Jan. 8, 1952 F. HALWARD 2,582,030

PISTON LOCK FOR DIE CASTING AND OTHER MACHINES

Filed Nov. 30, 1950 2 SHEETS--SHEET 1

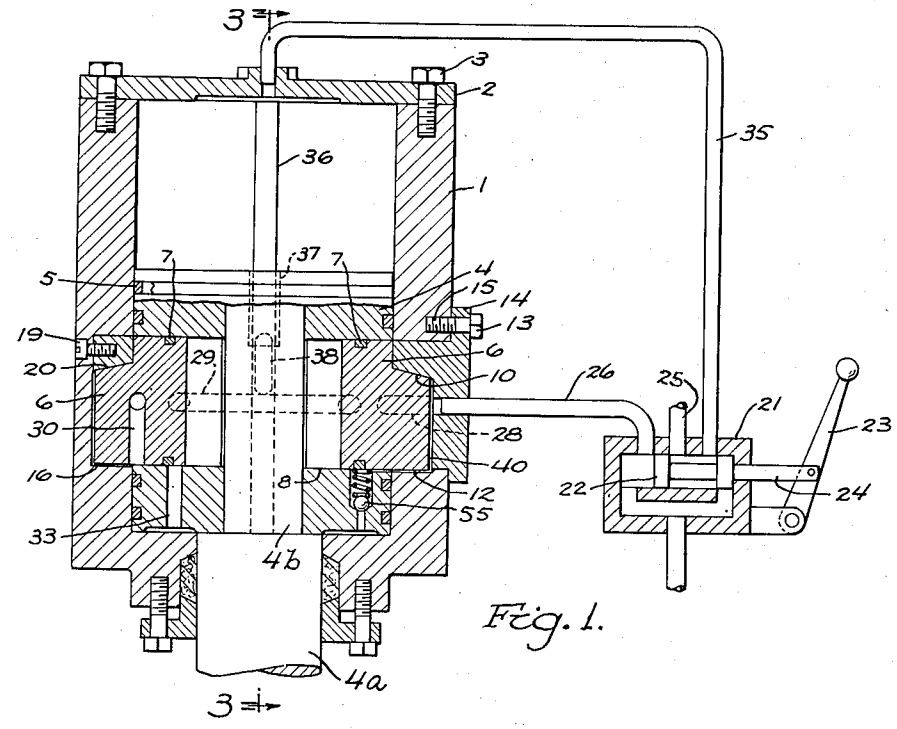


Fig. 1.

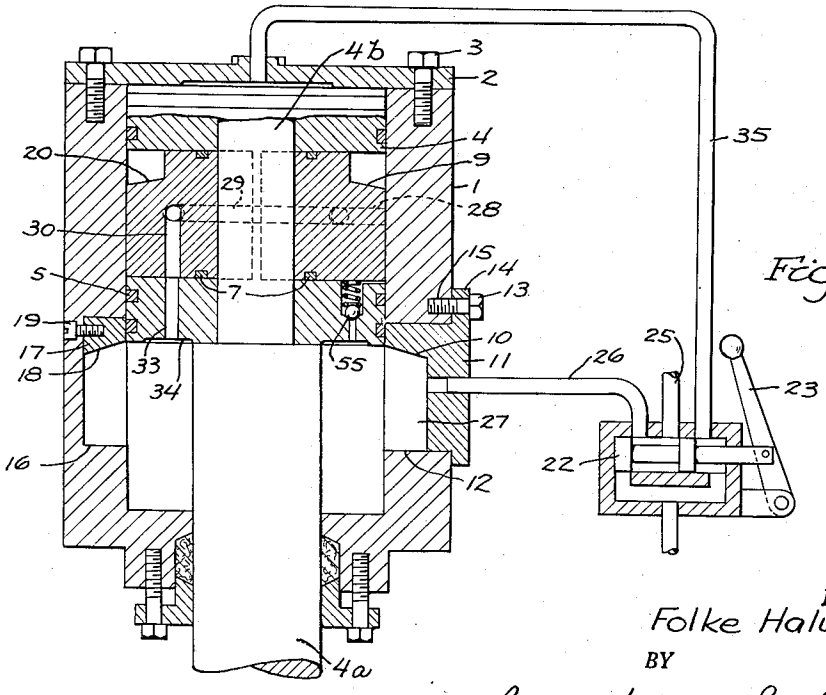


Fig. 2.

