Oct. 13, 1925.

1,556,904

J. G. BLESSING

AUTOMATIC CALLING DEVICE

Original Filed Aug. 22, 1921

Fig:3

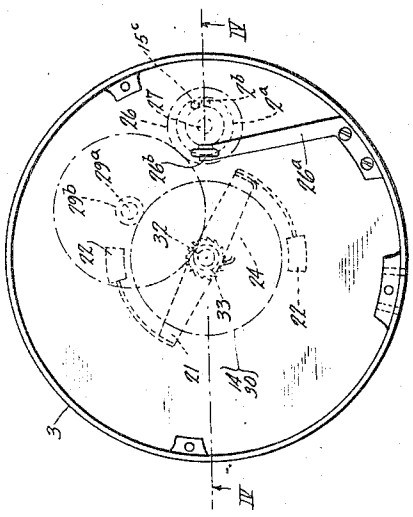


Fig:4

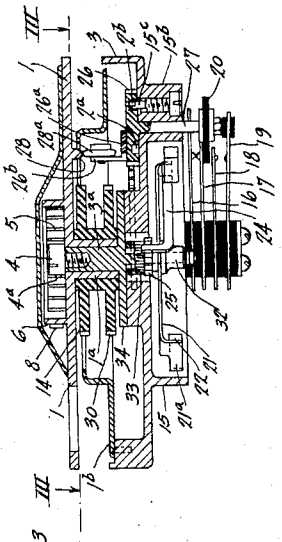


Fig:2

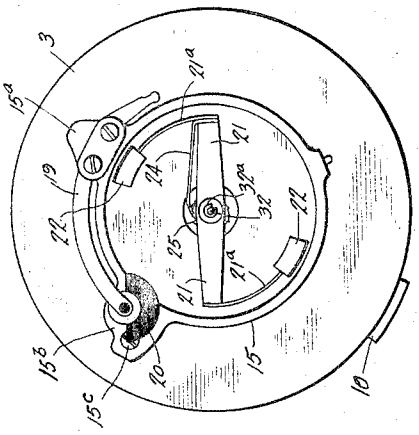
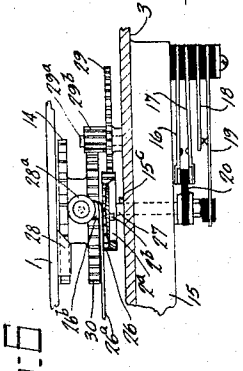


Fig:6



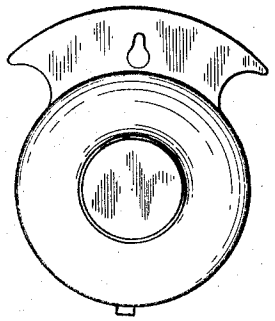


Fig:1

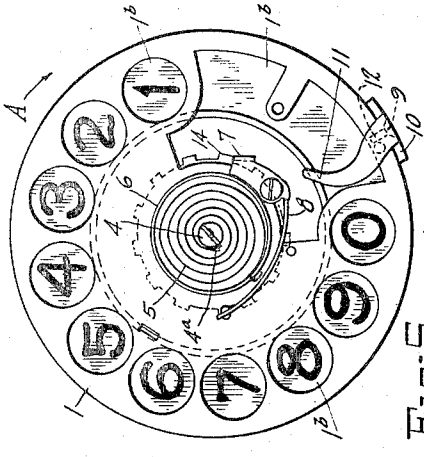


Fig:5

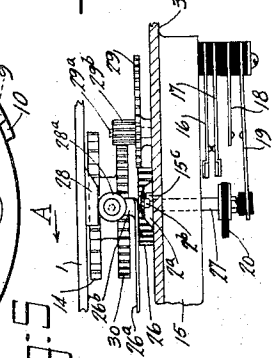


Fig:7

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UNITED STATES PATENT OFFICE.

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AUTOMATIC CALLING DEVICE.

Application filed August 22, 1921, Serial No. 494,281. Renewed March 20, 1925.

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 Oak Forest, 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 to impulse sending devices of the dial type in which the impulses are generated and transmitted successively in definite series according to definite digits after manipulation of the dial.

