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SPRAY PUMP

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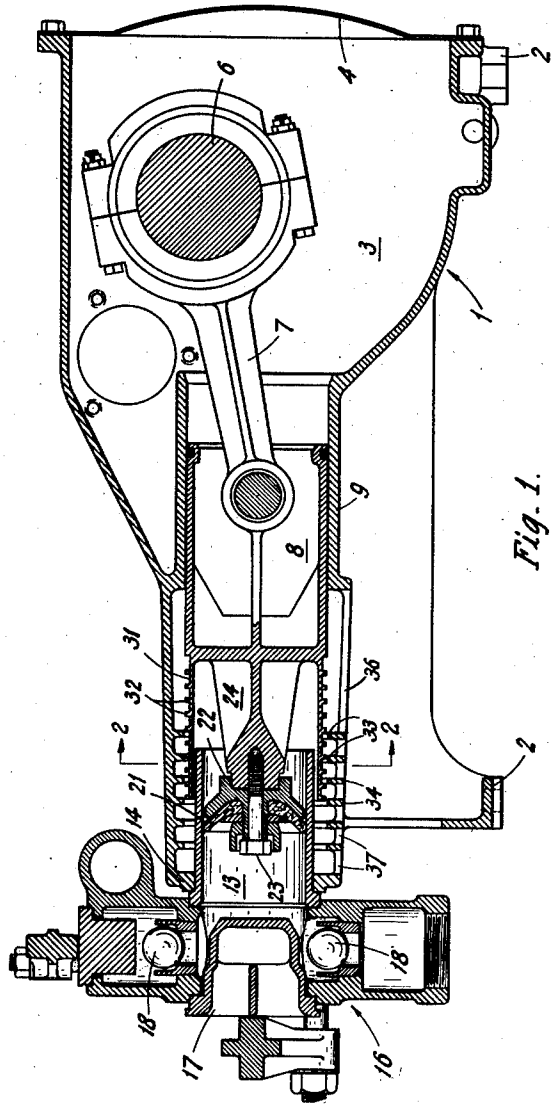


Fig. 1.

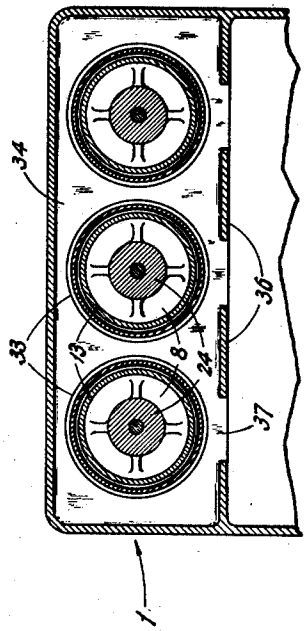


Fig. 2.

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SPRAY PUMP

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13 Claims. (Cl. 103—202)

This invention relates to high pressure pumps of the type used in spray rigs and the like and more particularly to an improved pump of the character referred to which provides for effective disposal of work fluid which leaks past the piston.

Heretofore, to our knowledge, in pumps of the general character referred to, the devices which function to prevent pump fluid which leaks past the pump piston from passing along the plunger rod and into the crankcase usually take the form of seal around the plunger rod, as for example, a stuffing box having a packing which is compressed against the rod by means of a gland nut through which the rod works. Such packings wear rapidly, and require frequent gland adjustment and correspondingly frequent replacement. Moreover, even with the most efficient seals of the above character, some liquid leaks past the seal into the crankcase to dilute the oil thereof. Wear of the character referred to, and the resultant crankcase oil dilution by work fluid which leaks past the pump piston, have formed especial handicaps in the spray pump art in which our invention is especially useful, because spraying pressures are high, and because the spray fluid is usually a corrosive chemical containing particles of solid abrasive material. Thus, any degree of dilution of the crankcase oil results in harmful erosive and corrosive action on the bearing parts of the pump. It is highly desirable, therefore, that such fluids be kept out of the crankcase and away from the bearing parts of a pump.

The above noted disadvantages are substantially eliminated in a pump embodying our invention by the provision of effective means for preventing entry of leakage spray or work fluid into the crankcase, such means comprising preferably a labyrinth baffle which is non-wearing in character and which directs leakage work fluid through paths leading away from the crankcase and out of the pump. In a preferred embodiment, the baffle may be formed as a cup-shaped member movable with the piston to telescope over the open end of the cylinder, and having a series of annular baffles thereon which telescope within a stationary series of annular baffles in wiping relation thereto.

It is a general object of our invention to provide a pump in which the crankcase is maintained permanently free of work fluid.

Another object of the invention is to provide a pump of the character referred to, in which work fluid which leaks past the pump plunger is carried through paths leading away from the crankcase.

Another object of the invention is to provide a pump of the character referred to, in which baffle means is provided between the pump cylinder and crankcase to dispose of work fluid which leaks past the pump plunger and thereby prevent entry of such leakage fluid into the crankcase.

