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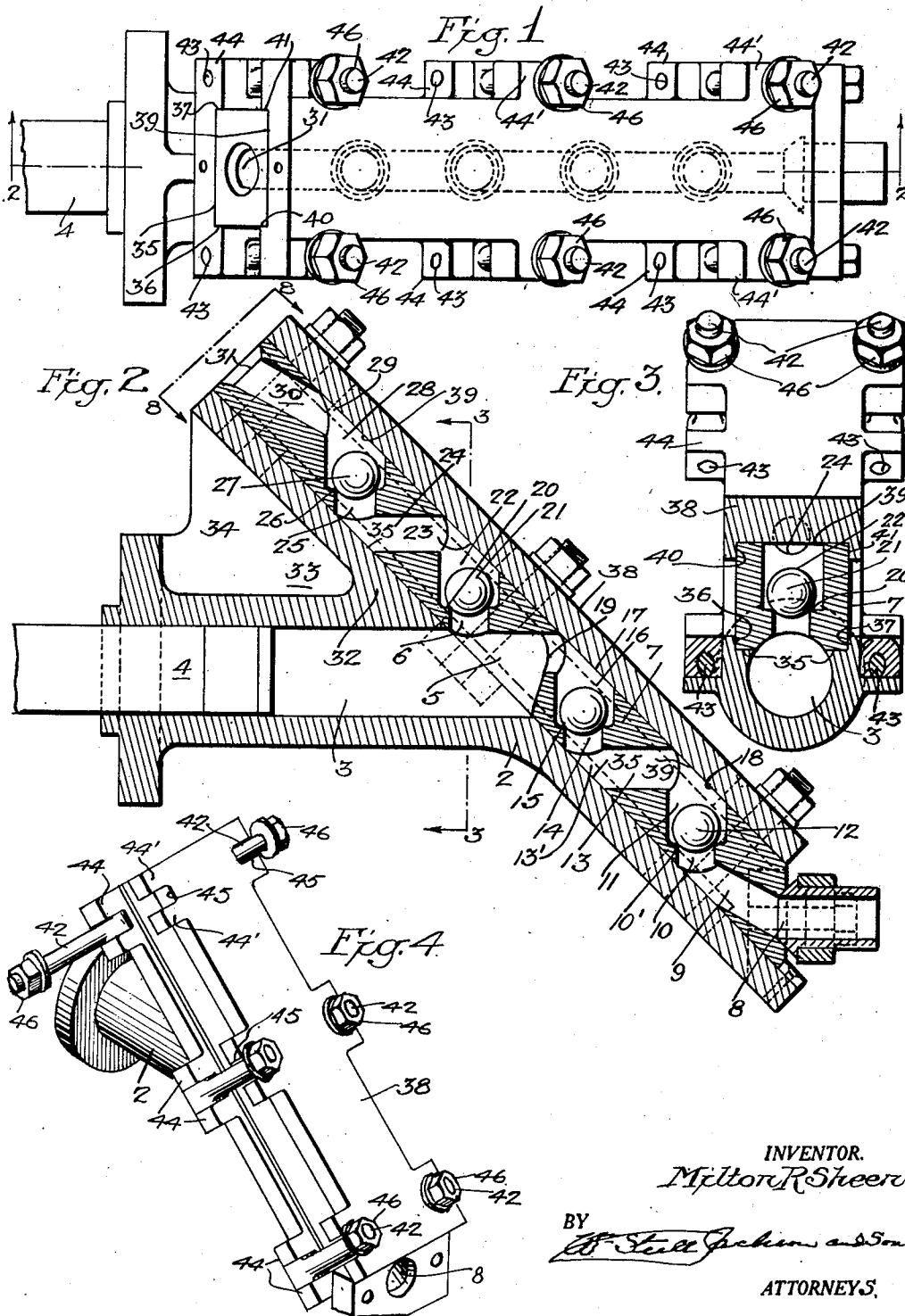
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2,554,481

