

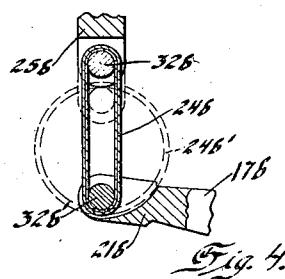
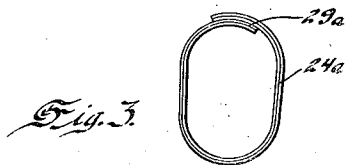
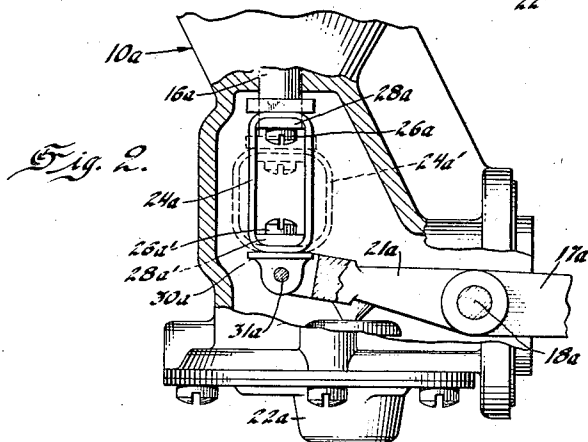
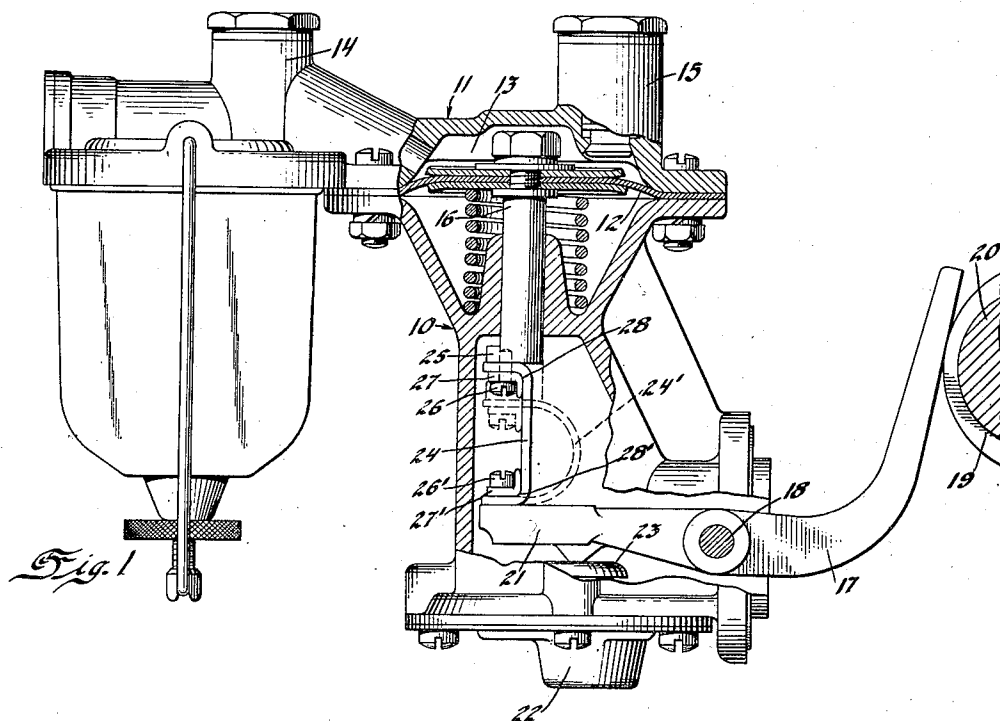
Dec. 10, 1929.

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1,738,786

FUEL PUMP

Filed June 23, 1928



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FUEL PUMP

Application filed June 23, 1928. Serial No. 287,754.

Although this invention is referred to as a fuel pump, it relates more particularly to a specific thrust-refusing connection between a reciprocated actuating element and a diaphragm stem or equivalent element attached to a pump diaphragm or other reciprocatory pumping element adapted to receive a variable stroke, said stroke being diminished in response to pressure within a pump chamber.

The principles of this invention being applicable to various types of fuel pumps, or the like, the illustrated pump is of the same general type as that described and claimed in a pending application of Abraham M. Babitch, Serial No. 123,370, filed July 19, 1926; but the present invention may be regarded as relating particularly to the use of a flexible link, loop or the like in the imparting of variable intake strokes to a pumping element, and to preferred means and methods of securing and using an intermediate thrust-refusing element of the general character referred to.

Other objects of this invention may be best appreciated from the following description of specific embodiments thereof, taken in connection with the appended claims and the accompanying drawings.

Fig. 1 may be referred to as an elevational view, with parts shown in substantially median section.

Fig. 2 is a view comparable with a central portion of Fig. 1, but showing features of modification.

Fig. 3 is a detail view showing one type of flexible link suitable for use as suggested in Fig. 2.

Fig. 4 is a detail view corresponding to a central portion of Fig. 2, but showing an alternative construction in which a link similar to that shown in Fig. 3, but imperforate, may be employed.

Referring first to Fig. 1, 10 and 11 being respectively a body casting and a cover cast-

ing, a reciprocatory pumping element in the form of a diaphragm 12 is shown as secured therebetween, and as adapted to vary the volume of a pump chamber 13, provided with an inlet valve 14 and with an outlet valve 15, the diaphragm 12 being adapted conditionally to receive an expulsion stroke from a "calibrated" spring and to receive an intake stroke through an attached handling element in the form of a slidable rod or stem 16. An actuating element in the form of a lever 17 is shown as pivoted at 18 and as adapted to be continuously engaged by a reciprocatory or rotating driven element such as a cam 19 upon a shaft 20, and an inner end 21 of said lever may be provided with means such as a compression spring retained between cupped plates 22 and 23, tending constantly to press said lever against the cam 19, or its equivalent, adapted cyclically to give said lever a uniform throw.