Further objects will become manifest to those skilled in the art as the description of a preferred embodiment proceeds in connection with the accompanying drawing, in which:

Fig. 1 is a view in sectional elevation of a pump embodying a preferred form of our invention, the view being taken in a vertical plane through the axis of a pump cylinder;

Fig. 2 is a vertical transverse section taken in the plane of the line 2—2 of Fig. 1.

Our invention is disclosed as embodied in a multi-cylinder high pressure spray pump of the horizontal type, with which it is especially useful. Generally, the means for disposing of leakage work fluid includes a labyrinth baffle which is preferably formed as a cup-shaped shield movable with the piston to telescope over the cylinder, together with a series of stationary baffles forming a grill around the pump cylinder and open at the bottom, and a series of reciprocating baffles forming a grill on the cup-shaped shield which is movable with the pump plunger to telescope over the pump cylinder and within the stationary grill in wiping relation thereto.

Referring to the drawing, the pump includes casing 1 providing a frame which can be secured in place by suitable connecting means applied to pads 2. Crankcase portion 3 is formed in casing 1 at the open end thereof closed by cover 4. Within crankcase portion 3, crank shaft 6 is suitably journaled and is operatively connected by eccentric or connecting rod 7 with crosshead 8 slidably mounted in cross head guideway 9 formed in casing 1. As seen in Fig. 2, three cylinders are provided in the pump, but as all are similar, only one will be described.

Each of the cylinders is formed by a liner removably mounted in casing 1 for cooperation with a piston removably carried by the associated cross head. To dispose of leakage work fluid which passes the piston, a cup-shaped shield is provided for movement with crosshead to telescope over the cylinder and form labyrinth baffling. Also, the casing and shield are each provided with respective series of annular baffles forming cooperating grills disposed in wiping relation to control the path of flow of the leakage fluid after

such fluid leaves the shield. Cylinder 13 (Fig. 1) is removably secured within boss 14 of casing 1 and has cylinder head 16 secured thereon. Cylinder head 16 is provided with closure 17 and also conventional intake and discharge ball check valves 18. Any suitable connecting means may be provided for mounting cylinder 13 on casing 1 in axial alignment with crosshead guideway 9. The piston comprises packing 21 suitably clamped in packing retainer 22, which is secured by stud 23 on extension 24 of crosshead 8.

For the purpose of preventing entry of leakage fluid into the crankcase, the crosshead is provided with a cup extension forming a shield which extends over and telescopes the pump cylinder and is provided around its exterior with spaced apart annular ribs or baffles forming a grill movable in telescopic relation with respect to stationary annular baffles on casing 1 forming a grill which is concentric with the cylinder. Crosshead 8 has cup-shaped extension 31 provided with a series of annular ribs 32. Extension 31 is positioned between cylinder 13 and a series of stationary annular baffles 33 formed within casing 1 by a series of transverse apertured walls 34, one of which is seen in Fig. 2. Walls 34 are connected and braced by bracing webs 36 which are spaced apart to provide openings 37 directly below each cylinder 13. Only a slight clearance is provided between baffles 32, 33 so that they are disposed in wiping relation.

In operation, the reciprocation of the piston from crank shaft 6 draws the work fluid in past one valve 18 and out past the other in the usual manner. Any leakage work fluid passing the piston is discharged from cylinder 13 into the baffle cup formed by cylindrical extension or skirt 31 from which it can only pass out through the peripheral space between skirt 31 and cylinder 13, from which it is discharged between baffles 33 and through ports 37. It will be noted that most of such fluid will be discharged through the left most ports 37 as seen in Fig. 1 and that the annular spaces between respective baffles 32, 33 provide blind paths for disposing of any fluid caught therebetween without the possibility of such fluid being carried back into the crankcase. The cooperating baffles 32, 33 during their relative reciprocation, effect removal of any work fluid from baffles 32 onto and past baffles 33.

Because of the close cooperating wiping relation between baffles 32, 33, there is no possibility of an air current to carry fluid or vapor back toward the crankcase. Thus, baffles 32 on skirt 31 tend to entrain such mist and fluid as overhangs skirt 31, as well as to sweep drops from the overhanging portions of baffles 33 and deposit such fluid in the grooves between baffles 32 so that such fluid flows around and down to the lower side of skirt 31. Any drops of fluid hanging from baffles 32 are wiped off by the lower portions of baffles 33, and such fluid passes through apertures 37 and out of the pump. As stated above, the greater portion of fluid escapes through the left hand ports 37, the residue rapidly diminishing during the intake stroke as the ports toward the right are progressively reached by the rim of skirt 31.

