Oct. 7, 1952 C. McJ. ROBERSON 2,613,101

HOOK LATCH OPERATING MECHANISM

Filed Oct. 17, 1950 3 Sheets-Sheet 1

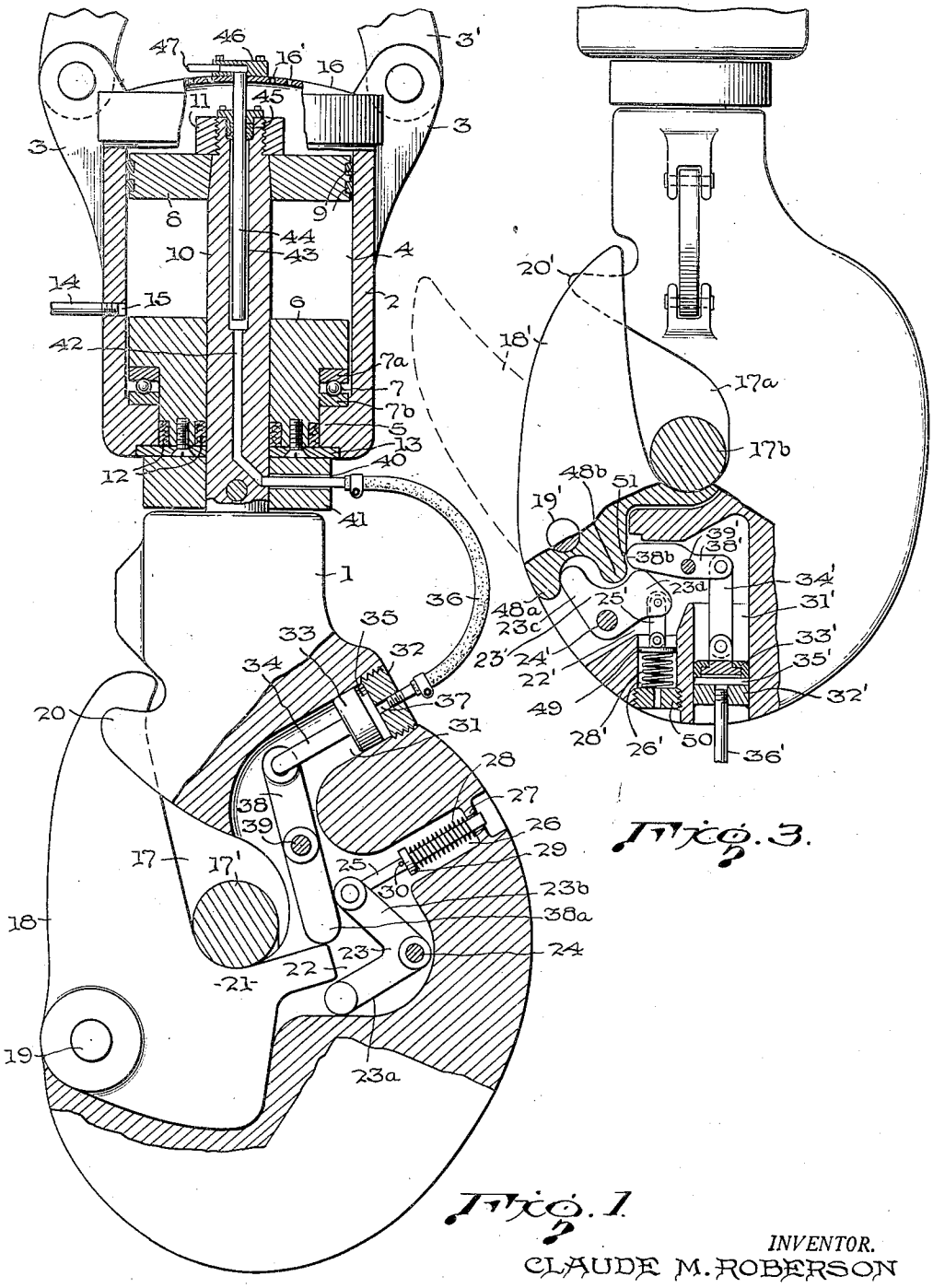


FIG. 1.