VALVE MECHANISM FOR PUMPS

Filed March 22, 1946

2 Sheets-Sheet 1



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Fig. 5

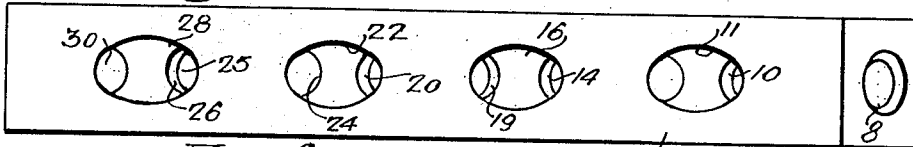


Fig. 6

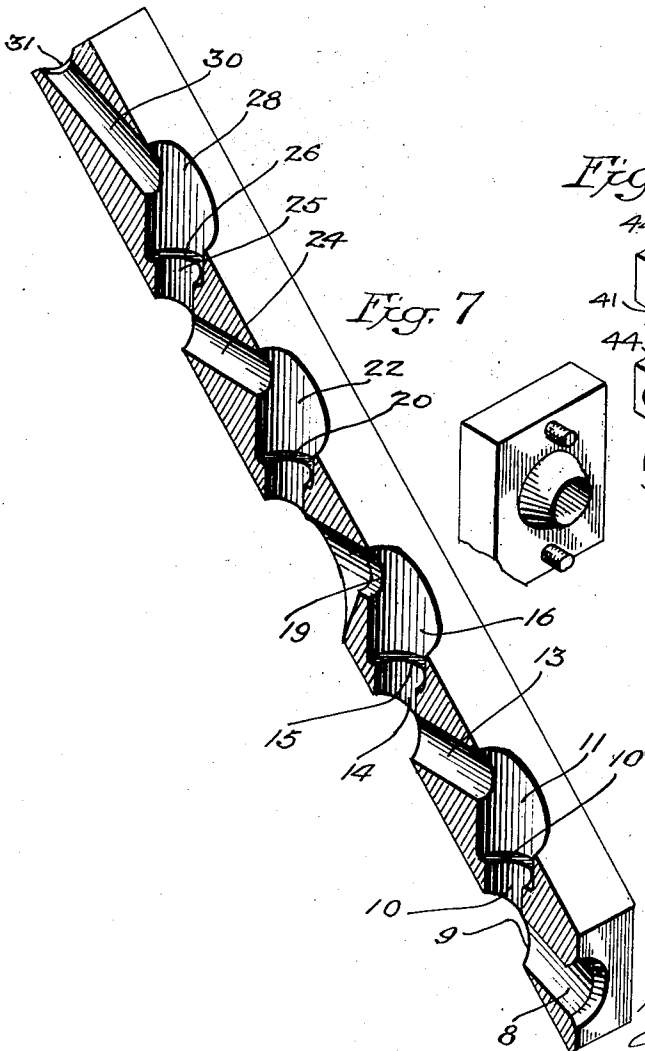
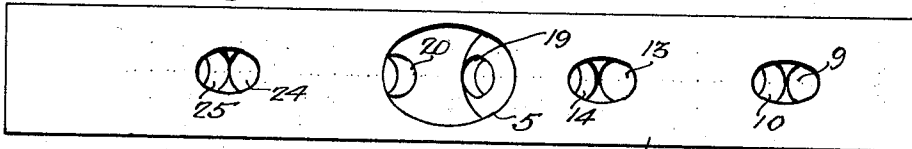
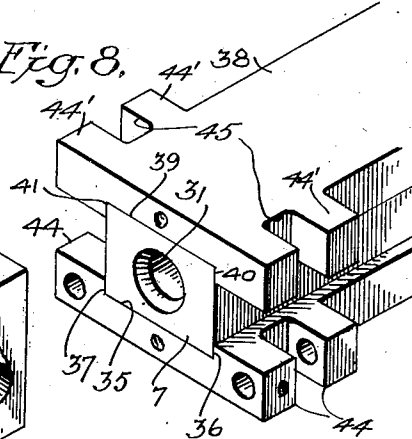


Fig. 8



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VALVE MECHANISM FOR PUMPS

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3 Claims. (Cl. 277-61)

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My invention applies to valve mechanism for a pump which forces fluids against a high pressure. It is particularly suited to maintenance of a high degree of cleanliness in the mechanism itself.

My invention makes the valve mechanism shown in my Patent No. 2,367,893 highly accessible for cleaning so that in handling such liquids as milk or other foods or chemicals the passages can conveniently be cleansed thoroughly and sterilized immediately after use.

The main purpose of my invention is to provide a series multivalved inlet and a series multivalved discharge valve having when assembled the general characteristics of the structure in my said patent, using a removable valve structure which may be cleansed completely and sterilized completely between successive uses during a temporary interruption in the operation but without damaging the valves.

