

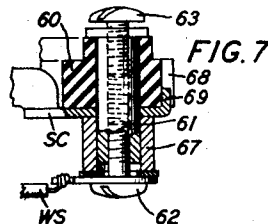
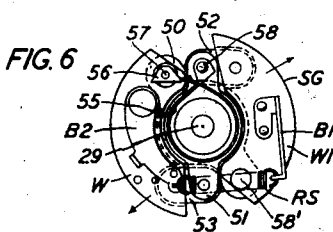
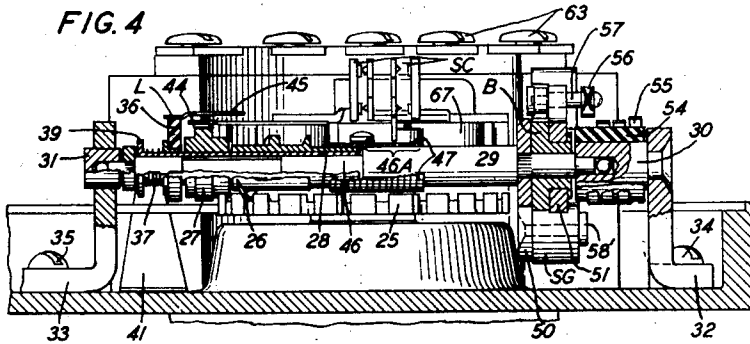
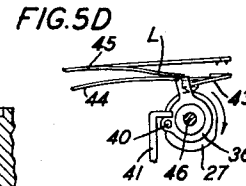
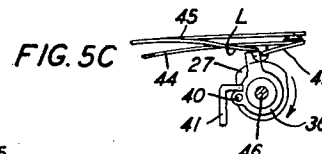
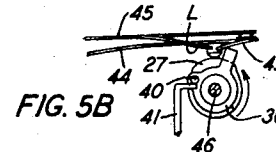
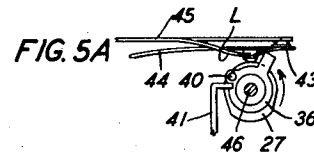
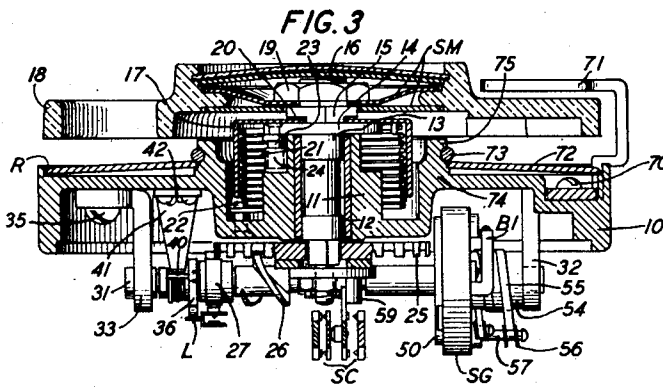
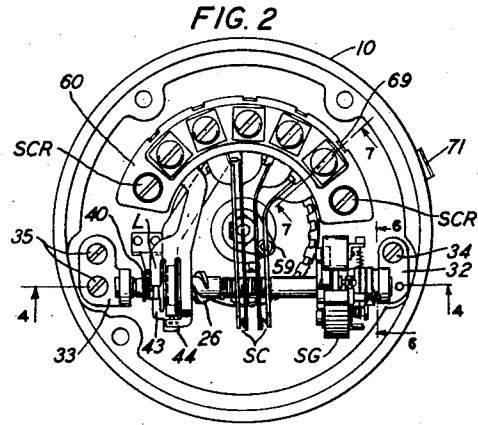
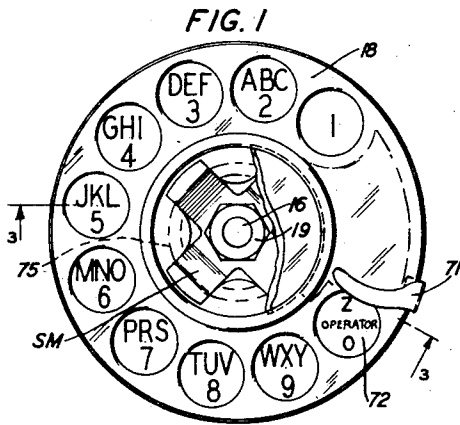
Oct. 10, 1944.

