

May 31, 1932.

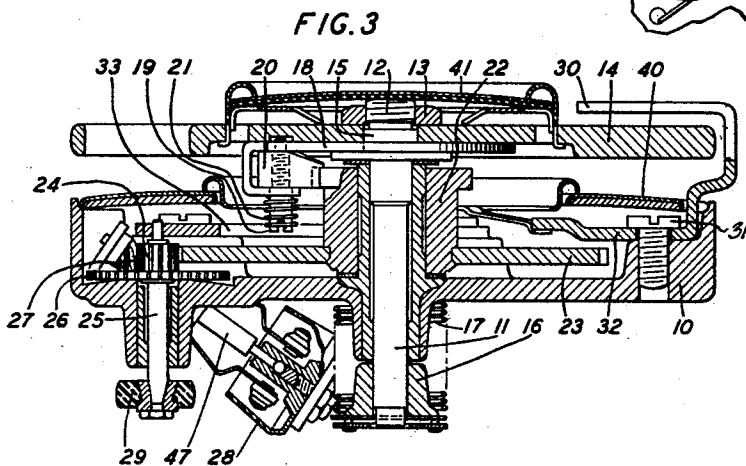
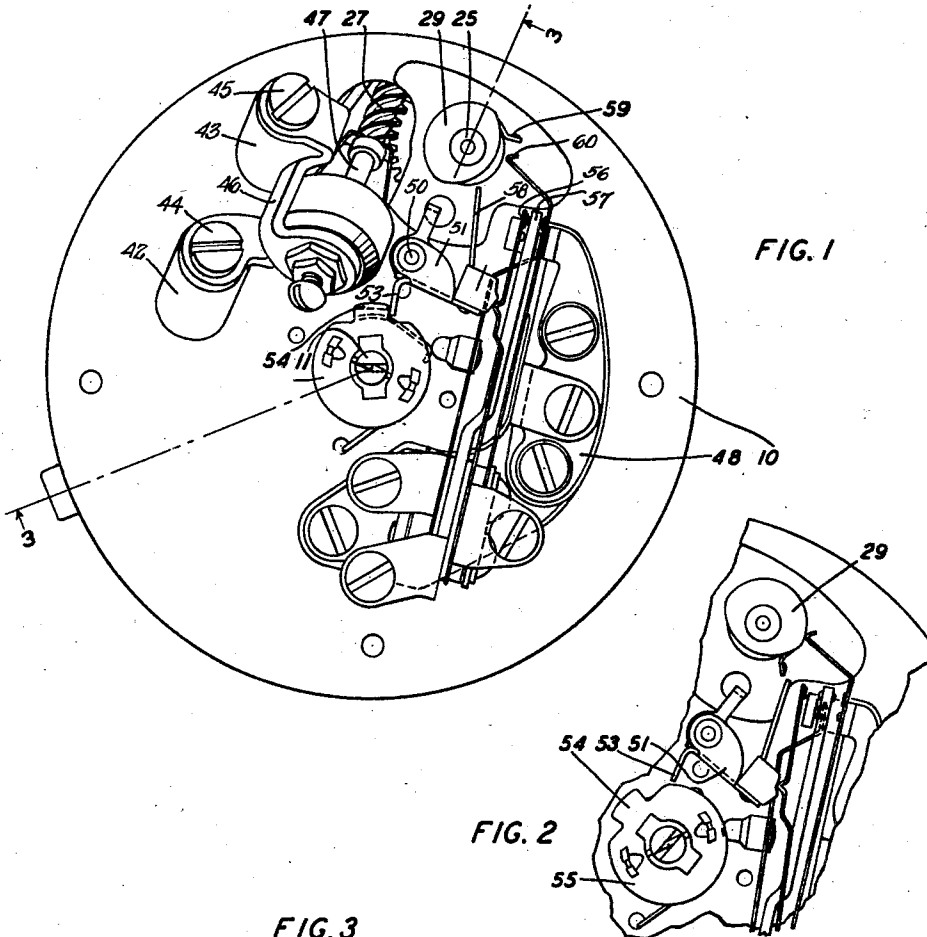
H. W. GOFF