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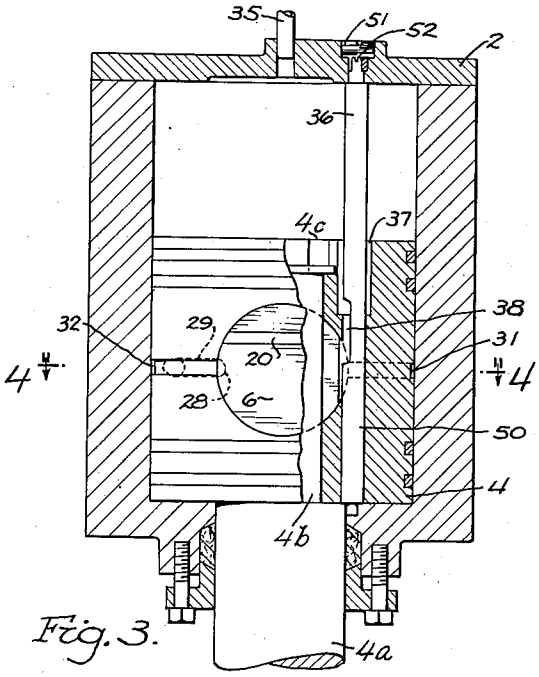


Fig. 3.

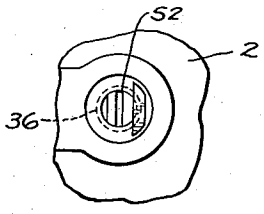


Fig. 5.

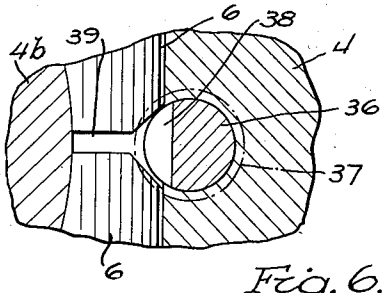


Fig. 6.

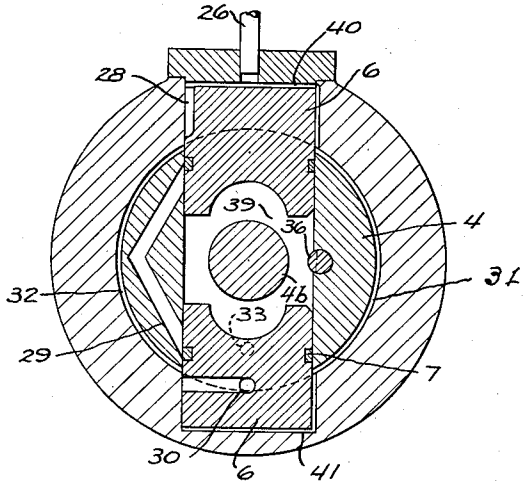
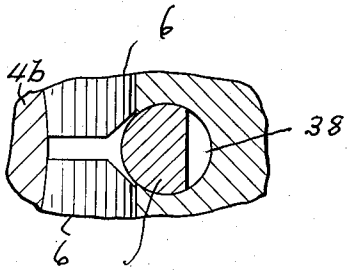


Fig. 4.



36 Fig. 7.

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UNITED STATES PATENT OFFICE

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PISTON LOCK FOR DIE CASTING AND OTHER MACHINES

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Application November 30, 1950, Serial No. 198,457

9 Claims. (Cl. 121—40)

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This invention relates to piston locks for die casting and other machines. The present invention is an improvement on the invention described and claimed in my Patent No. 2,532,768 of December 5, 1950. These piston locks are desirable in machines, particularly die casting machines where the piston moves to a position and then dwells during an operation. In die casting machines the dies are subjected to very heavy pressures when the molten metal is forced between the dies. It is desirable to have a piston lock to lock the piston that moves one of the dies into the closed position. The piston lock obviates the necessity of having heavy hydraulic pressure to resist the tendency of the dies to separate when the molten metal is forced into the closed dies. It also obviates the necessity of having a very large piston area to resist the separation of the dies.

