

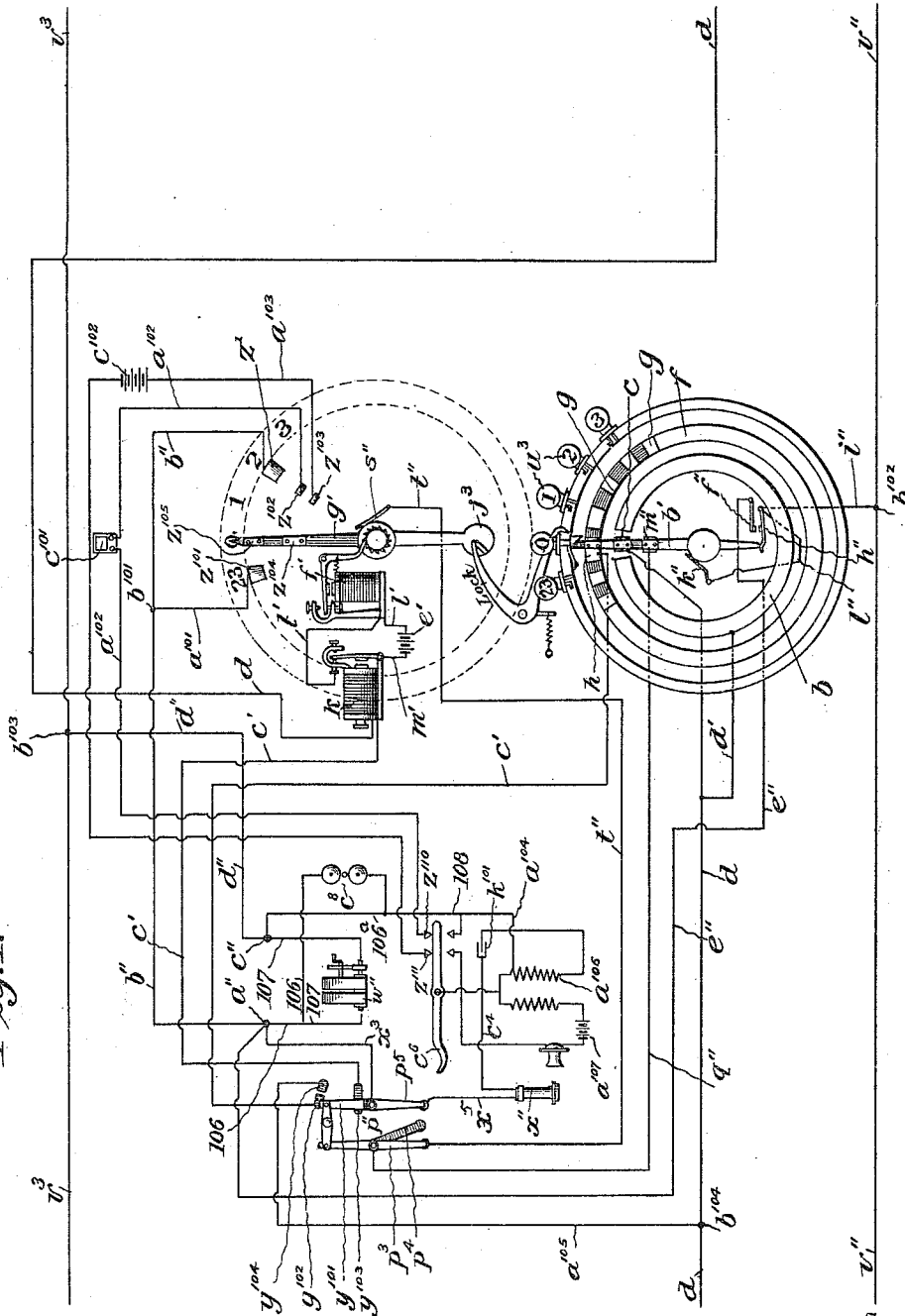
957,491.

