ANDRAE TELEPHONES NEVER DISAPPOINT

NEW FACTS FOR FARMERS

ABOUT

TELEPHONES

CATALOG No. 14

MANUFACTURED BY

Julius Andrae & Sons Co.

225 WEST WATER ST. - MILWAUKEE, WIS.

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Introductory

IN PRESENTING this catalog to the trade, we do so with the full conviction that our past efforts to produce telephone apparatus of the highest grade have met with more than a partial degree of success.

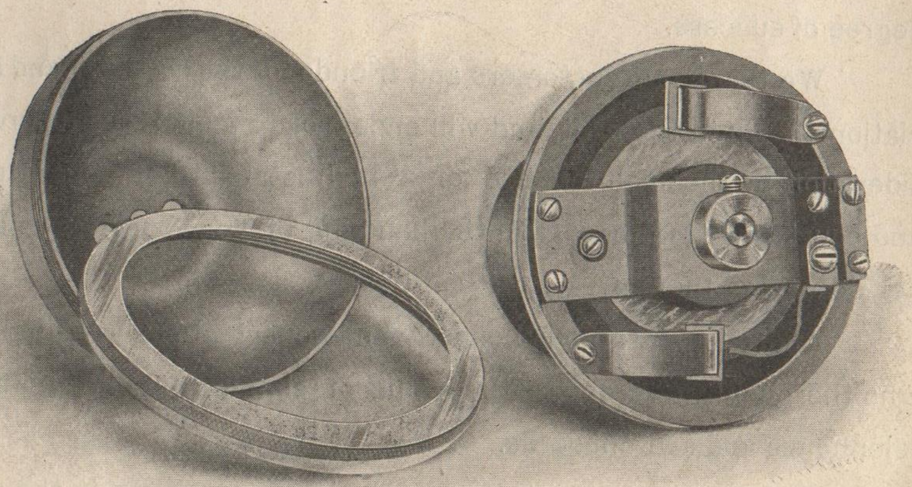
We thank our customers and friends for the courtesy and appreciation shown in the past, and will endeavor to merit your future consideration by the maintenance of a high standard of apparatus, fair and courteous treatment, and the handling of your business in a manner deserving thereof.

Andrae apparatus is honestly and conscientiously made by men who thoroughly appreciate the value of simple, durable and reliable telephones and switchboards.

The carrying out of these principles, as shown in the careful design, the use of finest material obtainable, and skillful workmanship, are the secrets of the ANDRAE reputation for highest efficiency and lowest cost of maintenance.

ANDRAE TRANSMITTERS.

The efficiency of Andrae Solid Back Transmitters is the result of years of experimenting, persistent effort and careful perfecting by telephone experts of vast resources. Andrae Solid Back Transmitters, since their advent several years ago, have been tried by some of the most exacting telephone users in America, and the universally favorable expression of satisfactory results derived therefrom, more than substantiate all we claim for them. It is constructed upon the latest principles of modern telephony, made with a heavy cast brass front, and heavy stamped back; metal and carbon diaphragms held in place with German silver springs, while the back carbon electrode is held in place by a heavy brass bridge, which in turn is supported by the transmitter front. The granular carbon is exceedingly hard and uniform in size and free from dust, retaining these qualities indefinitely. Each granule has a highly polished irregular surface and a density not unlike black diamond, being hard enough to cut glass. This carbon is imported for our especial use at a large cost over domestic carbon.



Andrae Solid Back Long Distance Transmitter.

ANDRAE TRANSMITTERS—CONTINUED.

The diaphragm is manufactured in a manner entirely of our own invention, which does away with all side tones, and makes it thoroughly moisture proof. The heavy stamped back or cover is attached in such a manner that no screws are used on the outside of the entire transmitter. Every small minor working part is designed to reduce loss of imparted energy, and secure responsiveness, accuracy, and delicacy of movement. The result combines volume and purity of tone with an articulation second to none.

Points embodied in the construction of Andrae transmitters are:

An instrument which is proof against "packing" or becoming dead from regular use. The most far-reaching transmission possible, suited for long distance and local connections. An instrument which will not blur or break when talking loud, and not susceptible to foreign sounds or noises in the room. An instrument operating with minimum battery consumption, but withstanding a variation of current without generating the disagreeable frying and scratching noises so prevalent in many transmitters. Small number of parts, accurately made from the best material obtainable, reducing possible chances for trouble to a minimum.

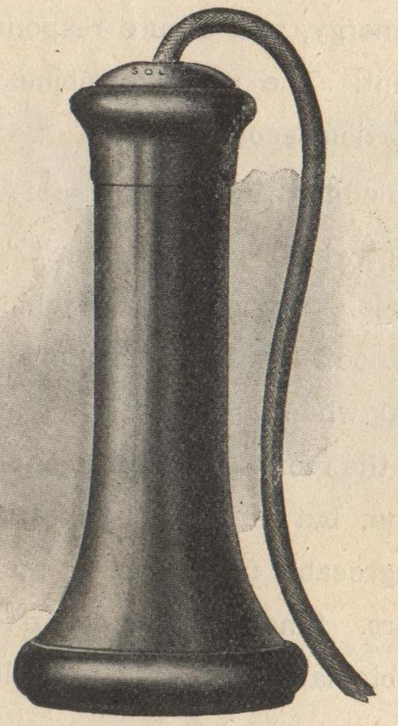
A highly finished transmitter, unexcelled for durability and long life, obtained from careful selection of material used in its construction.

A "perfect" transmitter.

ANDRAE RECEIVER—STYLE D.

Next in importance to the transmitter, in the talking circuit, is the receiver.

Andrae Receivers are the result of careful design tested out in actual operation for all conditions of service. The object in their design is to obtain the highest electrical and acoustic efficiency, and the best mechanical design, with the least possible chances for trouble. Experience has demonstrated that the Andrae is a properly designed and carefully constructed telephone receiver; is not subject to quick



Andrae Solid Receiver.

deterioration, therefore needs no adjustment after leaving the factory, and that all provisions for adjustment serve as a source of trouble and are a detriment rather than an advantage.

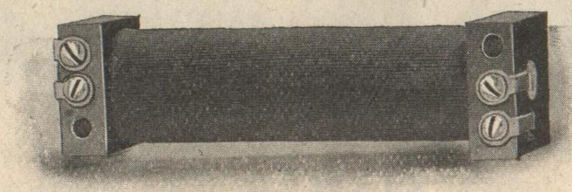
Andrae Solid Receivers have all parts moulded in the case, making the adjustment perfect, absolute and permanent. It cannot change, as the magnets cannot move. Neither can atmospheric conditions or undue shocks affect adjustment.

ANDRAE RECEIVER—STYLE D.—CONTINUED.

The cord terminals are enclosed within the receiver retaining case, and all strain on the cord conductors arranged to be taken by the braiding of the cord, thus preventing the connections from working loose and giving trouble. A cord thus fastened will last fully three times as long as with any other form of attachment. Andrae Receivers have all metal parts entirely concealed within their retaining case, obviating all possibility of shocks from lightning or electric light circuits.

ANDRAE INDUCTION COILS.

An efficient induction is requisite to step up the low pressure primary currents furnished by the cells of local batteries to such a magnitude as to penetrate easily the resistance and retardation of the low circuit. Before deciding upon the relative resistance of the primary and secondary windings, we made elaborate tests to determine



Andrae Induction Coil.

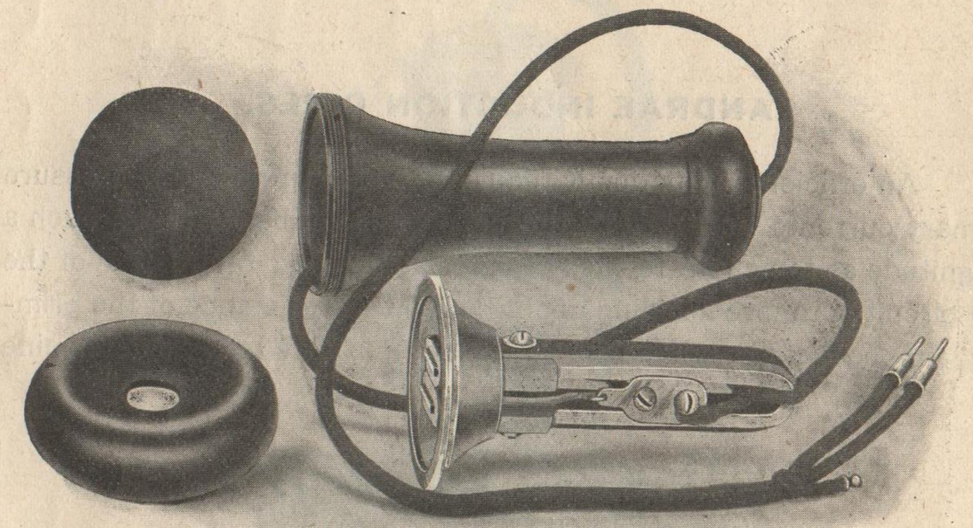
the best combination, and have adopted one which adds greatly to the efficiency of the talking circuit. The coil is wound with silk-covered magnet wire, and the core is made up of annealed iron wires.

The heads are heavy fibre blocks, which afford a good mounting for the terminals and for fastening the coil to the telephone box.

ANDRAE RECEIVER—STYLE A.

Our experience has demonstrated that our Andrae Solid Receiver, as shown on page 4, is the most serviceable of any receiver on the market. To meet the demand for a loose shell receiver however, we offer our Andrae Style A illustrated herewith.

This receiver is made of carefully gauged, interchangeable parts, and best of material, making a permanent and lasting instrument.



Andrae Style A Receiver.

Our Style A Receiver, aside from the loose shell feature, is identical in quality with our well known Solid Receiver. For a receiver of this type it has no superior.

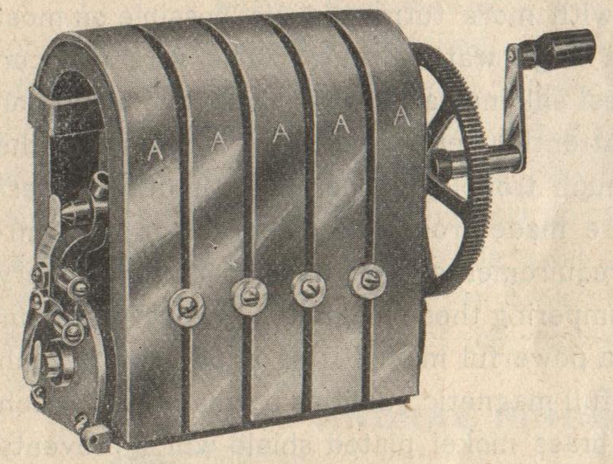
Unless specific directions to the contrary are received, Andrae telephones are invariably equipped with our Solid Receiver Style D.

ANDRAE "GIANT" GENERATORS.

Most Powerful Generator Made.

Generators are an important part of telephones. Many difficulties have been experienced in producing generators of sufficient output with lasting qualities and stability suitable for the exacting requirements of the various classes of magneto call service.

"Giant" generators were designed by pioneers in the business, and are pronounced by experienced users to be as nearly perfect electrically and mechanically as can be made. "Giant" generators are the strongest on the market. This statement, without evidence confirming it, would be no argument in its favor. To substantiate this statement however, it is only necessary to observe the original design, excellent material, and the minute attention given to the smallest details of its construction. The output of a generator depends on its watts. In practice the electrical pressure (volts) must be great enough to penetrate the resistance of a line, and the current (amperes) forced through by this pressure must be of sufficient quantity to ring all of the bridged bells connected across the line. Insufficient output of either of these elements results in a low output of watts. The increased watts output is due to—First, a larger cross section of the armature core; Second, the use of larger wire with a greater number of turns in the armature winding; Third, smaller air gap between the pole and armature surface.



"Andrae Giant" 5-Bar 100,000 Ohm Generator.

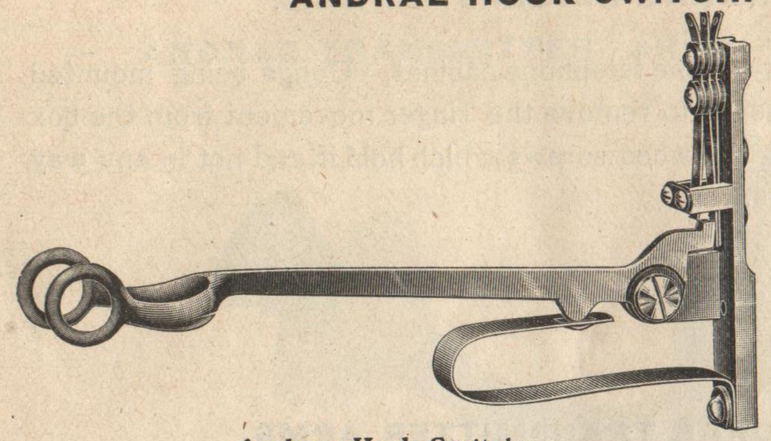
It will be noticed from the following description of the construction of our generator that we have taken advantage of these points, and as a result obtain the maximun effective watt output, and

ANDRAE "GIANT" GENERATORS—CONTINUED.

naturally a most powerful completed generator. The armature is laminated, the laminations being punched out of the very best Norway Sheet Steel and driven with high pressure on a steel shaft. Each armature is turned and ground between centers. This construction insures highest permeability, interchangeability and accuracy in bearings of the completed armature. The air gap is the smallest that good engineering will permit. The cross section of our armature is well considered, and we are able to wind larger sizes of wire with more turns than is possible on most generators, thus insuring a large watt output. The wire used on "Giant" armatures is the best silk insulated wire made. The insulation is very thorough, special attention being paid to the insulation of the contact pin, in which so much trouble is experienced in other generators. "Giant" magnets are made from a special grade of steel, imported for our particular requirements. We have special machinery for heating, bending and tempering these magnets. We saturate our magnets individually with a powerful magnetizing apparatus, in such a manner as to insure their full magnetic qualities permanently. Each magnet is covered with a brass nickel plated shield which prevents rusting. Our gears are made of machine cut brass, with an extra wide face, resulting in smooth running gears and will outlast an ordinary telephone. Special attention is paid to the shunt to make the machine quick acting, permanent and positive. Every generator is tested before leaving our factory, and if it fails to produce a certain voltage and current output, is rejected.

Numerous other desirable features commend "Giant" generators to the purchaser of high class telephone apparatus. Special attention is given to the finish, workmanship and care in assembling the various parts. "Giant" generators are made with three, four and five magnets for series and bridging work.

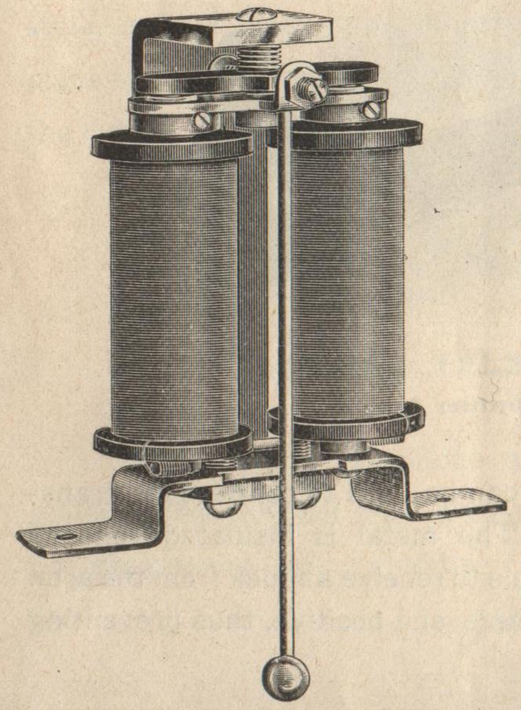
ANDRAE HOOK SWITCH.



Andrae Hook Switch.

Few telephone manufacturers realize the importance of a properly designed hook switch. When it is considered that all other circuit connections are permanently fastened, and that outside of the generator shunt the only movable or switch contacts in the telephone are located in this piece of mechanism, the necessity of a perfect hook switch is appreciated. Having from the first taken great pains in the design of this seemingly unimportant piece of apparatus, we are without a doubt making the most reliable telephone switch on the market. Our new long lever hook switch is self contained, and perfection of contacts cannot be equalled. Contact points are made from pure platinum.

ANDRAE RINGERS.



Andrae Ringers.

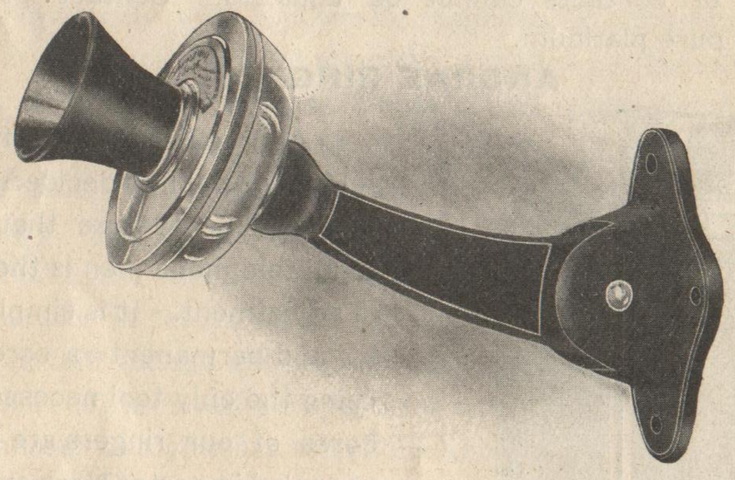
In Andrae Ringers we offer to the telephone public a decided improvement. The feature that appeals to all telephone men is the method of adjustment. It is simple, effective and permanent—a screw driver being the only tool necessary. The cores of our ringers are of double annealed imported Norway iron, and are wound with all silk wire. Our bridging ringers are wound to get high impedence and as many turns as possible to their specific resistance. The gongs are made of bell metal highly nickeled and polished. They are fastened by means of screws, to standards which in turn

ANDRAE RINGERS—CONTINUED.

are attached directly to the telephone cabinet. Gongs being mounted separately, it is possible to remove the ringer movement from the box by merely loosening the wood screws which hold it, and not in any way disturbing the gongs.

ANDRAE TRANSMITTER ARMS.

Andrae Telephone Arms receive the same careful attention bestowed upon more important parts of Andrae apparatus. They are made to fit various types of telephone cabinets, being sufficiently long, when attached, to extend the transmitter to a convenient position for speaking directly into the mouthpiece. These arms are made

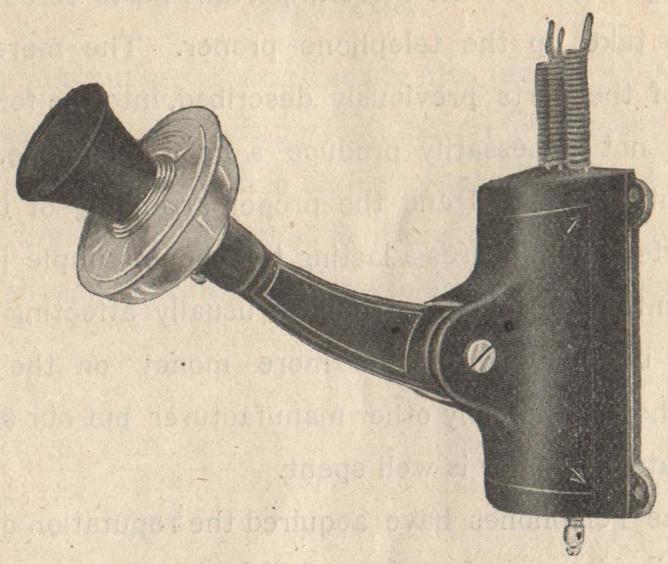


Andrae Transmitter Arm.

hollow, so that two concealed cords can be used to connect the transmitter with the telephone wiring. The metal is insulated from the telephone circuit, making it impossible to receive a shock from the arm.

The adjusting feature is simple and positive, thus preventing arms from becoming loose in socket.

ANDRAE TRANSMITTER ARMS—CONTINUED



ANDRAE LIGHTNING ARRESTER.

This arrester has been long known as a most simple and reliable arrester. We are free to confess, however, that in addition to this style, a fuse block type of arrester should be used. The proper place for a lightning arrester is not on the telephone but somewhere in the outside circuit.

ANDRAE TELEPHONE CORDS.

