June 20, 1933. E. C. HORTON ET AL 1,915,248

HORN

Filed May 11, 1931

Fig. 1

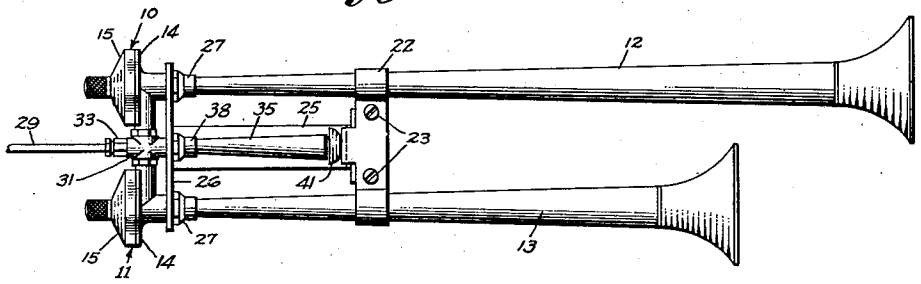
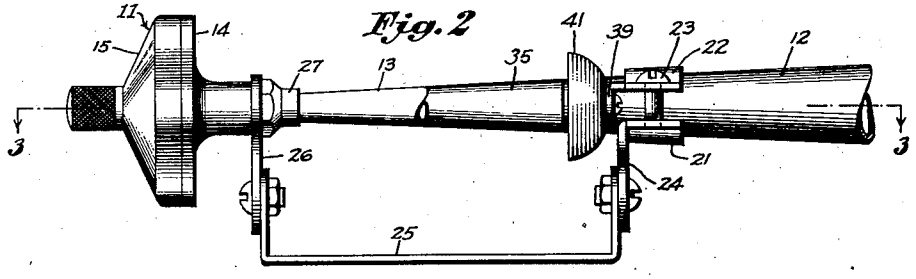


Fig. 2



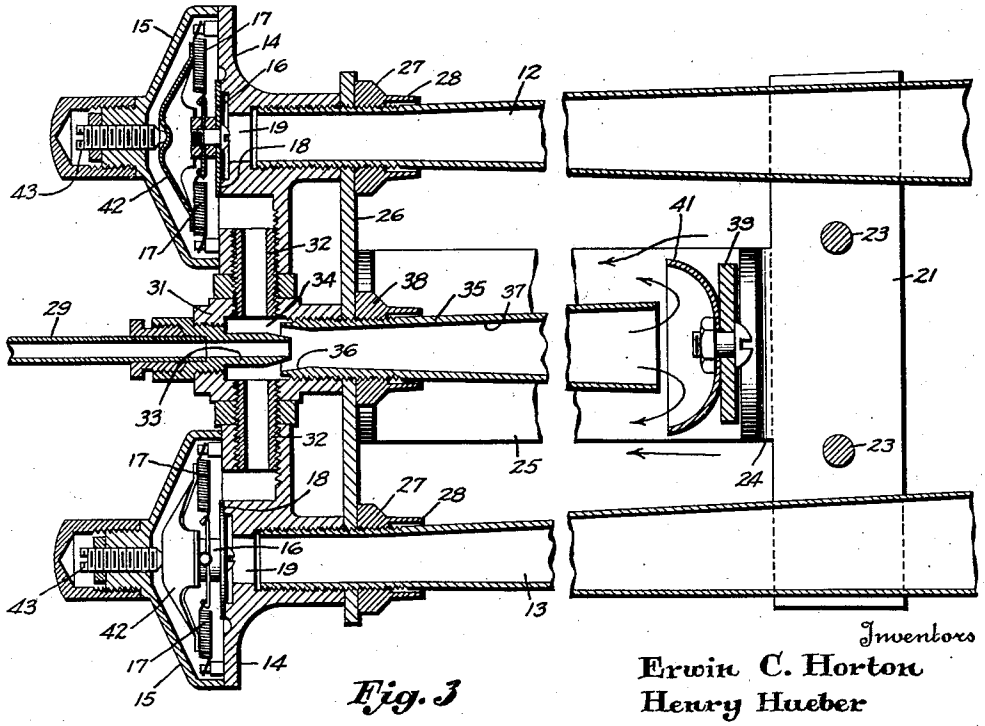


Fig. 3

Inventors
Erwin C. Horton
Henry Hueber
By Bean, Brooks & Henry.
Attorney.

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ERWIN C. HORTON, OF HAMBURG, AND HENRY HUEBER, OF BUFFALO, NEW YORK, ASSIGNORS TO TRICO PRODUCTS CORPORATION, OF BUFFALO, NEW YORK

HORN

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This invention relates to fluid pressure operable horns and particularly to horns of the general type disclosed in our application Serial No. 482,228, filed October 3, 1930.

