W. KAISLING.

CALLING DEVICE.

APPLICATION FILED JAN. 22, 1913.

1,258,686.

Patented Mar. 12, 1918.

2 SHEETS—SHEET 1.

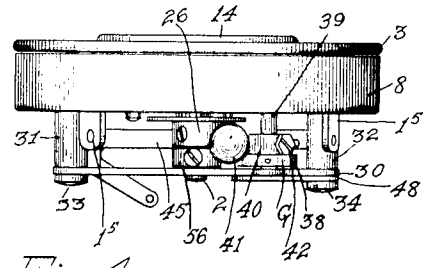

Fig. 4.

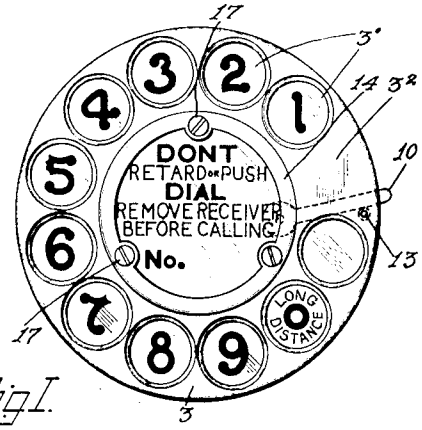

Fig. 1.

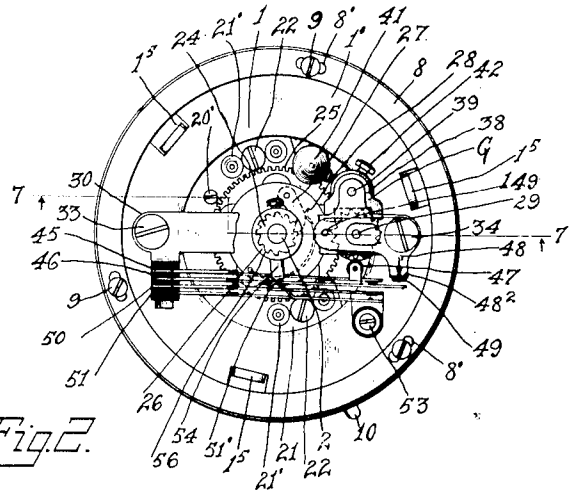

Fig. 2.

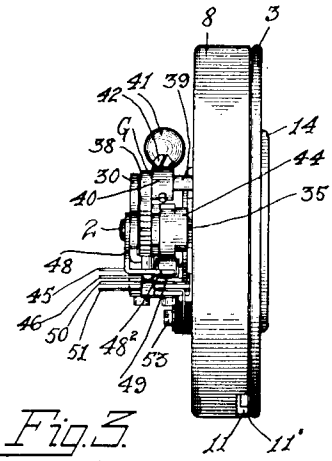

Fig. 3.

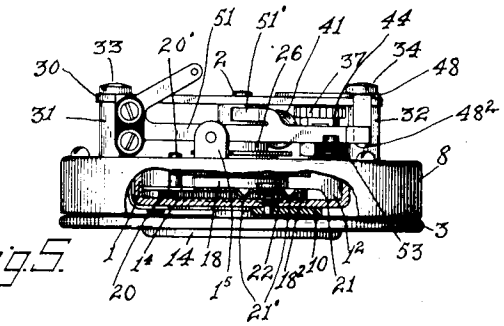

Fig. 5.

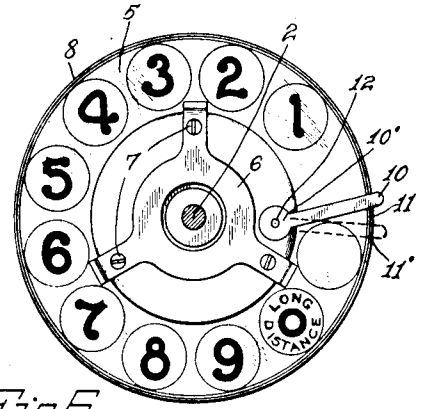

Fig. 6.