More particularly the invention relates to devices of the above type in which the action of the impulse mechanism of the dial, when influencing the latter, is automatically controlled by a governor, and the impulses are generated by the action of an interrupter, commonly and hereinafter termed the impulse cam, which latter as well as its governor, are driven from the dial by means of appropriate gear transmission. In these devices, and particularly when as in the present instance, they are constructed in the form of a calling device for automatic telephone systems, many efforts have been made and various means have been devised to prolong the interval between the transmission of the last impulse of one series and that of the first impulse of the next succeeding series, with a view of lengthening the time within which the automatic switches of the system are expected efficiently to perform and complete their function as predetermined by the individual impulse series.

The object of this invention is to provide a more simplified method of accomplishing the above results, thus making the device more desirable from an economical and commercial viewpoint.

Another feature is the improved means for stopping the dial upon its return to normal.

The above important features of the invention and other details will now be more fully described by reference to the practical embodiment illustrated by way of example in the annexed drawings in which:

Figure 1 is a front view of the device showing the power spring exposed by the removal of the cover plate shown in Figure 7.

Figure 2 is a rear view of the device showing the centrifugal governor and the impulse generating cam.

Figure 3 shows more or less diagrammatically the whole of the gear beneath the finger hold dial as it appears when viewed in the direction of the arrows III—III shown in Figure 4.

Figure 4 is an axial section of the whole device taken on the line IV—IV of the Figure 3 and viewed in the direction of the arrows indicated therein.

Figure 5 illustrates more clearly the parts of the mechanism for displacing the shaft of the impulse cam and the stoplock for the dial in the normal position of the parts.

Figure 6 shows in a similar figure the same mechanism when the dial is in off-normal position, and

Figure 7 illustrates the cover plate normally secured to the dial to protect the power spring of the device.

As shown, the device comprises the usual finger hold dial 1 (as shown most clearly in Figs. 1 and 4), having its hub 1^a rotatably fitted about a central axial stem 3^a, which forms part of a shallow cylindrical housing 3, which may be of any light and durable material.

To prevent the finger hold dial from slipping off the stem 3^a it is rotatably held therein by a screw 4. The head of this screw is provided with a lateral lug 4^a to receive one end of a spiral power spring 5, the other end of which is secured in a notch or to a lug of a cup 6, forming part of or externally secured to the finger hold dial and serving as a protecting casing for that spring. The finger hold dial is, as usual, provided with ten or any other requisite number of finger holds which register with the numerals or letters on the usual digit

indicating disc 1^b suitably secured beneath the dial.

Loosely fitted on the hub of the dial is a compound gear comprising a ratchet wheel 14 and a gear 30 having a common hub. Secured to the upper side of the finger hold dial so as to project down into the path of the teeth 14 is a ratchet pawl 7 influenced by a spring 8. Secured to the under side of the finger hold dial close to its periphery is a pin 9 which, at the end of the return movement of the dial 1 is adapted to engage a stop screw 12 projecting into its path from the fastening lug 10 of the usual fixed finger stop 11, thereby preventing the dial from having moved backward beyond its normal position. This stopping arrangement is not necessary but is desirable when making certain adjustments, the important stopping means being associated with the gear 26 and the base 3 as will hereinafter be explained. The spring 8 normally tends to hold the pawl 7 in engagement with the teeth of ratchet wheel 14 so that as the dial is rotated forward in the direction of the arrow A Fig. 1 (for setting) the pawl 7 rides over the ratchet wheel 14, and upon the release and return movement of the dial, the pawl 7 engages said teeth to cause the ratchet wheel 14 to be rotated with the dial.

The cover plate shown in Fig. 7 is shaped to fit over the cup 6 and may be secured to the dial in any known manner.

The shallow housing 3 is provided rearwardly with a cup shaped circular flange 15 (Figs. 4 and 5) forming a circular cavity for the accommodation of the centrifugal governor 21 and provided with a thickened portion 15^a for the mounting of the impulse springs 16 and 17, and of the shunt springs 18 and 19, and with a thickened portion 15^b journalled in which is the shaft of the impulse generating or interrupter cam 20, and other parts related thereto.

