Oct. 8, 1940. H. F. OBERGFELL 2,217,074

CALLING DEVICE

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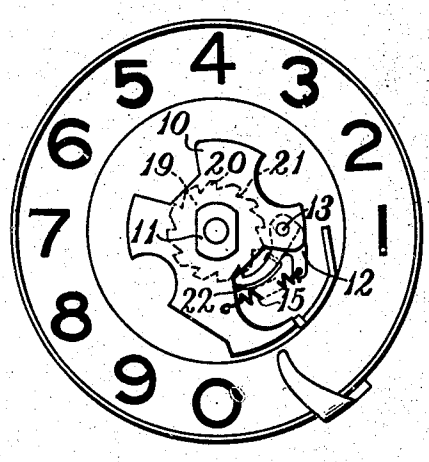

Fig. 1

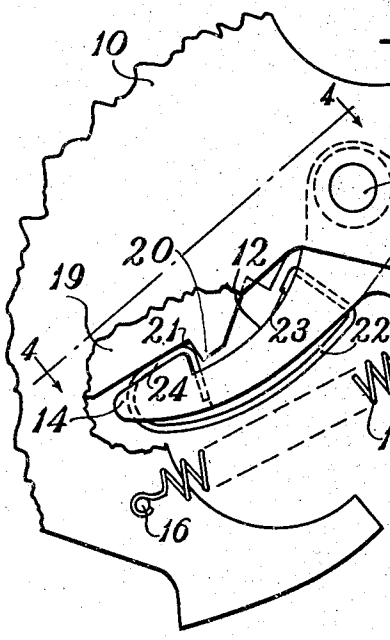

Fig. 2

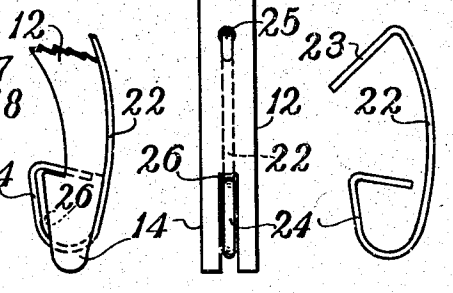

Fig 3

Fig. 4

Fig. 5

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CALLING DEVICE

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3 Claims. (Cl. 179—90)

The present invention relates to calling devices of the type employed in automatic telephone systems and, more particularly, to an improved arrangement for reducing the amount of noise ordinarily produced by a calling device incident to the operation thereof.

One such arrangement for reducing the amount of noise ordinarily produced by a calling device incident to the operation thereof is disclosed and claimed in U. S. Patent No. 2,068,700, Seth Peterson, granted January 26, 1937, the calling device in which the noise reducing arrangement there disclosed is incorporated being of the type disclosed and claimed in U. S. Patent No. 1,642,822, Herbert F. Obergfell, granted September 20, 1927.

Briefly, the calling device disclosed in the above-mentioned Obergfell patent comprises a finger dial which is variably rotatable in accordance with the different digits to be dialed and a member attached thereto carrying a pivotally mounted pawl. Associated with the pawl is a cooperating ratchet wheel having a number of teeth spaced apart by intervening notches. The ratchet wheel is associated with a gear wheel which drives a suitable impulse sending mechanism. When the finger dial is rotated away from its normal position, the pawl is rotated over the successive teeth and notches of the ratchet wheel, the number of teeth over which the pawl is rotated being dependent upon the digit dialed. When the finger dial is released, it is returned to its normal position by an associated driving spring at a substantially constant rate controlled by an associated governor. At the beginning of the return movement of the dial, the pawl engages the then adjacent tooth of the ratchet wheel and rotates the ratchet wheel until the dial is returned to its normal position. The rotation of the ratchet wheel drives the impulse sending mechanism by way of the associated gear wheel in order to cause series of impulses comprising a corresponding digit to be transmitted.

When the dial of the calling device is rotated in accordance with a given digit, the pawl passes over a given number of ratchet teeth as previously noted, and being urged by an associated spring toward the ratchet wheel, forcibly drops from the high points of the teeth of the ratchet wheel into the succeeding notches of the ratchet wheel causing a clatter or clicking noise which is quite noticeable, especially if the dialing speed is increased. This clatter or clicking noise is objectionable in that it is quite annoying to a person operating the calling device.

The arrangement for reducing the amount of noise ordinarily produced by the calling device incident to the operation thereof, as described above, which is disclosed in the above-mentioned Peterson patent, comprises a spring having one end thereof fixed to the pivotally mounted pawl and the other end thereof cooperating therewith a pin carried by the member upon which the pawl is pivotally mounted. The construction and arrangement of the pawl, the mounting member and cooperating spring and pin are such that the spring opposes pivotal movement of the pawl into the notch disposed between two adjacent teeth of the ratchet wheel when the pawl is moved partially into the notch, thereby to prevent the pawl from striking the bottom of the notch.