We use only telephone and desk stand cords of the highest grade. This cord not only presents a fine external appearance, but has exceptional lasting qualities.

ANDRAE TELEPHONES.

Having described the more important parts of our apparatus, we will now take up the telephone proper. The mere "throwing to-gether" of the parts previously described, into the form of a telephone, does not necessarily produce a good telephone. It is the careful attention to detail and the proper arranging of these highly efficient parts which insures a lasting telephone, simple in operation, and a prevention of outside troubles, usually affecting its delicate parts. We undoubtedly expend more money on the assembling of our telephones than any other manufacturer but our success convinces us that this money is well spent.

Andrae Telephones have acquired the reputation of being perfect when leaving our factory, and this reputation we intend to maintain.

FINISH.

All cabinet work is taken from selected stock, thoroughly well seasoned, and skillfully joined to make strong and attractive telephone cabinets. These are thoroughly and evenly finished and present an exceedingly handsome appearance.

WIRING.

The connections between the binding posts and apparatus in the telephone cabinet are made through tinned copper wire, securely fastened at all joints, and with the exception of the generator connections, carefully soldered.

All exposed wires are insulated by soft rubber sleeving. Positive continuity of circuit is assured in transferring the wiring to the lid or hinged portion of the telephone cabinet by the use of a hinge with a flat contact spring, each end of which is securely riveted and soldered to the halves of hinge.

ANDRAE TELEPHONES—CONTINUED.

TESTING.

Every precaution is exercised in the testing of Andrae Telephones to see that all is made perfect. Each instrument is adjusted and tested for practical working under its specific requirements.

They are securely packed in strong boxes ready for shipment, and a safe delivery of perfect working telephones is assured.

GUARANTEE.

We guarantee Andrae "Giant" Generators to be the most powerful and durable on the market. We guarantee Andrae Transmitters to talk farther and more distinctly than any other. We guarantee Andrae Solid Receivers will cost less to maintain and are the best sound reproducers made.

We guarantee all telephone and switchboard apparatus furnished by us to be first class in every respect, and to be free from inherent electrical and mechanical defects. We agree to replace or repair any part free of charge, that proves defective in material or workmanship, at any time, upon its return, provided same is properly installed, and the fault is not caused by misuse, ordinary wear, accident or neglect.

ANDRAE STANDARD "GIANT" BRIDGING TELEPHONE.

COMPACT DRY CELL TYPE.

No. 6 "Giant" Telephone.

It is with pardonable pride we call attention to accompanying illustration of our "GIANT" Bridging Telephone, which is our standard bridging telephone for heavily loaded farmers' or toll lines. It is built on the same general lines as our standard compact type series telephone, but the cabinet is larger to accomodate our 5 bar special heavy "Giant" generator. This generator is the most powerful in the world, and the ease with which it rings the most heavily loaded farmers' or toll lines cannot be appreciated until tried. The ringer used in this telephone is extremely sensitive, being especially designed for this work. Woodwork is exceptionally heavy to compensate for additional weight of generator. The lasting qualities of Andrae apparatus are more than ever appreciated in this telephone. Guaranteed absolutely reliable under the most severe conditions, and recommended where lines may eventually have from twenty to fifty telephones.

ANDRAE "GIANT" BRIDGING TELEPHONE.

COMPACT DRY CELL TYPE.

No. 6 "Giant." Open.

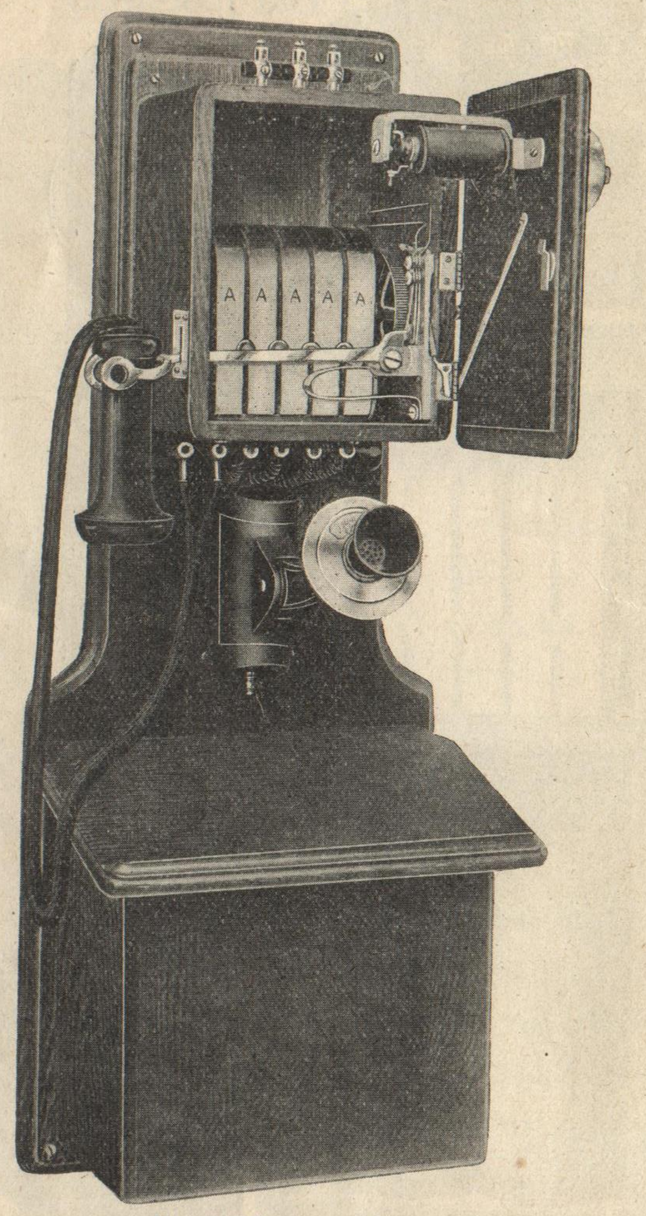
SPECIFICATIONS.

Oak woodwork, 5-bar 100,000 ohm generator, 1,600 ohm ringer, long distance solid back transmitter, adjustable arm, D solid receiver, silk induction coil, long lever hook switch, platinum contacts, lightning arrester, two cells dry battery.

		Ringer Resistance.		
No. 6.	Code word—ABRUPTLY.	1,000 ohm.	List Price.....	$23.00
No. 6A.	" —ABRUPTION.	1,600 "	"	24.00
No. 6B.	" —ABRUPTNESS.	2,000 "	"	25.00
No. 6C.	" —ABSCESS.	2,500 "	"	26.00

ANDRAE STANDARD "GIANT" BRIDGING TELEPHONE—CONTINUED.

DOUBLE BATTERY BOX TYPE.



No. 4 "Giant". Open.

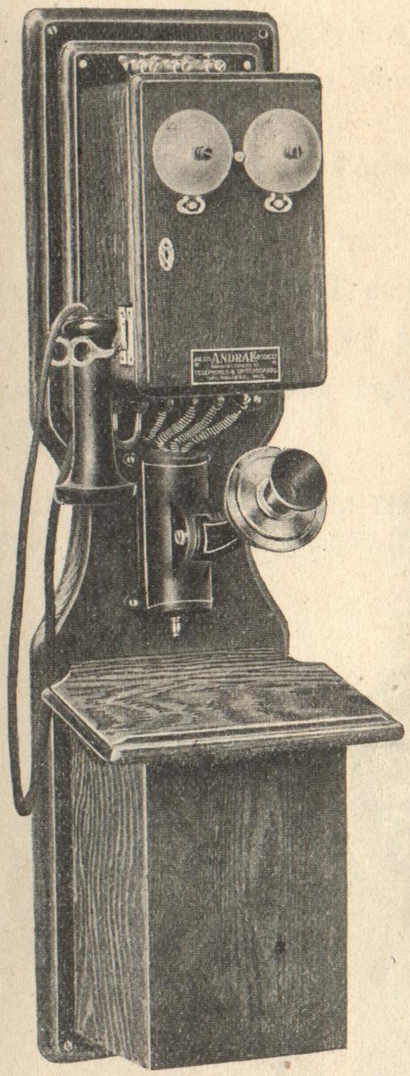
EQUIPMENT.

Oak woodwork, 5-bar 100,000 ohm generator, 1,600 ohm ringer, long distance solid back transmitter, adjustable arm, D solid receiver, silk induction coil, long lever hook switch, platinum contacts, lightning arrester, two cells dry battery.

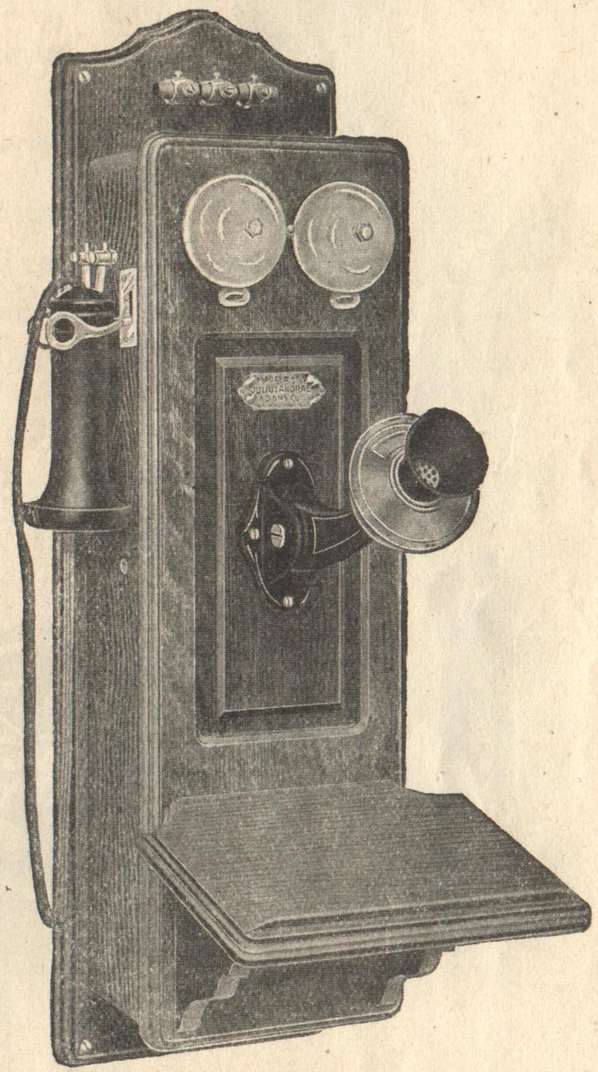
		Ringer Resistance.		
No. 4.	Code word—ABSCONDER.	1,000 ohms.	List Price.....	$23.00
No. 4A.	" —ABSENT.	1,600 "	"	24.00
No. 4B.	" —ABSENCE.	2,000 "	"	25.00
No. 4C.	" —ABSENTLY.	2,500 "	"	26.00

ANDRAE "GIANT" SERIES TELEPHONE.

SINGLE BATTERY BOX TYPE.



COMPACT DRY CELL TYPE.



No. 2 "Giant" Series Telephone. **No. 5 Andrae "Giant" Series Telephone.**

SPECIFICATIONS.

Oak woodwork, 3 bar generator, 80 ohm ringer, long distance solid back transmitter, D long distance receiver, silk induction coil, adjustable transmitter arm, long lever hook switch, platinum contacts, lightning arrester, two cells dry battery.

No. 2.	Code word—ABSCIND.	List Price.....	$17.00
No. 5.	" —ABROAD.	"	$17.00

ANDRAE PORTABLE DESK TELEPHONES.

The Andrae Portable Desk Telephone shown on this page is the most neat appearing, convenient, durable, and reliable instrument that can be produced. As will be noticed in the illustration, it is a self-contained stand. The transmitter stem and hook switch are all mounted together on a steel frame. A sheet iron plate conveniently

ANDRAE PORTABLE DESK TELEPHONES—CONTINUED.

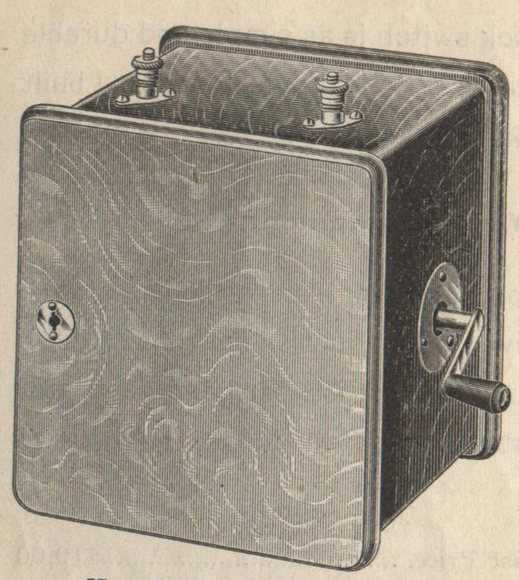
fastened to the base protects the induction coil and connections, which are very substantial. The hook switch is as simple and durable as our long lever type. The pedestal is artistically designed and built of strong brass castings, heavily nickel plated.

No. 7. For Series Work. Equipment.

Stand as shown in illustration, including Andrae long distance solid back transmitter, D solid receiver, silk induction coil, hook switch and terminal block with a 7-foot connecting cord, 3-bar hand generator and 80 ohm extension bell, mounted separately in oak boxes, two cells dry battery.

No. 7.	Code word—ABSOLUTIST.	List Price.....$19.00
No. 7D.	" —ABSOLVABLE.	Desk Standard only, complete, less generator and extension bell.... 12.00

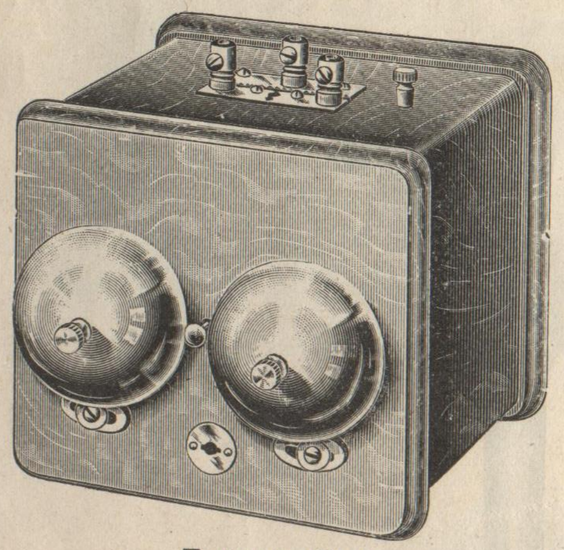
ANDRAE PORTABLE DESK TELEPHONES—CONTINUED.



Hand Generator.

Andrae Portable Series or Bridging Desk Stands are identical, in so far as the standard proper and talking circuit are concerned. They differ, however as to generators and extension bells, each being equipped with these according to their specific requirements. Generators and extension bell shown herewith are finished in oak, designed for service and durability.

No. 8. For Bridging Work. Equipment.

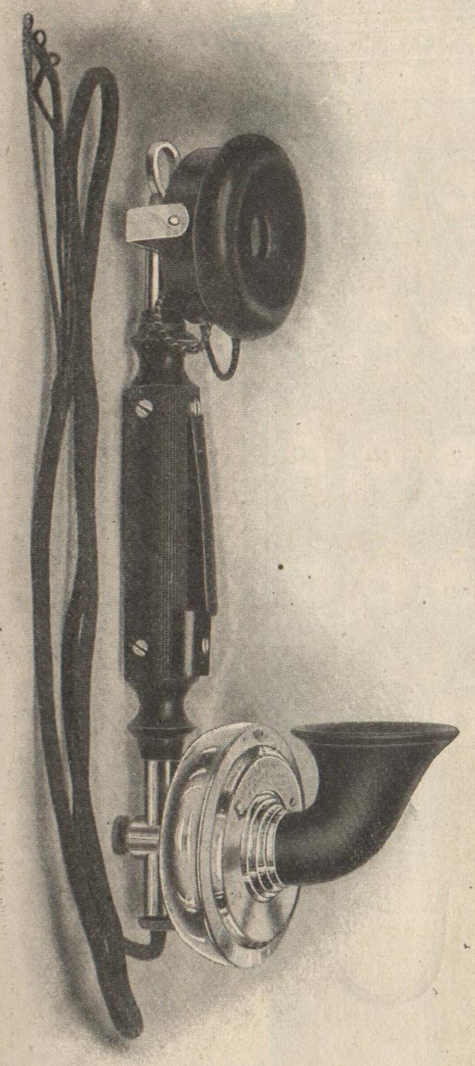


Extension Bell.

Stand, as shown on foregoing page, including Andrae long distance solid back transmitter, D solid receiver, silk induction coil, hook switch and terminal block with a 7 foot connecting cord. The 5-bar 100,000 ohm generator, and 1,600 ohm extension bell, are mounted separately in oak boxes. Two cells dry battery.

		Ringer Resistance.	
No. 8.	Code word—ABSOLUTISTIC.	1,000 ohms.	List Price.....$23.00
No. 8A.	" —ABSOLVE.	1,600 "	" 24.00
No. 8B.	" —ABSOLUTION.	2,000 "	" 25.00
No. 8C.	" —ABSOLUTORY.	2,500 "	" 26 00
No. 8D.	" —ABSOLVER.	Desk Standard only, complete, less generator and extension bell	13.00

ANDRAE HAND MICROTELEPHONE, SERIES AND BRIDGING.



The Hand Microtelephone shown on this page, is generally used in connection with a hand generator and extension bell, as shown on preceding page. It combines our long distance solid back transmitter and solid watch-case receiver. The hook switch is dispensed with, a contact in the microphone replacing same. It is especially desirable, when insufficient space prohibits the use of a desk telephone, as it can easily be attached to the side of a desk. Doctors will also appreciate its use, as it can be used as an extension to the wall telephone and placed within easy reach at night. These instruments are efficient and unexcelled for quality and durability.

Combination No. 16.

For Series Work.

Oak woodwork, 3-bar "Giant" hand generator, 80 ohm extension bell, hand microphone, consisting of Andrae long distance solid back transmitter and solid watch-case receiver, lightning arrester, two cells dry battery.

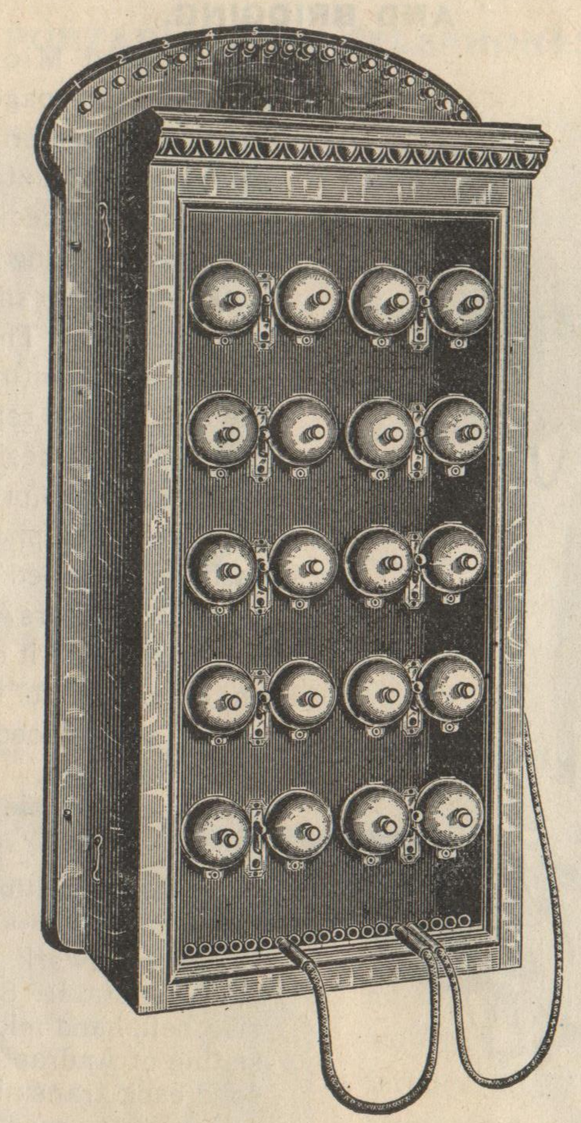
No. 16. Code word—ABSINTHIAN. List Price.....$22.00

Combination No. 17. For Bridging Work.