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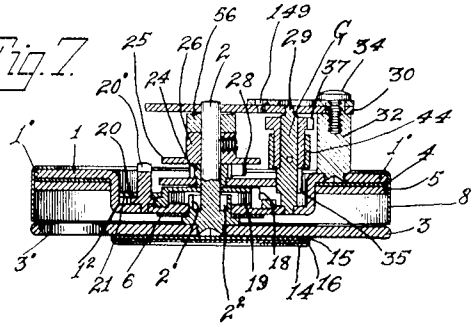
2 SHEETS—SHEET 2.

Fig. 7.



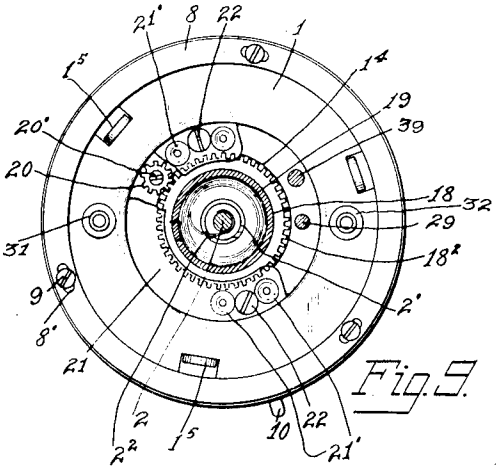


Fig. 9.

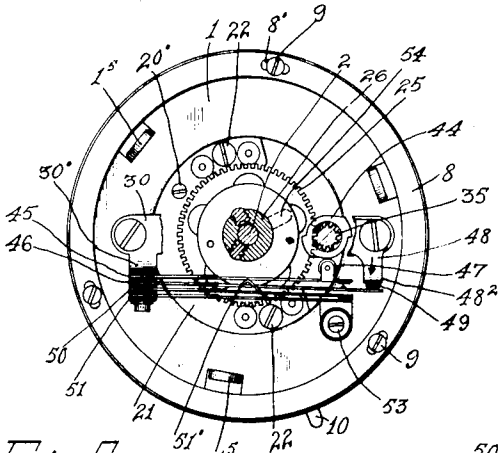


Fig. 8.

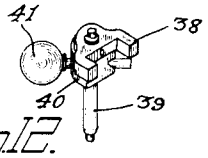


Fig. 12.

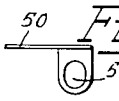


Fig. 13.

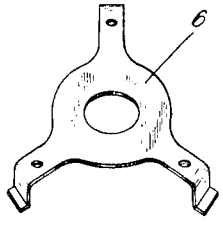


Fig. 10.

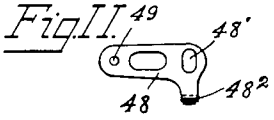


Fig. 11.

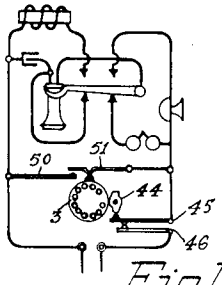


Fig. 15.

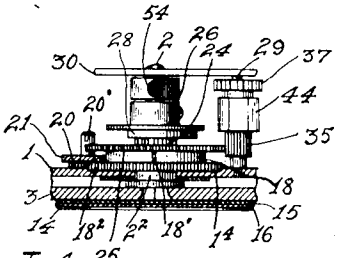


Fig. 14.

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UNITED STATES PATENT OFFICE.

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

CALLING DEVICE.

1,258,686. Specification of Letters Patent. Patented Mar. 12, 1918.

Application filed January 22, 1913. Serial No. 743,460.

To all whom it may concern:

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

My invention relates to calling devices, and has to do more particularly with calling devices such as are commonly used at substation telephones for directively controlling automatic switches at the central office for extending the connection of a calling line. Different types of automatic telephone systems are in use at present, and my invention is directed more particularly to the so-called metallic circuit or two-wire type in which the metallic circuit of the line is interrupted a number of times corresponding to the predetermined adjustment of the calling device.