1,860,535

IMPULSE TRANSMITTER

Filed June 9, 1931

2 Sheets-Sheet 1



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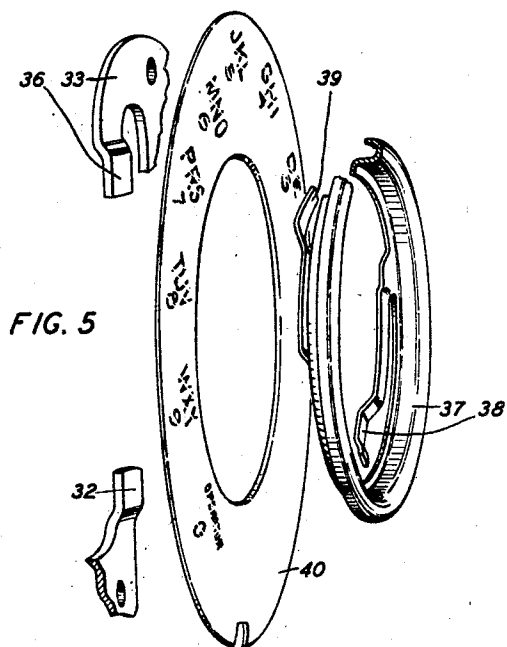
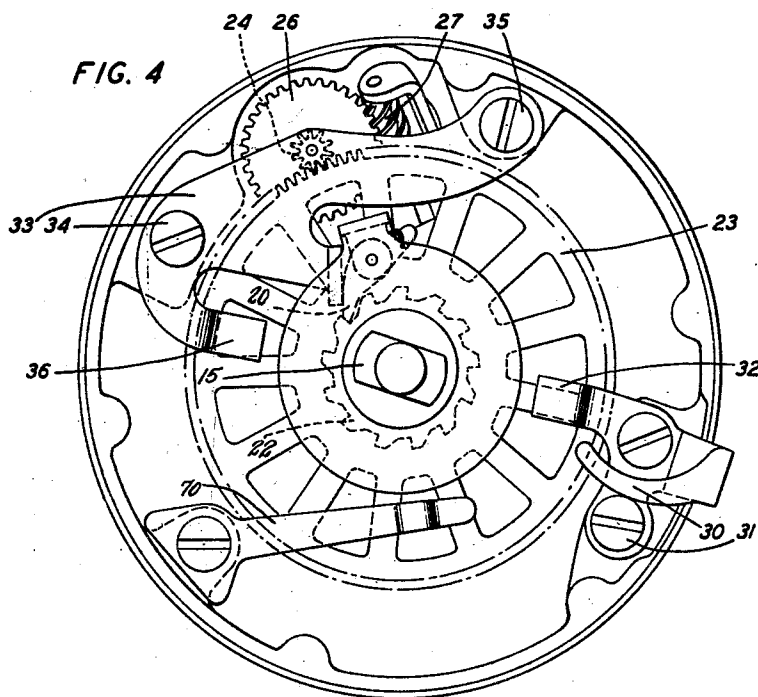
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IMPULSE TRANSMITTER

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2 Sheets-Sheet 2



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IMPULSE TRANSMITTER

Application filed June 9, 1931. Serial No. 543,071.

This invention relates to impulse transmitters and particularly to calling dials of the type commonly employed in automatic and semi-automatic telephone systems.

5 In the art of automatic telephony the switching operations required in establishing telephone connections must necessarily be performed in a definite predetermined sequence. In general, and particularly in the
10 case of an automatic connection being set up by a telephone operator, it is essential that certain switching operations, as for example, the operation of certain relays in the operator's circuit, take place prior to the transmission of the dial pulses which control the automatic switches.
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In order to satisfy such a requirement it has been found necessary to provide means in the dial structure whereby a certain time interval is introduced between the time an operator starts to set up a connection and the time when dial pulses are actually transmitted to actuate the automatic switches.
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Heretofore, attempts have been made to
25 provide the necessary time interval by providing mechanical means which caused the pulsing springs of the telephone dial to be moved clear of the pulsing cam for a short period of time before the rotation of the pulsing cam become effective in actuating the pulsing springs. Such attempts have been characterized by the use of friction cams and other similar mechanisms which resulted in
30 somewhat complicated and expensive dialing devices.
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It is accordingly the object of this invention to provide an improved type of impulse transmitter which is mechanically positive in operation, simple in construction and
40 which imposes no extra load on the dial during pulsing in introducing the necessary time interval prior to the transmission of pulses.

