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FUEL PUMP WITH CRIMPED COVER SEAL

Filed Jan. 19, 1966

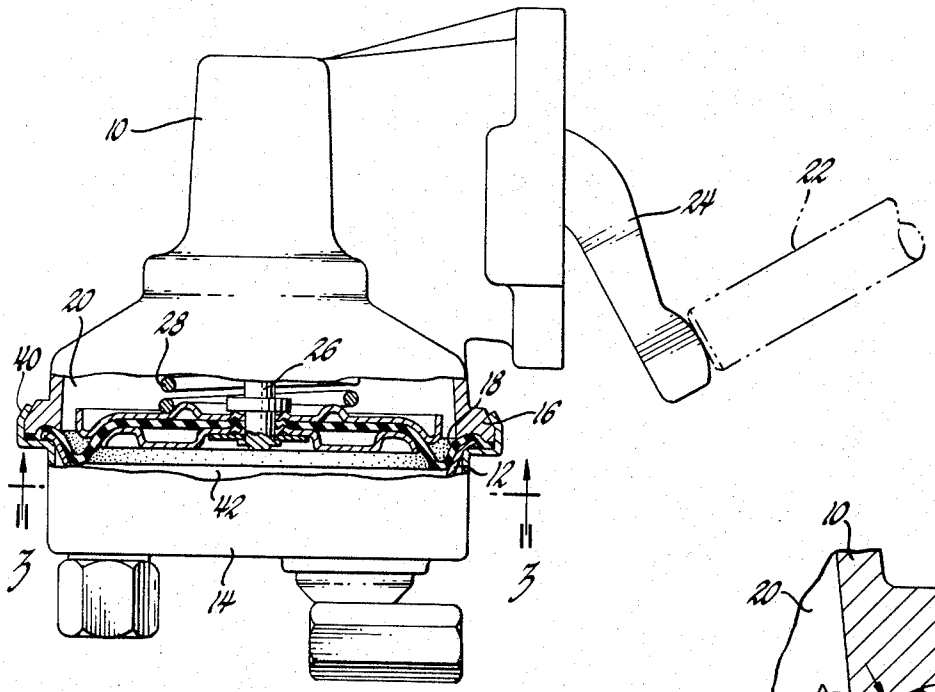


Fig. 1

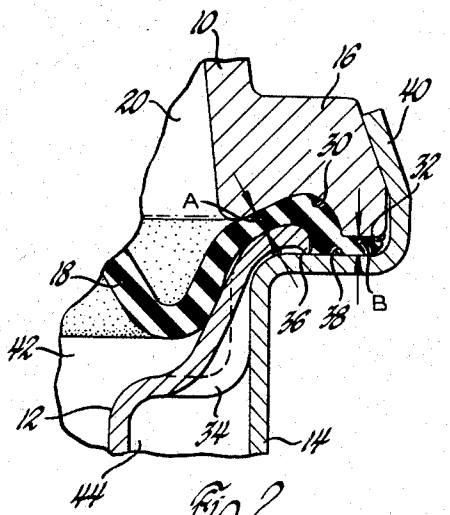


Fig. 2

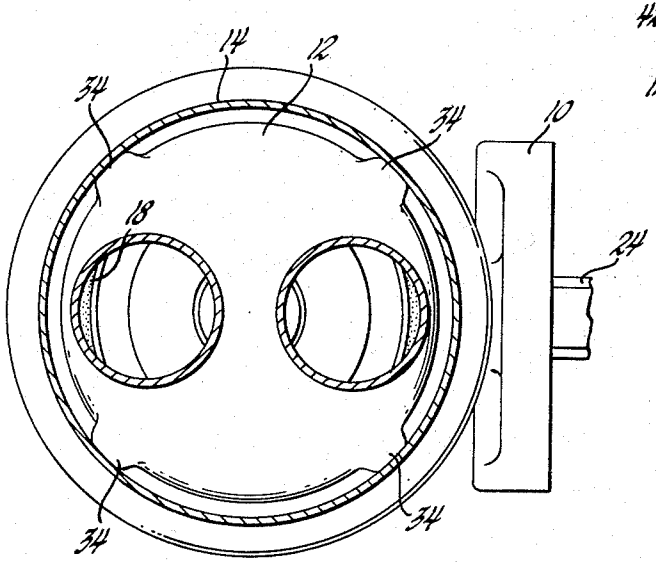


Fig. 3

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FUEL PUMP WITH CRIMPED COVER SEAL

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ABSTRACT OF THE DISCLOSURE

A fuel pump having a casing of three parts, two of which are of sheet metal and the other having a flange being of thicker or more rigid material, the flange and peripheries of the two parts being joined together by crimping to form a tight seal without the use of a yielding sealing material other than that of a pumping diaphragm margin constrained by the casing.

This invention relates to pumps and more particularly to diaphragm type pumps such as used in providing fuel to automobile engines.

