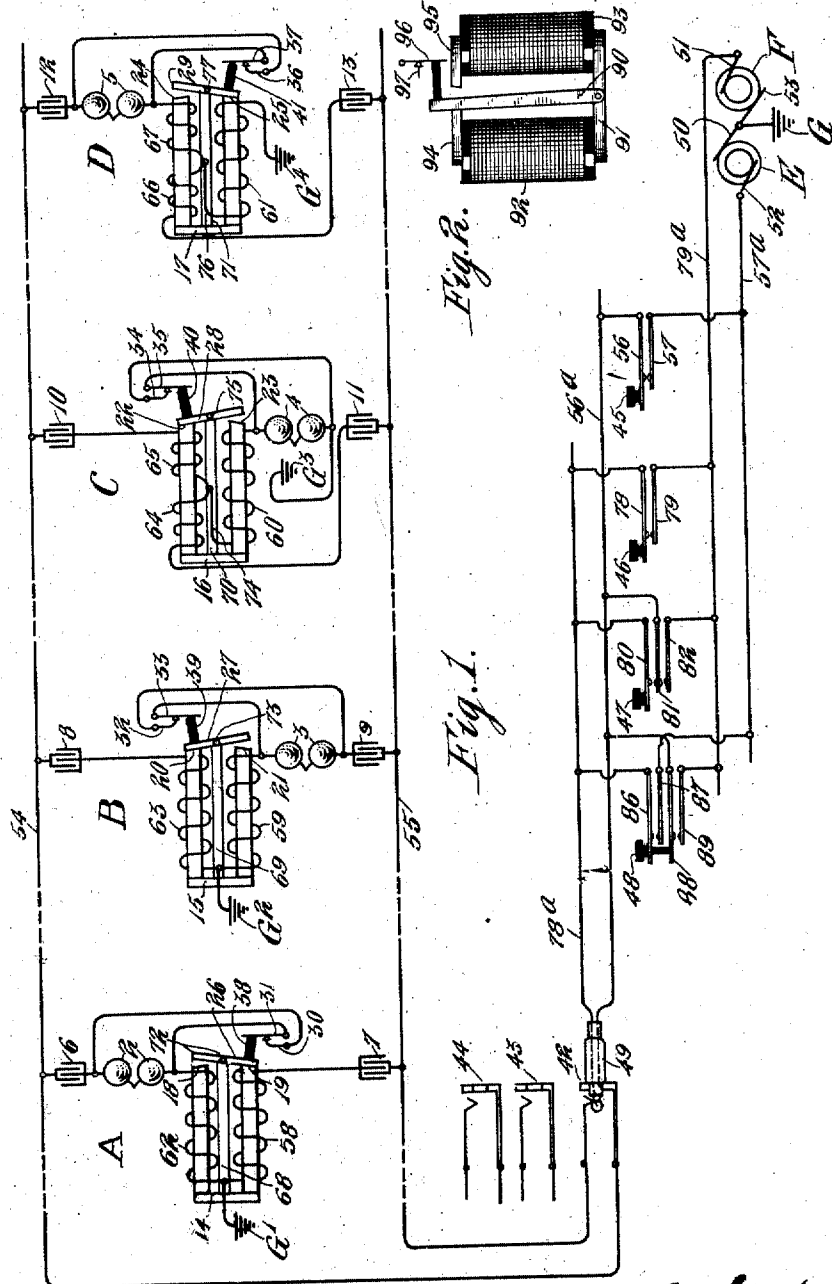


J. ERICKSON.
SELECTIVE SIGNALING SYSTEM.
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984,203.

Patented Feb. 14, 1911.



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UNITED STATES PATENT OFFICE.

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SELECTIVE SIGNALING SYSTEM.

984,203.

Specification of Letters Patent.

Patented Feb. 14, 1911.

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To all whom it may concern:

Be it known that I, JOHN ERICKSON, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Selective Signaling Systems, of which the following is a specification.

My invention relates to selective signaling systems in general, but more particularly to selective signaling systems adapted for use in connection with party-line telephone systems, and especially to selective signaling systems in which alternating electric currents are employed for selectively operating a plurality of signal-receiving means over the same line.

My invention contemplates the provision of certain improvements generally; but as there are several features which are disclosed and covered in my previous application Serial No. 274,491, filed August 16, 1905, it will be seen that my present invention is also more or less in the nature of an improvement upon the selective signaling system shown and described in my said prior application.

Generally stated, the object of my invention is to provide an improved and highly efficient selective signaling system.

Special objects of my invention are to provide an improved construction and arrangement involving a plurality of electric bells or ringers connected with the same line-circuit, together with double-wound relays for controlling normally-closed shunts or short-circuiting connections extending around the said bells or ringers, and a calling apparatus arranged at the central station and adapted for selectively operating the said bells or ringers; to provide an improved construction and arrangement whereby the establishment of the particular line-circuit for ringing any given bell or ringer serves also to automatically open the normally-closed shunt or short-circuiting connection extending around said bell or ringer, and whereby the similar connections extending around all other bells or ringers remain closed, thus insuring the desired selective and non-interfering character of the system; and to provide certain details and features of improvement tending to increase the general efficiency and serv-

iceability of a selective signaling system of this particular character.

In the accompanying drawings, Figure 1 is a diagram illustrating a selective signaling system embodying the principles of my invention, and showing a party-line having four telephone subscribers' stations thereon, together with the operators' selective calling apparatus at the exchange or central station. Fig. 2 is an enlarged detail view of one of the double-wound relays with which each subscriber's apparatus is equipped, which control the shunt or short-circuiting connections extending around the different bells.

As thus illustrated, the construction and mode of operation of my invention are as follows: The several subscribers' stations A, B, C and D are each provided with a polarized ringer 2, 3, 4 and 5, respectively; and said stations, in the order named, are each provided in addition with two condensers 6 and 7, 8 and 9, 10 and 11, and 12 and 13, and with a double-wound magnet 14, 15, 16 and 17, respectively, each of said magnets being provided with two pole-pieces 18 and 19, 20 and 21, 22 and 23, and 24 and 25, respectively, and an armature 26, 27, 28 and 29, respectively. Each of said ringers 2, 3, 4 and 5, in the order named, is short-circuited through two springs 30 and 31, 32 and 33, 34 and 35, and 36 and 37, respectively. Between each of the armatures 26, 27, 28 and 29, and one of the corresponding short-circuiting springs 31, 33, 35 and 37 there is an insulating-pin 38, 39, 40 and 41 serving as a plunger for moving the corresponding short-circuiting spring at proper times. Each line in the system terminates in a jack, such as the jacks 42, 43 and 44. The stations are so designed that by pressing any one of the push-buttons 45, 46, 47 and 48, while the plug 49 is connected with any particular line—the line leading to the sub-station A, B, C, and D, for example—some one of the four stations on said line will be signaled. That is, the arrangement is such that if the button 45 is pressed, the station A will respond, and if each of the succeeding buttons is likewise pressed, each of the succeeding stations will correspondingly be signaled in the same order.

