Oct. 13, 1953 G. J. MONTALTO 2,655,052

IMPULSE SWITCH SILENCER

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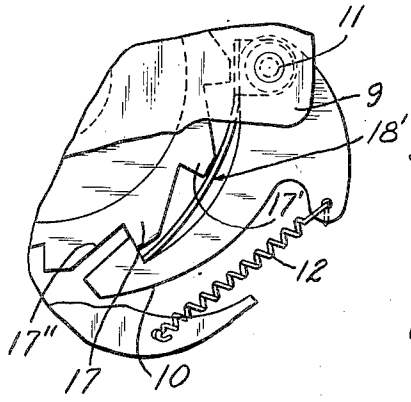


FIG. 5.

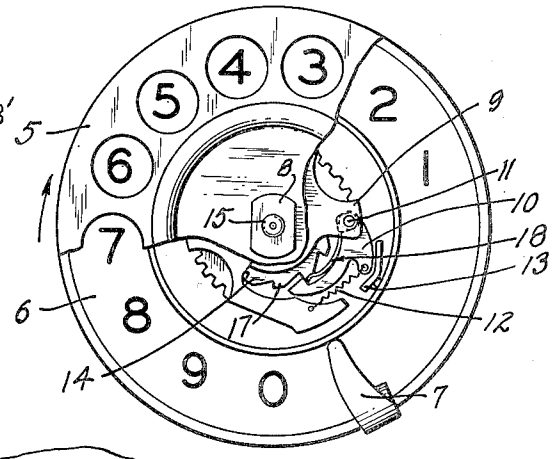


FIG. 1.

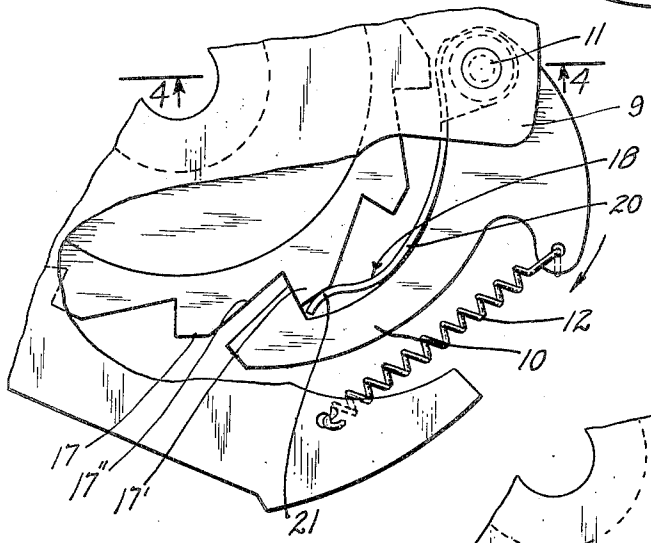


FIG. 2.

FIG. 3.

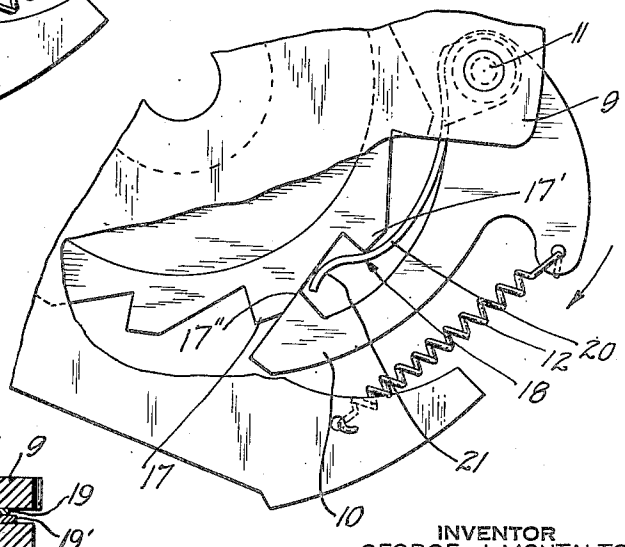
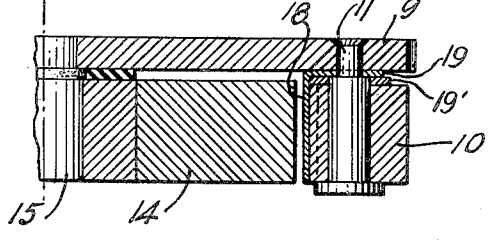


FIG. 4.



