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2,252,875

CALL TRANSMITTER DEVICE

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FIG. 1

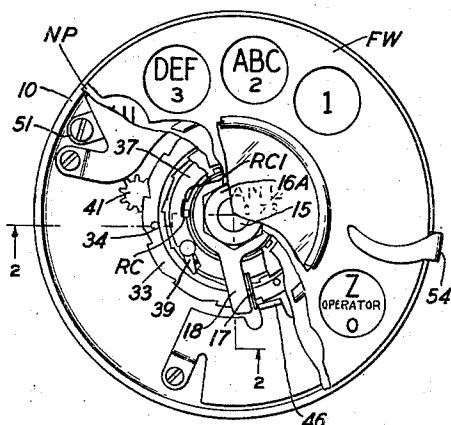


FIG. 2

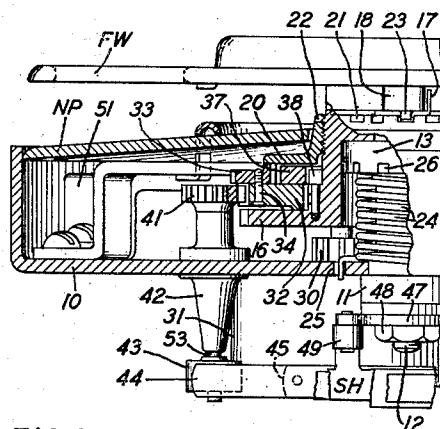


FIG. 3

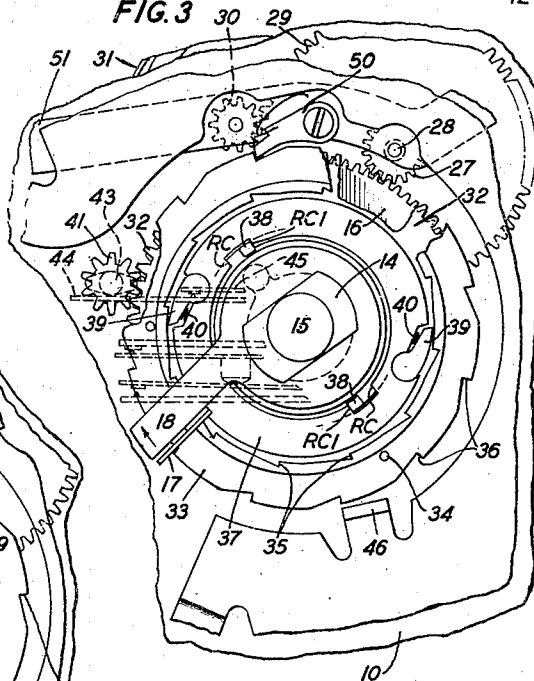
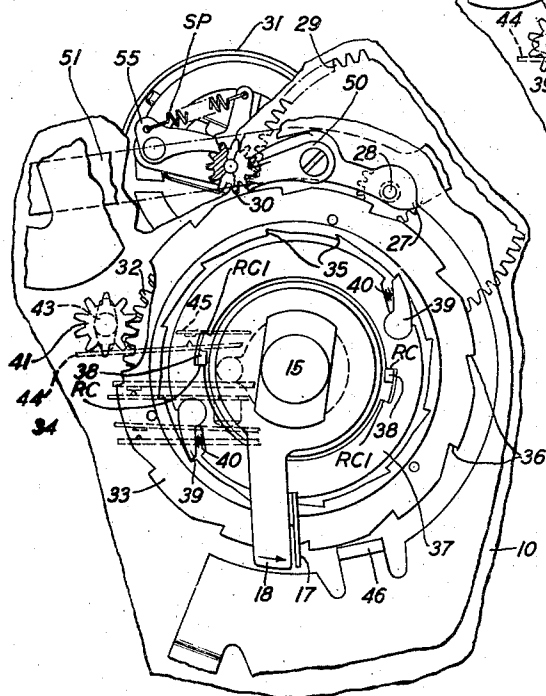


FIG. 4



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CALL TRANSMITTER DEVICE

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8 Claims. (Cl. 179—90)

This invention relates to call transmitter devices of the type used for transmitting sets of electrical impulses for controlling the operation of switches in an automatic telephone exchange system and the like for establishing telephone connections.

The invention has particular reference to a type of call transmitter in which a wheel is provided with so-called finger holds disposed in registry with a plurality of equally spaced numbers or digits appearing on a number disc for operating the finger wheel an angular distance from any one of the digits selected to a finger stop, the turning movement of such a wheel being effective to tension a motor spring, the function of which is to return the finger wheel to normal position while operating a pulsing mechanism, under control of a speed governor, a number of times corresponding to the digit selected.