H. W. GOFF ET AL

2,359,841

TELEPHONE CALL TRANSMITTER

Original Filed Oct. 19, 1940



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TELEPHONE CALL TRANSMITTER

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Original application October 19, 1940, Serial No. 361,840. Divided and this application July 30, 1942, Serial No. 452,852

7 Claims. (Cl. 179—90)

This invention relates to call transmitters and more particularly to telephone call transmitters of the finger-wheel operated type.

It is a division of our copending application filed October 19, 1940, Serial No. 361,840, now Patent 2,345,471, issued March 28, 1944.

The object of the invention is to improve the operation of such a call transmitter while reducing the number of the operating parts.

According to the call transmitter of this invention a mounting is formed with a centrally disposed circular projection provided for rotatably receiving a shaft serving for mounting the operable element of the transmitter in predetermined spaced relation to a number plate secured to a circular bearing portion forming part of the mounting, while a finger-stop secured in a recess formed in the bearing portion in cooperation with which a pin carried by the finger-wheel and a stop formed with the centrally disposed projection serve to limit the angular movement of the finger-wheel and its supporting shaft relative to the numbers or symbols printed on the number plate. Motor means in the form of a coiled spring disposed concentric to the projection formed with the mounting serves to return the finger-wheel and its supporting shaft to normal non-operated position following each selective movement of the finger-wheel, while means keyed to the supporting shaft serve for adjusting the tension of the motor spring.

A driving mechanism including a gear secured to the end of the supporting shaft opposite the finger-wheel actuates a worm mounted for free rotation on a secondary shaft for imparting corresponding movements to a cam in direction opposite to each other with clutch means effective in one direction for imparting movement to the cam supporting shaft for actuating a governor mechanism serving to control the operation of the pulsing cam, frictionally operable means actuated by the two-way movement of the cam being effective to render certain operations of the pulsing cam ineffective relative to an operatively associated pulsing contact for assuring proper control of the automatic switches at the telephone exchange and thereby avoiding the establishment of wrong telephone connections.

Other novel features and advantages of the invention will appear from the following description and by the claims appended thereto, reference being had to the accompanying drawing in which:

Referring to the drawing:

Fig. 1 is a plan view of the call transmitter con-

structed according to the invention, the transparent disc and the instruction card for the transmitter being shown with portions cut away;

Fig. 2 is a rear assembly view of Fig. 1;

Fig. 3 is a vertical sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a vertical sectional view taken on line 4—4 of Fig. 2;

Fig. 5A is a detail view showing the position of the contact springs during the selective operation of the finger-wheel;

Fig. 5B is another detail view showing the position of the contact springs during the selective operation of the finger-wheel, their operating cam being shown moved in position 180 degrees from the position shown in Fig. 5A;

Fig. 5D is a detail view showing the position of the contact springs during the pulsing operation of the transmitter; that is, during a return movement of the finger-wheel to normal unoperated position, one of the springs being shown latched in the raised position during the movement of the other contact spring according to the configuration of the pulsing cam;

Fig. 5C is another detail view showing the closed position of the contact springs during the return movement of the finger-wheel, the pulsing cam being shown rotated 180 degrees from the position shown in Fig. 5D;

Fig. 6 is an assembly view of the governor mechanism viewed from the direction indicated by the arrows 6—6 in Fig. 2; and

Fig. 7 is a vertical cross-sectional view of the bank used for mounting the pulsing and shunt springs taken on line 7—7 of Fig. 2.

The telephone call transmitter of this invention consists of a circular mounting 10 having a centrally disposed hub portion 11 provided for receiving a bushing 12 in which a shaft 13 is journaled. Shaft 13 is formed at its upper end with a disc portion 14, a key portion 15 and a screw-threaded portion 16, the disc portion 14 serving for supporting an inverted bell-shaped member 17 provided for a purpose which will be hereinafter described, while the key portion 15 serves for keying the bell-shaped member 17 and the clamping members SM serving for mounting a finger-wheel 18 on the shaft 13, and a nut 19 engaging the screw-threaded portion 16 of the shaft is provided for firmly securing the clamping member SM and thereby the finger-wheel 18 on the shaft 13.

