June 6, 1933. F. G. SCHWEISTHAL 1,912,659

MECHANICAL FUEL PUMP

Original Filed Dec. 21, 1931 3 Sheets-Sheet 1

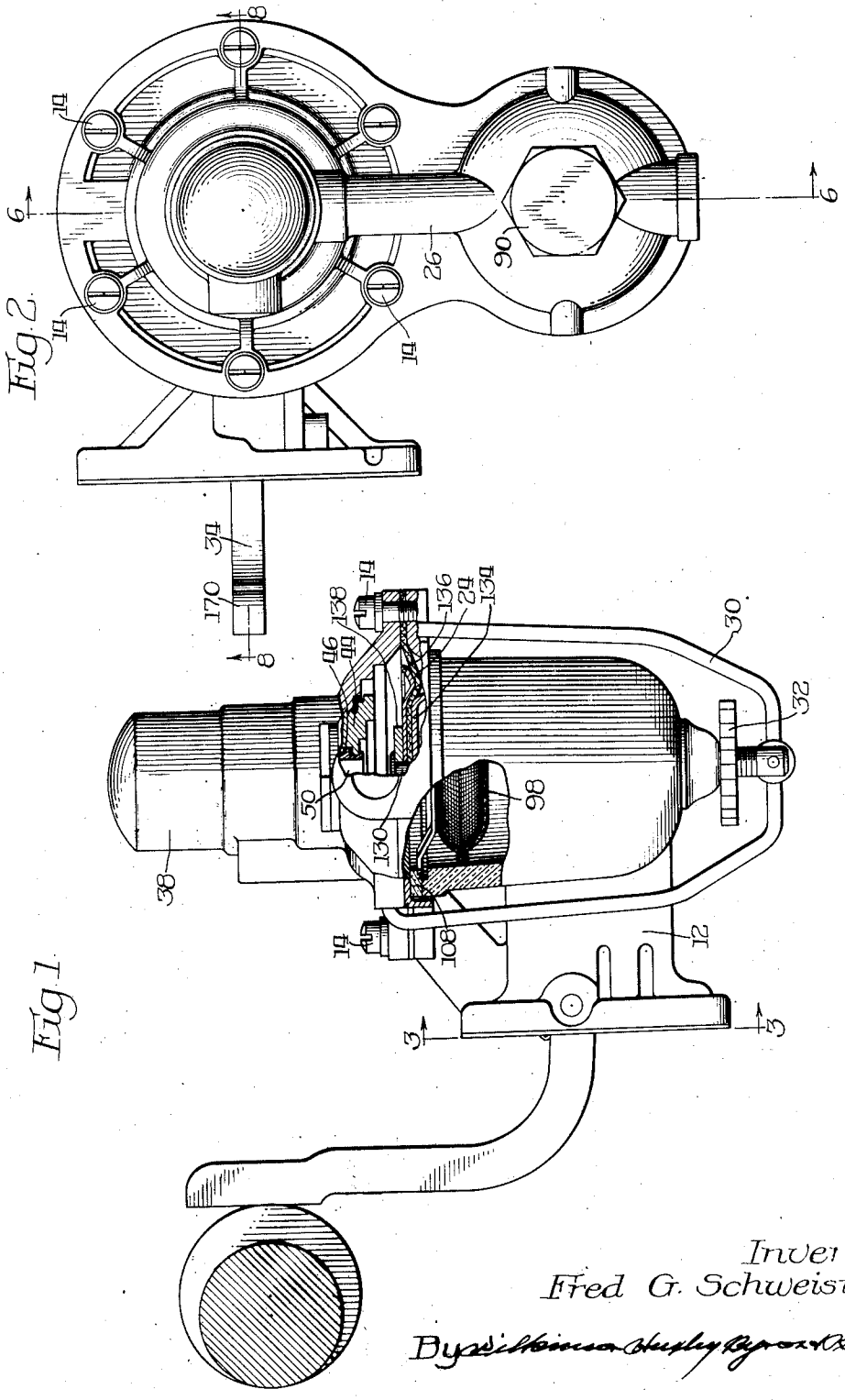


Fig. 2.

Fig. 1.