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IMPULSE SWITCH SILENCER

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10 Claims. (Cl. 74—576)

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This invention relates to silencers for impulse switches, and has particular reference to a silencer for the calling dials of automatic telephone systems or other apparatus controllable remotely by selective electrical impulses.

An incident to the operation of telephone calling dials is the familiar clicking noise caused by the dropping of the finger wheel pawl to the bottoms of the successive 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. Many expedients have been employed to eliminate or at least deaden the annoying ratchet click, but most of them have been complicated, difficult of assembly or break or diminish in effectiveness before a reasonable length of operating life has elapsed.

In accordance with the present invention, a simple, durable 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 switch, 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 switch of the type having a ratchet wheel cooperating with a rotated pivoted pawl, and a leaf spring having one end anchored at the pawl pivot and the free end sliding over the ratchet teeth but terminating short of the pawl hook and so shaped that the ratchet tooth leading the one about to be engaged by the pawl hook holds the spring and consequently the pawl away from the back of the next tooth until the pawl hook is in engagement with the next tooth, whereupon the leading tooth releases the spring and the pawl to enable the latter to drop while the drop is cushioned by the spring so as to deaden the impact.

It will be seen that the invention provides a very simple and inexpensive means for correcting the principal objection to electrical impulse switches 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 silencer of this invention, certain of the parts being cut away in the interest of clarity;

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Figs. 2 and 3 are enlarged views of the pawl and silencer mechanism of the calling dial illustrated in Fig. 1 and showing the relation of the pawl and silencer spring in successive positions;

Fig. 4 is an enlarged transverse section of the pawl mounting, as seen along the line 4—4 of Fig. 2, and

Fig. 5 is a view similar to Fig. 2 of a modification.

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 operator's finger engages stop 7, whereupon the wheel 5 is released and is rotated counterclockwise 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 switching 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 striking the back of the corresponding tooth 17, the familiar clicking noise ensues. In order to deaden and thus substantially eliminate this clicking noise, a cushioning leaf spring is provided between the pawl and the ratchet teeth. This cushioning spring is designated 18 and is formed of a thin strip of spring steel, Phosphor bronze, beryllium bronze, or other suitable resilient material capable of withstanding virtually countless operations of the dial without losing its resiliency or breaking.

One end of the cushioning spring 18 is fixed on plate 9 by stationary pin 11 on which the pawl 10 is pivoted as described. Conveniently,

the end 19 of the spring strip 18 is turned at 90°, perforated and the reduced end of the pivot pin 11 inserted therethrough and riveted in place, whereby the end 19 is clamped against plate 9, as is best shown in Fig. 4. A washer 19' is interposed between pawl 10 and fixed end 19.

Preferably, the spring 18 is arched at 20 toward the pawl 10 and away from the ratchet teeth 17, although its free end 21 is turned upwardly slightly so as to act like a shoe riding freely over the ratchet teeth 17. The shape and disposition of the spring 18 lends two functions thereto as will be described.

In operation of the dial of this invention, the pawl plate 9 rotates with the finger wheel 5 and carries the pawl 10 so that when the dial is turned in the direction of the arrow, the pawl 10 drops over the ends of the teeth 17 to normally strike against the back faces thereof and thus make the objectionable clicking noise. However, leading ratchet tooth 17' tangentially engages spring 18 whose arch 20 engages and holds the pawl 10 back and thus prevents the pawl 10 from dropping all the way to strike the back face 17'' of the corresponding ratchet tooth 17 under pressure of spring 12 (Fig. 2). When the pawl 10 moves halfway to the following ratchet tooth 17 (Fig. 3), the leading ratchet tooth 17' releases spring 18 to allow the pawl 10 to drop the remaining short distance to the back 17'' of the corresponding ratchet tooth 17, the drop being restrained resiliently and thus deadened by spring 18, so that the dial equipped with the cushioning spring 18 is virtually noiseless.