The key portion 15 of shaft 16 is provided with an undercut 20 forming a bayonet-like shaped lock for the bell-shaped member 17 and to this

member is secured one end of a motor spring 21, the other end of this spring being secured to a pin 22 shown in Fig. 3, in turn secured to mounting 10 so that any angular movement of finger-wheel 18 is effective to tension the motor spring 21, the function of which is to return the finger-wheel to normal position while actuating a pulsing mechanism in a manner which will hereinafter be described. A stop member 23 carried by the disc portion 14 of shaft 13 cooperates with a stop member 24 formed with the hub portion 11 of mounting 10 for limiting the turning movement of shaft 13 and that of the finger-wheel 18 carried thereby when actuated by the tension of the motor spring 21.

To the opposite end of shaft 13 is keyed a gear-wheel 25 engaged by a worm 26 shown in Figs. 2, 3 and 4, this worm being mounted for rotation with a pulsing cam 27 and a sleeve 28 as a unit, the sleeve being in turn mounted for free rotation on a shaft 29, journaled on bearings 30 and 31 supported by brackets 32 and 33 secured to mounting 10 by a number of screws 34 and 35, respectively.

A latch member 36 shown in Figs. 2, 3, 4, 5A, 5B, 5D and 5C made of insulating material is mounted for free movement on the sleeve 28 but is rotated therewith by friction with the pulsing cam 27 under the tension of a helical spring 37 having one end abutting against a collar 39 formed with the sleeve 28 and its other end bearing against the side of latch member 36. The angular movement of latch 36, however, during the selective operation of the finger-wheel is limited by a pin 40 carried by this latch in cooperation with a stop in the form of a bracket 41 secured to mounting 10, as by a number of screws 42 shown in Fig. 3, and during the return operation of the finger-wheel and, therefore, the operation of pulsing contact springs 44 and 45 by a lug 43 formed with spring 44 so as to control the operations of these springs as will be hereinafter described in detail.

The worm 26 is formed with a sleeve portion 46 of a diameter similar to that of bearing portion 46A of shaft 29 to form, in cooperation with a coiled spring 47, a one-way effective clutch for rotating shaft 29 and a speed governor SG, shown in Figs. 2, 3, 4 and 6, provided for controlling the operation of the pulsing mechanism when actuated by the tension of motor spring 21.

This speed governor consists of a yoke 50 keyed on shaft 29 and serves for pivotally mounting at the ends thereof the fly-weights W and W' on pivots 57 and 58' respectively. A second yoke 51 is secured on a bearing B, in turn mounted for free rotation on shaft 29. The yoke 51 is connected at its ends with the free ends of the weights W and W' by links 52 and 53, respectively, so that the two weights W and W' are caused to move simultaneously on their pivots 57 and 58' against the tension of a retractile spring RS when subjected to centrifugal action. Retractable spring RS has its ends hooked to brackets B1 and B2 on the weights W, W', the latter bracket being pivotally mounted on weight W and adjustable thereon for controlling the adjustment of the tension of spring RS.

On bearing 39 is fixed a drum 54 of composition material disposed concentric to a helically wound metallic band 55 having one of its ends 56 attached to a stud 57 on yoke 50 keyed to shaft 29 on which the weight W is pivoted while the opposite end of band 55 is attached to a pivot 58 connecting the link 52 to the yoke 51

mounted for free rotation on shaft 29 so that the movement of the fly-weights W and W' is effective to cause the band 55 to effect a braking action on the drum 54 for controlling the speed of the pulsing mechanism when actuated under the tension of motor spring 22.

On shaft 13 positioned adjacent to gear-wheel 25 is mounted a crank 59 provided for actuating a set of shunting contacts SC which are mounted on a bank 60 of insulating material also supporting the pulsing springs 44 and 45. This bank is secured to the mounting 10 by screws SCR shown in Fig. 2. Conducting bushings 61, as shown in Fig. 7, are embedded in the insulating material and are screw-threaded for receiving screws 62 and 63 for securing the terminals of wires WS serving for interconnecting the different springs in the bank, while screws 63 are provided for connecting the terminals of the subset to the call transmitter, the tightening of screws 62 serving for clamping the associated contact springs SC between the under-side of bank 66 and the bushing 67 telescopically engaging the sleeve 61, while the bank 66 is provided with notches, as 68, into which lugs, as 69, formed with the pulsing and shunting springs are fitted for readily locating them in operative relation with the pulsing cam 27 and the crank 59.

On mounting 10 at the periphery thereof is secured a finger-stop 71 provided for limiting the selective movement of finger-wheel 18, while a number plate 72 is placed in a recess R in mounting 10 concentric to hub 11, the number plate being removably held in such recess by a split spring ring 73 shown in Fig. 3 engaging a circular groove in the collar portion 75 formed with the mounting 10.

