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[54] **MULTITONE AIR BLAST HORN**

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[52] **U.S. Cl.** ..................... **116/140,** 46/177, 84/330, 116/137 R
[51] **Int. Cl.** .......................................... **G10k 5/00**
[58] **Field of Search** ............ 116/139, 137, 138, 59, 116/142 R, 141, 142 FP; 340/388, 384, 404, 405, 406; 46/179, 178, 180, 181; 84/330

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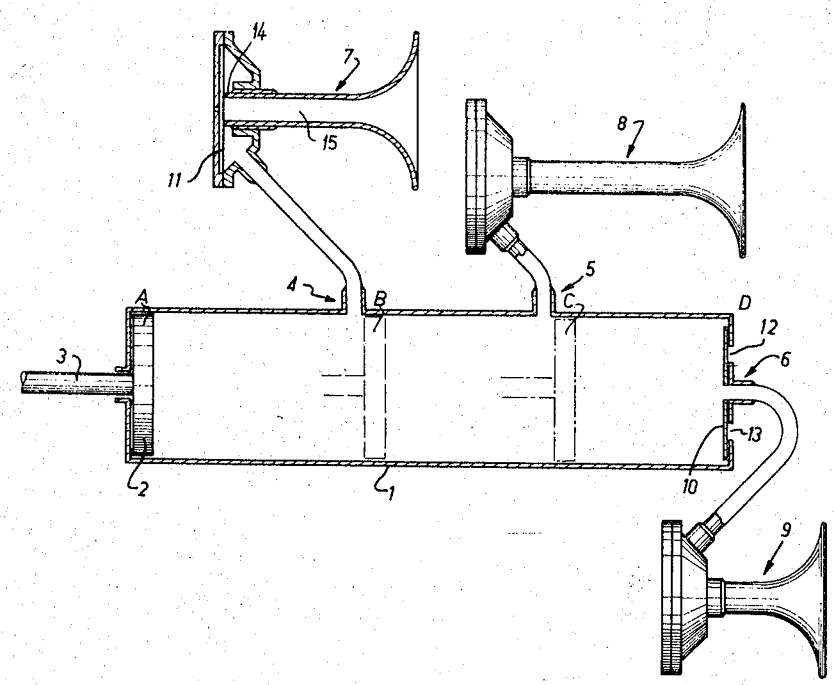
[57] **ABSTRACT**

This multitone air blast horn system comprises an air generator, an air distributor and a plurality of acoustic horns; said air generator consists of a piston pump and the distributor consists simply of the pump body formed to this end with a plurality of outlet ports communicating with the corresponding acoustic horns, respectively.

