



Fig. 5—No. 890 Telephone with Spring Snap Lock and Key Outer Door Ajar

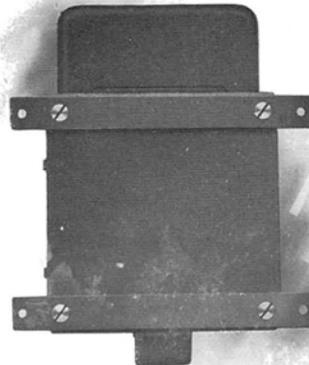


Fig. 6—No. 890 Telephone Rear View, with Detachable Mounting Bars in Horizontal Position

## Mine Telephones

## No. A-5551 Magneto Switchboard

¶ The Mine-A-Phone system is complete with a switchboard, on which the calling signals are received and connections made between the different telephone stations by an operator.

¶ Our No. A-5551 Magneto Switchboard is of recent design, and combines the Combination Wall Telephone and Switchboard. It is to be mounted on the wall, like any telephone, and operated by an office employee, who is chiefly occupied with other duties, during the working hours of the day. A central telephone office, consisting of this switchboard and lightning arrester, may be readily installed without requiring any rearrangements of department to accommodate the telephone equipment.

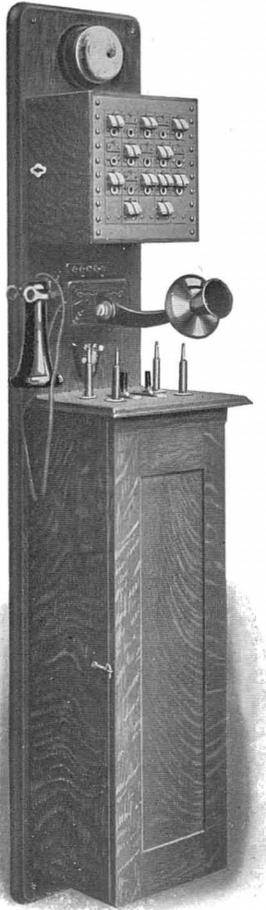


Fig. 7—No. A-5551 Magneto Switchboard. Closed View

¶ The switchboard cabinet is strongly built of selected oak and finished handsomely. "Stromberg-Carlson" woodwork is made in our own factories, and has always maintained the reputation of superior construction and finishes.

¶ The Standard No. A-5551 Switchboard has a capacity for accommodating fifteen lines, each of which may be connected to a telephone stationed any place in or out of the mine workings. It has our famous "Triplet Set," consisting of a transmitter and receiver for the operator, and two pairs of connecting cords and ringing apparatus, so that the operator can connect together any two of the fifteen lines and call any telephone station. The call signals are received by drops, which have visual shutters that fall and display the number of the calling telephone station. Our No. 8 Self-Restoring Gravity Drop is standard for all Magneto Switchboard systems; positive in operation and combines numerous mechanical features which make it the most practical and economical device of the kind on the market.

¶ Fifteen feet of our standard fifteen pair, one silk and one cotton insulated copper conductor switchboard cable is furnished for connecting the switchboard to the lightning arrester terminal strip, which may be mounted near by. The conductors at the other end of the cable are brought out through the backboard, formed and paired to the screw terminal fasteners of each drop. In Fig. 8 the cable form is not represented, as it would obstruct the view of the drops, which shows in this position how each complete drop coil may be removed from the rear separately, by simply unfastening coil terminals without disturbing the connections. This is a convenient feature in case a drop coil is burnt out and must be replaced instantly.

¶ The Night Bell, shown above the cabinet containing the drops, is connected to a battery and the line drops, so that when any of the drops are operated, the circuit

**Mine Telephones**

is closed and the bell is rung. This is to signal the operator in case he has other duties and is not near the switchboard.

¶ Every necessary feature of an effective switchboard system is furnished with this equipment. The battery box is of sufficient size to contain the generator, cords and batteries, besides providing a finished appearance and protecting these parts from injury.

¶ The No. A-5551 Magneto Switchboard is simple to operate and readily installed for immediate use. We reproduce a typical circuit of a Mine-A-Phone installation on page 10, that may be followed in connecting up a system of fifteen or less number of instruments.

¶ To afford our reader an idea of the construction materials required for a Mine-A-Phone System, we list a variety of necessary wires, insulators, etc., from which may be chosen a suitable stock list that will meet the varying conditions for any mine installation. As the distances underground are usually short and irregular, no quantities will be specified, as no standard construction may be determined. A complete catalog describing all telephone construction material and supplies will be furnished upon application.