Oak woodwork, 5-bar 100,000 ohm "Giant" generator, 1,600 ohm ringer, hand microphone, consisting of Andrae long distance solid back transmitter, Andrae solid watch case receiver, lightning arrester, two cells dry battery.

		Ringer Resistance.	
No. 17,	Code word—ABSOLUTE.	1 000 ohms.	List Price.....$25.00
No. 17A.	" —ABSOLUTELY.	1,600 "	" 26.00
No. 17B.	" —ABSOLUTENESS.	2.000 "	" 26.50
No. 17C.	" —ABSOLUTISM.	2 500 "	" 27.00
No. 17H.	" —YANKEE	Hand Microphone only.....	13.00

COUNTRY PARTY LINE SWITCHBOARD.



No. 220.

Our wall cabinet country party line switchboard can be used with either wall or desk telephone. It is provided with two pairs of connecting cords and plugs and an additional cord and plug to be attached to the telephone with which it is used. Made up for any number of lines.

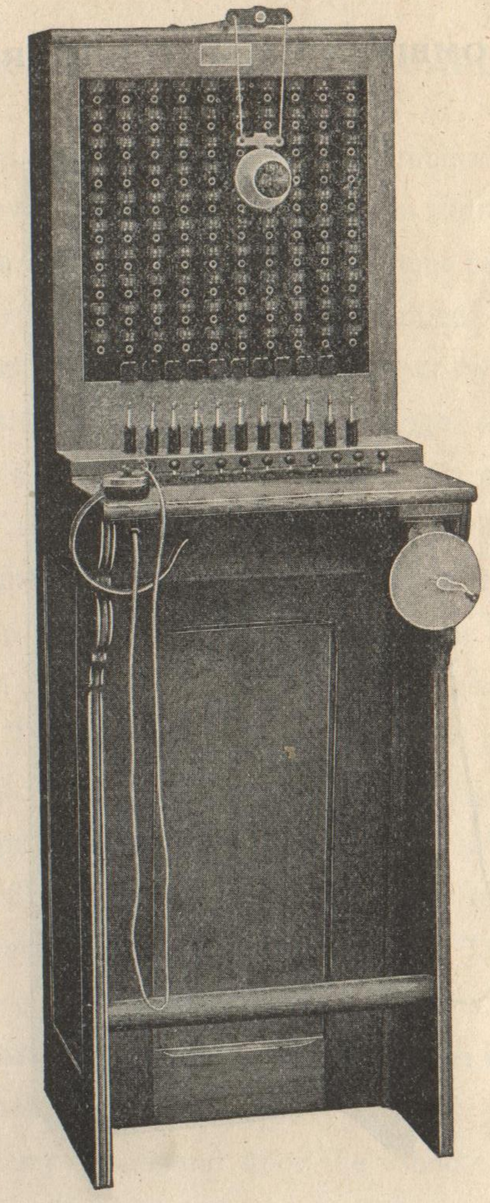
Code word—QUOTING. 10-line wall cabinet only, equipped with one operator's plug and cord, and one pair of connecting plugs and cords. List Price $12.00

For each indicating bell and duplicate jack installed add:

1000 ohms.....	Metallic circuit,	$6.50	Ground circuit,	$5.50
1600 "	"	7.00	"	6.00
2000 "	"	7.00	"	6.50
2500 "	"	8.00	"	7.00
Extra connecting plugs and cords,	" per pr..	4.50	"	3.00

BELL EXPRESS SWITCHBOARD.

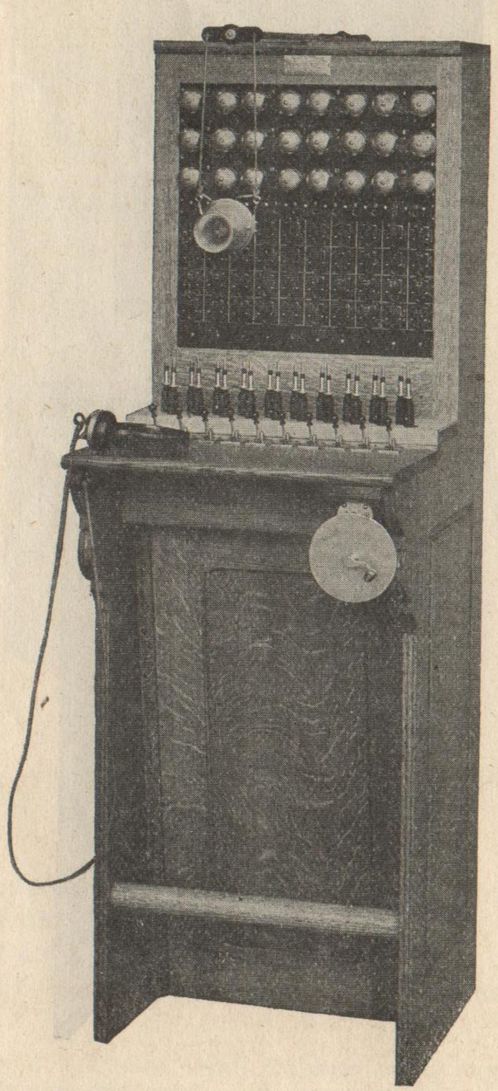
100-DROP CAPACITY CABINET.



The accompanying cut illustrates our 100 capacity switchboard cabinet, fully equipped with 100 Bell express self-restoring drops and jacks.

BELL EXPRESS SWITCHBOARD—CONTINUED.

COMBIN ATION SWITCHBOARD.

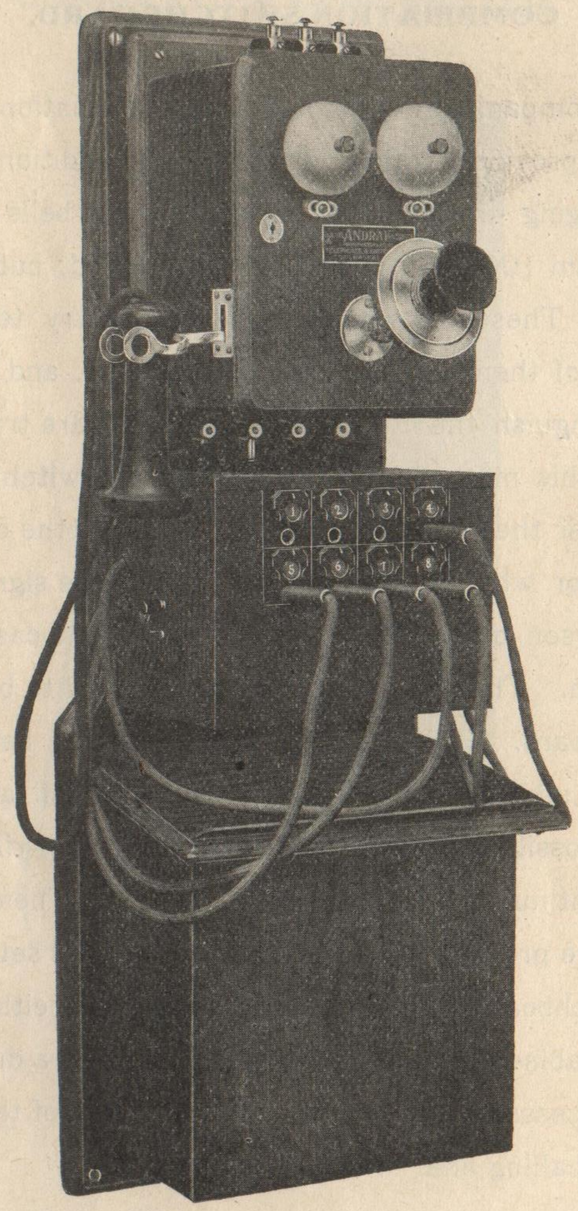


BELL EXPRESS SWITCHBOARD—CONTINUED.

COMBINATION SWITCHBOARD.

The accompaning cut shows our combination switchboard, which may be provided with bridging bells, in addition to the regular series and bridging drops. The ringers of these bells may be wound to anywhere from 1000 to 2000 ohms as specified, but 1600 ohms is recommended. These bells are used for country telephone lines, where several of them enter the same exchange, and where it is desirable to distinguish the number of signals that are transmitted over the line. By this method, the operator at the switchboard may distinguish whether the call is for central, which is the case if one ring only is heard, or whether she is to disregard the signal, it being for some other person of the same line, which is the case if more than one ring is given. Thus an operator does not need to be continuously at the switchboard. For this reason the bridging bells give better service than a night bell, as with only a night bell attached to the drops it is impossible to distinguish the number of rings, unless the operator is continuously at the switchboard. These combination switchboards are provided with a regular operator's set, the same as our other switchboards, and are constructed with either 100 or 200 line capacity cabinets. Each bell is provided with a drop shutter, so that it is unnecessary to depend upon the sound of the bell alone to distinguish the calling line.

COMBINED TELEPHONE AND SWITCHBOARD.



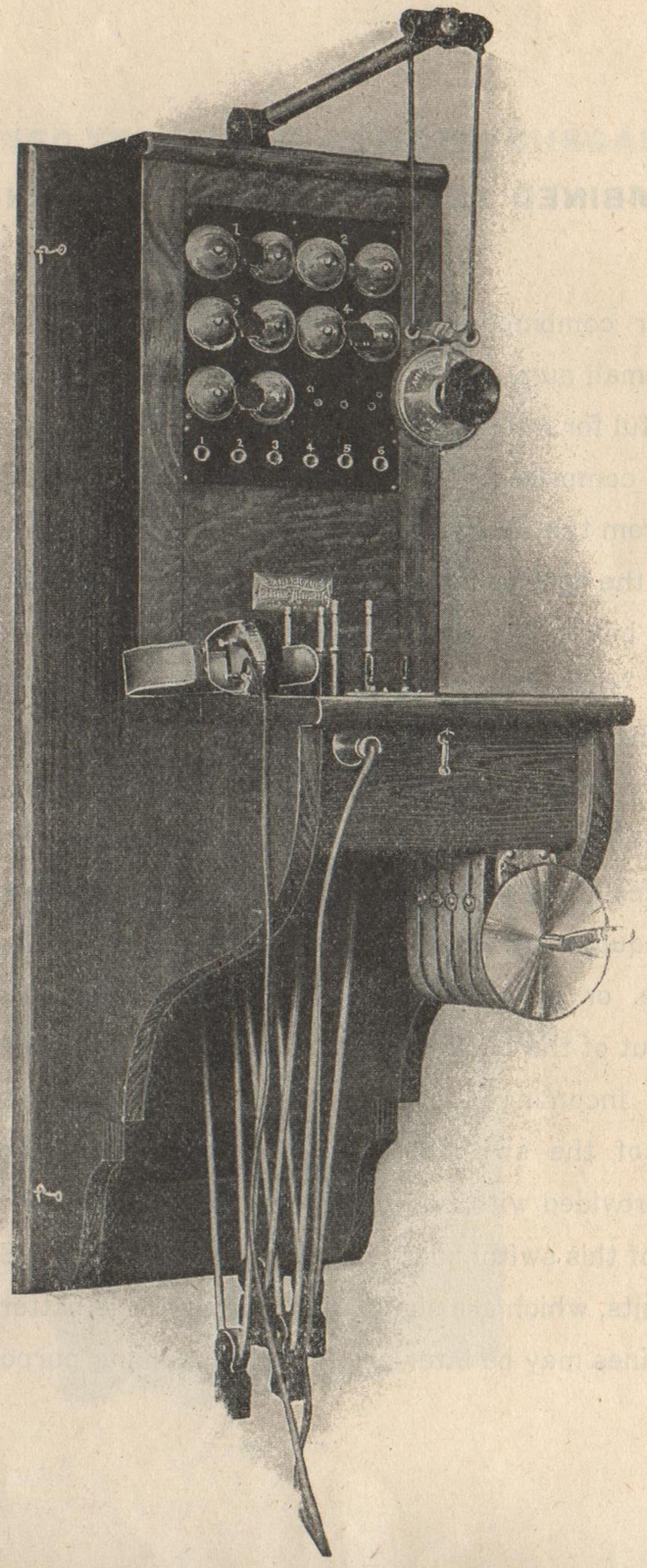
No. 199.

COMBINED TELEPHONE AND SWITCHBOARD.

No. 199.

Our combined telephone and switchboard is of great utility where a small number of lines enter a switching station, and is especially useful for inter-communicating farm lines at a farmhouse. The telephone comprises all of the necessary parts of a telephone, as will be seen from the illustration, and in addition, is provided with cord and plug, the cord being attached to the terminal at the side of the telephone box. The plug is to be inserted in the small jack provided below the "ring-off", or clearing-out drops (not shown in the illustration), so that telephone may be connected with any line when the particular cord circuit attached to the jack is inserted in any subscriber's line jack. The hand generator in the switchboard is of our 5-bar type. The cabinet provided below the transmitter, contains all the subscribers' line equipment, and we can mount 16 of our self-restoring drops and jacks, or our Bell style drops and jacks therein. A cable is brought out of the back of switchboard, and is connected to the terminal for incoming subscribers' lines. This terminal is mounted on the side of the switchboard. The combined telephone and switchboard is provided with two sets of cords, as illustrated. The ultimate capacity of this switchboard is 16 drops and jacks. By means of the cord circuits, which are shown hanging over the battery box, any four entering lines may be inter-connected for talking purposes.

COUNTRY SWITCHBOARDS.



No. 222.

COUNTRY SWITCHBOARDS—CONTINUED.

SMALL EXCHANGE SWITCHBOARDS. No. 222.

To meet the great demand for small switchboards, which are to be placed in some convenient space, where they will be out of the way, we have provided our wall cabinet, as shown herewith, which is equipped with the same high class material as our 100 or 200 line switchboards. The transmitter is adjustably mounted with cord weights, the key shelf is hinged, and everything is similar in construction to our latest type switchboard. The switchboard may be provided with any number of cord circuits up to five. The cabinet is hinged, and is easily opened, so that connection to the rear with line wires may be readily made. The generator is also of our strongest type. The switchboard is capable of accomodating an ultimate of 10 bridging bells or 50 self-restoring Bell Express drops and jacks. Bell style drops and jacks may also be mounted, if desired. The cabinet work is of the very best highly polished oak, so the switchboard makes a neat and finished appearance.

The cut shows bridging bells mounted in place of drops and jacks.

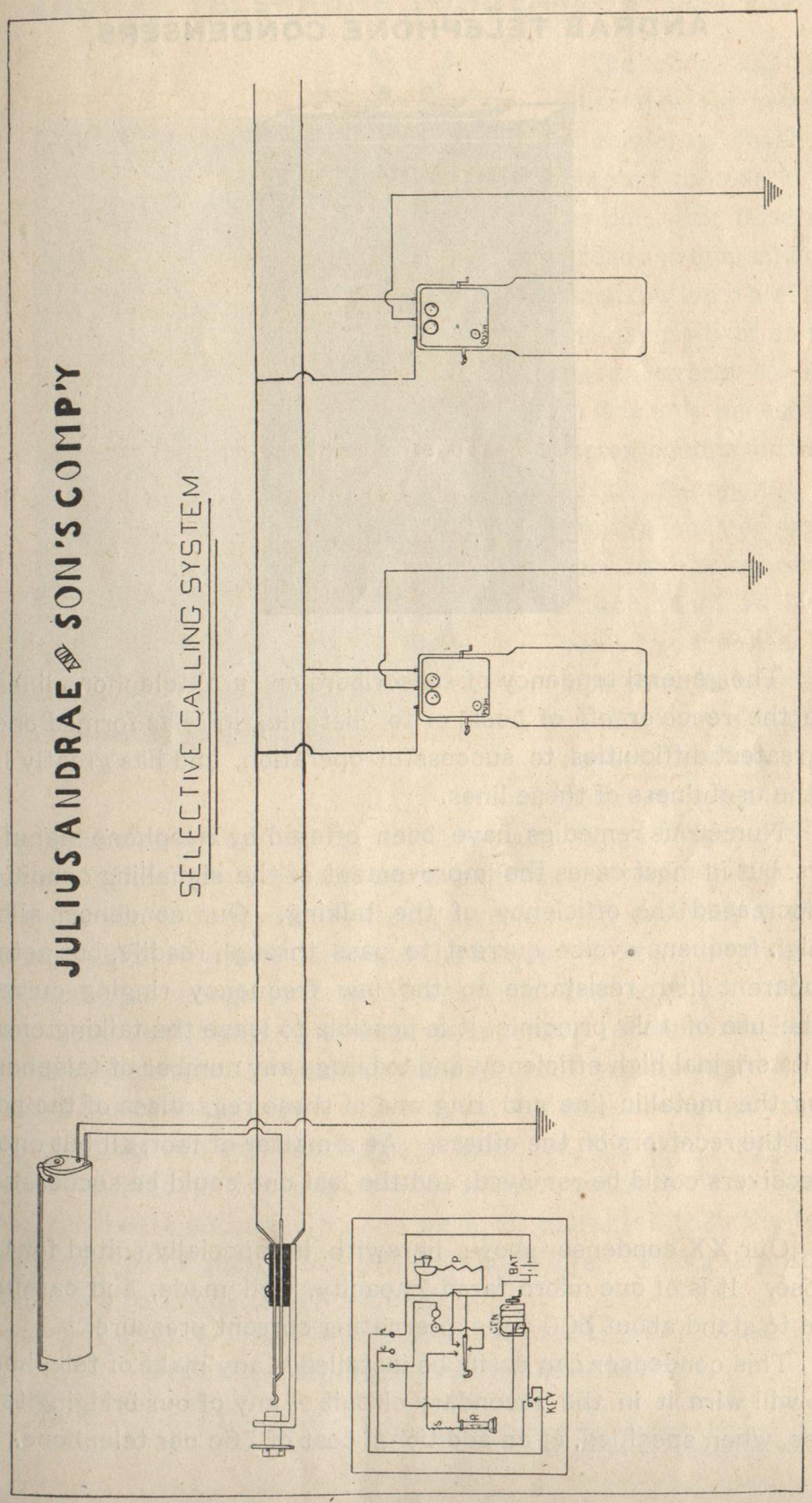
ANDRAE SELECTIVE CALLING BRIDGING TELEPHONE.

WITH GROUNDING DEVICE.

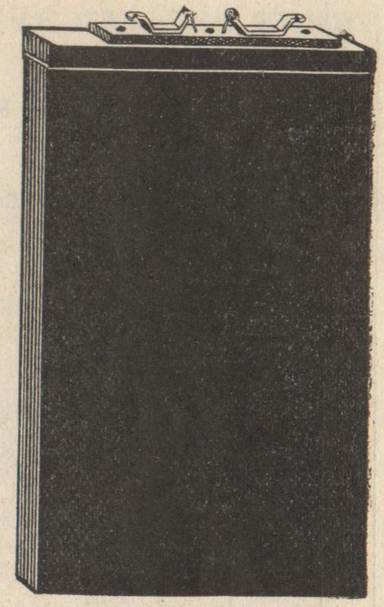
To meet the demand for a telephone that will enable a subscriber to call central without disturbing other parties on the same line, and that will permit subscribers to call each other without throwing the drop at central, we offer our selective calling telephone. It will be noticed that a key has been introduced, so that when pushed, the generator will be connected between the sleeve binding post No. 1 and ground binding post G. When the key is in its normal position, the wiring is the same as for a standard bridging telephone. It is only necessary to connect the line drop at central between the sleeve side of line to ground, in order to fit a circuit for this special service. Then, when the generator is operated at any of the telephones on this line, the drop remains normal, but the other telephones are signaled the same as on any bridging circuit. With the key depressed, the generator will send current from the sleeve side of line through the drop to ground, and thus back to the generator. This will throw the drop but will not ring the bells on the other telephones connected to the same line. The talking circuit of a completed connection through the switchboard is the same as for the best bridging line, as there are no ground connections. The line drop is cut off in the line jack, and the best grade of transmission is assured. (See diagram on opposite page,)

For telephones wired as above, add to price of all Andrae bridging telephones 50 cents net.

Add code word "Quoth" to code word applying to regular bridging telephones, when telephone described above is wanted.



ANDRAE TELEPHONE CONDENSERS.