This object is attained in accordance with
45 a feature of the invention by the provision of an auxiliary short-circuiting spring which is controlled jointly, through the medium of a pivoted element, by the main drive shaft and the pulsing cam shaft to maintain the pulsing springs short-circuited during the
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wind-up of the dial and for one complete revolution of the pulsing cam after the dial has been released.

The invention will be readily understood from the following detailed description made
55 with reference to the accompanying drawings, in which:

Fig. 1 is an enlarged bottom plan view of a telephone dial embodying the features of this invention;
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Fig. 2 is an enlarged partial fragmentary view of the pivoting member in one of its stages of operation;

Fig. 3 is a section taken along the line 3—3 of Fig. 1 looking in the direction of the arrows;
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Fig. 4 is an enlarged internal plan view of the dial operating mechanism; and

Fig. 5 is an exploded perspective of the means employed for locking the dial number
70 plate in position.

The dial casing 10 is a die-casting provided with the necessary pads and projections for mounting the various dial elements as will hereinafter appear. A main drive shaft
75 11, housed in a centrally located sleeve of the casing 10, is provided at one end with a thread 12 which accommodates a nut 13 for the purpose of securing the finger wheel 14 in place, the finger wheel being provided with a substantially rectangular slot which fits
80 over a correspondingly shaped shoulder portion 15 of the main shaft 11. The other end of the shaft 11 fits into the element 16 and is secured thereto in any suitable manner. A
85 main coil spring 17 has one end secured to the base of the casing 10 and its other end made fast to the element 16 so that when the shaft 11 is rotated the coil spring is wound up, the casing 10 being stationary.
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Interposed between the finger wheel 14 and the shoulder 17 and staked to the shaft 11 is a ring-shaped element 18 provided with an integral, depending L-shaped bracket which supports a pin 19 which is screwed into
95 a pawl 20, the pin being rotatably mounted in the bracket. A coil spring 21 is wound about the pin 19 as shown in Fig. 3, having one end secured to the pin and the other end
100 hooked to the bracket. This spring tends to

maintain the pawl 20 in constant engagement with the ratchet 22.

The ratchet 22 is in reality a collar rotatably mounted on the centrally located sleeve of the casing 10, provided at its upper end with a series of ratchet teeth which are adapted to be engaged by the pawl 20, as will appear hereinafter.

A gear wheel 23 is staked to the lower end of the ratchet element 22, rotates therewith and meshes with a pinion gear 24 which is mounted on the pulsing shaft 25 rotatably housed in a depending sleeve portion of the casing 10. Immediately below the pinion gear 24, a worm wheel 26 is mounted on the shaft 25 which meshes with the worm 27 which constitutes a part of a well known type of governor generally indicated by the numeral 28. A single lobe pulsing cam 29 is mounted on the end of the shaft 25 and is located, with respect to pulsing spring 60, in such a position as to successively actuate it upon the rotation of the cam.

A finger stop 30 mounted on a pad of the casing 10 by means of screw 31 is provided with an internally projecting piece 32, clearly indicated in Figs. 3, 4 and 5. A bridge member 33 is secured to the casing 10 by means of screws 34 and 35 (Fig. 4) and is provided with a projecting piece 36 corresponding to and oppositely disposed to the finger wheel projection 32. The projections 32 and 36 serve to maintain the clamping ring 37 in position, the depending resilient spring fingers 38 and 39 of the ring 37 being adapted to be slipped under the elements 32 and 36 respectively. The spring member 38 is so formed that, when the elements 38 and 39 are placed under the projections 32 and 36 respectively, and the ring 37 turned slightly, the ring becomes locked in position. The ring 37 serves to maintain the number plate 40 in position, the outer periphery of the plate resting on a circular shoulder portion of the casing 10.