FIG. 3.

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Filed Oct. 17, 1950 3 Sheets-Sheet 2

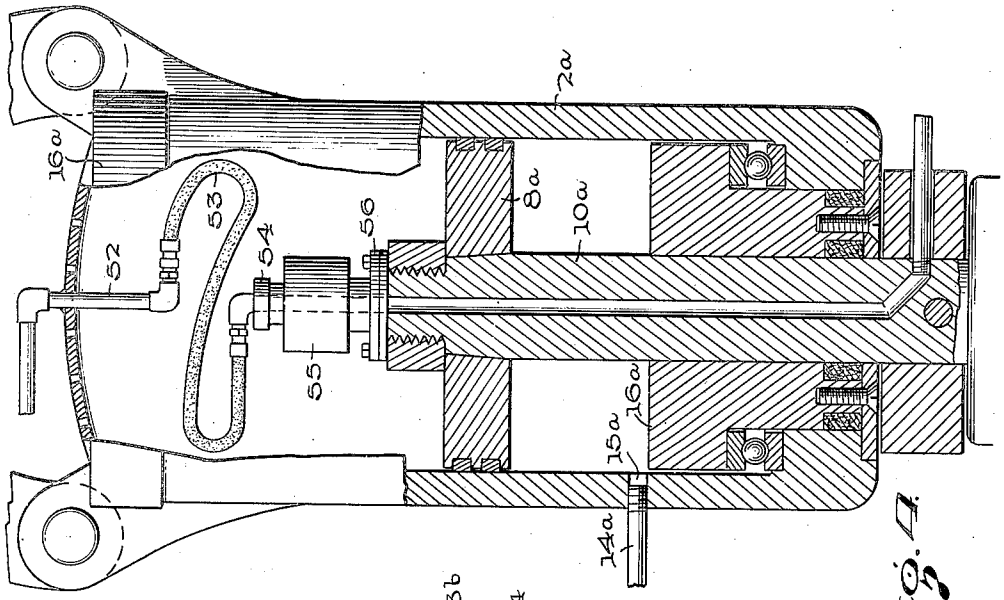


Fig. 4.

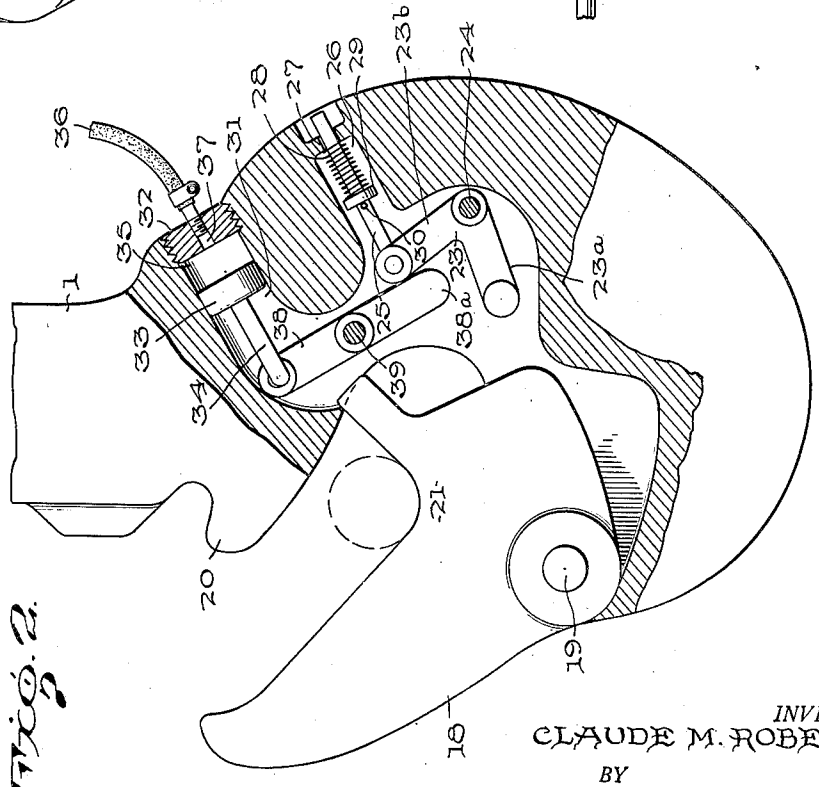


Fig. 2.