To understand more clearly my invention, it will be advisable to follow the results accompanying the pressing of the individual buttons. It will be assumed, for the sake of simplicity, that while the buttons are being pressed the armatures of the generators E and F are in such positions that the brushes 50 and 51 are negative, and that the brushes 52 and 53 are positive; and the conductor 54 will be known as the sleeve-conductor, and conductor 55 as the tip-conductor. When the first button 45 is pressed the sleeve-conductor 54 is, through the conductor 56^a and springs 56 and 57, placed in connection with the positive terminal 52 of the generator E, by way of the conductor 57^a. Alternating current will then flow through each of the stations A, B, C and D from the sleeve-conductor to the grounded terminals G¹, G², G³ and G⁴, respectively, and back to the generator E through the ground terminal G. Each of the controlling-magnets comprises two independent magnetic circuits—that is, the coils 58, 59, 60 and 61 each controls a magnetic circuit which does not include the pole-pieces 18, 20, 22 and 24. Likewise, the coils 62, 63, 64 and 65, and 66 and 67 control magnetic circuits that do not include the pole-pieces 19, 21, 23 and 25. However, the magnetic circuits in the controlling-magnet 14, identified with the pole-pieces 18 and 19, use in common a magnetic conductor 68; likewise, magnetic circuits individual to the pole-pieces 20 and 21 respectively include also a common magnetic conductor 69; likewise the magnetic circuits through the pole-pieces 22 and 23 comprise in common a magnetic conductor 70; and the magnetic circuits identified with the pole-pieces 24 and 25 also use in common a magnetic conductor 71. Therefore, at the first station A, when the current passes through the condenser 6, springs 30 and 31 and the coil 62 to ground G¹, the armature 26 is attracted by the pole-piece 18, since the magnetic circuit includes the pole-piece 18 and magnetic conductor 68, upon which latter the armature 26 is supported; said armature, as well as the armatures 27, 28 and 29, being of magnetic material. As soon as the said armature 26 is attracted, the springs 30 and 31 are separated by the plunger 38 which, since the armature 26 is pivoted centrally at the point 72, is bound to travel directly away from the pole-piece 19. The short-circuit being removed from across the ringer 2, the current will then flow through said ringer instead of through the springs 30 and 31 as at first. The natural result is, then, that the signaling apparatus at this first station becomes energized, since after the short-circuit is removed, the current can do nothing but flow through the ringer 2. At the second station, the current passes through the coil 63 to ground G² from the sleeve-conductor 54, by way of the condenser 8. Said coil 63 becoming energized, the armature 27 is retained in its normal position by the magnetic force developed at the pole-piece 20. The bell 3 is not rung because no current passes through it, since there is no difference of potential between the condenser 9 and the ground G²; and even were there a difference of potential, then the current would pass by way of short-circuiting springs 32 and 33, rather than through the ringer. It will be understood, of course, that the armature 27 is pivoted centrally, the pivot being shown at 73. In the third station the current passes from the sleeve-conductor 54 through the condenser 10 and the coil 65, conductor 74, coil 60, springs 35 and 34 to ground G³. In this case, both the cores 22 and 23 become magnetized, but because of the air-gap between the armature 28 and pole-piece 23, the force holding said armature against pole-piece 22 is greater than the force tending to pull armature 28 from said pole-piece 22, about the pivot 75, and toward pole-piece 23. In addition, the tension of the spring 35 has a tendency to assist the force at the pole-piece 22. The armature 28 being, therefore, retained in its normal position, the short-circuit across the terminals of the ringer 4, through the springs 34 and 35, is not removed, and said ringer is, therefore, not energized. At the fourth station D the current passes from sleeve-conductor 54 through the condenser 12 and springs 36 and 37, through the coil 67, conductor 76, coil 61 to ground G⁴. Therefore, the pole-pieces 24 and 25 become magnetized, but owing to the air-gap between the former pole-piece and armature 29 the magnetism at pole-piece 25 overbalances the magnetism at pole-piece 24 in a tendency to rotate armature 29 about pivot 77; and the armature 29 remains in its normal position. Since the springs 36 and 37 remain in contact, the short-circuit across the ringer 5 is not removed, and the current, instead of passing through said ringer, cuts across through said springs without energizing the ringer. From what has been described, then, it is very plain that by pressing the push-button 45 only one station—station A—is signaled.

If the second push-button 46 is pressed, the terminal 51 of the generator F is connected with the tip-conductor 55 through the conductor 78^a, springs 79 and 78, and conductor 79^a. The current then, at the first station, passes from ground G¹ through coil 58 to condenser 7. Said coil 58 becomes magnetized, and the armature 26 is held against the pole-piece 19; therefore, the springs 30 and 31 remain closed. But even were the springs 30 and 31 separated, the ringer 2 would not be energized, since its terminals are not included in a live circuit.

At the second station, however, the current in passing from ground G^2 through coil 59, springs 32 and 33, condenser 9 to tip-conductor 55, magnetizes the coil 59; and the armature 27 is drawn by the pole-piece 21 about the pivot 73, so that the plunger 39 separates the spring 33 from the spring 32. At once the current is switched through the ringer 3 which, of course, will be rung. It is evident that the circuit of the current at this station passes from ground G^2 through coil 59 to ringer 3 and condenser 9 to the tip-conductor 55. At the third station, the current passes from ground G^3 through the short-circuiting springs 34 and 35, through coil 60, conductor 74, coil 64, condenser 11 to the tip-conductor 55. In this case, also, both the cores 22 and 23 become magnetized, but the air-gap between the pole-piece 23 and armature 28 renders the magnetic pull at the pole-piece 23 weaker than the pull at the pole-piece 22, and the spring 35, through the plunger 40, assists in overcoming the pull at the pole-piece 23, and thus the armature 28 remains inactive, and the bell 4 does not ring. It will be understood that the coils 60, 64 and 65 are all of the same magnetizing power. At station D the current passes from ground G^4 through the coil 61, conductor 76 and coil 66, and thence through condenser 13 to the tip-conductor 55. At said station, also, both sections of the controlling-magnet become magnetized as was the case at station C. Owing to the air-gap between pole-piece 24 and armature 29, however, the pull exerted on armature 29 by the pole-piece 25, assisted by the tension of the spring 37 in the same direction, overcomes the pull of the pole-piece 24 about the pivot 77. Naturally, since the armature remains inoperative, and, furthermore, since the terminals of ringer 5 are not included in any magnetizing circuit, the ringer at that station remains inactive. In this way, when the button 46 is pressed, only the ringer at station B is energized. Similarly, when the third push-button 47 is pressed, current passes from the ground terminals G^1 , G^2 , G^3 and G^4 through the various coils toward both the sleeve and tip conductors, simultaneously. At the first station, half of the current passes through ground G^1 , the coil 58, and the condenser 7, arriving at the tip-conductor 55 which, by way of the springs 80, 81 and 82, reaches conductor 79^a and, therefore, the generator terminal 51. The other path is from ground G^1 through coil 62, springs 31 and 30 and condenser 6 to the sleeve-conductor 54, thence by way of springs 81 and 82 to generator F. Both of the coils 62 and 58 become energized, but owing to the air-gap between pole-piece 18 and armature 26 said armature is retained by pole-piece 19, as has been described in connection with some of the