NOTE: For Metallic Circuit, double the amounts of wire, brackets and insulators.

**Line Construction Material**

Code No.

933—No. 12 Galvanized B. B. Iron Wire for Aerial Wiring, or

934—No. 14 Galvanized B. B. Iron Wire for Aerial Wiring.

48—Double Conductor No. 19 Gauge Rubber-Covered and braided wire for Lightning arrester to telephone wiring in buildings.

943—Double Conductor No. 14 Gauge, weather-proof, rubber-covered telephone wire with double impregnated braiding for underground use.

Special—Lead-covered Cable as specified for Underground Wiring.

13—1½ in. x 12 in. Painted Oak Brackets.  
60-penny Nails for fastening Brackets.  
40-penny Nails for fastening Brackets.

15—No. 9 Pony Glass Insulators.

20—No. 4 Porcelain Knobs.

15—3-inch No. 15 Flat-head Bright Screws.

565—Single Pair Fuse and Carbon Lightning Arrester for use at each telephone.

¶ In making a stock list be sure to order enough material, and consider that the best line construction is the surest means of obtaining reliable and durable service.

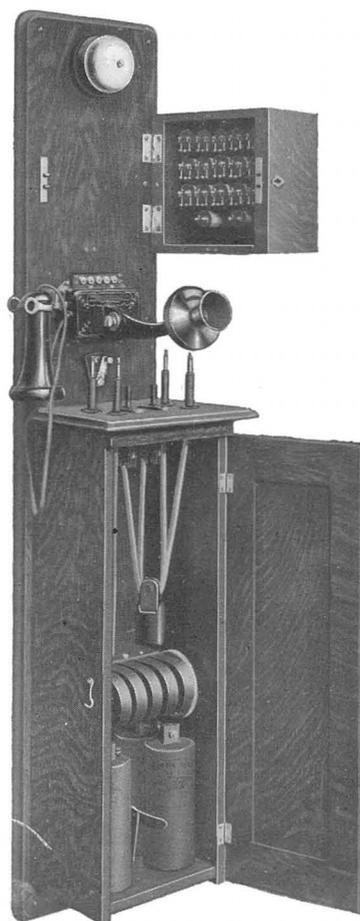


Fig. 8—No. A-5551 Magneto Switchboard. Open View

## Mine Telephones

## Magneto Wall and Portable Desk Telephones

¶ We are recommending this adaptable type of Magneto Telephones for use above the surface of the mines at such stations as the Superintendent's Office, Manager's Residence, Engine Room, Work House, and in fact, any place where it is necessary to have a convenient form of telephone.

¶ Mines are seldom alike in departmental arrangement, but the difference in the several types of telephones illustrated in this bulletin, permits the most suitable selection for any Mine Telephone System that may be considered.

¶ To provide a uniform and efficient system, we specify by Code Number the telephone of the type having the apparatus which is identical in each type. The talking and signalling apparatus in our Magneto Telephone is of the latest improved design, which insures perfect speech transmission and the volume of ringing power.

¶ Our No. 7-B Solid Back Transmitter, and No. 14-A Receiver, have many points of merit in design, which make them the most efficient and durable talking sets for magneto service over long and short distance lines. Our Five Bar Hand Generators are the best that experience and scientific development can produce and are capable of giving service under the most severe conditions.

¶ The No. 6-C 1600 ohm ringer is the self-contained, adjustable type, equipped with loud sounding spun brass gongs. Each Telephone in the Mine-A-Phone System should be of the same resistance, otherwise, the best ringing results cannot be maintained. In every detail "Stromberg-Carlson" Magneto Telephones will be found to have numerous mechanical and electrical construction features conceded the acme of superior modern telephone practice.

¶ Our No. 896 Compact Type Magneto Telephone, two views of which are shown on this page, embodies a number of new features which have never been incorporated in any other Magneto Telephone. The Instrument consists of a well designed oak box five inches shorter than our former compact type telephones. The high quality finish characteristic of all Stromberg-Carlson woodwork is provided with this instrument.