C. F. BRADBURN.
TELEPHONE SYSTEM.
APPLICATION FILED NOV. 25, 1908.

Patented May 10, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



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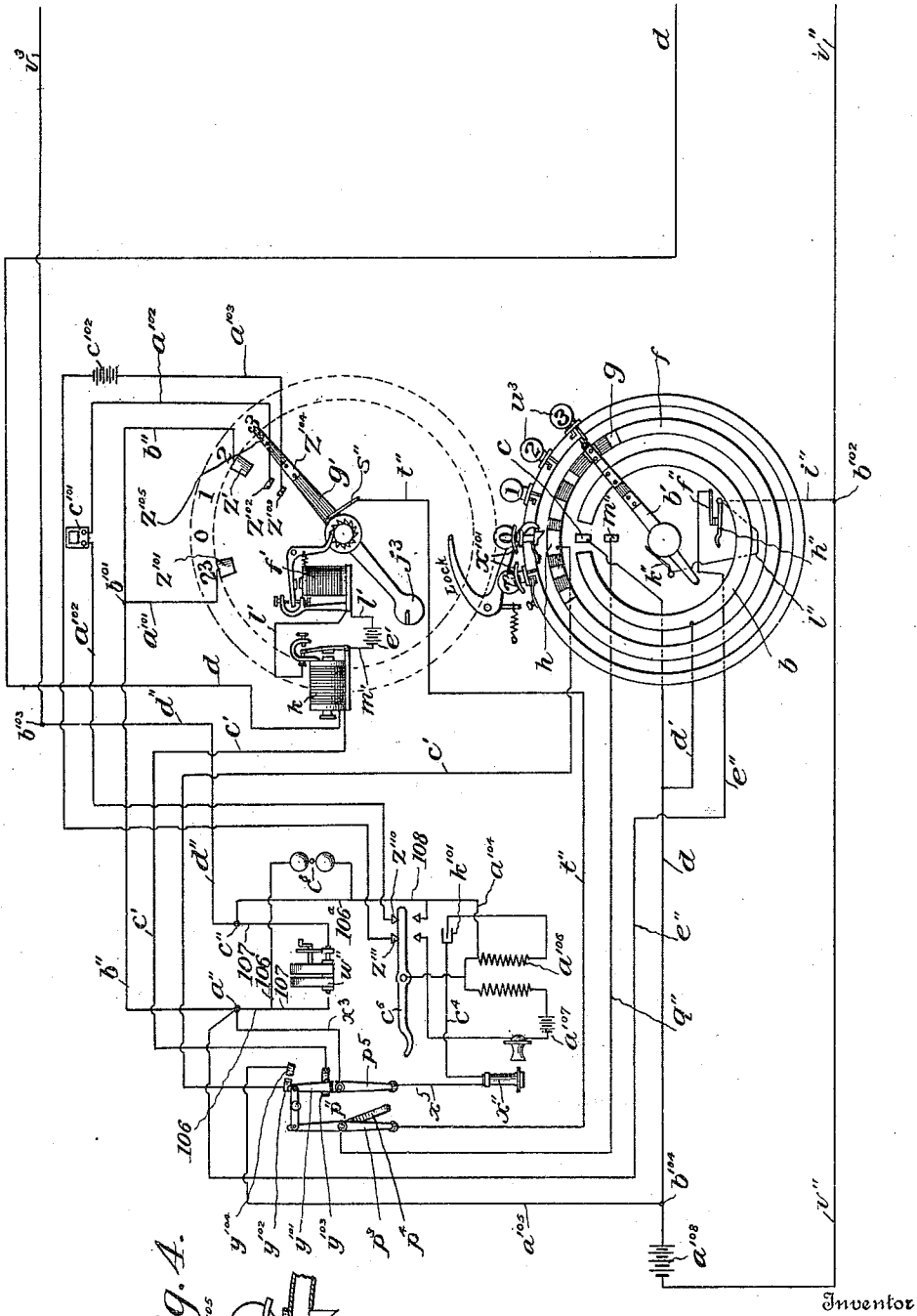
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4 SHEETS—SHEET 2.

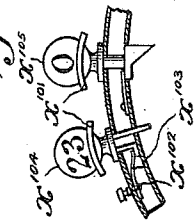
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Fig. 2.



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Fig. 4.



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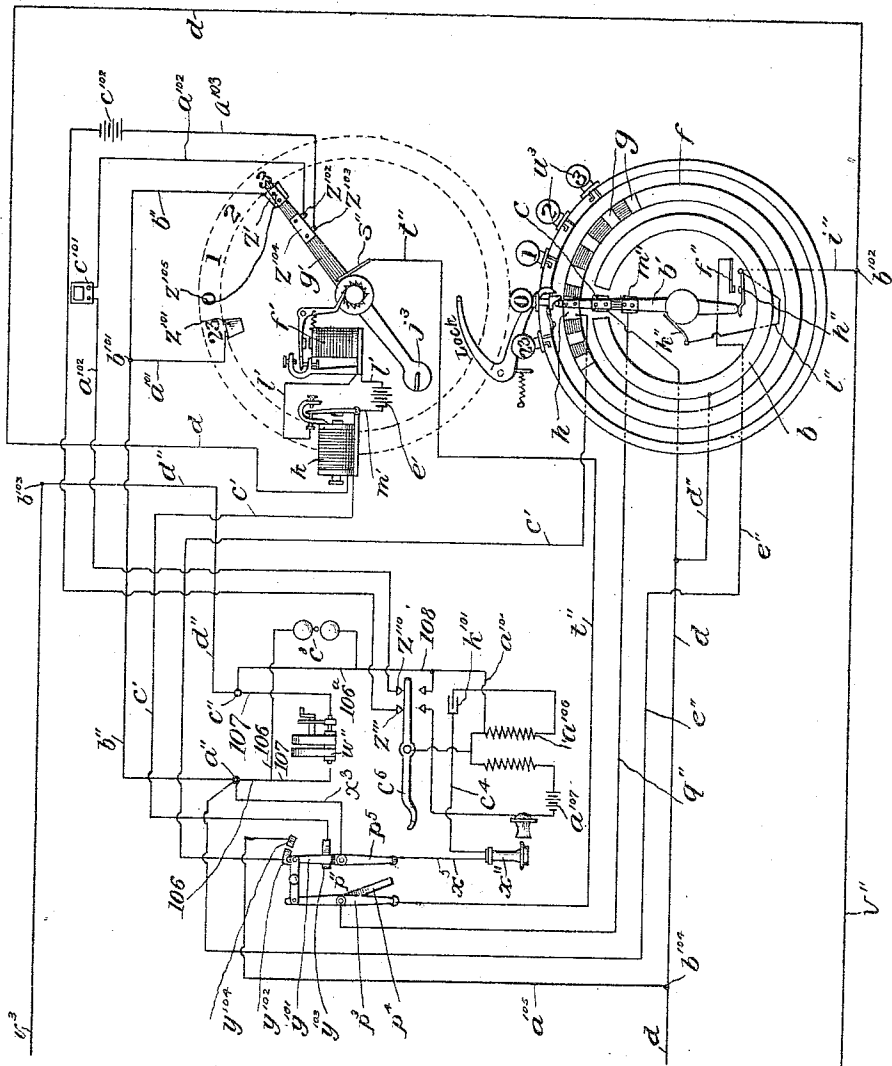
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4 SHEETS—SHEET 3.

