Sept. 8, 1936. G. F. WEISS 2,053,982

WHISTLE

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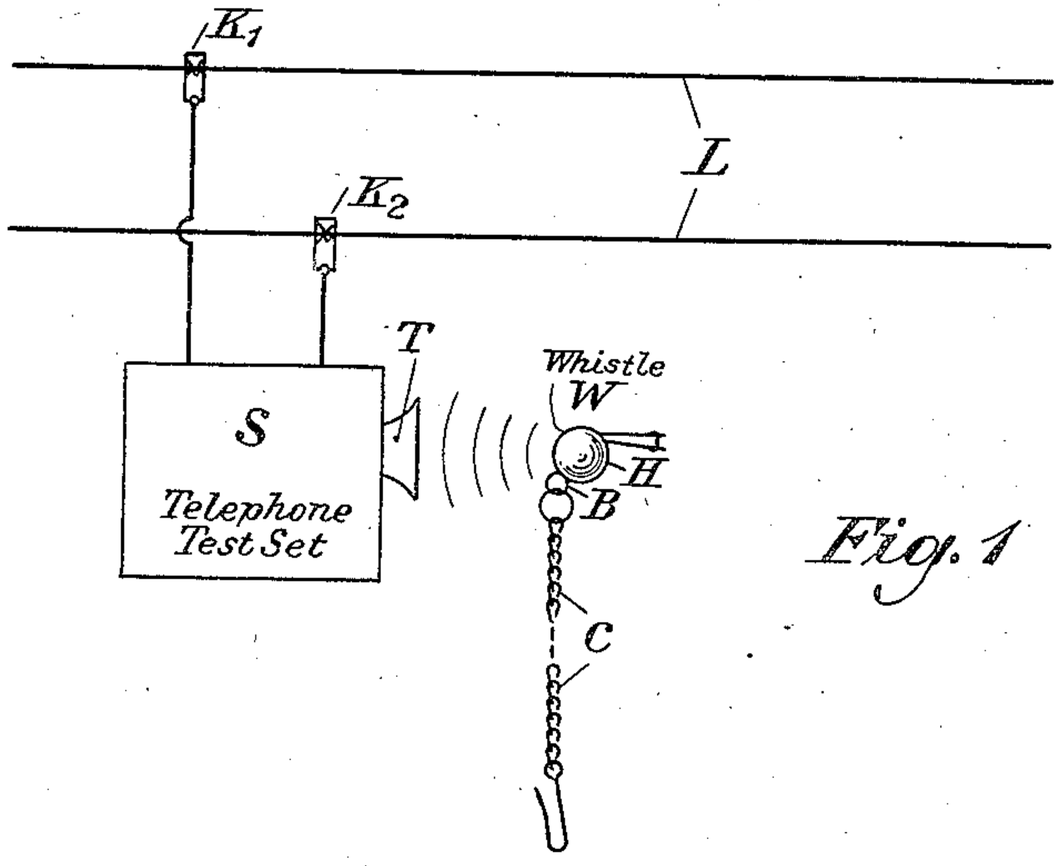