Fig. 9—No. 896  
Magneto Wall Telephone  
Closed View

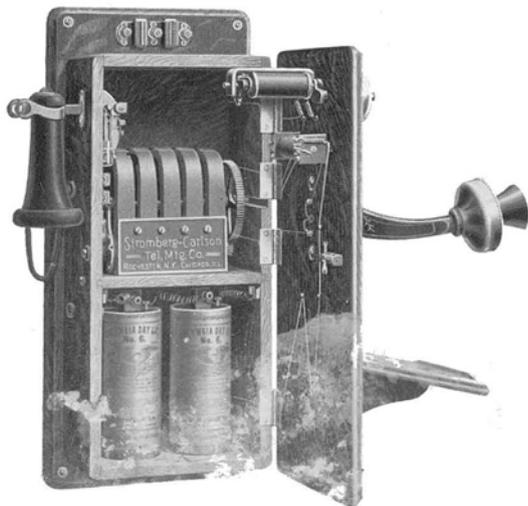


Fig. 10—No. 896  
Magneto Wall Telephone  
Open View

**Mine Telephones**

¶ Perfecting every detail of the construction of our No. 896 Compact Type Wall Telephone costs us more, but it is always our highest aim to furnish "Quality Apparatus" that will outwear and surpass the similar type of telephone of any other manufacture. That such results have been accomplished by us will be readily realized by those who give their attention to all the details, and the fact that there are over 1,250,000 of our various types of telephones in operation today.

¶ All Stromberg-Carlson Magneto Telephones are provided with pure platinum points of contact. This is the proper instrument for offices and residences.

¶ Our No. 774 Telephone is our standard two-piece desk telephone, for use wherever a portable instrument is desirable. It may be placed on a desk or table and moved around, as required. The tube or pedestal is made of seamless steel tubing and finished in black enamel that will not crack or peel. It presents a pleasing appearance and does not show the effect of constant handling as much as hard rubber or nickel plating. The base is given the same kind of finish. The contact springs of the hook-switch are mounted accessibly within the base. The movement of the hook-lever is transmitted to these springs by a rod, which extends up through the tube or pedestal, one end being fastened to the hook-lever, the other provided with a hard rubber plunger which passes through the main tension springs and engages the operating contact springs. There is also mounted within the base a hard fibre block, upon which are mounted the bridging posts for all the terminals, and also a hard rubber block upon which is mounted the hook-switch contact springs. The terminal block is a self-contained unit, which can be removed easily if desired. It is fastened to the base with two machine screws. There are no castings used in the design of this instrument. The conductors of the desk stand cord all terminate in the metal tips, numbered to correspond to numbering in terminal block. Neither the pedestal or hook-lever form any part of the circuit. An iron shield protects the parts within the base, and there is no danger of scratching a desk, as a strap of wax leather surrounds the edge. The transmitter is mounted on a transmitter arm of the ball-and-socket type, which gives the transmitter a wide range of adjustment, yet does not permit putting the transmitter in a position that would affect its operating. The ringer and hand generator are mounted in a box, and connected to the desk-stand by a flexible six-foot cord. The batteries are placed near by in a suitable metal box.

¶ It will facilitate ordering if you will use code numbers as specified in this bulletin.

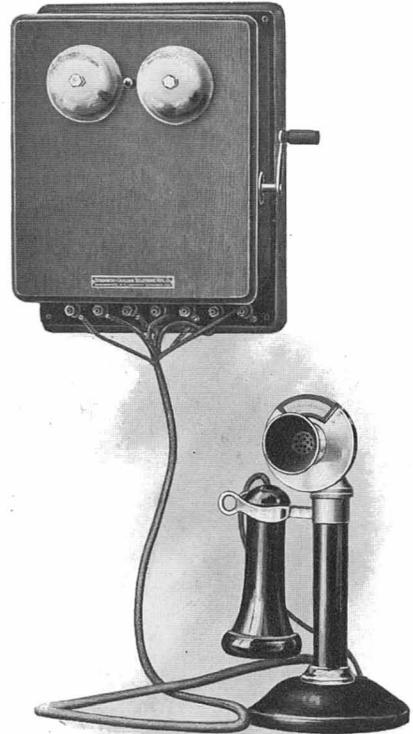


Fig. 11—No. 774 Type  
Magneto Desk Telephone

## Mine Telephones

## No. 962 Loud Ringing Signal Bell

¶ The accompanying illustrations show our iron-clad, waterproof and rust-proof loud ringing, alternating current signal bell, specially built for use underground.

¶ The cast iron frame is strongly built and provided with a water shed, mounting for condenser, slots for incoming connecting wires, a simple wide adjustment for either 6 inch or 8 inch gongs, as specified.

