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C. C. PUCKETTE

2,276,514

IMPULSE TRANSMITTING DEVICE

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FIG. 1.

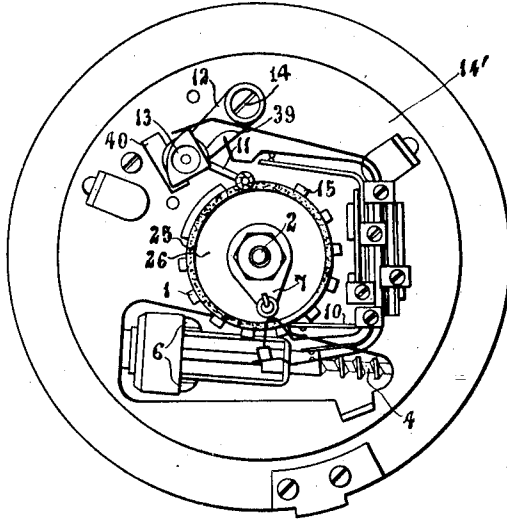


FIG - 2 -

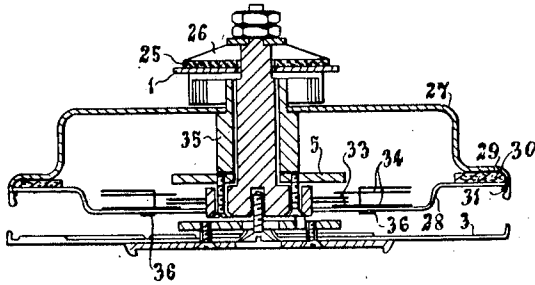


FIG. 3.

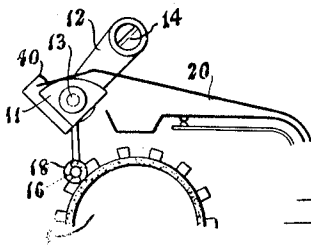


FIG. 4

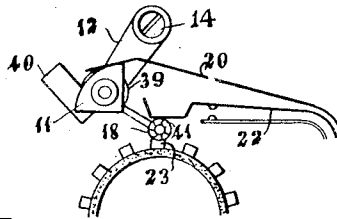
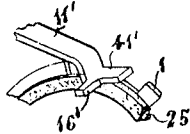


FIG. 5



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IMPULSE TRANSMITTING DEVICE

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10 Claims. (Cl. 179—90)

The invention relates to impulse sending devices of the type provided on telephone subscribers' instruments and operates by rotating a disc by a finger or the like, and the invention has for its object the provision of improvements in connection with the impulse producing portions of the mechanism.

As is well known, in impulse senders of the type referred to above, the impulses are sent out during the return motion of the finger plate to normal, each impulse train being preceded by a period corresponding approximately to the length of two complete impulses. This is known as the "lost motion" period, and is for the purpose of providing time for certain switching operations to be performed at the exchange.

According to the invention, an impulse sender of the type used in telephone systems comprises a toothed impulse sending wheel connected to a finger plate, and acting upon a rocking member rotatable on a pivot which is itself guided so as to move substantially radially relatively to the impulse wheel, the said rocking member acting upon impulse producing contacts during the return motion only of the finger plate to normal.

According to a feature of the invention, the toothed wheel is provided with a felt washer of a diameter slightly greater than that of the root circle of the impulse producing teeth, this washer being fixed to the wheel and containing lubricant for the impulse producing rocker.

According to another feature of the invention, dust is excluded from the inside of the mechanism by providing one or more discs of material such as synthetic resin, these discs being an accurate fit on the shaft carrying the finger plate, and being placed between two or more further discs of similar material fixed to the finger plate itself, each of the latter discs having a hole considerably larger than the said shaft.

In an embodiment of the invention, the impulse sending device is provided with a toothed impulse producing wheel fixed to a shaft carrying the finger plate. The teeth of this wheel act upon a spur of a rocking member during the wind-up motion of the sender, rotating the said member on a pivot which is fixed to an arm. This arm is pivoted at its other end to the frame of the sender, and is rotated through an angle in order to allow the spur and rocking member to be rotated to a limited degree by the teeth of the impulse producing wheel at the commencement of the wind-up period.

When the return motion commences, the rocking member is carried by the teeth in a backward

direction through the previously stated degree of motion, thus providing the lost motion period required. At the end of this period the spur is lifted and dropped alternatively by the teeth, an insulating collar on the spur opening and closing impulse producing springs carried by the frame of the sender.

As an alternative to the foregoing, the pivot of the rocking member may be carried by a flat spring tensioned so as to hold the member in contact with the wheel, a tongue of the spring being adopted to retain the rocking member in either of its extreme positions.

A washer of felt or similar porous material is fixed by means of a springy disc to the toothed wheel and is provided with a quantity of oil by which the impulse producing members are lubricated. This material also acts as a sound deadener.

