W. KAISLING.

SIGNAL TRANSMITTER.

APPLICATION FILED MAR. 21, 1910.

1,035,354.

Patented Aug. 13, 1912.

3 SHEETS—SHEET 1.

Fig. 2

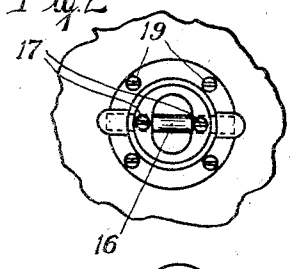


Fig. 1

Fig. 3

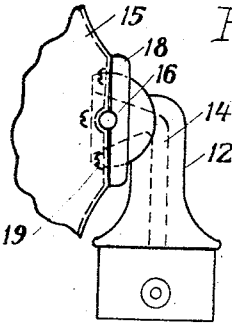
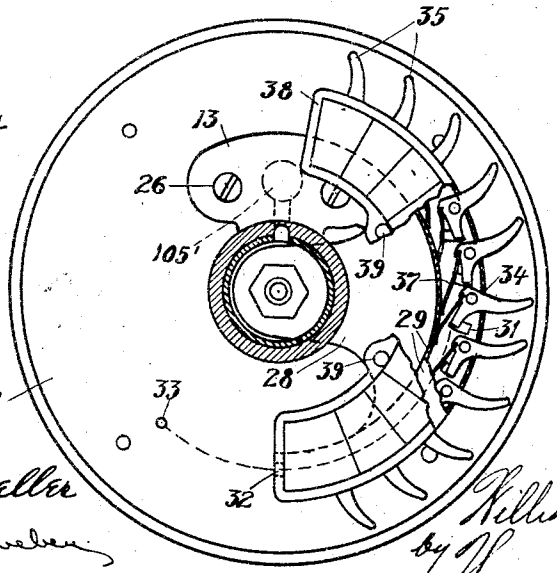


Fig. 4



Witnesses

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3 SHEETS—SHEET 2.

Fig. 5

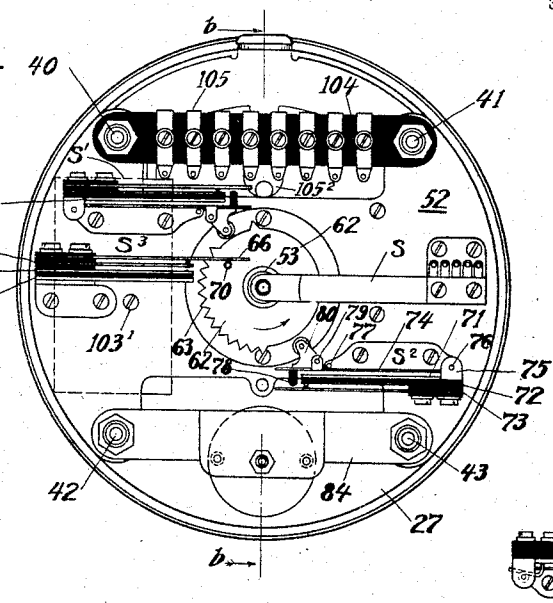
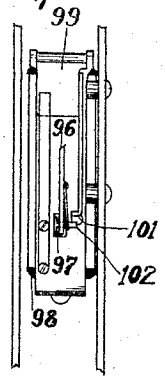


Fig. 6



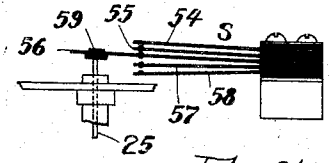


Fig. 7

Fig. 8

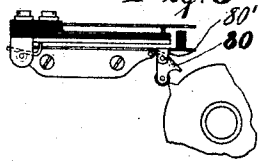


Fig. 9

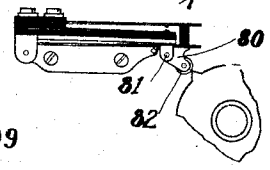
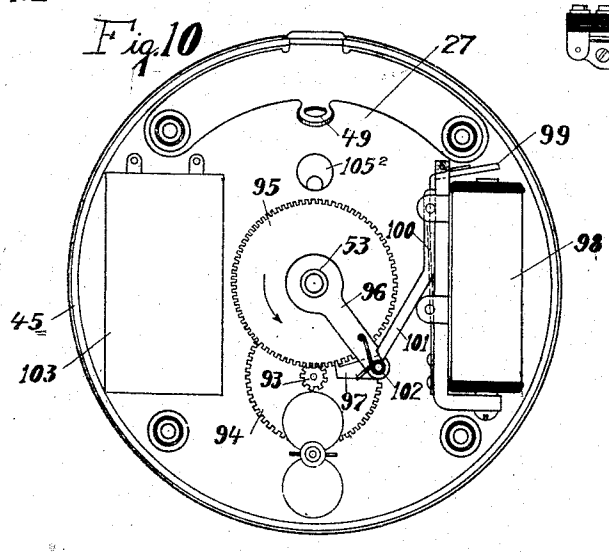


Fig. 10



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3 SHEETS—SHEET 3.

