Dec. 18, 1928. 1,695,305

C. B. UPTON

RAM

Filed Oct. 20, 1926 2 Sheets-Sheet 1

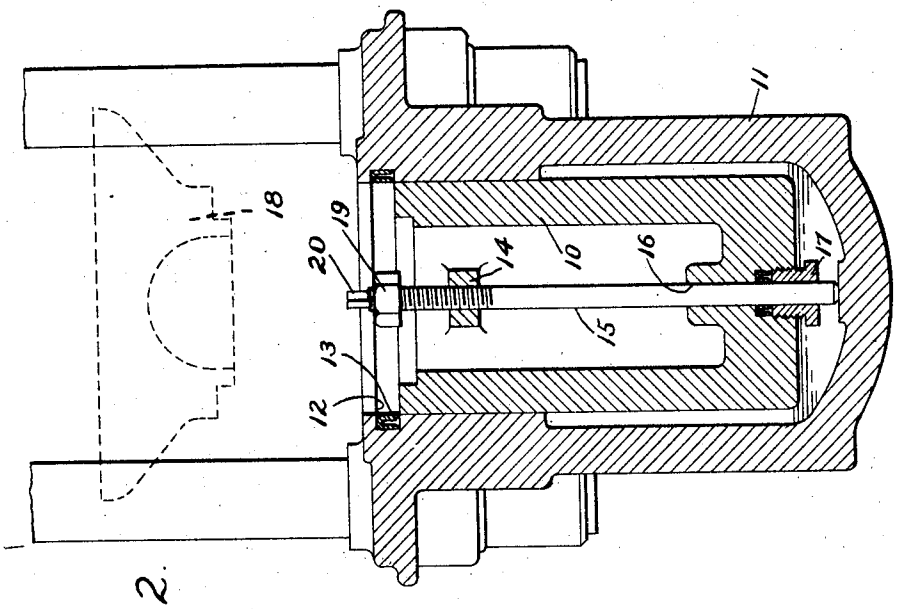


Fig. 2.

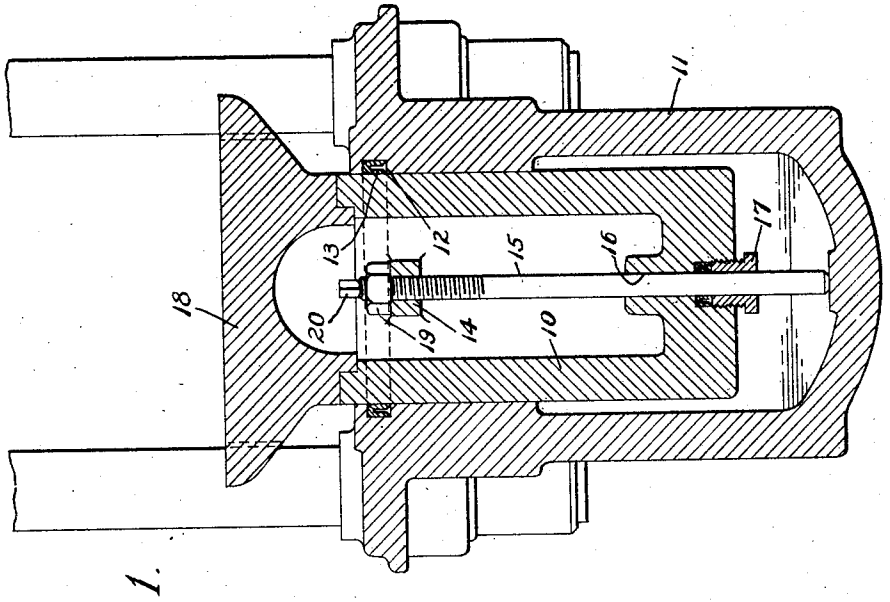


Fig. 1.