Due to the fact that the calling device is installed at the substation telephone and is therefore away from the central office, it has been found from practice that a simple device in which the coöperating elements are most positive in their operation and do not readily get out of order is most desirable. To this end my invention is directed, that is the provision of a calling device which is compact, simple in operation and adjustment, of attractive appearance and cheap to manufacture.

I have illustrated my invention in the accompanying drawings in which like reference characters indicate like parts and in which—

Figure 1 is a face view of my invention;

Fig. 2 is a rear elevation thereof;

Figs. 3, 4, and 5 are right end, top and bottom views respectively of Fig. 2.

Fig. 6 is a face view of the device but with the finger-hold actuating member removed;

Fig. 7 is a sectional view along the line 7, 7, of Fig. 2 looking in the direction of the arrows indicated thereon;

Fig. 8 is a rear elevation similar to that of Fig. 2 but with some of the parts broken away and removed;

Fig. 9 is a rear elevation with most of the mechanism removed to more clearly show the motor spring and its tension adjusting means;

Fig. 10 is a perspective view of the tripod clamping member for holding the number plate and protecting glass in place;

Fig. 11 shows an adjustable stop for the impulse springs;

Fig. 12 illustrates in perspective the pallet and regulating weight for the speed governor;

Fig. 13 is an end portion of one of the shunt springs;

Fig. 14 illustrates a part of the device showing more particularly the main shaft and parts carried thereby, and

Fig. 15 illustrates diagrammatically a well-known substation telephone circuit with the calling device connected in circuit.

Referring now more in detail to the structure illustrated, it comprises a main mounting plate 1 having the flange portion 1^1 and the forwardly extending cup portion 1^2. A main shaft 2 extends through a central bearing of member 1, and has a finger-hold actuating member 3 staked to its forward end. Actuating member 3 is provided with a plurality of finger-holds 3^1, preferably 11 in number and a numbered indicating plate 4 is positioned with its indicating numerals beneath the finger holds 3^1, said plate 4 having a transparent protective member 5 positioned in front thereof, said members 4 and 5 are clamped against the flange portion 1^1 by means of the tripod clamping member 6 which is fastened to the cup portion 1^2 by means of screws 7. The actuating member 3 is arranged with 11 finger holds 3^1 numbered 1, 2, 3, etc., to 0, the 11th hold being left unmarked. The calling device is adapted to transmit from one to eleven impulses, the numerals indicating the number of impulses the corresponding hold is adapted to effect transmission of. Hold 0 represents 10 impulses. The unmarked hold when used for operating the device will effect the transmission of eleven interruptions or so-called impulses. An inclosing casing 8 is also provided, being secured to the flange 1^1 by means of screws 9 which pass through slots 8^1, these slots being provided to allow circular adjustment of casing 8 for varying the movement of the finger stop 10.

In constructing a circular finger-hold actuating member as 3, it is desirable to make it of the smallest diameter with a given spacing of the actuating holds 3^1. That is it

has been found in practice that the finger-holds 3^1 cannot be made below a certain diameter in order to accommodate the finger of the operator, and this of course determines the shortest arcuate distance between these finger-holds. Furthermore, it has been found that the preliminary or advance movement of the actuating member as 3 requires an initial movement slightly greater than a single space between holds. This means that in calling devices of the past in which a fixed finger-stop has been used, the space 3^2 between the first and last hold was greater than the distance between the other holds due to the fact that the extra space was required for the fixed finger stop. One of the features of my invention is the provision of a finger-hold actuating member in which a movable finger-stop is provided and cooperates with the finger when in the finger-hold in such a manner that no extra space between the first and last holds is required for its accommodation. The movable finger stop of my invention is preferably a pivoted member 10^1 secured by means of a pivot pin 12 and limited in its movement by a stop-slot 11 in the casing 8. A pin 13 carried by member 3 is preferably provided to engage and hold the stop 10 clear of the last opening or finger hold so that the operator may readily insert the finger in this hole when desired. When the actuating member 3 is advanced, which is in a clockwise direction, pin 13 moves from finger-stop 10 so that when the advancing finger of the operator engages stop 10, the movement of the member 3 is limited by stop 10 engaging edge 11^1 of the stop opening 11 as shown by dotted lines in Fig. 6. When the actuating member is released it restores in a reverse clockwise direction and its pin 13 restores stop 10 so that it is clear of the last finger hold.