Fig. 1

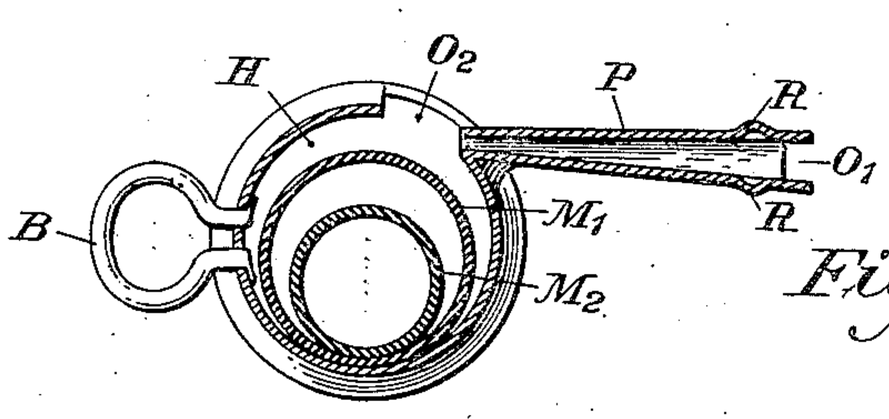


Fig. 2

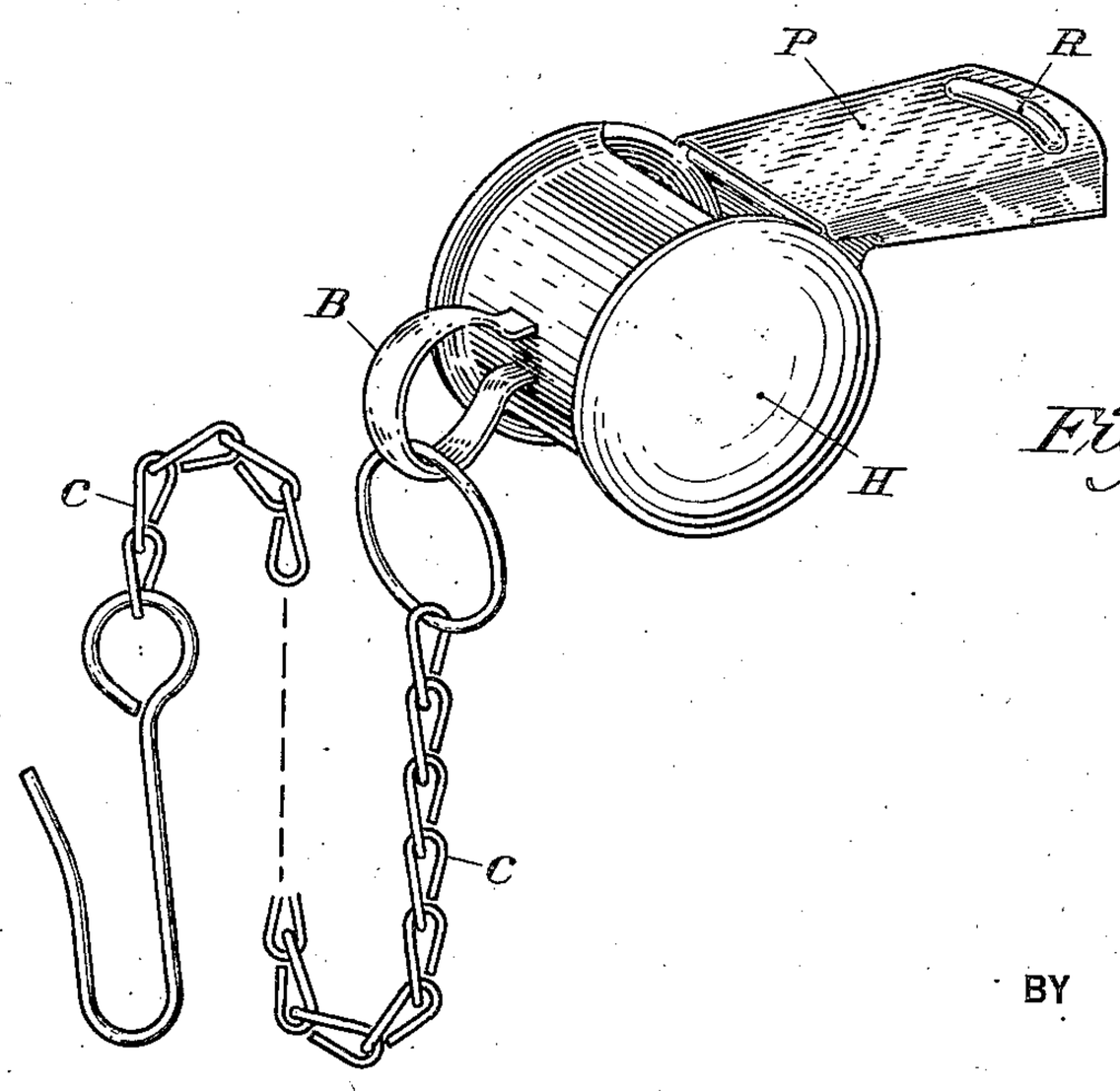


Fig. 3

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## WHISTLE

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7 Claims. (Cl. 116—137)

This invention relates generally to signaling systems and to apparatus for producing and transmitting signals. More particularly, this invention relates to arrangements for producing modulated currents. Still more particularly, this invention relates to signaling apparatus employing a moving column of air and a rotating element, or rotating elements, for producing suitable modulations of moving air.

In connection with telephone systems, there has recently arisen a need for means whereby a lineman may transmit ringing current, i. e., current of a frequency of, for example, 1000 cycles interrupted or modulated by a current of a frequency of, for example, 20 cycles, over a circuit equipped with apparatus suitable to handle such currents. In order that this may be done, it is necessary that a source of current of, for example, 1000 cycles, as well as another source of current, for example, 20 cycles, be readily available for producing the necessary modulation. One of the difficulties involved is that such equipment must be light in weight and small in size so that it may be readily carried from place to place along with the telephone lineman's familiar test set. The latter test set involves about as much weight as it is practical for a lineman to carry. It is also important that such equipment be quite inexpensive.