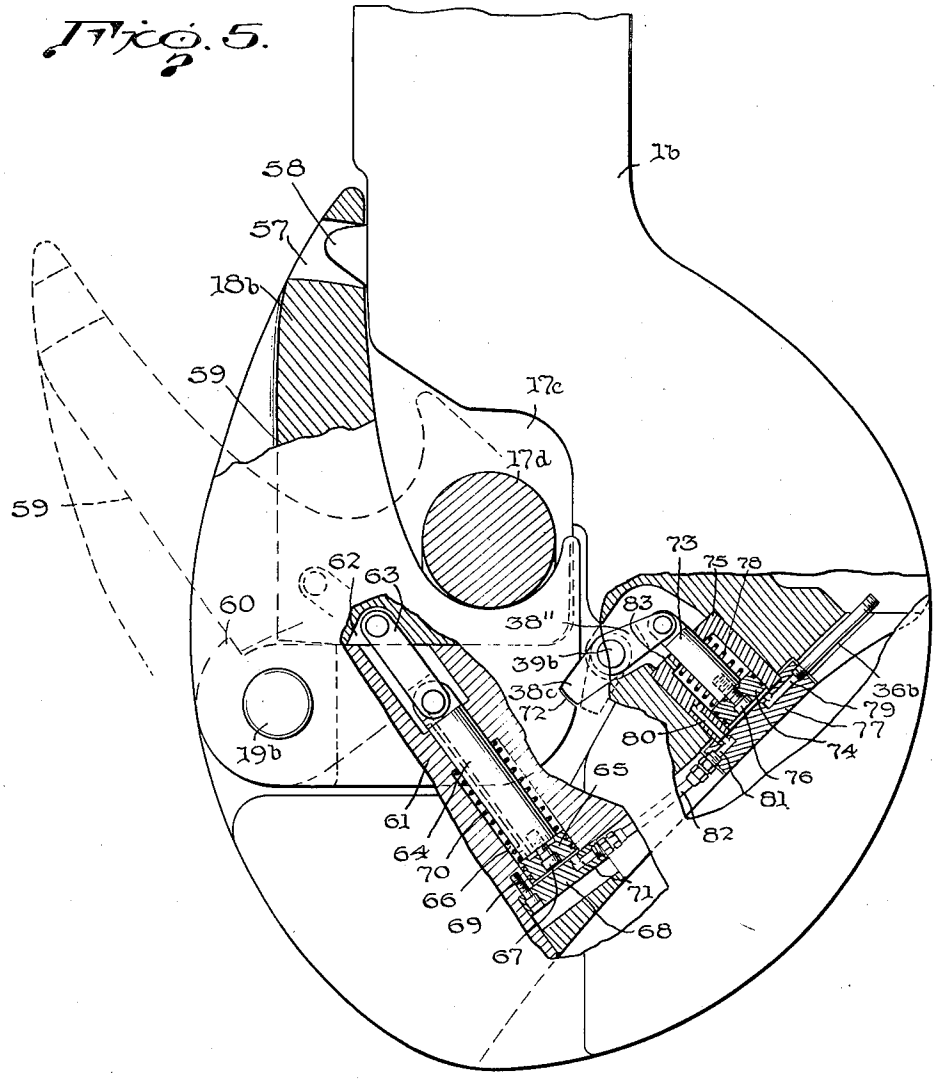
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Filed Oct. 17, 1950 3 Sheets-Sheet 3

Fig. 5.



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HOOK LATCH OPERATING MECHANISM

Claude McJunis Roberson, Shreveport, La.

Application October 17, 1950, Serial No. 190,516

20 Claims. (Cl. 294—82)

1

This invention relates to apparatus for the control of latches on hooks and particularly to latches used on oil well hooks.

