

Oct. 13, 1925.

1,556,905

J. G. BLESSING

AUTOMATIC CALLING DEVICE

Filed Oct. 18, 1921

2 Sheets-Sheet 1

Fig:1

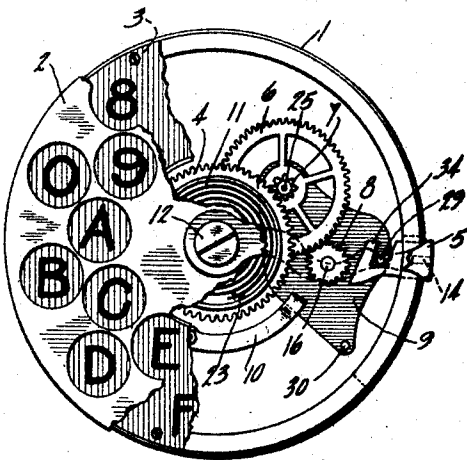


Fig:2

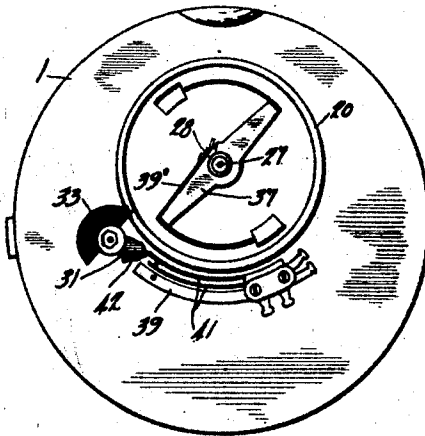


Fig:3

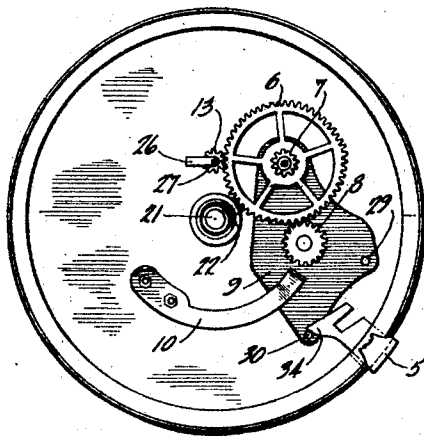


Fig:4

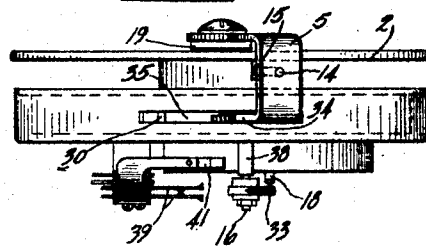
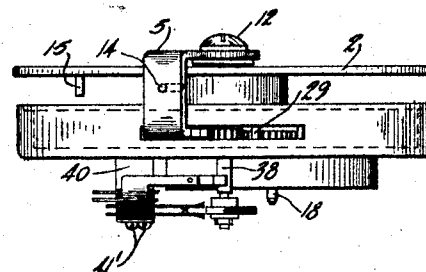