**6 Claims, 2 Drawing Figures**



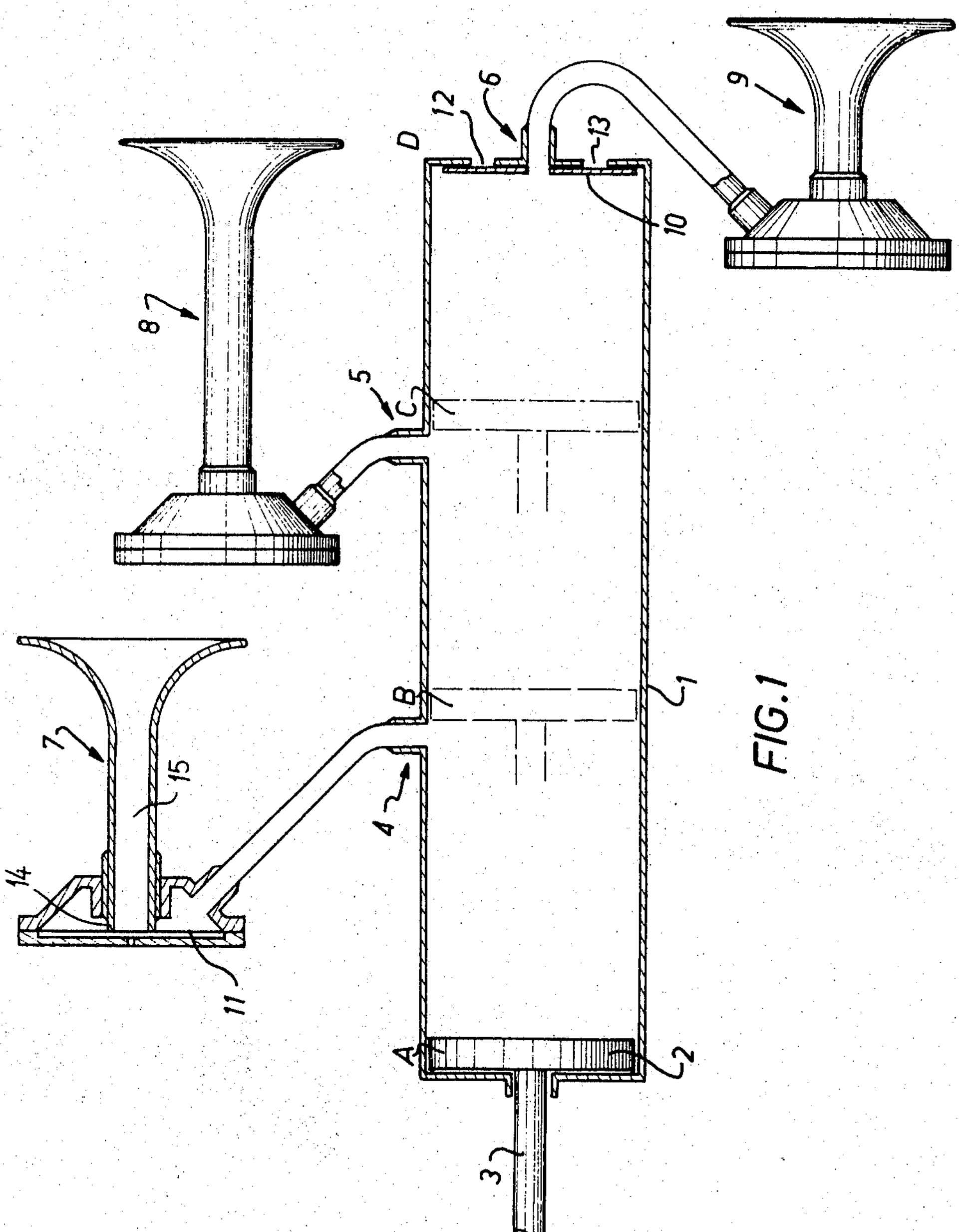



FIG.1

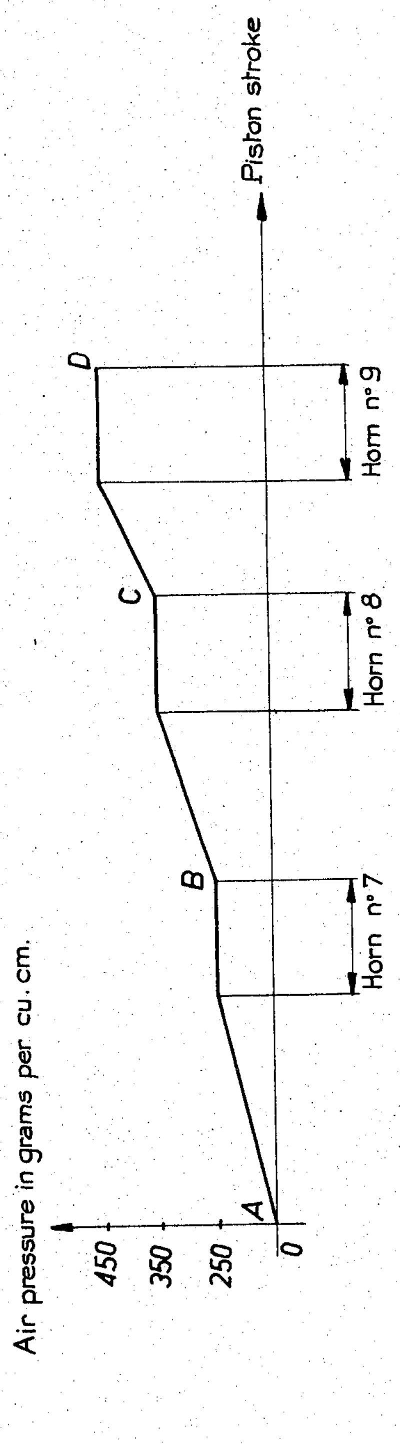

Piston stroke
Air pressure in grams per cu. cm.
450
350
250
0
A
B
C
D
Horn n°7
Horn n°8
Horn n°9

FIG. 2

# MULTITONE AIR BLAST HORN

The present invention relates in general to motor horns and has specific reference to multitone air blast horns.

Known horn systems of this character comprise as a rule a source of compressed air, a compressed air distributor and a plurality of acoustic horns.

As a rule, the source of compressed air consists of a vane pump driven from an electromagnetic motor adapted to control simultaneously a device for distributing the compressed air to the various acoustic or sound horns according to a predetermined order or sequence. Horns having different tones are adapted, when operated in succession, to produce very specific acoustic signals, for example as required for vehicles and crafts utilized by firemen, police patrols, ambulances and river boats, barges and the like.

It is the primary object of the present invention to provide a horn system or set of horns having similar functions but operated through simpler and therefore more economical means.

A multitone air blast horn system according to this invention comprises as a compressed air generator a piston pump and as an air distributor consisting simply of the pump body formed to this end with outlet ports communicating with the various acoustic horns.

With this arrangement, the conventional air distributor can be dispensed with since this device is an integral part of the pump body.

Moreover, the horn system according to this invention is advantageous in that it is adapted to supply two or more horns not only simultaneously but also separately according to a predetermined sequence in order to produce sound signals comprising a plurality of different tones emitted in succession.

Other advantages and features characterising the present invention will appear as the following description proceeds with reference to the accompanying drawing illustrating diagrammatically by way of example a typical form of embodiment thereof. In the drawing:

