April 18, 1933. H. HUEBER 1,904,759

FLUID PRESSURE HORN

Filed May 25, 1931

Fig. 1

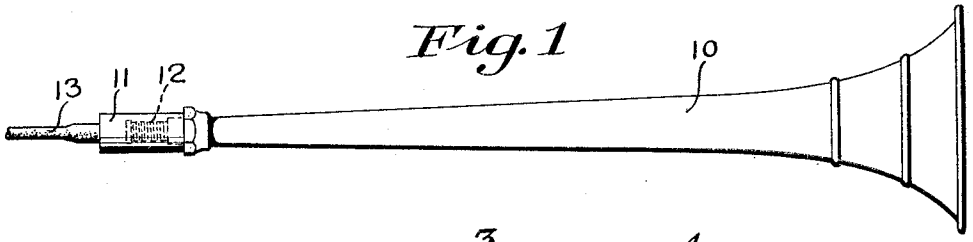


Fig. 2

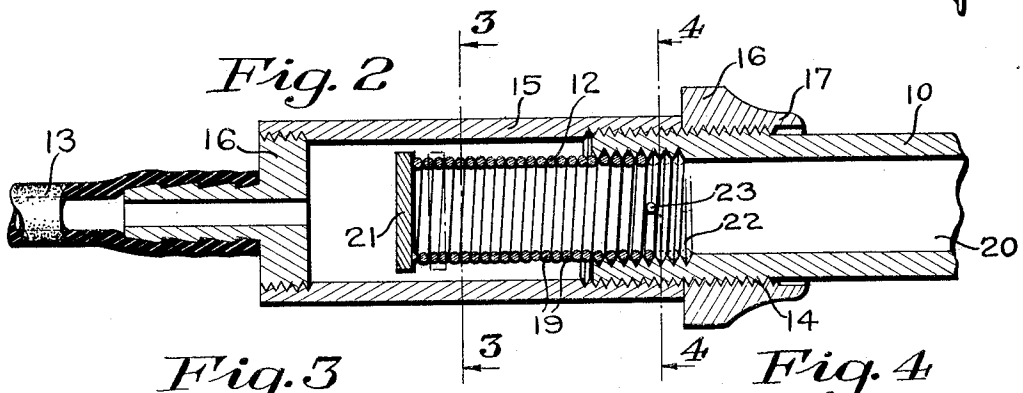


Fig. 3

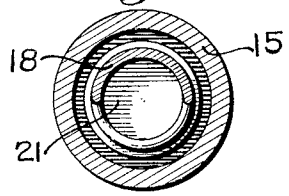


Fig. 4

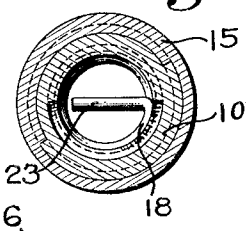


Fig. 5

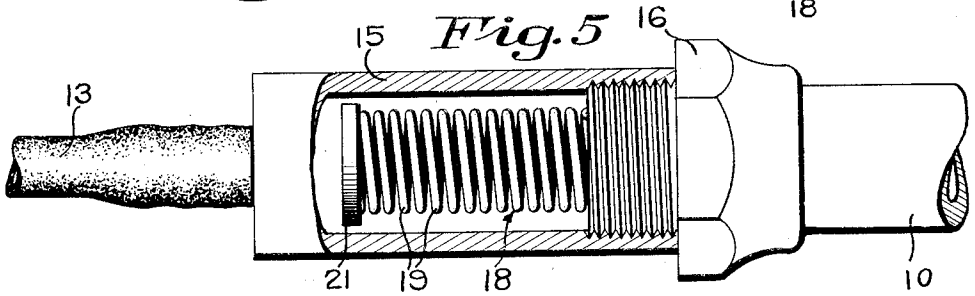


Fig. 8

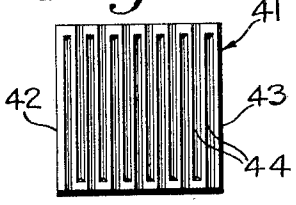


Fig. 9



Fig. 6

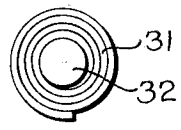
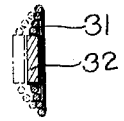


Fig. 7



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UNITED STATES PATENT OFFICE

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FLUID PRESSURE HORN

Application filed May 25, 1931. Serial No. 539,924.

This invention relates to fluid pressure operable horns and particularly to horns in which a flow of fluid through the horn body is periodically interrupted to create the effect of sound.