Fig:5



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2 Sheets-Sheet 2

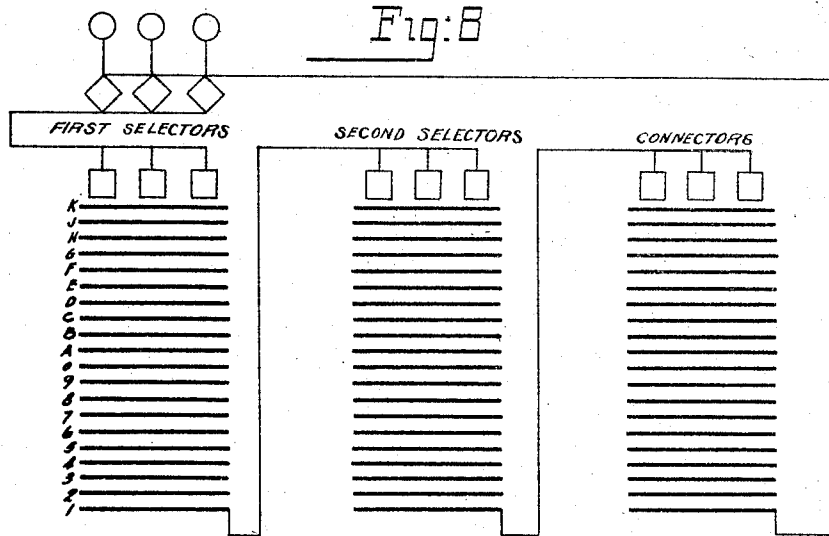


Fig: 6

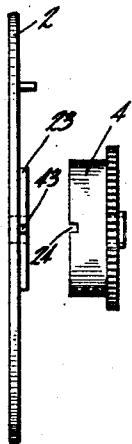
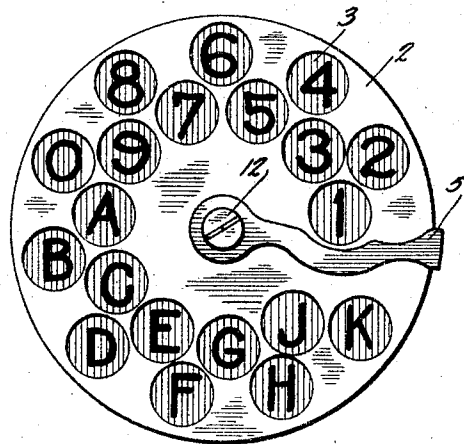


Fig: 7



— Inventor —
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UNITED STATES PATENT OFFICE.

JOHN G. BLESSING, OF CHICAGO, ILLINOIS, ASSIGNOR TO AUTOMATIC ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

AUTOMATIC CALLING DEVICE.

Application filed October 18, 1921. Serial No. 508,478.

To all whom it may concern:

Be it known that I, JOHN G. BLESSING, a citizen of the United States of America, and a resident of Chicago, Cook County, and State of Illinois, have invented certain new and useful Improvements in Automatic Calling Devices, of which the following is a specification.

My invention relates in general to an improved calling device and more specifically to an improved type of impulse sending mechanism for use in transmitting calling impulses to control the operation of an automatic switch of any well known two-wire type.

Among the features of my invention is to provide a simple device for prolonging the interval of time between the transmission of the final impulse of one digit and the transmission of the first impulse of the succeeding digit. It is well known that such a calling device is used in practice to first send one series of impulses to cause the vertical motion of the standard two-wire Strowger selector, and the switch then operates automatically to select an idle trunk in the group elected, therefore sufficient time must be given to permit this automatic trunk selecting function before the next series of impulses are transmitted. In order to accomplish the above result I have constructed the device so that the cam is rotated an additional revolution each time the calling device is operated. It will be understood that were no special means provided to prevent it, this dial when operated would move the cam a sufficient distance to send an extra impulse. Means are provided as will be explained, for preventing the transmission of this extra impulse by moving the cam out of the path of the impulse springs at a critical time.

Other features of my invention are the provision of a device which is very simple in construction and which requires a minimum number of moving parts. Other features of improvement will be explained in the following detailed description of the accompanying drawings in which:

Fig. 1 shows a front view of my improved calling device in normal position, with a portion of the finger hold dial 2 and a portion of the number dial 3 broken away, to more clearly show certain of the operating elements.

Fig. 2 shows a rear view of the device in normal position.

Fig. 3 shows a front view of the device in operated position, with the finger hold dial and the number dial removed.

Fig. 4 shows a side view of the device with the finger stop 5 in its normal position.

Fig. 5 shows a side view of the device with the finger stop 5 in its operated position.

Fig. 6 shows a side view of the finger hold dial 2 and the combined gear and spring cup.

Fig. 7 shows a complete front view of the dial, illustrating the order in which the figures and letters are arranged.

Fig. 8 shows a schematic diagram of a trunking system to which a calling device of the type illustrated may be applied.

I have chosen to illustrate my invention in the form of a calling device suitable for use, in what is commonly known as a large capacity system, it should be understood however that my invention may be applied equally well in any two-wire system, the number of impulses being an immaterial factor which may be varied to suit requirements.

I will now describe the various parts of the calling device more in detail, and explain the operation of the same, reference being made to the various figures of drawings.

