Oct. 18, 1938. H. F. OBERGFELL 2,133,469

CALLING DEVICE

Filed Sept. 5, 1936

FIG. 1

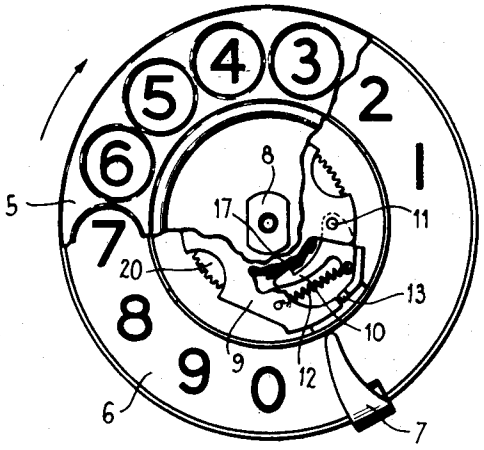


FIG. 2

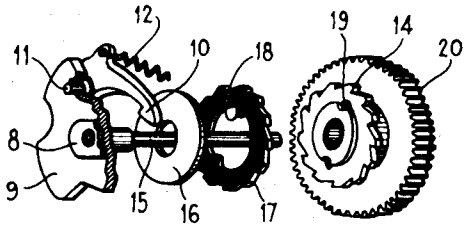


FIG. 3

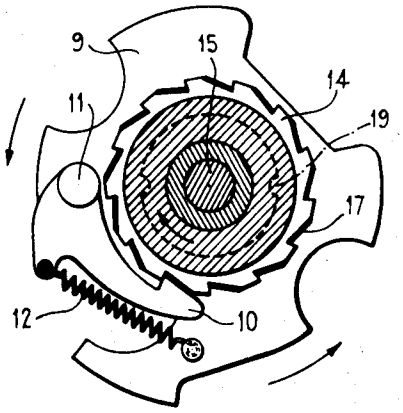


FIG. 4

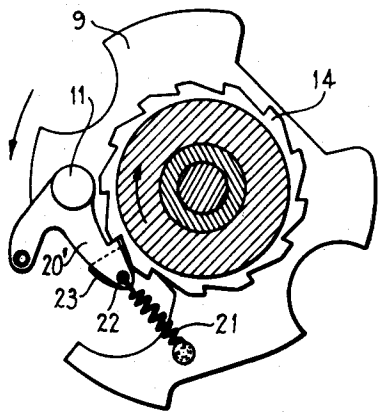
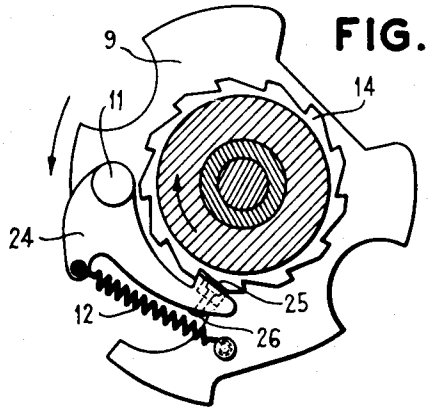


FIG. 5



INVENTOR.
HERBERT F. OBERGFELL
BY Wm Walter Dawson.
ATTORNEY.

Patented Oct. 18, 1938

2,133,469

UNITED STATES PATENT OFFICE

2,133,469

CALLING DEVICE

Herbert F. Obergfell, River Forest, Ill., assignor to Associated Electric Laboratories, Inc., Chicago, Ill., a corporation of Delaware

Application September 5, 1936, Serial No. 99,547

7 Claims. (Cl. 179—90)

This invention relates to calling devices or impulse senders of the type commonly employed in automatic telephone systems for establishing telephone connections between telephone lines or for remote control systems of various types in which selective operations are to be performed.