Fig. 3.



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TELEPHONE SYSTEM.

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4 SHEETS—SHEET 4.

957,491.

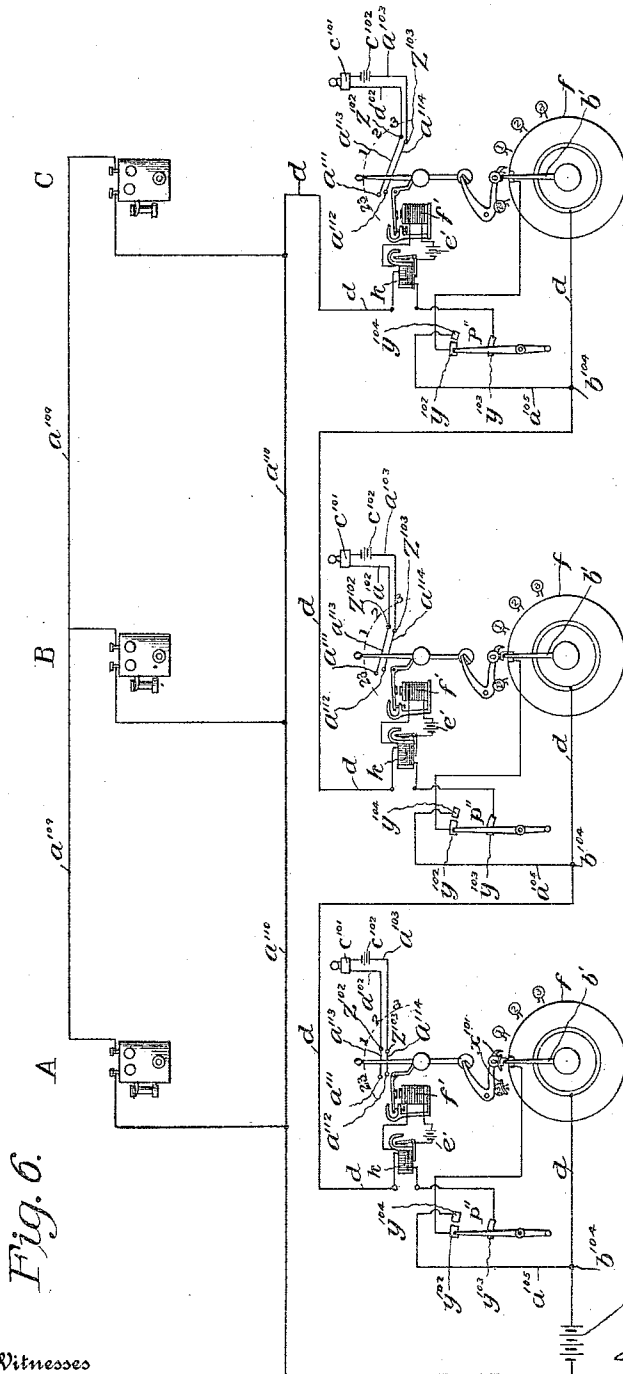


Fig. 6.

Witnesses

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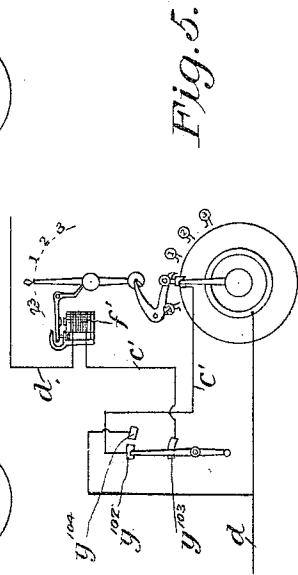


Fig. 5.

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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

957,491.

Specification of Letters Patent.

Patented May 10, 1910.

Application filed November 25, 1908. Serial No. 464,366.

To all whom it may concern:

Be it known that I, CHARLES FRANKLIN BRADBURN, of the village of Delmer, in the county of Oxford and Province of Ontario, Canada, have invented certain new and useful Improvements in Telephone Systems; and I hereby declare that the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon.

In my concurrent application filed August 10th, 1907, Serial No. 387,949, I have described a selective party line telephone system in which any station may communicate with any other station to the exclusion of the remaining stations in the system. The invention described in that application consists of a number of telephone stations each connected with the main line by a normally open telephone station circuit selectively closed by a selecting circuit which flows through all of the stations to connect them in series, each telephone station being provided with a selecting instrument comprising a primary mechanism and a secondary mechanism, a selecting battery, a relay, and an auxiliary circuit with positioning battery and electro magnet, the operation of any one of the primary mechanisms bringing about the synchronous operation of the secondary mechanism of each telephone station by transmitting the impulses of its individual selecting battery to the selecting circuit which is normally closed through all the selecting instruments, and an emergency circuit having an emergency switch by which a third station can signal two connected stations when the use of the line is desired by the third station, the emergency circuit and switch however preventing the third station listening or speaking to the connected stations.

In a subsequent application filed January 20th, 1908, Serial No. 411,730, which application matured into Patent #918,955, on April 20, 1909, I have described an improvement in the system forming the subject matter of my first application, which includes an automatic positioner to facilitate the manual operation of the selecting instruments embracing a motor means for revolving the primary pointer of the primary mechanism and an adjustable stop for each

contact plate of the primary dial to arrest the primary pointer at a selected contact plate.

