April 25, 1933. A. M. BABITCH ET AL 1,905,207

FUEL PUMP OPERATING MEANS

Filed Dec. 12, 1929

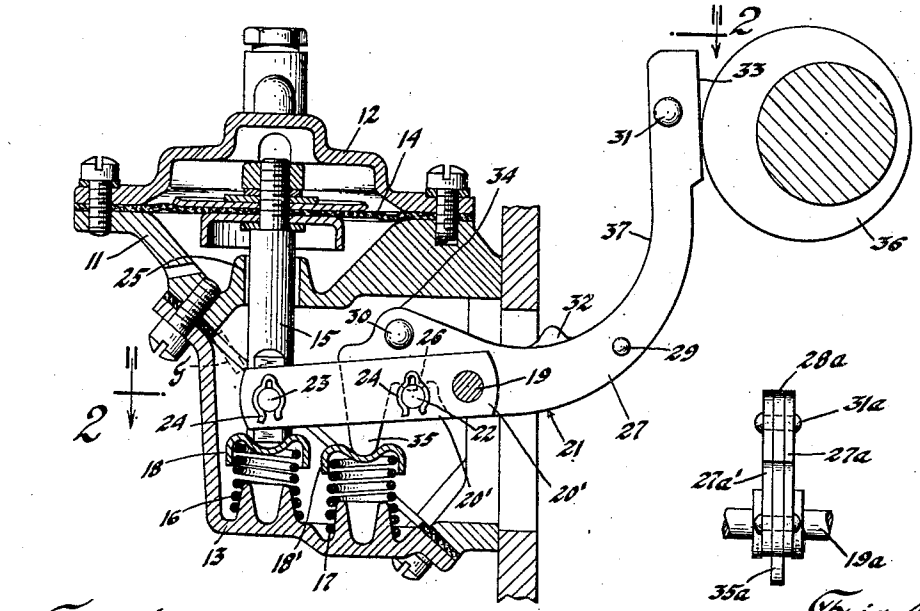


Fig. 1

Fig. 4

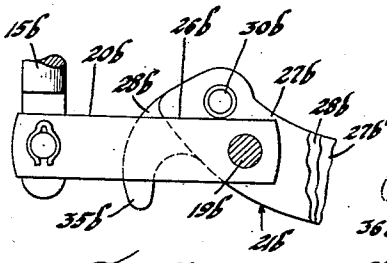


Fig. 5

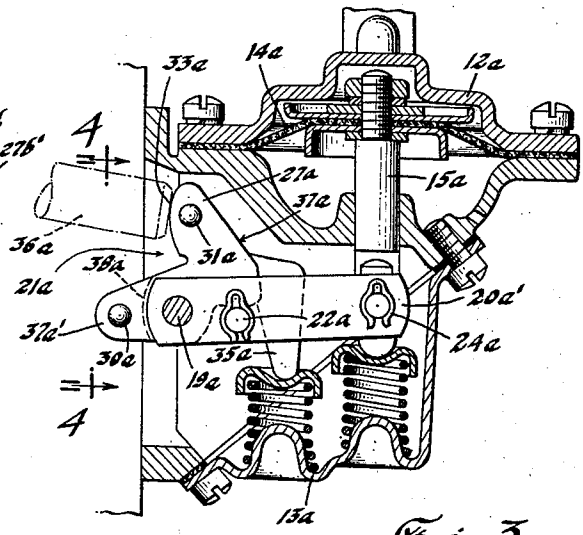


Fig. 3

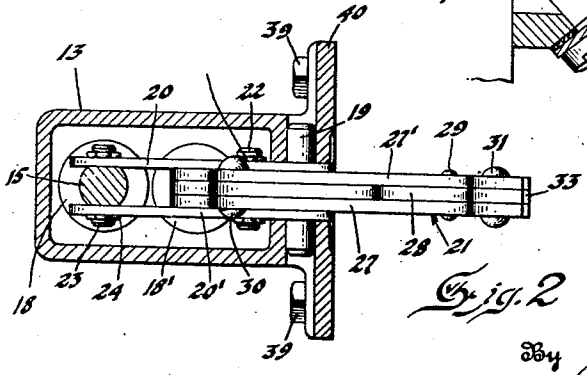


Fig. 2

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UNITED STATES PATENT OFFICE

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FUEL PUMP OPERATING MEANS

Application filed December 12, 1929. Serial No. 413,650.