Fig. 11

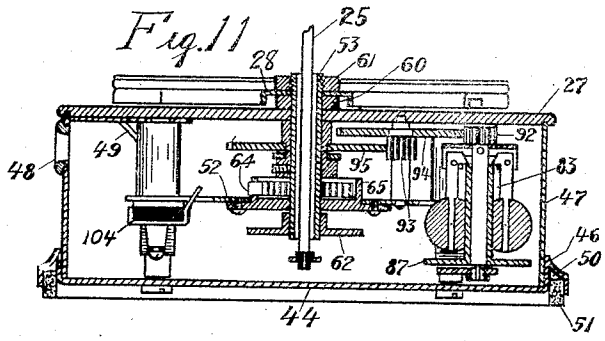


Fig. 11ª

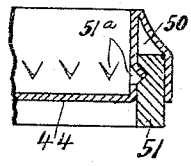


Fig. 12

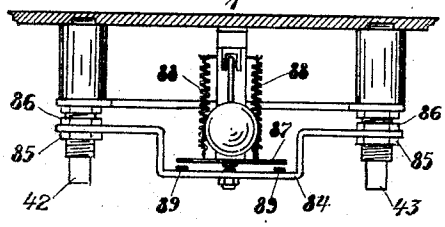
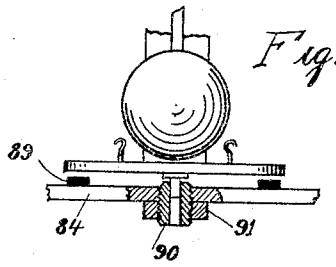


Fig. 13



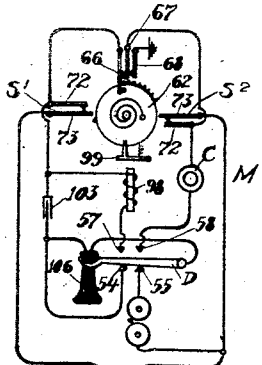


Fig. 15

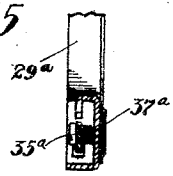


Fig. 16

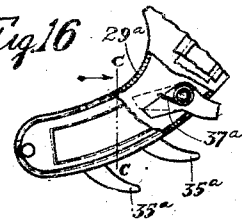
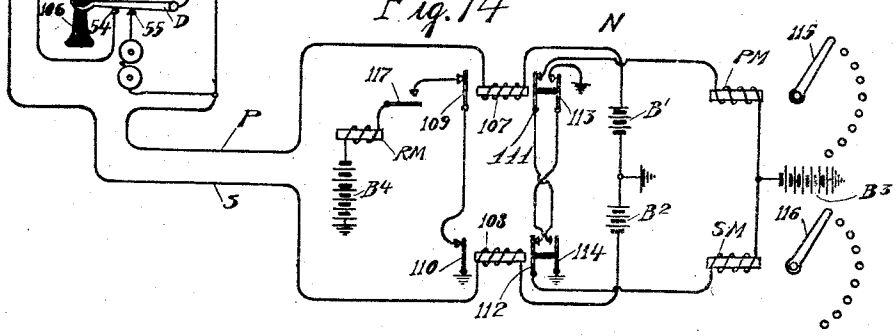


Fig. 14



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UNITED STATES PATENT OFFICE.

WILLIAM KAISLING, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD & SUPPLY COMPANY, A CORPORATION OF ILLINOIS.

SIGNAL-TRANSMITTER.

1,035,354. Specification of Letters Patent. Patented Aug. 13, 1912.

Original application filed May 3, 1907, Serial No. 371,641. Divided and this application filed March 21, 1910. Serial No. 550,663.

To all whom it may concern:

Be it known that I, WILLIAM KAISLING, a citizen of the United States, and resident of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Signal-Transmitters, of which the following is a specification.

The present invention relates to signal transmitters of the type commonly employed in automatic and semi-automatic telephony for the purpose of transmitting current impulses to directively operate associated switch mechanism.

The principal object of the invention is to provide a device of this sort which shall be certain and efficient in operation, simple in construction and economical to manufacture.

The present application is a division of my application Serial No. 371,641, filed May 3, 1907, for a telephone support, and the invention herein claimed is accordingly illustrated and described as part of a telephone desk-stand in which the transmitter forms the base for a standard which carries the transmitter and switch-hook at its upper end.

The many features and advantages of the transmitter structure herein described will be better understood upon reference to the following detailed description taken in connection with the accompanying drawing, and the scope of the invention will be particularly pointed out in the appended claims.

In the drawing, Figure 1 is an elevation of a desk-stand embodying as part of its structure a signal transmitter constructed in accordance with my invention, parts being shown in section and broken away for clearness; Figs. 2 and 3 are detail views illustrating the connection between the transmitter and the standard or pedestal; Fig. 4 is a plan view of the base showing a portion of the finger-hold mechanism in detail and the standard in section, the section being taken on a plane indicated by the line *a—a* of Fig. 1; Fig. 5 is a bottom plan view of the call mechanism as viewed after the removal of the bottom plate of the basal casing; Fig. 6 is a side elevation of a control magnet employed in such mechanism; Fig. 7 is a detail view illustrating the switch-hook contacts and the actuating means therefor; Figs. 8 and 9 are views which illustrate, in conjunction with Fig. 5, different operating positions of certain spring-contact mechanism; Fig. 10 is a view similar to Fig. 5 with the auxiliary supporting plate removed, showing the governor and its associated gearing, the control magnet therefor, and a condenser; Fig. 11 is a vertical section of the base and its contained mechanism, taken on a plane indicated by the line *b—b* of Fig. 5 and viewed in the direction of the arrows; Fig. 11ª is an enlarged detailed view showing a portion of the periphery of the base; Figs. 12 and 13 are views illustrating features of the governor mounting and construction; Fig. 14 is a diagram of a portion of an automatic telephone circuit, illustrating particularly the electrical connections to the apparatus shown in the other figures; and Figs. 15 and 16 are detail views of a modified construction of finger-hold mechanism, the section of Fig. 15 being taken on a plane indicated by the line *c—c* of Fig. 16.

