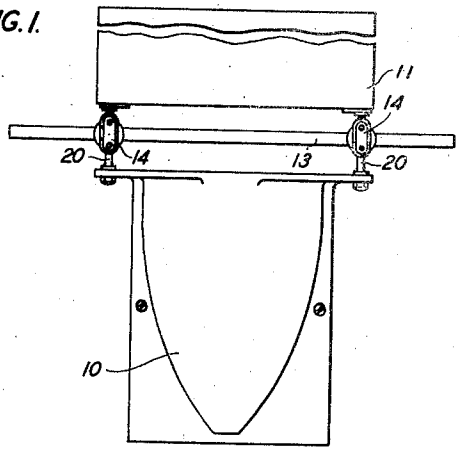
Jan. 12, 1943. K. E. BOWER 2,307,989

SOUND SIGNAL

Filed March 24, 1942

FIG. 1.



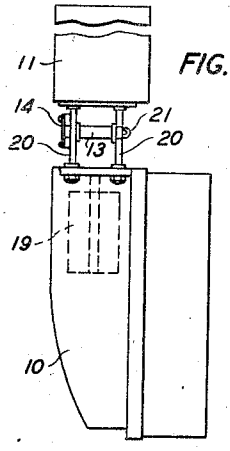


FIG. 2.

FIG. 3.

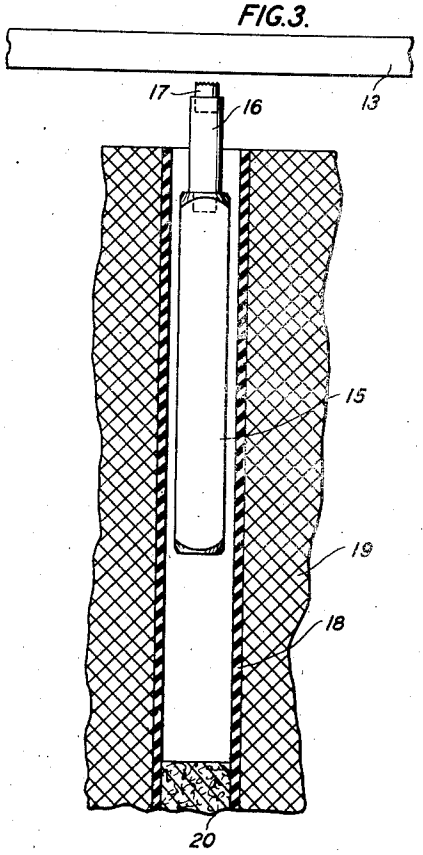
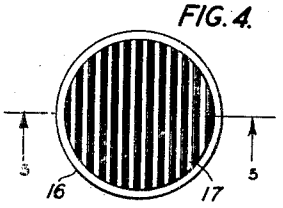


FIG. 4.



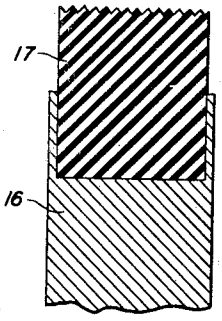


FIG. 5.

INVENTOR
K. E. BOWER

BY

ATTORNEY

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SOUND SIGNAL

Kline E. Bower, Brooklyn, N. Y., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

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7 Claims. (Cl. 116—148)

This invention relates to vibratile sound signals and particularly to improvements in chime signals.

Chime signals, in general, consist of a vibratable chime bar of metal, or other suitable material, which is caused to vibrate, to produce a sound signal, when struck by a manually or electrically actuated striking element. In electrically controlled chime signals the striking element generally comprises the metallic plunger of a solenoid which, when the solenoid is energized, is moved in the direction of the chime bar with sufficient force to cause one end of the plunger to strike the bar, causing it to vibrate. Heretofore, the striking end of the solenoid plunger has been furnished with a tip of some suitable material which functioned to improve the sound qualities of the chime signal. Such tips have been made of leather, hard rubber compositions and of similar materials.

Leather tips, and tips of similar relatively soft materials have been found to serve satisfactorily where the sound-intensity of the signal emitted by the chime bar was not a controlling factor, but since the life of leather tips has been found to be relatively short, it has become desirable to replace them with a tip of a material whose effective life span is considerably greater. Leather tips furthermore, have the desirable capability of reducing the impacts of plunger against chime bar to a minimum so that in finding a substitute for leather it was essential that this desirable cushioning effect should not be sacrificed. While tip materials, such as hard rubber compositions, were available and were known to have toughness such as to combine good volume with long life, it was found that plungers equipped with tips of such materials produced audible impacts of such intensity as to render the chime signal unfit for use where operated at frequent intervals, since the tone of the chime was overridden by the audible impacts.

It is the object of this invention to provide the striking element of a chime signal with a tip which insures good volume and long life and, at the same time, which reduces to a minimum the audible impacts which heretofore characterized tips having sufficient toughness to produce sound signals of great intensity over a relatively long period of time.

This object is attained in accordance with a feature of the invention by utilizing for the tip of the striking element of a chime signal, a material having the requisite toughness to insure long life and the hardness to produce a signal of good volume, and in surfacing the tip material in such a manner as to preclude the possibility of undesirable audible impacts being produced. More specifically, the object of this invention is attained by equipping the chime bar-actuating plunger of a chime signal with a tip of relatively tough material, such as rubber compositions, neoprene, and the like, and in corrugating the striking surface of the tip.