This invention relates to fuel pumps of that very simple and reliable type disclosed in the pending application of Abraham M. Babitch, Ser. No. 304,845, filed September 10, 1928; and it aims particularly at the provision of modified and improved forms of said fuel pump having in common the use of a sectional lever one or both of whose sections may be "laminated" or built up from sheet metal stampings. The mentioned lever sections, when separate, may both pivot upon a fixed pin; and a cam-engaging or motion-receiving outer section of said lever is, according to the preferred practice of the present invention, built up from three stampings,—these being preferably secured together at two or more points, as by spot welding, by riveting, or by like operation. This construction obviates expensive hardening operations and necessitates but little machining; the total cost of manufacture being very low.

Other objects of this invention, including the use, in said motion-receiving lever sections, of two external and substantially identical sheet metal stampings, having interposed therebetween a slightly different "intermediate" stamping, and including alternative forms which are respectively adapted to receive motion from a rotating cam and from a longitudinally slidable or other reciprocatory element, and including also the use of a transverse cam pin (extending through parallel plates which are comprised in an inner or motion imparting lever section directly connected with a diaphragm stem, said pin conditionally transmitting motion to said inner lever section from the mentioned built-up lever section) may be best appreciated from the following description of alternative embodiments of this invention, taken in connection with the appended claims and the accompanying drawing.

Fig. 1 is a substantially median vertical section through one form of pump including an embodiment of the present invention, parts being positioned as at the completion of an intake stroke.

Fig. 2 is a horizontal section, taken substantially as indicated by the line 2—2 of Fig. 1.

Fig. 3 is a vertical section, comparable with Fig. 1, but showing an alternative type or form of laminated lever section adapted to receive motion from a longitudinally slidable or other reciprocatory actuating element, and showing parts positioned as at the completion of an expulsion stroke.

Fig. 4 is a detail view taken substantially as indicated by the line 4—4 of Fig. 3.

Fig. 5 corresponds to a central portion of Fig. 1, but shows a modification.

Referring first to conventional features of that embodiment of the present invention illustrated in Figs 1 and 2, a pump comprising a main structural element 11, a cap or chamber-providing structural element 12 and a diagonally-contacting bottom closure element 13 is shown as comprising also a diaphragm 14, retained between structural elements 11 and 12, and a diaphragm manipulating element in the form of a so-called diaphragm stem or rod 15.

As in the mentioned prior application, the bottom closure element, or its equivalent may provide means for the support of a compression spring or a pair of substantially identical compression springs 16 and 17,—the former being shown as adapted resiliently to advance, by an upward transmission of pressure through a cup 18, a lever section and/or the diaphragm stem 15, to effect expulsion strokes.

Coming now to features involving more of novelty, to impart intake strokes to the diaphragm 14 through its stem 15, a sectional lever, pivoted upon a fixed pin 19 is shown as comprising, in addition to an inner section formed by a pair of substantially identical links or stamped plates 20, 20′, a laminated or built-up motion-receiving lever section 21; and it is to the structure and interrelationships of these lever sections and to the use of a cam pin 22 for conditionally transmitting motion to links 20, 20′ that the present invention more particularly relates.

Not only the fixed pivot pin 19 and the cam pin 22, but also a movable pin 23 are shown as extending through the parallel plates 20,

20′; and the pins 22 and 23 may be substantially alike in form and retained by cotters or "snap" means such as resilient clips 24. Unless an ample clearance is provided, as at 25, for diaphragm stem 15, a slot rather than a close fitting aperture should be provided for the pin 23 and/or for the fixed pivot 19; but it will be understood that the configuration of the lever section 21 is intended to be such that the pin 22, instead of extending therethrough, may be conditionally engaged by a cam surface, such as that provided at 26 by edge surfaces of one or more of the plates or laminæ comprised in said lever section 21. In the form here referred to, the lever section 21 is shown as comprising a pair of substantially identical outer plates 27, 27′ which have disposed therebetween an intermediate plate 28,—all of said plates being preferably stamped from sheet metal and held together by means such as weld spots, pins and/or rivets, as 29, 30, 31.