In the center of the actuating member 3 is provided a clamping ring 14 for holding a card 15 and transparent protecting plate 16 in place, said ring 14 being held by means of screws 17 which thread into the member 3.

Referring now more particularly to the operating mechanism, the main shaft 2 extends through an adjustable spring barrel 18 which carries a spring 19 secured at its inner end to a slot 2^1 in a counterbored portion 2^2 of shaft 2. The outer end of spring 19 is inserted in a slot 18^1 of spring barrel 18, the method of securing spring 19 being more clearly indicated in Fig. 9. Spring barrel 18 is preferably a flanged cup member having gear teeth 18^2 cut in the peripheral edge of the flange portion, and the flange portion is set in a counterbore 1^4 in the inner surface of the cup portion 1^2. Counterbore 1^4 acts as a guide for barrel 18 so as to hold its central hole clear of shaft 2. The gear teeth 18^2 coöperate with a pinion 20 having a slotted extension 20^1, so that the pinion 20 may be rotated by the use of a screw-driver placed in the slot of extension 20^1 whereby the spring barrel 18 may be moved to adjust the tension of the motor spring 19. In order to hold the spring barrel in an adjusted position, clamping means are used preferably in the form of a plate 21 which is held in place by means of clamping screws 22. This plate 21 also serves as a support for the pinion member 20, which is rotatably supported by the main plate 1 and clamping plate 21 as is indicated in Figs. 5 and 7. In order to make the device more compact, clamping plate 21 is made of thin material, and to prevent its being bent when screws 22 are tightened, I provide supports in the form of indentations 21^1 which rest against the bottom of cup 1^2 when the clamping plate 21 is acting. In Fig. 9 I have cut a portion of plate 21 away to show the geared connection between the spring barrel 18 and adjusting pinion 20.

Positioned along the main shaft 2 next to spring barrel 18, is a ratchet wheel 24 to which is rigidly attached a driving gear 25, said gear being staked upon a hub portion of ratchet 24, gear 25 and ratchet 24 although fastened together being free to rotate upon shaft 22. This gear 25 is connected with governor mechanism G which is adapted to retard the return movement of the actuating member and thus the impulse mechanism is retarded to a predetermined speed, and to this end the gear 25 and attached ratchet 24 are connected to shaft 2 through the medium of a hub and disk member 26 carrying a pawl 27 shown in dotted lines in Fig. 2. This pawl 27 is pivotally attached to the disk 26 and is held in engagement with the teeth of ratchet 24 by means of a spring 28. Ratchet 24 and pawl 27 are so related that when the dial is advanced for adjustment, the hub 26 is rotated in a clockwise direction, (that is when looking at the face of the device), and therefore the pawl 27 rides freely over the teeth of ratchet wheel 24 which is held stationary due to the engagement through gear 25 and governor G. Of course when the actuating member 3 is released, the spring 19 carries it backward and also the shaft 2 whereby the pawl 27 engages and holds a tooth of ratchet 24 and carries it along.

Governor mechanism G comprises a main shaft 29 which is rotatably supported at its opposite ends in member 1 and bridge plate 30, which bridge plate is secured to studs 31 and 32 by means of screws 33, 34. Said studs 31, 32, are staked into member 1 as shown in section in Fig. 7. This plate 30 also supports the main shaft 2 at its rear end. A pinion 35 is cut on shaft 29 and is in mesh with the driving gear 25 as shown in