Throughout these views, like characters refer to like parts.

Referring to the drawing in detail, it will be observed that the desk-stand includes a base A, which is preferably circular, a standard B, preferably extending from the center of said base, a transmitter C pivotally secured to the upper end of the standard, and a switch-hook D pivotally secured to the standard B near its upper end and operatively connected to the mechanism contained in the base A. The transmitter C may be of any preferred construction and in itself constitutes no part of the present invention. The standard B is made hollow to reduce the weight of the upper portion of the structure and to permit the passage of the connection between the switch-hook and the mechanism in the base and preferably comprises an inner metallic tube 10, an outer tube 11 of rubber, ebonite or other suitable insulating material, a metal cap 12 located at its upper end, and a metal bracket 13 located at its lower end. The cap 12 is provided with a suitable opening or passage 14 through which leads may extend from the transmitter terminals to the interior of the standard B, from which point they are led through the base, as hereinafter more par-

ticularly pointed out. The upper end of the cap 12 is provided with a transverse pin which is rigidly secured to the cap, preferably by means of screws 17; and the plate 18 and the adjacent portion of the transmitter shell 15 are arranged to tightly engage the pin 16 to thereby provide a frictional connection between the transmitter and the standard so that the transmitter will remain in any position to which it is moved by the user of the instrument.

The shell 15 is composed of springy material which is punched out in the manner indicated in Fig. 2 to provide a bearing surface for the pin 16; and the plate 18, which in the present case is more rigid, is provided with a similar bearing for the pin 16; but these bearing surfaces are so constructed that, without subjecting the shell 15 to flexure, the portions of the plate and shell on either side of the pin 16 will not come into engagement with each other when the parts are assembled, but, by means of the screws 19, the shell 15 and plate 18 are drawn together and the adjacent portions of the shell 15 are thereby flexed slightly and a good frictional engagement between the pin and its clamping members is thereby obtained. In the present instance, the upper end of the cap 12 is of spherical form and enters a circular opening in the shell 15 and the plate 18. Obviously, this same frictional effect might be obtained by modifying the structure herein disclosed in many ways which will be obvious to persons skilled in this art. The cap 12 is preferably secured to the inner metallic tube 10 by means of a screw 20 which also extends into a threaded opening in the bracket 21, which in turn is again secured to the under side of the adjacent portion of the cap 12 by screws 22. This bracket serves as a support for the switch-hook D which is pivoted thereto at the point 23. The switch-hook extends through a suitable opening 24 in the opposite wall of the standard, and a connecting rod 25 is secured to the switch-hook at a point adjacent to this opening and extends downward through the interior of the standard into operative relation with the call mechanism in the case A, as will be hereinafter more fully pointed out.

The metal bracket 13 at the lower end of the standard B is secured to one side of the center of the base A, preferably by screws 26, to the top of the top plate 27 of the basal casing. By this arrangement, the lower end of the standard overhangs the center of the base and sufficient space is left between it and the top of the plate 27 for the passage of a plate 28 which forms part of the finger-hold mechanism by which the signal mechanism within the case is actuated. The portion of the bracket 13, which is secured to the plate 27, also serves to limit the movement of the finger-hold mechanism by engaging at its opposite sides the opposite sides of the plate 28. The finger-hold mechanism includes, in addition to the plate 28, an arcuate plate 29 having a downward projecting flange adapted to rest upon a similar arcuate plate 30 whose flange extends into close proximity to the top of the plate 27. The plate 30 is provided at its top with a series of openings 31 and its flange is notched at 32 so as to allow the passage of a stop-pin 33 when the finger-hold mechanism is operated. The outer flange of the plate 29 is provided with a series of openings 34 through which the outer ends of a series of finger-levers 35, serving as finger-holds, are adapted to pass. These finger-levers are L-shaped and are, in each instance, pivoted, at the angle, between the horizontal portions of the plates 29 and 30, and their inner ends are turned down through the openings 31 in the plate 30 so as to provide stop projections 36. In each instance, the finger-lever is held normally by a spring 37 so that its stop projection 36 lies in the outer portion of the opening 31. When in this position, as clearly indicated by the dotted line extending through the stop-pin 33, the stop portion will not engage the pin 33 when the finger-hold mechanism is operated, but it will be apparent that whenever any particular finger-lever is pressed by the finger for the purpose of operating the finger-hold mechanism, its stop projection will be moved into the inner portion of the opening 31 and into a path which will cause it to engage the stop-pin 33, provided the finger-hold mechanism is moved far enough. In addition to the plates 29 and 30, the plate 29 is covered by an escutcheon plate 38 which is preferably secured in place by bolts 39. This escutcheon plate is adapted to hold in place a card or other device on which designations, corresponding to the finger-hold levers, are marked. In the operation of the mechanism, as is usual in such devices, the lever opposite the particular designation wanted is pressed by the finger in order to rotate the finger-hold mechanism, and the extent of this movement in each instance is determined by the particular finger-lever depressed, since the displaced lever is the one which engages the stop-pin 33.