The invention will be readily understood from the following description made with reference to the accompanying drawing in which:

Fig. 1 is a front view of a chime signal of the type to which the invention is particularly applicable;

Fig. 2 is a side view of the chime signal shown in Fig. 1;

Fig. 3 is an enlarged view of a portion of the signal shown in Figs. 1 and 2 and of the striking plunger thereof which is equipped with a tip designed in accordance with the invention;

Fig. 4 is an enlarged view of the striking surface of the plunger shown in Fig. 3, and;

Fig. 5 is a sectional view of the plunger end taken along the line 5—5 of Fig. 4, looking in the direction of the arrows.

The chime signal shown in Figs. 1 and 2, which of itself, constitutes no part of the present invention consists essentially of a housing 10 of any suitable configuration, a resonating chamber 11, a chime bar 13, a solenoid 19 (Fig. 2) and suitable fixtures for supporting the chime bar 13 intermediate the resonating chamber 11 and the solenoid housing 10. As shown in Fig. 2 the rear of the housing provides sufficient space for the accommodation of the necessary wiring which may be brought into the housing by way of an aperture, not shown. The manner in which the chime bar 13 is mounted does not constitute a part of the present invention and need not be disclosed in detail. Suffice it to say that the bar 13 is supported at its node points by cords 21 which are run transversely through it and through the vertical standards 20 which separate the resonator 11 from the solenoid housing 10. The cords are knotted at their forward ends and have their other ends joined by means of a coil spring which, with portions of the cords, extends across the rear edge of the chime bar. The plates 14 cover the cord knots for appearance purposes.

The solenoid plunger 15 is a finished steel bar having a substantially square cross section and is provided with a cylindrical extension 16 of brass. The extension 16 is centered on the upper

end of the bar 15 and is fixed thereto in any suitable manner. The outer end of the extension 16 is hollowed out, or recessed to accommodate a plug 17 of a material, such as rubber composition, neoprene, etc., which is sufficiently tough to insure a long life of continued use, and which is sufficiently hard to insure the firmness of blow which produces a signal of good volume.

As shown in Figs. 4 and 5, the striking surface of the plug 17 is corrugated, or ribbed. Surfacing the tip of the plug 17 in this manner insures a cushioning effect when the plunger strikes the chime bar, which reduces the audible impacts to as little, and even less than those produced by tips of softer materials, such as leather, and by virtue of the relative hardness of the material used, and the consequent firmness of the blow imparted by the harder material, an appreciable increase in signal strength is obtained. Obviously also, corrugating the striking surface in this manner insures a longer life for the tip in that it permits the use of a relatively tough material whose life expectancy is considerably greater than that of the softer materials.

In the disclosure of Fig. 3, the plunger is shown located in a tube 18 of insulating material at the bottom of which is fixed a cushion of felt, or other suitable material. The tube 18 supports the solenoid coil indicated by the numeral 19 such that the magnetic center of the coil is above that of the plunger. When the coil is energized, the plunger is moved rapidly upward in the tube 18, the momentum of the plunger causes it to carry past the magnetic center of the coil causing the plunger tip 17 to strike the chime bar before the plunger is drawn back to the center of the coil. With an impulse so imparted the chime bar vibrates to emit a sound signal. When the energizing current is interrupted, the plunger returns to normal position under the action of gravity, the felt pad 20 serving to cushion the fall of the plunger.

By corrugating, or ribbing the surface of the plunger tip, applicant has rendered it possible to utilize a hard, tough material which insures a sound signal of relatively great intensity and which will withstand continuous operation over a long period of time, without introducing the undesirable audible impacts which characterized the use of such materials heretofore. In other words, applicant has imparted to a relatively hard material plunger tip the desirable cushioning effect of a softer material and has done so without impairing the quality or intensity of the sound signal produced by the harder material.

What is claimed is:

1. In combination, a sound signaling device, and means for vibrating said device to cause it to produce a sound signal comprising a member, movable so as to strike said device and having a corrugated striking surface.

2. In combination, a sound signaling device, and means for vibrating said device to cause it to produce a sound signal comprising a metallic member, movable so as to strike said device and having a corrugated striking surface of non-metallic material.

3. In combination, a sound signaling device, and means for vibrating said device to cause it to produce a sound signal comprising a member movable so as to strike said device, said member having a tip at its striking end of a material which inherently produces audible impacts when the tip engages said device, and said tip having a striking surface comprising alternate raised and lowered areas of the tip material which serve to reduce to a minimum the audible impacts.

4. The combination in a chime signal, of a vibratable sound emitting chime bar, a striker for said bar, and means for actuating said striker so as to cause it to strike said chime bar, said striker having a striking surface of a relatively hard material which is ribbed to impart thereto the cushioning effect of a softer material.

5. A striker, for actuating a vibratable sound signal, having a corrugated striking surface.

6. A striker, for actuating a vibratable sound signal, having a tip of relatively hard material, and means for imparting characteristics of a relatively softer material to said tip comprising corrugations of the relatively hard material located on the striking surface of said tip.

7. In combination, a sound signaling device, and means for vibrating said device to cause it to produce a sound signal, comprising a member movable so as to strike said device, said member having a tip at its striking end of a relatively hard material, and means for cushioning the blow of the relatively hard material on the sound signal comprising corrugations of the relatively hard material located on the striking surface of the tip.

KLINE E. BOWER.