March 2, 1943. R. M. MAGNUSON 2,312,430

PUMP PISTON PACKING

Filed Oct. 9, 1941

FIG. 1

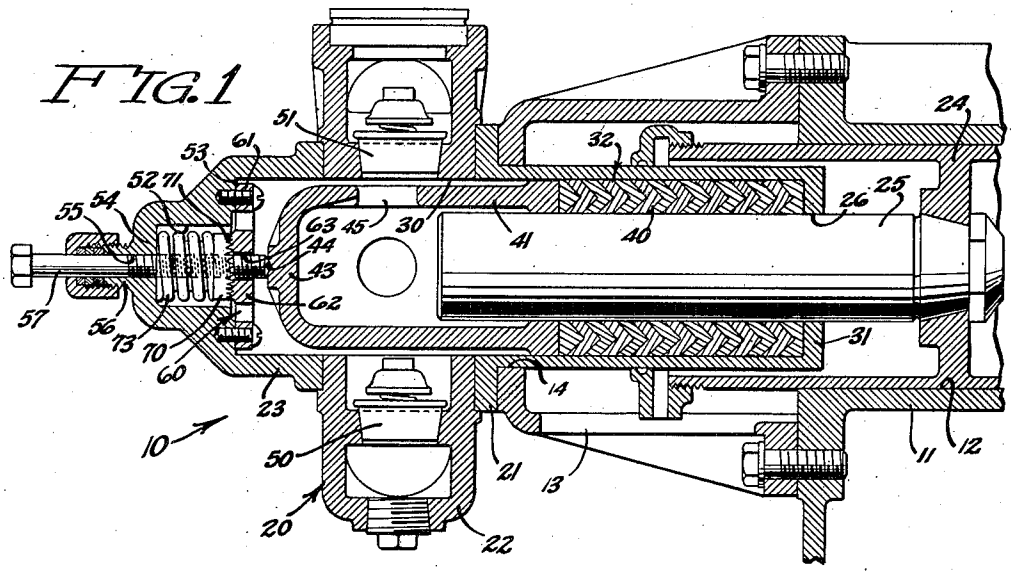


FIG. 2

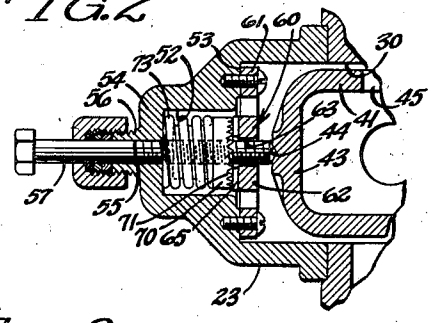
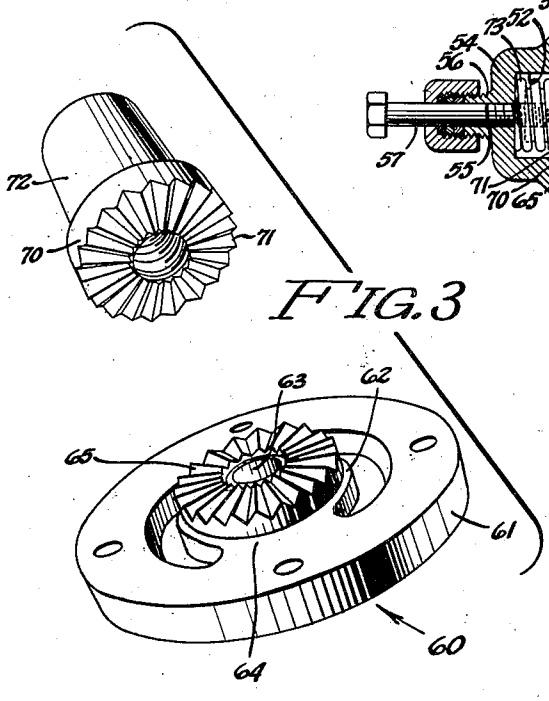


FIG. 3



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PUMP PISTON PACKING

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5 Claims. (Cl. 286—14)

This invention relates to pumps and particularly pumps of the ram type in which the piston itself extends through a stuffing box.