Figs. 7 and 8. An escapement wheel 37 is also carried by shaft 29, being preferably pinned thereto and operating in connection with a pallet 38 which is pinned to pallet shaft 39, said shaft 39 being pivotally supported at its ends in plate 30 and member 1. A hub 40 is also carried by pallet shaft 39 and a weighted member 41 is passed through an opening extending through hub 40 and shaft 39 and adjustably held by means of a set screw 42. Thus the weighted member 41 may be adjusted so as to regulate the speed at which the governor may be driven and therefore of course the speed at which the calling device would transmit the impulses, as will presently appear. In order to operate the impulse springs of the device, I preferably provide an actuating cam 44 mounted upon the governor main shaft 29 and having two teeth, each one of which is adapted to act upon the impulse springs for each complete rotation of the shaft. Gear wheel 25 and pinion 35 are so proportioned that a half revolution of shaft 29 is effected for the travel of a single space of the actuating member 3. For example, assuming the finger was inserted in the finger-hold indicated by the numeral 2 and the member 3 advanced until the finger is stopped by the finger stop 10, the return travel of the actuating member which would be the distance of two spaces, would cause one complete revolution of shaft 29 and therefore bring both of the teeth of the actuating cam 44 into play. This cam 44 is preferably of an insulating material.

As already referred to, my present invention is arranged as a so-called two-wire calling device in which the impulse springs are interrupted according to the number of impulses to be transmitted, and therefore I provide a pair of normally closed contact springs 45, 46, which are insulatingly mounted upon a downwardly projecting arm 30^1 preferably integral with the bridge-plate 30. A roller 47 is pivotally attached to the free end of contact spring 45 and normally rests upon a tooth of actuating cam 44 so as to hold contacts 45, 46 closed as indicated in Fig. 2 in which the parts are shown at normal. I preferably arrange my invention so that the duration of interruption and contact of impulse springs 45, 46, may be varied, and to this end I provide an adjusting plate 48 pivotally secured by means of a pivot pin 149, and clamped in position by means of the clamping screw 34 which passes through a slotted portion 48^1 as indicated in Fig. 11. An arm 48^2 extends from member 48, said arm carrying a stop 49 of insulating material. In the operation of the actuating cam 44, the teeth thereon act upon the roller 47 of contact spring 45 and thereby reciprocate the other end of spring 45 and as roller 47 is moving inwardly the free end of contact spring 46 engages the stop 49 whereby the contact between springs 45, 46, is interrupted. It will be apparent that by varying the adjustment of member 48, the duration of contact or duration of interruption of springs 45, and 46, is changed accordingly. That is, referring now to Fig. 8, if the member 48 were moved in the direction of the arrow indicated thereon, when the actuating cam 44 is revolved, spring 46 would engage the stop 49 at an earlier period in its travel so that the interruption of the contact between springs 45, 46 would be increased. Now, if member 48 were moved in a direction opposite to that indicated by the arrow, spring 46 would engage stop 49 in a latter period of its travel and consequently a shorter period of interruption would be effected.

Due to the fact that in the commercial systems of the present day the receiver is usually removed from the switch-hook to include the substation apparatus in the line circuit before the calling device may be operated, I provide means in the form of a pair of shunt contact springs 50, 51, by which the substation apparatus may be short-circuited while the impulses are being transmitted, thus cutting down the resistance of the line circuit producing a more effective operating circuit. Said springs 50, 51, are insulatingly mounted with the impulse springs, the spring 50 being also attached by means of a screw 53 which extends through a slot 51^1 in spring 51 as shown in Fig. 13. To operate the shunt springs, an operating button 54 preferably of insulating material is driven into a hub 56 which is rigidly attached to main shaft 2. This stud 54 is normally in engagement with a projecting portion 51^1 on shunt spring 51 whereby springs 50, 51 are held out of contact, but when the shaft 2 and actuating member 3 are moved off-normal the stud 54 moves away from the cam portion 51^1 of spring 51 and allows contacts 50, 51 to engage, these contacts remaining in engagement while the actuating member is off normal.

Although no protective casing for the rear of the device is illustrated, I contemplate providing such a casing and therefore have arranged threaded lugs 1^5 to which a casing may be secured.

In Fig. 15, I have illustrated a well-known substation telephone with the calling device of my invention connected in circuit. I have used like reference characters for indicating the parts of Fig. 15 which correspond to the rest of the drawings so that the coöperation of the impulse and shunt springs will be readily apparent.

Operation.