Heretofore, this interruption of fluid flow has been effected by a valve arranged to seat and unseat at high frequencies under the combined influences of fluid pressure and spring means. The present invention provides a fluid flow interrupter of exceedingly durable and economical construction, comprising a single flexible element having normally contacting parts, which, under the influence of pressure, may be spaced to pass fluid. Means are provided for varying the rate of oscillation or flexure of the interrupter in order that the device may be adjusted to vibrate at the desired frequency, preferably in resonance with the fluid column within the trumpet portion of the horn.

These and other objects and advantages will appear to those skilled in the art from the following description of typical embodiments of the invention, reference being made to the accompanying drawing, wherein:

Fig. 1 is a side elevational view of a horn device constructed in accordance with this invention;

Fig. 2 is a diametral longitudinal sectional view taken through the sound creating portion of the device shown in Fig. 1, the fluid flow interrupter being depicted in closed position;

Figs. 3 and 4 are cross-sectional views taken on lines 3—3 and 4—4 respectively of Fig. 2;

Fig. 5 is an elevational view of the parts shown in Fig. 2, the casing being shown in section, and the fluid flow interrupter being shown in open position with the normally contacting portions thereof spaced;

Figs. 6 and 7 are respectively an elevational view and a diametral cross-section of a modified fluid flow interrupter; and

Figs. 8 and 9 are respectively a front elevation and a bottom elevation of another modified flow interrupter.

In Fig. 1 is shown a horn device operable by suction and comprising a trumpet 10, a sound box 11 containing the fluid flow interrupter 12, and a conduit 13 connecting the interior of the sound box to a suitable source of suction, such as the intake manifold of an internal combustion engine. The inner or reduced end of the trumpet may be male threaded as indicated at 14 for attachment to the forward end of a tubular casing 15 comprising the body of the sound box. A locking nut 16 may be provided, for securing the casing and trumpet and may have a forwardly extending flange 17 for concealing the threads 14.

The fluid flow interrupter 12 as illustrated in Figs. 2, 3, 4 and 5, comprises a coiled spring 18 attached at one end over the opening at the forward end of the casing. Its convolutions 19 are normally in contact and a disk 21 is secured in any suitable manner to its free end to complete the closure between the sound box and the trumpet chamber. In the embodiment illustrated female threads 22 have been formed in the inner end of the trumpet for receiving the attaching end of the spring, the resilience of the latter urging it into tight engagement with the threads and preventing its displacement therefrom.

The extreme outer or attached end portion of the spring may be inwardly bent at 23, as shown in Fig. 4, to provide means for adjusting the spring relative to the trumpet and casing. A forked tool, for example, may be entered through the mouth of the trumpet into engagement with the finger 23 and may be turned to screw the spring further into the trumpet, as into the dotted line position shown in Fig. 2. The spring will normally engage the inner walls of the trumpet with pressure resisting such turning or screw movement, but it will be understood that, if the movement be initially resisted, the spring will become tensed by the turning and its diameter thereby reduced, whereupon turning movement will become free. The same applies to removal of the spring which may be effected by turning the closure 21.

In operation the source of suction will draw fluid through the conduit 13 from the interior of the sound box to decrease the fluid pressure therein. When the pressure falls to a predetermined level below that maintain-

ing in the trumpet chamber, the latter will be sufficient to expand the spring 19, causing its convolutions to separate as shown in Fig. 5 and allowing fluid in the trumpet to pass into the interior of the casing and into the conduit passage. The pressure is the casing interior, now increased by the inflow of fluid, will exert a greater pressure on member 21 and the exterior of the spring, allowing the spring to close by its own resilience until a difference of pressure sufficient to open it again occurs. Due to the high velocity of air flow, the oscillation or periodic opening and closing of the spring will occur at high frequencies, causing the flow of air through the trumpet and into the conduit 13 to be interrupted at similarly high frequencies to create the effect of sound.

By adjusting the spring, varying the extent of its unattached portion, its frequency of oscillation may be varied, and in this manner, and also by design of the parts, the frequency of oscillation may be made to conform with the natural period of oscillation of the air column within the trumpet passage, so that a musical tone of maximum amplitude may be produced.

In Figs. 6 and 7 a modified interrupter is depicted, comprising a helical spring 31 with a central closure or disk 32. It may be secured about its periphery in a sound box or horn, and upon the exertion of a greater fluid pressure on one side than on the other, will flex to the position shown in broken lines in Fig. 7, in which its convolutions are spaced to allow the passage of fluid therebetween.

In Figs. 8 and 9 another interrupter is shown, comprising a single spring member 41 having end portions 42 and 43 for securement to a horn device, connected by a plurality of normally contacting convolutions 44. Upon the application of greater fluid pressure to one side of the member it may flex as indicated in broken lines in Fig. 9 to space its normally contacting convolutions, and when the pressure is removed will return to its normal position, thus adapting it for the frequent interruption of a fluid stream.