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Original Filed Dec. 21, 1931 3 Sheets-Sheet 2

Fig. 3

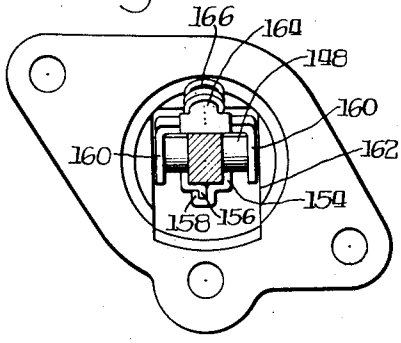


Fig. 5

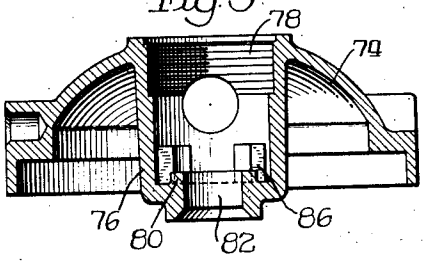


Fig. 4.

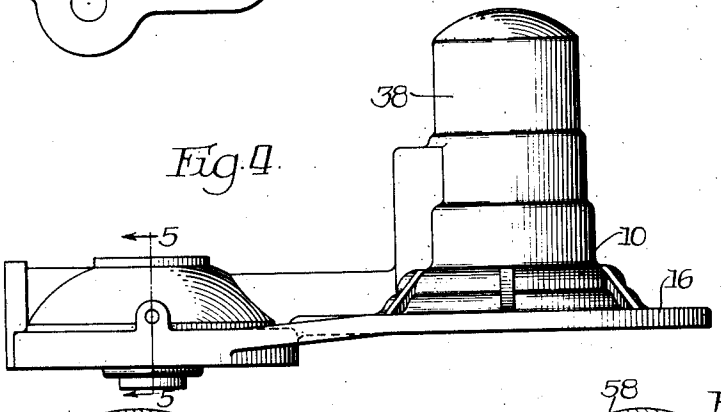


Fig. 6.

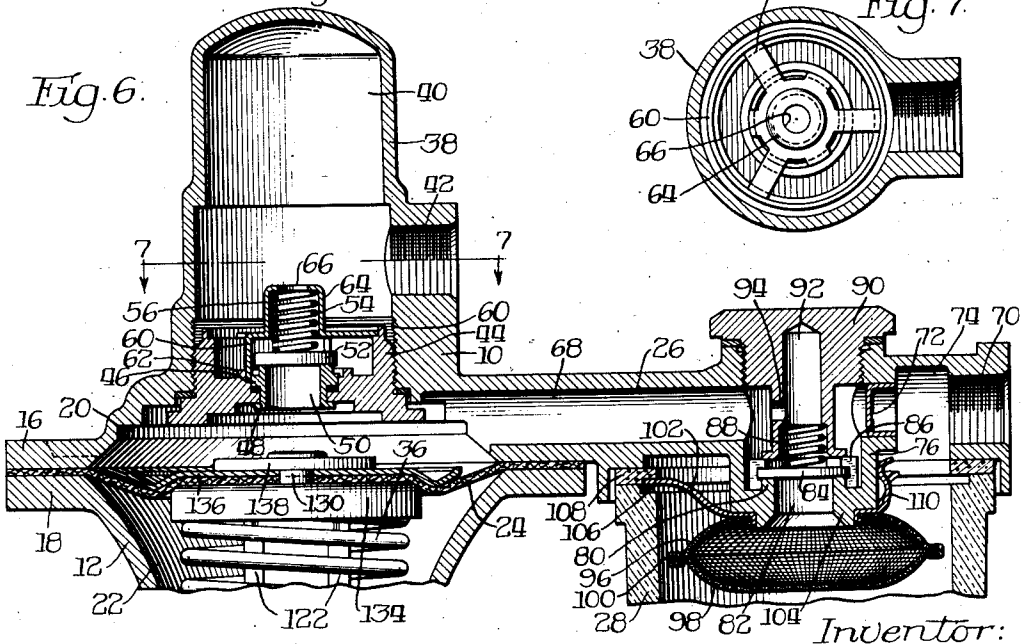


Fig. 7

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June 6, 1933. F. G. SCHWEISTHAL 1,912,659