Coming now to the novel features of the new combinations to whose protection the present application is directed, a flexible band or link or loop 24 formed of substantially inextensible material, is shown as secured between the lower end or a foot 25 upon the diaphragm stem 16 and the inner end 21 of the lever 17 by means comprising screws 26, 26' and clips 27, 27',—the latter being provided with curved surfaces, as at 28, 28' over which said band, link or loop may be bent without avoidable danger of breakage.

Referring to the showing in Fig. 1, the flexible element 24, whether or not said flexible element is formed from separate strands, as in the case of a cord or cable, may be circular in cross section and, in that case, it may be so bent and disposed with reference to the inner end of stem 16 and the lever end 21, and also with reference to the clips 27, 27', that the flexing thereof shall take place in an inward direction, but not necessarily in the plane of reciprocation of the lever 17. For example, 90

assuming the diaphragm 12 and stem 16 to be momentarily held down by a pressure built up within the chamber 13, the flexing of the band, link or loop 24 may occur in such planes as are suggested by the showing in Fig. 2, if the pertinent part of latter were regarded as a simultaneous view at right angles taken in connection with the dotted line showing at 24', Fig. 1.

Parts shown in Fig. 2 being identified by reference characters heretofore employed, but with the character "a" added thereto, the link 24^a may be either circular in cross sectional outline or of belt-like character. That is to say, as suggested in Fig. 3, the thrust-refusing element here referred to may be cut from tubular stock or formed from a tape-like material cut to suitable length and provided with overlapping ends, somewhat as suggested at 29^a, and in case this element is to be secured by means such as screws 26^a, 26^{a'} and clips 28^a, 28^{a'}, the lower end of the loop 24^a may advantageously be secured to any actuating element, such as the inner end 21^a of the lever 17^a by means such as a pivoted connection fitting 30^a, shown as adapted to receive the screw 26^{a'} and as secured by a transverse pin 31^a. The construction here referred to is obviously such as largely to obviate unequal distribution of strain upon the link or loop 24^a during reciprocation of said lever.

As a further alternative, dispensing with the mentioned screws and clips as suggested in Fig. 4, the lower end or foot 25^b of a valve stem and the inner end 21^b of an actuating element, such as the lever 17^b, may be respectively provided with fixed or rotatable pivot pins 32^b, 32^{b'} over which a flexible loop or link 24^b may be so disposed that, whether or not it is inherently resilient (as suggested by the dotted lines 24^{b'}) it may automatically shift its contact with said pins, thereby effecting a distribution of wear which is favorable to long use; and it will be understood that any of the described bands, loops or links may advantageously be built up from several strands or plies of a flexible but substantially inextensible material, whether textile, metallic, or other, in such manner as to assure durability. It will also be noted that the flexible intermediate elements described are preferably so secured as to predispose the same toward contraction by an equalization of flexure, those portions of said flexible element by which the same is engaged or secured being, in all cases, disposed substantially parallel with one another.

Although the foregoing description refers to alternative embodiments of this invention, it will be obvious that additional forms thereof might easily be devised, without involving the slightest departure from the spirit and scope of this invention, as indicated above and in the following claims.

I claim:

1. A pressure-responsive pumping organization including a reciprocable pumping element provided with pressure-responsive resilient means for advancing the same and with an attached handling element for retracting the same, a uniform throw actuating element, and thrust-refusing means interposed between said handling element and said reciprocatory element and having the form of a flexible link formed of a substantially inextensible material, the straightening of which gives a fixed inner limit to intake strokes imparted by said actuating element.

2. A pressure-responsive pumping organization including a reciprocable pumping element provided with pressure-responsive resilient means for advancing the same and with an attached handling element for retracting the same, a uniform throw actuating element, and a flexible element formed of substantially inextensible material and so secured between said actuating element and said handling element as to predispose said flexible element toward contraction and to impart intake strokes which have a fixed inner limit.

3. A pressure-responsive pumping organization including a reciprocable pumping element provided with pressure-responsive resilient means for advancing the same and with an attached handling element for retracting the same, a uniform throw actuating element, and a flexible element formed of substantially inextensible material and so secured between said actuating element and said handling element as to predispose said flexible element toward contraction, portions of said flexible element by which the same is secured being disposed substantially parallel with one another and to impart intake strokes which have a fixed inner limit.

4. A pressure-responsive pumping organization including a reciprocable pumping element provided with a pressure-responsive resilient means for advancing the same and with an attached handling element, a uniform throw reciprocatory actuating element, and a substantially inextensible but flexible element in the form of a loop secured between said actuating element and said handling element, portions of said loop by which the same is secured being disposed substantially parallel with one another.

5. A pressure-responsive pumping organization including a reciprocable pumping element provided with pressure-responsive resilient means for advancing the same and with an attached handling element for retracting the same, a uniform throw actuating element, and thrust-refusing means interposed between said handling element and said actuating element and having the

form of a flexible link formed of a plurality of laps of fabric.

6. A pressure-responsive pumping organization including a reciprocable pumping element provided with pressure-responsive resilient means for advancing the same and with an attached handling element for retracting the same, a uniform throw actuating element, a thrust-refusing means interposed between said handling element and said actuating element and having the form of a flexible link formed of a plurality of laps of fabric and secured to said actuating element by means providing a pivotal connection.

In testimony whereof I affix my signature.

CHARLES W. MCKINLEY.