April 18, 1933. C. D. FAGAN ET AL 1,904,284

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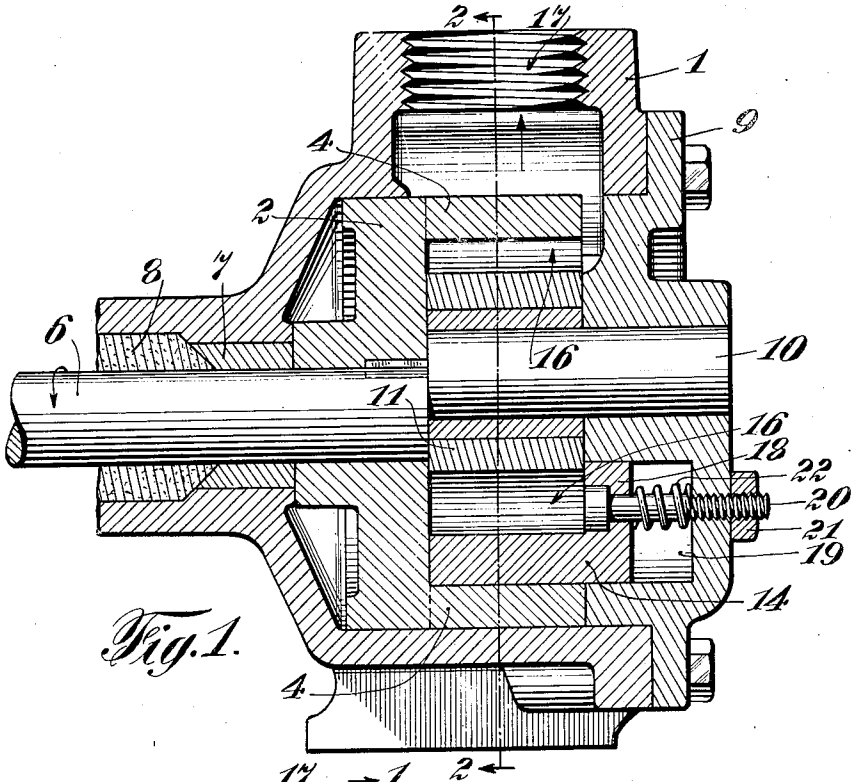


Fig. 1.

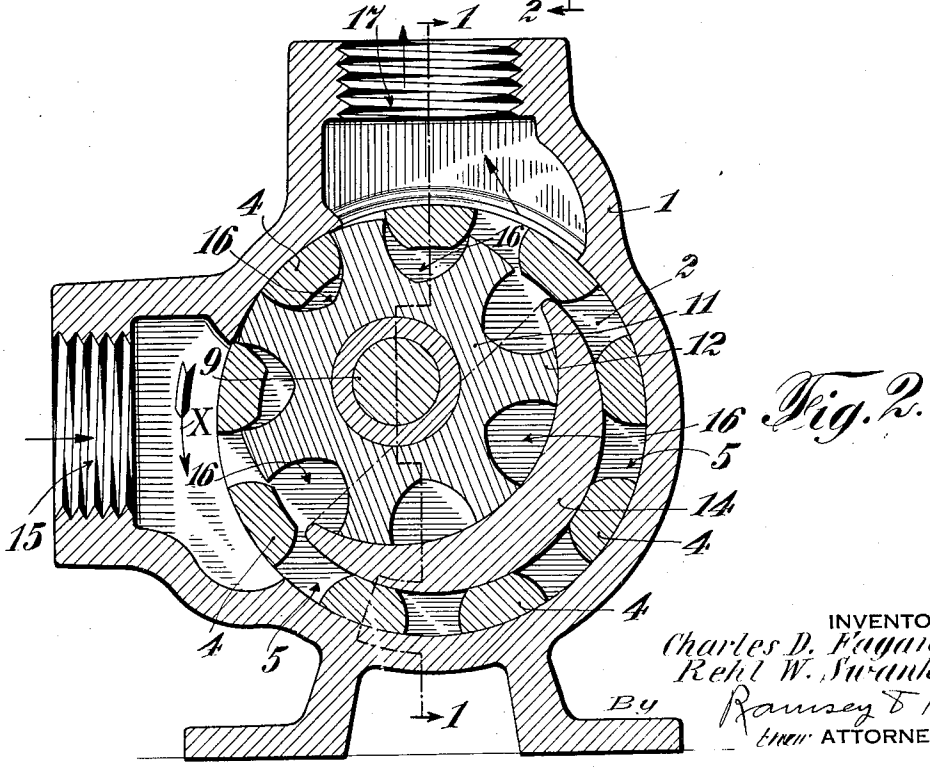


Fig. 2.