MECHANICAL FUEL PUMP

Original Filed Dec. 21, 1931 3 Sheets-Sheet 3

Fig. 8

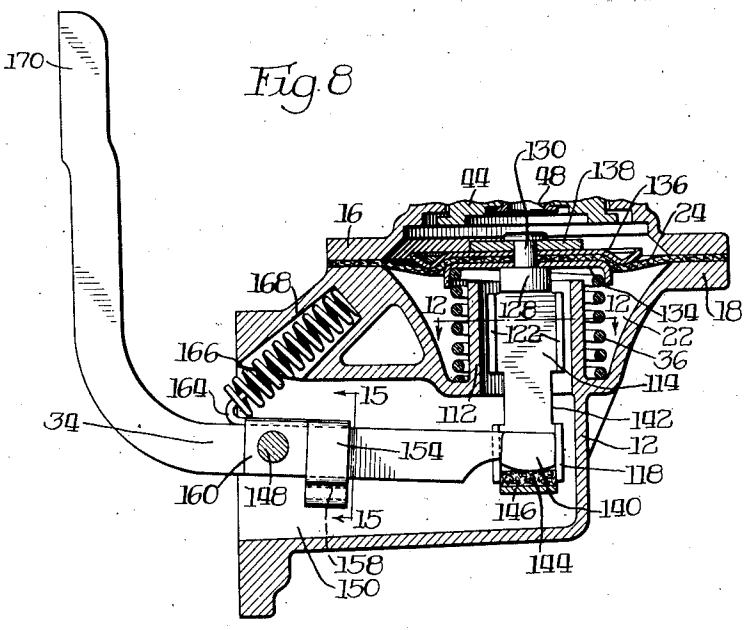


Fig. 10

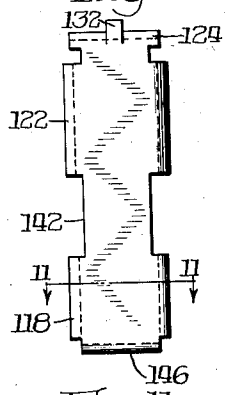


Fig. 11

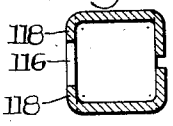


Fig. 9

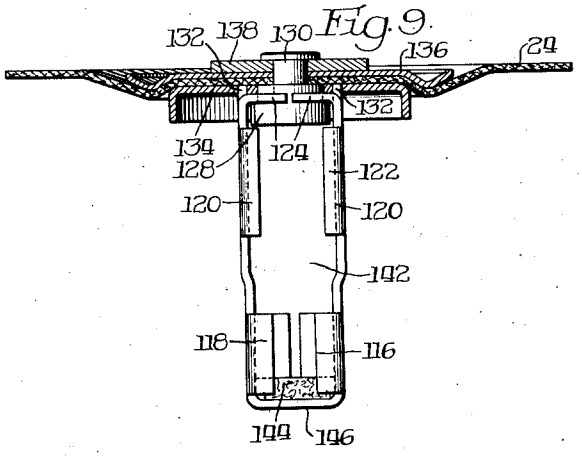


Fig. 12

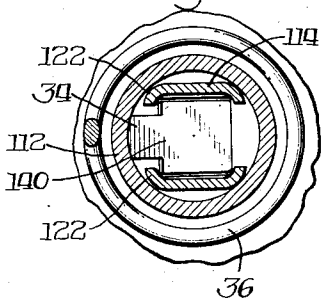


Fig. 13

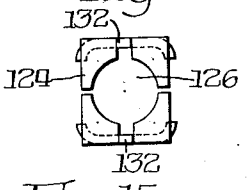


Fig. 14

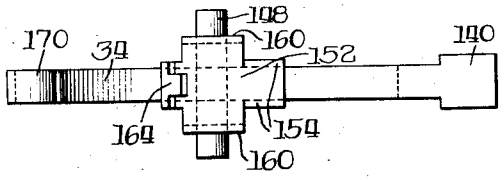
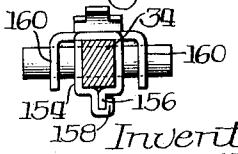


Fig. 15



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UNITED STATES PATENT OFFICE

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MECHANICAL FUEL PUMP

Original application filed December 21, 1931, Serial No. 582,226. Divided and this application filed August 8, 1932. Serial No. 627,937.