A further purpose is to clamp a removable valve structure between opposing flat valve frame and cap faces by which both ends of each passage are terminated.

A further purpose is to provide a removable valve structure containing multiple inlet valve seats and valves and multiple outlet valve seats and valves and to position the removable valve structure between a flat valve frame face and flat clamping structure in cap form, so that when the parts are released the valve seats, valve passages and valves may be accessible for physical cleaning and for sterilization.

Further purposes will appear in the specification and in the claims.

I have preferred to disclose my invention by a single form only, selecting a form which is practical, effective and inexpensive but which at the same time well illustrates the principles of the invention.

In the preferred form shown,

Figure 1 is a top plan view of an assembled pump valve.

Figure 2 is a section of Figure 1 upon line 2-2.

Figure 3 is a section of Figure 2 on line 3-3.

Figure 4 is a perspective view of the valve of Figure 1.

Figure 5 is a top plan view of the complete structure of which a half is shown in Figure 7.

Figure 6 is a bottom plan view of the complete structure of which a half is shown in Figure 7.

Figure 7 is a longitudinal central section showing the removable valve of Figure 2 in sectional perspective.

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Figure 8 is a perspective of a portion of Figure 2 taken from the position of line 8-8.

In the drawings, similar numerals indicate like parts.

The complete valve structure comparable with the structure of Figure 5 in my patent above is seen in Figures 1 and 2—see also Figure 7—in which earlier figures the valve casing 2 supports a cylinder 3 provided with a suitable gland, not shown, for a piston 4. The cylinder intake is seen at 5 and its discharge at 6. In front of the piston is mounted a valve-carrying removable block 7. Within the block the inlet is guarded by two check valves in series and the discharge is likewise protected by two check valves in series.

The intake passage for the system is shown at 8 opening through chamber 9 and bore 10 to valve chamber 11. The bore is provided with an annular valve seat 10' on which rests a ball 12. The valve chamber 11 connects through a diagonal passage 13 and a bore 14 valved at 15 with a chamber 16. The sizes of the openings at 17 and 18 are restricted so that the several balls cannot escape from the parts of the passages adjacent their seats. The valves settle, preferably by gravity, or by spring or by reason of the back pressure of the liquid upon cessation of the flow of the liquid. The passage 19 becomes the inlet 5 to the pump cylinder.

The two valve members 12 and 15 operate in series as in my patent to prevent the reverse flow of liquid from within the piston chamber toward the intake 8, while at the same time permitting substantially free flow of liquid from said intake toward and into said piston chamber during the outward stroke of the piston.

The outlet aperture 6 from the piston bore forms a valve passageway and is provided with an annular valve seat 20 upon which rests a third ball or equivalent valve 21 within a valve chamber 22 which in turn leads through a transversely restricted opening 23 into a connecting passageway 24.

From the passageway 24 the liquid flows from the piston bore during the inward (pumping) stroke of said piston through passageway 25 provided with annular valve seat 26 for a fourth ball or equivalent valve member 27 within a valve chamber 28.

The valve chamber 28 communicates through a transversely restricted opening 29 with an angularly directed passageway 30 provided with the discharge port 31.

With this construction, it will be seen that the two discharge valve members 21 and 27 cooperate

in series to prevent reverse flow of a liquid from the discharge port back toward the piston cylinder, in a manner similar to the operation of the two series inlet valves.

It will be evident that the inlet and outlet passages are made up chiefly of pairs of oppositely diagonal passages through from one face to the other of the valve block, communicating adjacent the two faces and closed respectively by the valve block seat and the cap or cover, whereby fluid entering at the inlet end travels (staggered) through adjoining diagonal passages to the pump cylinder, and escapes from the cylinder through diagonally opposite communicating passages.

It passes through one but preferably through a series of valves within the inlet path and through one, but preferably through a series of valves in the outlet travel. The construction affords complete access to the passages, cylinder, valve seat and cover face when the cover shall have been removed.

The invention is well suited to use in handling milk and other liquid foods, which are easily spoiled.

It will be evident that the unusual access to the casing and cover parts and to the block make it possible not only to cut the passages desired but to cleanse the parts and sterilize them quickly and satisfactorily.

It will be evident that all joints between the valve parts and the casing and cover respectively are made by pressure and are released by releasing the pressure.