The top plate 27 of the base A forms the main supporting plate for the mechanism contained within the base; and as clearly illustrated in the drawing, this mechanism is supported through the agency of four supporting posts 40, 41, 42, 43, which are firmly secured to the top plate in any preferred manner and extend downward into close proximity to the upper face of the bottom plate 44 of the casing. Suitable screws, passing through the case from the bottom and threaded into the lower ends of

these posts, serve to hold the parts together. The top plate is provided with a peripheral groove 45, and the bottom plate 44 is provided with a similarly disposed upturned flange 46, both of which engage the peripheral wall 47 of the casing and firmly hold it in place. With this construction, a substantially dust-proof casing is provided.

For the purpose of providing a suitable guide for the electrical conductors entering the base A, the wall 47 is cut away slightly so as to enable a guide-ring 48 to be used. This guide-ring 48 and a second guide-ring 49 are struck up out of a strip of metal which is held in place between the plate 27 and the upper ends of the posts 40, 41, as clearly indicated in Figs. 5, 10 and 11. In order to still further increase the stability of the structure over that which results from lowering its center of gravity, the bottom plate 44 is struck up so as to provide a groove 50 at its extreme outer edge; and into this groove, is inserted a strip 51 of leather, felt, or like fibrous material which, when the stand is in use, engages the supporting surface upon which the stand may be resting and tends to prevent its slipping or its ready rotation in case of accidental movement, as by the engagement of the clothing with the hook-levers 35.

The mechanism, contained within the casing formed by the plates 27, 44 and 47, comprises, in general, gear mechanism which is located between the plate 27 and an auxiliary supporting plate 52, and contact mechanism which is mounted on the lower side of said auxiliary supporting plate. For the purpose of operatively connecting the finger-hold mechanism located above the plate 27 and the gearing located below said plate, a hollow shaft 53 is provided. This shaft is journaled in the plates 27 and 52 and is provided with an opening throughout its length, through which the lower end of the rod 25, connected, as previously described, to switch-hook D, extends into operative relation with a set of spring-contacts s which is supported near the outer edge of the auxiliary supporting plate 52. This set includes spring-contacts 54, 55, 56, 57, 58, which are suitably insulated from each other and provided with proper connection terminals. As clearly illustrated in Fig. 7, contact 56 is longer than its fellows and it is this contact which is engaged by the rod 25 to vary the connections of the contacts. In order to prevent electrical contact between the rod 25 and contact 56, the latter is provided with a suitable insulating button 59, which the end of the rod 25 is adapted to engage. The upper end of the shaft 53 is secured to the finger-hold frame 28 in any suitable manner as by means of the collar 60 and the nut 61 cooperating therewith. The lower end of the shaft carries an actuating or impulse wheel 62, provided with a series of teeth 63 arranged in the manner indicated in Fig. 5, which is rigidly secured thereto so as to partake of the movement of the shaft and the finger-hold mechanism. The shaft 53 is also provided with a driving-spring 64 which is secured at one end to the shaft, and at its opposite end to a case 65 which in turn is secured to the auxiliary plate 52. With this arrangement, the movement of the finger-hold mechanism places the spring under tension and it tends to return the shaft 53 and its associated parts to normal position, which is that illustrated in Fig. 4, in which the right side of the bracket 13 and the left side of the plate 28 are in engagement.

In addition to the set of contacts s located on the under side of the auxiliary plate 52, said plate carries three other sets, designated respectively s^1, s^2, s^3. Each of these is separately mounted upon the auxiliary plate 52, preferably by means of screws, and each can be readily removed for purposes of inspection or repair. The set s^3 comprises spring contacts 66, 67, rigid contact 68, and a supporting plate 69. The supporting plate 69 terminates in a flanged end which serves as the means of securing the set of contacts to the plate 52 and it supports an insulating strip which separates it from the contact 68 and also supports the insulation which separates the contacts 66, 67. Contact 66 is longer than its fellows and is normally engaged by a pin 70 carried upon the actuating wheel 62 and located so as to maintain the contacts 66, 67, 68 out of engagement. Due to the inherent tension of contact 66, however, as soon as the wheel 62 is moved from normal, these contacts are brought into engagement. The sets of contacts s^1, s^2 are substantially identical and each comprises a rigid supporting strip 71, a fixed contact 72, a spring-contact 73, and a pivoted actuating member 74. The supporting strip 71 is provided with a flange by which the set is secured to the auxiliary plate 52 and it also has a laterally extending lug 75 between which and the bottom flange is pivoted the actuating member 74. This member is provided with a tension spring which is coiled about its pivot 76 and normally tends to hold it against the stop-pin 77. A block of insulation 78 serves as a spacer between the member 74 and the spring-contact 73. The strip 71 and contacts 72, 73, are suitably insulated from each other and the contacts are provided with suitable connection terminals. The tension of the spring-contacts 73 is such as to normally maintain contacts 72, 73 in engagement.