Hooks of the type herein referred to are particularly adapted for the control of oil well apparatus used in supporting the drill stem and in lifting and positioning sections of pipe to be attached to the drill stem in the well, or in supporting and controlling sections of pipe to be detached from the drill stem.

Hooks of this general type are described and claimed in my co-pending application, Serial No. 188,031, filed October 2, 1950, and in my Patent No. 2,519,288. Reference is made to these disclosures for a description of the apparatus with which such hooks are used and for a more complete description of the hook itself. The present invention is particularly directed to means for controlling the operation of the hook latch.

In the method most commonly used for drilling oil wells, rotary drilling, a derrick is positioned over the well site to make convenient handling of the pipe used in the drilling operation possible. A crown block with sheaves over which cable, called the drilling line, is passed is suspended from the top of the derrick. The drilling line is passed around a plurality of sheaves of a lower, or travelling block. Manipulation of the drilling line causes vertical movement of the suspended travelling block within the derrick. From the travelling block a hook is suspended which is used to support the rotary swivel during the drilling operation and to hold the pipe stands to be added to or disconnected from the drill stem in the well. The swivel has a bail attached thereto which is suspended from the hook.

The rotary swivel is a large and expensive piece of equipment which must be capable of sustaining the weight of the entire drill stem during the drilling operation and yet allow rotation of the stem at speeds as high as 200 R. P. M. Consequently, it is necessary that the swivel bail be securely held in the hook against any possibility of disengagement. For this purpose, a latch usually is provided for the hook which will prevent the swivel from slipping off the hook. Yet the swivel bail must be easily removed from the hook during the process of adding or removing pipe stands to or from the drill stem. Therefore, it is desirable that the latch be readily opened and closed.

The latch position could be controlled by the workers on the derrick floor, but it is more convenient and less dangerous if the operation is performed at a remote position by the driller.

2

With these considerations in mind, a latch-operating mechanism for the hook has been devised that may be easily and conveniently operated by fluid pressure, controlled, for instance, from the driller's position.

During the drilling operation, it is frequently necessary to attach sections of pipe to the drill stem as the bit progresses into the earth. It also is necessary at times to remove the drill stem from the well in order to change the bit, removing several sections of the drill pipe from the stem at a time, placing them in a convenient storage position and then removing other sections till the bit reaches the surface. In both operations, the sections of pipe to be connected or disconnected must be rotated relative to one another, since the joints between pipe sections are threadedly engaged. The hook, then, should be freely rotatable, but the hook body should remain stationary, so that the drilling line will not be twisted or the travelling block damaged.

It is necessary that fluid under pressure be supplied to the latch operating mechanism from some external source in order to actuate that mechanism. If long fluid pressure lines were led from such a source of fluid under pressure directly to the latch-operating mechanism adjacent the hook, these lines would be in danger of becoming twisted and entangled when the hook was rotated. To avert this danger, it is proposed that fluid under pressure for the operation of the hook latch be supplied to a passage extending through the body of the hook, from the top thereof, and led through the passage to a point adjacent the latch-operating mechanism. In such case, it is not necessary that there be any long fluid line adjacent the hook, so that the danger of twisting and entanglement is eliminated.

The hook latch operating mechanism of the present invention comprises generally a pivoted latch member for closing the bail-receiving notch of the hook and a fluid-operated mechanism to control the opening and closing of the latch member. In one form of the invention, this fluid-operated mechanism includes a piston mounted in a fluid chamber and having a piston rod extending outwardly therefrom, and connected at its outer end to a locking lever which engages one arm of a bell crank lever. The other arm of the bell crank lever engages an extension arm of the pivoted latch member to cause pivotal movement of the latch member when the bell crank lever is moved.

In the specific construction of this form of the

invention which is herein described, the bell crank lever is spring biased to a position such that the latch is closed. The positions of the latch member and its associated apparatus when the latch is closed will be hereinafter referred to as the normal positions thereof. When the latch is to be opened, fluid under pressure is supplied to the piston chamber, the piston and its associated rod and locking lever being moved to pivot the bell crank lever against the action of the spring and open the latch member. When the latch member is again to be closed, the pressure of the fluid is released and the piston allowed to return to its normal position. At the same time, the swivel bail, urged downwardly by the weight of the swivel, will move the latch member's extension arm downwardly, thus causing the latch member to return to its closed position. The spring means concurrently returns the bell crank lever and the locking lever to their previous positions, the locking lever then locking the extension arm of the latch member in position.