¶ The principal features of this simple mechanism are the armature adjustment and the hermetically sealed metal cases for the ringer coils. By referring to the open view showing the unique assembly of the few parts, it will be noticed that the swing of the armature and clapper rod is bound by the limits between the round posts located at each side of the armature. The posts are eccentric dowels with tapered ends and are screwed down tight

by a long screw that goes clear through the post which is drilled off center, thereby providing the simple eccentric adjustment. By turning these posts on their axis, the space between the posts can be increased or decreased instantly. This adjustment cannot become loose from vibration and there are no fine thread screws and such adjustments which are inferior, but common, with almost all other types of bells.

¶ The pair of ringer coils are placed in air-tight metal cases and filled with boiled beeswax, making them absolutely water-proof. The terminals are connected to insulated wires outside the coil enclosing cases. This mechanism can be submerged in water and come out unaffected. The magnets and all the metal parts are specially treated to adapt them for use in mines. The housing over the mechanism fits under the water shed and fastens with a screw.

¶ No. 962 Signal Bells are used with a Mine-A-Phone System as illustrated by the diagram shown on Page 14. Any number of bells may be located at different places in the main and branch entries and operated by a No. 963 Hand Generator usually located at the bottom of the

main shaft. Whether on a separate pair of wires or a three-wire circuit, using one wire of the metallic pair for the mine telephones and another wire for the bells, the whole mine can be effectively wired economically for the alarm signal system. As shown by our plan, the bells are located near the ends of each branch entry on the side through which the air currents for ventilation are being forced. This places each bell in a most advantageous place, permitting the sounds to be carried to the greatest number of places at one time. The length of entries and the kind of work in progress governs the number of these No. 962 Signal Bells to be installed. We will assist you in the matter of laying a system from plans of any mine.



Fig. 7—No. 962 8-inch Bell.  
Closed view.

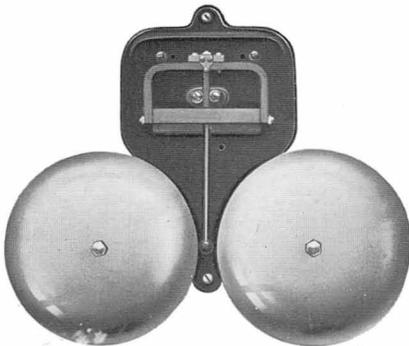


Fig. 8—No. 962 8-inch Bell.  
Open view

## Mine Telephones

## No. 963 Iron Clad Magneto Generator

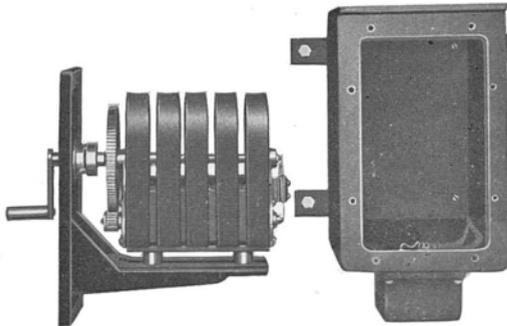
☐ The equipment for sending signals. There are no batteries employed and therefore no deterioration takes place when standing idle or furnishing current. This is the only iron clad, waterproof and rustproof magneto generator set on the market, especially made for use underground.

☐ The cast iron housing is neatly finished with our famous enamel and hermetically seals the contents when closed. Detachable mounting bars, similar to our No. 890 Mine Telephone, are provided, also the iron clad terminal box. When mounting bars are not used, the same holes that take the bar fastening screws are ready for receiving long flat head screws from the inside. A wide felt gasket completely seals the front door of case.



☐ The 5 Bar Generator is mounted on the shelf which is a part of the door casting. This mounting prevents generator crank from getting out of alignment and binding in the hole in the door, as is the case when generator is mounted on another plane. The crank shaft is surrounded by a gasket chamber so no moisture can get inside. The crank shaft is joined inside the box by shaft coupling device, which makes starting of generator instantaneous and easy, and likewise makes possible the only absolutely moisture-proof generator signalling set.

☐ For special cases where a magneto generator of the iron clad type is not required, we can furnish the same five bar generator in wooden case known as Code No. 310 Hand Generator.



☐ There are several methods of using the No. 963 Hand Generator and different ways for each installation of a Mine-A-Phone and Alarm Signal system, but we have chosen some of the most practicable ways of using these equipments efficiently, which during our several years of professional experience in this business have proven to be the best and most economical.