In such call transmitter, however, it has been found that rotation of the finger wheel may be forced so as to successively transmit sets of digits of the lowest denomination such as 1 and 2, for example, which are located nearest the finger stop at a greater rate of speed than that required for the automatic switches to distinguish between different sets of pulses with the result that wrong telephone connections are established. It has also been found that in other types of call transmitters as, for example, where a ratchet mechanism directly connects the motor spring with the pulsing mechanism, the release of the finger wheel by the operator from the finger stop following the selection of a digit permits the uncontrolled return movement of the finger stop to a point where the driving pawls reengage one of the teeth of the ratchet wheel with the consequent damaging of the pawl, the teeth of the ratchet wheel and the operating parts of the pulsing mechanism.

The object of the invention is to improve the construction and operation of such a call transmitter device.

In the drawing:

Fig. 1 is a front view of the call transmitter device embodying the invention shown with a number of operating parts with portions cut away;

Fig. 2 is a side view partly in section taken on line 2—2 of Fig. 1;

Fig. 3 is a partial view enlarged shown with the finger wheel removed from its supporting shaft showing the condition of the delay device and the ratchet mechanism during the selective operation of the finger wheel; and

Fig. 4 is another partial enlarged view, shown with the finger wheel removed from its supporting shaft and showing the condition of the delay device and ratchet mechanism during the pulsing cycle of the transmitter mechanism.

Referring to the drawing, a circular cup-shaped casing 10, shown in Figs. 1 and 2, is provided at its center portion with an opening for mounting a bushing 11. A shaft 12 is mounted for rotary movement in the bushing and is provided at its upper disposed end with a collar 13, a substantially rectangular-shaped portion 14, shown in Figs. 3 and 4, and a screw-threaded portion 15 fitted with a similar screw-threaded nut 16A, serving for securing a gear 16, a damping spring 17, a radial extending arm 18 and a finger wheel FW in superposed relation to each other. The hub of gear 16 at its upper disposed end portion is screw threaded for receiving a similarly screw-threaded disc 20 having notches, such as 22, registering with notches 21 at the upper disposed end of the hub of gear 16 for engagement by a lug 23 carried by damping spring 17 so as to lock the disc 20 from rotation relative to gear 16 for a purpose which will be hereinafter described in detail.

A helical motor spring 24, shown in Fig. 2, is mounted in position concentric to bushing 11, and has one end engaging a hole 25 in the casing 10, while its other end extends tangentially for engaging, depending upon the adjusted tension of motor spring 24, one of the notches 26 formed at the periphery of collar 13. The gear 16 engages a pinion 27, shown in Figs. 3 and 4, mounted on a shaft 28 for rotation as a unit with a gear 29, the latter meshing with a pinion 30 for actuating, through a spring pressed pawl SP engaging with the teeth of pinion 30, a flyweight speed governor, shown in Fig. 4, rotating in a drum 31 secured to the underside of casing 10.

On the hub of gear 16 is mounted in superposed relation to each other and for movement as a unit, a gear 32 and a ring 33, the latter having internally and peripherally disposed ratchet teeth 35 and 36, respectively. The ring 33 and gear 32 are secured from relative movement to each other by a number of screws such as 34 shown in Figs. 1, 2, 3 and 4, while a ring 37 is mounted on the hub of gear 16 in position concentric to ring 33, the movement of ring 37 relative to gear 16 being limited by two diametrically opposite studs 38—39 carried by gear 16 in cooperation with stops afforded by

the abutting portions RC—RC and RC!—RC! formed by recesses in this ring.

Ring 37 is provided with peripherally disposed cavities for receiving similar driving pawls 39—39 which are in turn held in engageable relation with the internally disposed teeth 35 of ring 33 by springs 40 shown in Figs. 3 and 4. A spring pressed pawl 50 pivoted on a bridge piece 51, in turn secured into the casing 10, is provided for preventing the turning movement of ring 33 and that of gear 32 as imparted by the friction of pawls 39—39 on the teeth 35 of ratchet wheel 33 upon the clockwise or selective movement of finger wheel FW, the gear 32, and the unit ring 37 and ratchet ring 33 are held in adjusted position to each other on the gear 16 by the disc 20 which may be adjusted to the thickness of gear 32 and unit ring 37—33 with reference to proper clearance between these parts by the turning or screwing movement of disc 20 on the hub of gear 16 where it may be afterward locked by lug 23 carried by damping spring 17 engaging any one of the notches 21 and 22 in the hub of gear 16 and disc 20 as above described.