It will be observed that the spring 18, being anchored at one end on pin 11, rotates with the pawl plate 9 relatively to the ratchet wheel 14 when dialing in the direction of the arrow, so that the shoe 21 of the spring 18 is pushed ahead of the pawl 10 over the ratchet wheel without any deteriorating torsion by the pawl 10 since it is anchored independently of the pawl on stationary pin 11. Accordingly, the spring 18 is relatively stationary with respect to the movements of the pawl 10 except for the slight relative creeping action of the shoe 21 as the spring 18 slightly flexes in response to movement of the pawl 10.

Instead of being of the arched shape shown in Figs. 2 and 3, spring 18 may be virtually flat as shown at 18' in Fig. 5, where the center portion of spring 18' instead of the tip of the spring is engaged by leading ratchet tooth 17' to hold the pawl 10 from dropping all the way to the back 17'' of the next ratchet until the tooth 17' moves on to disengage the spring 18' and allow the pawl to drop the short remaining distance to the back 17'' of the tooth 17. Thus, in the modification of Fig. 5, the tooth 17' ahead of the tooth about to be engaged by the pawl 10 cams the spring 18' radially outwardly, whereas in Fig. 2 the tooth 17' about to be engaged by the pawl 10 cams the spring 18 radially outwardly by engaging its shoe or tip 21, but the operation is essentially the same in both cases.

Although a preferred embodiment of the invention has 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 claims.

I claim:

1. In an electrical impulse switch having a ratchet wheel provided with teeth around its periphery, a hooked pawl adapted to engage the toothed periphery of said ratchet wheel, and 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, the combination of a leaf spring interposed between the pawl and ratchet wheel teeth and terminating short of the pawl hook, and mounting means for one end of said spring carried by said pawl rotating means and moving therewith, said spring engaging a leading ratchet tooth to thereby hold the pawl from the back of the next ratchet tooth until released by said leading ratchet tooth.

2. In an electrical impulse switch having a ratchet wheel provided with teeth around its periphery, a hooked pawl adapted to engage the toothed periphery of said ratchet wheel, and 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, the combination of an elongated resilient member interposed between said teeth and said pawl and terminating short of the pawl hook and continuously engaging and actuated by said ratchet wheel teeth, and means anchoring one end of said member to said rotating means with the free end extending substantially parallel to said pawl, whereby the member is moved with said pawl relatively to said wheel during operation and prevents the pawl from striking the back of a ratchet wheel tooth upon release by said tooth.

3. In an electrical impulse switch having a ratchet wheel provided with teeth around its periphery a hooked pawl adapted to engage the toothed periphery of said ratchet wheel, and 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, the combination of a leaf spring interposed between said teeth and said pawl and terminating short of the pawl hook and continuously engaging and actuated by said ratchet wheel teeth, and means anchoring one end of said spring to said rotating means with the free end extending substantially parallel to said pawl, whereby the spring is moved with said pawl relatively to said wheel during operation and prevents the pawl from striking the back of a ratchet wheel tooth upon release by said tooth.

4. In an electrical impulse switch having a ratchet wheel provided with teeth around its periphery, a hooked pawl adapted to engage the toothed periphery of said ratchet wheel, and 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, the combination of an elongated resilient member having an arched center portion and interposed between said teeth and said pawl and terminating short of the pawl hook and continuously engaging and actuated by said ratchet teeth wheel, and means anchoring one end of said member to said rotating means with the free end extending substantially parallel to said pawl, whereby the member is moved with said pawl relatively to said wheel during operation and prevents the pawl from striking the back of a ratchet wheel tooth upon release by said tooth.