A dust sealing washer of the type already described is provided in connection with the shaft of the device, the object being to permit a certain amount of adjustment to the number plate of the dial during assembly, relative to the central shaft, without causing gaps to appear around the shaft through which dust could obtain access to the interior of the impulse sender.

In order that the nature of the invention may be more particularly described, reference should be made to the accompanying drawing in which Figure 1 is a rear view of an impulse sending device or dial as used by telephone subscribers, Figure 2 is a section of the device, and Figures 3 and 4 show the impulse producing portion of the dial in particular positions to be described later, and Figure 5 is an enlarged view of one form of the rocking member.

Referring to Figures 1 and 2, it will be seen that the impulse sender comprises a toothed impulse producing wheel 1, mounted on a shaft 2, this shaft being rotated by the subscriber by means of a finger plate 3, in normal manner. The shaft bears a sprocket wheel 5, which drives a further gear (not shown) engaging with the worm 4 which is mounted on the same shaft as the fly-weights 6, forming part of a normal type of governor mechanism. The shaft 2 also carries an arm 7 which engages in a normal position with the contact springs 13, these performing off-normal circuit functions when the dial is wound up.

The toothed wheel 1 engages with the spur 41 of a rocking member 11 when the wheel is rotated, this rocking member being pivoted at 13 on the arm 12, this arm itself being pivoted at 14

so as to have a limited degree of rotation. When the dial is rotated in a winding up direction, the first tooth 15 of the wheel 1 engages the spur of the rocking member 11, turning it to the position shown on Figure 3. The spur of the member 11 is merely a continuation of the pin 16, which carries an insulating collar 18, the purpose of which will be explained later. As the winding up action progresses, the spur is alternately lifted and dropped between the teeth of the wheel 1, the arm 12 remaining in the position shown in Figure 3 whilst the rocking member 11 pivots about the point 13, the said member being returned to the bottom of the teeth each time by the flat spring 20 the front end or tongue of which passes over a cam shaped face of member 11.

The extent of movement of the arm 12 is controlled by the engagement of a projection on it with the slot 40, the projection normally resting on the end of the slot nearest the centre of the dial. The arm and projection only leave this position during the initial movement of the rocking member from the position shown in Figure 1 to that shown in Figure 3 at the commencement of the winding-up period, and also during the initial part of the reverse movement of the dial, prior to impulse sending.

At the end of the wind-up period, the spur of the rocking member 11 rests in a space between two teeth of the wheel 1. As the return motion of the dial commences, a tooth catches the spur, and rotates the rocking member 11 through a considerable angle to approximately the position shown in Figure 4, the radial movement of the pivoted end of the rocking member being permitted by the rotation of the arm 12 about its pivot 14. At the end of a period of rotary motion equal to approximately two tooth spaces, the arm 12 once more reaches the extent of its travel inwards, and a slight further movement of the wheel 1 in a return direction causes engagement of a tooth of the wheel with the spur 41, lifting the end of rocking member to the position shown in Figure 4. Here the collar 18 engages with one spring of the contact set 22, opening the contacts while the tooth 23 passes underneath the spur. After the tooth has passed, the springs 20 and 22 cause the spur to drop into the space between the teeth, with the result that the impulse springs 22 reclose.

Thus an impulse has been sent, the length of which, and the spacing between it and successive impulses, is determined by the shape and dimensions of the teeth of the wheel 1. In addition, a period of "lost motion" has been provided at the commencement of the impulse train, this period being prefixed to any digit dialled by the subscriber.

As an alternative to this construction, the pivot 13 may be carried by a flat spring similar to 20, tensioned so as to hold the rocking member in contact with the impulse producing wheel, a tongue of the spring being adapted to retain the rocking member in either of its extreme positions in a manner similar to that described in connection with the cam shaped face of the rocking member itself. As a further alternative, the spring 20 and the profile of the rocker 11 may be retained, and the pivot 13 may be given a truly radial movement either by a straight line motion linkage, or by mounting it on a slide engaging with a slot formed in the body of the dial.

In order to prevent noise and wear, we arrange to provide a disc 25 of felt, this disc being held against the impulse producing wheel 1 by means

of a dished spring 26. This felt disc has a diameter slightly greater than that of the root circle of the teeth, with the result that the spur of the rocker, in falling from the crests of the teeth, encounters a soft surface, this reducing noise. The disc is impregnated with a suitable lubricant, such as a thin oil, this reducing frictional wear on the spur and teeth and helping to maintain the pivots of the device in a lubricated condition.

