J. J. RICHARDS, JR.

AUTOMOBILE HORN.

APPLICATION FILED AUG. 17, 1911.

1,043,032.

Patented Oct. 29, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

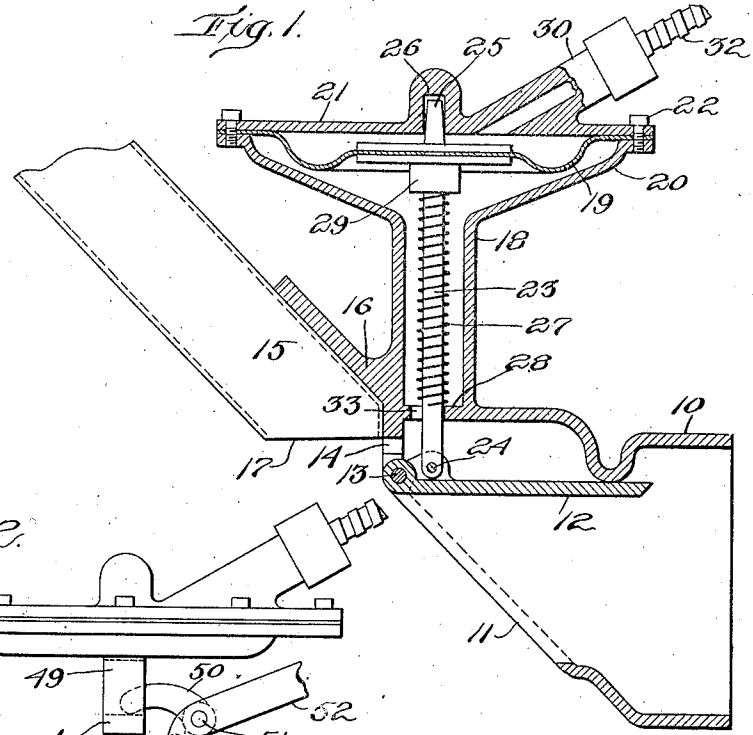

Fig. 2.

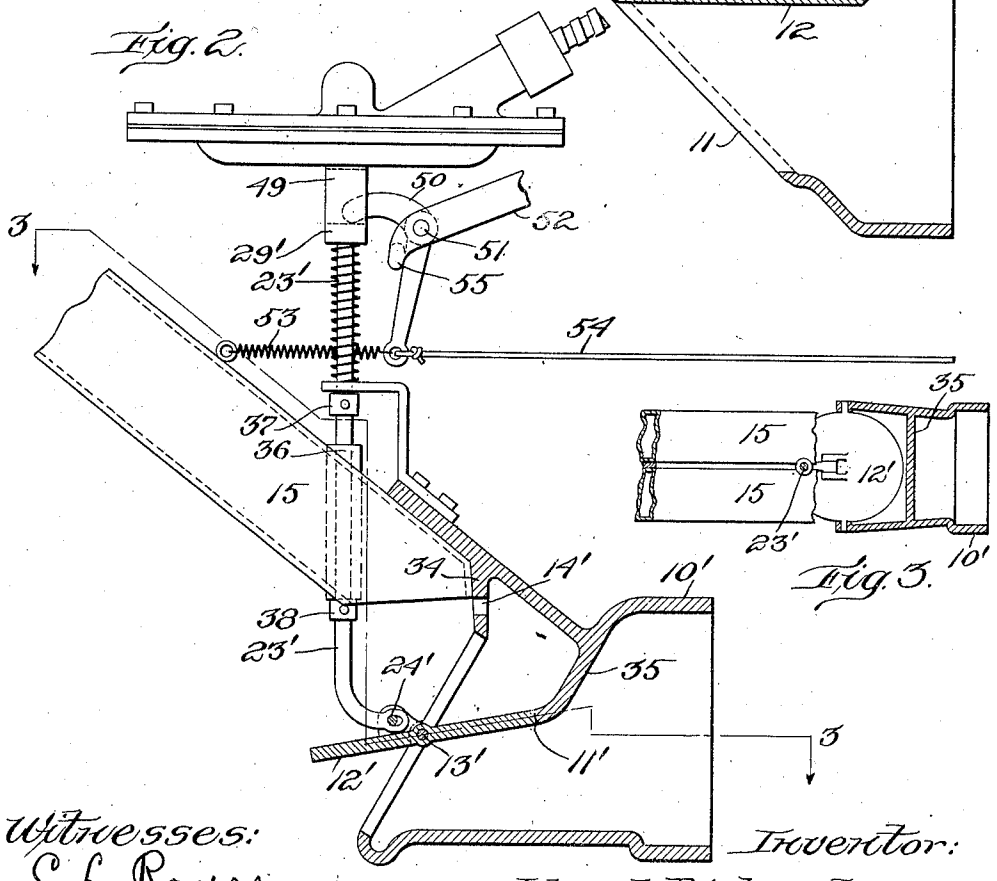

Fig. 3.