While the arrangement for reducing the amount of noise ordinarily produced by a calling device incident to the operation thereof, disclosed in the previously-mentioned Peterson patent is entirely satisfactory in operation, it is somewhat more expensive to manufacture than is desirable. Moreover, the elements thereof must be carefully positioned and adjusted during manufacture in order to render the arrangement effective for the purpose intended.

Accordingly, it is an object of the present invention to provide an improved arrangement for reducing the amount of noise ordinarily produced by a calling device incident to the operation thereof, which arrangement, is of simple and rugged construction and which is economical to manufacture.

In general, the object set forth above is attained in accordance with the present invention by providing in a calling device comprising a mechanism including a ratchet having a number of teeth spaced apart by intervening notches, a cooperating pawl, and means including a dial for operating the pawl and ratchet; means for reducing the amount of noise ordinarily produced as the pawl is rotated over successive teeth and notches of the ratchet, which means comprise a spring carried by the pawl and adapted to engage successive teeth and notches of the ratchet. The spring is so constructed and arranged that a force is exerted thereby upon the pawl as the pawl approaches the ratchet, thereby to cushion the movement of the pawl toward the ratchet as the pawl passes over a tooth and descends in the succeeding notch of the ratchet. More particularly, the ratchet-engaging portion of the pawl is bifurcated and one end of the spring is fixed to the pawl, the other end of the spring being free and disposed in the bifurcation of the last-mentioned portion of the pawl and adapted

for reciprocal movement therein. Also, the pawl and the ratchet are so constructed and arranged that when the pawl exerts a driving force upon the ratchet the pawl is moved against the force exerted thereupon by the spring into direct driving engagement with an adjacent tooth of the ratchet.

The novel features believed to be characteristic of the invention are set forth with particularity in the appended claims. The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawing, in which Figure 1 is a plan view of a calling device, the finger dial being removed, including an arrangement for reducing the amount of noise ordinarily produced thereby incident to the operation thereof and embodying the present invention; Fig. 2 is an enlarged fragmentary plan view of the pawl and ratchet mechanism incorporated in the calling device shown in Fig. 1; Fig. 3 is an enlarged fragmentary plan view of the ratchet-engaging end of the pawl of the mechanism showing the ratchet-engaging spring mounted thereon in normal position; Fig. 4 is an enlarged side elevational view of the pawl and the ratchet-engaging spring taken in the direction of the arrows 4—4 in Fig. 2; and Fig. 5 is an enlarged plan view of the ratchet-engaging spring disassociated from the pawl.

Referring now, more particularly, to Figs. 1 and 2 of the drawing there is illustrated a calling device embodying an arrangement for reducing the amount of noise ordinarily produced thereby incident to the operation thereof, which is constructed and arranged in accordance with the present invention. The calling device there shown is of the type of that disclosed in the previously-mentioned Obergfell patent and comprises a rotatable plate 10 having a raised hub 11 upon which a finger dial, not shown, having a centrally disposed opening therein is adapted to fit, the finger dial being held in place by a screw, not shown, threaded in a tapped hole provided in the hub 11. A pawl 12 is pivotally mounted on the plate 10 by a pivot pin 13 and has a toothed or ratchet-engaging portion or end 14, which is urged in a clockwise direction about the pivot pin 13 by a spring 15 extending between a stud 16 carried by the plate 10 and an arm 17 provided on the pawl 12. One end of the spring 15 is fixed to the stud 16 and the other end thereof is fastened in an opening 18 provided in the arm 17. A rotatable ratchet wheel 19 mounted concentric with the axis of the hub 11 is operatively associated with the pawl 12, the ratchet wheel 19 being provided with a number of teeth 20 spaced apart by intervening notches 21. Also operatively associated with the ratchet wheel 19 is a driving gear, not shown, which is operatively associated with an impulse sending mechanism, not shown, which is operative to cause impulses corresponding to the various digits to be transmitted.