It will be noted that baffles 32 on skirt 31 are so spaced apart that baffles 32 in their movement alternately open and substantially close the spaces between baffles 33. This construction appears to aid in preventing fluid from passing in the direction of the crankcase since the fluid has substantially no free path longitudinally of the cylinder. It is also to be noted that in the furthest displacement of skirt 31 in the discharge stroke of the piston, end baffle 32 adjacent crosshead 8 is still positioned to the right of the adjacent end baffle 33. It will be seen also that the labyrinth construction presents a relatively large fluid receiving space and large related surfaces whereon fluid may collect and that even a very large amount of leakage fluid will be deflected by the same, and positively directed away from the crankcase.

Having described a preferred embodiment of our invention and explained the principle thereof, it will be apparent that the same may be variously embodied by those skilled in the art, and it is to be understood, therefore, that we consider ourselves entitled to all such modifications as fall within the purview of the claims.

We claim:

1. In a horizontal spray pump; a casing having a crankcase, a cylinder, and a guideway therein; a piston in said cylinder; a crosshead carrying said piston and mounted for reciprocation in said guideway; a series of annular baffles in said casing around said cylinder and spaced therefrom; a baffle skirt on said crosshead and telescoping over said cylinder and within said series of baffles; and a series of annular baffles on said skirt in wiping relation with said first-named series of baffles.

2. In a pump, a casing provided with a crankcase portion, a piston and cylinder receiving chamber, and a crosshead guideway therebetween; said piston and cylinder receiving section further providing a series of spaced baffle forming walls coaxially apertured to form a cylinder space; a pump cylinder in said space in spaced relation to and coaxially of said series of baffle forming walls; a crosshead mounted for movement in said guideway; a piston on said crosshead and extending into working relation with said pump cylinder; a deflector skirt secured to the crosshead and extending in the direction of said piston and telescoping over said cylinder and within said apertured walls; and a series of annular baffles on said skirt for movement along and in close proximity to the surfaces of said baffle forming walls.

3. In a pump, a cylinder, a piston therein, a crosshead therefor, means for driving said crosshead, and baffle means carried by the crosshead and telescoping over the cylinder for preventing travel of piston leakage along the crosshead toward said driving means.

4. In a horizontal pump, a cylinder, a working piston therein, and a labyrinth baffle associated with said cylinder for disposing of fluid leaking past said piston, said baffle comprising a reciprocative section having a series of annular baffles, and a stationary section having a series of annular baffles surrounding the path of movement of said reciprocative section.

5. In a horizontal pump, a casing, a cylinder in said casing, a piston in said cylinder, operating means for said piston comprising a crosshead, a series of annular baffles coaxial with said cylinder, a deflector skirt on said crosshead and disposed to reverse the flow of leakage from the pump cylinder, and disposed to sweep past said baffles upon reciprocation of said crosshead.

6. In a horizontal pump, a casing, a cylinder in said casing, a piston in said cylinder, operating means for said piston comprising a crosshead, a series of annular baffles coaxial with said cylinder, a deflector skirt on said crosshead and dis-

posed to reverse the flow of leakage from the pump cylinder and having a series of annular baffles disposed to sweep past said first-named baffles upon reciprocation of said crosshead.

7. In a horizontal spray pump, a crankcase, a cylinder, a working piston in said cylinder, an annular baffle grill surrounding said cylinder in spaced relation therefrom, and a cup-shaped member movable with said piston and telescoping over said cylinder and within said grill.

8. In a horizontal spray pump, a crankcase, a cylinder, a working piston in said cylinder, an annular baffle grill surrounding said cylinder in spaced relation therefrom, and a cup-shaped member movable with said piston and telescoping over said cylinder and within said grill, said member having an annular baffle grill disposed in wiping relation with said first-named grill.

9. The combination with a horizontally disposed pump cylinder having a piston working therein, and a guide bearing for said piston, of a cup-shaped member movable with the piston and telescoping said cylinder in spaced relation therefrom to provide a labyrinth baffle for controlling the flow of leakage work fluid to direct such fluid away from said guide bearing.

10. The combination with a horizontally disposed pump cylinder having a piston working therein, of a cup-shaped member movable with the piston and telescoping said cylinder in spaced relation therefrom to provide a labyrinth baffle for controlling the flow of leakage work fluid, and means for receiving and directing such fluid away from said member.

11. A device for preventing leakage fluid from passing from a cylinder-piston assembly to the power drive thereof comprising means forming a recessed chamber surrounding the cylinder of the pump and provided with a series of parallel spaced baffle plates, and baffle means mounted for reciprocation with the piston and forming a labyrinth baffle with said baffle plates.

12. In a pump, a cylinder, a piston therein, a cup-shaped member movable with said piston and telescoping over said cylinder, and means in wiping relation with the exterior of said cup-shaped member for receiving and directing leakage fluid away from said member.

13. In a pump, a cylinder, a piston therein, a cup-shaped member movable with said piston and telescoping over said cylinder, and a series of baffles in wiping realtion with the exterior of said cup-shaped member for removing leakage fluid therefrom.

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