Referring to Figure 1, my improved calling device consists of a mounting plate 1, the front side being as a whole so shaped as to form a cup. In the center is a post 21 (Fig. 3) on which are a plurality of shoulders forming three distinct sections. The lowermost section acts as a bearing point for the gear and spring cup 4. On the second section is provided a lug 22, which co-operates with an aperture on the inner end of spring 11, the outer end of spring 11 being fastened to a lug 23 on the inner side of the cup 4. The uppermost section of the post 21 acts as a bearing point for the finger hold dial 2. The finger stop 5 is held in place by the screw 12, which also serves to hold the finger hold dial 2 and the gear and spring cup 4 in place. A second post 25 acts as an axis for the plate 9 and the unit comprising gear and pinion 6 and 7. The gear 8 is mounted on the shaft 16, which extends through the plate 9 and a

sleeve 38 which is fixed to the plate 9. The shaft 16 also extends through an elongated hole 31 (Fig. 2) in the mounting plate 1, and carries the impulse cam 33 as shown in Figure 2. The spring 10 is fastened to the mounting plate 1 and extends over the plate 9 to cause the plate 9 to be retained in its operated position as will be later explained. The plate 9 carries two pins 29 and 30, which co-operate with the arm 34 of the finger stop 5 to throw the cam 33 in and out of range of the impulse springs 39 and shunt springs 41. Pin 14 attached to the finger stop 5, co-operates with the pin 15 on the finger hold dial 2 to return the finger stop to normal position after the dial has been operated. Referring to Fig. 3, the bracket 26 carries the shaft 27, which acts as an axis for the unit comprising gear and ratchet 13 and 28. The ratchet 28 extends through a hole in the mounting plate 1, and co-operates with the governor assembly 37, which is also mounted on shaft 27, as shown in Fig. 2. The rear of the mounting plate 1 has a raised portion 20 which forms a cup for the governor 37. The shunt and interrupter springs 41 and 39 are mounted on a block 40 and the whole is held to plate 1 by the screws 41'. Screws 41' also serve to hold spring 10 in place as shown in Fig. 3. In Fig. 6 is shown the finger hold dial 2 and the gear spring cup 4. The finger hold dial has a machined shoulder 23 and a key 43. The cup 4 has its inner surface machined so that the shoulder and the cup snugly fit together forming a unit. A slot 24 in the cup 4 meshes with the key 43 to prevent any possible rotary movement of the cup independent of the dial.

The operation of the device is as follows: The operator inserts her finger in the hole corresponding to the desired digit and rotates the finger-hold dial 2 in a clockwise direction as far as it will go, carrying with it the finger stop 5 which will then be in the position shown in Figs. 3 and 5. The finger stop 5 moving into this position engages the pin 30 and thereby carries the plate 9 into its operated position as shown in Figs. 3 and 5, in which position the plate 9 is held by the spring 10 (Figs. 1 and 3). When the plate 9 was moved into its operated position it carried with it the sleeve 38, the gear 8, shaft 16 and the cam 33. The sleeve 38 is brought into operative relation to an insulated portion 42 of the shunt springs 41 which are thereby operated. The cam 33 is now in the position shown in Fig. 5, in readiness to operate the interrupter springs 39. It may be stated at this time that the spring 11 (Fig. 1) is partially wound up at all times, but is prevented from unwinding by the pins 14 and 15, and by the stop 5 engaging the extreme end of the slot 35 (Fig. 4). When the operator moved the finger

hold dial 2 in a clockwise direction additional power was stored in the spring 11 and the pin 15, was carried out of engagement of pin 14. Upon releasing, the finger hold dial starts on its return movement under tension of spring 11 and through the medium of gear 4, pinion 25 and gear 8, the cam 33 is caused to rotate. As soon as the cam has operated the interrupter springs 39 the number of times corresponding to the particular digit dialed, pin 15 on the dial 2 again engages the pin 14 of the stop 5, and before the cam 33 rotates sufficiently to again operate, the springs 39, the arm 34 of the finger stop 5 engages pin 29 on plate 9 and carries the plate 9, gear 8, shaft 11 and cam 33 to a point out of reach of the interrupter springs 39 and therefore, the springs are not operated during the last revolution of the cam. The instant the cam completes its last revolution the stop 5 comes into engagement with the end of the slot 35 (Fig. 4) and the dial and cam are brought to a positive stop. The pawl spring 39' co-operates with the teeth of ratchet wheel 28, so that when the gears revolve as the dial is moved in a clockwise direction, the spring may slide over the ratchet wheel. When the gears operate in the reverse direction the governor is carried with them to regulate the return movement of the dial, but when the gears come to a positive stop the governor is permitted to rotate until it gradually comes to a stop, thus removing any undue strain on the governor.