The actuating member 74 is provided near its free end with lugs 79 between which is pivoted a triangular engaging member 80. This engaging member is so constructed that upon the movement of the actuating

wheel 62 in the direction of the arrow in Fig. 5, it will rock about its pivot without separating contacts 72, 73; but upon the reverse movement of the wheel, these contacts will be disengaged and engaged upon the passage of each tooth. This action is clearly illustrated in Figs. 5, 8 and 9. As shown in Fig. 8, upon the forward movement, the portion of the member 80, which normally lies in engagement with member 74, is moved out of engagement and the contacts are not actuated; but upon the return movement, the application of pressure is in such a direction that the contacts are separated and remain in this position until the end of the tooth slips by the engaging portion of the member 80, whereupon the parts return to normal, due to the tension of the spring-contact 73 and the spring surrounding the pivot 76 of the actuating member 74. Obviously, the time consumed between the separation of the contacts and their subsequent engagement may be increased by adjusting the position of the set upon the plate 52 so as to move the member 80 nearer the shaft 53, and may be decreased by adjusting the set so as to move said member farther from said shaft. In order that the member 80 will return to its normal position after movement to the position illustrated in Fig. 8, it is provided with a small returning spring 80′ which is preferably spirally wound about its pivot 81. In order to decrease the friction between the parts, the portion of the member 80, which engages the teeth of the wheel 62, is provided with an anti-friction roller 82. Obviously, changes may be made in the details of this mechanism without departing from the spirit of the invention.

In order to regulate the speed of the actuating wheel 62, the shaft 53 is operatively connected to a governor 83. Any preferred type of governor may be employed for this purpose and in the present instance I have illustrated a centrifugal governor of the ball type. As clearly illustrated in Fig. 12, the governor shaft is journaled between the top plate 27 and a bridge 84 which unites the supporting posts 42, 43 and which is adapted to be adjusted through the agency of nuts 85, 86, threaded upon said posts. In the action of the governor, as the balls fly outward, they tend to depress the disk 87 downward in opposition to the upward pull of the springs 88. The disk 87 is adapted to engage friction blocks 89 of ebonite, rubber or other suitable material, carried by the bridge 84. As clearly illustrated in Fig. 13, the position of the lower bearing of the shaft of the governor may be nicely adjusted by means of the screw 90 threaded into the bridge 84 and retained in the desired position by the lock-nut 91.

The pinion 92 on the shaft of the governor is operatively connected to the shaft 53 by a suitable train of gearing including pinion 93 and gear-wheels 94, 95. In order that the governor may be brought into action only upon the return movement of the shaft 53 and its connected parts, a clutch is provided between said shaft and the gear-wheel 95, which is loosely journaled upon the shaft 53. This clutch comprises an arm 96 fixed to the shaft 53 and carrying at its outer end a pawl 97 which is provided with a spring tending to throw its engaging end into engagement with the teeth of the gear-wheel 95. Upon the movement of the arm 96 in the direction of the arrow in Fig. 10, the pawl 97 slips out of engagement with the teeth and readily passes over them without actuating the gear-wheel 95; but upon the return movement, caused by the driving-spring 64, the motion of the arm 96 is communicated to the train of gearing and thereby to the governor. By the engagement of the disk 87 with the friction blocks 89 of the governor, the return movement of the shaft 53 and its associated parts is retarded so as to provide a proper interval of time between the successive operations of the actuated spring-contacts.

In order to prevent the manipulation of the finger-hold mechanism prior to the removal of the receiver from the switch-hook D, an electromagnet 98 is mounted between the main and auxiliary supporting plates 27 and 52 in a position to control, through its armature mechanism, the initial operation of the shaft 53. This electromagnet has an angular armature 99 which is normally held in a retracted position by a spring 100 and which coöperates with an obstructing arm 101 to control the movement of the arm 96. The end of the arm 101 extends downward so as to lie normally in the path of movement of the pin 102 forming, in the present instance, an extension of the pivotal pawl 97; but when the armature is attracted, this arm 101 is thrown out of engaging position and the arm 96 may be freely rotated. This electromagnet is conveniently disposed with reference to the other parts of the mechanism and may be readily gotten at for purposes of repair or substitution. As clearly illustrated in Fig. 10, the condenser 103 of the subscriber's set may be conveniently located on the opposite side of the shaft 53 from the electromagnet 98 in compact relation with the various parts of the mechanism and clamped against the top plate 27 by a screw 103^1 threaded through the auxiliary plate 52.

For convenience in making electrical connections to the various parts of the apparatus, a bridge 104 of insulating material is arranged between the supporting posts 40, 41, to the opposite side of the shaft 53 from the bridge 84 and provided with a series of

terminals 105. With this arrangement, the connections within the instrument may be made between the various contacts and these terminals and external connections may be made at any time with these terminals. In extending the telephone transmitter leads from the standard B to the contacts on the bridge 105, they are preferably led through a channel 105^1 extending through the bracket 13 at the base of the standard and a registering opening 105^2 in the top plate 27, the former being indicated in dotted lines in Fig. 4, and the latter being partially shown in Fig. 5.