For example, we will assume that the operator desires to effect 6 operations of

the impulse springs 45, 46, the finger will be inserted in the finger-hold above numeral 6 and the actuating or setting member 3 rotated in a clockwise direction. As member 3 leaves normal, pin 13 carried thereby moves away from the pivoted finger-stop 10 so that as the member 3 is advanced, the finger engages stop 10 and a further advance of member 3 is prevented when stop 10 engages the stop edge 11^1. The adjustment of member 3 of course, causes a rotation of main shaft 2 whereby the hub 24 carried thereby moves the pawl 27 over 6 teeth of ratchet wheel 24 but of course without moving said ratchet wheel. As the main shaft 2 leaves normal, the insulated stud 54 carried thereby leaves the cam portion 51^1 of shunt spring 51 allowing said spring 51 to engage spring 50 whereby shunt contacts 50, 51, are closed to short-circuit the substation apparatus. This adjustment of member 3 of course is effective to wind up the motor spring 19 so that when the operator removes the finger from the finger-hold to free the member 3, spring 19 restores main shaft 2 whereby the pawl 27 carried thereby, due to its holding engagement with a tooth of ratchet 24, carries said ratchet and driving gear 25 along with it until member 3 is stopped at normal by the engagement of its pin 13 with the stop 10 as shown in Fig. 1. In Fig. 8, I have shown the mechanism with the setting member 3 off-normal, and with the shunt operating stud 54 indicated by dotted lines in an off-normal position, and with the impulse spring operating cam 44 in an intermediate position. The setting member 3 having been advanced, a distance of 6 finger-holds, the return movement thereof is sufficient to cause three revolutions of shaft 29 and of course three revolutions of cam 44 whereby the two teeth on said cam 44 will effect 6 interruptions of impulse contacts 45, 46. This operation of shaft 29 is effected through the connection between driving gear 25 and pinion 35 and said impulse mechanism is therefore retarded in its operation when transmitting impulses due to the governor mechanism G. Upon the device reaching normal, stud 54 again engages the cam 51^1 whereby shunt springs 50, 51, are interrupted. The setting member being at normal and the impulses having been transmitted, the device may again be adjusted for effecting the transmission of another set of impulses according to the selected finger-hold.

In illustrating an application of my invention I have chosen a preferred substation telephone and connected the device in circuit in a preferred manner, but it is to be understood that I do not desire to be limited to the manner of connecting the device in circuit or to the method of operation described, and neither do I desire to be limited to the exact structure as shown as I am aware that changes and modifications thereof will readily suggest themselves, and therefore I aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

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

1. A calling device comprising an integral cup-shaped flanged mounting frame, impulse mechanism supported by the frame and positioned partially within the cup portion of the frame, a rotatable finger-hole setting member positioned at the external face of the cup portion and connected with said impulse mechanism, said cup portion having its external peripheral surface clear of the finger-holes so as to permit the insertion of the finger in a finger-hole.

2. A calling device comprising a mounting frame having a central cup shaped portion and an annular flange extending from the rim of the cup portion, impulse mechanism supported by the frame and positioned partially within the cup portion thereof, a rotatable finger-hole setting member positioned at the external face of the cup portion, a connecting shaft extending from said impulse mechanism through a central bearing of the cup portion to said setting member, said cup portion having its external peripheral surface clear of the finger holes so as to permit the insertion of the finger in a finger-hole.

3. A calling device comprising impulse mechanism, a motor spring for driving said mechanism, a spring barrel for said motor spring carrying gear teeth, an adjustable pinion connected with said gear teeth whereby when said pinion is rotated said spring barrel is adjusted to vary the normal tension of said motor spring, and means for holding said barrel in its adjusted position.

4. A calling device comprising impulse mechanism, a motor spring for driving said mechanism, a spring barrel for said motor spring carrying gear teeth, an adjustable pinion connected with said gear teeth whereby when said pinion is rotated said spring barrel is adjusted to vary the normal tension of said motor spring, and a holding device for said pinion and barrel to prevent movement thereof except for adjustment.