In a concurrent application filed January 20th, 1908, Serial No. 411,731, I have described a further improvement to the telephone system set forth in my original application, comprising a detent for each primary pointer released from its engagement with the primary pointer when the secondary pointer is at its zero position and brought into position to engage the primary pointer when the secondary pointer has moved from its zero position.

It has been stated in my previous applications above mentioned, that the operation of the primary pointer of the primary mechanism at any telephone station causes the co-incident operation of the secondary pointers of all of the selecting instruments, and in my application 411,731, it is stated that when the primary pointer of the calling selecting instrument moves to the first contact from the zero contact it actuates the secondary pointers of all the secondary mechanisms, and that co-incident with the movement of the secondary pointers, the detents are positioned to engage the remaining primary pointers and arrest them at their zero position until the primary pointer of the calling selecting instrument has completed its revolution and returned to zero so that no other primary pointer can be operated during that period to disorganize the synchronism of the selecting mechanisms. The secondary pointers of all the selecting instruments return to zero co-incident with the return of the primary pointer of the calling selecting instrument and cause the removal of the detents from the paths of the primary pointers so that any of them can then be operated.

The improvement which constitutes the subject matter of the present application embraces a means by which any station may simultaneously signal and simultaneously communicate with all the remaining stations, this feature being designed partly for bulletin and concert work, but more particularly for train despatching by telephone, and to satisfy more fully the requirements of the latter class of service, the following features are included, viz.,—automatic ringing in "individual calls," i. e. in calls where one station selects some other station;—a means by which the selecting instruments may be caused to stand

normally upon the common calling contact *i. e.* the contact upon which all stations are cut in upon the line or are connected in a way to admit of intercommunication;—and
 5 a means by which an operator may, while the instruments are upon the “common calling contact” overhear the business being transacted over the line, without removing his receiver from its hook.

10 Other features of the present invention involve a means for cutting out the primary mechanism for correction purposes, the application of a common battery in the main selecting circuit in cases where the line is
 15 intended to be in practically continuous use, as is usual upon despatching circuits, and the use of a common return for the main circuits both telephone and selecting.

20 I shall now describe in detail the features outlined above, reference being had to the drawings annexed thereto, in which,

Figure 1, represents a telephone station with the instruments standing at their normal initial positions and not in use. Fig. 2,
 25 represents one station calling another station, this being an individual call. Fig. 3, represents the called or selected station. Fig. 4, shows the special common arresting stop used on a primary mechanism at a despatching office only. Fig. 5, shows a station having a modified system of circuits. Fig. 6, is a diagram of a modified system,
 30 showing three telephone stations, in which the selecting apparatus and circuits are independently employed for signaling or calling purposes in combination with a common bridging telephone line.

35 In train despatching the telephone instruments are intended to stand ordinarily upon the common calling contact, and the terms normal position or initial position are necessarily used in a somewhat restricted sense in treating of this class of service.

40 As the selecting and emergency circuits and accessories, the automatic positioner, and the locking mechanism, remain as described in my concurrent application except for the addition of the correction circuit, and the employment of a common selecting
 50 battery in railroad service, I shall not particularly describe these parts or their operations but rather limit my description to such elements and such functions as may relate to the invention forming the subject
 55 matter of this application.

60 In adapting the telephone system to simultaneous communication it has been necessary in order to obtain the highest results to employ “bridging” telephone circuits, instead of “series” telephone circuits as
 65 formerly employed, the selecting circuits however remaining “series” circuits, and although I describe a metallic “bridging” main telephone circuit in this application it will be understood that a grounded “bridg-

ing” main telephone circuit may be used instead.

The selecting instruments of each telephone station are located upon a telephone circuit which “bridges” or connects the
 70 two sides of the main telephone line at each telephone station. This telephone circuit is normally open, that is it is open when the instruments are not in use, but is closed whenever the instruments are operated, either in selecting,—in being selected, or in using the
 75 emergency switch. The arrangement of the circuits shown in the drawings, is, omitting the conductor *a*¹⁰⁴ hereinafter described, a conventional one, the generator is open when not in use, while the bells or ringing movement is short circuited when the receiver is
 80 taken from the hook. The conductor *i*'' connects the switch *h*'' of the primary mechanism, with the conductor *v*'' of the metallic circuit or main telephone line, and the conductor *d*'' connects the binding post *c*'' of the telephone instrument with the conductor *v*³ of the metallic circuit or main
 85 telephone line.

Reference has been made to a telephone circuit “bridging” the main telephone line *v*'' *v*³ at each telephone station and it should be noted that while the conductors *i*'' and *d*'' always form a portion of this circuit,
 90 the remaining portion may be made up of various combinations of conductors depending upon the particular operations of the instruments. In “calling” the flow of the current through the generator *w*'' is from the main telephone conductor *v*'' by means
 95 of the conductor *i*'', switch *h*'', contact *f*'', conductor *e*'', binding post *a*'', conductor 107, binding post *c*'' and conductor *d*'' to the main telephone conductor *v*³. In being called the flow of the current is from the main telephone conductor *v*'' by means of
 100 the conductor *i*'', switch *h*'', conductor *l*'', brush *k*'', primary pointer *b*', contact *m*'', conductor *q*'', blade *p*³ of the emergency switch *p*'', conductor *t*'', brush *s*'', secondary pointer *g*', contact *z*', conductor *b*'', binding post *a*'', conductor 106, and ringer movement *c*⁸, binding post *c*'', and conductor *d*'' to the main telephone conductor *v*³.
 105 In emergency work the flow of the current is from the main telephone conductor *v*'' by means of the conductor *i*'', switch *h*'', conductor *l*'', brush *k*'', primary pointer *b*', contact *m*'', conductor *q*'', emergency blade *p*⁴, and emergency blade *p*³, conductor *a*³, binding post *a*'', conductor 107 and generator *w*'', binding post *c*'', conductor *d*'', to the main telephone conductor *v*³.
 110