In a typical example of operation of the call transmitter of the invention, the angular operation of the finger-wheel, from any one of the finger-holes in wheel 18 in registry with the groups of digits and letters printed on the number plate 72, to the finger-stop 71 is effective to tension the motor spring 22, while rotating the worm 26 through its engagement with the gear-wheel 25 keyed to the finger-wheel supporting shaft 13. The turning movement of worm 26 and its sleeve portion 46, and the pulsing cam 27, mounted for rotation as a unit on sleeve 28, in the direction indicated by the arrows in Figs. 5A and 5B, is effective to move the pulsing springs 44 and 45, which are normally tensioned against each other collectively, according to the shape of pulsing cam 27. The rotation of this cam is effective to move the latch 36 due to their frictional engagement under the tension of spring 37 from the position shown in Fig. 5C to the position shown in Fig. 5A, thus permitting the movement as above mentioned of contact springs 44 and 45 collectively according to the contour of pulsing cam 27 and, therefore, the opening of the pulsing contacts 44 and 45 does not take place during the selective operation of the finger-wheel, and the shaft 29 is not operated due to the one-way clutch formed by the helical spring 47 connecting the shaft 29 to sleeve unit 28.

Upon the release of finger-wheel 18 by the operator the tension of the motor spring 22 is effective to return this wheel to normal position as defined by the pin 23 engaging the stop lug 24 formed with the hub portion 11 of the mounting 10. The return movement of finger-wheel 18 and the consequent rotary movement of pulsing cam 27 as effected by worm 26 in the opposite direction, the clutch spring 47 is now rendered effective to

turn the shaft 29 and thereby the governor SG, the fly-weights W and W1 of which are caused to operate under centrifugal and tangential forces for tightening the break-band 55 around the drum 54 for controlling the speed of pulsing cam 27 and thereby the make and break operations of the contact springs 44 and 45. The rotation of pulsing cam 27 is effective to rotate the latching member 36 from the position shown in Figs. 5A and 5B to the position shown in Figs. 5D and 5C; that is, in position where the latching member engages the under-side of a lug L formed with upper contact spring 45 for holding this spring raised and the pulsing contact closed (Fig. 5C) until the high part of the impulse cam 27 passes from contact with the lower impulse spring 44 when this spring moves out of contact with spring 45, as shown in Fig. 5D, thus causing the first opening of the impulse circuit leading to the central office. It is to be noted that upon the release of the finger-wheel, the first rotation of the impulse cam 27 from the position shown in Fig. 5A, to the position shown in Fig. 5D, following its passing through the position shown in Fig. 5B, the pulsing springs are not opened, for the reason that the latching member 36 engages the lug L of the upper spring at the beginning of the second turn of the cam thus negating the first turn of the cam and suppressing the first impulse for the purpose of giving the selectors at the central office more time to operate between trains of impulses. These operations are repeated until all the impulses have been sent. The cam 27 drives the springs to the closed position at a controlled rate in a positive manner thus avoiding chatter and accidental opening of the pulsing contacts, and since the speed of the pulsing cam is constant due to the improved speed governor coupled with the single-lobe cam, all pulses will be alike. The latching member 36 is held in engaged relation with lug L during the pulsing operations from any selected position of finger-wheel 18. The crank 59 operates the shunting springs SC following the selective and return movement of the finger-wheel 18 to normal position, to perform switching operations well known in the automatic telephone art, but which form no part of the present invention.

From the foregoing it is evident that the signal transmitter of this invention is a distinct advance in the art in that it provides a powerful, slow speed governor of novel construction which while occupying relatively small space in the dial, where space is at a premium, controls the speed of the shaft with much less variation due to friction and other causes heretofore specified than governors heretofore used in automatic telephone dials. This low speed governor also permits of the use of a single-lobe pulsing cam, instead of the butterfly or other multiple cam arrangements heretofore used, resulting in the production of uniform pulses, and the use of the positive drive for moving the springs from one position to another at a controlled rate, avoiding impact of one against the other, tends to overcome or even prevent contact chatter and thereby accidental opening of the pulsing contacts.

What is claimed is:

1. A signal transmitting device comprising a rotatable shaft movable in opposite directions, a cam on said shaft, a set of normally closed contact springs collectively actuated by said cam, means operable by the movement of said shaft to render the movement of said cam ineffective to open said contacts, in one of said directions, said

means operating in each of said directions to cause the make-and-break operation of said contact springs by said cam in the other of said directions.