5. A calling device comprising impulse mechanism, an operating shaft for said mechanism, a motor spring having one end connected with said shaft, a spring barrel to which the other end of said motor spring is attached, said spring barrel carrying gear teeth, an adjustable pinion connected with said gear teeth whereby said spring barrel may be adjusted to vary the normal tension of said motor spring, and means for holding said barrel in its adjusted position.

6. A calling device comprising impulse

mechanism, a motor spring for driving said mechanism, a spring barrel for said motor spring carrying gear teeth, an adjustable pinion connected with said gear teeth whereby said spring barrel may be adjusted to vary the normal tension of said motor spring, and a clamping device for engaging and holding said barrel and pinion in their adjusted position when the calling device is operated.

7. A calling device comprising a plate-like mounting frame, impulse mechanism carried thereby, an operating shaft extending through said mounting frame and connected to said impulse mechanism, a motor spring connected at one end to said shaft, a spring barrel connected to the other end of said motor spring, a peripheral flange for said spring barrel having gear teeth and positioned against the surface of said frame, an adjustable pinion connected with said teeth whereby when said pinion is rotated said spring barrel is adjusted to vary the normal tension of said motor spring, and a clamping device for holding said peripheral flange against the mounting plate whereby the spring barrel is maintained to hold the motor spring to its adjusted tension.

8. A calling device comprising a setting member, a plurality of adjacent finger holds for said setting member, a pivoted finger lever adapted to be engaged by the finger when in a finger hold, a stop for limiting the movement of the finger lever so as to limit the advance of the setting member, means for restoring the setting member when released by the operator, a stop carried by the setting member adapted upon restoration of the setting member to engage said finger lever, and a second stop adapted to be engaged by the finger lever to limit the restoration of the setting member.

9. In a calling device, an impulse transmitter, a movable dial having a series of finger holes for controlling said transmitter, and a movable stop for the dial for limiting the stroke of the latter, said stop being restored to normal by the dial, the said stop operable in the same direction with the dial by the finger of the operator and by the dial.

10. In a calling device, an impulse transmitter, a dial for controlling said transmitter, a movable stop for limiting the advance of the dial, and a stop carried by the dial for engagement with said movable stop to limit the return of the dial, said dial being adapted to revolve through an angle of substantially three hundred and sixty degrees.

11. A calling device comprising impulse mechanism, a finger-hole dial for controlling said mechanism, a movable stop for limiting the advance of the dial, a stop movable with the dial for engagement with the first stop when the dial restores, and means to limit the restoration of the movable stop so as to limit the restoration of the dial.

12. In a calling device, an automatic transmitter, a dial for controlling said transmitter, a movable finger stop for limiting the advance of the dial, and a stop carried by the dial for engagement with the movable stop so as to limit the restoring movement of the dial.

13. In a calling device, an impulse transmitter, a movable dial having a series of finger holes for controlling said transmitter, and a movable stop for the dial used exclusively for limiting the stroke of the latter, said stop movable in the same direction with the dial, the said stop operable in the same direction with the dial by the finger of the operator and by the dial.

14. In a calling device, an impulse transmitter, a dial having a series of finger holes for controlling the transmitter, and a movable stop for the dial for limiting the stroke of the latter, said stop movable in the same direction with the dial, the said dial having a reciprocating motion, the said stop operable in one direction by the finger of the operator and in the other direction by the dial, but in the same direction with the dial in each case.

15. In a calling device, an impulse transmitter, a dial having a series of finger holes for controlling said transmitter, and a movable stop for the dial, the said dial having a reciprocating motion, the said stop operable in one direction by the finger of the operator and in the other direction by the dial, but in the same direction with the dial in each case.

16. In a calling device, an impulse transmitter, a dial having a series of finger holes for controlling said transmitter, and a movable stop for the dial for limiting the stroke of the latter, said stop being restored to normal by the dial, the said dial having a reciprocating motion, the said stop operable in one direction by the finger of the operator and in the other direction by the dial, but in the same direction with the dial in each case.

Signed by me at Chicago, county of Cook and State of Illinois, in the presence of two witnesses.

WILLIAM KAISLING.

Witnesses:
G. E. MUELLER,
B. O'BRIEN.