In order to illustrate one application of the invention, I have provided Fig. 14 in which the various elements of the mechanism heretofore described are diagrammatically illustrated. According to this diagram, the substation, which is designated M, is connected by line limbs P, S, with automatic switch mechanism at the exchange, designated N. As far as possible in this diagram, the same reference characters are used as heretofore, in order to connect the parts of the different figures with the diagram. In operation, a party at substation M, desiring to obtain connection with a line running to some other substation, first removes his receiver 106 from the switch-hook D, thereby interrupting the normal circuit between contacts 54, 55, and closing a circuit between contacts 57, 58. In the mechanical construction, this is brought about through the agency of the rod 25 which extends down through the standard and the hollow shaft 53 into engagement with the spring-contact 56. While the receiver is on the hook, the contacts are in the position illustrated in Fig. 7; but upon removing the receiver, contacts 56, 57, 58 come into engagement. The closing of contacts 57, 58 completes a circuit from the live pole of the battery B^1 at the central office, through relay 107, line limb P, contacts 72, 73 of set s^2, transmitter C, contacts 58, 57, winding of electromagnet 98, contacts 72, 73 of set s^1, line limb S, relay 108, through battery B^2 to the grounded pole of battery B^1. The closing of this circuit energizes electromagnet 98 at the substation to attract its armature 99 and thereby unlock the impulse wheel 62 and the connected finger-hold mechanism to allow the same to be manually operated. The closing of the circuit also energizes relays 107 and 108 of the switch mechanism at the central office. The energization of these relays opens contacts 109, 110 of the circuit for the release magnet RM, and the energization of the same relays opens contacts 111, 112 and closes contacts 113, 114. With the contacts in this position, it will be observed that a circuit for primary magnet PM extends from the live pole of the battery B^3 through the winding of said magnet to open contact 111, and hence through closed contact 114 to ground. A similar circuit extends from the live pole of the battery B^3, through the winding of secondary magnet SM to open contact 112, thence through closed contact 113 to ground. In this it will be seen that the momentary deënergization of relay 107 will momentarily energize primary magnet PM and a momentary deënergization of relay 108 will momentarily energize the secondary magnet SM. The switch structure is of the usual type employed in automatic systems in which the wipers are moved to a desired bank contact by partaking of movements in two directions, a primary direction and a secondary direction. In the diagram, the wipers 115, 116 represent two of the wipers of such a switch which are adapted to receive their primary movements by the repeated momentary energizations of primary magnet PM, and their secondary movements by the similar energizations of secondary magnet SM, and to be restored to normal at the end of conversation by the energization of release magnet RM. In this diagram, contact 117 is the contact of an off-normal switch which is adapted to be closed upon the first primary movement of the switch parts. Such switches are well known in the art and it seems unnecessary to refer to them more specifically.

Having now removed the receiver and thereby unlocked the calling mechanism, the calling party now actuates his finger-hold mechanism to transmit the impulses necessary to make the desired connection. Although there is but one switch shown, it will be understood that in the use of the invention in automatic or semi-automatic systems, there will ordinarily be a series of switches set in operation in making each connection. Assuming that it is desired first to transmit six impulses over the line, the sixth finger-lever from the bottom, as seen in Fig. 4, will be depressed and the frame 28 carried around until the stop projection 36 on the depressed lever engages the stop-pin 33. This movement will be far enough to carry six teeth 63 of the actuating wheel 62 beyond the engaging member 80 of the set s^2 of the spring-contacts; then upon the removal of the finger from the engaged lever, the actuating wheel 62 will be returned by the spring 64; and during its return movement, the contacts 72, 73 of the set s^2 will be broken six times, followed by a single break of the contacts 72, 73 of set s^1. The six impulses will momentarily deënergize relay 107 six times and thus momentarily energize primary magnet PM six times and thereby step the wipers 115, 116 six steps in a primary direction. The single following impulse will deënergize electromagnet 108 once with a consequent momentary single energization of the secondary magnet SM.

It will be seen from the diagram and mechanical drawing that the first movement of the impulse wheel 62 will ground the line limbs PS at the substation by way of contacts 66, 67, 68. Thus the energizing circuits for the relays 107, 108 will then extend from the live poles of the batteries B^1, B^2, over the line limbs P and S, respectively, to this ground.

It will be understood that the switch construction, diagrammatically illustrated, is such that the single impulse, following the six impulses, will start wipers 115, 116 in a secondary direction and they will continue this movement until an idle trunk is found. Since the extension of the calling party's circuit through other switches calls for the same operation of the calling mechanism, it will be unnecessary to go further into a detailed description of such operation. After each operation of the actuating wheel 62, the ground is removed from the line limbs and the contacts of each set s^1, s^2, are returned to normal.

At the end of conversation, the restoration of the receiver to its hook restores the contacts 54, 55, 56, 57, 58, to their normal position, thus interrupting the circuit through relays 107, 108 simultaneously, and thereby through their contacts 109, 110, completing a circuit for the release magnet RM from the live pole of battery B^4 through the winding of said magnet, off-normal contact 117 and contacts 109, 110, to ground, thereby restoring the switch parts to normal.

It is believed that this diagram, although fragmentary, will make the operation of the subject-matter of the invention perfectly clear without going further into the description of the operation of the system in which said device is intended to be used.

From the above description, it will be seen that I have devised a signal transmitter which is capable of use in various relations other than as part of a desk-stand structure and which has many features capable of use in other relations. It will be apparent also that many alterations and modifications may be made in the structure herein disclosed without departing from the spirit and scope of my invention. For example, the arcuate frames 29 and 30 of the finger-hold mechanism may be combined in a single plate 29^a, as shown in Figs. 15 and 16, which serves as the sole support for the modified finger-levers 35^a, whose inner ends are not turned downward as in the case of levers 35, but lie in the same plane as the outward extending ends. These levers are adapted to coöperate with the stop-pin 33, as in the case of the levers 35, but are retained in their normal positions by the coiled spring 37^a. Likewise, other changes may be made. I therefore do not wish to be limited to the specific disclosure of the structure and its use, but aim to cover by the terms of the appended claims all reasonable modifications and adaptations.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. A call device comprising a movable member, a finger-hold for actuating said member, and means operated by the engagement of the finger with the finger-hold to determine the extent of movement of said member.

2. A call device comprising a movable member, a plurality of finger-holds for actuating said member, and means operated by the engagement of the finger with each finger-hold to permit the movement of said member a distance corresponding to the particular finger-hold engaged.