FIG. 1 is a part-sectional view showing a multitone air blast horn system according to this invention, which comprises three acoustic horns, and

FIG. 2 is a diagram showing the pressure obtaining in the pump body as a function of the variations in the piston position.

Referring to FIG. 1, the acoustic horn system according to this invention comprises a pump body 1 consisting of a cylinder in which a piston 2 is slidably mounted and provided with a control rod or stem 3 extending through one bottom of the cylinder. The cylindrical wall of this pump has formed therethrough a pair of outlet ports 4, 5 connected through pipe or hose means to acoustic horns 7 and 8, respectively. A third port 6 formed through the opposite bottom of the cylinder communicates via another pipe or hose with a third acoustic horn 9, and a diaphragm 10 surrounding this port 6 is adapted to close a pair of orifices 12, 13 connecting the inner space of the pump with the external atmosphere. In the conventional manner, the horn 7 shown in axial section comprises a thin diaphragm 11 normally sealing the inlet end 14 of the acoustic tube 15. This diaphragm 11 acts as a reed and beyond a predetermined pressure threshold it undergoes a certain deformation, thus permitting the passage of air creating stationary vibration within the sound or acoustic tube 15. This diaphragm 11 also acts as a valve since it is unseated only when a predetermined pressure threshold is overstepped, so that the pressure is kept at a substantially constant value during the piston stroke. The other horns 8 and 9 are constructed and operate like the above-described horn 7 with the exception of the pressure threshold. In this regard, the diaphragm of the horn 8 seats against the inlet end of this horn with more force than that generated in horn 7. Similarly, the diaphragm of horn 9 seats against the inlet end of its horn with even more force. In this manner, the threshold of horn 7 (for example 250 grams per cubic centimeter as explained below) is less than that of horn 8 (for example 350 grams per cubic centimeter) which, in turn, is less than the threshold of horn 9 (for example 450 grams per cubic centimeter).