INVENTORS
Charles D. Fagan and
Rehl W. Swank
By Ramsey & Kent
their ATTORNEYS

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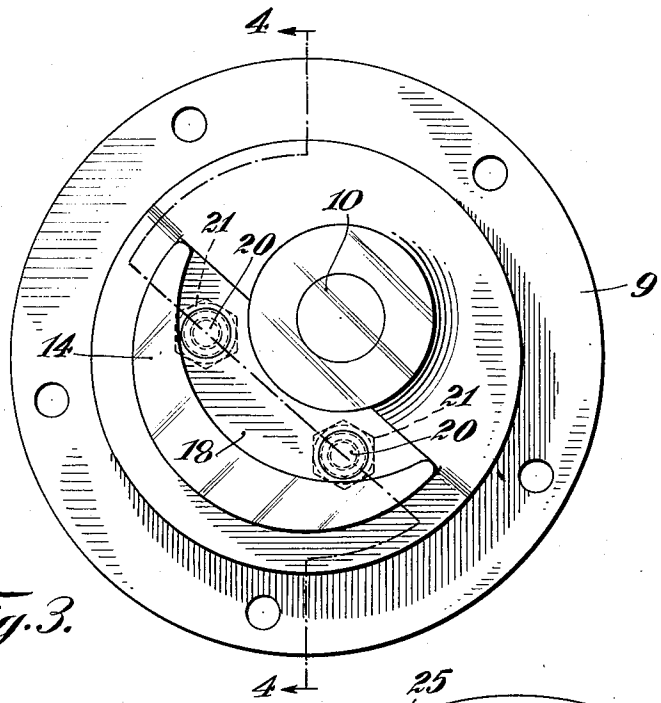


Fig. 3.

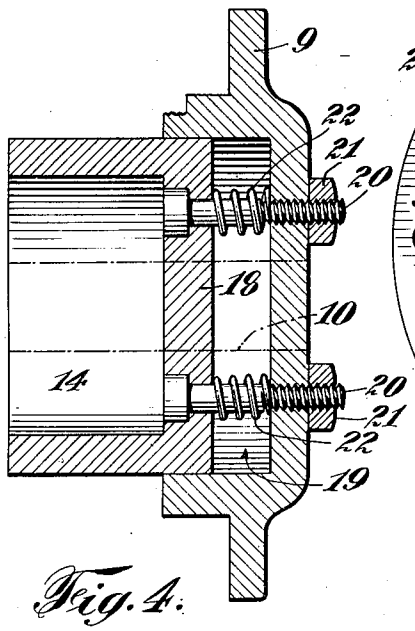


Fig. 4.

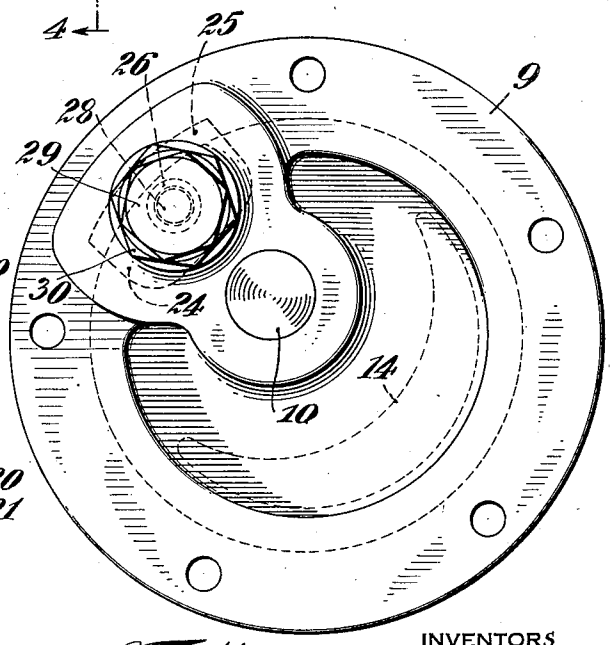


Fig. 7.