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2 SHEETS—SHEET 2.

Fig. 4.

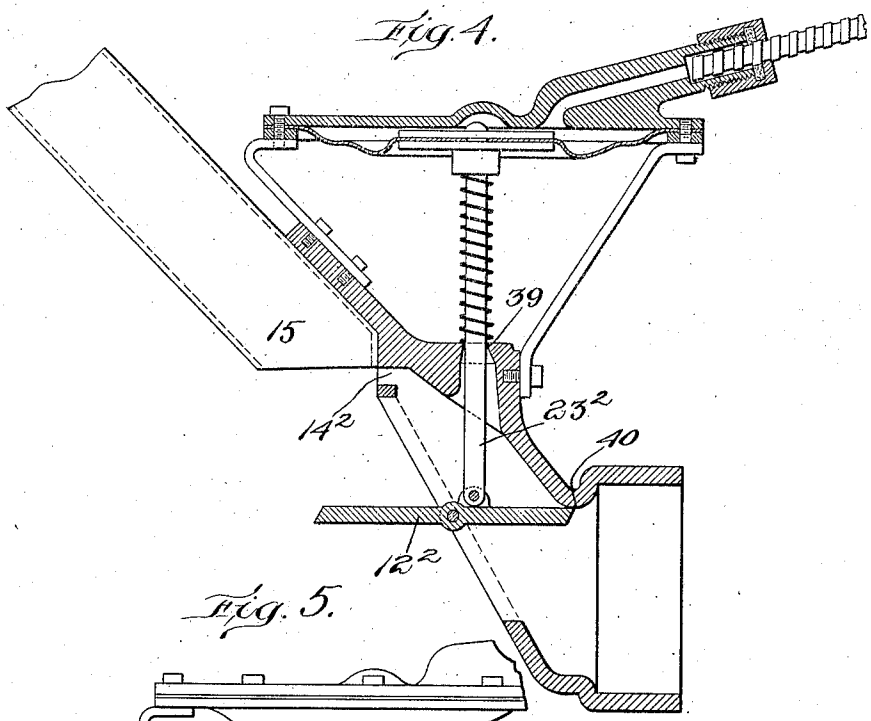
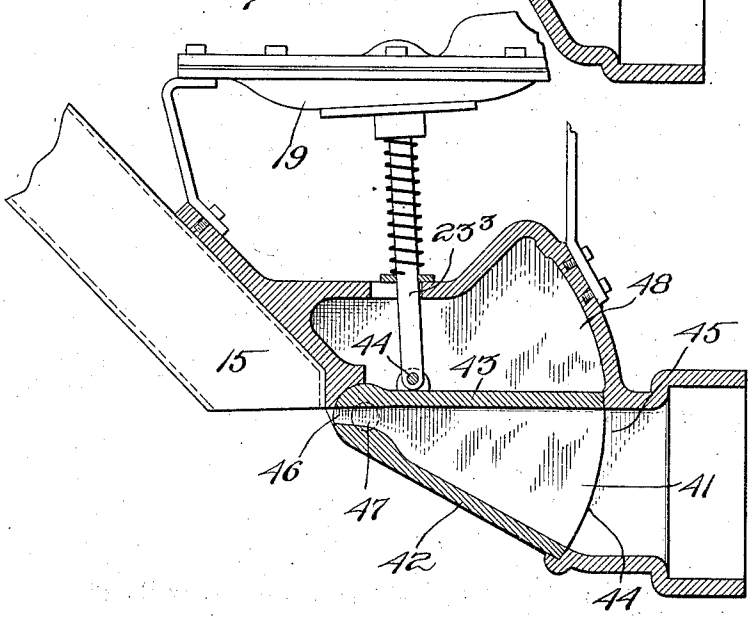


Fig. 5.



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UNITED STATES PATENT OFFICE.

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AUTOMOBILE-HORN.

1,043,032. Specification of Letters Patent. Patented Oct. 29, 1912.

Application filed August 17, 1911. Serial No. 644,614.