In my patent above referred to, the piston lock is provided with poppet valves. It is the object of the present invention to do away with any moving valves of this type and to provide in place thereof ports and passageways in the sliding wedging blocks and in the piston to properly direct and control the hydraulic fluid. This makes a cheaper and more reliable structure.

Referring to the drawings:

Fig. 1 is a vertical section of a piston and cylinder with my improved piston lock showing the piston in locked position.

Fig. 2 is a similar view showing the piston in position of retreat which it assumes when the dies are separated.

Fig. 3 is a vertical section of the same parts showing the piston partly in elevation and partly in section.

Fig. 4 is a section on the line 4—4 of Fig. 3.

Fig. 5 is a top plan view of part of the cylinder head showing the end of the valve rod. The screw plug which covers the valve rod opening has been removed.

Fig. 6 is a fragmentary cross section through the cylinder and a part of the piston showing the valve rod in operative position to lock the piston.

Fig. 7 is a similar view showing the valve rod turned to make the locking system inoperative so the piston operates in the conventional way without any locking mechanism.

1 is the cylinder provided with a cylinder head 2 held in place by the bolts 3. The piston 4 reciprocates in the cylinder and is provided with the oil sealing rings 5. The locking blocks 6 are in the form of transverse sliding pistons having the oil sealing rings 7. They reciprocate in the cross passage 8 in the piston. The right hand

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locking block 6 has a shelf with an inclined surface 9 which is adapted to engage under the inclined surface 10 of the plug 11 that is secured in the recess 12 in one side of the cylinder wall 1. Bolts 13 secure the plug 11 in place by passing through the flange 14 on the plug into the threaded opening 15 in the cylinder wall.

On the other side of the cylinder (Fig. 3) recess 16 is provided on the inside of the cylinder and into this fits a segment 17 which has an inclined wedging surface 18. This segment is secured in place by the cap screws 19. When the locking blocks are expanded outwardly as shown in Fig. 1, the inclined surface 20 on the shelf engages the inclined surface 18 of the segment.

The piston 4 is carried on a piston rod 4a which has a reduced portion 4b which is secured to the end of the piston by a nut 4c shown in Fig. 3. The piston rod 4a forms a stop for the inward withdrawal of the locking block 6. These blocks are shown in their withdrawn or inward position in Figs. 6 and 7 where the blocks are up against the piston rod 4a.

It is now necessary to explain how the locking blocks are operated and controlled. I shall first describe how the locking blocks are released and the piston lifted. A valve housing 21 is provided in which slides the two headed valve 22 operated by lever 23 and connecting link 24. When the lever is in the left hand position as shown in Fig. 2 the valve is thrown to the left hand position and the hydraulic fluid, preferably oil, passes through the supply pipe 25 to conduit 26. Here it passes into the recess 27 in plug 11 and pushes the right hand locking block inwardly. When this block moves in and the recess 28 registers with the passageway 29 in the piston, the oil passes to this passageway 29, thence through an L passage 30 which opens to the bottom of the block. When the block is pressed in, the L passage 30 registers with the bore 33 in the lower end of the piston and the fluid enters the annular recess 34 in the bottom of the piston and provides pressure to cause the piston to rise from the position shown in Fig. 1 to that shown in Fig. 2.

The fluid, before it enters passageway 29 to get below the piston, passes around the piston in the segmental grooves 31 and 32. The blocks 6 are rather loose in their cylinders except as they are sealed by the piston rings 7. Consequently the oil can be delivered by the grooves 31 and 32 through the loose fit of the piston in the cylinder walls to the space behind the block and consequently push the locking block on the further side of the piston in and now the piston 4 is free to move upwardly.

Next I shall describe how the piston is pressed to its outermost position and the locking blocks spread to the locking positions. The valve control lever **23** is thrown to the right hand position shown in Fig. 1, the hydraulic fluid passes from supply pipe **25** to conduit **35** and enters the head **2** of the cylinder and presses down on the piston **4** to bring the dies, not shown, to their closed position. With the control rod **36** in the position shown in Figs. 3, 4, and 6, the oil passes down between the control rod and the passageway **37** in the head of the piston. It then passes into the notch **38** of the valve control rod and enters the space **39** between the locking blocks **6**, see Fig. 6. This enables the fluid pressure to force the blocks outwardly to the locking position shown in Figs. 1 and 4.