3. A call device comprising a movable member, a finger-hold for actuating said member, a part movable from normal by the pressure of the finger upon the finger-hold, and a stop lying in the path of movement of said part when in its abnormal position.

4. A call device comprising a movable member, a plurality of finger-holds for actuating said member, a part associated with each finger-hold, movable from normal by the pressure of the finger upon the finger-hold, and a stop lying in the path of movement of said parts when in their abnormal positions.

5. A call device comprising a movable member, a finger-hold for actuating said member including a lever movable from normal under the pressure of the finger independently of said member, and a stop lying in the path of movement of the pressed lever.

6. A call device comprising a movable member, a plurality of finger-holds for actuating said member, each including a lever movable from normal under the pressure of the finger independently of said member, and a stop lying in the path of movement of the pressed levers.

7. A call device comprising a supporting plate, a contact-actuating member rotatably mounted on one side of said plate, a finger-hold member rotatably mounted on the opposite side of said plate and operatively connected to said contact-actuating member, finger-holds formed by levers pivoted to and projecting outward from said finger-hold member and having a limited movement from normal under the pressure of the finger, and a stop mounted on said plate in the path of movement of the pressed levers.

8. In a call device, a finger-hold device comprising a punching having a top and a downward projecting flange, and finger-levers pivoted at the under side of said top adjacent to said flange and projecting outward through suitable openings in said flange.

9. In a call device, a finger-hold device comprising a punching having a top and a downward projecting flange, finger-levers pivoted at the under side of said top adjacent to said flange and projecting outward through suitable openings in said flange, and springs for holding said levers normally in the same relative position.

10. In a call device, the combination of a supporting plate, a stop-pin secured thereto and a finger-hold device pivotally mounted on one side of said plate, said finger-hold device comprising a punching having a top and a downward projecting flange provided with a series of openings, a series of finger-levers pivoted to the under side of said top adjacent to said flange and having their outer ends projecting through said openings and their inner ends normally lying adjacent to the path of movement traversed by said stop and severally movable into said path upon the application of pressure to said outer ends, and springs tending to hold said levers in their normal positions.

11. In a call device, the combination of a supporting plate, a stop-pin projecting from one side thereof and a finger-hold device pivotally mounted on the same side of said plate as said stop-pin, said finger-hold device comprising a punching having a top and a flange projecting downward on all sides of said punching into close proximity to said plate, and finger-levers pivoted to said punching on the under side of said top within the space formed by said flange and having their outer ends projecting through suitable openings in said flange.

12. A call device comprising a frame including a main supporting plate, finger-hold mechanism pivoted to one side of said plate, spring and gear mechanism located adjacent to the opposite side of said plate, and spring contacts and actuating means therefor accessibly supported on said frame more remotely from said plate than said spring and gear mechanism.

13. A call device comprising two substantially parallel supporting plates, finger-hold mechanism pivoted to the outer face of one of said plates, a main central shaft spring and gear mechanism located between said plates and operatively connected by said shaft to said finger-hold mechanism, and spring contacts and actuating means therefor located on the outer face of the other of said plates, said actuating means being operatively connected by said shaft to said spring and gear mechanism.

14. A call device comprising a main supporting plate, finger-hold mechanism pivoted to the outer face of said plate, supporting posts extending outward from the opposite side of said main plate, an auxiliary supporting plate carried by said posts and spaced from said main plate, spring and gear mechanism located between said plates and operatively connected to said finger-hold mechanism, spring contacts and actuating means therefor located on the outer face of said auxiliary plate and operatively connected to said spring-and gear mechanism, a bridge uniting said posts, and contact terminals mounted upon said bridge.

15. A call device comprising a main supporting plate, finger-hold mechanism pivoted to the outer face of said plate, supporting posts extending outward from the opposite side of said main plate, an auxiliary supporting plate carried by said posts and spaced from said main plate, spring and gear mechanism located between said plates and operatively connected to said finger-hold mechanism, spring contacts and actuating means therefor located on the outer face of said auxiliary plate and operatively connected to said spring and gear mechanism, a bridge uniting said posts, and a governor located between said bridge and main plate and operatively connected to said spring and gear mechanism.

16. A call device comprising a main supporting plate, finger-hold mechanism pivoted to the outer face of said plate, supporting posts extending outward from the opposite side of said main plate, an auxiliary supporting plate carried by said posts and spaced from said main plate, spring and gear mechanism located between said plates and operatively connected to said finger-hold mechanism, spring contacts and actuating mechanism therefor located on the outer face of said auxiliary plate and operatively connected to said spring and gear mechanism, a bridge uniting two of said posts, contact terminals mounted on said bridge, a second bridge also uniting two of said posts, and a governor located between said second bridge and said main plate and operatively connected to said spring and gear mechanism.

17. In a call device, the combination of a toothed actuating member, a yielding contact member laterally movable relative to said toothed member, and pivoted engaging means between said members whereby the movement of said actuating member in one direction actuates said contact member, tooth by tooth, and by its movement in the opposite direction coöperates with said pivoted member whereby it fails to actuate said contact member.

18. In a call device, the combination of a toothed actuating wheel, a yielding contact member laterally movable relative to said toothed member, and pivoted engaging means between said members whereby the movement of said actuating wheel in one direction actuates said contact member, tooth by tooth, and by its movement in the opposite direction coöperates with said pivoted

member whereby it fails to actuate said contact member.

