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HIGH PRESSURE PUMP

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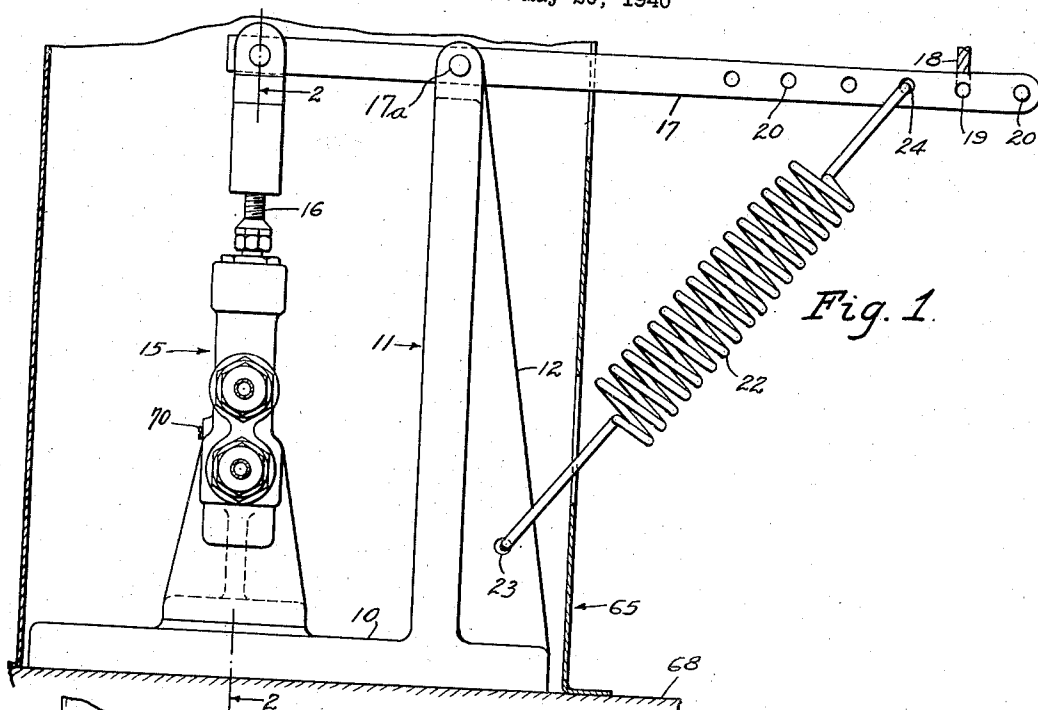


Fig. 1.

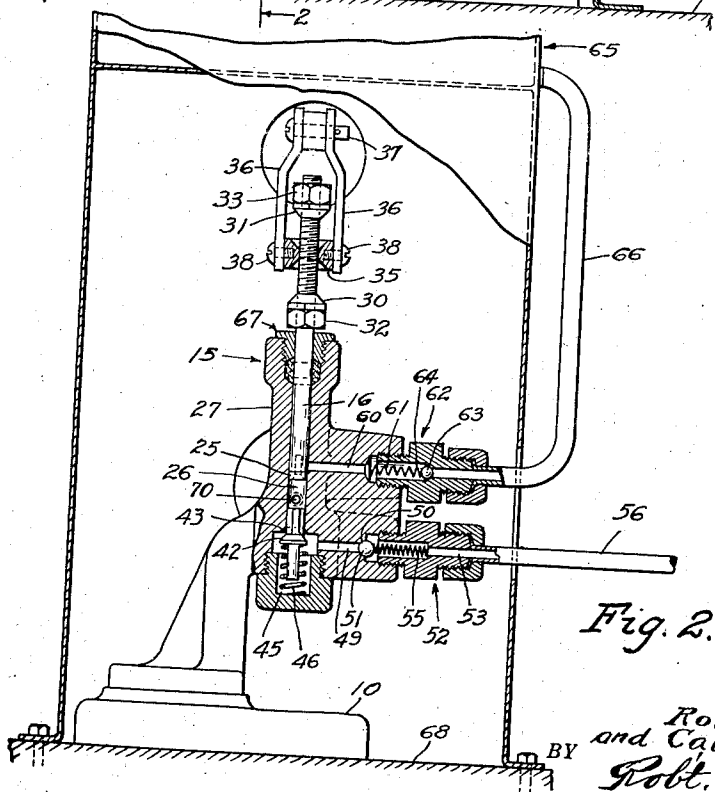


Fig. 2.