The circuits of the currents above described in “calling”, “being called” and
 125 “emergency work”, are similar to, but not exactly the same as those described in my previous application, as the broken contact ring of the secondary mechanism shown and
 130

described in those applications has been omitted, and other changes have been made to adapt the present system to the new purpose, for which it is intended, for instance, the secondary mechanism now carries a common contact z^{101} , radially aligned between the highest indicating number upon the secondary dial and the center thereof. This contact z^{101} is engaged by the outer contact shoe z^{105} of the secondary pointer g' which also engages the individual calling contact z' employed in the previous mechanisms. A conductor a^{101} connects the common calling contact z^{101} with the conductor b'' leading to the binding post a'' of the telephone instrument. I shall now describe the current circuitings involved in this modification of the telephone circuits, explaining the circuitings that occur in both individual and simultaneous work, first taking the circuiting of the former as being the fundamental circuiting of the system and the least complex.

The junction point at which the conductor i'' connects with the main telephone conductor v'' is indicated by the reference character b^{102} , and the junction point at which the conductor d'' connects with the conductor v^3 is indicated by the reference character b^{103} .

When station a has made individual selection of station c by positioning his primary pointer in the usual manner, upon the indicating or calling number corresponding to station c the secondary pointer on station c will be positioned upon its individual calling contact z' , and the telephone circuit at station a will be closed across the main telephone line v'' , v^3 , by means of the switch h'' establishing connection between the conductors i'' , e'' , as the primary pointer of the primary mechanism of station a moves from the zero position, see Fig. 2, while at station c the telephone circuit is closed across the main telephone line v'' , v^3 by means of its secondary pointer engaging the individual calling contact z' of this station, see Fig. 3, and stations a and c are then closed upon the main telephone circuit. The interaction between the primary and secondary mechanisms is fully explained in my co-pending applications, Serial Numbers 387,949 and 411,730.

When the generator w'' at station a is operated a current will flow by means of the conductor 107, to the binding post e'' , then by means of the conductor d'' to the main telephone conductor v^3 , thence along the main telephone conductor v^3 to station c , then along the conductor d'' to the binding post e'' of station c , then by the conductors 106^a and 106 and the ringer movement e^8 to the binding post a'' , then by the conductor b'' to the individual calling contact z' , then by means of the secondary pointer g' , which is

now in engagement with its individual calling contact z' , to the brush s'' , then by the conductor t'' to the blade p^3 of the emergency switch passing along the blade p^3 and the conductor q'' to the contact plate m'' of the primary mechanism, then by means of the primary pointer b' to the brush k'' , then along the conductor l'' , to the switch h'' , then by means of the conductor i'' to the main telephone conductor v'' . The current flowing along the main telephone conductor v'' returns to the selecting or calling station a , by the means of the conductor, i'' , switch h'' , which is now closed, contact f'' , conductor e'' and binding post a'' of the telephone instruments at station a , and then by means of conductor 107 to the generator w'' which is the point of origin. A portion of this current of course will be shunted through the ringer movement of the selecting or calling station a . When the receivers x'' are taken from their hooks the ringer movement will be short circuited as is usual in telephony and the generator will be open, and the path of the speaking currents within the binding post a'' e'' will be through the conductor x^3 and emergency blade p^5 , conductor x^5 , receiver x'' , receiver conductor c^4 , (including condenser k^{101} and induction coil) switch hook c^6 , now engaging the usual receiver contacts, conductor 108 and conductor 106^a. Apart from these changes the path of the speaking or voice currents will be that traced in the circuiting of the ringer or generator currents. It will be understood that the engagement of the primary and secondary pointers with the contacts is made by means of spring contact shoes through which, of course, the currents circuit.

If while stations a and c are communicating, another station b employs the emergency circuit, the moving of the blade p^5 of the emergency switch p'' will close the ringer circuit of station b into the speaking circuit established between stations a and c . The path of the emergency current will then be as follows: From the generator w'' the current will flow by means of the conductor 107 to the binding post e'' , then by conductor d'' to the junction point b^{103} with the line v^3 . Here the current will divide, one part passing to the right along the telephone conductor v^3 to station c , passing through station c along the same path described as the circuit of the speaking currents and returning to station b over the line v'' . Leaving the line v'' at the junction point b^{102} , the current passes by means of the conductor i'' , to the switch h'' , then by conductor l'' to the brush k'' , along the primary pointer b' to the contact plate m'' , then along the conductor q'' to the emergency switch p'' whose blade p^5 is now in engagement with the blade p^4 , then along the

conductor w^3 to the binding post a'' , then along the conductor 107 to the generator w'' which is the place of origin. The other portion of the current on leaving the junction point b^{103} , passes to the left over the line v^3 , and reaching station a , follows the same path as the speaking currents before described, this particular circuiting however occurring in the inverse direction to that in which the speaking currents were traced to station c , and returning along the line v'' to the junction point b^{102} , of station b , unites with its complementary part and continues as described to its point of origin.

