Sept. 12, 1950 W. T. WEIDENMAN 2,522,004

ELECTRIC IMPULSE TRANSMITTER PAWL SILENCER

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FIG.1.

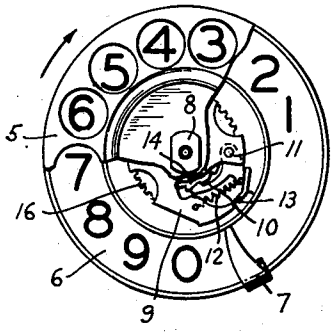


FIG.2.

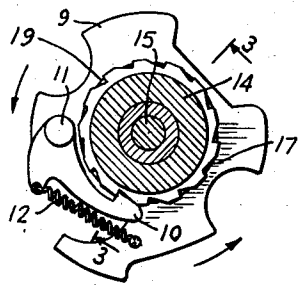


FIG.3.

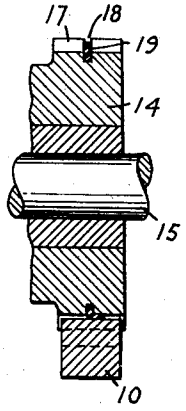


FIG.4.

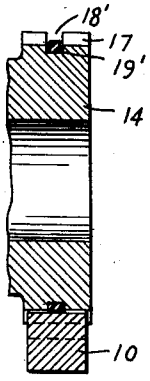
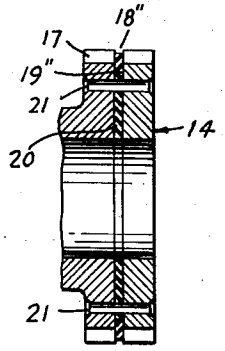


FIG.5.



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ELECTRIC IMPULSE TRANSMITTER PAWL SILENCER

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1 Claim. (Cl. 74—126)

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This invention relates to electrical impulse transmitters, and has particular reference to calling dials for automatic telephone systems or other apparatus controllable remotely by selective electrical impulses.

Telephone calling dials are well known and their construction and operation has become substantially standardized. An incident to their operation is the familiar clicking noise caused by the dropping of the finger wheel pawl to the bottom of the teeth of the ratchet before the return spring rotates the ratchet wheel through the angle equal to the number of teeth corresponding to the digit dialed, causing the contacts to close an equal number of times to send that number of electrical impulses. Although this clicking is not loud, it is distracting and often disturbing, especially where the dial is in almost continual operation as by a telephone operator. Many expedients have been employed to eliminate or at least deaden the click, but they have either been ineffective or have impaired the efficiency of operation of the dial in time.

In accordance with the present invention, a simple and inexpensive means is provided for virtually eliminating the clicking noise incident to the operation of the ratchet and pawl mechanism of a calling dial type of impulse sender, without impairing the efficiency of the dial even after extended use, and without requiring attention or replacement of parts other than that normally required in any event.

The invention comprises an electric impulse transmitter having the usual ratchet wheel and pivoted pawl, which is rotated by the finger wheel or dial in a rearward direction until released so that the pawl engages a tooth to rotate the ratchet wheel, the ratchet wheel being grooved peripherally to at least the root circle of the teeth, and a resilient ring or disc is disposed in the groove for deformation by the pawl to deaden the impact thereof.

In the embodiment of the invention, the resilient ring or disc is thin axially so as to be deflected in one axial direction or the other by the pawl to intervene between the pawl and the bottom of the notch to thereby cushion the impact of the usual metal-to-metal contact between the pawl and the ratchet wheel, thus substantially eliminating the click of impact.

In a modification of the invention, the peripheral slot is substantially wider axially than the resilient ring or disc, so that upon impact of the pawl, the former is squeezed and spread laterally into the slot without deflection, so as to cushion

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the impact of the pawl against the bottom of the notch to thereby substantially eliminate the click of impact.

It will be seen that the invention provides a very simple and inexpensive means for correcting the principal objection to impulse transmitters of the calling dial type, and that the invention may be applied to existing designs of dials without impairing their efficiency or introducing an element of future difficulty.

For a more complete understanding of the invention, reference may be had to the accompanying drawings, in which:

Figure 1 illustrates a front view of a telephone type calling dial embodying the invention, a portion of certain of the parts being cut away in the interest of clarity;

Fig. 2 is an enlarged rear view of the ratchet and pawl mechanism of the calling dial illustrated in Fig. 1;

Fig. 3 is an enlarged transverse section through the pawl and ratchet mechanism, as seen along the line 3—3 of Fig. 2; and,

Figs. 4 and 5 are similar transverse sections of modifications.

Referring to Fig. 1, numeral 5 designates the finger wheel dial arranged with its finger holes above the number plate 6, and having a central opening keyed to a raised hub portion 8 of the plate 9 and to which it is held by means of a screw threaded in the hole in the center of hub 8. Hence, clockwise manual rotation of the finger wheel 5 results in the movement of plate 9 up to the point where the finger engages stop 7, whereupon the wheel 5 is released and is rotated counter-clockwise by a tension spring attached to shaft 15 at a speed controlled by the usual governor, not shown. This return movement of dial 5 and plate 9 is limited by the engagement of a projection on plate 9 with the stop 13.