INVENTORS
Charles D. Fagan
and Rehl W. Swank
By Ramsey & Kent
their ATTORNEYS

April 18, 1933. C. D. FAGAN ET AL 1,904,284

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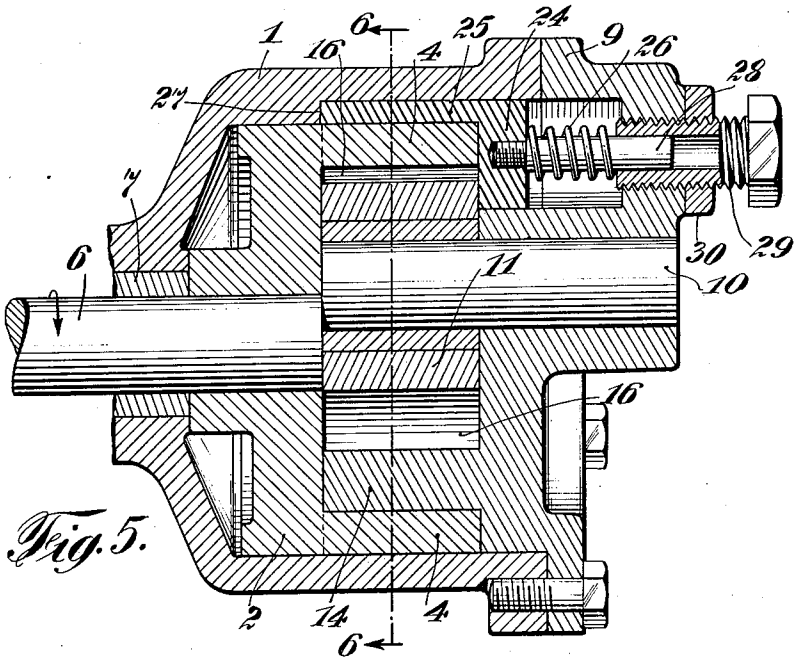


Fig. 5.

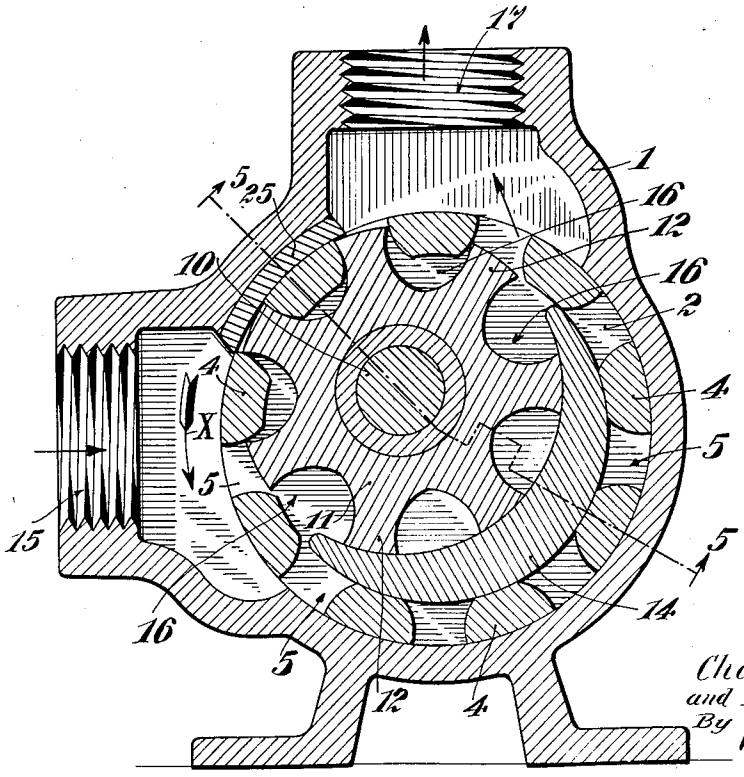


Fig. 6.