As best shown in Figs. 2 to 5 inclusive, a ratchet-engaging spring 22 is carried by the pawl 12, the spring 22 having an outwardly extending end 23 and a free end 24. The spring 22 is arranged on the outside of the pawl 12 and the outwardly extending end 23 thereof projecting through an opening 25 provided in the body portion of the pawl 12, the extreme outer end of the outwardly projecting end 23 thereof being bent over into frictional engagement with the body portion of the pawl 12. The ratchet-engaging end 14 of the pawl 12 is provided with a bifurcation or slot 26 therein in which the free end 24 of the spring 22 is disposed. The free end 24 of the spring 22 has a return-bent configuration, the general outline of which is similar, but slightly larger than the outline of the ratchet-engaging end of the pawl 12. The body portion of the spring 22 is urged into engagement with the adjacent outside surface of the pawl 12 and the forward portion of the free end 24 thereof projects through the slot 26 provided in the ratchet-engaging end 14 of the pawl 12 into engagement with the ratchet wheel 19 associated with the pawl 12. The spring 22 is so constructed and arranged that the free end 24 thereof engages the ratchet wheel 19 thereby to cause the spring 22 to exert a force upon the pawl 12 tending to rotate the pawl in a counter-clockwise direction about the pivot pin 13. Thus, the force exerted upon the pawl 12 by the spring 22 opposes the force exerted thereupon by the spring 15.

In the operation of the calling device, when the finger dial is in place, the finger dial is rotated in a clockwise direction about the axis of the hub 11 in the usual manner in accordance with the digit to be transmitted. As the finger dial is rotated in the clockwise direction, the plate 10 is also rotated in the clockwise direction due to the engagement between the finger dial and the hub 11 of the plate 10. The rotation of the plate 10 in the clockwise direction causes the pawl 12 carried thereby to slip with respect to the associated ratchet wheel 19. Accordingly, the ratchet wheel 19 remains stationary while the pawl 12 is rotated in the clockwise direction. As the pawl 12 is rotated in the direction indicated, the ratchet-engaging end 14 thereof, rides up one of the teeth 20 of the ratchet wheel 19 and then falls into the succeeding notch 21 of the ratchet wheel under the urge of the spring 15, this movement of the pawl being repeated a number of times depending upon the digit dialed.

Disregarding, for the present, the operation of the ratchet-engaging spring 22, each time the ratchet-engaging end 14 of the pawl 12 falls off of one of the teeth 20 of the ratchet wheel 19 into the succeeding notch 21 of the ratchet wheel, a decided click is ordinarily produced when the ratchet-engaging end 14 of the pawl 12 engages the bottom of the notch 21. Thus, a series of clicks are ordinarily produced incident to the rotation of the pawl 12 in the clockwise direction, the number of clicks ordinarily produced depending upon the digit dialed.

The ratchet-engaging spring 22 constitutes means for reducing the amount of noise ordinarily produced by the calling device incident to the operation thereof and, more particularly, means for minimizing the clicking noise produced by the ratchet-engaging end 14 of the pawl 12 when it falls into one of the notches 21 of the ratchet wheel 19. Considering now the operation of the pawl and ratchet wheel mechanism, as disclosed, including the operation of the ratchet-engaging spring 22 carried by the pawl 12, as the ratchet-engaging end 14 of the pawl 12 rides up one of the teeth 20 of the ratchet wheel 19, the free end 24 of the spring 22 is forced further into the slot 26 provided in the ratchet-engaging end 14 of the pawl 12, thereby to cause the spring 22 to exert a force upon the pawl 12 in opposition to the force exerted thereupon by the spring 15. At the instant the ratchet-engaging end 14 of the pawl 12 rides off of the tooth 20 of the ratchet wheel 19

into the succeeding notch 21 of the ratchet wheel 19, the free end 24 of the spring 22 disengages the associated tooth 20 of the ratchet wheel 19 and moves out of the slot 26 provided in the ratchet-engaging end 14 of the pawl 12 into a position in advance of the ratchet-engaging end 14 of the pawl 12. The spring 15 then rotates the pawl 12 in a clockwise direction thereby to cause the free end 24 of the spring 22 to engage the bottom of the associated notch 21 of the ratchet wheel 19, whereupon the free end 24 of the spring 22 is forced into the slot 26 provided in the ratchet-engaging end 14 of the pawl 12 in order to exert a force upon the pawl 12 in opposition to the force exerted thereupon by the spring 15. The force exerted upon the pawl 12 by the spring 22 in opposition to the force exerted thereupon by the spring 15, prevents the ratchet-engaging end 14 of the pawl 12 from striking the bottom of the associated notch 21 of the ratchet wheel 19, thereby to eliminate the clicking which is ordinarily produced incident to the engagement of the ratchet-engaging end 14 of the pawl 12 and the bottom of the associated notch 21 of the ratchet wheel 19.

From the foregoing, it is apparent that the ratchet-engaging spring 22 prevents the clicking noise ordinarily produced incident to the operation of the calling device due to the cushioning action this spring exerts upon the movement of the pawl 12 toward the associated ratchet wheel 19.