In order to afford a clearer understanding of the mode of operation of this horn system, two intermediate piston positions B and C, corresponding to ports 4 and 5 must be observed between the two end positions of piston 2, namely the back position A and the expansion position D.

When the piston 2 is driven from A to B, it increases the air pressure, and this pressure increment continues steadily since it causes the diaphragm 10 to be pressed against the right-hand bottom of the cylinder, as shown in FIG. 1, so as to seal the ports 12 and 13 to prevent any escape of air to the outside. When this pressure reaches a predetermined value of, say, 250 grams per cu.cm., the horn 7, preset for operating under this particular pressure, emits a sound. As the other horns 8 and 9 are set for operating under pressure of the order of 350 and 450 g. per cu.cm., respectively, they are not operated. Due to the presence of the horn diaphragm 11 maintaining a substantially constant air pressure in horn 7, the latter continues to emit a sound until its cylinder port 4 is no more connected with the pressurized chamber of this cylinder, i.e., when the piston is at position B.

As the piston 2 continues its stroke towards position C, the air pressure increases until it reaches the value of, say 350 g. per cu.cm., corresponding to the operation of horn 8, and the latter is thus operated until the piston actually reaches position C.

Similarly, during its travel towards position D, the piston 2 causes the pressure to rise to 450 g. per cu.cm, this value remaining constant and causing the operation of the third horn 9 until the piston has completed its stroke. During the return stroke of piston 2 from D to A, atmospheric air penetrates freely into the pump body 1 through the ports 12 and 13 from which the diaphragm 10 is separated, thus avoiding the building of any negative pressure in the pump body.

In FIG. 2, the operation of the system is illustrated in diagrammatic form, and the three stages of the pump operation which result from the piston stroke are clearly shown.

Of course, the preset values of the operating pressures of the acoustic horns and the number of these horns in the system shown and described herein should not be construed as limiting the scope of the invention, since these figures are given by way of illustration and can be varied as desired without departing from the basic principles of the invention. On the other hand, the relative distance between the ports may be varied with a view to produce different durations of the sound signals emitted by the system.

What is claimed as new is:

1. A multitone air blast horn system comprising: a cylindrical body having a forward end and a rearward end formed with outlet ports distributed along its length; a plurality of tuned acoustic horns communicating directly with respective ones of said outlet ports, wherein each horn has a preset pressure threshold of operation, and wherein the preset pressure thresholds of the respective horns increases in the direction from the rearward end to the forward end of the cylindrical body; a piston slidably mounted in said cylindrical body and adapted to sound the air blast horn when thrust forward from its fully retracted position near said rearward end toward said forward end; said outlet ports and said piston cooperating such that said piston develops a pressure in the outlet ports which increases from one outlet to the next during the forward piston stroke; and said pressure thresholds of the respective horns being such that the horns are sounded one at a time, in succession, according to the increased pressure in the outlet ports from the rearward to the forward end of the cylindrical body.

2. The multitone air blast horn of claim 1, and further comprising an air admission valve for communicating the cylindrical body with the atmosphere during the return stroke of the piston.

3. The multitone air blast horn of claim 2, wherein the admission valve comprises a diaphragm cooperating with orifices at the forward end of the cylindrical body.

4. The multitone air blast horn of claim 1, wherein each of said outlet ports experiences a positive pressure during the initial forward stroke of the piston, and successively fewer of said outlet ports experience such positive pressure as the piston advances along its forward stroke.

5. The multitone air blast horn of claim 1, wherein said outlet ports are in constant communication with said cylindrical body.

6. The multitone air blast horn of claim 5, wherein said acoustic horns are in constant communication with said outlet ports.

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