Oct. 1, 1929. R. M. CRITCHFIELD 1,730,192

SOUND SIGNAL

Filed Nov. 29, 1927

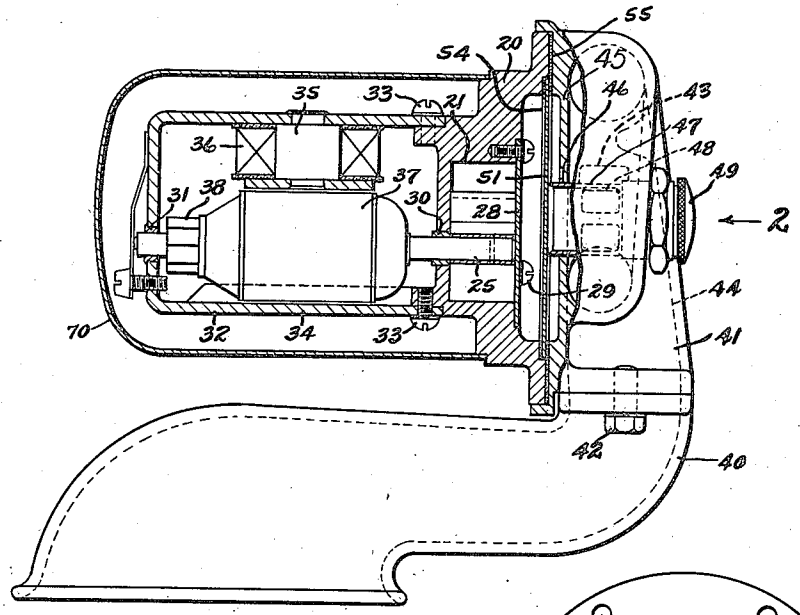


Fig. 1

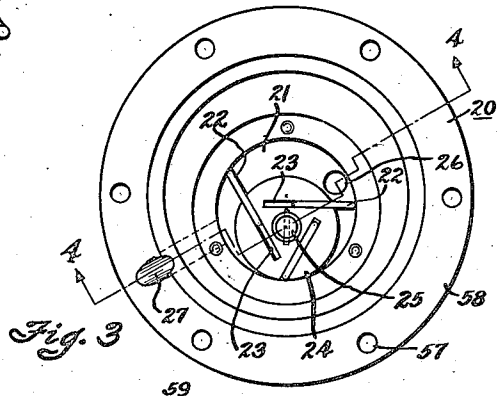


Fig. 3

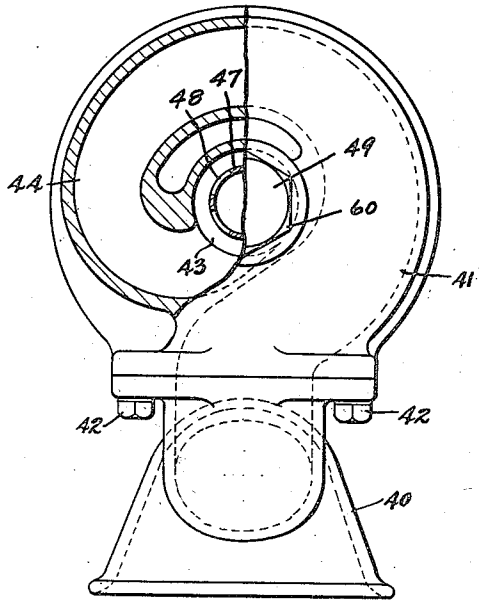


Fig. 2

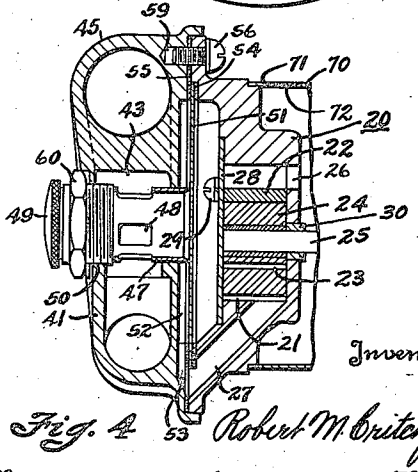


Fig. 4

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UNITED STATES PATENT OFFICE

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SOUND SIGNAL

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This invention relates to sound signals for automotive vehicles and the like and particularly to the type of warning signal in which the body of air within a horn or projector, is maintained in a state of vibration by causing a stream of pressure fluid to be directed intermittently into the mouth of the projector. The intermittent flow of the pressure fluid is controlled by vibratory diaphragm.