The springs 16 and 17 are repeatedly opened in the operation of the device by the cam 20, whereby impulses are generated while the springs 18 and 19 are closed as the dial 1 moves off-normal to shunt the talking equipment of the telephone during impulses. In the example shown the impulse springs 16 and 17 and the shunt springs 18 and 19 are arranged directly above one another and the top spring 19 is lengthened so that normally the free end of the shaft of the cam 20 is in contact with the end of the spring 19 holding the latter under tension.

The cam 20 of the insulating material is, as shown, semi-circular in form so as to break the contact between the interrupter spring only once in every revolution, which is of great advantage, inasmuch as it definitely safeguards the generation of uniform individual impulses.

As will more clearly be seen from Figures 4, 5 and 6 this cam is mounted on a short stub shaft 27 rotatably and displaceably journalled in an appropriate bore in the lug 15^b and carrying at its inner end inside the shallow casing 3, a gear wheel 26. Normally bearing on but when freed tending to rise from the outer face of this gear wheel is a leaf spring 26^a, the other end of which is secured to the inner circumference of the casing 3. Rotatably journalled in an offset lug 26^b of the leaf spring, is a roller 28^a, and on the under side of the finger hold dial 1 is secured a cam 28 which, as shown, in Figure 5 is normally in contact with the roller 28^a so as to force the leaf spring 26^a to exert pressure on the gear wheel 26 and thereby to hold the cam 20 in its outermost position (Figs. 4 and 5) in opposition to the inward pressure exerted thereon as already stated by the contact spring 19.

The opposite face of the gear wheel 26 adjacent to the bottom of the shallow casing 3 is provided with a circular slot 2^a into which projects from its upper side a pin 2^b so that in the position of gear wheel 26 shown in Figs. 4 and 5, and when the finger hold dial is in its normal position, said pin engages the end of the stop screw 15^c fitted in the lug 15^b. In the position shown in Fig. 6, that is to say when cam 28 has left the roller 28^a and the latter with spring 26^a have freed the gear wheel 26 the cam 20 with shaft 27 are displaced inwardly by the pressure of the spring 19 and the pins 2^b and 15^c are, as shown, removed one from the other and therefore relatively out of engagement; when in engagement these pins therefore constitute a stop lock against continual rotation of the cam 20 and the gear by which it is operated.

The configuration of the cam 28 is such as to cause the shaft 27 and the impulse cam 20 to be forced outward against the tension of the spring 19 as the dial 1 during its return rotation passes through the final portion of its movement just before reaching normal.

Projecting axially from a plate 34 (Fig. 4) between which and the dial 1 the compound gear 14, 30 is confined, is a central shaft 32 which extends right through and beyond the cavity formed by the flange 15 which accommodates the centrifugal governor. In the example shown this governor consists as clearly seen in Figure 2, of a resilient plate 21 extending diagrammatically across the cavity, and carrying at each end a circularly curved arm 21^a fitted with a weight 22 of which the sides adjacent to the inner periphery of the flange 13 are coated with rubber or other friction material. Instead of the governor 21 a spider having three or four radial arms, each fitted with a weight, may of course, be used if desired.

This governor, as shown, is fitted axially but loosely, on the shaft 32 by means of a boss 32^a, and is adapted to be driven by a gear 33 of a ratchet and gear unit, which is loosely mounted on the shaft 32. To this end, the governor body is provided with a pawl 24 engaging the ratchet teeth 25 of the unit so that the governor is rotated by the rotation of the gear 33, but is free to revolve and to continue its rotation thereon after the gear has stopped thus being relieved from any such strain as would otherwise be exerted thereon by a sudden stoppage of the gear wheel.

As will be seen from Figs. 3 and 4, the gear wheel 33 is in mesh with gear wheel 29 loosely journalled on a stub shaft 29^a, mounted within the housing 3. This gear wheel 29 is integral with a small concentrical pinion 29^b which latter is in mesh with the gear wheel 30 which, as stated, is integral with the main ratchet gear wheel 14. The gear wheel 29, moreover, is also in mesh with the gear wheel 26 which, as above referred to, is mounted on the inner end of shaft 27 of the impulse generating cam 20.