This invention relates to improvements in fuel pumps of the mechanical type in which the pumping diaphragm may have a variable discharge stroke in accordance with the delivery pressure, that is, as the delivery pressure in the pumping chamber becomes sufficiently high to resist the discharge stroke under the influence of the discharge spring beneath the pumping diaphragm, the full delivery or discharge stroke of the diaphragm will be prevented. Pumps of this general type are well known and the present improvements relate to certain details of the construction.

This application is a division of my application, Serial No. 582,226, filed December 21, 1931, and the claims of the present application are directed to the actuating means.

It is one object of the present invention to provide a simplified construction of the cam-actuated lever and to provide a stamped member or clip for pivotally supporting the lever upon the pivot pin carried by the pump casing. The stamped clip is clamped around the lever at its fulcrum point and is of a width to fit across the cavity at the flanged end of the fuel pump casing whereby the lever is centered with respect thereto. The stamped member or clip is further provided with an angular upwardly directed lug for engaging one end of the follower spring which maintains the lever in engagement with the actuating cam.

It is further an object of the present invention to provide a simplified and improved construction of the pick-up member which is secured to the lower plate or disk of the pumping diaphragm and depends axially therefrom. The pick-up member is in the form of a stamping provided at its lower end with a box-like formation having a slot for the passage of the lever body and allowing the lost motion of the lever with respect to the pick-up member. The end of the lever is adapted to engage a cushioning abutment carried at the bottom of the pick-up member.

Further and additional features and advantages of the present improvements will be more readily apparent from the following description taken in connection with the attached drawings, in which

Figure 1 is a side elevation partially in broken section of the fuel pump;

Figure 2 is a plan view of the fuel pump;

Figure 3 is a vertical section taken on the plane indicated 3—3 in Figure 1;

Figure 4 is a side view of the top part of the pump casing;

Figure 5 is a transverse section taken on the plane indicated 5—5 in Figure 4;

Figure 6 is a longitudinal vertical section taken on the plane indicated 6—6 in Figure 2;

Figure 7 is a detail horizontal section taken on the plane indicated 7—7 in Figure 6;

Figure 8 is a partial vertical section on the plane indicated 8—8 in Figure 2;

Figure 9 is a detail view showing the pick-up stem in side elevation and the diaphragm in section;

Figure 10 is another side elevation of the pick-up stem;

Figure 11 is a detail section taken on the plane indicated 11—11 in Figure 10;

Figure 12 is a detail horizontal section showing the manner in which the pick-up stem is guided by the pump casing;

Figure 13 is a top view of the pick-up stem;

Figure 14 is a detail plan view of the lever assembly, and

Figure 15 is a detail vertical section of the lever supporting means.

In general the pump construction corresponds to present commercial designs and includes a pump casing made up of a top casing part 10 and a bottom casing part 12. The pair of casing parts are clamped together by a series of bolts 14 and the marginal flanges 16 of the upper casing part and 18 of the lower casing part surround recessed portions 20 in the upper casing part and 22

in the lower casing part, there being a flexible pumping diaphragm 24 clamped at its marginal edge between the pair of pump casing parts. The top casing part 10 has a lateral extension 26 in the usual manner adapted to have removably secured thereto, on its bottom side, a transparent bowl 28 held in place by the swinging yoke 30 and clamping nut 32. The diaphragm is operated in the usual manner by a lever 34 which is adapted to extend into the engine casing for cam actuation. The pump is of a type in which the discharge stroke is variable and produced by the force of a compression spring 36, positioned in the recessed portion 22 of the lower casing part 12 and reacting upwardly upon the pumping diaphragm. The lever imparts a positive suction stroke to the diaphragm.