To all whom it may concern:

Be it known that I, JOHN J. RICHARDS, Jr., a citizen of the United States, and resident of Brookline, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Automobile-Horns, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to horns of a type, which while having other and more general fields of usefulness is especially designed for use on automobiles, to be operated by the exhaust gas from the engine. Such horns as heretofore constructed have been subject to the objection that the controlling valve mechanism for directing the gas to the horn or diverting it therefrom has either been unduly complicated or when a single valve gate has been employed, the pressure thereupon in horn blowing position being all exerted upon one side of the gate and this pressure being sometimes considerable has required that some little degree of force be used in shifting the gate to divert the gas away from the horn. The amount of force thus required to operate the valve gate has been such as to usually require that this be effected with some little effort by a manual operation and has required that the transmitting connections be somewhat elaborate to transmit the necessary impulse.

The present invention provides a single controlling gate which when moved to one limiting position directs the gas through a restricted aperture to sound the horn while in its other limiting position it diverts the gas away from the horn to a free exhaust. This valve gate is arranged and connected so as to be substantially balanced when withstanding the gaseous pressure in horn sounding position so that it can be moved therefrom to horn mute position with comparatively little effort, the small impulse required to effect this movement being transmitted by a fluid transmitting medium, which may have a simple flexible tube connection from a bulb convenient to the driver's seat.

The invention will be more fully understood from the following detailed description wherein several illustrative embodiments are shown in connection with the accompanying drawings and thereafter pointed out in the appended claims.

Referring to the drawings: Figure 1 is a central vertical section through the operative parts of one form of the device, the sounding chamber being shown in elevation and partly broken away. Fig. 2 is a similar view of another form of the device. Fig. 3 is a horizontal sectional view on line 3—3 of Fig. 2 and Figs. 4 and 5 are central vertical sections showing other illustrative forms of the invention.

Referring to Fig. 1 10 designates a connection at the end of the exhaust gas conduit which may conveniently be attached to the muffler outlet. This connection has a relatively large and substantially axial opening 11 which is controlled by a valve gate 12 swingingly mounted about the axis 13, in this case at one edge of said opening. This conduit connection 10 also has at its upper part a restricted outlet passage 14 through which the gas passes to impinge upon the sounding chamber 15 to sound the horn. This sounding chamber is mounted on a supporting projection 16 shown as integral with the connection 10 with its lower edge 17 in a plane inclined slightly downward, in practice about 4 degrees, below the plane of the aperture 14. The connection 10 has rigid therewith, and shown as integrally formed, an upstanding hollow support 18 for the fluid operating device which is to control the valve gate. The means for transmitting the fluid pressure impulse may be of various forms; I have found that an ordinary flexible diaphragm of fabric, rubber or metal is well suited for the requirements. This diaphragm is clamped to a flared-out portion 20 of the support 18 by means of a cap plate 21 held thereto by screw bolts 22. This diaphragm is connected to operate the valve gate by rod 23 clamped centrally to the diaphragm and pivotally connected to the valve gate near its pivotal axis at 24. The upper end 25 of this rod extends up into a guiding aperture 26 formed in the cap plate 21. A coil spring 27 is mounted on this rod between a ledge 28 extending inward from the bottom of the support 18, and a block 29 fitting against the diaphragm. A suitable fluid pressure connection for the transmis-

sion of fluid to control the valve gate which, in practice is usually compressed air, is shown at 30, illustrated as a part of the cap plate 21 and having usual or suitable connection with a flexible tube 32 which may lead to a compression bulb near the driver's seat.

It may now be understood that as the valve gate 12 is moved from the position shown, to close the exhaust opening 11 and direct the gas outlet to the relatively small aperture 14 for horn sounding the back pressure of gas thus created will pass up through the opening 33 by the side of the stem 23 to fill the chamber formed in the hollow support 18 below the diaphragm and as there is no outlet for the gas in this direction the pressure therein becomes substantially equal to that against the gate 12. The diaphragm 19 is made of a size so that the area exposed to the gas pressure formed underneath is approximately similar to the area of the valve gate 12 upon which the gas is pressing.