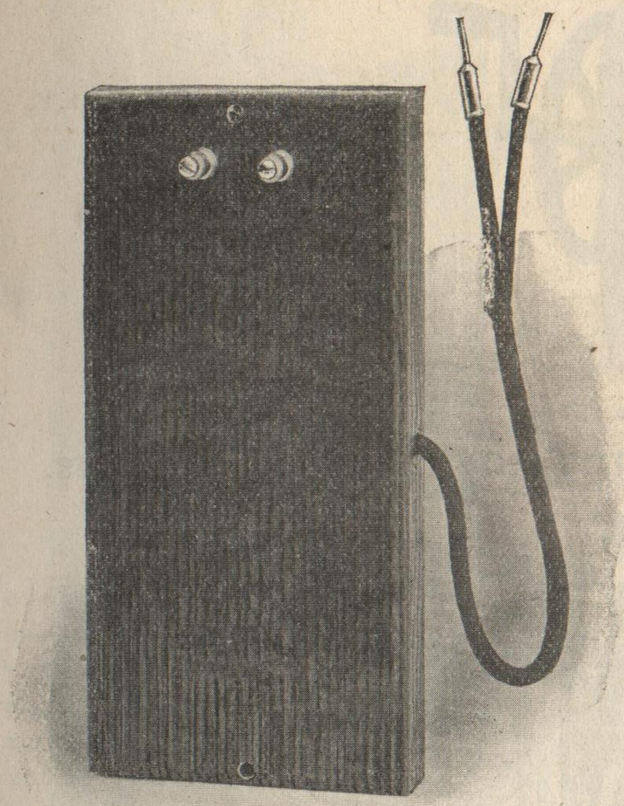
The general tendency of subscribers on rural telephone lines to leave the receiver off of hook, or to "listening in" has formed one of the greatest difficulties to successful operation, and has greatly limited the usefulness of these lines.

Numerous remedies have been offered by telephone manufacturers, but in most cases the improvement of the signalling conditions has decreased the efficiency of the talking. Our condenser allows the high frequency voice current to pass through readily, but acts as an apparent high resistance to the low frequency ringing current. By the use of this principle, it is possible to leave the talking circuit with its original high efficiency, and to bridge any number of telephones across the metallic line and ring one of these regardless of the position of the receivers on the others. As a matter of fact, all but one of the receivers could be removed, and the last one could be successfully rung.

Our XX condenser shown herewith, is especially suited for this purpose. It is of one micro farad capacity, well made, and carefully tested to stand about 300 volts alternating current pressure.

This condenser can easily be installed in any make of telephone, or we will wire it in the secondary circuit of any of our bridging telephones, when specified, at an additional cost of 75c per telephone.

ANDRAE TELEPHONE CONDENSERS—CONTINUED.



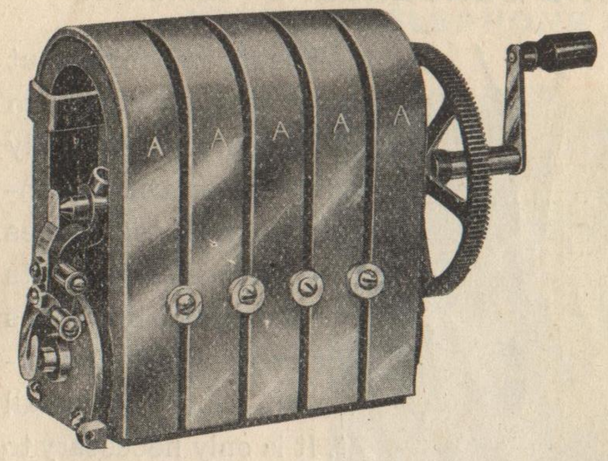
The accompanying cut illustrates our new form of condenser, especially adapted for use in connection with telephones already in operation. Its construction obviates the necessity of employing an expert to install it. It is only necessary to fasten condenser to wall beside telephone; then remove ends of receiver cord from telephone and attach them to binding posts on condenser case, afterward fastening cord coming from side of condenser case to binding posts on telephone formerly occupied by receiver cords. After attaching condenser to telephone, ring up someone on the line, turning crank rapidly; while turning crank, watch your lightning arrester very carefully and see if current sparks from one carbon to the others. If so, you must separate them just enough to prevent sparking, *and no more.* Number 400 carbon block lightning arrester is especially recommended for use with this condenser. If you can transmit your signals perfectly from one end of line to the other, with all your receivers hung up, we guarantee that the two stations farthest apart on the line, may ring one another as well, if not better, with all the receivers off the hook, as when they were all hung up; and we also guarantee that the talking service will be as good, if not better, than before. This guarantee applies only to bridging telephone lines.

Code word—QUACK. List Price.....each, $2.50

STYLE XX CONDENSERS. Illustrated on page 63.

1	—M. F., in tin case. List Price	$1.50
1½	— " " "	1.80
2	— " " "	1.90

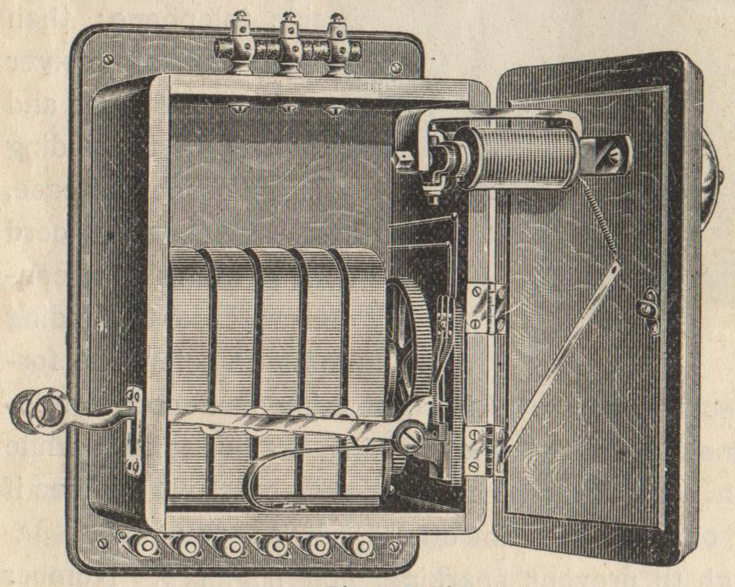
"GIANT" BRIDGING MAGNETO BELLS.



GENERATOR ONLY.

Code Word.
ACTIVELY. 5 magnet rings through 100,000 ohms. List Price..... each, $7.00

BRIDGING MAGNETOS MOUNTED IN OAK BOXES.



Made with 4 and 5 magnet bars. Complete, with long lever hook switch; ringers as indicated, and six binding posts on bottom for receiver, induction coil and batteries. Wired ready for telephone back board.

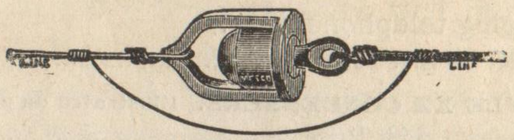
	Ringer Resistance.		4-bar.	5-bar.
Code word—ACONITE.	1000 ohms.	List Price	$10.50	$11.50
" —ACORN.	1600 "	"	11.00	12.50
" —ACOUSTIC.	2000 "	"	13.00	13.50
" —ACOUSTICS.	2500 "	"	14.00	14.50

If hook is not required, deduct 50 cents from net price of bells.

"Giant" generators are mounted in dove-tailed corner, handsomely finished oak or walnut boxes.

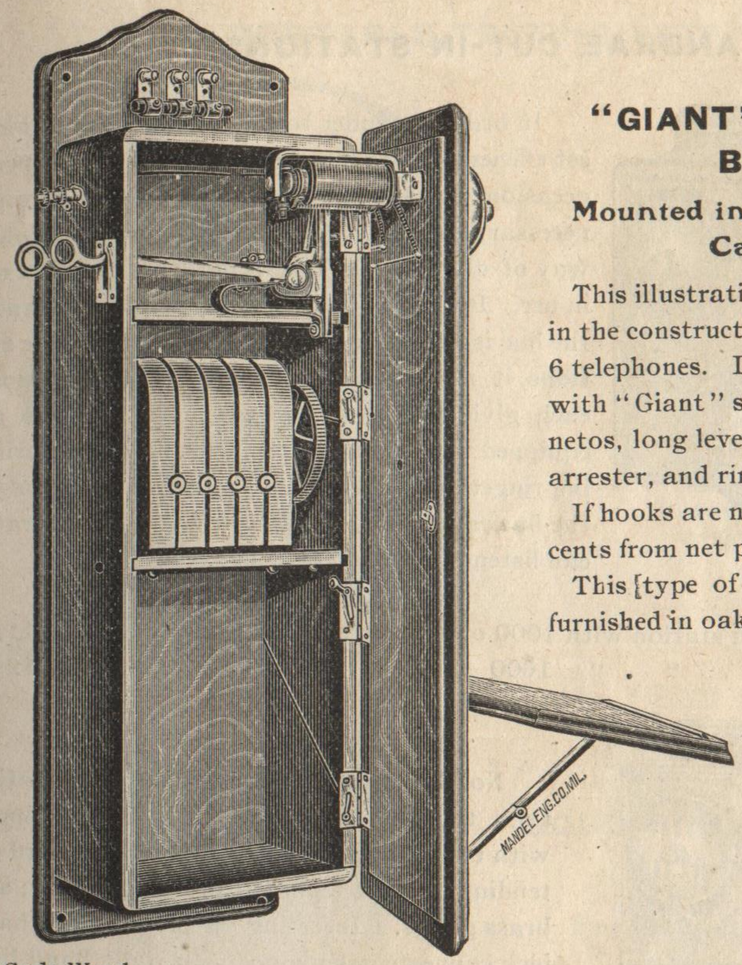
Unless otherwise instructed, we send oak, it being generally used.

ANTI-HUMMER.



A device to prevent humming of telephone or telegraph lines.

Code word—AGENT. Anti-hummer. List Price $0.28



"GIANT" MAGNETO BELLS.

Mounted in Compact Type Cabinets.

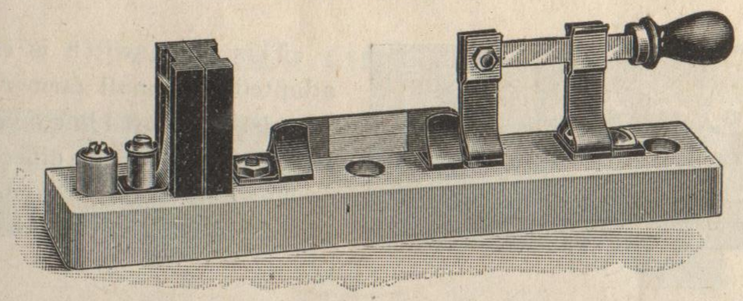
This illustration shows cabinet used in the construction of our Nos. 5 and 6 telephones. It is furnished complete with "Giant" series, or bridging magnetos, long lever hook switch, carbon arrester, and ringer.

If hooks are not wanted, deduct 50 cents from net price.

This type of cabinet is generally furnished in oak.

Code Word.								List Price.
ACQUAINT.	Series,	10,000 ohms,	3	magnet bars,	80	ohm ringers,		$10.00
ACQUIESCE.	Bridging,	50,000 "	4	"	1,000	"	"	12.00
ACQUIRE.	"	50,000 "	4	"	1,600	"	"	12.50
ACQUISITIVE.	"	100,000 "	5	"	1,000	"	"	13.50
ACQUIT.	"	100,000 "	5	"	1,600	"	"	14.00
ACRE.	"	100 000 "	5	"	2,000	"	"	14.50
ACREAGE.	"	100,000 "	5	"	2,500	"	"	15.00

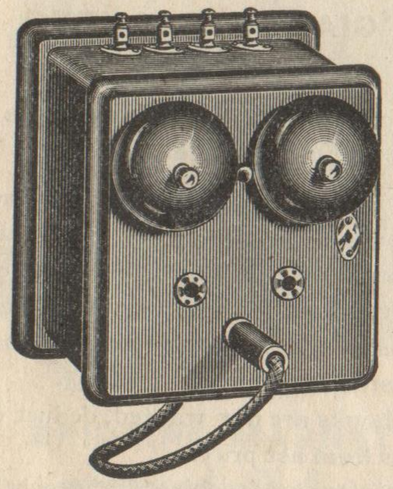
COMBINED SWITCH CUT-OUT, FUSE AND LIGHTNING ARRESTER.



Furnished W. U. or Postal style.

Code word—YAULP.	No. 501. Single pole.	With carbon.	List Price,	$ .80
" —YAWL.	No. 500. Double "	"	"	1.50

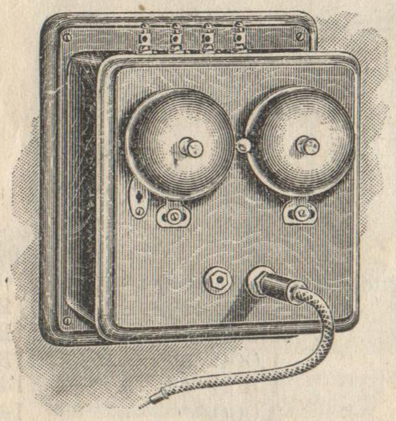
ANDRAE CUT-IN STATIONS.



In order to render toll and rural lines of highest efficiency and reduce the trouble and expense occasioned by intermediate stations, it becomes necessary to have some positive and convenient way of dividing the line, separating the part not in use. By this double service is possible, and if the line is a long one with many intermediate stations, it might be divided into several sections, each giving service. These cut-in stations are equipped with three spring jacks, fuse plug, bridging ringer and brass gong. Either or both ends of the line can be used at same time, or the operator can listen-in on the center jack.

Code Word.

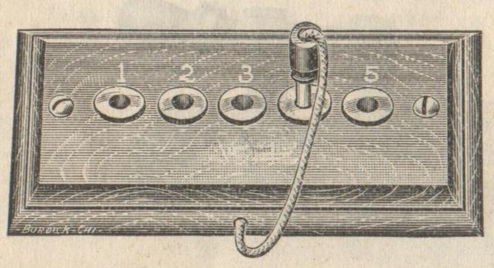
ACCURSE. Cut-in station with 1000 ohm ringers. List Price.....$11.00
ACCUSE. " " " 1600 " " 12.00



No. A261 is a lower priced cut-in station than the one shown above. It is equipped with two spring jacks, one plug and cord extending from telephone, bridging ringer, and brass gongs. Inserting the plug in right hand jack connects telephone with right hand line, and extension bell with left hand line, and vice versa if plug is inserted in left hand jack.

Code word—ZACCHO. 1000 ohm ringers. List Price.....$9.70
" —YOSEMITE. 1600 " " 10.00

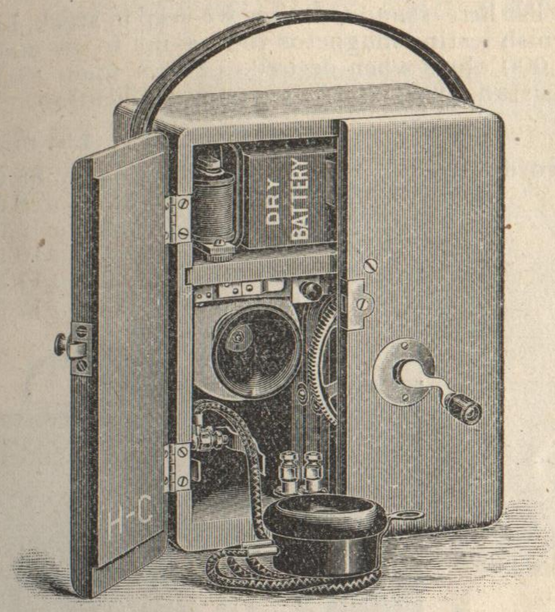
PLUG SWITCH.



This plug switch is especially well adapted for small farmer line switchboards. It is used in connection with extension bells with different sounding gongs or extension bells with indicators. Furnished with any number of lines.

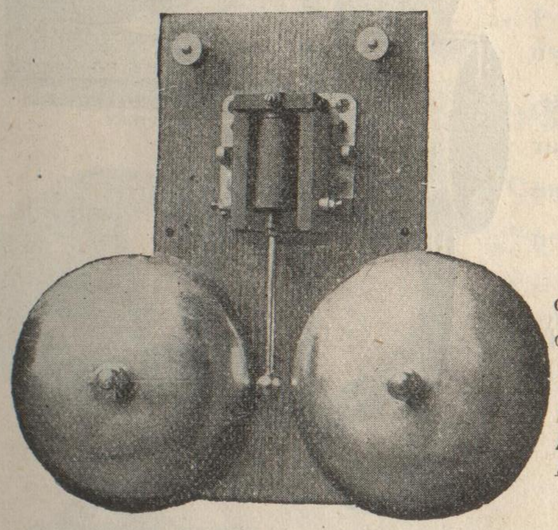
Code word—ZOCCO. 5 lines. List Price.....$3.00
" —ZOCLE. 10 lines. " 5.00
" —YONDER. Cord and Plug. List Price..... 1.00

PORTABLE TESTING SETS.



Code Word. List Price

ADIEU. Testing set complete with 3 magnet generator and 80 ohm ringer.....$25.25
ADIPOSE. Testing set complete with 4 magnet generator and 1000 ohm ringer, 28.25
ZEMINDAR. 5 magnet generator and 1600 ohm ringer..... 30.00



LOUD RINGING EXTENSION GONGS.

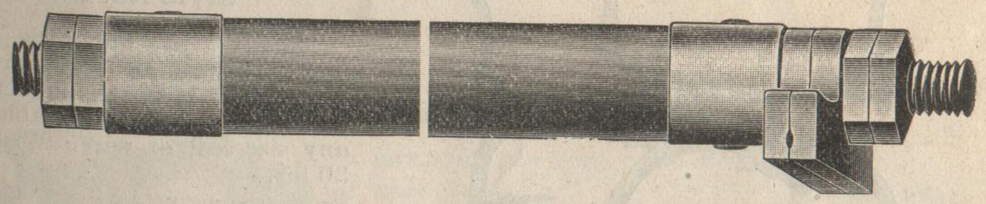
For Telephone Circuits.

STYLE L. R.

These bells can be wound to any required resistance from 80 to 10,000 ohms.

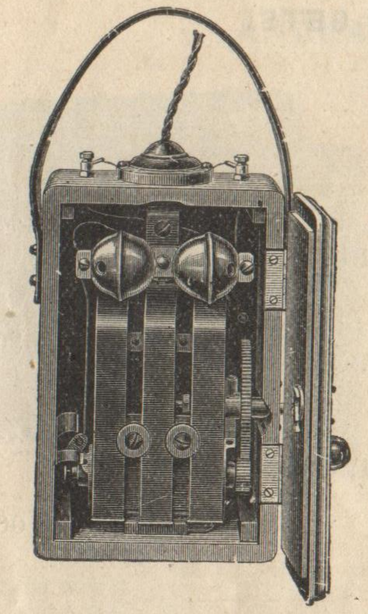
Code Word.	Resistance.	List Price.
ADET.	80 ohms	$9.00
ADJURE.	1000 "	9.50
ADJUST.	1600 "	9.75

TUBULAR LINE FUSES.



These line fuses are made of seasoned wood tubes with mountings of heavy brass. The line fuses are furnished either with oiled or enameled finish.

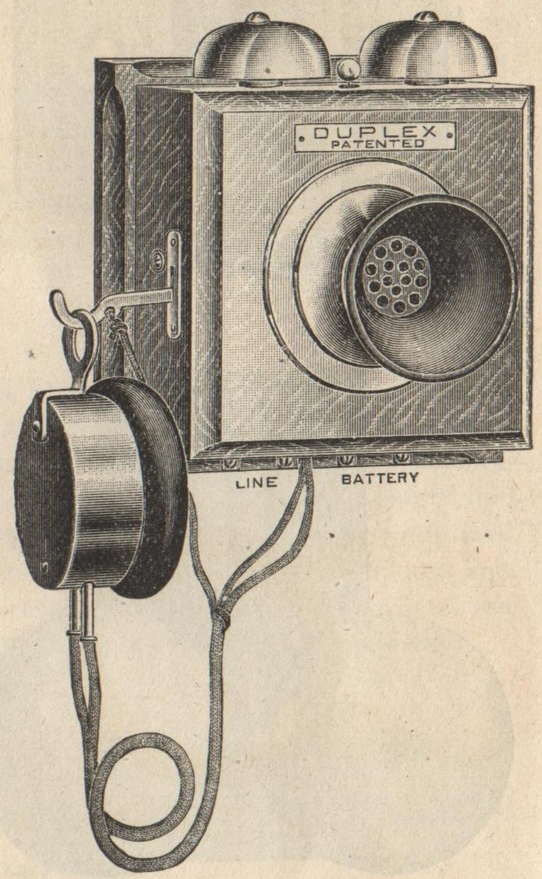
Code word—AFFIANCE. Tubular line fuses. List Price.....$0.15



H.-C. TESTING MAGNETO.