2. A signal transmitting device comprising a rotatable shaft, a manually operable member movable in opposite directions for actuating said shaft in each of said directions, a set of normally closed contacts, a gearing mechanism actuated by said shaft, a pulsing cam geared to said mechanism, and means operable automatically in each of said directions for controlling the operation of said contacts by the movement of said cam, said means in one direction holding said contacts in position ineffective relative to said cam and in the other direction permitting the operation of one of said contacts away from the other contact.

3. A call transmitter comprising a rotatable shaft movable in opposite directions, a set of normally closed contact springs, a pulsing cam on said shaft for actuating said contact springs, means frictionally operable upon the movement of said cam in each of said directions, said means in one direction engaging means carried by one of said springs for permitting the operation of said cam ineffective to open said contact springs and in the other direction engaging means carried by the other of said contact springs for preventing its operation to cause the make-and-break operation of said contact springs.

4. A call transmitter comprising a mounting, a shaft journaled in said mounting, a manually operable member movable in opposite directions for rotating said shaft, a gearing mechanism, a pulsing cam actuated by said mechanism, said cam having a bearing portion, normally closed contact springs tensioned against said cam, an insulating disc mounted on said bearing portion having a peripherally disposed latch portion, means for frictionally holding said disc against the side of said cam to cause said disc to frictionally rotate therewith, a pin extending perpendicularly from said disc, a stop member mounted on said base and cooperating with said pin for limiting the movement of said disc in each of said directions, said disc in one of said directions permitting the movement of both springs by said cam and in the other direction moving in position under means carried by one of said springs for holding it from movement relative to the other spring to cause the make-and-break operation therebetween.

5. In a call transmitter, a shaft, a manually operable element for actuating said shaft in one direction, a motor spring tensioned by the movement of said shaft for rotating it in the opposite direction, a gear keyed to said shaft, a second shaft, a worm and a pulsing cam mounted for rotation as a unit on said second shaft, a one-way effective clutch element operatively connecting said unit to said second shaft, a pair of normally closed contact springs, a latching element frictionally operable upon the movement of said cam for engaging means carried by one of said springs for holding both springs in position ineffective relative to said cam, said element operating upon the reverse movement of said shaft by said motor spring for engaging means carried by the other contact spring for holding the latter in position to cause the make and break operation of said contact springs and a governor mechanism keyed on said second shaft for controlling the operation of said cam during the operation of said contact springs.

6. A call transmitter comprising an inverted cup-shaped casing having a centrally disposed hub and a wall concentric to said hub forming therewith an annular recess, a shaft pivoted in said hub having a shoulder portion resting on said hub, a finger-wheel secured to one end of said shaft, a coiled motor spring located in said annular recess, means carried by said casing for securing one end of said spring, an inverted bell-shaped element secured to said shaft and having means for engaging the other end of said coiled spring to tension the latter upon the operation of said finger-wheel in one direction, a gear secured to the other end of said shaft, another shaft disposed in the plane of said gear and adjacent thereto, a cam and worm unit mounted for free rotation on the second-mentioned shaft, a pair of normally closed contact springs disposed for operation by the movement of said cam, a one-way operable clutch element operatively connecting said cam-worm unit to said second-mentioned shaft for rotating the latter upon rotation of said finger-wheel in another direction, and a governor mechanism on said shaft operable for controlling the movement thereof in said other direction.

7. In a call transmitter, an inverted cup-shaped casing having a centrally disposed bearing portion and a circular wall concentric to said bearing portion forming an annular recess, a

shaft mounted for free rotation in said bearing portion, a finger-wheel secured to one end of said shaft, an inverted bell-shaped element disposed in said annular recess and secured to said shaft, a motor spring having one end secured to said bell-shaped member and to said casing to cause the tensioning of said spring upon the manual operation of said finger-wheel, a gear secured to the other end of said shaft, a second shaft, bearings carried by said casing for supporting said shaft, a worm and pulsing cam unit mounted for free rotation on said second shaft, a pair of normally closed contact springs disposed in operable relation with said cam, a one-way effective clutch element operatively connecting said worm cam unit with said second shaft for rotating the latter, a governor mechanism for controlling the rotation of said second shaft by said motor spring, means frictionally actuated by the movement of said unit for holding said contact springs in position ineffective relative to said cam and in the other direction of said finger-wheel said means operating for retaining one of said contact springs from operating to cause the opening of said contact springs.

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