According to this construction, a so-called loose or delay motion is obtained between shaft 15 and the ring 37 driving the ring 33 and gear wheel 32. Gear 32 meshes with a pinion 41 having a spindle portion 53 mounted for rotary movement in a bushing 42 shown in Fig. 2 secured to the casing 10 and on the lower disposed end of this spindle is securely mounted a two-lobe pulsing cam 43 provided for actuating the normally closed contact springs 44 and 45 for transmitting series of pulses corresponding to the selecting movement of finger wheel FW from any one of digits printed on the number plate NP and a finger stop 54 mounted on casing 10, the speed ratio between gear 32 and pinion 41 being of the order 6 to 1.

The finger wheel FW is provided with ten finger holds disposed 30 degrees apart on

10
12

of its circumference registering when this finger wheel is in normal position with digits 1 to 9 plus a zero printed on the number plate, the number zero representing 10 as is well known in the telephone signaling art.

The radial arm 18 which is secured to shaft 12 cooperates with the damping spring 17 and a stop element 46 for arresting the finger wheel FW in its movement toward normal position following each call transmitting operation and to the lower disposed end of shaft 12 is secured as by nut 48 an arm 47 provided with an insulating stud 49 for controlling the operation of a shunting contact SH for a purpose well known in the telephone art but which forms no part of the present invention.

In a typical example of operation, supposing that it is desired to transmit a telephone call designation 311, for example, with the operating part of the transmitter in position as shown in Fig. 1; that is, with the studs 38—38 abutting under the normal tension of motor spring 24 against the stop portion RC—RC formed by the recesses in the ring 37 and the arm 18 abutting against the stop lug 46, the movement of finger wheel FW in a clockwise direction within the angular distance determined by the studs 38—38 and stop portions RC—RC and RC!—RC! which is equal to 30 degrees or a half turn of pinion 41 and thereby that of pulsing cam 43 is rendered

ineffective to move the driving pawl 39—39 relative to ratchet wheel 33, so that while the selective movement of finger wheel FW from the digit 3 to the finger stop 54 is equal to 120 degrees or one turn of pulsing cam 43, therefore an angular distance of 30 degrees of the finger wheel is negated by the loose motion of studs 38—38 relative to stops RC!—RC! in ring 37, thus operating the pulsing cam 43 one turn and a half upon the return movement of the finger wheel to normal position through the rotation of gear 32 driven by the pawls 39—39 in engagement with the ratchet wheel 33 keyed to gear 32. The operation of cam 43 is effective to operate the pulsing spring 44 for transmitting three pulses, the first number of the telephone call designation 311 above mentioned, but it is to be noted that upon the release of the finger wheel by the operator following the selective movement from digit 3 to the finger stop 54 under the tension of motor spring 24, the speed governor which is operatively connected to gear 16 through pinion 27 and gear 29, becomes effective immediately upon the release of the finger wheel so as to prevent the uncontrolled movement of the finger wheel, while the studs 38—38 are moving from the abutting portions RC—RC to abutting portions RC!—RC! thus preventing the engagement of the driving pawls 39—39 with the teeth of ratchet wheel 33 and the starting of the pulsing mechanism at the uncontrolled speed of the motor mechanism with the consequent detrimental effect of the jerks imparted to the pulsing mechanism.

In the selective operation of the finger wheel FW for transmitting the digits 1—1, the second and third digits of the call transmitter 311 above mentioned, supposing that the operator attempted to force the finger wheel twice back and forth from digit 1 to finger stop 54 as for transmitting the digit 1—1 in a period of time less than the adjusted speed of the transmitter. The loose motion or time delay introduced between the finger wheel FW and the pulsing mechanism in the form of studs 38—38 and abutting portion RC—RC and RC!—RC! formed by the recesses in ring 37 is sufficient to permit the automatic switches at the exchanges to distinguish between the digits 1—1 and digit 2 and thereby prevents the establishment of wrong telephone connections.

What is claimed is:

1. In a call transmitter, a rotatable shaft, a gear and a finger wheel secured to said shaft, a second gear, a cam operatively connected to said second gear, a delay motion mechanism between said shaft and said second gear, a motor spring tensioned by the manual operation of said finger wheel for rotating said cam, and a pulsing contact actuated by the operation of said cam.

2. In a call transmitter, main rotatable shaft, a gear secured to and rotating with said shaft, said gear having a hub portion, a speed governor operatively connected to said gear, a second gear mounted for rotation on said hub member, a contact, a pulsing cam for actuating said contact operatively connected to said second gear, a clutching mechanism operatively connecting said first gear to said second gear and motor means for actuating said shaft to cause the operation of said contact.