After the finger dial has been rotated in the clockwise direction to its final position it is released, whereupon a spring, not shown, causes the plate 10 to be driven in the counter-clockwise direction back to its normal position. When a force is exerted upon the plate 10, the forward edge of the ratchet-engaging end 14 of the pawl 12 engages the then adjacent tooth 20 of the ratchet wheel 19 in order to cause an operating force to be exerted between the pawl 12 and the associated ratchet wheel 19, whereupon the ratchet wheel 19 is driven in the counter-clockwise direction in order to cause the driving gear associated therewith to operate the impulse sending mechanism. The pawl 12, the associated ratchet wheel 19, and the ratchet-engaging spring 22 are so constructed and arranged that when a driving force is exerted between the ratchet-engaging end 14 of the pawl 12 and an associated tooth 20 of the ratchet wheel 19, the ratchet-engaging end 14 of the pawl 12 is moved against the force exerted upon the pawl 12 by the ratchet-engaging spring 22 into direct driving engagement with the associated tooth 20 of the ratchet wheel 19, the free end 24 of the spring 22 being moved into the slot 26 provided in the ratchet-engaging end of the pawl 12.

In assembling the calling device, the ratchet-engaging spring 22 is pre-formed as previously noted and then placed upon the associated pawl 12 as previously explained. The extreme outer end of the outwardly projecting end 23 of the ratchet-engaging spring 22 is then bent over in order, frictionally, to engage the body portion of the pawl 12 as previously noted. The sub-assembly, comprising the pawl 12 and the ratchet-engaging spring 22, is then assembled into the calling device in a well-known manner. When the sub-assembly is thus assembled into the calling device, the ratchet-engaging spring 22 is so positioned and arranged, without further adjustment thereof, that the clicking noise ordinarily produced incident to the operation of the calling device is eliminated as previously explained.

In view of the foregoing, it is apparent that an improved arrangement for reducing the noise ordinarily produced by a calling device incident to the operation thereof is provided, which arrangement is of simple and rugged construction and which is economical to manufacture.

While there has been described what is, at present, considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is contemplated to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. In a calling device provided with a mechanism including a ratchet having a number of teeth spaced apart by intervening notches, a cooperating pawl having a recess therein adjacent the ratchet-engaging portion thereof, and means including a dial for operating said pawl and said ratchet; means for reducing the amount of noise produced as said pawl is rotated over successive teeth and notches of said ratchet, said last-mentioned means comprising a spring having one of its ends fixed to said pawl and the other of its ends free, the free end of said spring being disposed in the recess in said pawl and adapted for reciprocal movement therein into engagement with the successive teeth and notches of said ratchet, said spring being so constructed and arranged that the free end thereof is moved into the recess in said pawl as the ratchet-engaging portion of said pawl approaches said ratchet, thereby to exert a force upon said pawl in order to cushion the movement of said pawl toward said ratchet as said pawl passes over a tooth and descends into the succeeding notch of said ratchet, said pawl and said ratchet being so constructed and arranged that when said pawl exerts a driving force upon said ratchet the free end of said spring is moved into the recess in said pawl and said pawl is moved against the force exerted thereupon by said spring into direct driving engagement with a tooth of said ratchet.

2. In a calling device provided with a mechanism including a ratchet having a number of teeth spaced apart by intervening notches, a cooperating pawl having a recess therein adjacent the ratchet-engaging portion thereof, and means for operating said pawl and said ratchet; means for reducing the amount of noise produced as said pawl is rotated over successive teeth and notches of said ratchet, said last-mentioned means comprising a spring having one of its ends fixed to said pawl and the other of its ends free, the free end of said spring being disposed in the recess in said pawl and adapted for reciprocal movement therein and for engagement with the successive teeth and notches of said ratchet, said spring being so constructed and arranged that the free end thereof is moved into the recess in said pawl as the ratchet-engaging portion of said pawl approaches said ratchet, thereby to cushion the movement of the last-mentioned portion of said pawl as said last-mentioned portion thereof passes over a tooth and descends into the succeeding notch of said ratchet.

3. In a calling device provided with a mechanism including a ratchet having a number of teeth spaced apart by intervening notches, a cooperating pawl having a bifurcated ratchet-engaging portion, and means for operating said

pawl and said ratchet; means for reducing the amount of noise produced as said pawl is rotated over successive teeth and notches of said ratchet, said last-mentioned means comprising a spring having one of its ends fixed to said pawl and the other of its ends free, the free end of said spring being disposed in the bifurcation of the ratchet-engaging portion of said pawl and projecting therethrough toward said ratchet and adapted for reciprocal movement in the bifurcation of the last-mentioned portion of said pawl and for engagement with the successive teeth and notches of said ratchet, said spring being so constructed and arranged that the free end thereof is moved into the bifurcation in the ratchet-engaging portion of said pawl as the last-mentioned portion thereof approaches said ratchet, thereby to cushion the movement of the last-mentioned portion of said pawl as said last-mentioned portion thereof passes over a tooth and descends into the succeeding notch of said ratchet.

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