Station a can make simultaneous selection of stations b and c , i. e. station a can bring all of the stations of the system into simultaneous communication by moving the primary pointer of the primary mechanism until all of the secondary pointers engage with the common calling contacts z^{101} where the secondary pointers are arrested by the arrest of the primary pointer of the calling instrument as hereinafter described.

When all of the stations in the system are in simultaneous communication the circuit of the current is as follows: Commencing with the generator w'' of the selecting station the current flows by means of the conductor 107, binding post c'' , conductor d'' , to the main telephone conductor v^3 and passes from the main telephone conductor v^3 at the selected stations through the conductors d'' , binding posts c'' , conductors 106^a and signal instruments c^s , to the conductors 106, binding posts a'' , conductor b'' , conductors a^{101} , to the common calling contacts z^{101} , of the selected stations, to the secondary pointers g' , brushes s'' , conductors t'' , emergency switch blade p^3 conductors q'' , contacts m'' , primary pointers b' , brushes k'' , conductors l'' , switches h'' , conductors i'' , to the main telephone conductor v'' . From the main telephone conductor v'' the current continues to the generator w'' of the selecting station by means of the conductor i'' , switch h'' , contact f'' , conductor e'' , binding post a'' and conductor 107. If station a makes simultaneous selection of stations b and c its secondary pointer and each of the other secondary pointers will be on the common calling contact z^{101} while the primary pointers of the selected stations b and c will stand upon their initial or zero positions. The telephones of all the stations will then be connected by the main telephone line, the telephone instruments of station a being closed upon the main telephone line in the same manner as if said station were making an individual selection, for although the secondary pointer will stand upon the common calling contact, still on tracing backward from the binding post a'' through the conductor b'' , a^{101} , contact plate z^{101} secondary pointer g' , brush s'' ,

conductor t'' , emergency switch blade p^3 and conductor q'' to the contact m'' we arrive at a break or open circuit, the primary pointer not engaging said last mentioned contact. The ringing and speaking currents will then flow through stations a and b over exactly the same path as that traced for the circuiting of the current between stations a and c in the case of the individual selection of station c by station a , and with this single exception, instead of flowing from the conductor b'' to the individual calling contact z' and thence to the secondary pointer, they will now flow from the junction point b^{101} , on conductor b'' of station b , to conductor a^{101} , common calling contact z^{101} , and thence to the secondary pointer g' engaging the common calling contact.

The entire current from station a will not pass through station b , but will divide at the junction point b^{103} of the branch on which station b is located, and a portion of the current will pass on to station c by means of the main telephone conductor v^3 flowing through station c , over precisely the same circuit as that traced for the circuit through station b , and returning by means of the other main telephone conductor v'' to unite with its complementary portion at the junction point b^{102} of station b , and then continue to its point of origin in selecting station a . If there were stations to the right of station c , the current would again divide this time at the junction points of the branch through station c , and flowing to the right would subdivide a portion passing through each branch, in obedience to the laws of Ohm. Currents originating in the last station to the right of the system will pass out from that station and subdivide in the inverse order, through all stations to the left, while currents originating in an intermediate station will divide at that station and passing both to the right and left will subdivide in a way analogous to that above described; the principles of which are understood. Finally it may be noted that in the present scheme involving bridging telephone circuits, and in regard to individual selection or to the use of the emergency circuit if we were to transpose the two sides of the main telephone line between the connected stations so that the main telephone circuit will pass from the primary of one station to the secondary of the connected station and from the secondary of the first station to the primary of the second station, then the circuitings in the present system will follow exactly the circuits described in my previous applications neglecting the main part of the broken contact ring included in those applications.

I shall now describe those features which are intended more especially for use in a train despatching service, it being under-

stood that the same may be used in other service if desired. Each secondary mechanism carries upon its dial a pair of contact points z^{102} and z^{103} , alined on the radius which passes through its individual calling contact plate z' . The contacts z^{102} and z^{103} are located immediately within the contact z' and are engaged by an insulated contact shoe z^{104} carried by the secondary pointers g' . From the contact z^{102} , a conductor a^{102} leads to an automatic bell or buzzer c^{101} and then to a contact z^{110} engaging the switch hook c^6 of the local telephone instrument when said hook is in its normal position. From the contact z^{103} a conductor a^{103} leads through a local battery c^{102} and then to another contact z^{111} also engaging the switch hook c^6 , when the latter is in its normal position. When a secondary pointer is positioned to engage its individual calling contact z' it will also engage the contacts z^{102} and z^{103} , and the circuit above described, will be closed to permit of the battery c^{102} actuating the automatic signal c^{101} and producing automatically a calling signal at this particular station, which signal will be interrupted when the called party removes his receiver from the hook, such removal breaking the automatic calling circuit above described. The contacts z^{102} and z^{103} and the contact shoe z^{104} are made narrow so that the secondary pointer in sweeping across these contacts will not close the circuit long enough to produce a false call.

In selecting instruments intended for use in a despatching office such as station a , the primary mechanism will be provided with a special common arresting stop x^{104} located to correspond with the common calling contact z^{101} , which as previously stated is radially alined with the center of the secondary pointer and the highest station number shown in the present instance as 23. This stop like the zero stop possesses a spring x^{103} , which returns the stop to its normal "in" position after having been withdrawn from the path of the primary pointer, the spring being preferably a slotted spring or wire loop removably held by an adjustable locking nut and screw x^{102} as shown in Fig. 4. Both this stop and the zero stop x^{105} carry curving flanges or projections x^{101} upon the faces of their thumb pieces or buttons the opposing or adjacent extremities of the flanges nearly meeting so that an operator may separately raise the common arresting stop, x^{104} and zero stop x^{105} , or may raise the common arresting stop and zero stop simultaneously.