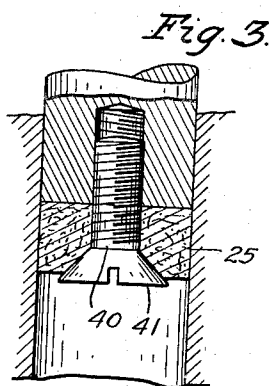


Fig. 3.

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HIGH PRESSURE PUMP

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5 Claims. (Cl. 103—38)

This invention relates to a pump structure for pumping operations which require the application of high pressures to fluids.

Among the objects of the invention are to provide a superior piston rod operating mechanism whereby the length of the stroke imparted to the piston may be regulated as desired and wherein an impact means is provided which safeguards against the head of the piston sticking in the cylinder. This last mentioned feature is particularly valuable in conjunction with oil well pumps, for injecting a chemical into the petroleum to break up the emulsion into its original constituents.

The invention includes the provision of a piston operating means particularly well suited for being operatively connected with the walking beam of an oil well pump.

The invention further includes a superior piston head structure whereby an efficient packing is afforded between the piston head and the interior of the pump cylinder in which it operates, notwithstanding the very high pressures against which it may be necessary to operate the piston.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawing, which illustrates what is at present deemed to be a preferred embodiment of the invention,

Fig. 1 is a side elevation of the pump.

Fig. 2 is a front elevation except that parts of the structure shown are sectioned on line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmental section of the piston head.

Referring in detail to the drawing, an elongated supporting base 10 is furnished near one end with an upstanding post or standard 11 which is slightly spaced away from the adjacent end of the base to provide room for an upwardly tapering flangelike strut 12 which may be cast integral with said base and standard.

The pump proper 15 is mounted upon the base in a spaced relation to said standard, and its piston rod 16 is operated by means of a lever 17 fulcrumed by a pin 17a to the upper end of the standard 11.

The conventional walking beam is not shown but such beam is operatively connected with the long end of the lever 17 by means of a pendant rod or link 18 a fragment of which is shown, said link being adjustably connected to said lever by a pin 19 insertable into any one of a series of apertures 20 spaced longitudinally along said lever.

A powerful tension spring 22, having its lower end anchored at 23 to the lower portion of the strut 12 and its upper end connected at 24 to the long end of the lever 17 retracts said lever after the lifting action of the walking beam link 19. It is necessary to use this spring whenever the usual flexible connection is made with the walking beam.

The piston rod 16 carries at its lower end a piston head 25 which operates within the piston chamber 26 formed with the pump casing 27. A considerable portion of the piston rod at all times projects above said casing and this projecting part has two longitudinally adjustable abutment members 30 and 31 screwed on to it and respectively kept in place by lock nuts 32 and 33.

Between said abutment members operates an impact member 35 which loosely surrounds the piston rod and which is carried by and between two pendant links or yoke arms 36 which, in turn, are secured, for slight pivotal movement, to the short end of the lever 17 by means of a pin 37.

Each of the abutment members is furnished with a convex face, and when the pump is mounted in the upstanding position shown in the drawing these faces are directed toward the intervening impact member 35. Said impact member has a concave upper face to match the convexity of the abutment member 31, and a like concave lower face to match the convexity of the lower abutment member 30, thus affording broad impact receiving faces.

The impact member 35 is shown as being a short, thick sleeve of materially greater diameter than the abutment members 30 and 31, in order to afford the requisite clearances between the yoke arms and the abutment member 31. Diametrically opposite screw threaded seats are provided in the impact member into which screws 38 screw whereby the lower end portions of the links 36 are secured to said abutment member 35.