other stations. The armature 26 remaining inactive, the short-circuit across the bell 2 is not moved; consequently, said bell is not rung. At the second station, one path that the current takes extends from ground G^2 through coil 63 and the condenser 8 to the sleeve-conductor 54, and thence over conductor 56^a and through the springs 81 and 82 to the terminal 51 of the generator F. The other current passes from ground G^2 through coil 59, short-circuiting springs 33 and 32, condenser 9, tip-conductor 55, thence to conductor 78^a and to the generator F. Again both the cores of the controlling-magnet 15 are magnetized. Since the magnetizing forces of the coils 63 and 59 are the same, the armature 27 remains inactive for the reason described in connection with station A; therefore, the bell 3 does not ring, since the short-circuit through the springs 32 and 33 is not removed. At the third station, however, only the coil 60 of the controlling-magnet 16 becomes magnetized, and the armature 28 is attracted by the pole-piece 23, which latter rotates the former about the pivot 75. The current at this station passes from ground G^3 through the short-circuiting springs 34 and 35 and coil 60 to the conductor 74. It then branches, half passing through coil 64 and half through coil 65; the magnetizing effect of the coils 65 and 64 upon the core 22 is neutralized, leaving the pole-piece 23, as was stated, to do its work. As soon as the springs 34 and 35 are separated by the plunger 40, the current is forced to pass through the ringer 4 on its way through coil 60, operating said ringer. At the station D the current comes from ground G^4 through coil 61 to the conductor 76. Here, also, it branches into the coils 66 and 67, which are so wound that under these conditions their magnetizing tendencies upon the core are neutralized. Evidently, then, since only the pole-piece 25 exerts a pull on armature 29, the latter is retained inoperative and the bell 5 remains short-circuited.

It is evident that the current that passes through coil 66 reaches the tip-conductor 55 through the condenser 13, and the current passing through the coil 67 reaches the sleeve-conductor 54 by passing through the springs 37 and 36, and through condenser 12. Obviously, then, by pressing the button 47 the stations A, B and D are allowed to remain silent, station C being the only one to respond. The only step remaining now is to press the button 48, thereby placing the conductors 54 and 55, respectively, through the springs 86, 87, 88 and 89, in connection with the terminals 52 and 51 of the generators. In this way, the negative terminal 51 of the generator F is placed in connection with sleeve-conductor 54, and the positive terminal of the generator E is

placed in connection with tip-conductor 55. Under such conditions, the said generators are bridged in series across the line-conductors. At the different stations the coils are so wound that all circuits between the ground-terminals G^1 , G^2 , G^3 and G^4 and the generator-terminals 52 and 51 are balanced. Currents, therefore, will not pass through the ground return circuit, but instead from one line-conductor to the other through the stations. At station A, for instance, a circuit extends from the tip-conductor 55 through the condenser 7, magnet-coils 58 and 62, spring 31 and 30, condenser 6, to the sleeve-conductor 54. Evidently, both the coils 58 and 62 become magnetized, and it has been pointed out that under such conditions the bell at the station will not ring. At the second station the current enters the condenser 9 and passes through the springs 32 and 33, coils 59 and 63 to the condenser 8, and to the sleeve-conductor 54. Here, also, both coils 59 and 63 become magnetized, and for the same reason the bell at the station does not ring. At the third station the current circuit may be traced from the tip-conductor 55 through the condenser 11, coils 64 and 65, condenser 10 to the sleeve-conductor 54. It is evident that only the coils 64 and 65 become magnetized; therefore, of the two pole-pieces 23 and 22, only the latter becomes magnetized. It has also been pointed out that these conditions do not enable the bell 4 to ring. At the last station—station D—the circuit may be traced through condenser 13, coils 66 and 67, through springs 37 and 36 and the condenser 12 to the conductor 54. Pole-piece 24, becoming magnetized, attracts the armature 29, rotating the latter about the pivot 77, and causing the plunger 41 to separate the spring 37 from spring 36. Thus the current that magnetized the coils 66 and 67, in order to continue its flow, is forced to pass through ringer 5, causing the latter to produce a sound. Of course, the currents thrown on the line-conductors 54 and 55, by the closing of the push-button, very rapidly alternates in character; but it is clear to any one familiar with the relations of electric currents and their magnetic effects, that the results described in assuming the generator-terminals 52 and 53 are positive, and terminals 50 and 51 negative, for the time being, will be the same if the polarities of the said terminals are reversed. It will be understood, also, for instance, in connection with station A, that when the coil 62 is magnetized alone, and the springs 31 and 32 separated by the armature 26 being attracted to said pole-piece, the current that magnetized said coil 62 also rings the bell 2; and notwithstanding that said current is alternating, the magnetism developed in the pole-piece 18 is able to retain the armature 26 against said pole-

piece as long as the button 45 is pressed. Thus when the button 45 is pressed, of the short-circuits or shunts around each of the ringers 2, 3, 4 and 5, only the short-circuit around the ringer 2 is removed, and the current that magnetizes the core 18 and attracts the armature 26 passes on its way through the ringer 2, instead of across the short-circuiting loop that includes the springs 30 and 31. Similarly, when the second button 46 is pressed, only the armature of the controlling-magnet at the second station B is attracted, and only the ringer 3 will ring. Likewise, when button 47 is operated the ringer at the third station sounds an alarm, because only at that station does the controlling-magnet become operative to remove the short-circuit from around the ringer (ringer 4) which then receives the current that causes it to become active. Finally, when the fourth button 48 is pressed, the armature 29 at the fourth station D becomes attracted for reasons already described, and the current on passing from one line-conductor to the other passes through the ringer 5 with the desired effect. Clearly, then, if a line has bridged across it only one station—station A, for instance—it is possible to ring that station by pressing the proper button, button 45. Any one of the other stations may be retained across the line alone, and it would be possible to ring said station by pressing the proper button. Also, two stations only may be across the line, or even three. As each station works absolutely independently of the other stations, there will be no confusion in a system operating with this arrangement, whether all the lines carry the maximum number of stations or not. My description has been confined to one line whose conductors are designated as 54 and 55; but should there be another line provided with stations similar to the ones above described, terminating in the jack 43, for instance, any one of said stations could be signaled by removing the plug 49 from the jack 42 and inserting it instead in the said jack 43, and by then pressing the proper button.

Fig. 2 shows a modified form of the controlling-magnets, involving the same principles that have been described in the foregoing—stations A, B, C and D. The modification in structure is the main feature. The magnetic conductor 90 is similar to the magnetic conductor 68 in station A, and is pivotally secured from its lower end to the yoke 91 that joins the coils 92 and 93. Said member is held in normal position against the pole-piece 94 or 95, as it may be desired, by the tension of the spring 96 which, in connection with spring 97, forms a short-circuiting means similar to the means embodying the springs 31 and 30 in station A. The same method of wiring is carried out which

has been illustrated in Fig. 1. For instance, the coil 92 would take the place of the coil 58 in station A, and the coil 93 the place of coil 62 at the same station. If employed at station C, for instance, the windings 64 and 65 would be duplicated on the core inclosed by the coil 92. It will be borne in mind that the generators should run in synchronism, so that the effects described in the foregoing may be true. It has been found that good results are obtained by having the coils 58, 59, 60, 61, 62, 63, 64, 65, 66 and 67 all of about 500 ohms resistance each. Of course, after the armatures 26, 27, 28 and 29 are attracted, they are then returned to their normal positions, when the magnetizing force ceases, by the springs 31, 33, 35 and 37.