It will thus be seen that as the ratchet gear wheel 14 is rotated, rotation is imparted through the gear wheel 30 to the pinion 29^b and therethrough to gear wheel 29 which, in turn, drives the pinion 33 with the ratchet wheel 25 and the centrifugal governor, and at the same time, the gear wheel 26 with the shaft 27 and the impulse generating cam 20.

The operation of the device is as follows:—

In the well known manner the user of the device according to the digit required places his finger in the hole of the finger hold dial 1 which registers with that digit, and pulls the dial around in the direction of arrow A until his finger has encountered the stop 11 shown in Figure 1 (for setting). By so doing, the cam 28 (Figs. 4, 5 and 6) arranged on the underside of the dial 1, slips off the roller 28^a freeing the latter to the upward tendency of the spring 26^a, thereby causing the gear wheel 26, the stub shaft 27 and the impulse cam 20 to be pushed inwardly from the position shown in Figures 4 and 5 to that shown in Figure 6 by the tension of the outer shunt spring 19 and causing the shunt springs 18 and 19 to be short circuited. By this displacement of the gear wheel 26 the locking pins 2^b and 15^c become locally separated as shown in Figure 6 thus enabling the gear wheel 26 to be rotated. During the clockwise rotation of the finger hold dial pawl 7 rides over the teeth of the ratchet wheel 14 and none of the gear wheels of the mechanism are therefore driven, but power is thereby stored in the spring 5. By withdrawing his finger from the dial hold at the end of the setting operation, the user releases the dial to the action of the power spring 5 which causes it to revolve in the opposite direction until it is stopped by the engagement of the pins 2^b and 15^c above referred to.

During the return rotation of the dial the pawl 7 is in engagement with the ratchet gear 14 thereby causing this gear to rotate with the dial, and through the gear wheel 30 and the gear unit 29, 29^b, to drive the gear unit 33, 25 and the governor, and at the same time, the gear wheel 26, shaft 27, and impulse cam 20. Both the governor 21 and the impulse cam 20 are therefore in rotation during the whole of the return rotation of the finger hold dial 1.

During this operation (Fig. 6) the governor exerts regulating effect on the dial by centrifugal or braking action and while the impulse cam 20 is operative in repeatedly breaking the contact between the impulse springs 16 and 17. Just at the moment when the impulse cam has performed its last active revolution and the last impulse of the series has thus been transmitted and during the last stage of the return movement of the dial the cam 28 rides upon the roller 28^a, thus forcing the roller down against the gear wheel 26, and through the spring 26^a exerting direct friction and braking effect on the latter. The shaft 27 and the impulse cam 20, are thus forced outward again to the position shown in Figures 4 and 5 in opposition to the tension of the shunt spring 19 and the friction on the gear wheel 26 above referred to prevents any overthrow of the impulse cam 20 before the latter is brought to a standstill by the engagement of the stop pins 2^b, 15^c, which causes the whole gear train, the impulse cam and the finger hold dial 1 to come to a dead stop coinciding precisely with the normal position of the dial. It will be seen from Figs. 4 and 5 that in this normal position, the impulse springs 16, 17 are closed while the shunt springs 18, 19 of the telephone equipment are held open by the mechanical contact of the outer shunt spring 19 with the end of the shaft 27 of the impulse cam.

Between the time of commencing and completing its operation, the impulse cam is, therefore, displaced relatively to the springs 16, 17, 18, 19 controlled by it and this displacement takes place in the example shown, always at the end of the last active rotation to enable the cam to perform the required idle movement when out of register with the impulse springs 16, 17. The action is so timed that this displacement is effected at the precise moment and the cam 20 is not stopped until it has completed its idle revolution while it is held opposite the gap between the impulse springs 16, 17 and the shunt springs 18, 19 and before the engage-

ment of the pins 2^b, 15^c, by which both the finger hold dial and the cam are arrested in the position for the next setting operation. When so arrested the action of the whole gear train is stopped, but due to the ratchet arrangement between the gear unit 33 and 25 and the governor 21 this sudden stoppage is not transmitted to the governor, which is thereby relieved from any unnecessary strain.