19. In a call device, the combination of a toothed actuating member, a yielding contact member laterally movable relative to said toothed member, a pivoted engaging member so shaped and pivotally mounted upon said contact member as to transmit the movement of said actuating member to said contact member upon the movement of said actuating member in one direction only.

20. In a call device, the combination of a toothed actuating member, a yielding contact member, a triangular engaging member pivoted at one corner to said contact member, normally engaging said contact member at another corner and having its third corner lying in the path of movement of the teeth of said actuating member.

21. In a call device, the combination of a toothed actuating member, a yielding contact member, a triangular engaging member pivoted at one corner to said contact member and having a second corner adapted to engage said contact member and its third corner adapted to be engaged by the teeth of the actuating member, a spring for yieldingly holding said engaging member so as to cause said second corner to engage said contact member, and an anti-friction roller located at the third corner of said engaging member.

22. A call device comprising a supporting plate, a shaft journaled in said plate, a spiral driving spring acting between said shaft and plate, means for winding up said spring, means for governing its unwinding, an actuating wheel mounted on said shaft, a pin projecting from its surface, spring contacts normally held out of engagement by said pin and brought into engagement upon the rotation of said wheel from normal, and contacts secured to said plate at opposite sides of said wheel and operatively related thereto.

23. A call device comprising a supporting plate, a hollow shaft journaled in said plate, a spiral driving spring acting between said shaft and plate, means for winding up said spring, means for governing its unwinding, an actuating wheel mounted on said shaft, contacts secured to said plate at opposite sides of said wheel and operatively related thereto, additional spring contacts, and actuating means extending through said hollow shaft into operative relation to said additional spring contacts.

24. A call device comprising a supporting plate, a hollow shaft journaled in said plate, a spiral driving spring acting between said shaft and plate, means for winding up said spring, means for governing its unwinding, an actuating wheel mounted on said shaft on the opposite side of said plate from said driving spring, a pin projecting from the side of said wheel, a set of spring contacts mounted on said plate and extending into operative relation with said pin, sets of spring contacts mounted on said plate at opposite sides of said shaft and extending into operative relation to said wheel, an additional set of spring contacts also mounted on said plate and extending over the end of said shaft, and actuating means extending through said hollow shaft into operative relation to said additional spring contacts.

25. A device of the character described, an operating member having a series of movable finger-hold members, a stationary stop with which said finger-hold members will engage when in operating position and thereby limit the movement of the operating member.

26. In a device of the character described, an operating member having a series of resilient finger-hold members adapted to be pressed out of their normal position by the finger of the operator, and a stationary stop located out of the normal path of the resilient members, said resilient members being adapted to engage said stop when pressed out of their normal position and thereby limit the movement of the operating member.

27. In a device of the character described, a revoluble operating member having a series of spring fingers adapted to be engaged by the finger of the operator when used, a stop member adapted to be engaged by the spring fingers when pressed from their normal position, thereby limiting a revoluble movement of the operating member.

28. A calling device comprising two substantially parallel supporting plates, finger hold mechanism located at the outer surface of one of said plates, spring and gear mechanism located between said plates, spring contacts and a toothed actuating wheel therefor located on the outer face of the other of said plates, and a main central shaft extending through said plates and rigidly secured to said finger hold mechanism, spring, and actuating wheel.

29. A calling device including a revoluble dial having a series of finger holds, a stop, and means associated with each of said finger holds for engaging said stop to limit the movement of said dial according to the engaged finger hold.

30. In a device as described, a main frame, a shaft, a notched segment on said shaft, an electric switch, adapted to be intermittently operated by each successive notch passing a given point, a head on said shaft by which said shaft may be manually oscillated, pressable stop keys in said head, and a stop cooperating with said pressable keys to limit the movement of said notched segment, substantially as specified.

31. In a device as described, a main frame,

an oscillating shaft, a notched segment thereon, an electric switch, means for operating said switch by each of the respective notches of said segment, pressable stop keys and a stop limiting the movement of said segment whereby a predetermined number of notches will be brought into operative position, substantially as specified.

32. In a device as described, a main frame, an oscillating shaft, a notched segment carried by said shaft, an electric switch adapted to be successively operated by the respective notches of said segment, said segment being adapted to move in one direction independent of said switch, a motor returning said segment in operative engagement with said switch and a series of pressable stop keys limiting the notched segment to a predetermined number of operating engagements with said switch, substantially as specified.

33. In a device as described, a main frame, an oscillating shaft, a notched segment on said shaft, an electric switch, a head on said shaft, whereby said shaft may be oscillated in one direction, pressable stop keys in said head and a stop with which said keys engage to limit the oscillation of said shaft and segment, a motor adapted to return said segment, an electric switch, interengaging means between said segment and switch whereby said segment will move independent of said switch in one direction, but will intermittently operate said switch when moved in the contrary direction, substantially as specified.

34. In a device as described, a main frame, an oscillating notched segment therein, an electric switch, a lever adapted to operate said switch, a reversible pawl pivoted to said lever and engaging said notched segment, and riding freely over said notches as the segment moves in one direction and means to limit the pivotal movement of said pawl in its reverse position whereby said pawl in riding over the notches of said segment will cause a corresponding movement of the lever, substantially as specified.

In witness whereof, I hereunto subscribe my name this 16th day of March, 1910.

WILLIAM KAISLING.

Witnesses:

CAROLYN WEBER,

CARRIE E. ANDERSON.