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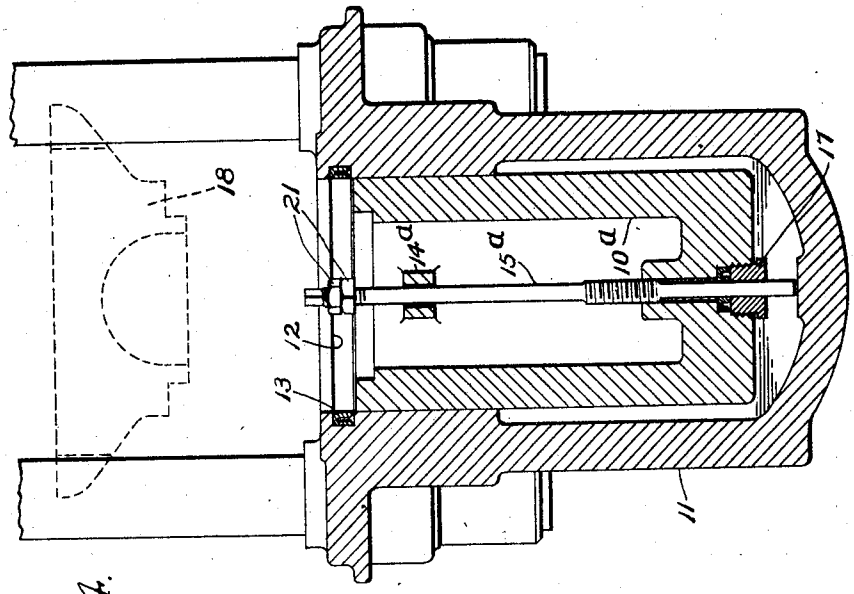


Fig. 4.

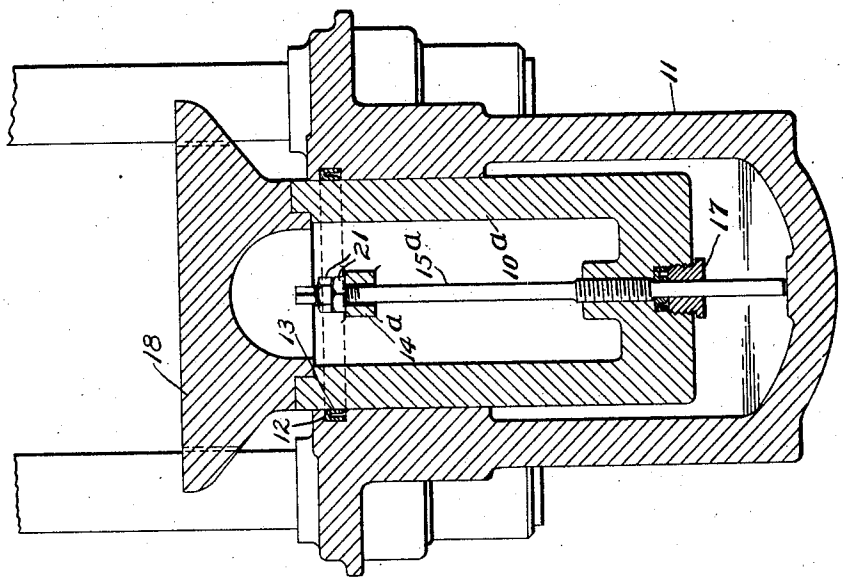


Fig. 3.

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UNITED STATES PATENT OFFICE.

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RAM.

Application filed October 20, 1926. Serial No. 142,955.

This invention relates to rams, and particularly to rams for hydraulic presses. In such rams it is customary to provide a packing in the upper end of the cylinder to prevent leakage of the pressure liquid which operates the piston of the ram. In the case of single piece rams which were formerly used, it was necessary, in order to renew the packing, to remove the plates or other parts placed above the piston, and to lift the piston out of the cylinder in order to gain access to the packing for renewing it. This work required the attention of several men for several hours with the consequent loss from the shutting down of the press. To facilitate the renewal of the packing, rams have been made heretofore with the piston in two or more sections, so that part of the piston could be removed in order to expose the packing when the packing was to be renewed. In such rams the inner section was then moved inwardly to expose the packing above its outer end. Objections to the two-piece construction of the piston are that it is expensive, and that during the operation of the press the joint moves across the packing, and wears or cuts, and sometimes tears out the packing, thus requiring more frequent renewals of the packing. An attempt was made to prevent injury to packing by the movement of the joint of the two-piece piston across the same during the operation of the ram, by placing the packing groove quite a considerable distance inwardly from the open end of the cylinder, but this was unsatisfactory because the groove was not conveniently accessible for the replacement or insertion of the packing.