Having chosen to illustrate my invention as applied to a large capacity system, I have illustrated in Fig. 8 a trunking arrangement which may be used in connection with a calling device of the particular type disclosed. Referring to Fig. 8 I will now explain the trunking scheme briefly. Three subscribers' telephone stations are indicated by the circles at the upper left hand corner of the diagram. These stations are connected by the usual line circuits with the exchange, where they terminate preferably in line switches of some kind through the medium of which the lines when calling may be extended to idle first selector switches. The first selectors are the first in the series of numerical switches which are used to establish connections in accordance with called telephone numbers. The three squares labeled "First selectors" indicate three of these switches, and the multiple banks thereof, comprising 20 levels of contact sets are indicated by the 20 heavy horizontal lines. From each first selector level trunk lines extend to a group of second selectors, there being in all 20 groups of such second selectors. The group in which the trunk lines from the first selector level terminate is indicated in the drawing by three more

squares, labeled "Second selectors", and the multiple banks are indicated by 20 horizontal lines as in the case of the first selectors. Each group of second selectors has access through its 20 bank levels to 20 groups of connectors. As in the case of the second selectors, only one group of connectors is shown, this being the group accessible from the first level of the group of second selectors shown. The connectors are likewise indicated by three squares, which are labeled "Connectors" in the drawing, and the banks are indicated by the heavy lines as before. It will be seen that the trunking scheme as a whole is similar to the usual one in common use, the only substantial difference being in the capacity of the switches.

In mechanical construction the selector and connector switches may be of the ordinary vertical and rotary type, as shown in the U. S. patents to Keith, Erickson, and Erickson, Numbers 815,321 and 815,176, the shafts, however being provided with more notches to permit their wipers to be positioned on any one of the increased number of bank contacts. The circuits may be of the well-known two-wire type, as illustrated by the U. S. patent to Newforth, No. 13,901, reissued April 13, 1915.

The numbering of the bank levels will now be considered as shown in the drawing, the levels 1 to 0 correspond to the digits 1 to 0 on the upper half of the dial, while the levels 11 to 20 correspond to the digits in A, B, C, etc., as shown in the lower half of the dial. It should be understood that the invention is not limited to the particular arrangement of letters and figures shown, as any desired arrangement may be used. In the connectors, the individual contact sets in each level are similarly numbered, for they are selected by numerical operations under control of the calling devices.

Inasmuch as the connectors have 20 levels and 20 contact sets in each level, the capacity of each group of connectors will be 400 lines. There are 20 groups of connectors accessible to each group of second selectors, which would give each group of second selectors access to 8000 lines; and since there are 20 groups of second selectors the total capacity of the 20 level system shown will be 160,000 lines. When this number of lines is compared with the capacity of the ordinary four digit decimal system, which is 10,000 lines, the enormous increase in capacity may be realized.

It will be seen that I have provided a very efficient and simply constructed type of calling device which prolongs the time interval between each series of impulses and which may be equally well applied to a percentage system as to a large capacity system. I do not wish therefore to limit my invention to the exact embodiment described, but desire

to include and have protected by Letters Patent all embodiments thereof which come within the scope of the appended claims.

What I claim is:

1. In an impulse sending device, a spring for driving said device, a rotatable finger hold dial having a keyed shoulder thereon, a combined driving gear and spring cup for holding said spring, said cup so machined and keyed as to tightly fit over said shoulder making said finger hold dial and gear and spring cup as a unit.

2. In an impulse sending device, impulse springs, a rotatable shaft carrying an impulse cam, for operating said springs, a gear on said shaft, a plate supporting said shaft and also carrying a plurality of pins, and a finger stop having an arm adapted to engage said pins to move said plate to permit said cam to operate said springs and for thereafter moving said plate to prevent further operation of said springs.

3. In an impulse sending device having two cycles of operation, a pair of impulse springs lying in planes parallel to each other, a cam for operating said springs, said cam permanently fixed in a plane intermediate to said first planes, means for rotating said cam and means for causing said rotations to interrupt said springs during one cycle of operation and for causing said rotations to become ineffective during the other cycle of operation.

4. In an impulse sending device, a rotatable finger hold dial, an impulse cam, interrupter springs operated by said cam, and means associated with said cam for removing said cam from operative relation to said springs by changing its axis to make further rotation of said cam ineffective.