The U.S. patent application S.N. 489,104, filed Sept. 22, 1965, in the name of Dimitar Toschkoff discloses a fuel pump generally similar in over-all concept to the pump described herein. In that application, joining of two outer casing parts and an intermediate part bearing inlet and outlet valves is done to secure a fluid-tight casing. A yieldable or relatively soft pumping diaphragm margin is retained as a part of the joint and a satisfactory seal of the casing is achieved. After extended or severe service, however, leaks have sometimes occurred in the joint provided and it is to this problem that the present invention is directed. An obvious solution has been to apply a sealing composition at the interface of one exterior part with an intermediate or inner part of the casing and to rely upon the sealing effect of the diaphragm material between the intermediate part and the other exterior or main part of the casing. The application of the sealing composition is an added expense and, during volume production, the added step or steps, though feasible, are objectionable for other obvious reasons.

Important features of the present invention will now be described in detail and then pointed out more particularly in the appended claims.

In the drawings:

FIGURE 1 is an elevation view of a fuel pump embodying the present invention, parts being broken away better to illustrate pertinent details;

FIGURE 2 is an enlarged sectional view of a peripheral seal or joint shown in FIGURE 1; and

FIGURE 3 is a sectional view looking in the direction of the arrows 3—3 in FIGURE 1.

In FIGURE 1 a fuel pump is disclosed having a casing of three main parts **10**, **12** and **14**. The part **10** is in the form of a casting with a rigid annular flange **16** and this part **10** cooperates with a flexible pumping diaphragm **18** to define a pumping spring chamber **20**.

As is conventional in automobile pumps, the part **10** is utilized to support the pump on an engine and the diaphragm **18** is adapted to reciprocate by virtue of the action of the engine through a plunger **22**, a rocker arm **24** and a diaphragm plunger **26** for moving the diaphragm **18** in one direction and by a spring **28** for moving the diaphragm in the other direction. The casing part **12**, as well as the part **14**, is made of sheet metal and in the present instance the part **12** supports inlet and outlet valves (not shown) which form no part of the present

invention. It is to be noted, however, that the rigid flange **16** of the casing part **10** has a radially curved wall recess **30** and a radial, flat or annular wall **32**. The inner sheet metal part **12** of the casing bears at least four radially extending projections **34** snugly received within a cylindrical wall of the casing part **14**. The part **12** also has a sharp peripheral edge at **36** which is adapted to engage a radial flange surface **38** of the part **14**. It will be noted that the interrelationship of the three casing parts is such that two annular clamping zones are effected with respect to the pumping diaphragm **18**. Sections of these two clamping zones designate them in FIGURE 2 as zone A and zone B.

The casing part **14** is made in the form of a cup and it not only snugly receives the casing part **12** at the projections **34** and evenly engages the sharp downturned edge **36** of the part **12**, but it also bears a marginal portion **40** which is crimped around the rigid flange **16** tightly to hold the three casing parts together in fluid tight relation.

It will be noted that the spring chamber **20** is sealed from the atmosphere at both zones A and B. The chamber **42** existing between the diaphragm **18** and the casing part **12** is sealed from the atmosphere at zones A and B and also from the chamber **44** (latter is beneath part **12**) at zone A. The chamber **44** is sealed from the atmosphere at zone B and constitutes an outlet chamber.

I claim:

1. A fuel pump comprising a fluid tight casing of three parts, one of said parts having a rigid peripheral flange, the second and third of said parts being of sheet metal, an annular recess with a radially curved wall formed in said rigid flange, a pumping diaphragm of flexible relatively soft material and having a diameter greater than that of said second part, said diaphragm having two adjacent annular clamped portions, one of said clamped portions being retained in said recess by said second part to form one annular sealing zone, the other of said clamped portions being between said flange and said third part to form a second annular sealing zone, and said annular sealing zones being coaxial with said pumping diaphragm.

2. A fuel pump as set forth in claim **1**, and said third part having an integral flange crimped around said rigid flange to hold said three parts together.

3. A fuel pump as set forth in claim **1**, said second sheet metal part having a sharp annular peripheral edge engaging said third part at an angle.

4. A fuel pump as set forth in claim **1**, said second sheet metal part having a series of spaced radially extending projections maintaining said second and third parts coaxially.

5. A fuel pump comprising a fluid tight casing of three parts, one of said parts having a rigid and thick flange, the second and third of said parts being of relatively thin sheet metal, an annular recess in said rigid flange, said recess having a curved wall, a pumping diaphragm interposed beween said flange and said second part to form a seal with said wall of said recess at one side of said diaphragm and said third part retaining said diaphrgam against said flange to form a second seal at the other side of said diaphragm, and said second part having an annular peripheral edge engaging said third part at an angle and a series of spaced radially extending projections, said edge and projections being arranged to maintain the relative positioning of said second and third parts.

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