In another form of the invention, the locking lever and the latch-moving mechanism are controlled by separate pistons. The direction of fluid travel is such that the locking lever is moved to its inoperative position before actuation of the latch-moving mechanism. Both the locking lever and the latch-moving mechanism are spring-urged to their normal positions.

The invention will be further described with reference to the accompanying drawings in which a preferred embodiment of the invention is shown. However, it is to be understood that such further disclosure and description is by way of exemplification and the invention is not limited thereto, except to the extent set forth in the subjoined claims.

In the drawings:

Fig. 1 is an elevation view, partly in section, of a hook constructed in accordance with the invention,

Fig. 2 is a view of the hook, similar to Fig. 1, showing the latch member in open position,

Fig. 3 is a detail elevation view of the lower part of the hook showing a modified embodiment of the invention, with parts of the hook being shown in section,

Fig. 4 is an elevation view, partly in section, of the upper part of a modification of the apparatus of Fig. 1, and

Fig. 5 is an elevation view, partly in section, of a further modified form of the hook.

The hook assembly illustrated in the drawings is of the type used in oil well drilling, and comprises, Fig. 1, a hook 1 and a hook body 2. The hook body has a pair of ears 3 extending from its upper end for connection to a bail 3' supported by the usual travelling block (not shown).

The hook body 2 has a cylindrical chamber 4 extending longitudinally thereof. The inner wall of the hook body extends inwardly at its lower end to form a shoulder 5 upon which is supported a bearing member 6. Ball bearings 7 are interposed between upper and lower bearing rings 7a and 7b between the lower surface of the bearing member 6 and the shoulder 5, to allow rotation of the bearing member relative to the wall of the hook body.

A cylindrical piston 8 is positioned within the chamber 4 and has a pair of sealing rings 9 in slots in its peripheral edge to prevent the escape of fluid from one of its sides to the other. A piston rod 10 extends through an upwardly converging bore in the piston 8 and is threadedly engaged with a nut 11 which rests on the upper side of the piston and securely connects the piston to the piston rod.

The piston rod extends downwardly through the bearing member 6 and has its lower end secured to the shank of the hook 1. Appropriate sealing packing 12 is positioned between the piston rod 10 and the bearing member 6 and between the outer periphery of the lower portion of the bearing member and the wall of the hook body to prevent fluid from escaping from the chamber. A plate 13 is bolted to the lower end of the bearing member to keep the packing in position.

Fluid under pressure is admitted to the cylinder 4 through a fluid supply pipe 14 threadedly engaged in a passage 15 through the wall of the hook body adjacent the bearing member 6. When fluid is admitted to the cylinder, it will exert a force on the piston 8, tending to force it and the hook which is connected to the lower end of the piston rod, upwardly.

The peripheral surface of the bearing member 6 is spaced slightly from the wall of the hook body 2, so that fluid within the cylinder 4 may communicate with both sides of the bearing member. As a result, the pressure exerted on the bearing member when fluid under pressure is supplied to the cylinder 4 is greatly reduced, thus decreasing the tendency for the bearing member to be so jammed against the shoulder of the hook body that it would resist rotation with the hook.

A cap 16 closes the upper end of the hook body to exclude dirt and moisture therefrom and has a plurality of vent holes 16' through it through which air compressed by upward movement of the piston may be discharged.

The hook 1 has a bail-receiving notch 17 at one side within which the bail 17' of the rotary swivel is received. A latch member 18 is pivoted on a pin 19 on the hook and fits, when in the closed position shown in Fig. 1, between a pair of outstanding ears 20 integral with the hook, to close the bail-receiving notch 17.