It would obviously be within the scope of this invention to form the intermediate plate 28 of a material, whether stamped from sheet stock or otherwise formed, somewhat harder than that used in the lateral plates 27, 27′; and said intermediate plate, or any one or two or all three of said plates, may be provided with a so-called "location boss" 32, for use in positioning this lever section, or the elements thereof, during machining and/or other operations,—such as may be incidental to the perfecting of a cam-follower face 33, a play-limiting or safeguarding boss 34 and/or a head 35. This latter is adapted to be constantly pressed by the spring 17, or by an interposed cup 18′, in such manner as to hold the cam-follower face 33 always in engagement with a cam 36, or the like. The inclination of this face may be favorable to the positioning of the pump by upward pressure and wedging action, cam 36 being in the position shown during momentary insertion of a gauge at G.

In the operation of this pump, as in that described in the mentioned application, it will be understood that the lever section 21 may be constantly reciprocated through an unvarying angle so long as the cam 36 is rotated, the length of throw thereby imparted to the diaphragm 14, through the stem 15 or its equivalent, being dependent upon the level to which said diaphragm is depressed by built-up pressure and the period of consequent engagement between the pin 22, or an equivalent cam carried by the inner lever section, and any cooperating cam face provided, as at 26, upon the lever section 21; and substantially this same mode of operation may characterize also the alternative forms shown in Figs. 3 and 4,—wherein the same reference characters that have been above employed are applied to corresponding parts but with an "*a*" added to each character.

The lever section 21*a*, mounted upon a pivot pin 19*a*, is shown as including, in addition to an arm carrying a head 35*a* (corresponding to the head 35 of lever section 21) a cam-carrying arm 37*a* (corresponding to the arm 37 of the lever section 21 and) provided with a cam face 33*a*,—which is disposed favorably to engagement by a slidably reciprocable element 36*a*; but the means employed to impart variable or uniform reciprocations to the last mentioned elements are immaterial to the present invention. In this embodiment, side plates 27*a* and 27*a*′ are shown as retaining therebetween an intermediate plate 28*a* which alone includes the head element 35*a*; and any extension of the intermediate plate 28*a* past a line such as that suggested at 38*a* and into an optional extension such as that shown at 37*a*′ may depend upon whether or not a pin or rivet, shown as extending therethrough at 30*a*, is deemed necessary, or advantageous as providing another means of imparting reciprocatory movement to the lever section 21*a*.

In this embodiment of our invention, the bottom closure element 13*a* is illustrated as if stamped up from suitable sheet metal; but it will be understood that either illustrated type of bottom closure element may be employed as desired; and also that, as suggested in Fig. 5, a special rivet or pin 30*b* may laterally so extend beyond said plates 27, 27′ (or 27*a*, 27*a*′ or 27*b*, 27*b*′) as to obviate the necessity for the use of a separate cam pin such as the pins shown at 22 and at 22*a*,—the ends of the rivet or pin 30*b* being engageable with edge surfaces 26*b* of the plates 20*b*, pivoted at 19*b*, during at least a portion of each stroke of the lever section 21*b* whenever the diaphragm handling element 15*b*, or its equivalent, is not held down by pressure above a reciprocatory pumping element; and plate 28*b* may include head 35*b*.

It will be seen that even a non-sectional lever might embody some described features,—such as, for example, the illustrated backward inclination of cam face 33, to permit reliance upon the release of a gauge G in affording guidance to the positioning of the pump body before bolts or screws 39 are tightened upon flange 40; and although the foregoing description has included details of but a limited number of alternative embodiments of this invention, it should be understood not only that various features thereof might be independently employed but also that numerous additional modifications might easily be devised,—all without involving departure from the spirit and scope of the present invention.

We claim:

In a fuel pump, a sectional actuating lever comprising: an inner lever section formed of separate stampings spaced apart sufficiently to permit the interposition of an outer lever

section therebetween; an outer lever section, also formed of separate stampings, movable therebetween; a pivot common to said sections; and a cam pin carried by one of said sections and conditionally engaging cam surfaces provided by edges of the stampings of the other of said sections,—said outer section including three stampings which are secured together by rivets near the respective ends thereof and the intermediate stamping being different in outline from the adjacent stamping to provide a head engageable by resilient means to hold said outer section in engagement with means for imparting reciprocatory movement thereto.

In testimony whereof we affix our signatures.

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