With the exception of the bell at the subscriber's station C, all of the different subscribers' bells or ringers are bridged across the complete metallic line-circuit comprising the parallel line-conductors 54 and 55. At the said subscriber's station C, however, the bell 4 is included in the connection to ground, rather than in the bridge between the two sides of the line-circuit. At the subscribers' stations A and B the relays have both of their coils connected in series with the bell, and in series with the two condensers, so that both coils at each station are in bridge across the talking-circuit. At the stations C and D, however, the relays each have a coil which is not included in the bridge, and which is simply connected to ground. At the stations A and B, the ground connection extends from between the coils on the two cores of the relay. If a centralized source of current supply is employed for furnishing the current for either talking or signaling purposes, or for both, such battery current is prevented by the condensers 6 to 13, inclusive, from flowing through the bridges in which the signal-receiving means are connected. It will be understood that any suitable, known or approved form of telephone instruments can be employed and associated with the different signal-receiving means at the different subscribers' stations. In a telephone system of this character, any suitable line and supervisory signals, for attracting the attention of the operator, may be employed and operated in any suitable or well-known manner. In the drawing, only enough of the operator's cord-circuit is shown to illustrate the use of the same as a part of the calling apparatus for selectively operating the different signal-receiving means located at the different subscribers' stations. In this case, also, it will be understood that the balance of the switch-board operator's apparatus may be of any suitable or desired character. The resistance of the various coils may, of course, be varied or adjusted to suit the requirements of different cases. The two generators, con-

nected and arranged to simultaneously develop impulses in the same direction, are connected together in series and grounded at a point between them. Various kinds of switching devices can, of course, be employed for connecting the generators with the line-circuit.

I do not limit myself to the exact construction shown and described, as it is obvious that various changes and modifications can be made therein without departing from the spirit of my invention.

What I claim as my invention is:—

1. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and a calling apparatus for selectively operating said signal-receiving means over the said circuit, said calling apparatus including a couple of synchronized alternating current generators, said generators being connected in series and grounded at a point between them, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening up such shunt or short-circuiting connection when the bell is to be rung.
2. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening and holding open said shunt or short-circuiting connection when the bell is to be rung.
3. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening and holding open said shunt or short-circuiting connection when the bell is to be rung.
4. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus normally

disconnected from the said line-circuit, but adapted to be connected therewith for the purpose of selectively operating the said signal-receiving means, said calling apparatus including a plurality of generators connected in series and grounded at a point between them, together with a plurality of ringing-keys controlling the flow of current from the generators to the line-circuit and corresponding in number to the said signal-receiving means, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening and holding open said shunt or short-circuiting connection when the bell is to be rung.

5. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected thereto for the purpose of selectively operating said signal-receiving means, said calling apparatus including a plurality of alternating current-generators connected in series and grounded at a point between them, together with a plurality of ringing-keys whereof one is adapted for including one of said generators in series with the ground and one side of the line-circuit, another for connecting the other side of the line-circuit in series with the ground and the other generator, another for connecting one of the generators in a ground-circuit including both sides of the line-circuit in parallel, and the other for connecting both generators in series in a complete metallic circuit including both sides of the line, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening up such shunt or short-circuiting connection when the bell is to be rung.

6. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said line-circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of the signal-receiving means, and a calling apparatus for selectively operating the said signal-receiving means over the said line-circuit, said calling apparatus including a plurality of alternating current-generators connected in series, and each connected with ground, together with a plurality of selective ringing keys corresponding in number to the signal-receiving means, and adapted for connecting up the generators in as many different circuits as there are signal-receiving means, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-cir-

cuiting connection extending around said bell or ringer, and means for automatically opening up such shunt or short-circuiting connection when the bell is to be rung.

7. A selective signaling system comprising a complete metallic subscriber's line, a spring-jack in which the said line terminates, a cord circuit provided with a plug adapted for insertion in said jack, a plurality of alternating current-generators connected in series and grounded at a point between them, a plurality of keys for variously connecting the generators with either one or both sides of the cord-circuit, and a plurality of signal-receiving means bridged across the said line, each bridge being grounded, and each signal-receiving means being adapted to be operated by its allotted key and no other, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening up such shunt or short-circuiting connection when the bell is to be rung.

8. A selective signaling system comprising a complete metallic subscriber's line, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of said signal-receiving means, and a calling apparatus normally disconnected from the said line, but adapted to be connected thereto for the purpose of selectively operating the said signal-receiving means over the said line, said calling apparatus including a plurality of alternating current-generators, together with switching devices adapted for variously connecting one or more of said generators with either one or both sides of the line-circuit, and whereby said generators may be connected up in as many different circuits as there are signal-receiving means, each signal-receiving means being responsive only when its allotted line-circuit is closed, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening up such shunt or short-circuiting connection when the bell is to be rung.

9. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and a calling apparatus for selectively operating said signal-receiving means over the said circuit, said calling apparatus including a couple of synchronized alternating current generators, said generators being connected in series and grounded at a point between them, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or

short-circuiting connection extending around said bell or ringer, and means for automatically opening up such shunt or short-circuiting connection when the bell is to be rung.

10. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening and holding open said shunt or short-circuiting connection when the bell is to be rung.

11. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening and holding open said shunt or short-circuiting connection when the bell is to be rung.

12. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected therewith for the purpose of selectively operating the said signal-receiving means, said calling apparatus including a plurality of generators connected in series and grounded at a point between them, together with a plurality of ringing keys controlling the flow of current from the generators to the line-circuit and corresponding in number to the said signal-receiving means, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening and holding open said shunt or short-circuiting connection when the bell is to be rung.

13. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded, and a calling apparatus normally disconnected

from the said line-circuit, but adapted to be connected thereto for the purpose of selectively operating said signal-receiving means, said calling apparatus including a plurality of alternating current-generators connected in series and grounded at a point between them, together with a plurality of ringing-keys whereof one is adapted for including one of said generators in series with the ground and one side of the line-circuit, another for connecting the other side of the line-circuit in series with the ground and the other generator, another for connecting one of the generators in a ground-circuit including both sides of the line-circuit in parallel, and the other for connecting both generators in series in a complete metallic circuit including both sides of the line, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening up such shunt or short-circuiting connection when the bell is to be rung.

14. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said line-circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of the signal-receiving means, and a calling apparatus for selectively operating the said signal-receiving means over the said line-circuit, said calling apparatus including a plurality of alternating current-generators connected in series, and each connected with ground, together with a plurality of selective ringing-keys corresponding in number to the signal-receiving means, and adapted for connecting up the generators in as many different circuits as there are signal-receiving means, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening up such shunt or short-circuiting connection when the bell is to be rung.

15. A selective signaling system comprising a complete metallic subscriber's line, a spring-jack in which the said line terminates, a cord circuit provided with a plug adapted for insertion in said jack, a plurality of alternating current-generators connected in series and grounded at a point between them, a plurality of keys for variously connecting the generators with either one or both sides of the cord-circuit, and a plurality of signal-receiving means bridged across the said line, each bridge being grounded, and each signal-receiving means being adapted to be operated by its allotted key and no other, at least one of said signal-receiving means comprising an electric bell or

ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening up such shunt or short-circuiting connection when the bell is to be rung.

16. A selective signaling system comprising a complete metallic subscriber's line, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of said signal-receiving means, and a calling apparatus normally disconnected from the said line, but adapted to be connected thereto for the purpose of selectively operating the said signal-receiving means over the said line, said calling apparatus including a plurality of alternating current-generators, together with switching devices adapted for variously connecting one or more of said generators with either one or both sides of the line-circuit, and whereby said generators may be connected up in as many different circuits as there are signal-receiving means, each signal-receiving means being responsive only when its allotted line-circuit is closed, at least one of said signal-receiving means comprising an electric bell or ringer, a normally closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening up such shunt or short-circuiting connection when the bell is to be rung.

17. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and a calling apparatus for selectively operating said signal-receiving means over the said circuit, said calling apparatus including a couple of synchronized alternating current generators, said generators being connected in series and grounded at a point between them, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open the said shunt or short-circuiting connection when it is desired to ring the bell.

18. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay

being adapted to open and hold open said shunt or short-circuiting connection when it is desired to ring the bell.

19. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open and hold open said shunt or short-circuiting connection when it is desired to ring the bell.

20. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected therewith for the purpose of selectively operating the said signal-receiving means, said calling apparatus including a plurality of generators connected in series and grounded at a point between them, together with a plurality of ringing-keys controlling the flow of current from the generators to the line-circuit and corresponding in number to the said signal-receiving means, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open and hold open said shunt or short-circuiting connection when it is desired to ring the bell.

21. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected thereto for the purpose of selectively operating said signal-receiving means, said calling apparatus including a plurality of alternating current-generators connected in series and grounded at a point between them, together with a plurality of ringing-keys whereof one is adapted for including one of said generators in series with the ground and one side of the line-circuit, another for connecting the other side of the line-circuit in series with the ground and the other generator, another for connecting one of the generators in a ground-circuit including both sides of the line-circuit in par-

allel, and the other for connecting both generators in series in a complete metallic circuit including both sides of the line, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt for short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open the said shunt or short-circuiting connection when it is desired to ring the bell.

22. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said line-circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of the signal-receiving means, and a calling apparatus for selectively operating the said signal-receiving means over the said line-circuit, said calling apparatus including a plurality of alternating current-generators connected in series, and each connected with ground, together with a plurality of selective ringing-keys corresponding in number to the signal-receiving means, and adapted for connecting up the generators in as many different circuits as there are signal-receiving means, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open the said shunt or short-circuiting connection when it is desired to ring the bell.

23. A selective signaling system comprising a complete metallic subscriber's line, a spring-jack in which the said line terminates, a cord-circuit provided with a plug adapted for insertion in said jack, a plurality of alternating current-generators connected in series and grounded at a point between them, a plurality of keys for variously connecting the generators with either one or both sides of the cord-circuit, and a plurality of signal-receiving means bridged across the said line, each bridge being grounded, and each signal-receiving means being adapted to be operated by its allotted key and no other, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open the said shunt or short-circuiting connection when it is desired to ring the bell.

24. A selective signaling system comprising a complete metallic subscriber's line, a plurality of signal-receiving means bridged across the said circuit, each bridge being

grounded and including a pair of condensers arranged at opposite sides of said signal-receiving means, and a calling apparatus normally disconnected from the said line, but adapted to be connected thereto for the purpose of selectively operating the said signal-receiving means over the said line, said calling apparatus including a plurality of alternating current-generators, together with switching devices adapted for variously connecting one or more of said generators with either one or both sides of the line-circuit, and whereby said generators may be connected up in as many different circuits as there are signal-receiving means each signal receiving means being responsive only when its allotted line-circuit is closed, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open the said shunt or short-circuiting connection when it is desired to ring the bell.

25. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and a calling apparatus for selectively operating said signal-receiving means over the said circuit, said calling apparatus including a couple of synchronized alternating current generators, said generators being connected in series and grounded at a point between them, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open the said shunt or short-circuiting connection when it is desired to ring the bell.

26. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open and hold open said shunt or short-circuiting connection when it is desired to ring the bell.

27. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus for selec-

tively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open and hold open said shunt or short-circuiting connection when it is desired to ring the bell.

28. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected therewith for the purpose of selectively operating the said signal-receiving means, said calling apparatus including a plurality of generators connected in series and grounded at a point between them, together with a plurality of ringing-keys controlling the flow of current from the generators to the line-circuit and corresponding in number to the said signal-receiving means, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open and hold open said shunt or short-circuiting connection when it is desired to ring the bell.

29. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected thereto for the purpose of selectively operating said signal-receiving means, said calling apparatus including a plurality of alternating current-generators connected in series and grounded at a point between them, together with a plurality of ringing-keys whereof one is adapted for including one of said generators in series with the ground and one side of the line-circuit, another for connecting the other side of the line-circuit in series with the ground and the other generator, another for connecting one of the generators in a ground-circuit including both sides of the line-circuit in parallel, and the other for connecting both generators in series in a complete metallic circuit including both sides of the line, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connect-

ed in series with said bell, said relay being adapted to open the said shunt or short-circuiting connection when it is desired to ring the bell.

30. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said line-circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of the signal-receiving means, and a calling apparatus for selectively operating the said signal-receiving means over the said line-circuit, said calling apparatus including a plurality of alternating current-generators connected in series, and each connected with ground, together with a plurality of selective ringing-keys corresponding in number to the signal-receiving means, and adapted for connecting up the generators in as many different circuits as there are signal-receiving means, at least one of said signal-receiving means comprising an electric bell or ringer, a normally closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open the said shunt or short-circuiting connection when it is desired to ring the bell.

31. A selective signaling system comprising a complete metallic subscriber's line, a spring-jack in which the said line terminates, a cord-circuit provided with a plug adapted for insertion in said jack, a plurality of alternating current-generators connected in series and grounded at a point between them, a plurality of keys for variously connecting the generators with either one or both sides of the cord-circuit, and a plurality of signal-receiving means bridged across the said line, each bridge being grounded, and each signal-receiving means being adapted to be operated by its allotted key and no other, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open the said shunt or short-circuiting connection when it is desired to ring the bell.

32. A selective signaling system comprising a complete metallic subscriber's line, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of said signal-receiving means, and a calling apparatus normally disconnected from the said line, but adapted to be connected thereto for the purpose of selectively operating the said signal-receiving means over the said line, said calling apparatus including a plurality of alter-

nating current-generators, together with switching devices adapted for variously connecting one or more of said generators with either one or both sides of the line-circuit, and whereby said generators may be connected up in as many different circuits as there are signal-receiving means, each signal-receiving means being responsive only when its allotted line-circuit is closed, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open the said shunt or short-circuiting connection when it is desired to ring the bell.

33. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and a calling apparatus for selectively operating said signal-receiving means over the said circuit, said calling apparatus including a couple of synchronized alternating current generators, said generators being connected in series and grounded at a point between them, and each of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening the said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

34. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, and each of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening and holding open said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

35. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, and each of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-cir-

cuiting connection extending around such bell or ringer, and a relay adapted for opening and holding open said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

36. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected therewith for the purpose of selectively operating the said signal-receiving means, said calling apparatus including a plurality of generators connected in series and grounded at a point between them, together with a plurality of ringing-keys controlling the flow of current from the generators to the line-circuit and corresponding in number to the said signal-receiving means, and each of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening and holding open said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

37. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected thereto for the purpose of selectively operating said signal-receiving means, said calling apparatus including a plurality of alternating current-generators connected in series and grounded at a point between them, together with a plurality of ringing-keys whereof one is adapted for including one of said generators in series with the ground and one side of the line-circuit, another for connecting the other side of the line-circuit in series with the ground and the other generator, another for connecting one of the generators in a ground-circuit including both sides of the line-circuit in parallel, and the other for connecting both generators in series in a complete metallic circuit including both sides of the line, and each of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening the said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

38. A selective signaling system compris-

ing a metallic line-circuit, a plurality of signal-receiving means bridged across the said line-circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of the signal-receiving means, and a calling apparatus for selectively operating the said signal-receiving means over the said line-circuit, said calling apparatus including a plurality of alternating current-generators connected in series, and each connected with ground, together with a plurality of selective ringing-keys corresponding in number to the signal-receiving means, and adapted for connecting up the generators in as many different circuits as there are signal-receiving means, and each of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening the said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

39. A selective signaling system comprising a complete metallic subscriber's line, a spring-jack in which the said line terminates, a cord-circuit provided with a plug adapted for insertion in said jack, a plurality of alternating current-generators connected in series and grounded at a point between them, a plurality of keys for variously connecting the generators with either one or both sides of the cord-circuit, and a plurality of signal-receiving means bridged across the said line, each bridge being grounded, and each signal-receiving means being adapted to be operated by its allotted key and no other, and each of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening the said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils, each of which is in series with the bell or ringer.

40. A selective signaling system comprising a complete metallic subscriber's line, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of said signal-receiving means, and a calling apparatus normally disconnected from the said line, but adapted to be connected thereto for the purpose of selectively operating the said signal-receiving means over the said line, said calling apparatus including a plurality of alternating current-generators, together with switching devices adapted for variously connecting one or more of said generators with either one or both sides of the line-circuit, and whereby said generators

may be connected up in as many different circuits as there are signal-receiving means, each signal-receiving means being responsive only when its allotted line-circuit is closed, and each of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening the said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

41. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and a calling apparatus for selectively operating said signal-receiving means over the said circuit, said calling apparatus including a couple of synchronized alternating current generators, said generators being connected in series and grounded at a point between them, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening the said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

42. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening and holding open said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

43. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening and holding open said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils

each of which is in series with the bell or ringer.

44. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected therewith for the purpose of selectively operating the said signal-receiving means, said calling apparatus including a plurality of generators connected in series and grounded at a point between them, together with a plurality of ringing-keys controlling the flow of current from the generators to the line-circuit and corresponding in number to the said signal-receiving means, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening and holding open said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

45. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected thereto for the purpose of selectively operating said signal-receiving means, said calling apparatus including a plurality of alternating current-generators connected in series and grounded at a point between them, together with a plurality of ringing-keys whereof one is adapted for including one of said generators in series with the ground and one side of the line-circuit, another for connecting the other side of the line-circuit in series with the ground and the other generator, another for connecting one of the generators in a ground-circuit including both sides of the line-circuit in parallel, and the other for connecting both generators in series in a complete metallic circuit including both sides of the line, at one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening the said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

46. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said line-circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of the signal-receiving means, and a calling apparatus for selectively oper-

ating the said signal-receiving means over the said line-circuit, said calling apparatus including a plurality of alternating current-generators connected in series, and each connected with ground, together with a plurality of selective ringing-keys corresponding in number to the signal-receiving means, and adapted for connecting up the generators in as many different circuits as there are signal-receiving means, at least one of said signal-receiving means comprising an electric bell or ringer, a normally closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening the said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

47. A selective signaling system comprising a complete metallic subscriber's line, a spring-jack in which the said line terminates, a cord-circuit provided with a plug adapted for insertion in said jack, a plurality of alternating current-generators connected in series and grounded at a point between them, a plurality of keys for variously connecting the generators with either one or both sides of the cord-circuit, and a plurality of signal-receiving means bridged across the said line, each bridge being grounded, and each signal-receiving means being adapted to be operated by its allotted key and no other, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening the said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

48. A selective signaling system comprising a complete metallic subscriber's line, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of said signal-receiving means, and a calling apparatus normally disconnected from the said line, but adapted to be connected thereto for the purpose of selectively operating the said signal-receiving means over the said line, said calling apparatus including a plurality of alternating current-generators, together with switching devices adapted for variously connecting one or more of said generators with either one or both sides of the line-circuit, and whereby said generators may be connected up in as many different circuits as there are signal-receiving means, each signal-receiving means being responsive only when its allotted line-circuit is closed, at least one of said signal-receiving means comprising an electric bell or ringer,

a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening the said shunt or short-circuiting connection 5 when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

49. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and a calling apparatus for selectively operating said signal-receiving means over the said circuit, said calling apparatus including a couple of synchronized alternating current generators, said generators being connected in series and grounded at a point between them, and each signal-receiving means comprising a normally and locally short-circuited electric bell or ringer.

50. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, and each signal-receiving means comprising a normally and locally short-circuited electric bell or ringer, together with automatic means for holding the short-circuit open during operation of the ringer.

51. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, and each signal-receiving means comprising a normally and locally short-circuited electric bell or ringer, together with automatic means for holding the short-circuit open during operation of the ringer.

52. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected therewith for the purpose of selectively operating the said signal-receiving means, said calling apparatus including a plurality of generators connected in series and grounded at a point between them, together with a plurality of ringing-keys controlling the flow of current from the generators to the line-circuit and corresponding in number to the said signal-receiving means, and each signal-receiving means comprising a normally and locally short-circuited electric bell or ringer, together with automatic means for holding 65

the short-circuit open during operation of the ringer.

53. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected thereto for the purpose of selectively operating said signal-receiving means, said calling apparatus including a plurality of alternating current-generators connected in series and grounded at a point between them, together with a plurality of ringing-keys whereof one is adapted for including one of said generators in series with the ground and one side of the line-circuit, another for connecting the other side of the line-circuit in series with the ground and the other generator, another for connecting one of the generators in a ground-circuit including both sides of the line-circuit in parallel, and the other for connecting both generators in series in a complete metallic circuit including both sides of the line, and each signal-receiving means comprising a normally and locally short-circuited electric bell or ringer.

54. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said line-circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of the signal-receiving means, and a calling apparatus for selectively operating the said signal-receiving means over the said line-circuit, said calling apparatus including a plurality of alternating current-generators connected in series, and each connected with ground, together with a plurality of selective ringing-keys corresponding in number to the signal-receiving means, and adapted for connecting up the generators in as many different circuits as there are signal-receiving means, and each signal-receiving means comprising a normally and locally short-circuited electric bell or ringer.

55. A selective signaling system comprising a complete metallic subscriber's line, a spring-jack in which the said line terminates, a cord-circuit provided with a plug adapted for insertion in said jack, a plurality of alternating current-generators connected in series and grounded at a point between them, a plurality of keys for variously connecting the generators with either one or both sides of the cord-circuit, and a plurality of signal-receiving means bridged across the said line, each bridge being grounded, and each signal-receiving means being adapted to be operated by its allotted key and no other, and each signal-receiving means comprising a normally and locally short-circuited electric bell or ringer.

56. A selective signaling system comprising 130

ing a complete metallic subscriber's line, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of said signal-receiving means, and a calling apparatus normally disconnected from the said line, but adapted to be connected thereto for the purpose of selectively operating the said signal-receiving means over the said line, said calling apparatus including a plurality of alternating current-generators, together with switching devices adapted for variously connecting one or more of said generators with either one or both sides of the line-circuit, and whereby said generators may be connected up in as many different circuits as there are signal-receiving means, each signal-receiving means being responsive only when its allotted line-circuit is closed, and each signal-receiving means comprising a normally and locally short-circuited electric bell or ringer.

57. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and a calling apparatus for selectively operating said signal-receiving means over the said circuit, said calling apparatus including a couple of synchronized alternating current generators, said generators being connected in series and grounded at a point between them, at least one of said signal-receiving means comprising a normally and locally short circuited electric bell or ringer.

58. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and calling apparatus for selectively operating the said signal-receiving means over the said circuit; said calling apparatus including a couple of generators connected in series and grounded at a point between them, at least one of said signal-receiving means comprising a normally and locally short-circuited electric bell or ringer, together with automatic means for holding the short-circuit open during operation of the ringer.

59. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, at least one of said signal-receiving means comprising a normally and locally short-circuited electric bell or ringer, together with automatic means for holding the short-circuit open during operation of the ringer.

60. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected therewith for the purpose of selectively operating the said signal-receiving means, said calling apparatus including a plurality of generators connected in series and grounded at a point between them, together with a plurality of ringing-keys controlling the flow of current from the generators to the line-circuit and corresponding in number to the said signal-receiving means, at least one of said signal-receiving means comprising a normally and locally short-circuited electric bell or ringer, together with automatic means for holding the short-circuit open during operation of the ringer.

61. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected thereto for the purpose of selectively operating said signal-receiving means, said calling apparatus including a plurality of alternating current-generators connected in series and grounded at a point between them, together with a plurality of ringing-keys whereof one is adapted for including one of said generators in series with the ground and one side of the line-circuit, another for connecting the other side of the line-circuit in series with the ground and the other generator, another for connecting one of the generators in a ground-circuit including both sides of the line-circuit in parallel, and the other for connecting both generators in series in a complete metallic circuit including both sides of the line, at least one of said signal-receiving means comprising a normally and locally short-circuited electric bell or ringer.

62. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said line-circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of the signal-receiving means, and a calling apparatus for selectively operating the said signal-receiving means over the said line-circuit, said calling apparatus including a plurality of alternating current-generators connected in series and each connected with ground, together with a plurality of selective ringing-keys corresponding in number to the signal-receiving means, and adapted for connecting up the generators in as many different circuits as there are signal-receiving means, at least one of said signal-receiving means

comprising a normally and locally short-circuited electric bell or ringer.

63. A selective signaling system comprising a complete metallic subscriber's line, a spring-jack in which the said line terminates, a cord-circuit provided with a plug adapted for insertion in said jack, a plurality of alternating current-generators connected in series and grounded at a point between them, a plurality of keys for variously connecting the generators with either one or both sides of the cord-circuit, and a plurality of signal-receiving means bridged across the said line, each bridge being grounded, and each signal-receiving means being adapted to be operated by its allotted key and no other, at least one of said signal-receiving means comprising a normally and locally short-circuited electric bell or ringer.

64. A selective signaling system comprising a complete metallic subscriber's line, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of said signal-receiving means, and a calling apparatus normally disconnected from the said line, but adapted to be connected thereto for the purpose of selectively operating the said signal-receiving means over the said line, said calling apparatus including a plurality of alternating current-generators, together with switching devices adapted for variously connecting one or more of said generators with either one or both sides of the line-circuit, and whereby said generators may be connected up in as many different circuits as there are signal-receiving means, each signal-receiving means being responsive only when its allotted line-circuit is closed, at least one of said signal-receiving means comprising a normally and locally short-circuited electric bell or ringer.

65. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and a calling apparatus for selectively operating said signal-receiving means over the said circuit, said calling apparatus including a couple of synchronized alternating current generators, said generators being connected in series and grounded at a point between them, and each signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same.

66. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus

including a couple of generators connected in series and grounded at a point between them, and each signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same, together with automatic means for holding the short-circuit open during operation of the ringer.

67. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, and each signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same, together with automatic means for holding the short-circuit open during operation of the ringer.

68. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected therewith for the purpose of selectively operating the said signal-receiving means, said calling apparatus including a plurality of generators connected in series and grounded at a point between them, together with a plurality of ringing-keys controlling the flow of current from the generators to the line-circuit and corresponding in number to the said signal-receiving means, and each signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same, together with automatic means for holding the short-circuit open during operation of the ringer.

69. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said circuit, each bridge being grounded, and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected thereto for the purpose of selectively operating said signal-receiving means, said calling apparatus including a plurality of alternating current-generators connected in series and grounded at a point between them, together with a plurality of

ringing-keys whereof one is adapted for including one of said generators in series with the ground and one side of the line-circuit, another for connecting the other side of the line-circuit in series with the ground and the other generator, another for connecting one of the generators in a ground-circuit including both sides of the line-circuit in parallel, and the other for connecting both generators in series in a complete metallic circuit including both sides of the line, and each signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same.

70. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said line-circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of the signal-receiving means, and a calling apparatus for selectively operating the said signal-receiving means over the said line-circuit, said calling apparatus including a plurality of alternating current-generators connected in series, and each connected with ground, together with a plurality of selective ringing-keys corresponding in number to the signal-receiving means, and adapted for connecting up the generators in as many different circuits as there are signal-receiving means, and each signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same.

71. A selective signaling system comprising a complete metallic subscriber's line, a spring-jack in which the said line terminates, a cord-circuit provided with a plug adapted for insertion in said jack, a plurality of alternating current-generators connected in series and grounded at a point between them, a plurality of keys for variously connecting the generators with either one or both sides of the cord-circuit, and a plurality of signal-receiving means bridged across the said line, each bridge being grounded, and each signal-receiving means being adapted to be operated by its allotted key and no other, and each signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same.

72. A selective signaling system comprising a complete metallic subscriber's line, a plurality of signal-receiving means bridged across the said circuit, each bridge being

grounded and including a pair of condensers arranged at opposite sides of said signal-receiving means, and a calling apparatus normally disconnected from the said line, but adapted to be connected thereto for the purpose of selectively operating the said signal-receiving means over the said line, said calling apparatus including a plurality of alternating current-generators, together with switching devices adapted for variously connecting one or more of said generators with either one or both sides of the line-circuit, and whereby said generators may be connected up in as many different circuits as there are signal-receiving means, each signal-receiving means being responsive only when its allotted line-circuit is closed, and each signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same.

73. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and a calling apparatus for selectively operating said signal-receiving means over the said circuit, said calling apparatus including a couple of synchronized alternating current generators, said generators being connected in series and grounded at a point between them, at least one of said signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same.

74. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, and calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point between them, at least one of said signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same, together with automatic means for holding the short-circuit open during operation of the ringer.

75. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus for selectively operating the said signal-receiving means over the said circuit, said calling apparatus including a couple of generators connected in series and grounded at a point

between them, at least one of said signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with
 5 electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same, together with automatic means for holding the short-circuit open during operation of the ringer.

10 76. A selective signaling system comprising a line-circuit, a plurality of signal-receiving means connected with the said circuit, each signal-receiving means being grounded, and a calling apparatus normally
 15 disconnected from the said line-circuit, but adapted to be connected therewith for the purpose of selectively operating the said signal-receiving means, said calling apparatus including a plurality of generators
 20 connected in series and grounded at a point between them, together with a plurality of ringing-keys controlling the flow of current from the generators to the line-circuit and corresponding in number to the said signal-receiving means, at least one of said
 25 signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative
 30 when it is desired to ring the same, together with automatic means for holding the short-circuit open during operation of the ringer.