Calling devices as employed in automatic telephone systems are extensively used and are well known to the average telephone subscriber. Their mechanical and electrical design has reached high stages of perfection from the operating companies' and the subscribers' viewpoint. However, considerable objection has been voiced by the subscribers because of the fact that the calling devices produce a loud distracting noise when they are being operated. This noise distracts the attention of the subscriber while he is dialling the digits of a telephone number, causing him to forget the number being dialled, and also invades his privacy by calling the attention of nearby persons to the fact that a telephone call is being made. Telephone operators who are constantly operating their calling devices are subjected to a certain amount of nervous tension by the constant clocking noise produced by their own or adjacent operators' calling devices.

It is accordingly the object of this invention to provide an improved calling device in which the objectionable operating noise is greatly reduced or practically eliminated without detracting from the electrical and mechanical efficiency of the calling device.

A further object of the invention is to provide a calling device of standard construction with means for rendering its operation noiseless without extensive changes or alterations to its various parts thereby cheapening the cost of the same.

A calling device of the type applicable to the invention and which is widely used is that disclosed in Patent 1,642,822, issued September 20, 1927, to H. F. Obergfell. This calling device has a finger wheel plate which is variably rotatable by the user in accordance with the different digits of a wanted subscriber's telephone number. The finger wheel carries a plate upon which is mounted a pawl, and associated with the pawl is a ratchet wheel having a series of teeth around its periphery. As the finger wheel is rotated the pawl is rapidly rotated and passes over the teeth in succession, the number being dependent upon the digit dialled. Upon release of the finger wheel it returns to normal by means of a spring and at a constant governor controlled speed. At the beginning of the return movement the pawl drops in and engages the adjacent tooth of the ratchet wheel and thereby rotates the ratchet wheel at the same time with the return movement of the finger wheel. The ratchet wheel controls mechanism to operate the impulse transmitting springs to set the automatic switches at the distant switching center or exchange.

As the foregoing calling device is operated in accordance with a digit the pawl, as pointed out, passes over a plurality of teeth of the ratchet wheel in succession and being urged by a spring drops between each pair of teeth and then rides up over the following tooth. Each time the pawl drops between the teeth it produces a loud clicking noise which is noticeably audible and extremely disagreeable, particularly when the finger wheel is rapidly rotated. In addition this results in considerable wear and tear on the pawl and ratchet mechanism itself.

The objects of the invention are attained in accordance with the feature of the invention by the provision of resilient means interposed between the pawl and ratchet mechanism of the calling device. Such resilient means may take the form of an auxiliary rubber ratchet wheel attached to the main ratchet wheel to take up and absorb the force and shock of the pawl dropping between the teeth of the ratchet wheel or alternatively providing the pawl with a rubber nose. In each case the pawl subsequent to dropping between the ratchet wheel and engaging the adjacent tooth makes a metal-to-metal contact to positively rotate the ratchet wheel, the rubber being only utilized to absorb the shock or impact of the spring actuated pawl at the time it drops off the end of a ratchet tooth.

The invention will be pointed out in detail in the following description together with the accompanying drawing in which:

Fig. 1 illustrates a front view of a calling device with a portion of certain of the parts cut away; Fig. 2 is an extended perspective view of the pawl and ratchet mechanism of Fig. 1; Fig. 3 is an enlarged rear view of the mechanism; while Figs. 4 and 5 are rear views of the pawl and ratchet mechanisms illustrating modifications of that shown in Fig. 1.