The body, casing or frame portion 32 is webbed at 33 to connect the piston-carrying portion of the casing and a channeled support within which the valve-carrying removable valve-block unit 7 is mounted. This valve-block or valve-carrying unit rests on a plane seat forming the bottom 35 of a slot between flanges 36 and 37. It is clamped into sealing engagement with the block by pressure exerted between said bottom and a channeled cap 38 whose inner face forms a plane valve-block cover 39 between channel cover flanges 40 and 41. In the illustration the faces of the seat and cover are plane and parallel but this is not essential provided the surfaces fit the adjacent faces of the block and close the diagonal passages.

The clamping between the valve-block seat and the cover is effected by bolts 42 (Figures 1-4) which, for quick application and release, are pivoted upon pins 43 supported in and between ears 44 upon the casing, and swing into spaces 45 between ears 44' in the cover. Nuts 46 hold the parts together.

It will be apparent that the surfaces of the seat and cover effectively close the ends of the different passages, and that the release of the bolts permits complete removal of the block for the purpose of giving full access to the parts of the casing and cover as well as to the various passages and valve elements.

The casing is laterally extended on both sides at intervals to provide the lugs between which the bolts are pivoted. The bolts swing transversely to the length of the valve-block to enter from the sides—the slots between the corresponding ears or lugs at the edges of the cover.

Nuts 46 are tightened to clamp the parts together.

The block is held firmly between the cover and the block seat, whereby not only does the clamping action between the cover on the one side and the block seat on the other firmly hold the block

in position against movement but the faces of the cover and seat respectively close the various openings formed by chambers, passages, etc.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a valve, a member provided with a valve block seat having a passage extending through the seat intermediate the ends of the seat, a valve block having opposed faces with one abutting against the valve block seat and having a series of passages in the block each extending completely therethrough from one face thereof to the other so that adjacent ends of the passages intersect and communication with the passage in the member is established intermediate the ends of the series, a cooperating check valve and seat in one of the valve block passages between one end of the series and the passage through the valve block seat, said check valve opening toward the passage through the valve block seat, a cooperating check valve and seat in another of the valve block passages between the other end of the series and the passage through the valve block seat, said last mentioned check valve opening away from the passage through the valve block seat, an inlet communicating with one end of the series of passages, an outlet communicating with the other end of the series of passages, a cover on the valve block at the opposite ends of the passages therein from the valve block seat, and a clamping device pressing the valve block seat, the valve block and the cover together.

2. In a valve, a member provided with a valve block seat having a passage extending through the seat intermediate the ends of the seat, a valve block having opposed faces with one resting against the seat having a series of passages in the block each extending completely therethrough from one face thereof to the other so that adjacent ends of the passages intersect and communication with the passage in the member is established intermediate the ends of the series, the passages at the block being in zig-zag relation to one another, a pair of cooperating check valves and seats in sequence in the passages in the block between one end of the series of passages in the block and the passage through the block seat, said check valves opening in the direction toward the passage through the block seat, a pair of cooperating check valves and seats in sequence in the block passages between the other end of the series of passages in the block and the passage through the block seat, said last mentioned check valve opening in the direction away from the passage through the block seat, an inlet communicating with one end of the series of passages, an outlet communicating with the other end of the series of passages, a cover on the opposite face of the valve block from the valve block seat, and clamping means holding the valve block seat, the valve block and the cover together.

3. In a valve, a member provided with a valve block seat having a passage therethrough intermediate its ends, the seat being inclined to the horizontal, a valve block having opposed faces one of which rests on the inclined face of the

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valve block seat and having a series of first passages in the block each extending completely therethrough from one face thereof to the other and inclined in one direction with respect to the inclined face of the valve block seat and having a series of second passages in the block generally transverse to the first passages and each extending completely therethrough from one face thereof to the other, the first and second passages at their adjacent ends intersecting and communicating with one another, and communicating intermediate the ends of the series with the passage through the valve block seat, a plurality of cooperating ball check valves and valve seats in the first series of passages on each side of the passage through the valve block seat, the ball check valves on one side of the passage through the valve block seat opening toward and those on the other side opening away from the passage through the valve block seat, an inlet communicating with one end of the series of passages, an outlet communicating with the other

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end of the series of passages, a cover on the valve block and clamping means securing the valve block seat, the valve block and cover together.
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The following references are of record in the file of this patent:

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(Addition to 444,102)