The latch member 18 has an extension 21 protruding into a space 22 formed within the hook. A bell crank lever 23 is pivotally mounted at 24 within said space and has an actuating arm 23a for the extension which lies beneath and slightly spaced from the extension when the latch member is in its closed position. The other arm 23b of the bell crank lever is connected to a push rod 25 reciprocally mounted within a cylindrically-shaped bore 26 formed in the hook. The outer end of the rod 25 extends through a central aperture formed by an annular shoulder 27 near the outer end of the bore. A compression spring 28 is interposed between the shoulder 27 and a stop washer 29 fitted about the push rod 25 and held in a predetermined position by a pin 30 which passes through the rod 25. The biasing action of the spring exerted through the rod 25 normally urges the bell crank lever 23 to the position shown in Fig. 1 with its arm 23a adjacent the lower portion of the surface bounding the space within the hook.

Another cylindrically-shaped bore 31 also extends from the space in the hook and has a sealing plug 32 at its outer end. A piston 33 is positioned for reciprocation within the bore 31 and carries a piston rod 34 at its inner side. The plug 32 and the piston 33 form the two ends of an expansible fluid chamber 35 within the cy-

lindrical bore 31. Fluid is admitted under pressure to the expansible fluid chamber through a section of flexible tubing 36 which has one of its ends communicating with a passage 37 extending through the sealing plug 32. The piston rod 34 is connected to one end of a locking lever 38 at its end remote from the piston. The locking lever is pivoted on a pin 39 mounted in said space in the hook. The opposite end 38a of the locking lever bears normally against the upper side of the extension 21 to prevent the latch member from swinging counter-clockwise about its pivot 19, and thereby locks the latch member in its closed position.

When fluid under pressure is supplied to the chamber 35 through the flexible tubing 36, the piston 33 is forced away from the sealing plug 32. The piston carries the piston rod 34 with it to cause pivotal movement of the locking lever 38 about its pivot pin 39 in a counter-clockwise direction, moving the end 38a of the locking lever away from the upper end of the extension 21, thus freeing the extension for movement. This movement of the locking lever 38 causes a clockwise movement of the bell crank lever 23, and the arm 23b thereof forces the push rod 25 outwardly within the cylindrical bore 26 against the action of the spring 28. Simultaneously, the arm 23a of the bell crank lever moves into engagement with the lower side of the extension 21 and swings the latch 18 in a counter-clockwise direction to its open position, shown in Fig. 2.

When the latch member is to be moved to its closed position, the supply of fluid to the expansible chamber 35 is turned off. The bail 17', urged downwardly by the weight of the swivel, will move the extension 21 downwardly, thus causing clockwise movement of the latch member 18 to its closed position between the ears 20. The bell crank lever 23 will also be moved by the extension in a counter-clockwise direction.

At the same time, the push rod 25 will be carried inwardly by the bell crank lever arm 23b towards its normal position. After the latch member comes to rest in its normal position, the force of the spring 28 continues to operate to move the push rod 25 farther inwardly, thus moving the bell crank lever farther in the counter-clockwise direction till the arm 23a thereof bears against the surface defining the space 22 in the hook. The locking lever 38 will also be moved by movement of the push rod 25 and the bell crank lever arm 23b in a clockwise direction till its end 38a is positioned above the extension 22. The extension at this time will be locked in position by the locking lever because it is restrained thereby against pivotal movement in a counter-clockwise direction. The latch member, consqeuently, cannot open accidentally.

The clockwise movement of the locking lever 38 also moves the piston rod and piston outwardly, preparing the latch mechanism for its next operation.

The upper end of the flexible tubing 36 extends through a passage 40 in a bearing collar 41 pinned to the piston rod 10 of the main fluid cylinder. This end of the tubing communicates with a fluid passage 42 extending upwardly through the piston rod 10 to a larger axial bore 43 in the upper end of the piston rod. Fluid for actuating the piston 33 is introduced through a fluid-conducting tube 44 which extends through the cap 16 and into, and to near the bottom of the bore 43 when the piston 8 is in its uppermost position. The fluid-conducting tube 44 passes through a

packing gland 45 where it enters the upper end of the piston rod. The packing gland maintains a fluid tight connection with the tube 44, while permitting both reciprocation and rotation of the piston and piston rod about the tube.