The valve rod **36** is of considerably less diameter than the upper passageway **37** through which it is threaded but the lower passageway **50** is substantially the same diameter as the valve rod. When the valve rod is turned as shown in Fig. 6 this allows the oil to pass through the space around the rod **36** in passageway **37** and down through notch **38** and into the space **39** between the two sliding locking blocks **6**. But, when the screw block **51** is taken out and the valve rod turned by entering a screw driver in the screw driver slot **52** it can take the position shown in Fig. 7. In this position the hydraulic fluid never gets into the space **39** to separate the blocks and hence the piston can operate without any lock. This may be desirable under some circumstances, hence it is a feature of my invention that the lock can be made to operate or can be locked out.

What I claim is:

1. A piston lock for die casting and other machines, having in combination a cylinder, a piston with a cross passage reciprocating in the cylinder, and means for locking the piston at one end of its stroke, comprising a recess within the wall of the cylinder, a locking block slidable in the piston cross passage and recess and provided with a shelf adapted to be forced into engagement with a surface of the said recess, a second sliding locking block provided with a shelf and slidable in said cross passage on the other side of the piston, a second recess on the opposite side of the cylinder in which the said second block reciprocates and having a surface adapted to be engaged by the shelf of the second locking block, the piston having a passageway leading longitudinally into the piston and opening into the space between the blocks, the upper end of the passageway having an enlarged portion and a narrower lower portion communicating with the space between the inside ends of the locking blocks, and a valve rod located in said passageway through the piston and engaged in the head of the cylinder and the bottom of the cylinder and on which the piston slides, said rod having a notch therein connecting the larger diameter upper passageway with the space between the two locking blocks when the valve rod is turned for the notch to face said space between the blocks.

2. The combination claimed in claim 1 in which the said valve rod may be turned through 180° to block communication through the passageway from the upper end of the piston to the space between the locking blocks so that the blocks are not expanded and the piston is not locked in its lowermost position when it is forced down.

3. The combination claimed in claim 1 in which the recesses in the wall of the cylinder into which the sliding blocks enter are provided with inclined surface portions which engage inclined shelves on the blocks to wedge the blocks in the recesses.

4. A piston lock for die casting and other machines having in combination a cylinder provided with opposed recesses in its wall, a piston reciprocating in the cylinder and having a cross passage, and means for locking the piston at one end of its stroke, comprising two locking blocks reciprocable in said recesses and the cross passage, a hand shut-off valve controlled fluid passageway for passing fluid from the top of the cylinder to the space between the blocks to expand the blocks and a segmental groove on the exterior of the piston to pass fluid from the space in front of one locking block around the piston to the space in front of the other locking block for the purpose of causing the locking blocks to retreat into the piston and free the piston for movement when fluid under pressure is turned into the recess in front of one of the blocks.

5. The combination claimed in claim 4 with a passageway through the piston and blocks communicating at one end with the space in front of one locking block to which pressure for releasing the locking blocks is delivered, said passageway terminating below the piston for delivering pressure from the fluid source to a space under the piston to lift the piston when the locking blocks are released and drawn inward.

6. The combination claimed in claim 5 in which the said piston has a groove on the underside into which the pressure from said passageway is delivered to start the lift of the piston.

7. A piston lock for die casting and other machines having in combination a cylinder, a piston with a cross passage reciprocating in said cylinder, a pair of blocks slidable in the cross passage of said piston and in recesses in the cylinder wall for locking the piston in its outward position, and a fluid opening through the piston and the blocks from one recess in the cylinder to the space at the outer end of the piston, said opening opened from said recess to said space only when the locking blocks are pushed inwardly when fluid pressure is supplied in front of the blocks.

8. The combination claimed in claim 7 in which the locking block that controls the passageway opening the fluid under pressure to the space below the piston is provided with a notch in its outer end connecting the space in front of the locking block to the passageway through the cylinder so as to supply fluid under pressure to the outer end of the piston.

9. The combination claimed in claim 7 in which the said fluid opening includes a passageway transverse of the piston, an L passage through one block when the block is pushed to its inner position for the mouth of the L passage to register with the end of the transverse opening, and a bore through the end of the piston when the block is in the innermost position so that the bore registers with the end of the L passage.

FOLKE HALWARD.

REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
2,532,768	Halward	Dec. 5, 1950