3. In a call transmitter, a shaft rotatable in directions opposite to each other, a gear and a finger wheel secured to said shaft, a speed governor actuated by the movement of said gear, said gear having a hub portion, a ring mounted

on said hub portion for movement relative to said gear, means carried by said gear cooperating with means carried by said ring for defining the extent of such relative movement, a second gear mounted on the first-mentioned gear in position concentric to said ring, a pulsing cam operatively connected to said second gear, a motor spring tensioned by the operation of said finger wheel in one direction of said shaft for returning said shaft in the other direction, a clutching element carried by said ring, a clutching element carried by said second gear for actuating said cam upon the return movement of said shaft by the tension of said motor spring, and a contact actuated by the movement of said cam.

4. A call transmitter comprising a mounting plate, a shaft rotatably mounted on said plate for movement in directions opposite to each other, a gear securely mounted on and rotating with said shaft, a governor mechanism operatively connected to said gear for controlling the movement of said shaft in one of said directions, a second gear normally stationary during the operation of the first-mentioned gear in said direction, a ratchet mechanism effective in the other direction for operatively connecting the first-mentioned gear to said second gear, a pulsing cam actuated by said second gear and a contact actuated by said cam.

5. A call transmitter comprising a mounting plate having a bearing, a shaft rotatably mounted on said bearing for movement in directions opposite to each other, a gear secured to said shaft, a speed governor actuated by said gear, another gear mounted on the first-mentioned gear for movement relative thereto, a ratchet mechanism operatively connecting the last-mentioned gear to the first-mentioned gear upon the movement of the latter in one of said directions, a motor spring tensioned by the movement of said shaft in the other direction, a pulsing contact and a cam actuated by the operation of the last-mentioned gear following the tensioning of said spring for actuating said contact under control of said governor mechanism.

6. A call transmitter comprising a mounting plate, a bearing carried by said plate, a shaft rotatably mounted in said bearing, a gear mounted on said shaft, a second gear mounted on the first-mentioned gear, a one-way effective clutch mechanism operatively connecting said gears, a governor mechanism operatively connected to the first-mentioned gear, a pulsing cam operatively connected to the other gear, a number disc, a supporting member for said number disc secured to said plate, a finger wheel secured at one end of said shaft, a finger stop carried by said plate, a motor spring tensioned by the manual operation of said finger wheel from one of said numbers on said finger stop for causing the operation of said cam under the tension of said motor

spring upon the return movement of said wheel, a pulsing contact actuated by said cam and means for permitting a predetermined relative movement between said gears upon the reverse movement of said finger wheel.

7. A call transmitter comprising a mounting plate, a shaft journaled on said plate for movement in directions opposite to each other, a manually operable wheel secured to said shaft having a plurality of finger holds, a disc mounted on said plate having a plurality of numbers marked at equal spaced relation thereon, and registering with the finger holds in said wheel, a finger stop carried by said plate for limiting the manual movement of said finger wheel from one of said numbers, a motor spring tensioned by the manual movement of said finger wheel, a gear securely mounted on said shaft, a second gear mounted for movement relative to the first-mentioned gear, a ratchet mechanism operatively connecting the first gear to the last-mentioned gear for rotating it following the tensioning of said motor spring, a pulsing cam actuated by the rotation of the last-mentioned gear, a governor mechanism actuated by the movement of the other of said gears, a pulsing contact actuated by the movement of said cam upon the return movement of said finger wheel from the selected number to said stop and means for permitting relative movement between said ratchet mechanism and said shaft upon each reverting movement of said finger wheel.

8. In a call transmitter, a base, a finger stop and a bearing secured to said base, a shaft mounted for movement in said bearing in direction opposite to each other, a gear, an arm and a finger wheel secured to said shaft, a bracket secured on said plate, a number plate secured to said bracket having call designations appearing in registering relation with the finger holds of said wheel, said bracket having means cooperating with said arm for defining such registering relation, a speed governor mechanism operatively connected to said gear, a second gear, a pulsing cam operatively connected to said second gear, said second gear having a clutch element, another clutch element cooperating with the first-mentioned clutch element for imparting the movement of the first gear to said second gear, a loose motion device connecting the second-mentioned clutch element to the first-mentioned gear whereby the angular selective movement of said finger wheel as defined by the digits on said plate and said finger stop is greater than the movement imparted to said cam for transmitting the selected digit, a motor spring tensioned by the operation of said finger wheel in one direction for rotating said cam upon the movement of said wheel in the other direction and a contact actuated by said cam.

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