77. A selective signaling system comprising a metallic line-circuit, a plurality of signal-receiving means bridged across the said
 35 circuit, each bridge being grounded; and a calling apparatus normally disconnected from the said line-circuit, but adapted to be connected thereto for the purpose of selectively operating said signal-receiving means, said calling apparatus including a plurality
 40 of alternating current-generators connected in series and grounded at a point between them, together with a plurality of ringing-keys whereof one is adapted for including one of said generators in series with the
 45 ground and one side of the line-circuit, another for connecting the other side of the line-circuit in series with the ground and the other generator, another for connecting one
 50 of the generators in a ground-circuit including both sides of the line-circuit in parallel, and the other for connecting both generators in series in a complete metallic circuit including both sides of the line, at least one
 55 of said signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative
 60 when it is desired to ring the same.

78. A selective signaling system comprising a metallic line-circuit, a plurality of
 65 signal-receiving means bridged across the

said line-circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of the signal-receiving means, and a calling apparatus for selectively operating the said signal-receiving
 70 means over the said line-circuit, said calling apparatus including a plurality of alternating current-generators connected in series, and each connected with ground, together with a plurality of selective ringing-keys
 75 corresponding in number to the signal-receiving means, and adapted for connecting up the generators in as many different circuits as there are signal-receiving means, at least one of said signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or
 80 ringer operative when it is desired to ring the same.

79. A selective signaling system comprising a complete metallic subscriber's line, a spring-jack in which the said line terminates, a cord-circuit provided with a plug adapted
 90 for insertion in said jack, a plurality of alternating current-generators connected in series and grounded at a point between them, a plurality of keys for variously connecting the generators with either one or both sides
 95 of the cord-circuit, and a plurality of signal-receiving means bridged across the said line, each bridge being grounded, and each signal-receiving means being adapted to be operated by its allotted key and no other, at
 100 least one of said signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or
 105 ringer operative when it is desired to ring the same.

80. A selective signaling system comprising a complete metallic subscriber's line, a plurality of signal-receiving means bridged
 110 across the said circuit, each bridge being grounded and including a pair of condensers arranged at opposite sides of said signal-receiving means, and a calling apparatus normally disconnected from the said line,
 115 but adapted to be connected thereto for the purpose of selectively operating the said signal-receiving means over the said line, said calling apparatus including a plurality of alternating current-generators, together
 120 with switching devices adapted for variously connecting one or more of said generators with either one or both sides of the line-circuit, and whereby said generators may be connected up in as many different circuits
 125 as there are signal-receiving means, each signal-receiving means being responsive only when its allotted line-circuit is closed, at least one of said signal-receiving means comprising an electric bell or ringer, means nor-
 130

mally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same.

81. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, comprising means for supplying ringing current through as many different circuits as there are separate signal-receiving means, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening and holding open said shunt or short-circuiting connection when the bell is to be rung.

82. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, comprising means for supplying ringing current through as many different circuits as there are separate signal-receiving means, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and means for automatically opening and holding open said shunt or short-circuiting connection when the bell is to be rung.

83. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, comprising means for supplying ringing current through as many different circuits as there are separate signal-receiving means, and each signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open and hold open said shunt or short-circuiting connection when it is desired to ring the bell.

84. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, comprising means for supplying ringing current through as many different circuits as there are separate signal-receiving means, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay having one or more windings connected in series with said bell, said relay being adapted to open and hold open

said shunt or short-circuiting connection when it is desired to ring the bell.

85. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, comprising means for supplying ringing current through as many different circuits as there are separate signal-receiving means, and each of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around such bell or ringer, and a relay adapted for opening and holding open said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

86. A selective signaling system comprising a plurality of selective signaling-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, comprising means for supplying ringing current through as many different circuits as there are separate signal-receiving means, at least one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short circuiting connection extending around such bell or ringer, and a relay adapted for opening and holding open said shunt or short-circuiting connection when the bell is to be rung, said relay having a plurality of coils each of which is in series with the bell or ringer.

87. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, comprising means for supplying ringing current through as many different circuits as there are separate signal-receiving means, and each signal-receiving means comprising a normally and locally short-circuited electric bell or ringer, together with automatic means for holding the short-circuit open during operation of the ringer.

88. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, comprising means for supplying ringing current through as many different circuits as there are separate signal-receiving means, at least one of said signal-receiving means comprising a normally and locally short-circuited electric bell or ringer, together with automatic means for holding the short-circuit open during operation of the ringer.

89. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, comprising means for supplying ringing current through as many different

circuits as there are separate signal-receiving means, and each signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same, together with automatic means for holding the short-circuit open during operation of the ringer.

90. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, comprising means for supplying ringing current through as many different circuits as there are separate signal-receiving means, at least one of said signal-receiving means comprising an electric bell or ringer, means normally rendering the bell or ringer inoperative, together with electro-magnetic means for automatically rendering the bell or ringer operative when it is desired to ring the same, together with automatic means for holding the short-circuit open during operation of the ringer.

91. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, a relay controlling said shunt or short-circuiting connection and provided with two cores each having a winding thereon, the two windings being connected in series with the bell or ringer, and a ground connection extending from between the two windings of the relay, and the relay having a pivoted armature held normally away from the core upon which is mounted the winding connecting the ground with the bell, and held normally against the other core.

92. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, a relay controlling said shunt or short-circuiting connection and provided with two cores each having a winding thereon, the bell and one winding being connected in series between the ground and the middle point of the winding on the other core, and the relay having a pivoted armature held normally

away from the core having a winding connected between the bell and the middle point of the other winding and against the other core.

93. A selective signaling system comprising a plurality of selective signal-receiving means, and a suitable calling apparatus for selectively operating said signal-receiving means, one of said signal-receiving means comprising an electric bell or ringer, a normally-closed shunt or short-circuiting connection extending around said bell or ringer, and a relay controlling said shunt or short-circuiting connection and provided with two cores each having a winding thereon, one winding being connected between the ground and the middle point of the winding on the other core, the bell being connected between one side of the line-circuit and the winding which is connected to ground through the winding on the other core, said relay having a pivoted armature held normally away from the core having the winding which is grounded at its middle point, and against the other core.

94. In a telephone system, a party-line, a plurality of ringers on said line, a normally closed shunt around each ringer, and means including an armature operated and retained by the ringing current in position to hold said shunt or shunts open as long as the current remains on the line.

95. In a telephone system, a party-line, a plurality of ringers on said line, a normally closed shunt around one or more of said ringers, and means including an armature operated and retained by the ringing current in position to hold said shunt or shunts open as long as the current remains on the line.

96. In a telephone system, a party-line, a ringer on said line, a normally closed shunt around said ringer, and means including an armature operated and retained by the ringing current in position to hold said shunt open as long as the current remains on the line.

97. In a telephone system, a party-line, a plurality of ringers on said line, a normally closed shunt around each ringer, and relays having armatures adapted to remain stationary in attracted position for holding the shunts open and preventing closure thereof during the operation of said ringers.

Signed by me at Chicago, Cook county, Illinois, this 1st day of August, 1905.

JOHN ERICKSON.

Witnesses:

R. C. GIFFORD,

W. LEE CAMPBELL.