5. In an electrical impulse switch having a ratchet wheel provided with teeth around its periphery, a hooked pawl adapted to engage the toothed periphery of said ratchet wheel, and

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, the combination of a leaf spring having an arched center portion and interposed between said teeth and said pawl and terminating short of the pawl hook and continuously engaging and actuated by said ratchet teeth wheel, and means anchoring one end of said spring to said rotating means with the free end extending substantially parallel to said pawl, whereby the spring is moved with said pawl relatively to said wheel during operation and prevents the pawl from striking the back of a ratchet wheel tooth upon release by said tooth.

6. In an electrical impulse switch having a ratchet wheel provided with teeth around its periphery, a hooked pawl adapted to engage the toothed periphery of said ratchet wheel, and 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, the combination of an elongated leaf spring, means anchoring one end of said spring to the said rotating means with said spring extending substantially parallel to said pawl and terminating at a point adjacent said pawl hook and engaging said ratchet wheel, whereby the center portion of said spring is engaged by a leading ratchet tooth to hold the pawl disengaged from the back of the next tooth until released by said leading tooth to thereby deaden the impact sound.

7. In an electrical impulse switch having a ratchet wheel provided with teeth around its periphery, a hooked pawl adapted to engage the toothed periphery of said ratchet wheel, and 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, the combination of an elongated leaf spring having an end portion engaging said pawl, means anchoring one end of said spring to the said rotating means with said spring extending substantially parallel to said pawl and terminating at a point adjacent said pawl hook and engaging said ratchet wheel, whereby the underside of the center portion of said spring is engaged by a leading ratchet tooth to hold the pawl disengaged from the back of the next tooth until released by said leading tooth to thereby deaden the impact sound.

8. In an electrical impulse switch having a ratchet wheel provided with teeth around its periphery, a hooked pawl adapted to engage the toothed periphery of said ratchet wheel, and 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, the combination of a substantially straight leaf spring, means anchoring one end of said spring to the said rotating means independently of said pawl with said spring extending substantially parallel to said pawl and terminating at a point adjacent said pawl hook and engaging said ratchet wheel, whereby the center portion of said spring is engaged by a leading ratchet tooth to hold the pawl disengaged from the back of the next tooth until released by said leading tooth to thereby deaden the impact sound.

9. In an electric impulse switch having a ratchet wheel provided with teeth around its periphery, a hooked pawl pivotally mounted and adapted to engage the toothed periphery of said ratchet wheel, and 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, the combination of a spring member interposed between the pawl and the ratchet wheel teeth and terminating short of the pawl hook, and means anchoring one end of said spring to said means for rotating the pawl, said spring being anchored independently of pivotal movement of said pawl, said spring engaging a leading ratchet tooth to thereby hold the pawl from the back of a following ratchet tooth until released by said leading ratchet tooth.

10. In an electrical impulse switch having a ratchet wheel provided with teeth around its periphery, a hooked pawl adapted to engage the toothed periphery of the ratchet wheel, and means for rotating said pawl rearwardly over the ratchet wheel teeth and then to engage a tooth thereof to move the ratchet wheel with the pawl, said pawl being pivotally connected to said means for rotating the pawl, the combination of a spring member interposed between the pawl and the ratchet wheel teeth and terminating short of the pawl hook, and mounting means for one end of said spring at the point of the pivotal connection between the pawl and the means for rotating the pawl, said spring thereby being connected to the means for rotating the pawl independently of pivotal movement of the pawl, said spring engaging a leading ratchet tooth to thereby hold the pawl from the back of a following ratchet tooth until released by said leading ratchet tooth.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
210,251	Grosclande	Nov. 26, 1878
1,367,145	Josleyn	Feb. 1, 1921
2,068,700	Peterson	Jan. 26, 1937
2,217,074	Obergfell	Oct. 8, 1940
2,389,695	Stenhammer	Nov. 27, 1945

FOREIGN PATENTS

Number	Country	Date
89,498	Germany	Mar. 8, 1896