Pumps of this general type are employed where high liquid pressures are required and it is necessary to maintain the stuffing box relatively tight in order to prevent leakage. It is possible, however, to tighten this box to such an extent as to cause damage to the piston and it is difficult to prevent this happening where these pumps must be operated without expert supervision.

It is accordingly an object of my invention to provide a pump of the type mentioned in which adequate pressure may be maintained on the packing about the piston while at the same time preventing the accidental application of sufficient pressure to this packing to damage the piston.

It is a further object of my invention to provide a pump of the type mentioned in which means is provided for giving a signal to a person adjusting the pressure on the packing when that pressure reaches a pre-determined value.

The manner of accomplishing the foregoing objects, as well as further objects and advantages will be made manifest in the following description taken in connection with the accompanying drawing, in which:

Fig. 1 is a diagrammatic cross sectional view of a pump illustrating a preferred embodiment of my invention.

Fig. 2 is a fragmentary view of a portion of the structure shown in Fig. 1 and illustrating the operation of the signal giving means of the invention.

Fig. 3 is an enlarged perspective view of the principal operating elements in the signal giving means of the invention.

Referring specifically to the drawing, these show a pump 10 which includes a crank case 11 providing a cross head slideway 12 and having secured thereto a cylinder supporting frame 13, the latter having an opening 14 concentric with the slideway 12. Fitting into the opening 14 and secured to the frame 13, is a cylinder assembly 20 which includes a cylinder 21, a valve head 22 and a cylinder head 23.

Slidable in the slideway 12 is a cross head 24 carrying a ram type piston 25 which extends into an opening 26 formed in the lower end of the cylinder 21. The cylinder assembly 20 has a pump chamber 30 which is substantially larger than the diameter of the piston 25, the right hand or lower end of the chamber 30 disposed outside the piston 25 being closed by an annular wall 31 provided on the cylinder 21.

Disposed in the chamber 30 about the piston 25 is a stuffing box 32 in which a quantity of packing 40 is compressed between the wall of the cylinder and the piston 25 by a gland or packing follower 41. The left hand or upper end of the follower 41 has an end wall 43 provided with a screw centering depression 44. The follower 41 also has suitable openings 45 through which liquid may circulate in the pumping operations of the pump 10.

The valve head 22 is provided with suitable intake and exhaust valves 50 and 51 which are constructed in a manner well known in the art and are provided for the purpose of facilitating the pumping of liquid by the pump 10 when the piston 25 is reciprocated in the pump chamber 30.

The cylinder head 23 has a subordinate bore 52, a shoulder 53 between this bore and the pump chamber 30 and an end wall 54 through which extends a screw hole 55 about which is formed a bonnet stuffing box 56. Extending inwardly through this hole and stuffing box is a screw 57, the inner end of which is adapted to rest in the screw centering depression 44 in the packing follower 41.

The cylinder head 23 also has a guide spider 60, this spider including a ring 61 which rests against and is secured to the shoulder 53, and a hub 62 which has a screw guiding hole 63 and is connected to the ring 61 by webs 64. The hub 62 has an annular serrated upper face providing teeth 65 which radiate outwardly from the center of the hole 63. Screwed onto the screw 57 and disposed in the bore 52 of the head 23 is a nut 70 having a radially serrated face providing teeth 71 which are adapted to mesh with the teeth 65 of the spider 60. Portion 72 of the nut 70 is turned down so as to extend into a helical expansion spring 73 coiled thereabout and also disposed in the bore 52.

Operation

In the normal operation of the pump 10 the piston 25 reciprocates in the packing 40 thus causing liquid to be sucked through the valve 50 into the pump chamber 30 and expelled from the latter through the valve 51. The liquid pressure heads against which the pump 10 operates are usually very high so that it is necessary to maintain considerable pressure on the packing 40 in order to prevent liquid leaking outwardly between this packing and the piston 25. My invention provides a means whereby this may be accomplished without the danger of inadvertent-

ly applying so much pressure to the packing 40 as to damage the piston 25.