A card holder generally indicated by the numeral 41 is provided for the purpose of displaying a card upon which a telephone number or other necessary information may be printed.

Particular reference is now made to Fig. 1. The base of the casing 10 is provided with two projecting pads 42 and 43 to which is secured, by means of screws 44 and 45, the bracket 46 which serves as a support for the governor shaft 47. A spring pile-up generally indicated at 48 is also mounted on the underside of the casing 10.

Pivotaly supported upon the casing 10 at 50 is a bracket 51 provided with two extensions 53 and 58 and supporting an insulating stud 52 which engages a hump on the auxiliary spring 56 and maintains it normally in contact with one of the pulsing springs 57. The projection 53 is normally engaged

by the projection 54 of the element 55 which is rigidly secured to the drive shaft 11, for the purpose of maintaining spring 56 in engagement with the common spring member 57 as mentioned above. The other projection 58 is so positioned as to be in the line of travel of the projection 59 which is immovably secured to the pulsing shaft 25. The purpose of the pivoted member 51 and its action upon spring 56 will appear from the following description of the operation of the dial.

As the functioning of the various elements which constitute a telephone dial are well known, the general operation of applicant's device will be described briefly, though the parts which directly concern applicant's invention will be discussed fully.

The shaft 11 rotates with the finger wheel when the latter is actuated by an operator and causes the main spring 17 to be tensioned. The element 18 and its associated pawl 20 rotates with the shaft 11, the pawl 20 riding over the teeth in the ratchet member 22. A spring pawl 70, shown in Fig. 4, prevents the dial mechanism from turning backwards during the setting of the dial. When the finger wheel 14 is released the shaft 11 and the elements secured thereto are returned to normal by virtue of the unwinding of the coil spring 17. The pawl 20 engages with a tooth in the ratchet 22 causing the latter and the gear wheel 23 to be rotated. The gear wheel 23, by virtue of its meshing with pinion gear 24 causes the shaft 25 to rotate and the pulsing cam 29 being secured to the shaft 25, rotates correspondingly. The governor mechanism 28 is also actuated by means of worm wheel 26 and worm 27 to regulate the return speed of the dial. During the rotation of the shaft 25 the cam 29 repeatedly engages the end of spring 60 and repeatedly breaks contact between it and spring 57 to effect the transmission of a set of pulses corresponding to the setting of the finger wheel.

Referring now to Fig. 1, when the drive shaft 11 rotates from its normal position the element 55 secured thereto rotates correspondingly and the projection 54 is disengaged from the projection 53 of the pivot 51. The pivot member, however, does not change its position at this time so that the insulating stud 52 remains in engagement with short-circuiting spring 56 to maintain springs 56 and 57 in contact engagement. In this manner the pulsing springs are short-circuited during the wind-up of the dial, it being understood that springs 56 and 57 are electrically connected together at their back ends.

When the finger wheel is released and the dial mechanism functions to cause the rotation of the pulsing cam 29, the latter, upon its first rotation, actuates the pulsing spring 60, but no pulse is actually transmitted due to the fact that spring 56 is still in engage-

ment with spring 57 which effects a short circuit of the pulsing springs 57 and 60. After the first actuation of the pulsing spring 60 by the cam 29 the projection 59 secured to the shaft 25 of the pulsing cam engages the projection 58, causing the member 51 to pivot about its axis 50, whereupon the stud 52 is moved off the hump of spring 56. This action permits spring 56 to move away from spring 57 under its own tension. This condition is clearly shown in Fig. 2.

The disengagement of spring 56 from spring 57 removes the short circuit from the pulsing springs, so that every revolution of the cam 29 after the first one, is effective in transmitting a pulse, the first pulse having been voided by the short circuit of the pulsing springs effected by the engagement of spring 56 with spring 57.

When the shaft 11 reaches its normal position the projection 54 of element 55 again engages projection 53 to cause the closure of contact springs 56 and 57.

What is claimed is:

1. In an impulse transmitter, a pair of normally short-circuited pulsing springs, a pulsing cam for successively actuating said pulsing springs, means for actuating said pulsing cam and means actuated after the first interruption of said pulsing springs by said cam for removing the short circuit from said pulsing springs.