In order further to ensure freedom from wear in the remainder of the mechanism of the dial, we provide a dust-excluding device, shown in detail in Figure 2. As is well known, a dial usually consists of a base 27 containing the governor and gearing (not shown), these gears being enclosed in a space covered by the number plate 28. As, however, this plate does not make a very good joint either at its periphery or at the edge of the hole in its centre, we arrange a disc of felt 30 beneath the plate, this felt resting on a ledge 29 formed on the base of the instrument. The number plate rests on this felt and is held in place by a wire ring 31 in known manner. In addition, a dust sealing device is also employed to ensure that dust is excluded from the gap normally existing between the spindle of the dial and the inner edge of the hole in the number plate through which the spindle passes. One or more discs 33 are mounted on the central shaft 35 of the dial, these discs having holes in their centres which are only very slightly greater than the diameter of the member 35. The outer edges of these discs are enclosed between further discs 34, these discs having holes in their centres appreciably larger than the diameter of the member 35 and overlapping the edges of the hole formed in the plate 28. All these discs are preferably made of some thin sheet material, such as that producible from synthetic resin, and the outer discs 34 are fastened together and to the plate 28 by means of clips 36. These clips are made tight enough to prevent rotation of the discs 34 relative to the finger plate, but do not prevent sliding of the discs 33 between the edges of the discs 34. Thus, during rotation of the dial, the central shaft 35 rotates in the discs 33, the accurate fit of these discs round the shaft preventing ingress of dust particles to a very considerable extent. The construction of the device, however, is such that during assembly of the finger plate, the discs 33 can slide transversely to a limited extent between the discs 34, this enabling them to locate themselves accurately around the central shaft, whilst at the same time the finger plate can be made an easy fit in the base 27.

As a still further precaution against wear a collar 39 of felt or similar material is provided on the pin 13 inside the pivoted end of the rocking member 11. This collar is impregnated with oil, and stands just proud of the centre of the cam-surface of the member 11, this acting to lubricate the spring 20 and the cam surface. If desired, a similar felt collar can be provided in connection with the bearing 14.

I claim:

1. An impulse sender having a finger plate and a toothed impulse sending wheel connected thereto and rotated therewith, impulse producing contacts, a pivoted rocker arm, a rocking member pivoted on said rocker arm so that the pivoted end of the member has radial movement relative to said wheel, said member moved with its pivot point by forward rotation of said wheel

without operating said contacts and moved about its pivot point by the return of the wheel to operate said contacts.

2. An impulse sender as claimed in claim 1 having a pivoted arm having said rocking member pivoted to the movable member of said arm so that the pivoted end of the member has movement about the pivot point of the arm.

3. An impulse sender as claimed in claim 1 in which the rotation of said wheel causes rotary movement of the rocking member to a limited extent in the same direction as the teeth of the wheel, and also a corresponding reverse rotary movement of the member with the wheel to provide lost motion of the member before the contacts are operated.

4. In an impulse sender having a finger plate and a toothed wheel secured thereto and rotated forward and back, a rocking arm pivoted adjacent the wheel on a movable pivot point and oscillated by the teeth of said wheel on its forward and back movements, contact springs operated by the oscillations of said arm only on a portion of the back movement of the wheel, a cam shaped surface on the pivoted end of the arm, and a spring engaging said surface and tending to hold the free end of said arm always in engagement with the surface of said wheel.

5. An impulse sender as claimed in claim 4 in which said arm carries a collar of insulating material on its free end engaging the wheel, said collar removed from engagement with said contact springs on the forward movement of the wheel and engaged and operated by the teeth of the wheel on the back movement thereof to operate said springs.

6. In an impulse sender having a finger plate and a toothed impulse wheel rotated forward and backward thereby, impulse contacts, a pivoted arm, a rocking member pivoted to the free end of said arm and having one end engaging the surface of said wheel, said member and arm

having radial movement about the pivot point of said arm toward and away from said wheel and movable backward and forward with the wheel in its initial forward and its initial backward movement, said member moved about its pivot by said wheel on the latter part of its backward movement to engage and operate said contacts.

7. In an impulse sender as claimed in claim 6, having a spring engaging said member and acting thereon to hold the member in its extreme position out of contact with said contacts and against said wheel on forward movement thereof, and against the wheel and in contact with the contacts on the backward movement of the wheel.

8. An impulse sender as claimed in claim 1 wherein said impulse wheel is provided with an oiled washer of porous material slightly larger than the root circle of the wheel and engaged by said rocking member.

9. An impulse sender having a finger hole dial and a toothed impulse wheel secured thereto and rotating therewith backward and forward, impulse springs, a rocker arm for controlling said springs pivoted on a movable member adjacent said wheels so that its pivot point has a limited radial movement relative said wheel, said rocker arm moved in one direction with the wheel on the forward movement thereof and back to its initial position on the first part of the backward movement thereof, said member on the remaining backward movement operated by the teeth of said wheel in a movement to operate said springs intermittently.

10. An impulse sender as claimed in claim 1 having means for excluding dust from its interior comprising a series of thin disc washers closely mounted on the shaft of the finger wheel and other thin discs mounted in the device on stationary parts thereof, the first disc slidable between the other discs.

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