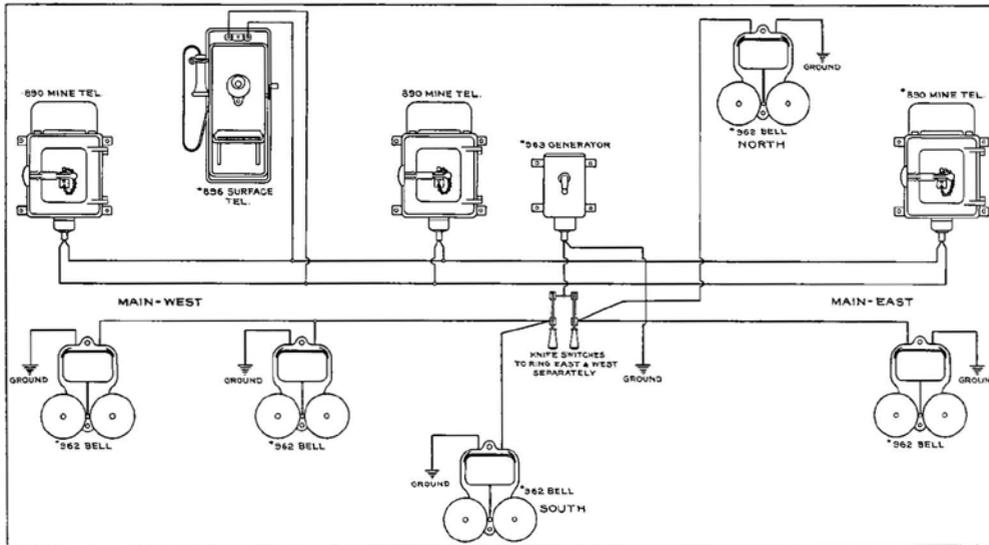
☐ Mines are sometimes worked in one direction at a time after they have been worked in opposite direction to get a knowledge of the conditions and values of the property. In this case the telephone and signal system can be divided by the use of knife switches and the equipment used only where the forces are working. This is only an incident of the adaptability of such simple and efficient equipment. We provide a special generator for the signaling set that has a voltage output sufficient to ring as many bells as any mine will require on one circuit.

## Mine Telephones

## Best Plan of Mine-A-Phone Installation.

☐ Mine Superintendents should carefully consider the method of wiring their mines for telephones and signal bells. The plan adopted should be such as to assure: 1st.—Good telephone transmission; 2nd.—Reliable signaling; 3rd.—Prevention of burnouts of bells and telephones; 4th.—Safety to users of the telephones.

☐ The accompanying diagram shows a practical plan of wiring; the kind of wire used should depend on the local conditions. Individual telephones and bells may be protected by fuses, if desired.



The advantages of this plan are:

- a. A metallic circuit for the telephones entirely independent of the signal bell circuit.
- b. An independent circuit for the signal bells.
- c. A means of ringing the signal bells in whole or any part of the mine, as desired.
- d. In case of accident to wires in one section of the mine, the bells in the other sections can be operated.
- e. The ringing of the bells is not dependent on the telephone wires.
- f. The ringing of the bells is independent of the power circuit in mines so equipped.
- g. The bells are not dependent on fragile incandescent lamps, which if broken, puts the bell out of service, or, if short circuited, burns up the bell coils and puts the whole system of bells out.
- h. The telephone users are not liable to shocks when the signal system is being used.
- i. No condensers are required for the telephones. Telephone condensers are made of tin-foil sheets separated by a very thin sheet of paper, which is liable to puncture due to induced current. When the telephone condenser is short circuited, the telephone will

be burnt out if circuit is grounded and will "kill" the whole bell and signal system.

j. No explosions can occur due to burnouts of bells and telephones, as burn-outs are impossible unless in case of gross carelessness.