2. In an impulse transmitter, a pair of normally short-circuited pulsing springs, a pulsing cam for successively actuating said pulsing springs, means actuated after the first interruption of said pulsing springs by said cam for removing the short circuit from said pulsing springs, and means effective after the last interruption of said pulsing springs by said cam for reestablishing the short circuit about said pulsing springs.

3. In an impulse transmitter, a pair of pulsing springs, an auxiliary spring normally short-circuiting said pulsing springs, means for successively interrupting said pulsing springs, and means actuated after the first interruption of said pulsing springs for actuating said auxiliary spring to remove the short circuit from said pulsing springs.

4. In an impulse transmitter, a pair of pulsing springs, an auxiliary spring normally short-circuiting said pulsing springs, means for successively interrupting said pulsing springs, means actuated after the first interruption of said pulsing springs for actuating said auxiliary spring to remove the short circuit from said pulsing springs, and means effective after the last interruption of said pulsing springs for reestablishing the short circuit about said pulsing springs.

5. In an impulse transmitter, a rotatable dial, a drive shaft upon which said rotatable dial is mounted, a pair of normally short-

circuited pulsing springs, a pulsing cam rotatably coupled to said drive shaft and adapted to successively interrupt said pulsing springs upon the release of said rotatable dial, and means intermediate said drive shaft and said pulsing cam for maintaining the short circuit about said pulsing springs during wind-up of said rotatable dial and removing it after the first interruption of said pulsing springs by said pulsing cam.

6. In an impulse transmitter, a pair of normally short-circuited pulsing springs, mechanical means for establishing and removing the short circuit from said pulsing springs, a drive shaft, a cam shaft driven by said drive shaft, a cam mounted on said cam shaft and adapted to successively interrupt said pulsing springs upon the actuation of said drive shaft, and means for alternately actuating said mechanical means to effect the removal of the short circuit from said pulsing springs after the first interruption thereof and reestablishing it after the last interruption thereof.

7. In an impulse transmitter, a pair of pulsing springs, an auxiliary spring normally in contact with one of said pulsing springs, means for successively interrupting said pulsing springs to transmit a series of impulses, mechanical means controlling the operation of said auxiliary spring, and means for alternately actuating said mechanical means to remove said auxiliary spring from engagement with its associated pulsing spring after the first interruption thereof and moving it into engagement with the same one of said pulsing springs after the last interruption thereof.

8. In an impulse transmitter, a pair of normally short-circuited pulsing springs, a pivoted member for establishing and removing the short circuit from said pulsing springs, a drive shaft, a cam shaft driven by said drive shaft, a cam mounted on said cam shaft and adapted to successively interrupt said pulsing springs upon the actuation of said drive shaft, means mounted on said cam shaft for actuating said pivoted member after the first interruption of said pulsing springs to remove the short circuit therefrom, and means mounted on said drive shaft for reactuating said pivoted member after the last interruption of said pulsing springs to reestablish the short circuit.

9. In an impulse transmitter, a pair of pulsing springs normally in engagement with each other, an auxiliary spring normally in contact with one of said pulsing springs and in permanent electrical association with the other of said pulsing springs, means for successively interrupting said pulsing springs, and means actuated by said last mentioned means for removing said auxiliary spring from engagement with one of said pulsing

springs after the first interruption of said pulsing springs.

10. In an impulse transmitter, a pair of pulsing springs, an auxiliary spring effecting a short circuit about said pair of pulsing springs, means for successively interrupting said pulsing springs, and means actuated by said last mentioned means for actuating said auxiliary spring to remove the short circuit from said pulsing spring after the first interruption thereof.

11. In an impulse transmitter, a pair of pulsing springs, an auxiliary spring effecting a short circuit about said pair of pulsing springs, a pulsing cam for successively interrupting said pulsing springs, means for actuating said pulsing cam, and means effective after the first interruption of said pulsing springs by said cam for actuating said auxiliary spring to remove the short circuit therefrom.

In witness whereof, I hereunto subscribe my name, this 3d day of June 1931.

HAROLD W. GOFF.

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