Heretofore such horns have been connected directly to the intake manifolds of the vehicles to which they are mounted so that suction maintaining in the manifolds may be effective to induce a flow of air from the atmosphere through the horns to create the effect of sound. In certain types of vehicles, such as trucks and buses, a sound note may be desired of greater intensity than that which can be produced by such suction as usually maintains in the manifold. Such vehicles, moreover, are sometimes provided with means for compressing air to be used for operating the brakes or for other purposes, and it is desirable to provide a horn which may be operable by such compressed air. As it has been found that the tone quality of a horn operating by suction is superior to that produced by horns operable by fluid under greater-than-atmospheric pressure, it is a purpose of this invention to provide a horn having means for converting pressure greater-than-atmospheric into a pressure less-than-atmospheric.

It is sometimes desirable to mount the horn on the outside of the vehicle with the horn trumpets directed toward the forward end of the vehicle in order that the warning sound may be directed toward traffic to the front of the vehicle. When moving at a high rate of speed there is a considerable volume of air passing over and about such a horn and it is desirable to take advantage of this air movement to increase the quantity of air passing through the horn, in order to augment its tone intensity.

These and other desiderata are accomplished in the present invention, which comprises a horn unit consisting of one or more sound producing elements and means for converting fluid pressure greater-than-atmospheric into a partial vacuum or pressure less-than-atmospheric at points adjacent the oscillating or sound creating elements of the device. Means are provided in association with the discharge orifice of the pressure line to reduce the back pressure in such line by reason of air passing over the elements due to motion of the vehicle.

These and other objects and advantages including those arising from the structural relationships and structural characteristics of the component parts of the device, will become apparent from the following description of one typical embodiment of the invention, reference being made to the accompanying drawing in which:

Fig. 1 is an elevational view of a complete horn unit constructed in accordance with the present invention.

Fig. 2 is a fragmentary elevational view of a portion of the device shown in Fig. 1, the view being taken at right angles to that shown in Fig. 1.

Fig. 3 is a central sectional view of the portions of the device shown in Fig. 2, being taken substantially along line 3—3 of Fig. 2.

As shown in Fig. 1 the device comprises a pair of spaced sound producing units 10 and 11 respectively connected to horn trumpets 12 and 13. Each horn unit comprises a forward and a rearward casing section 14 and 15, respectively, which serve to house a reciprocatory sound creating element 16, the latter being resiliently supported by springs 17, or like means, in such manner that the element 16 will normally be held against valve seats 18 adjacent the openings 19 between the casing interiors and the passages of the trumpets 12 and 13.

In the illustrated embodiment the trumpets are secured in spaced relation at their ends by a bracket cross member 21 disposed medially of their ends, being held by a clamping member 22 which is bolted or otherwise secured, as for example by such means as are indicated at 23, to the member 21. A downwardly turned flange 24 of the member 21 is secured to an upwardly extending flange of a supporting member 25 which may be attached in any desired manner to the vehicle. Another bracket member 26 serves to connect the horns adjacent the sound boxes thereof and preferably comprises a plate secured to a second upwardly turned flange of the supporting member 25, the plate having a pair

of spaced apertures which receive the trumpets being held in fixed relation thereto by abutment with the forward portions of the casing sections 14 and with adjusting nuts 27 which may be threaded to the trumpets. It will be noted that the latter have forwardly extending annular flanges which serve to overlie and conceal threads which may be formed upon the rearward portions of the trumpets.

A conduit 29 extends from any suitable source of fluid pressure into an X fitting 31, one leg of which is attached by suitable means, such as nipples 32, to the sound boxes 10 and 11. The terminal portion of the conduit 29 preferably comprises a discharge nipple 33, which extends partially through the interior 34 of the fitting 31, the interior 34 constituting an induced flow chamber. To the forward leg of the fitting 31 an exhaust conduit 35 is joined which preferably has its inner end 36 of conical form, reducing forwardly in diameter, the forward portions of the conduit 35 likewise being of conical form but expanding forwardly as indicated at 37. It will be noted that the member 35 extends through an aperture disposed substantially centrally of the plate 26 and is held fixed thereto by a nut 38 which clamps the plate against the forwardly extending leg of the fitting 31, the nut 38 functioning in the same manner and preferably being of the same form as the nuts 27. A depending flange 39, formed on the clamp member 22, preferably comprises the mounting means for a bell or dished member 41, which is disposed adjacent the mouth of the member 35.