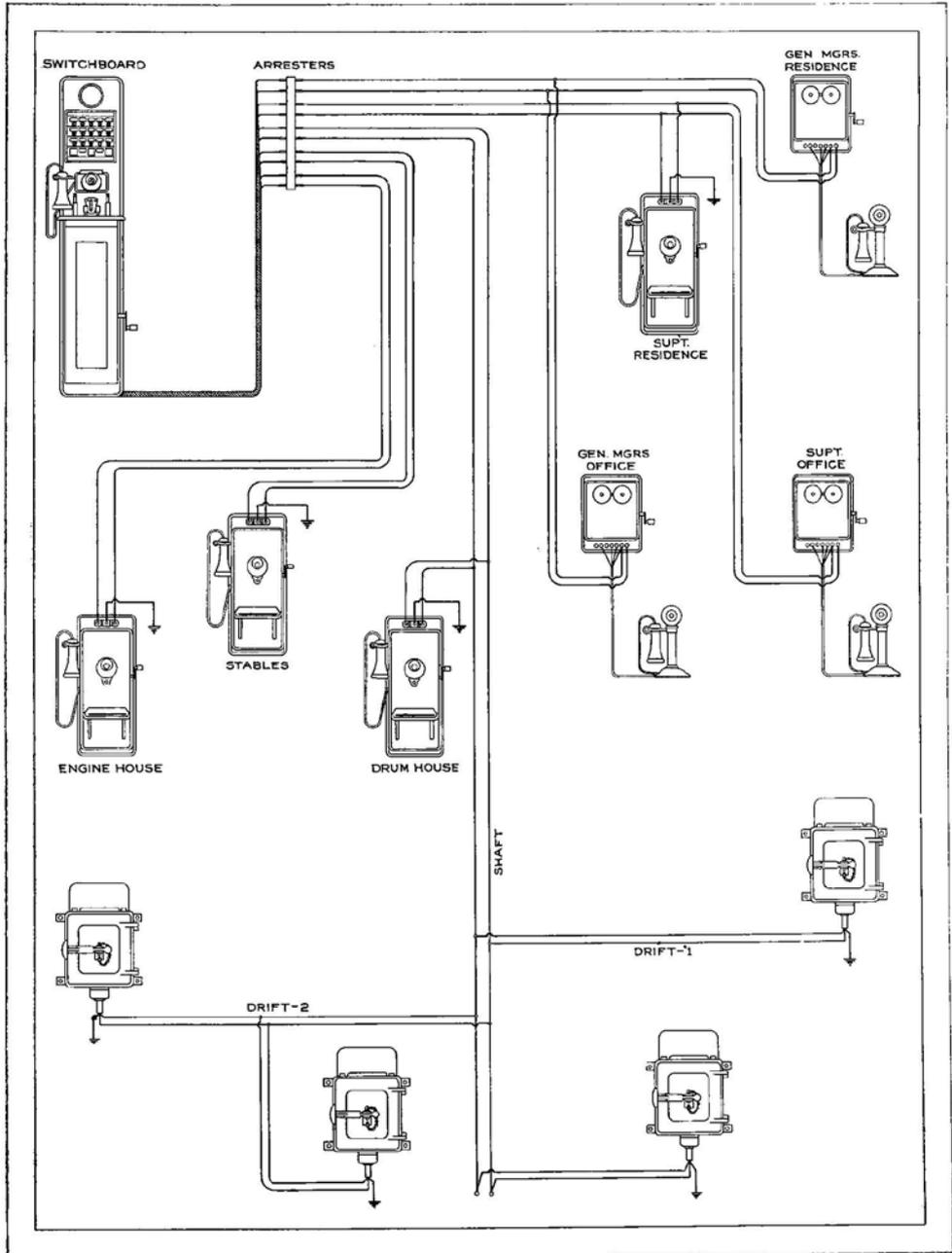
k. The expense of running a third wire over the whole system is well justified by the additional dependence of the signal and telephone system. It is also to be remembered that the telephones are located comparatively close to the shaft, whereas the bells are located near the working face of the mine.

The most perfect installation we can recommend has a pair of wires for both telephones and bells and is shown in Circuit No. 149, sent upon request. Other circuits for special conditions submitted upon full particulars from applicant.

We advise you to use Mine-A-Phones that have had the test of time the world over. Use polarized bells that have no contacts that will get dirty and spark. Use hand generators that are reliable and not dependent on power circuits which are of no service when the fuses blow or the engine stops. Run separate telephone and bell circuit. The best is always the cheapest.