We list here standard sizes we keep in stock, but can furnish testing magnetos to ring up to as much as 125,000 ohms when desired. Prices upon extra high resistance bells will be given on application

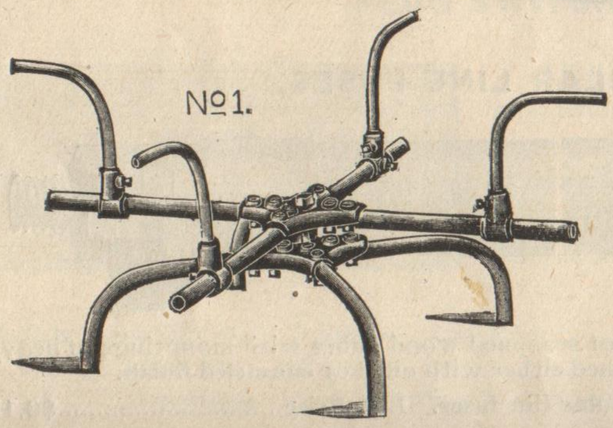
	Ringer Resistance.	List Price.
Code word—ADEPT.	10,000 ohms	$8.00
" —ADEQUATE.	15,000 "	8.50
" —ADFECTED.	25,000 "	9.50
" —ADHERE.	35 000 "	10.50
" —ADHERENT.	40,000 "	11.50
" —ADHESIVE.	50,000 "	12.50



DUPLEX BATTERY TELEPHONE.

Designed for private use between house and barn, offices in buildings, etc. Fully guaranteed to talk as far as any battery telephone made, and as easy to install as a common electric bell.

	List Price Per Pair.
Code word—ACCURATE.	$10.00



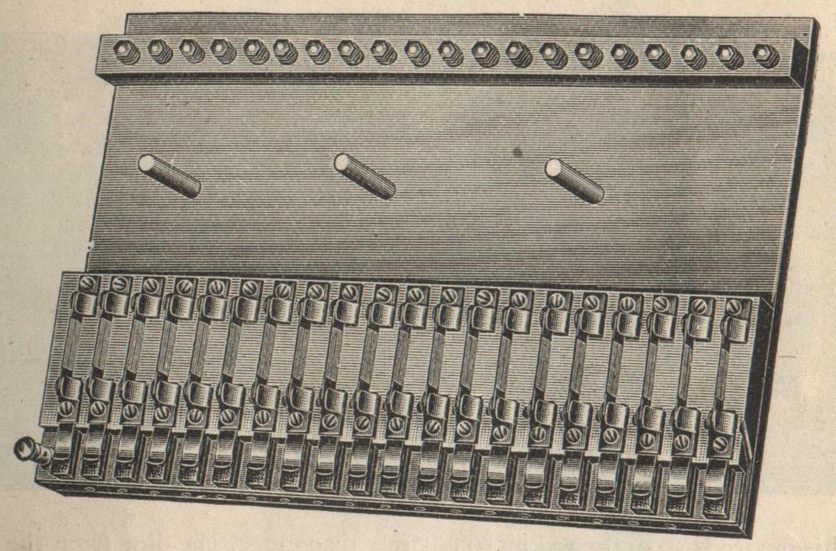
"READY" PAY-OUT REELS.

Style No. 1.

"Ready" pay-out reels are made entirely of iron, interchangeable parts and cone bearings, and are adjustable to any size coil of wire. Weight 30 lbs.

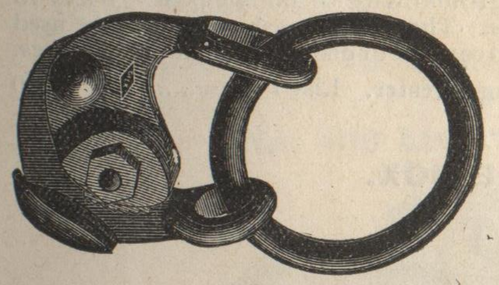
Code word—ARAB.
Style No. 1, plain, for use with heavy wires.
List Price.....each, $4.50

DISTRIBUTING AND PROTECTOR BOARDS.



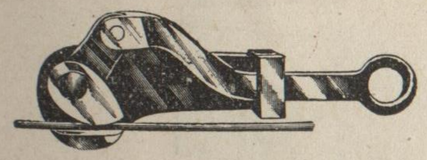
No. 13. Combined protector and distributing board is equipped with fuses and carbon lightning arresters.
Code word—ADUMBRATE. No. 13. List Price.....per line, $0.30

CLAMPS.



Come-Along Eccentric Clamp.

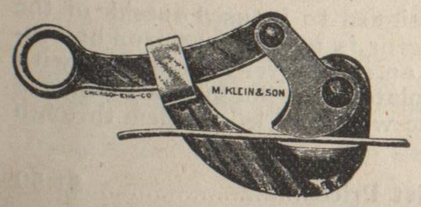
Code Word.	Mfr's No.	List Price.
ANNUL.	126.	Regular size, 9 B. & S. wire and finer, $1.00
ANNULET.	127.	Large size, 3 B. & S. wire and finer..... 2.00
ANODE.	128.	Extra large size, 3-0 B.&S. wire & finer 2.50



Landee's Clamp.

Code Word.	List Price.
ANON.	For No. 8 wire and finer. Each.....$2.50

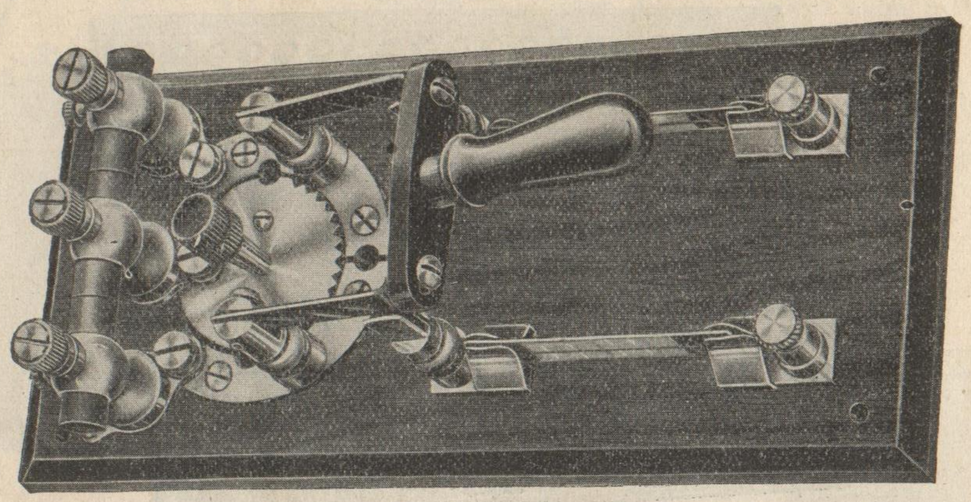
Haven's Patent Steel Eccentric Clamp.



Positive in grip, quick in action and will not injure the wire.

Code Word.	List Price
ANTACID.	For No. 8 B. & S. wire and finer.....$3.00
ANTALGIC.	For from No. 6 B. & S. wire to ½ in. guy cable... 5.50

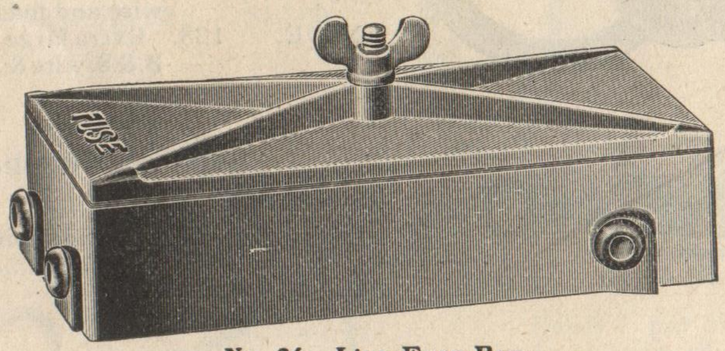
COMBINATION LIGHTNING ARRESTER, GROUND SWITCH FUSE AND LEVER CUT-OUT.



This device is so arranged as to entirely disconnect the line from the instrument, keeping the lightning arrester performing its part, saving the fuse, and at the same time not interfering with the working of other instruments on the same line. On the approach of a thunderstorm throw the switch lever open, which entirely disconnects the line from the instrument. When the switch lever is thus opened, injury to the cut-out or instrument is absolutely prevented. If a series line, the plug should be placed in lower opening or the line circuit will not be included, as is apparent. To cut out either side of circuit on a series line, place plug in opening at right or left, according to which side you wish to cut out. Line wires are connected to outside post, ground wire to middle post. Wires to instrument are connected to the lower post. The middle post on top can be used to connect a line to which you may wish to connect or disconnect at different times.

Code word—AGE. Combination lightning arrester. List Price.....each, $2.00

LINE FUSE BOX.



No. 26. Line Fuse Box.

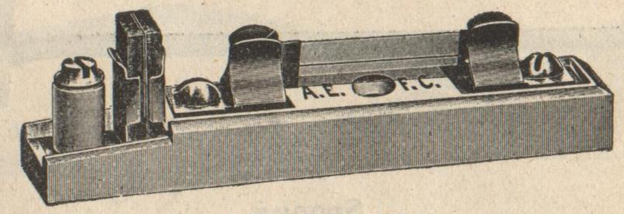
The above cut illustrates a line fuse box, designed to be used outside of the building at the subscribers' station. This protector is made of an iron box enclosing tubular line fuses, and is furnished with an iron cover held in place with thumb screws and made water tight by a rubber plate. The line fuses are clamped into position underneath screw contacts, and the wires are led to them through holes in the side and ends of box.

Code word—AGAIN. No. 26. Line fuse box List Price.....$1.50

LIGHTNING ARRESTERS.

Single Pole Carbon Arrester.

Western Union Style.



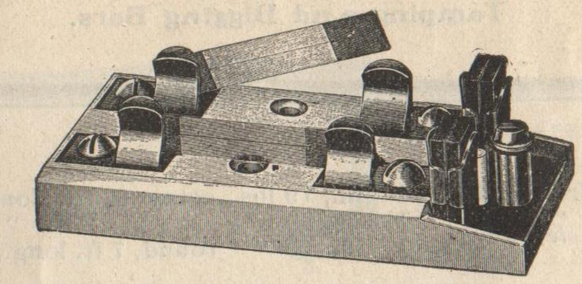
No. 42. Use No. 8 Fuse.

Porcelain base, polished brass mountings, upright carbons.

Code word—AFFIANT. No. 42. Block only. List Price $0.20

Double Pole Carbon Arrester.

Western Union Style.

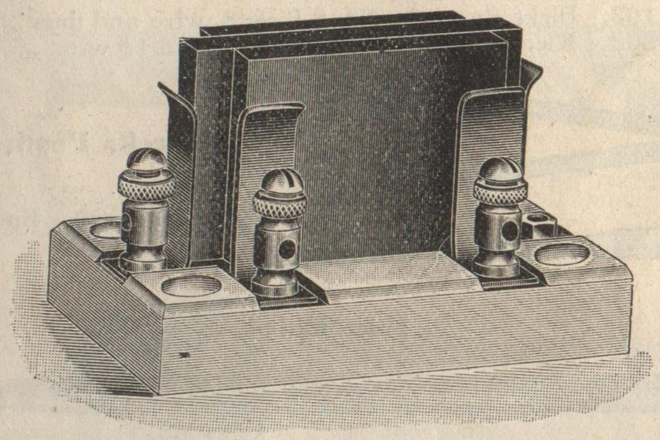


No. 57. Use No. 8 Fuse.

Latest improved standard W. U. style combination double pole porcelain fusible cut-out carbon lightning arrester, with upright carbons.

Code word—AFFLUX. No. 57. Block only. List Price $0.40

No. 400 LIGHTNING ARRESTER.



This arrester is the most popular toll line arrester on the market. It affords a broad carbon surface, and is highly recommended for use on rural and bridging circuits, where it acts not only as a lightning arrester, but as an induction killer.

Code word—AGAVE. No. 400. Double pole arrester. List Price.....$0.40

CONSTRUCTION TOOLS.

Shovels.

Code word—ALACRIFY. Mfr's No. 112. 7 ft. handle. List Price, per doz., $29.00
" —ALANTINE. " 114. 8 ft. " " " " 33.00

Spoons.

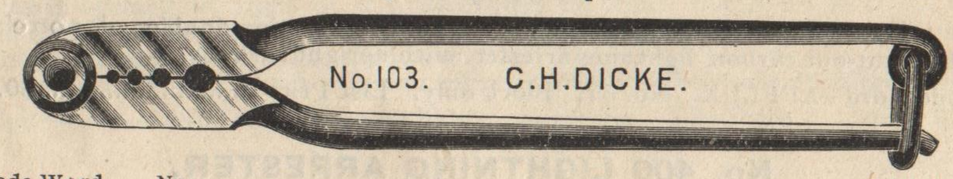
Code word—ALARM. Mfr's No. 116. 7 ft. handle. List Price, per doz., $32 00
" —ALARMIST. " 118. 8 ft. " " " " 35.00

These shovels and spoons are extra strong and made for hard usage.

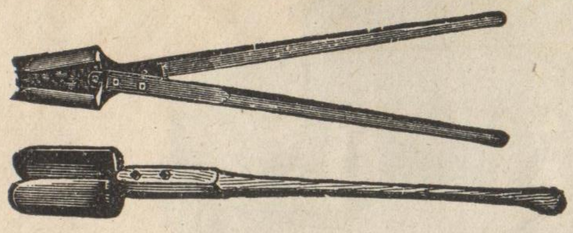
Tamping and Digging Bars.

Code Word.			List Price.
ALBINE.	Mfr's No. 140.	1 in., 19 lbs., octagon, 7 ft. long.....each,	$4.00
ALBION.	" 141.	1⅛ in., 30 " " 8 ft. " ..... "	4.50
ALBOLITH.	" 142.	1 in., 19 " round, 7 ft. long..... "	3.50

Splicing Clamp.



Code Word.	No.		List Price.
ALLOXAN.	103.	Dicke clamp for No. 8 B. & S. wire and finer.....each,	$3.20
ALLAY.	302.	Klein " Nos. 8, 10, 12 and 14 wire..... "	3.20



Eureka Posthole Digger.

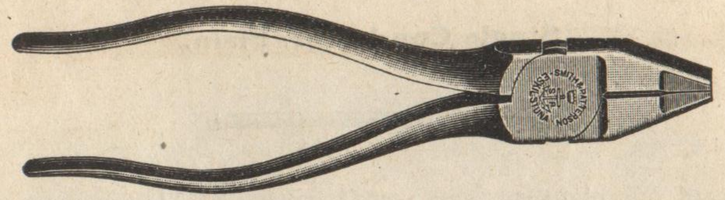
Code Word.		List Price.
ALBATROSS.	Each.....	$1.50

Pike Poles.

Code word—ALCEDO.	Mfr's No. 170.	10 ft.	List Price	.....	each,	$1.20
" —ALCHEMY.	" 170.	12 ft.	"	.....	"	1.30
" —ALCHEMIST.	" 170.	14 ft.	"	.....	"	1.30
" —ALCOHOL.	" 170.	16 ft.	"	.....	"	1.40
" —ALCORAN.	" 170.	18 ft.	"	.....	"	1.70
" —ALCOVE.	" 170.	20 ft.	"	.....	"	2.00

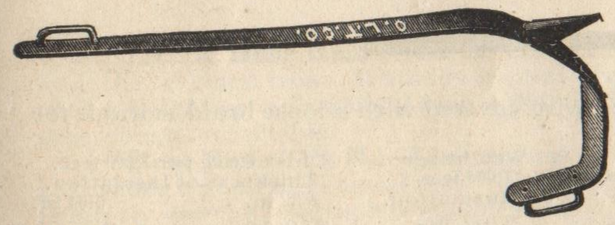
PLIERS.

Swedish Side Cutting Pliers.



We carry all steel pliers in stock regularly in Vom Cleff, Swedish and P.S.&W. makes.

Code Word.			List Price.	Code Word.		List Price
ALIENATE.	4 in., plain.	Each..	$0.80	ALIFORM.	Nickeled.	Each..$1.40
ALIENE.	5 "	" ..	.80	ALIGHT.	"	" .. 1.40
ALIENISM.	6 "	" ..	1.00	ALIGN.	"	" .. 1.70
ALIENIST.	7 "	" ..	1.40	ALIKE.	"	" .. 2.00
ALIFEROUS.	8 "	" ..	1.80	AILMENT.	"	" .. 2.50



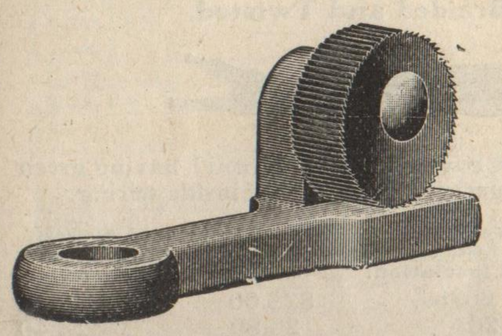
Eastern Climbers.

Klein's, Dicke's and Swedish "Sure Grip."

Code Word.			List Price.
ALGID.	No. 381.	Klein's Eastern, with riveted strap loops...per pair,	$4.00
ALGOR.	No. 382.	" " " punched " "	3.60
ALGUAZIL.	No. 110.	Dicke's " " riveted " "	2.70
ALIBI.	Jones' removable spur climbers.....	"	5.00
ALIEN.	Straps for all climbers.....per set of 4,		1.50

Steel Splicing Wrench.

Code word—APT.	No. 321.	For Nos. 4 and 6 B. & S.	List Price,	$1.70
" —APTLY.	No. 322.	" 8 " 9 "	"	1.70
" —APTNESS.	No. 323.	" 10 " 12 "	"	1.70



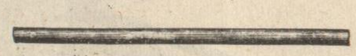
"HOLD FAST" WIRE GRIP.

It readily takes the place of the more expensive wire grips. It will take wire from Nos. 2 to 13 B. & S. gauge.

Code Word.		List Price.
YELP.	Each.....	$0.50

RUBBER COVERED TELEPHONE WIRE.

Single Conductor, Plain.



Consists of one plain rubber covered wire, suitable for cross connecting, inside wiring, etc,

		B. & S. Gauge.	Weight per 1,000 feet. 3-32 Insulation.	List Price per 1,000 feet. Thickness of Insulation. 3-32 in.	5-64 in.
Code word.	ATOP.	No. 18.	11½ lbs.	$8 50	$.....
"	ATRIUM.	No. 19.	10½ "	7.90	6.50
"	ATROCIOUS.	No. 20.	9 "	7.50	5.90
"	ATROPHY.	No. 22.	7½ "	6.50	5.00

Single Conductor. Braided.

Consists of one rubber covered wire, covered with a loose braid, suitable for cross-connecting, inside wiring, ete.

		B. & S. Gauge.	Weight per 1,000 feet. 3-32 Insulation.	List Price per 1,000 feet. Thickness of Insulation. 3-32 in.	5-64 in.
Code word.	ATROPIA.	No. 18.	12½ lbs.	$12.50	$.....
"	ATTACH.	No. 19.	11½ "	11.90	10 50
"	ATTACHE.	No. 20.	9½ "	11.50	9.90

Double Conductor, Plain, Twisted.

Consists of two plain rubber covered wires, one conductor red and one white, twisted together.