In operation, the fluid under pressure will pass through the conduit 29 and will be discharged at high velocity from the discharge nipple 33 across the interior of the portion 36 of the conduit 35, which is a part of the induced flow chamber 34. The fluid will exhaust from the mouth of the member 35 into the bell 41 by which it will be directed rearwardly in the direction of the flow of air passing about the device by reason of movement of the vehicle. Fluid in the chamber 34 will be induced by the discharge from the nipple 33 to flow along with it in accordance with the well known principles of Venturi action, so that the fluid in the chamber 34 and the interiors of the sound boxes 10 and 11, which communicate with the chamber 34, will be maintained in a condition of reduced or less-than-atmospheric pressure. When this pressure assumes a level substantially less than that of the atmosphere within the trumpet member 12 and 13, the latter will force the valve members 16 inwardly, against the urge of the resilient members 27, so that they will be displaced from their seats 18. Air will thus pass into the sound box through the opening 19 in the sound box until the pressure in the sound box becomes substantially equalized with that in the trumpets 12 and 13, at which time the resilient members 17 will again become effective to return the valves to their seats.

It will be understood that due to the high velocity of air flow the valves 16 will seat and unseat at extremely high frequencies so that the flow of atmospheric air from the trumpets 12 and 13 into the interiors of the units 10 and 11 will be interrupted at similar high frequencies to create the effect of sound, the sound waves being directed outwardly through the trumpet passages. The passage of air by the device by reason of the forward movement of the vehicle will induce a flow of air from the opening between the bell 41 and the mouth of the conduit 35, this draft being of substantial aid in inducing a flow of fluid from the induced flow chambers 34 and thereby serving to greatly augment the tone intensity of the horns.

It will be noted that the air trumpets are of different lengths, the purpose of this being to provide sound chambers which will oscillate at different frequencies, the trumpets being preferably so related that they will resound in harmony. In order to produce maximum tone intensity and insure harmonious tones of the horns, means comprising spiders 42 may be placed in the sound boxes for abutment with the resilient members 17. The spiders are held in this position by adjusting screws 43 provided with suitable locking means and housing means. By turning the screws 43 different degrees of pressure may be applied to the resilient members thereby causing them to exert varying degrees of pressure against the valves 16 for holding the latter against their seats 18. In this manner it will be understood that the frequency of the valve oscillation may be varied and it is preferred that the adjustment may be such that the frequency of the valve oscillation will be in resonance with the natural vibrational frequency of the sound chambers within the trumpets 12 and 13.

It will be further understood that the herein described embodiment is merely illustrative of the principles of the invention, which may be applied to other devices having different structural characteristics.

What is claimed is:

1. In a fluid pressure operable horn for motor vehicles, a horn unit operable by suction applied to the interior thereof, a source of fluid pressure, Venturi means in communication with the source of fluid pressure and having an induced flow chamber in communication with the interior of the horn unit whereby the pressure at the source may be converted to suction for operating said unit, and means associated with the venturi for causing air passing about the Venturi means by reason of movement of the vehicle to aid

in the inducement of fluid from said induced flow chamber.

2. In a horn, a horn unit operable by fluid pressure maintaining in the interior thereof, a source of fluid pressure, Venturi means having an induced flow chamber in communication with the interior of the horn unit, bracket means, and means supported by the bracket adjacent said Venturi means for causing air passing above the device to induce fluid from the induced flow chamber.

3. In a horn device, a pair of horn units operable by fluid under less-than-atmospheric pressure in the interiors thereof, a Venturi fitting joining said units and having an induced flow chamber in communication with the interior of said units, and a conduit extending from a source of pressure into said Venturi fitting.

4. In combination with a vehicle, a horn device mounted on an exposed portion of the vehicle, said device comprising a horn unit operable by fluid under less-than-atmospheric pressure in the interior thereof, Venturi means having a discharge nozzle in communication with a source of fluid pressure greater-than-atmospheric and having an induced flow chamber in communication with the interior of said horn unit, said Venturi means having a fluid outlet into the atmosphere in a direction opposite to the normal direction of movement of the vehicle, and a bell disposed over said fluid outlet, whereby movement of the vehicle will induce a flow of air from said fluid outlet to aid in the induction of fluid from said induced flow chamber.

5. In a horn unit, a trumpet and a casing having an opening from the interior thereof into the trumpet, a valve resiliently supported in said casing interior for normally restricting fluid passage through the opening, said valve being movable away from the opening when fluid pressure within the casing falls below the fluid pressure within the trumpet, and a passage between said casing interior and a chamber in said unit and means in said chamber connectible to a source of operating pressure for establishing a jet across said chamber to reduce the pressure in the passage and said casing interior to below atmospheric pressure.

6. In a horn apparatus for a moving vehicle, a sound box having an atmospheric opening, resiliently supported valve means in said box normally restricting fluid passage through said opening and movable to open when the fluid pressure in said opening exceeds that in the sound box, a fluid passageway extending from the sound box, and means associated with said fluid passageway, and operable by air passing thereabout by reason of the movement of the vehicle, for withdrawing air from said fluid passageway.

ERWIN C. HORTON.
HENRY HUEBER.