This means is embraced in the follower 41 and in the mechanism provided on the head 23. The spring 73 is selected so that the pressure required to compress this spring from the position in which this is shown in Fig. 1 to the position in which it is shown in Fig. 2 is that maximum pressure which can safely be applied to the packing 40 by the follower 41. Thus whenever it is desired to tighten up the packing 40 the operator applies a wrench to the head of the screw 57 and rotates this screw. It being assumed that at this time the follower 41 is not applying the maximum pressure aforesaid against the packing 40, the spring 73 will be forcing the nut 70 toward the spider hub 62 so that the teeth 71 of this nut will mesh with the teeth 65 of this hub, as shown in Fig. 1. The meshing of these teeth prevents the rotation of the nut 70 relative to the hub 62 so that the rotation of the screw 57 causes this to be screwed through the nut 70 and shift the follower 41 toward the wall 31, thereby compressing the packing 40.

When the pressure thus applied by the follower 41 to the packing 40 equals the maximum which it is desired to be appplied to the packing, the nut 70 starts compressing the spring 73 thereby withdrawing the teeth 71 from meshing relation with the teeth 65. Thus freed, the nut 70 rotates with the screw 57 when the latter is further rotated, thus making it impossible for the operator to place any higher pressure aginst the packing 40 than that just necessary to compress the spring 73 enough to disengage the nut 70 and permit this to rotate with the screw.

The disengagement of the teeth 71 from the teeth 65 and the rotation of the nut 70 are naturally accompanied by a clashing of the two sets of teeth against each other. This produces a metallic sound which is an audible signal to the operator that he has applied the maximum amount of pressure possible to the packing 40 so that he may discontinue rotating the screw 57.

It is also to be noted that after thus having operated the pressure applying mechanism of my invention the pressure of the spring 73 against the packing 40 is maintained until the latter has worn down to such an extent that the spring is able to force the nut 70 toward the spider hub 62 sufficiently to reseat the nut 70 snugly against the hub 62 with the teeth 71 and 65 snugly meshing with each other.

What I claim is:

1. In a pump the combination of: means forming a chamber having a piston opening; means forming a stuffing box about said opening; a piston extending through said stuffing box; means for applying pressure to the packing in said stuffing box to cause the packing to more tightly conform to said piston; and means giving an audible signal to the operator when said pressure has reached a pre-determined value.

2. In a pump the combination of: means forming a pump chamber having a piston opening; means forming a stuffing box about said opening; a piston extending through said stuffing box; means for applying pressure to the packing in said stuffing box to cause the packing to more tightly conform to said piston; and means rendering said pressure applying means inoperative to apply increased pressure to said packing when the pressure applied to said packing has reached a given value.

3. In a pump the combination of: means forming a pump chamber having a piston opening; means forming a stuffing box about said opening; a piston extending through said stuffing box; means for applying pressure to the packing in said stuffing box to cause the packing to more tightly conform to said piston; means rendering said pressure applying means inoperative to apply increased pressure to said packing when the pressure applied to said packing has reached a given value; and means for giving a signal to the operator when the pressure applied to said packing has reached said value.

4. In a pump the combination of: a pump cylinder having a piston opening and a cylinder head opposite said opening; a piston extending through said opening; means forming a stuffing box about said piston and including packing and a follower to apply pressure to said packing; a pressure screw provided in said head and positioned to apply pressure to said follower and to be operated from the exterior of said head; a nut on said screw; spring means between said nut and said head for applying pressure to said nut and through said nut and said screw to said follower when said screw is screwed through said nut; and means for preventing the rotation of said nut with said screw until said spring pressure has reached a pre-determined value and then releasing said nut for rotation with said screw.

5. In a pump the combination of: a pump cylinder having a piston opening and a cylinder head opposite said opening; a piston extending through said opening; means forming a stuffing box about said piston and including packing and a follower to apply pressure to said packing; a pressure screw provided in said head and positioned to apply pressure to said follower and to be operated from the exterior of said head; a nut on said screw; spring means between said nut and said head for applying pressure to said nut and through said nut and said screw to said follower when said screw is screwed through said nut; and inter-engaging teeth formed on said nut and said head for preventing the rotation of said nut relative to said screw until the pressure applied to said follower by said screw is sufficient to cause said nut to compress said spring and cause said teeth to disengage.

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