An object of this invention is to provide an improved ram with which the packing for the piston may be easily removed in a simple manner without dismantling or taking apart the piston; with which a more perfect packing effect may be obtained; with which the packing may be renewed with a minimum of operations and in a minimum of time; and which will be relatively simple, effective, and inexpensive.

Further objects and advantages will be apparent from the following description of an embodiment of the invention, and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawings,

Fig. 1 is a sectional elevation of a ram constructed in accordance with the invention, and illustrating one embodiment thereof, the piston being shown in its normal inward position;

Fig. 2 is a similar elevation, but showing the piston in the position which it occupies while the packing between the cylinder and the piston is being renewed;

Fig. 3 is a sectional elevation similar to Fig. 1, but illustrating another embodiment of the invention; and

Fig. 4 is a sectional elevation similar to Fig. 3, but showing the piston in its inward position while the packing is being renewed.

In the embodiment of the invention illustrated in Figs. 1 and 2, a piston 10 is mounted for reciprocation in and closes the open end of a cylinder 11, and the wall of the cylinder is provided with an annular groove 12 closely adjacent to its open end for receiving a packing ring 13 or other packing device which acts against the outer peripheral surface of the piston in order to seal the joint between the piston and the cylinder. This annular groove 12 is placed nearer the open end of the piston than has been customary heretofore, and the piston 10 is made of a single piece which projects outwardly of the cylinder and beyond the packing ring while in its normal inward limit of movement as shown in Fig. 1. The piston may be somewhat cup-shaped, if desired, as shown in Figs. 1 and 2, and provided in its interior with a stiffening cross-bar 14. The inward movements of the piston may be limited by an adjustable limit rod 15, and the latter may be and preferably is carried by the piston. In this embodiment of the invention, the rod 15 is threaded through the cross-bar 14, and also slidingly and rotatably mounted in a passage 16 in the inner end of the piston. The rod 15 extends entirely through the piston from end to end, and also is removable endwise therethrough. Its inner end is engageable with the inner or closed end of the cylinder as the piston moves inwardly, and thus it serves to limit the inward movement of the piston. Obviously by rotating the rod 15 it will be threaded through the piston to variable extents, and

thus one may selectively vary the point at which the inward movement of the piston will be checked by reason of the engagement of the inner end of the rod with the end of the cylinder.

The passage 16 of the piston, through which the rod 15 passes, is provided at the inner end of the piston with a suitable packing gland or device 17 through which the rod 15 passes and which effectively seals the joint between the piston and the rod 15. A platen 18 may be detachably connected to the outer end of the piston, as usual in hydraulic rams. The rod 15 may be locked in different adjusted positions in any suitable manner such as by a lock nut 19 which is threaded upon the rod 15 and engagable with the cross-bar 14. The upper end of the rod 15 may be made square or otherwise non-circular, as at 20, so that it will receive a tool or wrench by which the rod 15 may be rotated.

Referring particularly to Fig. 1 the ram is shown as in the position occupied when it is in its normal inward position. This position is determined and may be varied by threading the rod 15 through the piston to the desired extent, so that it will strike the inner end of the cylinder when the piston reaches its desired normal inward position. In this position, the outer end of the piston preferably extends just outwardly beyond the outer end of the cylinder, and the rod 15 may be locked in this position by tightening the nut 19 against the cross-bar 14. The piston reciprocates outwardly, and then returns to this position during its normal movements, and at no time during normal movements does the outer end of the one-piece piston cross the packing 13 in the cylinder wall.

When one desires to renew the packing 13, the platen 18 is elevated above the piston so as to expose the squared end 20 of the rod 15. The nut 19 is then loosened and the rod 15 rotated so as to retract it somewhat through the piston and allow further inward movement of the piston into the position shown in Fig. 2, where the outer end of the piston uncovers and exposes the groove 12 in which the packing 13 is disposed. The groove 12 being arranged very closely adjacent to the outer end of the cylinder is very readily accessible for renewal of the packing material. As soon as new packing has been placed in the groove, the rod 15 is again rotated to force it further inwardly through the piston and against the inner end of the cylinder, and during this rotation the piston 10 will be forced outwardly into the position shown in Fig. 1, which will be the normal inward position of the piston.