It will be understood that the described embodiments are merely illustrative of the principles of the invention, which may be utilized, in devices of other structural forms and operating upon varying degrees of fluid pressure, within the scope of this invention.

What I claim is:

1. In a fluid pressure operable horn, a casing having a fluid inlet passage and a fluid outlet passage, and a sound creating member comprising a resilient member normally closing one of said passages and having a plurality of convolutions normally abutting, said convolutions separating to allow fluid to pass through said casing.

2. In a fluid pressure operable horn, a casing having a fluid inlet passage and a fluid outlet passage, a trumpet secured to the casing in communication with one of said passages, and sound generating means disposed over one of said passages, said means comprising a resilient member having a plurality of convolutions normally abutting, said convolutions being separable by flexure of the member to allow fluid to pass through the casing.

3. In a fluid pressure operable horn, a casing having fluid inlet and outlet openings, a convolute spring secured in one of said openings and normally providing a closure therefor, the convolutions of the spring normally abutting and being separable upon flexure of the spring to allow fluid to pass through the casing.

4. In a fluid pressure operable horn, a casing having fluid inlet and outlet openings, one of said openings being threaded, a coil spring threaded into the threaded opening, a portion of the spring extending beyond the opening having the convolutions thereof normally abutting and the end thereof closed, said spring being flexible upon the application of pressure to one side thereof to space said convolutions thereof to permit of fluid passage through the casing.

5. In a fluid pressure operable horn, a casing having fluid inlet and outlet openings, a coil spring secured to the casing and overlying one of said openings, said spring having the convolutions thereof normally abutting, said spring being flexible upon the application of pressure to one side thereof to space the convolutions to allow fluid passage through said openings, and means for varying the effective length of said spring.

6. In a fluid pressure operable horn, a casing having fluid inlet and outlet openings, one of said openings being threaded, a coil spring threaded into the opening, a portion of the spring extending beyond the opening having the convolutions thereof normally abutting and the end thereof closed, the opposite end of the spring terminating in an inwardly bent portion adapted to be engaged by a tool for adjusting the position of the spring within the threaded opening.

7. In a suction operated horn, a trumpet and a coil spring attached to the inner end thereof, said spring normally having the convolutions thereof in contact and the free end thereof closed, a casing secured to the trumpet about the spring, and a suction line connected to the casing, whereby suction may be induced within the casing to periodically expand the spring to space the convolutions thereof and allow the passage of fluid from the trumpet into the casing.

8. In a fluid pressure operated horn, a fluid passage, a closure means secured to said passage, said means comprising a coiled spring having a portion extending beyond the point of securement to the passage, said portion

having the convolutions thereof normally in contact, and a disk secured to the free end of said portion.

9. In a fluid pressure operated horn, a fluid passage, a flexible element normally forming a closure for said passage, said element having normally contacting parts, said element being flexible upon the application of pressure to one side thereof to space said normally contacting parts.

10. In a fluid pressure operated horn, a trumpet tube and a casing secured to one end thereof, valve means supported by the walls of said tube and extending within the confines of the casing, said valve means being movable axially thereof by fluid pressure to open and close the fluid passage through said passage, and means for inducing a flow of fluid through said passage to effect alternate opening and closing of the valve means and the creation of sound.

11. A pressure actuated valve for a conduit, comprising a resilient member secured to the conduit, said member having a plurality of normally contacting convolutions closing said conduit, whereby upon the application of a predetermined pressure to said convolutions they may be spaced to provide an opening from the conduit and whereby upon removal of pressure the resilience of the member will cause the convolutions to contact to close the opening.

12. In a fluid pressure operated horn having a trumpet and a chamber, a fluid passage connecting the trumpet and chamber, sound producing means normally forming a closure for said passage, said means comprising normally contacting parts, said parts being flexible upon the application of pressure to one side of said means to space the normally contacting parts to allow the passage of fluid therebetween.

13. In a fluid pressure operable horn, a casing having a fluid inlet and a fluid outlet passage, and a sound creating member comprising a resilient member normally restricting fluid movement through one of said passages and having a plurality of convolutions normally so related as to substantially restrict the last mentioned passage, said convolutions separating to allow materially greater fluid movement through said last mentioned passage.

14. In a fluid pressure operable horn, a fluid passage, a flexible element normally forming a closure for said passage to materially restrict the movement of fluid therethrough, said element having parts normally so related as to provide such restriction to fluid movement, said element being flexible upon the application of greater pressure to one side thereof than to the other side thereof to spread said parts to permit of greater fluid movement through said passage.

15. In a fluid pressure operable horn, a fluid passage, an element operable by fluid pressure for periodically restricting movement of fluid through said passage, said element comprising a coiled spring having a plurality of adjacent convolutions and operable by fluid pressure for varying the relative spacing of said convolutions.

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