INVENTORS
Charles D. Fagan
and Rehl W. Swank
By Ramsey & Kerr
their ATTORNEYS

April 18, 1933. C. D. FAGAN ET AL 1,904,284

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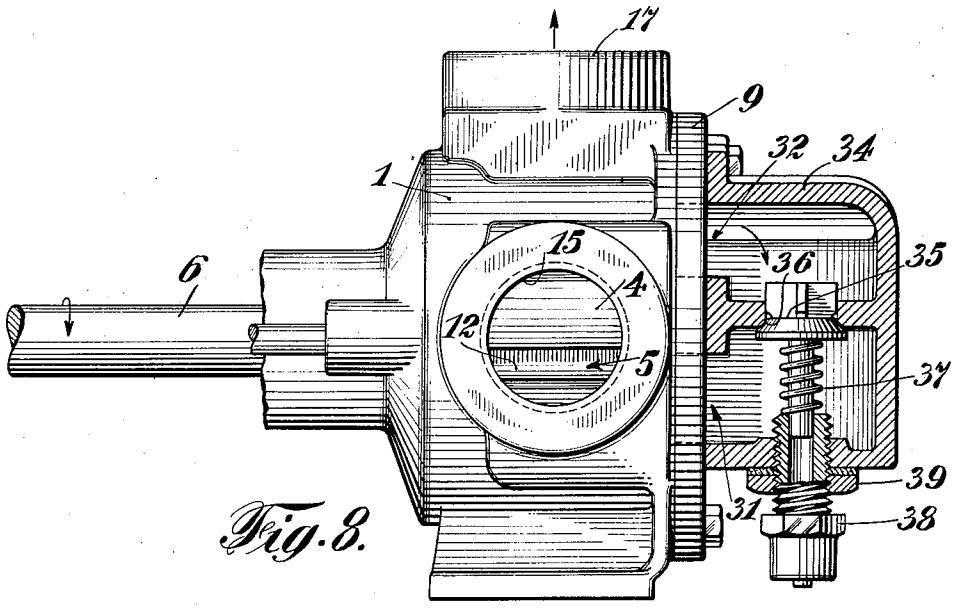


Fig. 8.

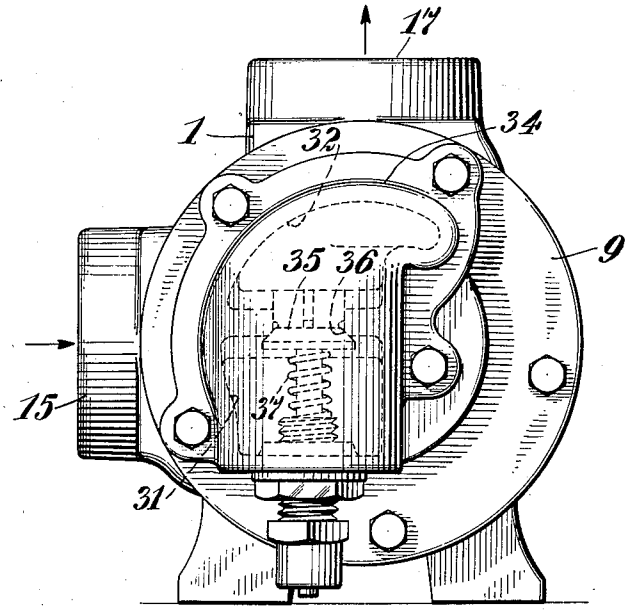


Fig. 9.

INVENTORS
Charles D. Fagan
and Rehl W. Swank
By Ramsey & Kent
their ATTORNEYS

Patented Apr. 18, 1933 1,904,284

UNITED STATES PATENT OFFICE

CHARLES D. FAGAN, OF SHARON, AND REHL W. SWANK, OF SHARPSVILLE, PENNSYLVANIA, ASSIGNORS TO SHARPSVILLE BOILER WORKS CO., OF SHARPSVILLE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

PUMP

Application filed August 26, 1931. Serial No. 559,382.

The present invention relates broadly to pumps and more especially to disabling mechanism for the pump when the pressure on the outlet side of the pump exceeds a predetermined amount.

There are a number of uses of pumps where it is desirable to open and close an outlet valve in a pump line, so that when the valve is open, the pump is effective to deliver liquid, and when the valve is closed, the pump ceases to be effective after a predetermined pressure is reached on the outlet side of the pump. The above problem is frequently met in connection with the oil industry, including pumps used in refineries, shipping plants, and more especially in connection with pumps used in retail gasoline dispensing stations.

The present invention is disclosed in connection with a relatively small rotary force pump adapted primarily for use in a gasoline dispensing station. In the type of dispensing station to which the present invention is more especially adapted, the rotary pump draws up gasoline by suction from a subterranean tank and forces the gasoline out through a dispensing hose. In the majority of cases, the outlet end of the hose terminates in a nozzle valve so that the control of the gasoline to the service tank is at the outer end of the hose and when this tank is filled, this nozzle valve is quickly closed.

The present invention comprises a force pump construction whereby the pump may continue to move but it becomes inoperative as a pump as soon as the pressure on the outlet side builds up beyond a predetermined point due to the closing the service nozzle valve.

The pump herein shown is of a well known type but the improvement is equally adaptable to other types of pumps by one skilled in the art. Therefore, the disclosure herewith is to be understood as illustrative and not in the limiting sense.