One of the objects of the present invention is to provide a unitary structure which comprises a fluid compressor driven by an electric motor, a horn or sound projector and a diaphragm controlled valve for controlling the passage of pressure fluid from the compressor to the sound wave passage of the projector.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a side elevation, partly in longitudinal section, of a unitary structure embodying the present invention;

Fig. 2 is a view looking in the direction of the arrow 2 in Fig. 1, and partly in section to show the spiral formation of the sound projector;

Fig. 3 is an end view of the air compressor, the projector frame and compressor chamber cover having been removed; and

Fig. 4 is a sectional view on the line 4—4 of Fig. 2 and Fig. 3.

The main supporting structure of the unit is the compressor frame 20 which is provided with a recess 21 eccentric to the axis of the frame. The recess 21 provides the compressor impeller chamber which receives a plurality of impeller blades 22 which are slidably guided by slots 23 provided by a disc 24 which is rotatably connected with a motor armature shaft 25. The frame 20 provides an air inlet passage 26 and an air outlet passage 27. The compressor chamber 21 is closed by cover 28 which is secured by screws 29. The armature shaft 25 is journaled in bearings 30 and 31 supported respectively by the frame 20 and by the yoke 32 of a magnetizable motor field frame which is attached to the frame 20 by screws 33. One leg of the field frame is shaped to provide a consequent pole piece 34 and the other leg supports a pole piece 35 surrounded by field windings 36. The shaft 25 supports an armature 37 connected in the usual manner with a commutator 38. By brushes not shown, the field winding 36 is connected in series with the armature 37 so that the motor may operate as a series motor.

The horn or projector is provided by two parts 40 and 41 in order that the projector may be made of castings. These parts are joined by screws 42. It will be noted that the projector part 41 provides a cylindrical sound-wave passage 43 into which fluid under pressure is admitted intermittently. The passage 43 communicates with a spiral sound-wave passage 44 leading into the projector part 40 which may be of any desired shape. The spiral passage 44 provides a sound-wave passage of substantial length within small space limits.

The part 41 is provided with a flat end wall 45 having an opening 46 concentric with the passage 43 and adapted to receive a tubular member 47 provided with side openings 48 and closed at its outer end by a plug 49. The tube 47 is joined to the plug 49 which is screw-threaded through a threaded opening in the outer wall 50 of the part 41. The wall 45 cooperates with a diaphragm 51 to form a fluid pressure chamber 52 which is connected by a passage 53 with the outlet passage 27 of the compressor. The diaphragm 51 is confined between gaskets 54 and 55 and these gaskets, together with the diaphragm, are clamped between the frame 20 and the projector part 41 by screws 56 which pass through plane holes 57 in the flange 58 of the frame 20 and through threaded holes 59 in the part 41.

Air is admitted under pressure to the sound-wave passages 43 and 44 only through the tube 47 which cooperates with the diaphragm 51 after the manner of a valve seat, the inner edge of the sleeve 47 being the valve seat and the diaphragm 51 the valve. When a predetermined fluid-pressure exists in the

chamber 52, due to the operation of the compressor by the electric motor, the diaphragm 51 will be forced away from the sleeve 47 and suddenly the entire area of the diaphragm will be subjected to the fluid-pressure in the chamber 52. Therefore, the pressure in the chamber 52 will be suddenly released and the diaphragm will return to engagement with the sleeve 47 and this cycle of movement of the diaphragm will be repeated as long as sufficient fluid-pressure is being maintained by the pump. The vibration of the diaphragm operates as a valve to open and close communication between the air pump and the sound projector. Therefore the body of air within the projector will be maintained in a state of vibration since the pressure fluid will pass into the projector intermittently or in a rapidly recurring series of puffs, thereby disturbing the surrounding air and producing sound vibrations.