The design of the upper casing part 10 is an improvement over prior constructions in that it includes an integrally cast vapor dome chamber 38, the axis of which is concentric with the pumping diaphragm. The threaded outlet connection from the chamber 40 of the dome is shown at 42. In this construction it is necessary to assemble the outlet check valve from the lower side of the pump casing part 10, and I have shown a plug 44 which supports the outlet valve assembly and which is threaded into the casing part 10 from the lower side. The plug 44 carries a valve seat member 46, assembled from the upper side of the plug 44 and having a beaded lower edge 48 for securing the valve seat member in place. The valve seat member has a central passage 50 in communication with the recessed portion 20 which constitutes the pumping chamber. An outlet check valve 52 seats downwardly upon the valve seat member 46 and is normally pressed to seated position by a spring 54 positioned and held in place by a stamped supporting member 56. The stamped member 56 is in the form of a spider, as shown in Figure 7, and has a plurality of arms 58 held in place by the rim 60 of the plug 44. The spider includes additional arms 60 bent downwards to engage an upwardly directed shoulder 62 of the plug 44. The stamped spider also includes a cylindrical portion 64 for receiving and positioning the spring, having an opening 66 at its upper side to permit escape of the fuel therefrom. It will therefore be understood that upon the discharge stroke of the pumping member, the fuel will be forced upwardly past the check valve 52 and through the stamped spider 56 and into the vapor dome chamber 40 from which liquid fuel will flow through the outlet connection and fuel vapor will be trapped in the dome to maintain a constant pressure on the fuel delivered.

The casing part 10 has a horizontal fuel passage 68 through which the fuel flows into the pumping chamber 20. The passage 68 is in line with the threaded inner connection 70 and the straight bore through the casing part 10 is closed by the plug 72, whereby the fuel is caused to flow downwardly and upwardly around the plug 72. The threaded inlet connection 70 communicates with a recessed chamber 74 on the lower side of the casing extension 26, as clearly shown in Figures 5 and 6.

The casing extension 26 has an integrally cast valve housing portion 76, as shown in Figure 5, which has an internally threaded portion 78 and a valve seat portion 80. The valve seat portion 80 has a vertical flow passage 82. The inlet check valve 84 is assembled through the upper open end of the housing portion 76 and is centrally positioned by integral lugs 86 which permit and guide the vertical movement of the valve 84. The valve 84 is pressed to its normal seated position by a spring 88, held in place and positioned by a plug 90 which is threaded into the housing 76. The plug 90 has a vertical bore 92 in communication with the passage 68 through an opening 94, whereby the fuel may flow into the passage 68 around the plug 90 or through the spring 88. It will be noted that the axis of the valve assembly is concentric with the fuel bowl 28 which constitutes a fuel receiving and trapping chamber.

Filtering means are provided to filter the fuel as it flows upward towards the inlet check valve 84 and comprise a pair of biscuit-shaped filter screen members 96 and 98 clamped together at their marginal portions as at 100 and supported by a stamped spider member 102, which is positioned centrally by a depending shoulder 104 of the housing 76. The spider has arms 106 extending for clamping by the shoulder of the bowl against the gasket 108 which seals the fuel bowl 28 to the extension 26 and the spider 102 includes spring arms 110 which engage the outer walls of the housing portion 76. It will be understood that the recessed chamber 74 or dome tends to maintain a partial vacuum therein during operation which assists in maintaining an even flow of fuel from the source of supply to the pump casing.

The lower casing part has an upstanding cylindrical portion 112 which is surrounded by the discharge spring 36. The cylindrical portion 112 forms a guide bearing for a substantially square-shaped in section pick-up member or diaphragm stem 114, as clearly shown in Figure 12. The pick-up member 114 is of novel construction and is shown in the detail views of Figures 9, 10, 11, 12 and 13 and comprises a metal stamping provided at its lower end with a box-like formation having a slot 116 between the inwardly directed flanges 118. The stamping 114 may be initially formed flat and bent to the shape shown and includes side members 120 and

curved flanges 122 for guiding the reciprocable movement of the pick-up member. The upper ends of the side member 120 have inwardly directed flanges 124, defining a central circular opening 126 whereby the flanges or fingers 124 engage the shoulder portion 128 of a rivet member 130 which serves to clamp the pick-up member to the diaphragm 24. For additionally securing the pick-up member, vertically directed fingers 132 are provided which engage openings of the cup-shaped disk member 134 which is clamped to the bottom side of the diaphragm. A metal disk 136 formed to take up the slack of the diaphragm is clamped to the upper side thereof and a washer 138 serves to further strengthen the central portion of the pumping member. The box-like formation at the bottom of the pick-up member is intended to receive the enlarged head 140 of the operating lever which may be introduced through the enlarged opening 142 at the mid-portion of the pick-up member. The enlarged head 140 is adapted to engage a cushion abutment 144 seating in the bottom of the box-like chamber upon the bottom wall 146.