Fig. 1 is a sectional view on line 1—1 of Fig. 2.

Fig. 2 is a sectional view on line 2—2 of Fig. 1.

Fig. 3 is an elevational view of the head of the pump illustrated in Figs. 1 and 2.

Fig. 4 is a sectional view on line 4—4 of Fig. 3.

Fig. 5 is a sectional view on line 5—5 of Fig. 6 illustrating a modification of the invention.

Fig. 6 is a sectional view on line 6—6 of Fig. 5 illustrating the modification shown in Fig. 5.

Fig. 7 is an elevational view of a pump head in accordance with the modification illustrated in Figs. 5 and 6.

Fig. 8 illustrates a pump wherein the pump elements are the same as those shown in Figs. 1 and 2 with the crescent member immovable and with a by-pass valve mounted on the pump head and showing a portion of the by-pass valve in section.

Fig. 9 is an end view of the construction illustrated in Fig. 8.

Referring to the drawings and more especially to Figs. 1 and 2, the pump comprises a casing 1 having a cylindrical bore which encloses a rotor 2 in the form of a cage comprising bars 4 and spaces 5 between the bars 4. The rotor is keyed to a drive shaft 6 which is connected with any suitable power plant to drive the rotor. This drive shaft 6 runs in bearings 7 and passes through a packing gland 8, as is common in the art. A cover or head 9 closes the open side of the casing 1 and carries a stub shaft 10 upon which is mounted a toothed idler 11. The axis of the stub shaft 10 is offset relative to the axis of the drive shaft 6 so that the maximum diameter of the idler 11 is considerably less than the maximum diameter of the rotor 2. The teeth 12 on the idler 11 are adapted to fit the spaces 5 between the bars 4 of the rotor 2. A crescent shaped filler 14 fills the eccentric space between one side of the idler 11 and the rotor 2.

When the drive shaft 6 is operated to drive the rotor 2 in the direction of the arrow X, the rotation of the rotor automatically rotates the idler 11 because of the engagement of the teeth 12 on the idler with the bars 4 on the rotor. As the rotor 2 rotates, the teeth 12 are withdrawn from the spaces 5 adja-

cent the inlet port 15 in the casing. This produces a partial vacuum which draws liquid into the inlet port and fills the spaces 5 in the rotor and also the spaces 16 between the teeth 12 of the idler with liquid. The liquid in the spaces 5 and 12 is retained therein by the crescent 14 until the spaces 5 and spaces 16 come into the area comprising the outlet port 17. As the teeth 12 move to fit between the bars 4, the liquid in the spaces 5 and 16 is forcibly ejected into the outlet port 17.

From the foregoing, it will be observed that when the rotor 2 is rotated, the pump just described acts as a force pump whereby liquid going through the pump is forced out of the outlet port under substantial pressure. It will also be observed that assuming the parts to be liquid tight and properly sealed that if the outlet of the pump be closed, due to the closing of the valve, an excess of pressure will quickly build up on the outlet side of the pump, which pressure will either stop the pump or cause damage.

In order to adapt this pump for use with dispensing systems of various kinds where it is desirable to close the outlet conduit, the building up of excessive pressure is obviated by destroying the effective action of the pump. One method and device by means of which this may be accomplished is to destroy the effective operation of the crescent filler 14. As illustrated in Figs. 1 to 4 according to the present invention, this crescent filler is carried by the head 9 and extends inwardly from a plate 18 which is slidably mounted in a recess 19 provided in the head 9. A pair of guide studs 20 are screw threaded into the head 9 and are locked with lock nuts 21. These guide studs 20 carry springs 22 which normally force the crescent filler into position to perform its function in filling the eccentric space between the rotating members. When excessive pressure begins to build up in the outlet port 17, this pressure is communicated to the face of the plate 18, thereby slightly compressing the springs 22 and causing the plate to yield outwardly. As soon as this happens, the pressure is immediately communicated over the entire plate and is relieved from between the rotor 2 and the idler 11 adjacent the inner side of the rotor from which the end of the crescent has been displaced. If the pressure continues to slightly build up, the springs will yield further until sufficient space is provided around the crescent 14 so that the liquid within the pump tends to flow backwardly as rapidly as it is carried forward, thereby permitting the rotating parts of the pump to turn and the function merely to agitate liquid within the pump. The springs 22 are of predetermined strength so that these springs do not yield until a predetermined pressure has been built up in the outlet port 17 so that the pump at all times delivers liquid through the outlet port at sufficient pressure to accomplish the purposes for which the pump is designed. As soon as this pressure is exceeded, however, the pump ceases to function due to the yielding of the springs 22 and the withdrawal of the filler crescent from its normal position when the pump is operating to deliver liquid.