5. In an impulse sending device, interrupter springs, a cam for operating said springs normally in inoperative relation thereto, a finger stop, and means associated therewith for moving said cam into operative relation to said springs.

6. In a calling device, a finger hold dial, interrupter springs, a cam for operating said springs, a finger stop for limiting the forward and backward movement of said dial and for throwing said impulse cam into and out of operative relation to said springs, and means associated with said device for holding said cam in operative relation to said springs until returned by said stop.

7. In an impulse sending device, springs, a combination comprising a gear, shaft, and cam, said cam normally in inoperative relation to said springs, a support for said combination and means for moving said support to place said cam in operative relation to said springs.

8. In an impulse sending device, interrupter springs, a cam for operating said

springs normally in inoperative relation thereto, a finger stop, means associated therewith for moving said cam into operative relation to said springs, and a pair of
5 shunt springs actuated by said means also.

9. In combination, interrupter springs, a rotatable cam for operating said springs normally in inoperative relation thereto, a movable finger stop, and means controlled
10 by said stop for causing a lateral movement of said cam to bring the same into operative relation to said springs.

10. In a calling device, a reciprocating dial, impulse springs, a cam for operating
15 said springs, means for rotating said cam both on the forward and backward movements of the dial, and means for preventing the rotating cam from operating said springs during the forward movement of
20 the dial.

11. In a calling device, a reciprocating dial, a cam rotated by said dial during the setting movement thereof, a spring tensioned by said setting movement and effective to return the dial and rotate said cam
25 during the return movement, impulse springs out of operative relation with said cam during the setting movement of the dial, and means for bringing the cam and
30 springs into operative relation before the return movement of the dial begins.

12. In a calling device, a rotatable cam, means for revolving said cam a plurality of times in one direction and a like plurality of
35 times in the opposite direction, impulse springs unaffected by said cam during the first movement thereof, and means for causing said cam to operate said springs during its second movement.

13. In a calling device, a rotatable cam, means for revolving said cam a plurality of times in one direction and a like plurality of times in the opposite direction, impulse
40 springs out of reach of said cam during the first movement thereof, and means for bringing the cam and springs into proximity with each other during the second movement of the cam.

14. In a calling device, a rotatable dial, a movable finger stop for limiting the movement of the dial, and means for pivotally supporting said stop on the same axis as
50 said dial.

15. In a calling device, impulse springs, a cam normally standing at a distance from said springs, a support for the cam, means for moving said support to bring the cam and springs together, means for operating

the cam to actuate said springs, and frictional means for retaining the support in position while the cam is being operated. 60

16. In a calling device, a reciprocating dial, a spring operating member, impulse springs normally out of the range of said member, a spring tensioned by said dial in the setting movement thereof for operating
65 said member during the return movement, and means actuated at the end of the setting movement and before the return movement begins for bringing the springs and said member into proximity with each other. 70

17. In a calling device, a cam, a gear and pinion for driving said cam, a shaft for the cam and pinion, a shaft for said gear, and a support for said first shaft pivoted on the
75 shaft of said gear.

18. In a calling device of the movable cam type, a cam shaft; a gear and pinion for driving the cam shaft, a pivoted lever supporting the said shaft, and a common shaft
80 for the gear and lever.

19. In an impulse transmitting device, impulse springs, means for operating said springs, said means normally in inoperative relation thereto, means for setting and then
85 releasing the device to transmit impulses, and means actuated at the end of the setting movement to bring the springs and spring operating means into operative relation.

20. In a calling device, a rotatable finger hole dial, impulse springs, a cam rotated by the dial for operating said springs, and means for moving the cam in a plane parallel to the dial for preventing certain of its
90 rotations from operating the springs. 95

21. In a calling device, impulse springs, a reciprocating dial, a cam for operating said springs, said cam rotated by the dial both during the forward and backward movement of the dial, and means for preventing
100 certain of the rotations of the cam from operating the springs both on the forward and backward movement of the dial.

22. In an impulse sending device, a pair of impulse springs lying in planes parallel to each other, a cam for operating said springs, said cam permanently fixed in a plane intermediate to said first planes, means for rotating said cam, and means for moving the cam to prevent certain of its rotations from operating said springs. 110

In witness whereof, I hereunto subscribe my name this 14th day of October, A. D. 1921.

JOHN G. BLESSING.