The lever is supported on the pivot pin 148 which is carried by the lower casing part 12 is a cavity 150 thereof in a novel manner by a stamping member 152. This metal stamping includes arms 154—156 bent around the rectangular portion of the lever 34 and interlocked as at 158. Another pair of arms 160 are bent to extend the entire width of the flanged opening 162, as shown in Figure 3, and serve to centrally position the lever. The arms 160 have openings to receive the pivot pin 148. The stamping 152 also includes an upwardly bent clip 164 which, as shown in Figure 8, engages one end of the follower spring 166 seated in an obliquely disposed spring chamber 168 formed in the lower body casing 12. The compression spring 166 tends to maintain the thrust receiving end 170 of the lever in engagement with the driving cam.

I claim:

1. In a fuel pump, a pump casing comprising a pair of separable casing parts, a pumping diaphragm clamped between said casing parts, the lower of said casing parts having a laterally open cavity therein, a pivot pin extending across said cavity, a constant stroke lever for actuating said diaphragm in one direction carried by said pivot pin and a stamped clip member secured to said lever adjacent the pivot pin and extending across the cavity to center the lever with respect to the cavity.

2. In a fuel pump, a reciprocable pumping diaphragm, a pump casing member having a laterally open cavity therein, a pivot pin extending across said cavity, a constant stroke lever for actuating said diaphragm in one direction carried by said pivot pin and a metal stamping clamped to said lever and spanning said cavity to center the lever with respect thereto, said stamping having an angular upwardly directed lug and a follower spring reacting between said lug and said casing member.

3. In a fuel pump, a reciprocable pumping diaphragm, a constant stroke lever for actuating said diaphragm for its suction stroke, a compression spring acting upon said diaphragm to produce the discharge stroke thereof and a pick-up stem member comprising a metal stamping bent to provide a box-like formation at its lower end to receive the end of said lever and having its upper end secured to said diaphragm.

4. In a fuel pump, a reciprocable pumping diaphragm, a pump casing part to which the marginal edge of the diaphragm is clamped, said pump casing part having a cylindrical guide bearing portion, a compression spring surrounding the guide bearing portion reacting upwardly upon said diaphragm to produce variable discharge strokes thereof, a pick-up member secured to said diaphragm depending downwardly therefrom, said pick-up member being formed from a metal stamping bent at its middle to form a box-like formation at its lower end and to provide upwardly extending side members, said side members being shaped to be guided by said guide bearing portion and a constant stroke lever member pivotally carried by said pump casing part having one end fitting within the box-like lower end of said lever member.

5. In a fuel pump, a reciprocable diaphragm, a pair of metal disk members on the upper and lower sides of said diaphragm, a rivet member for securing said metal disk members to said diaphragm and an operating stem for said diaphragm comprising a metal stamping bent into substantially U-shaped form, the free ends being secured to said diaphragm by said rivet, the lower end of said stem forming a substantially box-like formation slotted on one side and a constant stroke lever, one end of which is received within said box-like formation of said stem member, said lever passing through said slot with freedom for lost motion with respect thereto.

6. In a fuel pump, a cam actuated lever, a reciprocable pumping diaphragm, a pair of metal disk members on the upper and lower side of said diaphragm, a rivet member for securing said disk members to said diaphragm and a stem member for actuating said diaphragm comprising a metal stamping bent to a substantially U-shaped formation, the upper ends thereof being secured to said diaphragm by said rivet member, the sides of said stem member having inwardly directed flanges forming a box-like chamber at the lower end thereof, a cushion-

ing abutment fitting within said box-like chamber, said stem member having a relatively large opening at an intermediate point in the length thereof through which the enlarged head of the lever may be introduced, the enlarged head of said lever being adapted to fit into said box-like chamber for actuating said diaphragm in one direction by engaging said cushioning abutment.

Signed at Chicago, Illinois, this first day of August, 1932.

FRED G. SCHWEISTHAL.