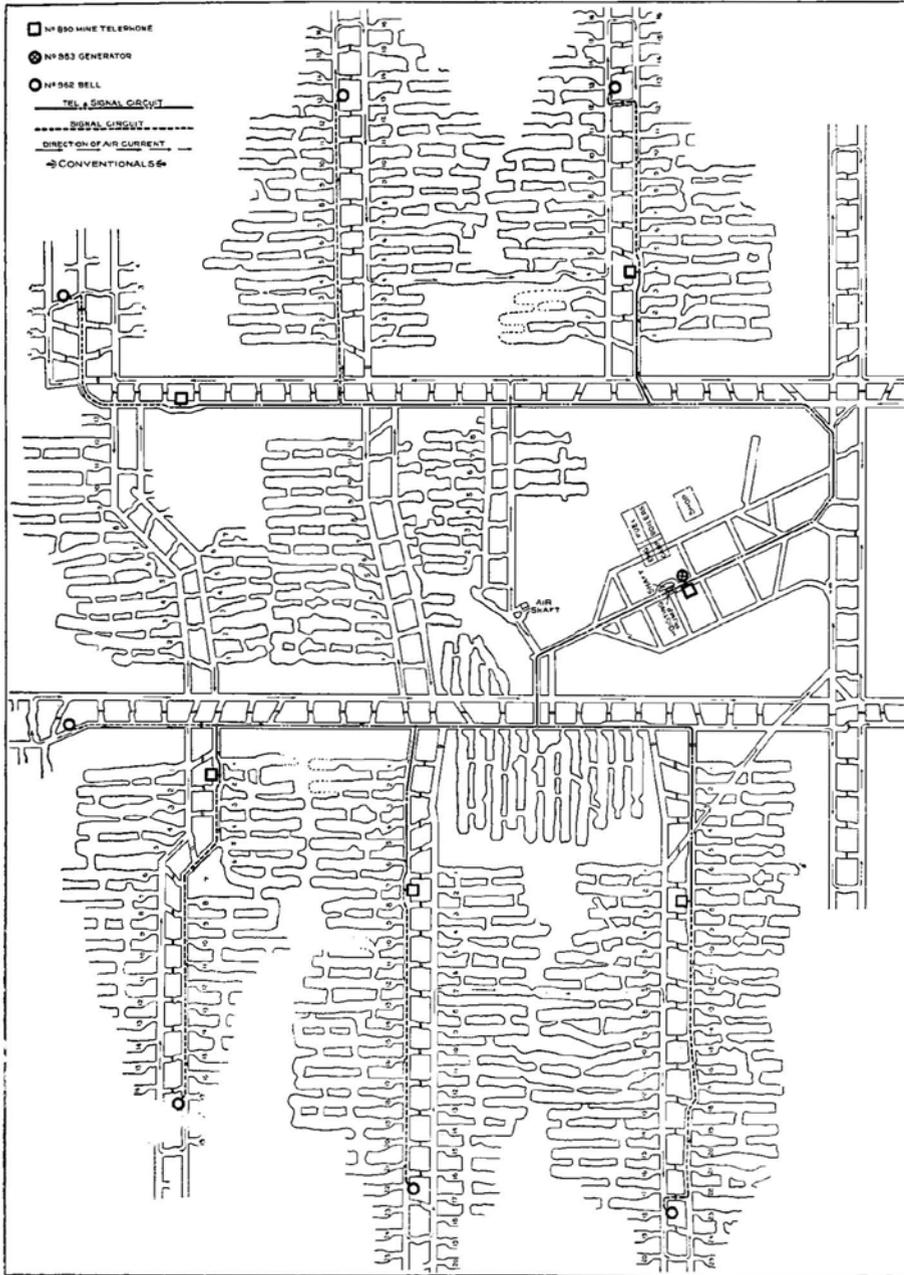
Mine Telephones

Wiring Diagram of a Typical Metallic Circuit for a Mine-A-Phone System



Mine Telephones

Conventional Diagram of a Mine-A-Phone and Alarm Signal System Installed in a Typical Coal Mine.