In practice the diaphragm may be made of a slightly greater area for the reason that the pressure thereupon is what may be termed a dead pressure whereas that upon the valve gate 12 has added to such dead pressure the impact or momentum of the moving gas. The diaphragm 19 and the valve gate 12 being thus proportioned so that the outward pressure upon the valve gate is substantially balanced by the upward pressure on the diaphragm, it is evident that the valve gate may be moved in either direction by an impulse only sufficient to overcome the inertia and friction of the parts. Thus the spring 27 need only be made strong enough so as to lift the valve and diaphragm when the air pressure above is relieved so as to hold the valve gate normally elevated as shown, and the air pressure required to operate the gate need be only enough to overcome this relatively light spring and the inertia of the parts. The inwardly extending ledge 28 which restricts the gas opening into the chamber of the support 18 has a special function in addition to guiding the rod 23 in that it throttles the gas inlet so that the relatively small amount of gas which can enter therethrough into the relatively large chamber under the diaphragm, does not heat this chamber and the dead gas therein enough so as to have deleterious effects on the diaphragm or other parts. The operation of the device is at once evident from the showing, the valve gate 12 in the position shown preventing the passage of gas through the aperture 14 and directing it out through the free exhaust 11. As the diaphragm is pressed down by the air or other fluid pressure from above the valve gate 12 is moved through a relatively small angle, in practice about 45 degrees, to its seat closing the exhaust 11 and affording an oblique baffle to divert the gas through the aperture 14 to sound the horn, this continuing until the air pressure above the diaphragm is relieved when the spring 27 will again raise the valve gate to the horn mute position shown.

In developing the combination whereby the valve gate and its operating connections are substantially balanced so as to be operable by a relatively small fluid pressure impulse, instead of having the valve gate balanced by gaseous pressure under the diaphragm, the valve gate itself may be so formed and mounted as to be of itself balanced against the gas pressure and thus free to move under a small impulse from the fluid transmitting connection. Such an embodiment is shown in different illustrative forms in Figs. 2 to 5.

Referring to Figs. 2 and 3 the gas conduit connection 10′ has its free endwise exhaust 11′, the restricted horn blowing aperture 14′ and the sounding chamber 15 arranged similarly to the form just described except that the exhaust outlet 11′ has the walls forming its peripheral outline extending obliquely in the opposite direction. In this form the valve gate 12′ is pivoted at an approximately central point 13′ and is adapted to swing through a relatively small angle, in practice about 50 degrees, from a position, wherein it closes the free exhaust 11′ and abuts against the inwardly extendingly abutment 34, in which the horn sounding aperture 14′ is formed, to its other limiting position as shown wherein it abuts against another inwardly extending abutment 35 to close the outlet for sounding the horn and direct the gas through the free exhaust 11′. The operating rod 23′ in this form is pivotally connected to the gate near its axis as seen at 24′ similarly to the first described form and, as shown, is bent outward therefrom to extend upward through a guiding tube 36 which may be fitted in the dividing plate of the sounding chamber as seen in Fig. 3. Suitable stops 37, 38 may be fixed to the rod 23′ properly spaced apart relative to the guide tube 36 so that in conjunction therewith they determine the two limiting positions of the valve gate. The operating diaphragm in this form may be in all respects similar to that just described, but as there is no occasion for the gas pressure to be exerted underneath the same, the chamber 20′ may be supported by suitable straps or otherwise. It may be now understood that with the gate 12′ in the position as shown in Fig. 2 the areas exposed to gaseous pressure at either side of the axis 13′ are substantially similar so that it may be operated by a small impulse, and the rod 23′ being pivoted close to the axis in connection with the small angular movement of the

gate makes only a small movement of the diaphragm necessary.

The form shown in Fig. 4 is substantially similar to that of Figs. 2 and 3 except that the walls of the opening controlled by the swinging gate 12^2 slope in the opposite direction *i. e.* in general alinement with the horn 15 instead of transversely thereof. In this form the rod 23^2 connecting the gate with the diaphragm is shown as extending up through and being guided in an aperture 39 opening from within the gas chamber so that this rod has a close sliding fit through such aperture. The valve gate in this form has its inner edge abutting at 40 against a side of the conduit connection which constitutes a stop therefor in horn mute position as shown and when in horn sounding position the gate presents an oblique surface directing the gas to the sounding aperture 14^2. In this form as in that of Figs. 2 and 3 the area of the gate, at the lower side of its axis against which more of the live impacts of the gas are exerted, may be slightly smaller than that of the other side which is only balanced by the dead pressure or with less of the impact, so that the gate is more exactly balanced than would be the case if only the dead pressure were taken into consideration.