		B. & S. Gauge.	Weight per 1,000 feet. 3-32 Insulation.	List Price per 1,000 feet. Thickness of Insulation. 3-32 in.	5-64 in
Code word.	ATTAIN.	No. 18.	25 lbs.	$28.00	$.....
"	ATTAINT,	No. 19.	22½ "	26.80	23.40
"	ATTEND.	No. 20.	20 "	26.00	22.20

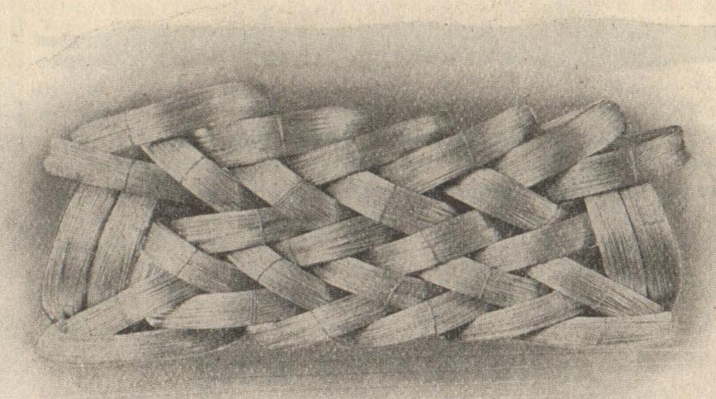
Double Conductor, Braided and Twisted.

Consists of two rubber covered wires, covered with oak braid, having green or red tracing thread, and then twisted together. Suitable for inside wiring.

		B & S. Gauge.	Weight per 1,000 feet. 3-32 Insulation.	List Price per 1,000 feet. Thickness of Insulation. 3-32 in.	5-64 in.
Code word.	ATTEMPT.	No. 18.	26 lbs.	$28.00	$.....
"	ATTEMPER.	No. 19.	23 "	26.80	23.40

DOUBLE GALV. TELEPHONE AND TELEGRAPH WIRE.

High Grade.



"Extra Best Best" (E. B. B.)—Made by improved continuous process from the very best iron. It stands highest of any telegraph wire in conductivity, with a weight per mile ohm of from 4,600 to 5,100 pounds. Uniform in quality, pure, tough and pliable.

"Best Best" (B. B.)—Less uniform and tough than the above mentioned, but stands a good mechanical test. Weight per mile ohm, 5,500 to 5,800 pounds. Is largely used by telegraph companies and in railway telegraph service.

"Steel" (or homogeneous metal), more expressly designed for short line telephone service, where a measure of conducitivity can be exchanged for tensile strength in a light wire. Weight per mile ohm, 6,000 to 7,000 pounds.

Sold only in full coils. No. 4 B. W. G. put up in ¼ mile coils; No. 6 in ⅓ mile coils; 8 to 14 in ¼ mile coils.

W. & M. EXTRA B. B. IRON.

Code word.	Size, B. W. G.	Weight in lbs. per mile.	Avera'e resist-ance in ohms, per mile.	List Price, Per lb.
ASLOPE	4	730	6.35	Prices.
ASP	6	540	8.62	
ASPARAGUS	8	380	11.97	
ASPECT	9	320	14.26	
ASPEN	10	260	17.02	
ASPERATE	12	165	28.30	
ASPERITY	14	96	48.10	
W. & M. B. B. IRON.				
ASPERSE	4	730	7 53	Market
ASPERSION	6	540	10.19	
ASPHALT	8	380	14.47	
ASPHALTIC	9	320	17.19	
ASPHODEL	10	260	21.15	
ASPHYXIA	12	165	33.33	
ASPIRE	14	96	57.29	
W. & M. STEEL SPECIAL.				
ASPIRANT	4	730	8.90	Lowest
ASPIRER	6	540	12.04	
ASPIRATE	8	380	17.10	
ASQUINT	9	320	20 31	
ASSAGAI	10	260	25.00	
ASSAIL	12	165	39.39	
ASSASSIN	14	96	67.71	

RUBBER COVERED TELEPHONE WIRE.

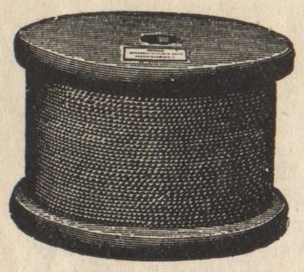
Twisted and Braided.

Consists of two plain rubber covered wires; one conductor red and one conductor black twisted together, and covered over outside with a black saturated braid. Suitable for outside or inside wiring.

	B. & S. Gauge.	Weight per 1,000 feet 3-32 Insulation.	List Price per 1,000 feet, Thickness of Insulation, 3-32 in.	5 64 in.
Code word. ATTEST.	No. 19.	24 lbs.	$24.80	$21.40

ANNUNCIATOR WIRE.

Has covering consisting of two wraps cotton saturated with paraffine. Made in various colors.



Code Word.	No. B. & S.	Feet, per pound.	List Price, per pound.
ATTORNEY.	14	70	$0 50
ATTOLLENT.	16	105	.50
ATTRACT.	18	165	.50
ATTRACTION.	20	225	.50
ATTRACTOR.	22	320	.50

OFFICE WIRE.

Single or Double Conductor.

Double braided, waxed and parafined, highly finished. Put up in coils.

		No. ft. per lb.	List Price.
Code word—AUGITE	No. 16 Single, B. & S. gauge,	83	Per lb.....$0.30
" —AUGMENT.	No. 18 " " "	111	" ..... .30
" —YAWN.	No. 16 Double, " "	55	" ..... .30
" —YAWS.	No. 18 " " "	81	" ..... .30

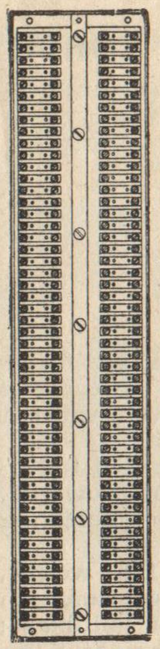
WEATHERPROOF COPPER WIRE.

		Wt. per 1000 ft.	
Code word—ASSEMBLY.	No. 14 B. & S. Gauge,	24	List Price...per lb., $0.30
" —ASSENT.	No. 16 " "	17	" ... " .30
" —ASSENTER.	No. 18 " "	13	" ... " .30

WEATHERPROOF INSULATED IRON WIRE.

A soft iron wire, insulated with weatherproof insulation, two or three braid, for use where lines run through trees, prevents possibility of grounded wires. Put up and sold only in half mile coils.

	B. W. gauge.	Approx. wt. per mile. Double Braid.	Triple Braid.	List Price, per mile. Double Braid.	Triple Braid.
Code word—ASSERT.	No. 10.	330 lbs.	375 lbs.	$30.00	$32.00
" —ASSESS.	No. 12.	250 "	285 "	20.00	22.00
" —ASSETS.	No. 14.	150 "	170 "	15.00	17.00



CABLE DISTRIBUTING BOARDS.

These are suitable for use in any ordinary pole box, or may be placed on the walls of an exchange or elsewhere, as may be desired.

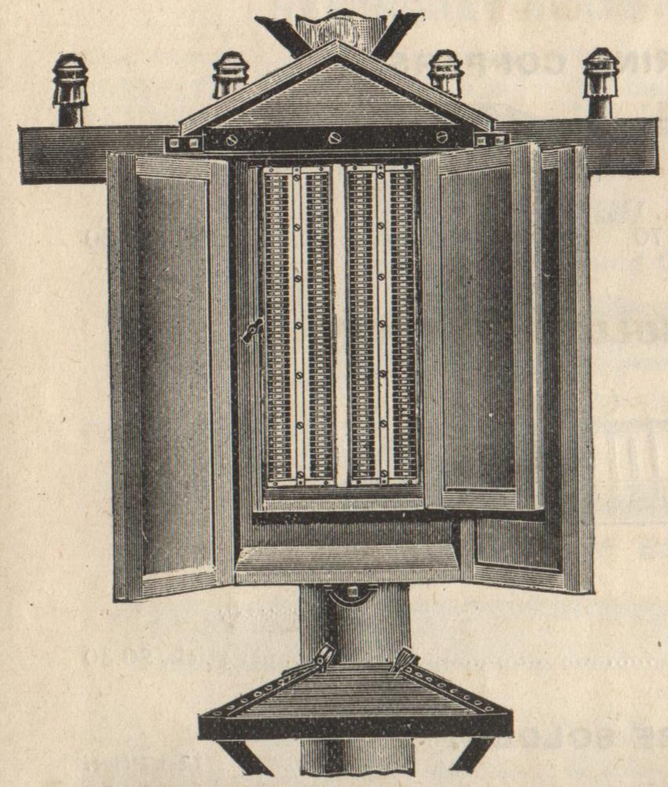
The base is of seasoned wood, mounting brass connection plates and a brass ground strip for lightning protection. The brass plates are provided with two screws each, and each screw with a washer. The table connection is made to the outer screws. These joints, should, of course, be soldered permanently. The fuse connects the two inner ends of the brass plates, and affords lightning protection. The jumper wires are to be attached to the outside screws on the other side. These connections are also to be soldered. These boards can be used for metallic, ground or common return circuits. The board is one of the most compact, convenient and economical made. They are easily connected up, and the saving of time in this matter should be taken into account.

ORDER BY CONDUCTORS. Do not say "lines," as this may mean one or two conductors for the service, may be grounded, common return or metallic. "Fifty conductors," or "twenty-five pairs," permits of no error in shipment. Two panels generally go in one box.

Code Word.		Size.	Weight.	
ADORABLE.	25 conductors.	4⅜x12 in.	4 lbs.	List Price..... $ 2.50
ADORABLY.	50 "	4⅜x21½ in.	7½ lbs.	" 5 00
ADORATION.	75 "	4⅜x31 in.	12 lbs.	" 7.50
YONNE.	100 "	4⅜x40½ in.	15 lbs.	" 10.00

Above prices include fuses from ¼ to 3 amperes

CABLE POLE HOUSES.



Pole House No. 1.

POLE HOUSE, No. 1.

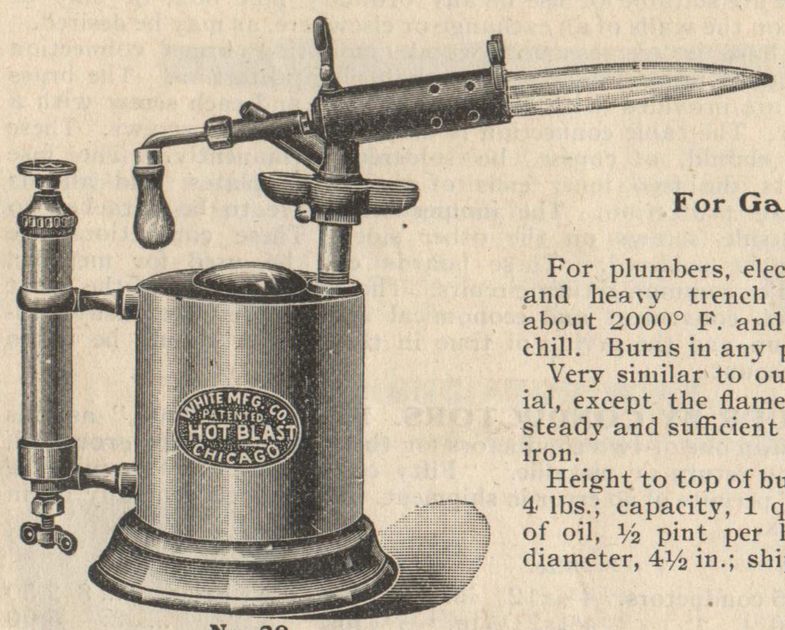
These pole houses are dry. They are made of clear cypress, painted white outside, with black P. & B. insulating paint on the inside. They are furnished with all the necessary irons to fastening to cross arm and pole. There are two compartments, both provided with doors; the outer doors are not paneled, but are provided with strapped hinges which reach almost across their front. This adds very materially to the strength, and prevents warping.

The houses are absolutely weatherproof, the only opening being at the bottom where the cable and jumper wires enter. These openings are usually made water-tight after the wires and cables are installed. Prices do not include distributing panels.

Code Word.	Pairs.	Conduct'rs	Wt. Cr'td Lbs.	List Price.
ADO.	25 or	50	55	$10.00
ADOBE.	50 or	100	70	12.00
ADOPT.	75 or	150	77	13.00
ADOPTER.	100 or	200	89	14.00

No. 29. KING COMBINATION "HOT BLAST" TORCH

Trade Mark



No. 29.

For Gasoline.

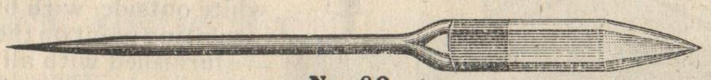
For plumbers, electricians, gas fitters and heavy trench work. Generates about 2000° F. and positively will not chill. Burns in any position.

Very similar to our celebrated Imperial, except the flame is more powerful, steady and sufficient to heat a soldering iron.

Height to top of burner, 11 in.; weight, 4 lbs.; capacity, 1 quart; consumption of oil, ½ pint per hour at full blast; diameter, 4½ in.; shipping weight, 6 lbs.

Code word—ARRET. No. 29. As shown in cut. List Price.....each, $4.00
" —ARRIS. No. 30. Same without soldering iron attachments.
List Price.....each, 3.50

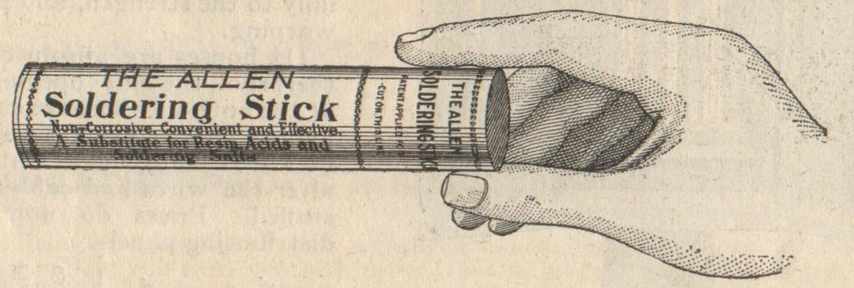
SOLDERING COPPERS.



No. 80.

For all purposes. Pointed 1, 1½, 2, 3, 4, 5, 6, 8.
Any size.....per lb., $0.70 Wood handles.....each, $0.20

ALLEN'S SOLDERING STICK.



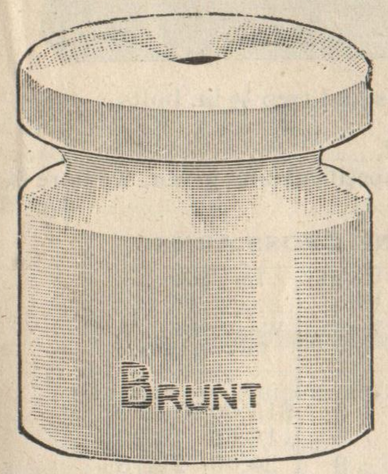
Code word—BARELY. List Price.....per stick, $0.30

WIRE SOLDER.

Code Word.		List Price.
BACK.	No. 10 gauge. Per lb.....	$0.50

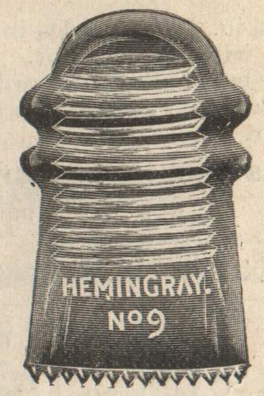
PORCELAIN KNOBS.

Standard No. 4½.



GLASS INSULATORS.

No. 9. Pony Insulator.



Double Groove Pony Insulator.

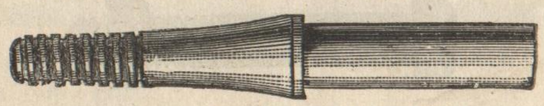
Code Word.	Std. No.	Height.	Diam.	Hole.	Groove.	Std. Pkg.	List Price. per 1000.
BELIGN.	4.	1 11/16 in.	1½ in.	⅜ in.	⅜ in.	2000	$12.50
BENCHER.	4½.	1⅞ in.	1½ in.	⅜ in.	7/16 in.	2000	14.00
BEND.	5.	1¼ in.	1 in.	1¼ in.	5/16 in.	5000	9.00
BENT.	5½.	1 9/16 in.	1 in.	¼ in.	5/16 in.	5000	10.00
BEMOAN.	6	⅞ in.	13/16 in.	7/32 in.	¼ in.	5000	10.68
BENCH.	8	15/16 in.	1 in.	¼ in.	5/16 in.	5000	10.68

HEMINGRAY GLASS INSULATORS.

Code Word.	No.	Wt. each.	Wt. per 1000.	Bbl. contains.	List Price.
BENEFIT.	9.	10 oz	725 lbs.	400	Per 1000.....$50.00
BENGOLA.	11 & 12.	10⅔ oz.	750 "	400	" 50.00

PINS.

Standard Painted Oak Pins.



	Size.	Sack contains.	Wt.	List Price.
Code word—BARYTES.	1¼x8 in.	250	260 lbs.	Per 1000.....$15.00
" —BARYTIC.	1½x9 in.	200	350 "	" 18.00

CROSS-ARM BRACES.

Code Word.	Dimensions, inches.	Weight, per 1000.	List Price, plain, 1000.	Code Word.	Weight, per 1000.	List Price galv. 1000.
BEAN.	1 x3/16x20	980 lbs.	$32.50	BEASTLY.	1080 lbs.	$45.00
BEARER.	1 x7/32x24	1600 lbs.	53.50	BEAT.	1675 lbs.	70.00

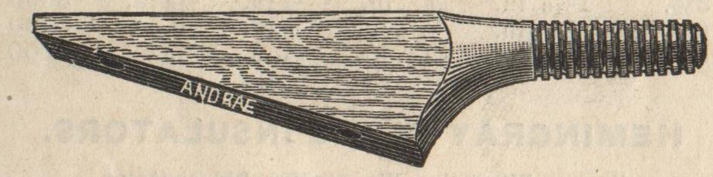
STANDARD TELEPHONE CROSS-ARMS.

Finished size 2¾x3¾ in., bored for 1¼ in. pins and two ½ in. bolts.
Painted thoroughly with red oil paint.
We never bore brace bolt holes unless ordered.
When brace bolt holes are ordered and no specifications given, we bore ⅜ in. holes 14 in. from center.

PRICE LIST STANDARD TELEPHONE CROSS-ARMS.

No. Pins.	Le'gth In.	Spacing. End, In.	Spacing. C'nter, In.	Spacing. Side, In.	Approx. each, lbs. L. L. Y. Pine.	Approx. each, lbs. Wash. Fir.	List Price, per 100. Wash. Fir.	List Price, per 100. L. L. Y. Pine.
2	24	4	16	...	6	5	$15 00	$13.00
2	30	4	22	...	7	6	18.00	16.25
4	42	4	14	10	10	9	24.00	22.75
6	62	4	14	10	16	13	36.00	33.59

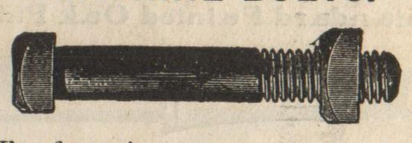
OAK BRACKETS.



Made from selected live oak, painted two coats mineral paint.

Code Word.		Size.	Wt. per 100.	List Price.
BASIS.	Standard.	2 x12 in.	70 lbs.	Per 1000.....$25.00

MACHINE BOLTS.



For fastening cross arms to poles.

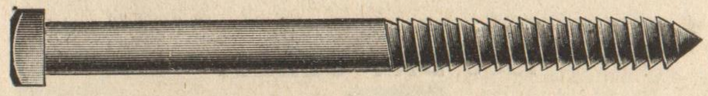
Length.	Diameter.	Price per 100.
7 inch.....	½ inch	$6.46
7½ inch.....	½ inch	6.72
8 inch.....	½ inch	6.98
9 inch.....	½ inch	7.50

COMMON CARRIAGE BOLTS.

For fastening cross arm braces to cross arms.

3¼ inch.....	⅜ inch	2.16

GIMLET POINT LAG SCREWS.



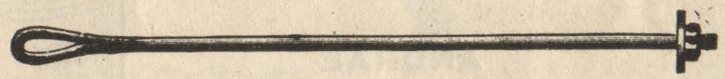
For fastening braces to pole.

Length.	Diameter.	Price per 100.
3½ inch.....	½ inch.....	$5.19
4 inch.....	½ inch.....	5.55

For fastening arm to pole.

7 inch.....	½ inch.....	7.71

GUY RODS.



Supplied with square nuts and one square washer.