In order that these difficulties may be overcome, it is proposed in this invention to devise a whistle which shall produce the necessary 1000-cycle note modulated at the 20-cycle rate. Inasmuch as the present lineman's test set is equipped with a telephone transmitter, this can be used to receive the modulated tone produced by the whistle and to apply current corresponding to this tone to a telephone line. Such a whistle will obviously be small in size, its weight negligible, and its cost very low.

It is the general object of this invention to devise a readily portable device for producing modulated currents suitable for ringing purposes in connection with telephone lines.

Other and further objects of this invention will be apparent from the more detailed description hereinafter following, when read in connection with the accompanying drawing, in which Figure 1 shows an open wire pair or telephone line, a test set, and a whistle designed to give a tone simulating ringing currents; Fig. 2 shows a cross-sectional view of one form of embodiment of the whistle constituting the basis of this invention; and Fig. 3 shows a perspective of the whistle illustrated in Fig. 2.

Referring to Fig. 1 of the drawing, an open wire pair or telephone line is designated L. A telephone lineman's test set S can be connected to line L by means of a pair of test clips designated $K_1$ and $K_2$. The test set includes, among other things, the familiar form of transmitter T and receiver (not shown). The whistle is designated W and this may be placed in front of the transmitter at any desired distance therefrom and it may be displaced at any desired or predetermined angle so that its tone will be suitably impressed upon the diaphragm of the transmitter. The whistle will be described in greater detail hereinafter in connection with Figs. 2 and 3 of the drawing.

The whistle W will produce modulated waves simulating telephone ringing currents and these waves will be impressed upon the diaphragm of the transmitter T. This will produce, correspondingly modulated current which will be transmitted to the line L, as is well understood in this art.

Fig. 2 shows the whistle of this invention in cross-sectional view. It consists of a cylindrical sound chamber H having a sound outlet opening $O_2$ and this sound chamber is permanently connected to a wedge-shaped stem or mouthpiece P. The connection between the mouthpiece P and the cylindrical chamber H is made approximately at the point immediately below the opening $O_2$ of the chamber H, in order that the opening $O_2$ and the orifice of the mouthpiece P may be adjacent to each other. The mouthpiece P may have a pair of ridges R on its upper and lower surfaces in order that the whistle may be gripped between the teeth of the lineman.

The sound chamber H houses two cylindrical rollers $M_1$ and $M_2$ which are of equal length but of different diameters so that the roller $M_2$, of smaller diameter, will always be movable within the larger roller $M_1$. Both of these rollers may be made of the same material such as fiber, bakelite or other material. Of course, these rollers may be formed of different materials, if so desired.

Air may be blown through the opening $O_1$ of the mouthpiece P, into the chamber H, then around the outer surface of the roller $M_1$, which is set into motion by the air current, and then the air will be emitted from the opening $O_2$ into the atmosphere. The tone of, for example, 1000 cycles is produced by the selected size of the sound chamber H and the width of the sound outlet opening $O_2$. The lower frequency modu-

lation, or frequency of interruption of, for example, 20 cycles will be produced by the combination of the rollers $M_1$ and $M_2$ which rotate within the chamber H, the outer roller $M_1$ periodically closing the sound outlet $O_2$ as it rotates about the inner surface of the sound chamber H.

The smaller roller $M_2$ tends to slow down the speed of the larger roller $M_1$, without greatly increasing the weight of the latter. However, the two rollers $M_1$ and $M_2$ may, if desired, be replaced by a single roller of greater weight. This increased weight may be obtained by using a heavier material of the same external diameter as the roller $M_1$ or by using a compounded ring having the same external diameter but composed of two rings, one of fiber and the other of brass or other material, or by using any other expedient familiar to those skilled in this art. The essential requirement in the design of the roller $M_1$ is that it have frequency of interruption of, for example, 20 cycles per second.

It has been determined, however, that two rollers as shown in the drawing are more desirable than but one roller of greater weight. The two rollers produce a sharper and more distinct interruption. This is particularly advantageous where the interrupted current produced by the sound impressions must flow over various circuits equipped with much apparatus and must ultimately operate highly selective ringing apparatus connected or coupled to the line of transmission L.

It has also been discovered that the size of the sound outlet opening $O_2$ controls the tone or pitch of the air flowing through the chamber H. The tone or pitch may be substantially increased in frequency by closing the sound outlet opening $O_2$ by a very small amount. Conversely, the tone or pitch may be decreased by slightly increasing the size of the sound outlet opening.

It has been further discovered that the elevation of the stem or mouthpiece P has practically no effect upon the tone or pitch of the high frequency blast although it does affect the frequency and distinctness of the lower frequency interruption. Consequently, it is important that the stem or mouthpiece P be firmly secured to the chamber H and at a predetermined elevation.