A station equipped with this device may ordinarily operate as a selecting station in simultaneous communication, may work in individual calls and communications, and then return the instruments to the common calling number without being obliged to sepa-

ately withdraw the common arresting stop and the zero stop in the initial stage of the work, and to separately insert the common arresting stop in the final stage, in other words the arrangement of these stops permits the operator at the selecting station by a single operation to release his primary pointer so that it may move to the required position on the primary dial and then return to its common calling position to be arrested by the common arresting stop. A means of this kind is particularly necessary in train despatching work where the train despatcher is required to arrange his connections with the fewest possible manual operations. A conductor a^{104} may be led from the receiver circuit just above the induction coil a^{100} to the conductor 108 thus including upon the receiver circuit, the receiver x'' , condenser k^{101} , and the induction coil a^{106} and permanently connect the receiver circuit from the conductor x^8 to the conductor 108 which may be described as permanently bridging this circuit across the branch on which its instruments are located.

The placing of the condenser k^{101} upon the receiving circuit offers such resistance to low frequency alternating currents as to cause sufficient generator current to circuit through the ringer movements and operate the same while the high impedance of the ringer movements to the rapidly oscillating speaking currents enables the receivers to be operated. Either operation can be accomplished in multiple, that is all ringers may be operated simultaneously or all receivers excited simultaneously. Thus when the system is being used for simultaneous work, any or all the parties upon the line may be able to "listen in" or overhear the messages transmitted over the line without removing their receivers from the hook and without interfering with the automatic calling circuit, the use of which may at any time be required by any of them—the use of a compensating microphone transmitter or its equivalent is contemplated for this purpose. When the receiver is removed the inductorium circuit of the telephone instruments will then be employed as usual, and the operating party may then speak, as well as listen, and without unnecessarily using the primary battery a^{107} . For convenience a train despatcher may leave his receiver off the hook as his automatic calling circuit is not required except when he temporarily leaves his instruments after placing all the instruments of the system at the zero position.

The upper half of the blade p^5 of the emergency switch p'' now carries an insulated conducting strip y^{101} , and when the switch p'' is in its normal position the conducting strip y^{101} engages at its upper extremity, a stationary contact y^{102} and when

the switch is moved to the emergency position, the conducting strip y^{101} engages a contact y^{104} situated to the right of the contact y^{102} , the emergency blade passing from one contact to the other without breaking circuit, the space between the contacts being sufficiently narrow as to be bridged by the engaging emergency blade. The lower extremity of the conducting strip y^{101} engages continually a third contact y^{103} . The relay actuating conductor c' connects the contact ring f of the primary mechanism with the contact y^{102} of the emergency switch and the contact y^{103} , of the emergency switch with the relay k .

The current circuits from the first part of the conductor c' to the contact y^{102} , through the conducting strip y^{101} to the contact y^{103} , and then through the second part of the conductor c' to the relay k . From a junction b^{104} on the main conductor d , a conductor a^{105} is led to the contact y^{104} .

When the emergency switch is moved to the emergency position the primary mechanism is cut out of the main selecting circuit, previously described, and the primary pointer may be independently manipulated for correction purposes, the main selecting circuit remaining intact during the operation, and the currents being shunted through the conductor a^{105} and emergency blade p^5 to the relay conductor c' .

Local troubles such as exhaustion of a main selecting battery, or failure of a locking device, and troubles arising from "faults" on the line such as crosses, grounds or breaks, which may interfere with the synchronism of the selecting mechanism may be corrected by the above means to insure facility and safety in a train despatching service.

In a service in which the line is in practically constant use a "common battery" a^{108} , may be used for energizing the main selecting circuit, the individual selecting batteries e' being removed, and the line closed across the gap that would otherwise be made by their removal. The common battery a^{108} is preferably located at a place outside the primary mechanism and the junction b^{104} preferably at a despatching or central station.

The selecting circuit will continue to be normally closed but with battery upon it, and while the primary mechanisms will then not be required to cut in and cut out selecting batteries, they will continue to act as circuit breakers or make-and-break devices controlling the relays, but if desired, the broken contact rings b of the primary mechanisms may be replaced by continuous rings, which will be understood, and which it will not be necessary to illustrate.

When either the common battery or the individual battery is employed for the se-

lecting circuit, one side of the metallic telephone line may be used as a common return for both the main telephone and main selecting circuits, but in systems having a few stations the selecting circuit composed of the conductor c' might be led directly through the positioning electro-magnet f' as shown in Fig. 5, in which case the relays k may be dispensed with.

The general method of operation of the telephone system in train despatching may now be briefly summarized.