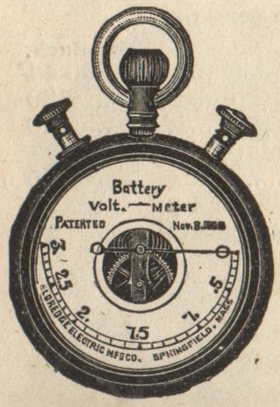
Code Word.	Size.	Weight.	List Price, Each, Plain.	Code Word.	List Price, Each, Galv.
AUGUST.	½ in. x 6 ft.	5 lbs.	$0 40	AURORAE.	$0.52
AUGUSTINE.	½ in. x 7 ft.	5½ lbs.	.48	AUSPICATE.	.60
AURAL.	⅝ in. x 6 ft.	7 lbs.	.55	AUSPICIOUS.	.70
AURIST.	⅝ in. x 7 ft.	8 lbs.	.62	AUSTERE.	.84

GROUND RODS.

Code Word.	Size.	Weight Each.	List Price, Each, Plain.	Code Word.	List Price, Each, Galv.
AUTONOMY.	⅜ in. x 6 ft.	2½ lbs,	$0.19	AUXILIAR.	$0.23
AUTOPSY.	½ in. x 6 ft.	4¼ lbs.	.27	AVAIL.	.35
AUTOTYPE.	½ in. x 7 ft.	4½ lbs.	.30	AVARICE.	.40
AUTUMN.	⅝ in. x 8 ft.	8 lbs.	.50	AVAST.	.65

POLE STEPS.

Code Word.		List Price.
BEAGLE.	Size, 9/16 x 9 in., plain. Weight, per 1000, 650 lbs.....per 1000,	$50.00
BEAK.	" " in., galv. " " " ..... "	60.00



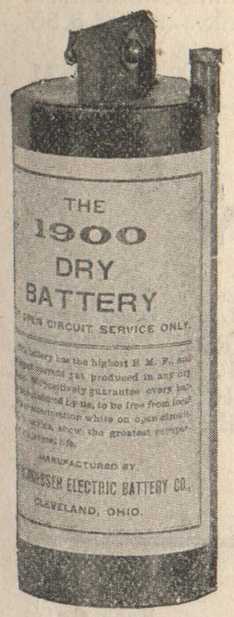
ELDREDGE BATTERY VOLTMETER.

For indicating accurately the voltage of single cells, either primary or storage. Scale in 1/10 volt divisions, The instrument is not liable to injury if accidentally connected to 8 or 10 cells. Suitable size for vest pocket.

Code Word.			List Price.
AHULL.	Capacity 0 to 3 volts.....	.....each,	$5.00
AID.	" 0 to 6 volts.....	"	6.00
AIDER.	" 0 to 10 volts.....	"	7.50

1900 DRY CELLS.

2½ x 6 in.

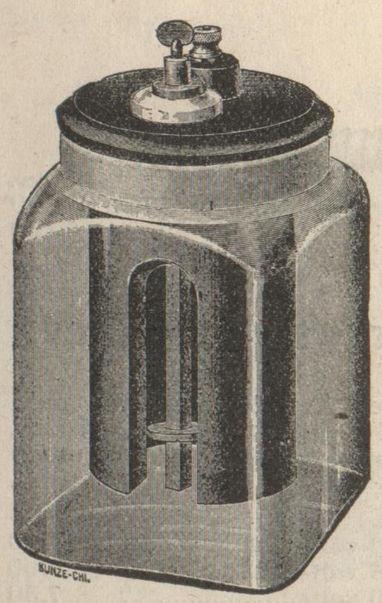


	List Price. Each.
Standard size, 2½ x 6 in., "1900" dry battery.....	$0.50

ANDRAE DRY BATTERY.

For call bells, annunciators, burglar alarms, telephones, medical apparatus, the laboratory and all open circuit work.

Code word—BANYAN. Andrae dry battery. List Price..... .....each, $0.50

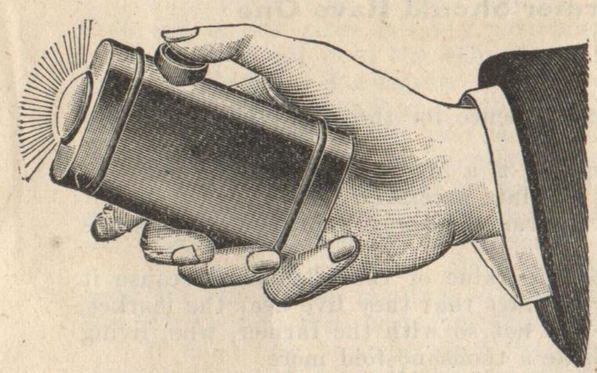


ANDRAE CARBON CYLINDER BATTERY.

The most powerful, efficient and economical, low price, open circuit battery on the market. We use only the very best carbon cylinders and guarantee every battery we send out.

Code Word.		Price Each.
BANK.	Battery, complete.....	$0.44
BANKER.	Carbon cylinder only.....	.30
BANKING.	Glass jar only.....	.10
BANNER.	Zinc, with insulator and soft rubber ring.....	.15
BANNOCK.	Sal Ammoniac, per lb.....	.20
BANNS.	Sal Ammoniac, package.....	.10

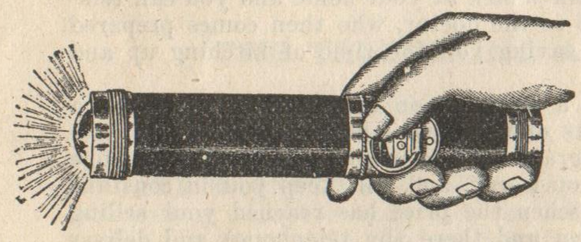
"EVER READY" ELECTRIC LIGHT.



Fire Fly Flash Light.
Can be carried in vest pocket.

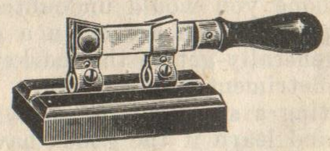
The "Ever Ready" Flash Light is not a toy, but is one of the most useful articles on the market. It cannot be blown out by the wind, emits no smoke or odor and requires no matches to light it. Especially adapted for night work on pole-house, line, switchboard, or in fact anywhere that a light is required.

	List Price each.
Style B—Pressboard Case,	$1.00
Style A—Metal Case covered with Leatherette,	1.25
Style A—Special—Vulcanized Fibre Case.....	1.50
Extra Batteries, 30 cts.	
Extra Bulbs, 35 cts.	



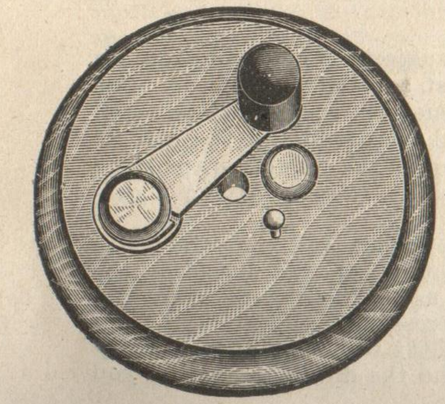
BESOT. No. 1—Pocket size, 1½ x 8½ in., 3½ volt lamp. Will give from 4000 to 5000 lights before battery requires renewal 4.50

BABY KNIFE SWITCHES.



Code Word.	Amperes.		List Price.
BEME.	15.	Single pole, single throw.....	each, $0.34
BEMY.	25.	" " " "	" .44
BERSEIK.	15.	Double " " "	" .42
BERTH.	25.	" " " "	" .50
BERTHAGE.	15.	Single " Double "	" .60
BERYL.	25.	" " " "	" .74
BESEECH.	15.	Double " " "	" .74
BESEECHER.	25.	" " " "	" .90

WOOD BASE SWITCHES.



Nickel plated trimmings, polished rubber knobs.

Code word—BENIGHT. 1-point switch, wood base. List Price.....each, $0.20
Code word—BENIGN. 2-point switch, wood base. List Price.....each, .24
Code word—BENISON. 3-point switch, wood base. List Price.....each, .26
Code word—BENZOIN. 4-point switch, wood base. List Price.....each, .30
Code word—BENZOIC. 5-point switch, wood base. List Price.....each, .40
Code word—BENZINE. 6-point switch, wood base. List Price.....each, .50

FACTS FOR FARMERS ABOUT THE TELEPHONE

And Why the Farmer Should Have One

The telephone is a modern convenience for the city residents, but a **real benefit** for the farmer.

To the city resident the telephone is a luxury, coupled with a necessity, but with the farmer it is an **absolute necessity.**

The telephone is, in a sense, a farmers' Saving Bank because it saves time—time is money.

The city residents appreciate the value of the telephone because it saves much time, notwithstanding the fact that they live near the market, grocery store, doctor's office, etc., but not so with the farmer, who, living away from the city needs a telephone a thousand-fold more.

The real benefits and necessity of a telephone in your home will present itself to you, especially

When some one is suddenly taken sick at your home and you can telephone the nature of the complaint to the doctor, who then comes prepared for your particular ailment, thus saving you the time of hitching up and driving to town after him.

When you wish to speak to a neighbor on business, or otherwise, a telephone will often save you hours of time and labor.

When you are holding your grain for the price to go up, a telephone will save you an endless amount of worry, and will keep you in constant touch with the markets, so that when the price has reached your selling mark you can make your sale then and there (by telephone) and deliver the grain or other produce the following day or at your convenience; but if you did not have a telephone you would undoubtedly look to the newspapers for the market reports, which are often a day or two old before they reach you, and you generally get to the market after the prices have declined, to your material detriment.

When you are expecting a shipment of goods you can telephone the railroad or express office and learn if the goods have arrived or not, thus saving you many unnecessary trips to town.

If you found it necessary to talk to men in town with whom you have, or want to have, business dealings, the use of the telephone will save you time, suspense and money.

The telephone to-day is just as much a part of your farm equipment as the reaper or mower; of course you can get along without either of them, but it will require more work and time to accomplish the same results.

Use a telephone on your farm for one week and you will be surprised at the time and labor **(farmer's capital)** it saves you.

What to Do.

Have a talk with your neighbors on the subject. They will soon see the advantage of the telephone on the farm just as easily as you do. Get together often as necessary and get a club formed between you, each man buying an instrument for his own use, then share equally in the cost of constructing the line. The chances are that one of the number owns some land from which the cedar poles may be obtained, thereby saving a considerable portion of the cost of the line.

After the club is formed amongst your neighbors and yourself, figure out the length of the entire line you intend putting up and decide on the number and kind of instruments you wish to use. Then write to us and we will ship the instruments, wire and other necessary material.

You will find the cost of your telephone outfit to be less than the city residents pay for the rent of their telephone, and the difference is that you

own your telephone and the city resident does not; you have no rents to pay, but your city friend pays a rental that helps to swell the coffers of a heartless monopoly.

On another page we show you the cost of one mile of telephone line that will be first class in every particular.

You will not need the help of an experienced lineman, as the directions in this book, if carefully followed, will be all the information necessary for you to properly and easily build a first-class telephone line.

It is a matter of fact that more than ninety per cent. of the rural or country telephone lines in successful operation have been constructed and all the instruments installed by men who have followed such instructions as those contained in this book, and whose entire knowledge of electricity and telephony has been gathered from such instructions.

It cannot be made too plain that telephone construction and instalment for rural lines requires a fair degree of good, common sense, but does not require skill or technical education.

It must also be understood that the telephone is not a complicated instrument, which we will demonstrate to your satisfaction in the following pages.

THE TELEPHONE AND ITS PARTS.

THE TELEPHONE may be said to consist of six parts: The magneto bell, the automatic hook, the receiver, the transmitter, the induction coil and the batteries.

THE MAGNETO BELL.—The magneto bell is used for signaling and has nothing whatever to do with the talking parts of a telephone; it consissts of a generator which produces the current for signaling and ringer movement and bells for receiving the signals. We produce a Magneto of powerful generating capacity, capable of ringing through 100,000 ohms resistance for use on the longest lines, with ringers most perfect in design for securing highest electrical and mechanical efficiency—sensitive and durable.

THE AUTOMATIC HOOK.—The functions of the automatic hook are to break the talking circuit when the telephone is not in use, thus preventing the premature exhaustion of the battery, and to complete the talking circuit when the telephone is in use, also to break the ringing and signaling circuit when the telephone is in use, then to again complete the ringing circuit when the telephone is not in use.

THE RECEIVER.—The function of the receiver is to receive the message.

THE TRANSMITTER.—The function of the transmitter is to govern the flow according to the intensity of the sound waves which strike its diaphragm and thus makes voice transmission possible.

THE BATTERY.—A battery may consist of one or more cells of either wet or dry battery, the function of which is to provide the necessary electrical current to transmit messages. The batteries in most general use in connection with telephones consist of a carbon and a zinc element with a simple sal ammoniac solution or a dry cell. The battery has nothing to do with the production of current for signaling, signaling energy being provided by the generator as above stated.

THE INDUCTION COIL.—The induction coil transforms the direct and sluggish battery current into an alternating current of high pressure. This transformation renders long distance service possible.

After once being installed, telephones require scarcely any attention; the only care consisting in recharging the batteries about once every six months, according to the amount of service of the telephone.

Telephones are made in various styles, as far as exterior appearances are concerned, and in two different classes of construction according to the uses to which the instruments are to be put; these are known as **series** and **bridging** telephones.

Telephones may be used in three different kinds of service, viz: **Exchanges, private lines** and **party lines.**

EXCHANGE WORK.—Series telephones are most generally used in connection with switchboards for exchange work, although bridging telephones may be used if desired. Each telephone should have a separate line to the switchboard. This kind of service is possible in cities and large towns.

PRIVATE LINES.—By private lines is meant any line having one telephone at each end. Where only two telephones are used on one line, and the line is not too long, series instruments will give perfect satisfaction. It frequently happens that more than two series instruments are used on one line, but the results obtained are not the best that could be desired; the reason for this is that where series instruments are used it is necessary for each station to talk through the ringers and generator cut-outs of all other stations on the line, notwithstanding the two telephones in use during a conversation may be within one hundred feet of each other. Diagrams No. 1 and No. 2 will illustrate the methods of series telephone line construction.

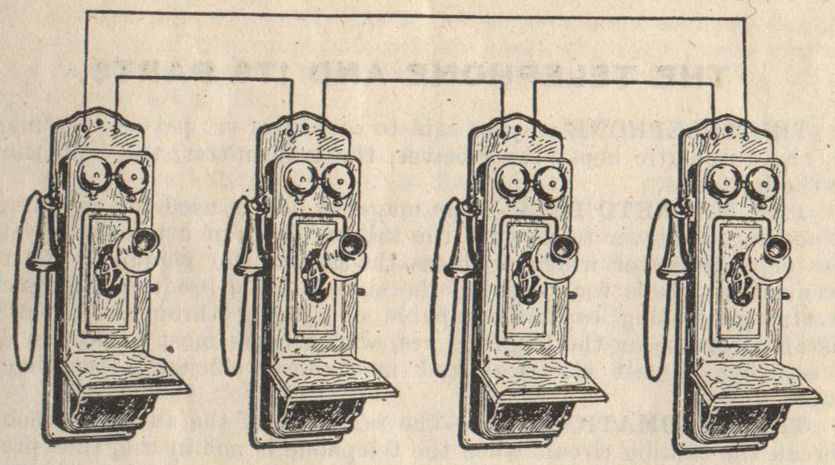


Diagram No. 1.

BRIDGING TELEPHONE LINES.—Bridging telephone lines are so constructed that when two instruments are in use it is not necessary to talk through the other instruments on the same line. Perfect results will be secured by using bridging telephones on all party lines, in fact, these results cannot be obtained in any other way.

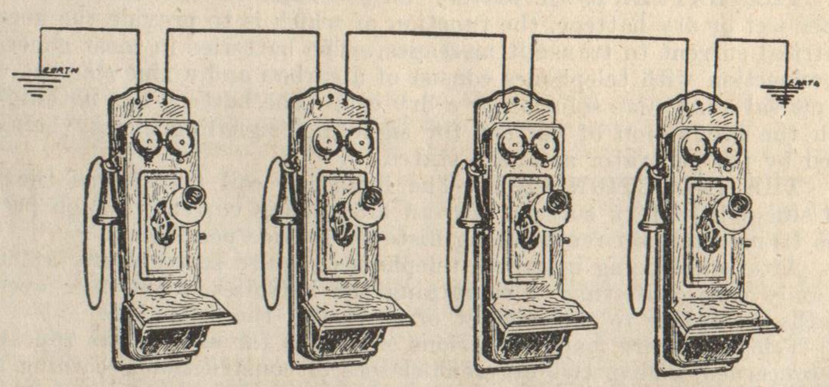


Diagram No. 2.

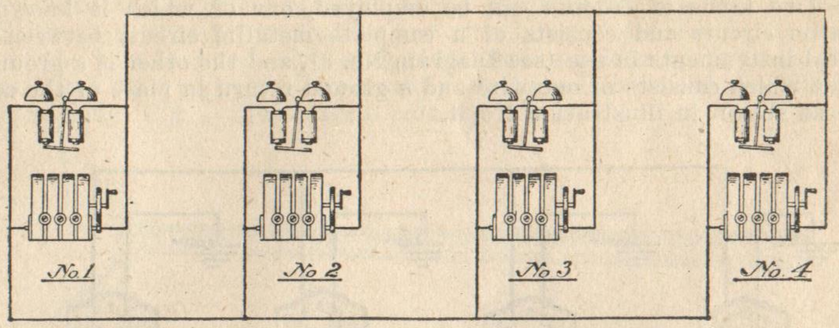


Fig. A.

The diagram in Fig. A shows the manner in which bridging telephones are connected, while Fig. B shows the connections for the series telephone. You will readily notice the difference in the circuits of the bridging and the series telephone, as the line wire in the series telephone passes through the ringing apparatus, while in the bridging instrument it goes past and not through it.

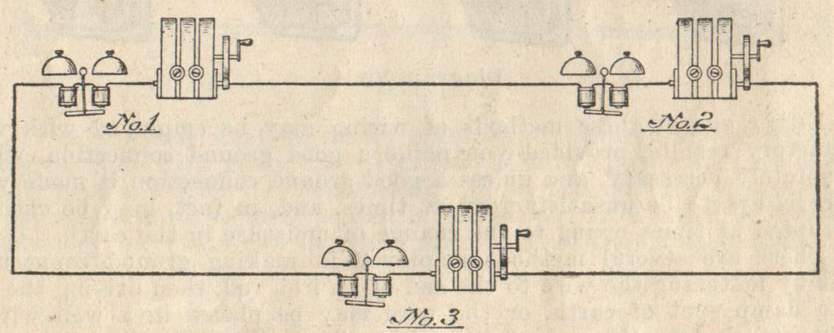


Fig. B.

These are actual facts as they exist in relation to the series and bridging telephones, and any statements to the contrary may be set down as made for other than honest purposes.

LINES.—Remember the best-made line is always the cheapest, because it lasts longer, costs less for repairs, which are often made necessary by big sleet storms, and give you the best and least interrupted service. Your calm judgment will tell you which is the best.

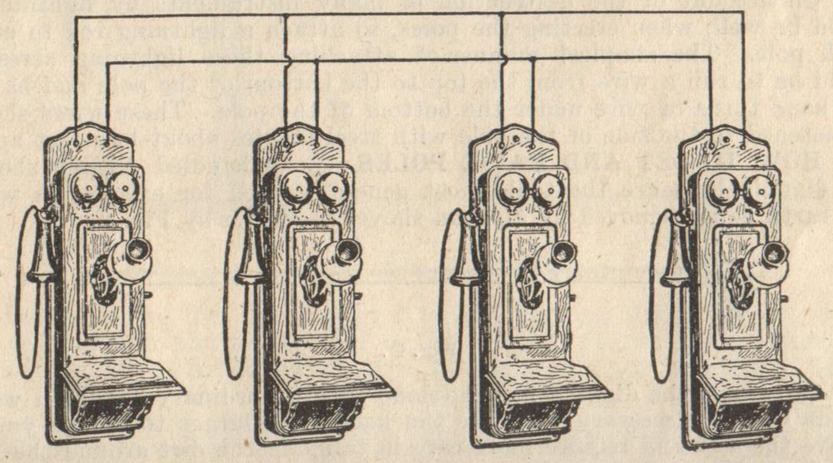


Diagram No. 3.

Two kinds of circuits can be employed, one of which is known as metallic circuit and consists of a complete metallic circuit between the several instruments in use (see Diagram No. 3), and the other is a grounded circuit which consists of one wire and a ground return in place of the other wire as shown in illustration No. 4.