Pawl 10 is pivoted at 11 to the plate 9 and is normally urged against and between the teeth 17 of ratchet wheel 14 by the coiled tension spring 12. As the finger wheel 5 is rotated in the clockwise direction, carrying the plate 9 and pawl 10 with it, the ratchet wheel 14 remains stationary and the pawl 10 snaps over the ends and between the ratchet wheel teeth 17. Upon the return movement of the finger wheel 5 the pawl engages one of the teeth 17, thereby carrying the ratchet wheel 14 along with it and also rotating the gear 16 formed integrally with the ratchet wheel and adapted to operate the impulsing mechanism, not shown. The mechanism just described is conventional and well-known.

Ordinarily, as the pawl 10 drops down into the notches between the teeth 17 on the ratchet 14, the familiar clicking noise ensues, owing to the metal-to-metal contact. In order to deaden and thus substantially eliminate this clicking noise, the ratchet 14 is provided with a peripheral groove 18, preferably extending slightly below the root circle of the teeth 17 as shown in Fig. 3, and in this slot 18 is inserted a soft rubber disc or ring 19, which fits relatively closely within the slot 18. The rubber ring or disc 19 is preferably made of a synthetic rubber of the type which is immune to deterioration by oil. The disc or ring 19 is thin, being on the order of .015 inch thick, the drawing being greatly exaggerated in the interest of clarity, both as to the width of the slot 18 and the rubber disc 19. It will be seen that being larger in outside diameter than the root circle of the teeth 17, the rubber disc or ring 19 overlaps the radial surfaces of the teeth 17 at opposite sides of the slot 18 and also bridges the notches between the teeth 17, as is best shown in Fig. 2.

Instead of cutting the groove 18 through the ratchet teeth 17 as shown in Fig. 3, the ratchet wheel 14 may be made of two parts riveted together by rivets 21 over a thin shim 20 having a thickness equal to the width desired for the slot 18'', as is shown in Fig. 5. The rubber ring or disc 19'' is then inserted in the slot provided by the spacing afforded by shim 20 of the two halves of the ratchet wheel 14, and the ring 19'' overlaps the ratchet teeth 17 at opposite sides of the slot 18''.

In operation of the form of the invention illustrated by Figs. 3 and 5, the pawl 10, in snapping over the teeth 17 into the notches between them, engages the free edge of the thin rubber ring or disc 19 and bends it over as shown at the bottom of Fig. 3, so that part of the rubber disc or ring 18 intervenes between the lower edge of the tooth or pawl 10 and the bottom of the metal notch in ratchet 14. In this way, the rubber ring or disc 19 effectively cushions the impact of the pawl 10 in the notches of the ratchet wheel 14 and thus eliminates the clicking noise during operation of the dial.

In a modified form of the invention illustrated in Fig. 4, the rubber ring or disc 19' is again made of resilient material, such as synthetic rubber but has a greater width than the ring shown in Fig. 3, as it is not required to be laterally flexible, but is required to be compressible. Thus, the width of rubber ring 19' in Fig. 4 is preferably .02 inch and the slot 18' is made wider, preferably 0.25 inch, for example. The slot 18' may be made as shown in Fig. 4, that is, by cutting it through the teeth 17 to a point slightly below the root circle thereof, as shown, or the slot 18' may be formed by a spacing shim 20, as indicated in Fig. 5, except that the shim 20 is made thicker so as to afford a wider notch 18'' than is shown in Fig. 5.

In operation of the modification shown in Fig. 4, the impact of the pawl 10 on the rubber ring 19' causes it to be compressed and to spread or flow laterally to the full width of the slot 18', as shown at the bottom of Fig. 4, so that the rubber fills that part of the slot 18' which extends below the root circle of the teeth 17. However, the cross-sectional area of the rubber ring 19' is somewhat greater than the cross-sectional area than that portion of the slot 18' which extends below the root circle of the tooth 17 so that the rubber more than fills the said portion of the slot 18' and extends slightly above it. Accordingly, the pawl 10, in compressing the rubber 19', engages only the rubber and not the bottom of the notch between adjoining teeth 17 in the ratchet 14 so that the clicking noise of the pawl impact is eliminated.

Although certain preferred embodiments of the invention have been illustrated and described herein, it is to be understood that the invention is not limited thereby but is susceptible of changes in form and detail within the scope of the appended claim.

I claim:

In an electrical impulse transmitter, the combination of a ratchet wheel having teeth around its periphery, a pivoted pawl adapted to engage the toothed periphery of said ratchet wheel, means for rotating said pawl rearwardly over said ratchet wheel teeth and then to engage a tooth thereof to move the ratchet wheel with the pawl, said ratchet wheel having a peripheral groove extending radially inwardly through the teeth thereof to at least the bottoms of the notches between said teeth, and a ring of resilient material inserted in said groove and having a uniform outside diameter greater than the diameter of the root circle of said teeth, and being axially narrower than said groove, said ring material having a resiliency such that the ring material temporarily deforms laterally to the width of said groove at the point of impact of said pawl thereon to thereby deaden the impact sound.

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