Referring now to Figs. 3 and 4, the ram illustrated is very similar to that shown in Figs. 1 and 2, except that the rod 15ª, corresponding to rod 15, instead of being threaded through the cross-bar 14ª as in Figs. 1 and 2, is passed loosely therethrough and is threaded into the inner end of the piston 10ª. The end of the rod 15ª which passes through the inner end of the piston is surrounded by a packing device 17 similar to that of Figs. 1 and 2 to prevent escape of the pressure fluid along the rod. The outer end of the rod 15ª is preferably reduced somewhat in diameter and at its outer end which passes through the cross-bar 14ª is threaded for receiving one or more lock nuts 21. The inner end of the rod 15ª beyond the threads is also slightly reduced in diameter and it is this section which moves through the packing so that the threads never enter or injure the packing material of the device 17. After the rod 15ª has been adjusted to the desired extent through the piston, the lock nuts 21 may be tightened upon the rod 15ª and against the cross bar 14ª so as to lock the rod 15ª against further and unintentional rotation. The changing of the packing in the annular groove in the cylinder is accomplished in the same manner in Figs. 3 and 4 as in Figs. 1 and 2, and corresponding parts are designated by corresponding reference characters.

It will be observed that in both embodiments of the invention which have been illustrated, the outer end of the one-piece piston will never cross the packing and cut it during the normal use of the piston. The manipulations necessary to renew the packing between the piston and cylinder are very few and simple and may be performed in a minimum of time. The packing between the limit rod and the piston is also very effective and simple and therefore no leakage occurs along or through the piston. The manufacture of the piston in a single piece, reduces its cost, and with such a one-piece piston the time required to renew the packing is reduced very considerably because it is unnecessary to take the piston apart in order to reach the packing.

It will be obvious that various changes in the details, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

Claims:—

1. A ram comprising an open-ended cylinder, a piston reciprocating in and closing the open end of the cylinder, the cylinder having an internal peripheral groove closely adjacent its open end, packing means in said groove acting against the piston to seal the cylinder, a limit rod threaded through and carried by the piston and engageable with the inner end of the cylinder to limit the inward movement of the piston, the rod

being adjustable to various extents through the piston by rotation, whereby the rod may be set to limit the normal piston movement inwardly before it uncovers and exposes said groove, and may also be adjusted to permit further inward movement of the piston sufficient to uncover and expose the groove when renewal of the packing means therein is desired, and a packing device acting between the rod and piston at a point located between the threaded connection of the rod and piston and the inner end of the piston beyond the range of the threads of the rod, whereby the packing device will be uninfluenced by the threads of the rod as the rod moves through the piston sufficiently to change the limit for the inward movement of the piston.

2. A ram comprising an open-ended cylinder, a cup shaped piston reciprocating in and closing the open end of the cylinder, with the open end of the cup of the piston at the open end of said cylinder, said cylinder having an annular groove in the wall of the chamber in which said piston reciprocates at a point closely adjacent the open end of the cylinder, packing means in said groove acting against the piston to seal the joint between said piston and cylinder, a limit rod extending through the inner closed end of the piston and coacting with the inner end of the cylinder to limit the inward movement of said piston, said piston also having a support extending across the interior thereof adjacent its open end and supporting said rod while permitting its movement therein, said rod being adjustable endwise through said piston to vary the inner limit of movement of said piston from a normal position in which the outer end of said piston does not cross said packing means during its normal operation, to a temporary position in which it crosses and exposes said groove and packing means to enable repairs to or replacement of said packing means, and means at the inner end of said piston for sealing the passage thereof through which said rod passes.

3. A ram comprising an open-ended cylinder, a one-piece piston reciprocating in and closing the open end of the cylinder, the cylinder having an internal peripheral groove closely adjacent its open end, packing means in said groove acting against the piston to seal the cylinder, a limit rod threaded endwise through and carried by the piston and engageable with the inner end of the cylinder to limit the inward movement of the piston, the outer end of said rod being formed for the reception of a tool by which the rod may be turned in either direction, said rod having an abutment engageable with said piston to determine the maximum extent to which the rod is threaded through the piston inwardly of the cylinder, whereby when said abutment engages said piston, said rod will prevent inward movement of the piston sufficiently far to uncover said groove and expose said packing means, and when said rod is retracted outwardly said piston may move inwardly sufficiently to uncover said groove and packing means for inspection, repairs or replacement of said packing means, and packing means carried by said piston around said rod between the threaded section of said rod and the inner end of said piston.

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