A despatching office will act as the selecting station, and all the instruments will stand normally upon the common calling contact with the despatcher's receiver removed. In this position an operator at any station may report to the despatching office by removing his receiver from the hook of his telephone instrument, and may overhear the messages passing over the line without removing his receiver from the telephone hook. When a despatcher desires to call any particular station, he makes individual selection of the same, and upon that station responding he returns the instruments to the common calling contact, transmitting train or holding orders when the instruments are at this position, so that all stations may overhear. Business of a private nature however is transacted on the individual calling contacts as previously described in this application and my former applications. When one station desires to communicate with another station, to the exclusion of the remaining stations, the despatching station can be requested to shift the instruments to the zero position and the selecting station can then select the station with which communication is desired, the instruments being returned to the common calling contact by the despatching station when the selecting and selected stations have ended their communication, the secondary pointer automatically indicating this fact. If two stations are using the line for individual business, the train despatcher can at any time, by the use of his emergency switch signal for the use of the line, and when the despatcher is engaged in calling any station, any remaining station having urgent business to transact with the despatcher, may signal to him by means of the emergency circuit without breaking the communication between the despatcher and the station with which he is communicating. In simultaneous communication the calling will be done by means of the regular ringers of the telephone instruments.

It is obvious that the signaling or calling functions of this system may be employed independently of the communicating or telephoning functions, the selecting circuits and accessories remaining intact while the telephone circuits and telephone instru-

ments may be removed, the signal system then being used in combination with a separate common bridging telephone line a^{100} as shown in Fig. 6, that is to say without any
 5 mechanical or electrical connection with the latter other than a common return line a^{110} for the signal and telephone circuits. In this case the automatic signaling can be extended to include the common calling contact a^{101} for all stations; an extra pair of
 10 contacts a^{111} , a^{112} on the radius of the common calling contact of the secondary dial connected with the buzzer conductors a^{102} , a^{103} , by conductors a^{113} and a^{114} , respectively, being used for this purpose.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A telephone system comprising a selecting circuit, a selecting means consisting of a primary and secondary mechanism a relay for the secondary mechanism, an emergency switch, a relay circuit passing through the primary mechanism and the emergency switch, when in its normal position, to the relay, and a correction circuit from the selecting circuit through the emergency switch to the relay when the emergency switch is moved to its emergency position.

2. A telephone system comprising a telephone instrument having the usual local telephone circuits, a selecting means consisting of a primary mechanism, and a secondary mechanism actuated by the primary mechanism, the secondary mechanism having an individual calling contact connected with the local telephone circuits and a common calling contact connected with the local telephone circuits, and means forming part of the secondary mechanism by which the local telephone circuits may be selectively switched through the individual or common calling contacts, a signal supplemental to the telephone signal, contacts to be engaged by the switching means of the secondary mechanism, contacts to be engaged by the switch hook, and conductors connecting the supplemental signal with each of the last mentioned contacts.

3. A telephone system comprising a telephone instrument having the usual local telephone circuits, a selecting means consisting of a primary mechanism, and a secondary mechanism actuated by the primary mechanism, the secondary mechanism having an individual calling contact connected with the local telephone circuits, means forming part of the secondary mechanism by which the local telephone circuits may be switched through the individual calling contacts, a signal supplemental to the signal of the telephone instrument, contacts to be engaged by the switching means of the secondary mechanism, contacts to be engaged by the switch hook of the telephone instrument,

and conductors connecting the supplemental signal with all of the last mentioned contacts.

4. In a telephone apparatus a selecting instrument comprising a primary mechanism having a primary pointer and contacts engaged thereby, and a secondary mechanism controlled by the contacts having a secondary pointer and individual and common calling contacts, engaged by the secondary pointer.

5. In a telephone apparatus a telephone instrument having a signal circuit and a receiver circuit, a condenser in the receiver circuit, and a conductor joining the signal and receiver circuits energizing the receiver for speaking purposes while hanging on the switch hook.

6. In a telephone system comprising a number of telephone selecting instruments adapted for use in connection with telephone instruments and through which the local telephone circuits of the telephone instruments are connected with the main line by means of normally open sub-station circuits, a selecting circuit closed through all the selecting instruments to connect them in series so that the operation of the primary mechanism of any selecting instrument will cause the synchronous actuation of the secondary mechanisms of all the selecting instruments to close the sub-station circuits of any selected two telephone stations upon the main line or to close the substation circuits of all the telephone stations simultaneously upon the main line, and an emergency circuit connected to the signal set of the local telephone instrument and closed upon the main line by an emergency switch.

7. In a telephone system comprising a number of telephone selecting instruments adapted for use in connection with telephone instruments and through which the local telephone circuits of the telephone instruments are connected with the main line by means of normally open sub-station circuits, a selecting circuit closed through all the selecting instruments to connect them in series so that the operation of the primary mechanism of any selecting instrument will cause the synchronous actuation of the secondary mechanisms of all the selecting instruments to close the sub-station circuits of any selected two telephone stations upon the main line or to close the sub-station circuits of all the telephone stations simultaneously upon the main line.

8. A telephone system comprising a number of telephone selecting instruments each adapted for use in combination with a telephone instrument, and through which the local telephone circuits of the telephone instruments are connected with the main line by normally open sub-station circuits, each selecting instrument consisting of a primary

mechanism or impulse transmitter having a
primary pointer a series of contacts and a
telephone switch, and a secondary mechan-
ism or selector-switch having a secondary
5 pointer an actuating means therefor and a
second set of contacts, the substation circuits
being connected with the latter contacts and
with the first mentioned switch, a selecting
circuit passing through the primary pointer
10 and contacts to the actuating means of the
secondary pointer so that the operation of
any primary pointer will cause the synchro-

nous actuation of all the secondary pointers
to close the sub-station circuits of any select-
ed two telephone stations upon the main line 15
or to close the sub-station circuit of all the
telephone stations simultaneously upon the
main line.

Washington, D. C. October 3rd, 1908.

CHARLES FRANKLIN BRADBURN.

Signed in the presence of—

C. H. RICHES,

L. F. BROCK.