In Fig. 5 the gate 41 instead of being a flat plate is formed with two wings 42, 43 which converge from a relatively wide opening 44 to register with the conduit connection passage 45, to the restricted horn sounding aperture 46. In the position shown the gas is directed from the conduit opening 45 through the converging chamber thus formed to the sounding aperture 46 and as the internal areas of the two plates 42, 43 are similar it is evident that the valve is balanced so as to be movable with a slight fluid pressure impulse from the diaphragm connecting rod 23^3 in like manner as in the other forms, this rod being pivotally connected to the upper plate at 44 quite near the pivotal axis 47 at the converging end of the valve about which it swings. As the gate thus formed is moved from the horn sounding position up within the protecting pocket 48 formed therefor in the conduit casing, the sounding aperture 46 is swung away from the sounding chamber and the gas connection thereto finally closed, the outer side of the plate 42 then forming a continuation of the free exhaust opening to divert the gas away from the sounding chamber. It is sometimes desirable to provide means whereby a horn may be operated by the foot or hand through mechanical connections at option, and associated with the form in Fig. 2 I have shown a manual connection with the diaphragm stem whereby this is conveniently effected. In this case the block abutment 29′ on the stem below the diaphragm is recessed out as seen at 49 and in this recess the end of an angular lever 50 works with some little lost motion. This angular lever is pivoted at 51 to a fixed support arm 52 and its other end has connected thereto a stout spring 53 operating in a direction tending to raise the end of the lever in recess 49 upward. A cable or other connection 54 is also attached to the outer end of the lever 50 arranged to pull the lever in a direction to overcome the spring 53 and force the diaphragm stem with the valve gate downward to operate the horn. A stop 55 on the fixed arm 52 limits the movement of the lever 50 by the spring 53 so that the inner end of this lever remains some little distance below the top of the recess 49, thus permitting the diaphram to operate within its limits of movement without moving the lever 50. Thus by virtue of this lost motion between the inner end of the lever 50 and the block 29′ in connection with the spring 53 it is evident that the fluid pressure connection to the diaphragm may operate the same without having to move the manual connections while the manual connections are held in position to be used when desired.

In each of the forms shown the single controlling gate which in one position directs the gas to the sounding chamber and in the other diverts it to a free exhaust is substantially balanced when resisting the gas pressure in horn sounding position so as to be movable with certainty by a relatively small impulse from the compression bulb in the hands of the operator; *i. e.*, the operative pressure required need be only enough to overcome the friction of the parts and the relatively light spring which is required to return the gate to horn mute position. I consider the special combination of the fluid pressure impulse transmitting means with the balanced gas controlling gate to be of special importance for the reason that such a transmission effects a flexible and elastic yet quick and certain operation of the gate so that the objectionable combination of sounds often produced by the uncertain movement of the valve in opening and closing with a direct hand operation or mechanical operating device is avoided or minimized.

While each of the several forms of the invention has certain distinctive advantages it may be especially pointed out as to that shown in Figs. 2 and 3 that the tendency of the momentum or impact movement of the gas accelerates the opening of the valve after this has been started by the diaphram thereby further avoiding the humming and whirring sounds often heard at the instant of opening. Further, in this form the operating rod 23′ has no close friction bearing being entirely outside in the atmosphere

and not having to extend into the gas pressure chamber so that the frictional resistance is thereby considerably reduced.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A device of the kind described, comprising a sounding chamber, a gas conduit leading thereto, having a relatively small aperture for horn sounding and a separate relatively free exhaust opening, a gate pivoted to swing to one position to direct gas through said relatively small aperture to sound the horn, and to another position to divert the gas through said separate relatively free exhaust opening, said parts being arranged for said gate to exercise said controlling action by a swing through materially less than a right angle, and fluid pressure operating means connected to said gate near the axis thereof by a link having a substantially right line movement, said gate with its operating connections having similar opposed areas exposed to like gas pressure when in horn sounding position, so as to be substantially balanced.

2. A device of the kind described, comprising a sounding chamber, a gas conduit leading thereto having a relatively small aperture for horn sounding and a separate relatively free exhaust opening, and a pivoted gate arranged to direct gas through said relatively small aperture to sound the horn in one position, and to divert the gas through said relatively free separate exhaust in another position, said parts being arranged for said gate to exercise said controlling action by a swing through materially less than a right angle, said gate having operating connections with fluid pressure controlling means, said connections operating with a substantially right line movement and having provision exerting a yielding force capable of being overcome by said fluid pressure controlling means to keep the gate normally in horn mute position, and said gate with its operating connections having similar opposed areas exposed to like gaseous pressure when in horn sounding position.