Referring now particularly to Fig. 1, the finger wheel dial 5 arranged with its finger holes above the number plate 6, has 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. Manual rotation of the finger wheel 5 clockwise therefore also results in the movement of plate 9. The finger wheel 5 is rotated until the finger stop 7

is encountered whereupon it is released and then rotates counter-clockwise under control of a tension spring attached to shaft 15 at a governor controlled speed (not shown). The return movement is limited by a projection on plate 9 striking the stop 13. The pawl 10 is pivoted at 11 to the plate 9 and is normally urged against and between the teeth of ratchet wheel 14 by the coiled tension spring 12. As the finger wheel 5 is rotated carrying the plate 9 and pawl 10 with it, the ratchet wheel remains stationary and the pawl snaps over the ends and between the ratchet wheel teeth. Upon the return movement of the finger wheel the pawl engages one of the teeth thereby carrying the ratchet wheel 14 along with it and also rotating the gear wheel 20 which is formed integral with the ratchet wheel. Gear wheel 20 operates the impulsing mechanism (not shown). So far the above parts are constructed and operate in the same manner as in the aforementioned Obergfell patent.

In order to eliminate the clicking noise produced as pointed out by the association of the pawl with the ratchet wheel teeth a resilient auxiliary ratchet wheel 17 is interposed between them. This ratchet is preferably constructed of synthetic rubber which resists excessive wear and is immune to corrosion due to the presence of lubricating oil on the dial mechanism. The auxiliary ratchet wheel 17 is formed in the shape of a ring (Fig. 2) with the ratchet teeth on the outside and a pair of oppositely spaced projections 18 on the inside which engage notches 19 on the hub portion formed on the ratchet wheel 14. The two ratchet wheels are thereby held together and movement relative to each other is prevented. A fiber bearing washer 16 is interposed between the auxiliary ratchet wheel 17 and the plate 9 carrying pawl 10 in order to lessen the friction between these parts when the mechanism is operating.

Referring now particularly to Fig. 3 which shows an enlarged rear view of the pawl and ratchet mechanism with the gear wheel 20 cut away, it will be seen that the teeth of the auxiliary ratchet wheel 17 are slightly wider along their sloping or back sides than the teeth of the metal ratchet wheel 14. The extreme outside edges and the faces of the teeth of both ratchet wheels, however, coincide with each other. Now as the finger wheel 5 is rotated manually in the direction indicated by the arrow it carries the plate 9 along with it and this in turn moves the pawl 10 around the teeth of the ratchet wheels 14 and 17 which at present remain stationary. The nose of pawl 10 rides on the sloping surface of the first tooth of rubber ratchet wheel 17, then slides along the outside surface of the teeth of both ratchets until it reaches the face of the teeth whereupon under the urging of spring 12 it snaps against the sloping side of the next tooth of rubber ratchet wheel 17. The impact shock of the pawl snapping off the end of each tooth is absorbed and cushioned by the resilient surface of the ratchet 17 thereby positively eliminating the clicking noises as the pawl passes over successive teeth. After the finger wheel 5 is stopped and released the operated mechanism returns under spring power as has been pointed out. The nose of pawl 10 engages the face of the tooth of ratchet wheel 14 that it is stopped at, and establishing contact therewith pulls the ratchet wheel 14 along with it to perform its function of operating the impulsing mechanism through the medium of gear wheel 20. From the foregoing it will be seen that the resilient ratchet teeth cushion the pawl as it passes over the teeth while when the pawl is actually performing its work of pulling ratchet wheel 14 around it makes a direct metal contact with the face of the metal teeth. The pawl therefore contacts with a portion of each ratchet wheel tooth and auxiliary wheel tooth. Wear on the nose of the pawl and obnoxious noises are consequently obviated. The auxiliary ratchet wheel 17 is not subject to excessive friction or wear and will last indefinitely. The addition of this resilient ratchet to calling devices already in use may be readily accomplished by merely replacing the regular ratchet wheel 14 with one having the hub and notches 19 formed in it, or the regular ratchet may be machined and altered to provide these changes. The auxiliary ratchet 17 and washer 16 are then added resulting in a noiseless dial.