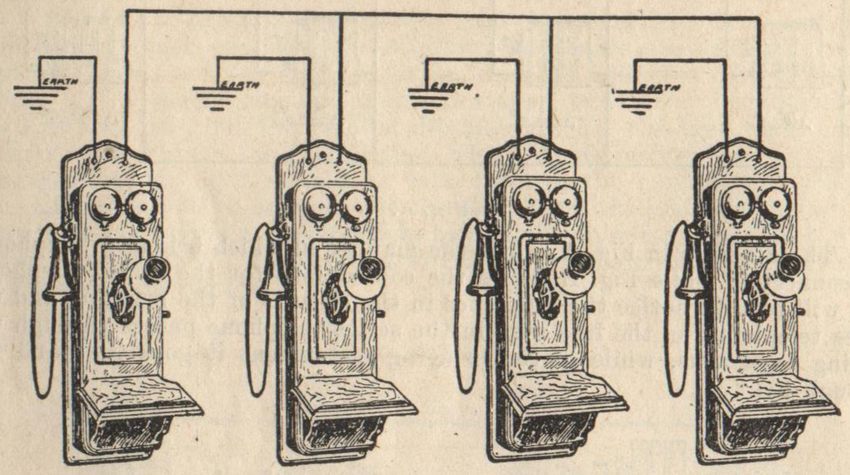


Diagram No. 4.

Either one of these methods of wiring may be employed with very satisfactory results, provided you make a good ground connection, which is absolutely necessary, and unless a good ground connection is made your service is apt to be unsatisfactory at times, and, in fact, may be entirely interrupted at times owing to the change of moisture in the earth.

There are several methods employed in making ground connection. One is by fastening the wire to the end of an iron rod, then driving the rod into a damp spot of earth, or the wire may be placed in a well with a weight attached to the end of it to keep it stationary and under water. In making connection between the line and a ground rod it is always best to solder the wire to the rod as this will prevent any corrosion between the two metals.

POLES.—Poles should be of a good quality of cedar and not less than 20 feet long; they should be at least 4 inches wide at the top, and should be roofed, that is, cut to a point on two sides in the shape of a roof so as to allow the water to run off. Set the pole about five feet in the ground, but never less than one-sixth the entire length of the pole, and have from 30 to 40 poles to the mile.

On account of the destruction of many instruments by lightning it would be well, when erecting the poles, to attach a lightning rod to every tenth pole. The simplest manner of attaching these lightning arresters would be to run a wire from the top to the bottom of the pole and having two hand turns of wire under the bottom of the pole. These wires should be fastened to the side of the pole with steel staples about two feet apart.

HOW TO SET AND RAISE POLES.—Long handled digging shovels and digging bars are the tools most generally used for excavation work. The earth being removed by a spoon shovel as shown by Fig. C.

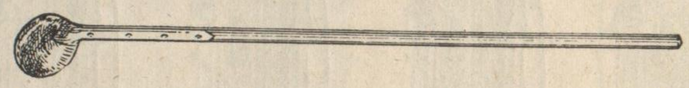


Fig. C.

Of course, the digging may be done with an ordinary spade, in which case it will be necessary to make the hole much larger to enable you to remove the dirt and require more care in tamping the dirt around the pole to make it firm and steadfast.

In raising the pole you first insert a plank in the hole for the pole to slide down on, thereby preventing any crumbling of the earth. Raise the end of the pole by hand, high enough to allow a pole support to be placed beneath and then move it along steadily as the pole is raised until it slides into the hole. Fig. D illustrates a pole support.

After this is done put pike poles around the pole to keep it in place while the earth is being shoveled in the hole and being well tamped down. In tamping the earth around the pole you should fill in at the top with coarse soil or gravel.

A good tamping iron and digging bar one inch in diameter and about eight feet long, made of solid steel, is shown in Fig. E.

Fig. E.

It is necessary that all corner poles be well braced and guyed, which should be done with great care as follows: Run a guy wire from the top of pole to a guy stub, as shown in Fig. F, or to a guy anchor as per Fig. G; these should be securely buried in the ground to a depth of 6 feet. A satisfactory guy wire can be made up of three strands of ordinary wire

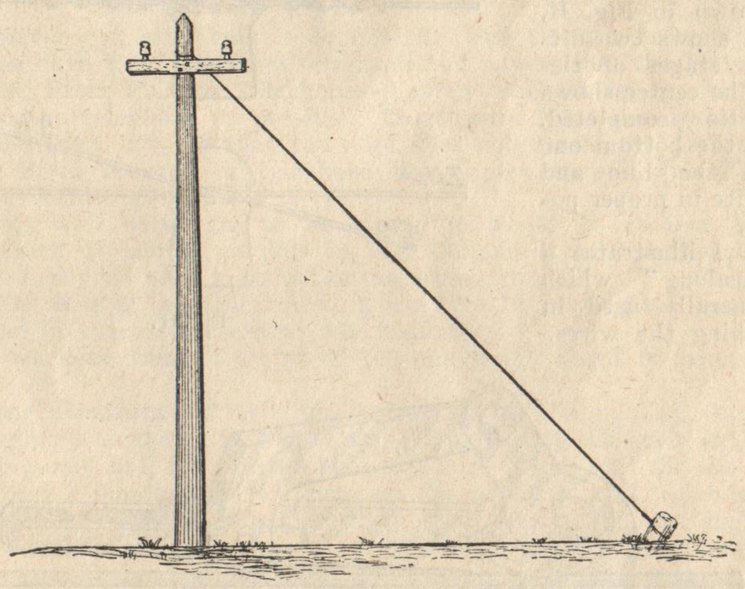


Fig. F.

twisted together. Do not guy to a tree if you can avoid it, but, should you do so, fasten the guy as near to the earth as possible, also protect the trees by strips of hardwood about a foot long and one and a half inches wide. The guy wire should be wound twice around the tree. The guy anchor as shown in Fig. G is about six feet long, through which passes a galvanized iron rod of the same length and one-half inch in diameter, and is fastened by a nut and washer.

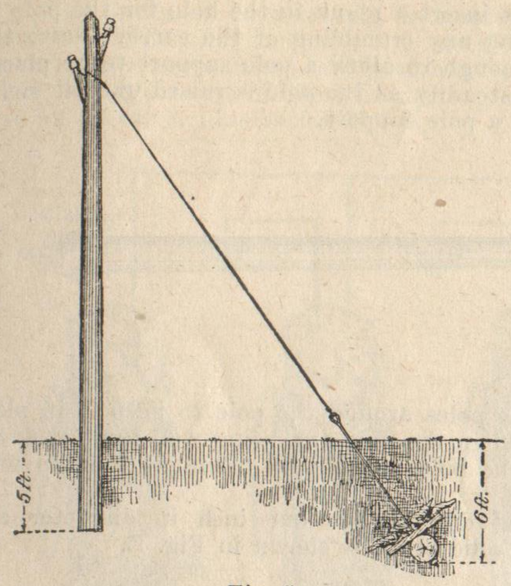


Fig. G.

Guying is especially necessary when the line rounds a corner, as it secures the pole and relieves the strain on a pole which unless guyed would soon be pulled out of line and also result in slack wires at the very points where they should be tight. Fig. F and G show how this is done.

WIRE.—Well galvanized No. 12 B.B. iron wire is most generally used for rural telephone systems, and weighs 165 pounds to the mile.

No attempt at stringing wires should be made until after the poles are erected and properly guyed, the cross arms or brackets attached and the insulators in place.

In stringing the wire the operation consists simply in running the wire off from the reel, putting it in its position, pulling to the desired tension and tieing same as shown in Fig. H, which shows two different stages of tieing. The center shows the tie completed, while the bottom one shows the line and the wire in proper position.

Fig. I illustrates a "Comealong" which is generally used in stretching the wires.

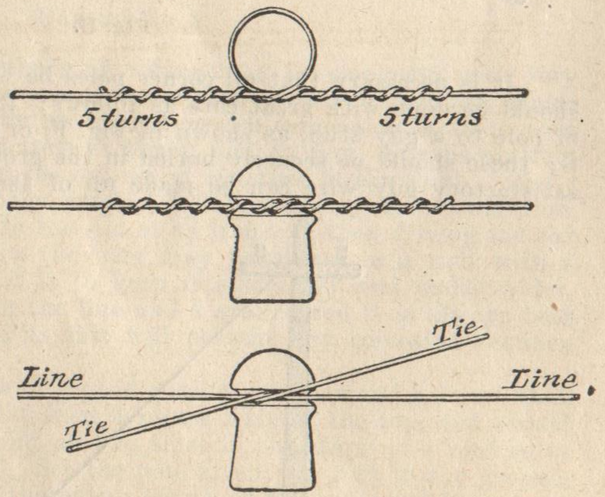


Fig. H.

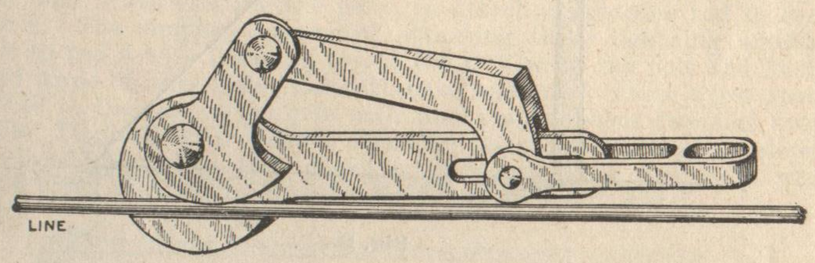


Fig. 1.

To Attach Wires to Insulators.—In attaching the wires as shown in Fig. H you first lay the line wire in the groove of the insulator, then a short piece of wire commonly known as a "tie wire," of the same size as the line wire should be passed all around to keep it in place, and then with

pliers twist the tie to the wire at either side. Make sure that the tie wire securely fastens the line wire to the insulator. It should also be remembered that tieing the wire too tight will weaken it, and you should avoid this by annealing your tie wire, which may be done by heating a small coil of the wire in a furnace to a cherry red and then allow it to cool slowly.

Tension of Wires.—Wires that are left too slack will be apt to swing across each other and cause much trouble.

Wires that are drawn overtight are liable to break in cold weather; of course, wires should be drawn tight enough to allow an 8 inch sag between poles.

Fig. J.

Splicing the Wire.—There are several means of splicing lengths of wire. Fig. J shows a good connection.

The method of making it is to grip the two wires with a splicing clamp, such as shown in Fig. K and twist the ends around firmly with pliers.

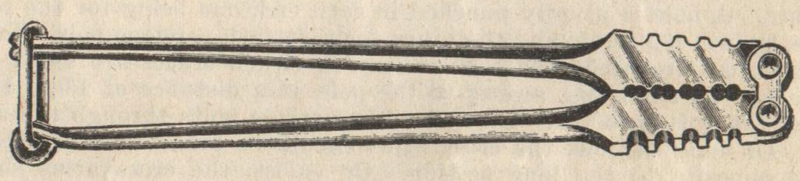


Fig. K.

Whenever you can avoid it do not run wire through trees, and the further you have your line from telegraph and power lines the better.

Wiring From Pole to Telephone.—Fasten brackets on the buildings as near to the telephone as possible. Carry wire from the nearest pole to these brackets, but see that the wire does not touch any part of the building. From bracket to telephone use duplex copper wire No. 19, rubber and cotton covered.

If only two wires are to be strung it would be cheaper to use brackets (such as shown on pole in Fig. G) and if well fastened they will give equally as good satisfaction as cross arms.

In this class of construction work use "No. 9 pony" glass insulators, which come in barrels containing 400 insulators.

Oak brackets come in crates of 100 and weigh about 80 pounds per crate.

Placing Brackets.—If two line wires are to be put up, brackets should be placed as shown in Fig. G and fastened with old style cut nails, using a 50 penny nail for the top hole and a 20 penny nail for the lower hole. In case a single wire is strung on the pole you will use brackets, which should be nailed on the side of the pole away from the highway. This will simplify matters when a second line is put up. The first wire should be placed about eight inches from the top of the pole, and the second wire about twenty inches from the top on the opposite side of the pole.

On corner poles the first bracket should be about ten inches from the top and the second one about twenty-four inches from the top, both brackets being put on the outer side of the pole and the line wire drawn around the outer side of the glass insulator. Then should the bracket become tipped or loose the line will rest in the groove of the insulator and the insulator will strike the pole instead of pulling off, and in case the tie wire breaks, the pole will catch the line wire.

Cross Arms.—Cross arms are rarely used in the construction of farmers' lines, as brackets are much cheaper and answer every purpose that the cross arms would. If they are used, those most preferred are those of sawed yellow pine painted with two heavy coats of good metallic paint. The size of telephone cross arms are 2¾x3¾ inches, bored for 1¼ inch pins. The length of cross arms and distance between pins and ends are as follows:

No. of Pins.	Length in Inches.	Distance of Pin from End of Arm.	Distance Between Center Pins.
2	24	3 inches.	18 inches.
2	30	3 "	24 "
2	36	3 "	30 "
4	42	3 "	16 "
6	62	3 "	16 "

When using cross arms gains should be cut in the poles about 1½ inches deep and six inches from the top, and wide enough to have a tight fit for the cross arm. The best manner of fastening cross arms to poles is by means of a plain machine bolt extending entirely through the arm and pole, being secured by a nut and washer. The arm may be braced by the use of wrought iron or steel strips, commonly known as "cross arm braces."

Cross Arm Braces.—Cross arm braces usually consist of straight, flat bars 1¼ inches wide by ¼ inch thick, varying in length from 20 to 28 inches. A hole is usually punched in each end, one being for the reception of a ½ inch lag screw and the other for a ⅜ inch carriage bolt. Two cross arm braces are used with each cross arm (when braces are used) and are attached by single lag screws to the pole at a distance of 15 to 18 inches from the bottom of the arm and with carriage bolts through the arm.

On long sections the cross arms should be placed on the side of the pole opposite to the long section. On curves the cross arms should be placed on the sides of the poles facing toward the middle of the curve, and at road crossing the cross arm should be placed on the side of the pole facing the road.

Cross arms should be reversed on alternate poles (that is, put on so they face opposite) so that the strain of the wire comes on the pole instead of the bolts.

The life of the poles will be greatly prolonged if the tops and the gains for cross arms are painted with one thick coat of metallic paint, as this keeps out the water.

Approximate Cost of One Mile of Telephone Line.

30 Cedar Poles, 25 ft. long, 4 inch top	$18 00
No. 12 B.B. Galvanized Iron Wire	6 50
30 Two-Pin Yellow Pine Cross Arms	1 95
60 Pins for Cross Arms	42
60 "Pony" Glass Insulators	90
80 Machine Bolts (square head)	2 10
	$29 87

If lag screws ½x7 inches are used instead of machine bolts the cost would be $28.77.

Line with Brackets instead of Cross Arms.

30 Cedar Poles, 25 ft. long, 4 inch top	18 00
No. 12 B.B. Galvanized Iron Wire	6 50
60 Oak Brackets	72
60 "Pony" Glass Insulators	90
50-Penny Nail for top and 20-Penny Nail for bottom hole in Brackets	25
	$26 37

All of this material could be bought cheaper in quantities. No allowance has been made for guy rods. The cost of same is as follows:

¾ inch x 6 feet long, plain	30c
¾ inch x 6 feet long, galvanized	35c
⅝ inch x 9 feet long, plain, each	30c
⅝ inch x 9 feet long, galvanized, each	35c

The above prices, except poles, are net, F. O. B. cars, Milwaukee or Chicago.

TELEPHONE TROUBLES.

Bell Will Not Ring.—If the bell does not ring when the two main binding posts on the top of a series bell are connected together, the trouble is most likely to be a wire burned out inside the box.

Magneto Bell Receives and Transmits, But You Cannot Talk.—This may be due to a bad cord or the trouble may be in the hook switch, connection loose or battery weak.

Bells Ring Frequently Without Apparent Cause.—If bell rings frequently without apparent cause, the trouble will be that the lines are swinging across each other.

Bells Ring But You Cannot Transmit Speech or Hear Anything.—If such is the case the receiver cord may be broken. To test whether the trouble is in the cord, disconnect it from the box, let the receiver remain on the hook, remove the wire from the binding-posts at the top of the box and place the two tips of the end of the cord in these binding-posts and ring the bell; if the cord is broken the bell will not ring. The wires in a cord may be broken and yet make contact if the cord is held in a certain position, but the result would be a scraping sound in the telephone, as the contact is scraping, or it may interrupt the speech so that a word is only heard occasionally.

Ringing and Talking Both Unsatisfactory on a Metallic Line.—If the ringing and talking on a metallic line are both unsatisfactory, the trouble would, in all probability, be caused by a loose connection, either at the top of the instrument or where the insulated wire joins on the line wires, or by poor connections on the line wires.

Transmission of Speech Is Feeble While You Receive Speech Strongly.—If the transmission of speech is feeble while you receive speech strongly, the trouble is either you stand too far away from the transmitter or the battery is weak. You should stand so that your lips are about one inch from the transmitter.

Important.—The placing of any articles, especially nails, screws, screw-drivers, scissors or other metallic substances, on the top of the instrument should be carefully avoided. In a bridged line, same as shown in Figs. 3 and 4, this might result in all the instruments on the line being cut out of service.

Diagrams Nos. 3 and 4 will clearly illustrate method of construction of bridging telephone lines.

Ground Circuit Party Line—(Diagram No. 2) with series instruments installed. This is a method sometimes used, but not recommended, as series telephones will not give satisfactory service on party lines.

Ground Circuit Private Lines, with two telephones installed (one at each end of line) are constructed in exactly the same manner as are party lines, as indicated in illustration No. 2, except that the middle telephones are omitted.

Series telephones on private lines give perfect satisfaction.

Metallic Circuit Party Lines—(Diagram No. 1) with series telephones installed. Not recommended for reasons stated under paragraph 2.

Metallic Circuit Private Line, where two instruments only are used, is the ideal private line.

Ground Circuit Party Lines—(Diagram No. 4) with bridging telephones installed. A thoroughly satisfactory method of constructing a country party line, and any town or village line where there is no influence from electric light or trolley wires, etc.

Metallic Circuit Party Line—(Diagram No. 3) with bridging instruments installed. The ideal telephone line.

Outside of cities and large towns telephone service is usually secured by party lines, and the use of bridging telephones by far exceeds the use of all other types and kinds.

As many instruments as desired can be placed on one bridging line up to a maximum of about thirty-five. This maximum will vary in different localities, owing to local, atmospheric and other natural conditions. A greater number than thirty-five instruments on one line is not practicable, as it is impractical to use a telephone box of sufficient size to encompass a generator which will energize so many ringer movements. Additionally, when so many are used, the system of signals would be so complex as to almost defy comprehension.

There are two important parts of bridging telephones that distinguish them from series instruments.

First.—The generator must be large, and not only must it have voltage (pressure) enough to ring through great resistance, but it must also produce large volume of current (amperage). Either of these features can be present without the other, but both must be present to secure a perfect instrument.

Second.—The ringer movements, or strikers, must be high wound, and all the ringer movements, or strikers, on any one bridging line must be wound to exactly the same resistance. To fail in this will be to unbalance the line and make it impossible to secure any satisfactory results whatever.

Under no circumstances can series telephones be satisfactorily used on a bridging party line.

IMPORTANT.

A mistake often made in organizing rural companies is in not conferring with the Manager of the nearest city or town exchange. He has usually had years of experience and will generally give you good advice. By this we do not mean that it is always advisable to be governed by his recommendations as to any particular make of telephone for the reason that he may have some ulterior motive in pushing the sale of some certain instrument. On matters pertaining to construction, rates, etc., he can always give you desirable information. Do not overlook the fact that you may want to connect with his exchange and perhaps have him ultimately take charge of the maintenance of your system.

Many methods are adopted for securing rural telephone service. Where service cannot be obtained from city companies a popular method is the incorporation of a company composed of the farmers, who subscribe for the stock on pro rata or other basis, install the system, running a direct line from their switchboard to that of the nearest town or city exchange. This is what is known as the community system, the heart of which is the small switchboard, from which radiate the lines to which the various subscribers telephones are attached.

If about to organize a rural telephone company the suggestions as outlined on preceding pages will be of interest to you. After you have had a preliminary meeting organize permanently according to rules and regulations, copy of which accompanies this catalogue. Each subscriber signing his name to the agreement.