What I claim as my invention is:

1. In an impulse sending device, a mounting plate having a spring and roller device attached thereto, a finger hold dial having a shoulder affixed thereto, a gear driven cam, a source of power for driving said cam and dial, to move said shoulder over said spring and roller device to shift said cam from a non-impulse sending position to an impulse sending position, and for returning the same to a non-impulse sending position each time the finger hold dial is operated.

2. In an impulse sending mechanism, a spring and roller device fixed to a stationery part thereof, a gear driven cam, a source of power for operating said device to shift said cam from a non-impulse sending position to an impulse sending position.

3. In a calling device, springs, a shaft carrying a gear on one end and an interrupting device on the other end for operating said springs, said shaft movable endwise, a rotatable finger hold dial, a flexible bracket mounted on a stationary part of said calling device extending over said gear and carrying a roller, a shoulder on the dial engaging said roller, a source of power for moving said shoulder to thereby move said gear and shaft through the medium of said bracket and roller while the dial is rotating.

4. In a calling device, a shaft having a cam on one end and gear on the other end, mechanism for rotating said shaft, means associated with said gear causing it to rotate in different planes, and means for limiting the rotary movement to a single revolution in one plane, said means being directly associated with said gear.

5. In a calling device, a source of power, a gear, a groove in said gear running concentric to the periphery thereof, an obstruction in said groove, a pin adapted to engage said obstruction, and means for moving said gear out of normal range of said pin during one period of operation to allow said gear to rotate a plurality of revolutions, and for thereafter returning said gear into range of said pin and allowing the obstruction of said groove to engage with said pin only after said gear has completed a revolution in its normal range.

6. In a calling device, impulse springs, a cam for interrupting said springs, a gear for driving said cam, a groove in one side of said gear having an obstruction therein, a pin cooperating with said obstruction, means for rotating said gear and cam, a device for moving said gear to cause the cam to rotate in a different plane, out of operative relation with the impulse springs and to bring said gear into operative relation with said pin to prevent more than one rotation of the cam while out of operative relation with the springs.

7. In a calling device, impulse springs, a cam for operating said springs, a gear train for driving said cam, a groove in the side of one of said gears, an obstruction in said groove, a pin cooperating with said obstruction to limit the movement of the gear train, and means for moving said gear parallel to its axis and out of operative relation with said pin to permit the rotation of the gear.

8. In a calling device, impulse sending mechanism, a gear train for operating said mechanism, a stationary pin cooperating with one of the gears to stop the movement thereof, and means for moving said gear out of range of said pin to permit the operation of the gear train.

9. In a calling device, impulse sending mechanism, a gear train for operating said mechanism, a stationary pin cooperating with one of the gears to stop the movement thereof, said gear rotating in a plane out of range of said pin, and means for moving the gear into range of the pin to stop the gear train.

10. In a calling device, impulse sending mechanism, a gear for operating said mechanism, an obstruction on one side of the gear, a pin in the path of said obstruction for preventing rotation thereof, and means for moving the gear parallel to its axis to permit its rotation.

11. In an impulse sending device, an impulse generating cam, said cam movable into and out of its impulse generating position, a gear for driving said cam, a mounting plate for supporting said gear, a spring mounted on said plate carrying a roller, a finger hold dial for operating said gear, and means on the dial for moving said cam through the medium of said roller.

12. In a calling device, an impulse sending mechanism comprising impulse springs, a cam for operating said springs movable into and out of operative relation therewith, a rotatable gear for driving said cam, a groove in said gear having an obstruction therein, means for moving said gear parallel to its axis to bring the cam out of operative relation with the springs, and a pin for engaging the obstruction in said groove to limit the rotation of the cam while out of engagement with the springs.

13. In an impulse sending device, a mounting plate supporting a finger hold dial and a gear driven cam having an impulse sending and a non-impulse sending position, a source

of power for driving said cam and dial, a spring and roller device mounted on said plate, and a shoulder on said dial for operating said spring and roller device to shift said cam from an impulse sending position to a non-impulse sending position.

14. In a calling device, impulse sending mechanism, a gear for operating said mechanism, an obstruction on one side of the gear, a pin in the path of said obstruction for preventing rotation thereof, and means including a spring for moving the gear parallel to its axis to permit its rotation.

In witness whereof, I hereunto subscribe my name this 16th day of August, A. D. 1921.

JOHN G. BLESSING.