Figs. 5, 6 and 7 disclose a slight modification of the invention in that provision is made for breaking the seal between the outlet and the inlet ports. When this seal is broken, the pump is not capable of producing an effective vacuum and therefore liquid is not drawn into the pump but the pump merely runs idly with the liquid that is already therein. In this form of the invention, the head 9 carries a plate 24 on which is mounted a curved member 25. This curved member fits between the casing 1 and the rotating members over the area between the inlet port 15 and the outlet port 17. A spring 26 normally holds the end of the curved member 25 seated against a shoulder 27 in the casing 1 so that the curved member in effect becomes merely a part of the casing. The spring 26 is mounted around a stud 28 which extends into an adjustment screw 29 which is adapted to be held in place by a lock nut 30 which seats against the head 9. In this form of the invention when an excess of pressure builds up in the outlet port 17, this pressure acts upon the plate 24 to move the same outwardly against the pressure of the spring 26. As soon as this occurs, the curved member 25 moves away from the shoulder 27 and provides a space extending from the inlet port 15 to the outlet port 17. The moving of the plate 24 away from the side of the rotating members also provides additional space. These spaces extending from the inlet port to the outlet port break the seal between these ports and renders the pump ineffective to build up a further pressure in the outlet opening.

Referring now to the structure shown in Figs. 8 and 9, the pump head 9 is provided with an opening 31 connecting with the inlet port 15 and another opening 32 connecting with the outlet port 17. A by-pass valve casing 34 is mounted over said openings 31 and 32 in such manner as to comprise a conduit connecting the inlet and outlet ports. This conduit is normally closed by valve 35 which is urged against the valve seat 36 by a spring 37 which is adjustable by the adjustment screw 38 which is locked in adjusted positions by the lock nut 39. In the construction shown in Figs. 8 and 9, the conduit leading from the outlet port 17 to the inlet port 15 is of sufficent area to take the full capacity of the pump and if the outlet conduit is closed while the pump is running, then when the pressure on the outlet side

builds up to such a degree as to overcome the resistance of the spring 37, the valve 35 opens and the liquid from the outlet side is bypassed to the inlet side. This relief construction is simple and is carried entirely by the pump so as to be compact and efficient.

What we claim is:—

1. A liquid pump of the eccentric type comprising a casing provided with an inlet port and an outlet port, a pair of eccentrically mounted pump elements adapted to intermesh for pumping action, a crescent shaped partition between said pair of eccentrically mounted pump elements, and pressure operated means to move said partition endwise to relieve the pumping action of both of said elements when the pressure in the outlet port exceeds a predetermined amount.

2. A liquid pump of the eccentric type comprising a casing provided with an inlet port and an outlet port, an outer rotatable pump member mounted within said casing and provided with liquid receiving pockets, an inner rotatable pump member provided with intermeshing means adapted to cooperate with the pockets in the outer member, said inner rotating member also being provided with liquid carrying pockets, a crescent shaped partition extending between said rotatable members and forming a seal between a portion of said members, and pressure controlled means to move said crescent shaped partition endwise to break the seal between said rotatable members when the pressure in the outlet port exceeds a predetermined amount.

3. A liquid pump of the eccentric type comprising a casing provided with an inlet port and an outlet port, rotatable eccentrically mounted pump elements provided with pockets for liquid, a crescent shaped partition extending between said rotatable elements, a movable side wall member carrying said crescent shaped partition, and yielding means normally forcing said crescent shaped partition inwardly to form a seal between said rotatable elements, said yielding means being adapted to permit an endwise movement of said side wall member and said crescent shaped partition to break the seal between said rotatable elements when pressure in the outlet port reaches a predetermined amount.

4. A liquid pump of the eccentric type comprising a casing provided with an inlet port and an outlet port, rotatable pump members eccentrically mounted within said casing and adapted to forcefully deliver liquid from the inlet port to the outlet port, a crescent shaped partition extending between said rotatable members and comprising a seal extending between portions of said members, and means controlled by the pressure in the outlet port to cause said crescent shaped partition to move endwise and break the seal of both of said pump elements when the pressure in the outlet port exceeds a predetermined amount.

CHARLES D. FAGAN.
REHL W. SWANK.