3. A device of the kind described, comprising a sounding chamber, a gas conduit leading thereto, having a relatively small aperture for horn sounding and a separate relatively free exhaust opening, a pivoted gate arranged to form a part of the walls of said conduit, and to direct gas to the sounding chamber and divert it therefrom in two limiting positions respectively, said gate having operating mechanism consisting of a diaphragm with fluid pressure controlling connections, a link connected to said gate near its axis and engaged for substantially right line movement by said diaphragm, said operating mechanism and gate being arranged to present similar opposing areas to the operating gaseous pressure when in horn sounding position so that a relatively small fluid pressure impulse may control the same.

4. A device of the kind described, comprising a sounding chamber, a gas conduit leading thereto having a relatively small aperture for horn sounding and a separate relatively free exhaust opening, a pivoted gate arranged to form a part of the walls of said conduit, and to direct gas to the sounding chamber and divert it therefrom in two limiting positions respectively, said gate having substantially equal areas exposed to pressure at each side of its pivot, a diaphragm having fluid pressure controlling means connected to said gate, such connection consisting in a link having substantially right line movement and pivoted near the axis of the gate and means exerting a yielding force capable of being overcome by said fluid pressure controlling means for normally holding the gate in horn mute position with the gas diverted from the sounding chamber.

5. A device of the kind described, comprising a sounding chamber, a gas conduit leading thereto having a relatively small aperture for horn sounding and a separate relatively free exhaust opening, a gate pivoted to swing to one position to direct gas through said relatively small aperture to sound the horn and to another position to divert the gas through said separate relatively free exhaust opening, said gate having substantially similar areas exposed to pressure on each side of its pivot when in horn sounding position, and operating means for said gate, said conduit having relatively thin portions extending out in the direction of the gate to meet and fit its peripheral edges in a limiting position thereof and cooperating therewith to control the fluid pressure passage whereby relatively small surfaces of the gate and the conduit are opposed as the gate is closed.

6. A device of the kind described, comprising a sounding chamber, a gas conduit leading thereto having a relatively small aperture for horn sounding and a separate relatively free exhaust opening, a gate pivoted to swing to one position to direct gas through said relatively small aperture to sound the horn and to another position to divert the gas through said separate relatively free exhaust opening, said gate having substantially similar areas exposed to pressure on each side of its pivot when in horn sounding position, and operating means for said gate comprising a diaphragm having fluid pressure connections for controlling the same, said conduit having inwardly projecting relatively thin ribs meeting and fitting the peripheral edges of the

gate in a limiting position thereof, extending then in the direction of the faces of the gate to coöperate therewith for controlling the conduit, with relatively small areas of abutting and relatively movable surfaces whereby obstruction of the gate from soot and other matter is obviated.

7. A device of the kind described, comprising a sounding chamber, a gas conduit leading thereto having a relatively small aperture for horn sounding and a separate relatively free exhaust opening, a gate pivoted to swing to one position to direct gas through said relatively small aperture to sound the horn and to another position to divert the gas through said separate relatively free exhaust opening, said gate having substantially similar areas exposed to pressure on each side of its pivot when in horn sounding position, and operating means for said gate comprising a diaphragm, a connecting rod from said diaphragm to the gate, said rod being connected to the gate adjacent its pivot with the parts so arranged that said rod extends wholly outside the pressure chamber, fluid pressure connections for controlling the diaphragm, and means for holding said gate normally in horn mute position.

8. A device of the kind described, comprising a sounding chamber, a gas conduit leading thereto having a relatively small aperture for horn sounding and a separate relatively free exhaust opening, a gate pivoted to swing to one position to direct gas through said relatively small aperture to sound the horn and to another position to divert the gas through said separate relatively free exhaust opening, said gate having opposed areas at each side of its pivot exposed to gas pressure and portions exposed to gas impacts, there being a slightly smaller area of the gate on the side of its pivot exposed to such gas impacts, and operating means for said gate having a fluid pressure connection.

9. A device of the kind described, comprising a sounding chamber, a gas conduit leading thereto having a relatively small aperture for horn sounding and a separate relatively free exhaust opening, a gate pivoted to swing to one position to direct gas through said relatively small aperture to sound the horn and to another position to divert the gas through said separate relatively free exhaust opening, said gate having opposed areas at each side of its pivot exposed to gas pressure, and operating means for said gate comprising fluid pressure controlling connections, yielding means for holding the gate normally in horn mute position and other connections for controlling the gate manually at will, said connections having a lost motion attachment arranged so as to be unmoved by the operation of the fluid pressure control.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN J. RICHARDS, JR.

Witnesses:
CLYDE L. ROGERS,
EDWARD MAXWELL.