The pitch of the tone produced by the warning signal may be varied by varying the pressure exerted upon the diaphragm normally upon the inner end of the sleeve 47. This pressure is varied by turning the plug 49 in or out of the wall 50 of the projector part 41. A nut 60 is used to secure the plug 49 in an adjusted position.

The motor is enclosed by a drawn sheet metal case 70 attached to the frame 20 and provided with an air inlet hole 71 covered by fine wire gauze 72 in order to exclude dust as much as possible from the interior of the warning signal.

From the foregoing description, it is apparent that the present invention provides a simple and compact structure which may be manufactured economically and which will provide a relatively long horn projector within a relatively small space. The present invention provides also convenient means for adjusting the tone of the horn from the exterior and while the compressor is in operation if desired.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A sound signal comprising, in combination, a frame providing chamber for a rotary fluid compressor mechanism, a projector attached to the frame, a diaphragm clamped at its edges between the projector and frame, the projector having a wall spaced from the diaphragm and cooperating therewith to provide a fluid-pressure chamber, said wall separating the fluid-pressure chamber from the projector sound-wave passage, a passage provided by the frame from the compressor chamber and communicating with the fluid-pressure chamber, and a tube providing a passage from the fluid-pressure chamber to the sound-wave passage of the projector, one end of the tube providing a valve seat normally engaged by the diaphragm.

2. A warning signal according to claim 1 in which the tube has a closed end adjustable through an outer wall of the projector in order to adjust from the exterior the pressure of the diaphragm upon the tube, the tube having side outlets communicating with the sound-wave passage.

3. A warning signal according to claim 1 in which the tube has a closed end threaded through a hole in an outer wall of the projector in order to adjust from the exterior the pressure of the diaphragm upon the tube, the tube having side outlets communicating with the sound-wave passage.

4. A warning signal according to claim 1 in which the sound-wave passage of the projector includes a spiral portion in communication with the tube.

5. A warning signal according to claim 1 in which sound-wave passage of the projector includes an annular portion surrounding the tube and a portion arranged spirally around the cylindrical portion.

6. A sound signal comprising two structural members and a diaphragm clamped between them and providing space on each side of the diaphragm to permit vibration thereof, one of the members having a sound-wave passage separated by a wall from a fluid-pressure chamber located between said wall and the diaphragm, a passage for conducting a pressure-fluid to the fluid pressure chamber, a tube for establishing communication between the chamber and passage and normally engaged at one end by the diaphragm, and means for exteriorly adjusting the tube endwise to vary the pressure exerted by the diaphragm upon the tube.

7. A sound signal according to claim 6, in which the tube has a closed end screw-threaded through an outer wall of the member providing the sound-wave passage, and in which the tube has side outlets communicating with the sound-waves passage.

8. A sound signal device comprising, in combination, an air compressor, a projector, a diaphragm, a chamber provided by said diaphragm between said compressor and projector, and means including the diaphragm adapted intermittently to provide communication between the chamber and the projector.

9. A sound signal comprising, in combination, an air compressor having a frame, a sound projector secured to the compressor frame and having an end wall adjacent the frame, a diaphragm confined between the compressor frame and projector end wall and spaced from the projector end wall to provide a chamber, means connecting the compressor and chamber, and means including the diaphragm for intermittently providing

communication betwen the chamber and projector.

10. A sound signal comprising, in combination, an air compressor having a frame, a sound projector secured to the compressor frame and having an end wall adjacent the frame, a diaphragm confined between the compressor frame and projector end wall and spaced from the projector end wall to provide a chamber, means connecting the compressor and chamber, and a valve adapted to provide intermittent communication between the chamber and projector, the diaphragm forming the movable member of the valve.

11. A sound signal comprising, in combination, an air compressor having a frame, a sound projector secured to the compressor frame and having an end wall adjacent the frame, a diaphragm confined between the compressor frame and projector end wall and spaced from the projector end wall to provide a chamber, means connecting the compressor and chamber, and a tubular member adapted to provide communication between the fluid pressure chamber and the sound projector, said tubular member being normally closed by the diaphragm.

In testimony whereof I hereto affix my signature.

ROBERT M. CRITCHFIELD.