In one form of whistle constructed to carry out the principles of this invention, the elements had the following proportions. The internal diameter of the sound chamber H was $\frac{15}{16}$ths of an inch and its depth was $\frac{7}{8}$ths of an inch. The sound outlet opening $O_2$ measured $\frac{1}{4}$ of an inch by $\frac{7}{8}$ths of an inch. The inside length of the stem or mouthpiece P was one inch. The opening $O_1$ at the outside end measured $\frac{3}{16}$ths of an inch by $\frac{7}{8}$ths of an inch and the opening at the orifice of the mouthpiece measured $\frac{1}{16}$th of an inch by $\frac{7}{8}$ths of an inch. The tube roller $M_1$ had an outside diameter of 0.707 inch, an inside diameter of 0.660 inch, a length of $\frac{13}{16}$ths of an inch and a weight of 30 grains. The roller $M_2$ had an outside diameter of 0.557 inch, an inside diameter of 0.510 inch, a length of $\frac{13}{16}$ths of an inch and a weight of 27 grains.

It will be understood, however, that the various dimensions just given and the various frequencies referred to throughout the specification are given merely by way of illustration and are not intended as limitations on the scope of the invention or of its appended claims. It will be clear that these dimensions just given may be varied in order to correspondingly change the high frequency pitch as well as the lower frequency of interruption to any desired values.

Fig. 3 of the drawing shows the whistle in perspective. In both Figs. 1 and 3, it will be seen that a ring B is fastened to the outside of the sound chamber H for the convenience of attaching a chain C for carrying the whistle.

While this invention has been shown and described in a certain particular embodiment merely for the purpose of illustration, it will be understood that the general principles of this invention may be applied to other and widely varied organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. In a whistle having a mouthpiece through which air may be blown, the combination of two hollow cylindrical rollers of equal height but of different diameters the smaller of which is placed within the other, and a cylindrical chamber housing said rollers and communicating with the mouthpiece so that the rollers may be freely rotated simultaneously about its inner cylindrical surface upon each air blast through said mouthpiece, said chamber having an opening of rectangular shape which leads to the atmosphere.

2. In a whistle, the combination of a cylindrical sound chamber, a wedge-shaped mouthpiece through which air may be blown, said mouthpiece being attached to said sound chamber and having an orifice which leads thereinto, said chamber having an opening which is adjacent to the orifice of the mouthpiece and which extends to the atmosphere, and a pair of cylindrical rollers of different diameters which are housed within said chamber and rotated in response to a blast of air.

3. In a cylindrical sound chamber for a whistle having a mouthpiece through which air may be blown into the sound chamber, a pair of cylindrical rollers of different diameters placed one within the other, the outer of which is rotatable about the inner cylindrical surface of said chamber for periodically interrupting the air emitted at high frequencies from said chamber, the outer roller having a length substantially equal to the length of the opening from which the air is emitted.

4. In a whistle having a mouthpiece through which air may be blown, the combination of a cylindrical sound chamber communicating with the mouthpiece so that air blown through the mouthpiece will enter said chamber, said chamber being adapted to produce an air current of high frequency, a cylindrical roller housed within said chamber, said roller having a smaller diameter than that of the sound chamber and being rotatable about the inner cylindrical surface of said sound chamber in response to an air blast, and means for weighting said roller, said roller periodically interrupting the high frequency tone emitted from said sound chamber.

5. A device for producing alternating sound impressions interrupted at a predetermined frequency, comprising a sound chamber including means through which air may be blown into the chamber, and means consisting of a cylindrical roller enclosed within said sound chamber and responsive to air blown into said sound chamber for periodically cutting off the emission of air blown into said sound chamber at a predetermined frequency.

6. A device for producing sound impressions of a predetermined frequency interrupted at another predetermined frequency comprising means including a cylindrical sound chamber having one opening for receiving air which is blown into the chamber and another opening for emitting air from the said chamber, and a weighted cylindrical roller of smaller diameter than that of said chamber and enclosed within said chamber, said roller being rotatable about the inner cylindrical surface of said sound chamber in response to air blown into said sound chamber and periodically closing the opening through which air is emitted from said chamber.

7. In a whistle having a cylindrical sound chamber in communication with a mouthpiece into which air may be blown into said chamber, said chamber having an opening from which air may be emitted, means comprising a cylindrical roller which may be rotated about the inner circular surface of said sound chamber in response to the pressure of air blown into said chamber, said roller being as long as the opening from which the air is emitted and periodically closing said opening of said sound chamber during its rotation.

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