In the modification of Fig. 4 the nose of pawl 20' is provided with a rubber inset 23 held in place in a slot in the pawl and by a rivet 22. Spring 21 attached to the rivet 22 on the end of pawl 20' exerts a pull on the pawl which is in line with the pawl pivot thereby rendering the action of the pawl semi-floating; that is, the spring has a tendency to hold back on the pawl as it falls between the ratchet wheel teeth, thereby lessening its force as it snaps against the sloping sides of the teeth. The rubber nose 23 in addition cushions the impact of the pawl and eliminates the clicking noise. The pawl 20' is made shorter so as to provide an effective length for the pawl spring 21.

In Fig. 5 a modification is shown in which the nose of pawl 24 is provided merely with a rubber insert 25 which is held in place in an opening of the pawl by a pin or rivet 26. This rubber insert on the pawl as it passes over the ratchet teeth cushions the impact of the pawl and prevents the metallic contact between the sloping sides of the teeth and the nose of the pawl. When the pawl, however, moves the ratchet wheel it contacts its metal trigger edge with the metal face of the ratchet teeth. This modification illustrates probably the simplest and cheapest manner in which the invention may be applied to existing calling devices, it being merely necessary to change the pawls.

What is claimed is:

1. In a pawl and ratchet mechanism wherein the pawl is moved over successive teeth of the ratchet wheel, means for eliminating the clicking noise comprising an auxiliary ratchet wheel having teeth larger than the teeth of the first ratchet wheel for preventing engagement between the pawl and the back of the teeth of the first ratchet wheel.

2. In a pawl and ratchet mechanism wherein the pawl is moved across successive teeth of the ratchet wheel and passes from one tooth to the next, an auxiliary ratchet wheel having resilient teeth, each tooth of the auxiliary ratchet wheel being of greater area than each tooth of the first ratchet wheel and arranged in juxtaposition to the teeth of the first ratchet wheel for eliminating the clicking pawl noise.

3. In a pawl and ratchet mechanism, a pair of ratchet wheels, one of said ratchet wheels having the sloping surface of its teeth arranged slightly in advance of the sloping surface of the teeth of the other ratchet wheel, and means for operating said pawl so as to move first over a portion of a

tooth of one ratchet wheel and then over a portion of a tooth of both ratchet wheels.

4. In a pawl and ratchet mechanism, a pair of ratchet wheels arranged side by side, one of said ratchet wheels having resilient teeth arranged with the back of the teeth in advance of the back of the teeth of the other ratchet wheel, the front face of the teeth of both ratchet wheels being coincident, means for moving the pawl forward over the back of the teeth of only one of said ratchet wheels, and means for moving the pawl backward and into engagement with the front face of a tooth of both ratchet wheels.

5. In a calling device having a pawl, a ratchet wheel having metal teeth, an auxiliary ratchet wheel having teeth formed of resilient material, means cooperative with both of said ratchet wheels for holding them in locked relationship, means responsive to the operation of said calling device for rotating said pawl across successive ones of the teeth of both ratchet wheels, the resilient teeth preventing any engagement of the pawl with the back of the metal teeth and thus eliminating the noise of the pawl as it drops between the metal teeth, and means for rotating said pawl backward in engagement with the face of one of said metal teeth to rotate both of said ratchet wheels.

6. In a calling device, a pawl and ratchet mechanism, means for moving said pawl across the back surface of successive ones of said ratchet teeth, means for moving said pawl back again in engagement with the face of one of said ratchet teeth to rotate the ratchet wheel, and resilient means attached to said pawl for preventing any engagement between the pawl and the back of the ratchet teeth thus eliminating the clicking noise of the pawl as it is moves across the back surfaces of said ratchet teeth.

7. In a calling device, a ratchet wheel, a pawl, means for moving the pawl backward over the ratchet wheel without moving the wheel and for moving it forward to engage a tooth to move the wheel, an element of resilient material interposed between the pawl and the back of the teeth of the ratchet wheel, said element having a surface parallel to the back of a tooth of the ratchet wheel and preventing the pawl from engaging any part of the back of a ratchet tooth while permitting direct engagement of the pawl with the front face of a ratchet wheel.

HERBERT F. OBERGFELL.