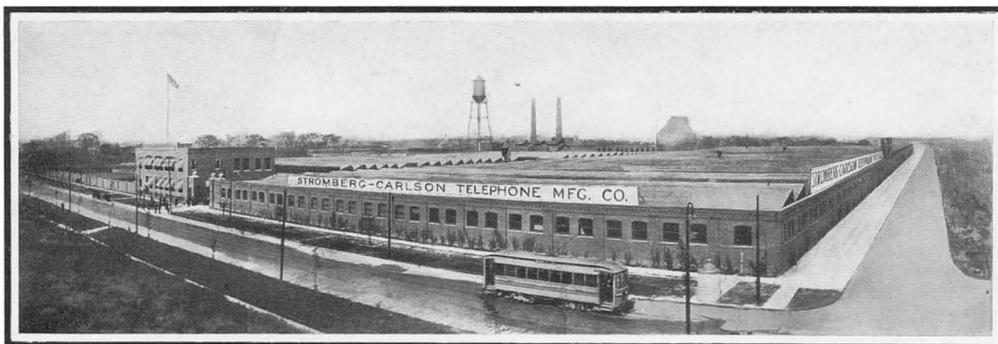


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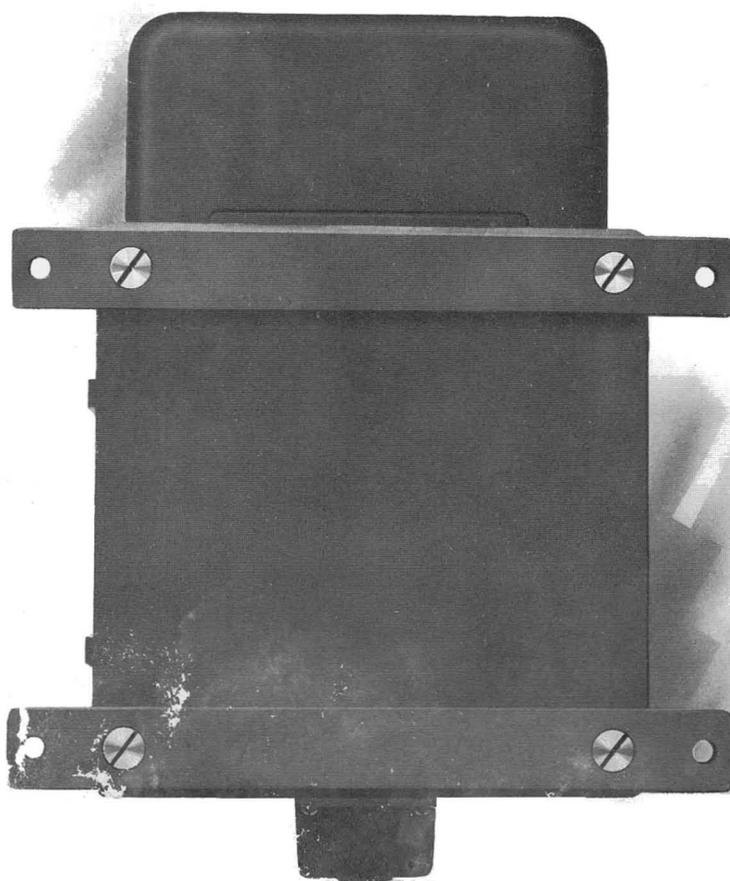
A Few Mining Companies Using the Mine-A-Phone System

In what mining district can you find telephone apparatus with a better record than that built by the Stromberg-Carlson Manufacturing Company

Republic Iron & Steel Company, Birmingham, Alabama.	Cleveland-Cliff Iron Company, Ishpeming, Michigan.
Southern Iron & Steel Company, Birmingham, Alabama.	Penn Iron Mining Company, Vulean, Minnesota.
Gold Road Mining & Exploration Co., Gold Road, Arizona.	Oliver Iron Mining Company, Duluth, Minnesota.
Alaska Threadwell Gold Mining Co., Threadwell, Alaska.	Goldfield Cons. Mining Company, Goldfield, Nevada.
Bully Hill Copper Mng. & Smelting Co., Winthrop, California.	Yellow Jacket Gold & Silver Mng. Co., Virginia City, Nevada.
South Eureka Mining Company, Sutler Creek, California.	Pittsburg Coal Company, Pittsburg, Pennsylvania.
Colorado Fuel & Iron Company, Denver, Colorado.	Lower Mammoth Mining Company, Salt Lake City, Utah.
Cresson Cons. Gold Mng. & Milling Co. Cripple Creek, Colorado.	Homestake Mining Company, Lead, South Dakota.
Federal Mining & Smelting Company, Wallace, Idaho.	Germania Mining Company, Springdale, Washington.
Anaconda Copper Mining Company, Anaconda, Montana.	Waihi Gold Mining Company, Auckland, New Zealand.
Consolidated Coal Company, Chicago, Illinois.	Montana Coal & Coke Company, Electric, Montana.
Hillsboro Coal Company, Hillsboro, Illinois.	United States Treasury Mining Co., Chloride, New Mexico.
Rosiclare Lead & Fluor Spar Mines, Rosiclare, Illinois.	Broken Hill Jet. North Silver Mng. Co., Broken Hill, New South Wales.
Wapello Coal Company, Hiteman, Iowa.	Phoenix Mining Company, Tecopilla, Chile, South America.
Union Mining Company, Mt. Savage, Maryland.	Mysore Gold Mining Company, Madras, India.
Champion Copper Company, Houghton, Michigan.	Simmu & Jack West Ltd., Gumeston, Transvaal.



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