At least adjacent to the head or gasket 25 the piston rod 16 has a snug working fit within the piston chamber. On account of the high fluid pressures against which the piston operates, a special construction is provided to maintain a fluid tight fit around the head 25 thereof. For this purpose said head is made from a disk of firm but expansible material, for example raw hide, this head or gasket being, when uncompressed, of approximately the same diameter as the piston cylinder into which it fits. Said gasket has through it a central aperture to receive

snugly the lower end portion of a screw 40 having a conical head 41 to expand the gasket into a tight but slidable contact with the piston cylinder. The efficient action of said screw as an expander of said gasket depends largely upon the fact that it has a head of a sufficiently large diameter to overlie the greater part of the outer face thereof.

In order to prevent back flow of the fluid delivered from the pump a double check valve structure is provided consisting, in part, of a valve 42 which cooperates with a seat 43 at the lower end of the passage 26 which forms the piston chamber, said valve being contained within a chamber 45 and being urged upwardly toward its seat by means of a compression spring 46. A fluid delivery passage 49 communicates with said chamber 45, and in this passage is a seat 50 for a spherical check valve 51. An adapter 52 is screwed on to the pump casing at this point and has through it a passage 53 to form a continuation of the passage 49, and which contains a compression spring 55 tending to urge the ball check valve 51 toward its seat. This adapter makes connection with a conduit 56 which conducts to the well of the fluid forced from the pump at each stroke of its piston.

The piston chamber is supplied through a supply passage 60 which is located above the delivery passage 49, and is continuous with the passage 61 of an adapter 62 which is screwed on to the pump casing as shown. Said adapter 62 contains a ball check valve 63 urged toward its seat by a compression spring 64. The fluid to be injected into the well under pressure is fed to said adapter 62 from a tank 65 by means of a conduit 66.

A stuffing-box structure 67 is provided at the upper end of the piston chamber. The pumping structure is shown secured to a well derrick floor 68.

The piston chamber is provided with a passage containing a screw 70 which may be removed to permit the air bleeding from said chamber.

We claim:

1. In an operating means for high pressure pumps, the combination, with the pump proper and its piston rod; of a pair of abutment members secured to said rod in a longitudinally spaced relation to each other, the adjacent sides of said members having concave faces, an impact member mounted to reciprocate between said abutment members, said impact member having opposite sides furnished with convex faces to impact against the concave faces of said abutment members, and means to reciprocate said impact member, said impact member positively actuating said rod in opposite directions.

2. In a high pressure pump structure, a support having in it a valve controlled piston chamber, a piston having a head working in said

chamber and a rod a portion of which at all times projects from said chamber, a pair of abutment members secured to the projecting portion of said rod in a longitudinally and adjustably spaced relation to each other, an impact member loosely encircling said rod between said abutment members, a lever for reciprocating said impact member to cause it to act upon said abutment members in alternation to operate said piston, a walking beam pendant connection to said lever at one side of its fulcrum, a support upon which said lever is fulcrumed at one side of said pendant connection, means operatively connecting said lever at the opposite side of its fulcrum with said impact member, and a spring connected with said lever to retract it in opposition to the action of the walking beam.

3. In a pumping structure for high pressure injection of liquids into oil well pumping apparatus, a support mountable upon a well derrick floor, said support including a pump casing, there being a vertically extending piston chamber in said casing, a piston having a head workable in said piston chamber, means to operate said piston, a supply conduit communicating laterally with said piston chamber, said piston chamber at its lower end communicating with a valve chamber in axial alignment therewith, there being a downwardly directed valve seat formed around the lower end of said piston chamber, a spring pressed sliding check valve in said chamber cooperating with said seat, there being a liquid delivery passage communicating with said valve chamber, said passage having an expanded portion furnished with an additional valve seat, and a ball check valve cooperating with the latter seat.

4. In a pumping structure for high pressure injection of liquids into oil well pumping apparatus, a support mountable upon a well derrick floor, said support including a pump casing, there being a vertically extending piston chamber in said casing, a piston having a head workable in said piston chamber, means to operate said piston, a supply conduit communicating laterally with said piston chamber, said piston chamber at its lower end being diametrically expanded thereby forming a valve chamber, there being a downwardly directed valve seat in the lower portion of said piston chamber, a check valve cooperating with said seat to prevent liquid upflow, there being a liquid delivery passage communicating with said valve chamber, and closure means for the lower end portion of said valve chamber.

5. The subject matter of claim 4 and, said valve seat being located at the juncture of said piston chamber with said valve chamber.

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