The upper end of the metal tube 44 which extends through the cap 16, communicates with the outlet of a fluid connection block 46, bolted to the upper side of the cap. Fluid under pressure is supplied to the inlet of the fluid connection block through a conduit 47 leading to an external source (not shown), where an appropriate valve (also not shown) is positioned to regulate the supply of fluid to the expansible chamber 35 of the latch operating mechanism.

The fluid passage 42 need not be extended to the periphery of the piston rod 10, but could be drilled through the shank of the hook to the space 31 in the hook adjacent the plug 32. In such case, there would not be a passage 40 through the collar 41, and the flexible tubing 36 would not be necessary. Fluid for operation of the latch would be passed within the hook assembly all the way from the connection block 46 to the expansible chamber 35.

When it is desired to operate the latch member 18 to move it to its open position so that the bail of the rotary swivel may be inserted into or removed from the bail-receiving notch 17, fluid under pressure is admitted through the conduit 47 to the fluid connection block 46. It then passes through the tube 44, the bore 43 and the passage 42 in the piston rod 10 to the flexible tubing 36, and finally to the expansible chamber 35. The latch member 18 will then be rotated in a counter-clockwise direction to its open position, as earlier described.

As explained above, the piston 8 and the piston rod 10 are forced upwardly when fluid under pressure is supplied to the cylinder 4. However, the fluid-conducting tube 44 is fixed to the cap 16 against vertical movement. As the piston moves upwardly, the piston rod slides upwardly about the tube 44, the lower end of the bore 43 in the piston rod moving toward the lower end of the tube 44. At the upper limit of travel of the piston, the lower end of the tube is still above the lower end of the bore 43. When the fluid pressure is released, the piston moves downwardly and the piston rod slides downwardly about the tube, till at the lower limit of the piston travel, the lower end of the tube is at the upper end of the bore 43. Consequently, the tube is not displaced during reciprocatory movement of the piston.

When the hook is rotated to effect engagement or disengagement of a pipe joint, the piston and piston rod also rotate but the tube 44 remains stationary, the bore 43 being of large enough diameter and being properly placed so that the wall of the bore never contacts the tube.

In Fig. 3 there is shown a modified form of the latch operating mechanism of the invention. In this embodiment of the invention the mechanism for locking and actuating the latch member is positioned adjacent the bottom of the hook rather than at the side thereof, and as shown, comprises a latch member 18' having a pair of bearing projections 48a, 48b formed at the lower end thereof. A modified bell crank lever 23', pivoted at 24', has one of its arms 23c engageable with each of the projections 48a and 48b, but normally is biased to a position against the inner side of projection 48a by a push rod and spring combination, now to be described.

The other arm 23*d* of the bell crank lever 23' has a push rod 25' connected thereto at its end remote from the pivot point 24'. The lower end of the push rod projects into a cylindrical passage 26' and carries a plate 49 which is urged upwardly by a spring 28' bearing at its upper end against the lower side of the plate and at its lower end against a plug 50 threaded into the passage 26'. As outlined above, the spring 28' urges the push rod 25' upwardly, biasing the bell crank lever 23' to its farthest counter-clockwise position. The bell crank lever arm 23*c* is held against the inner side of the projection 48*a*, biasing the latch member 18' to its closed position to hold the bail 17*b* within the hook opening 17*a*.

A second cylindrical passage 31' within the space in the lower end of the hook is sealed at its lower end by a modified plug 32' and a piston 33' carrying a piston rod 34' is positioned within the passage. The piston 33' and the plug 32' form an expansible fluid chamber 35' within the passage 31'. Fluid under pressure is supplied to the expansible chamber through a section of flexible tubing 36'.

The outer end of the piston rod 34' is connected to one end of a modified locking lever 38', which is pivoted at 39' on the hook. The under side of the other end of the locking lever bears against the upper side of the arm 23*d* of the bell crank lever. The extremity 38*b* of this end of the locking lever normally fits into a notch 51 in the inner side of the projection 48*b*, and the upper side of this end of the locking lever normally is interposed between the projection 48*b* and the upper surface of the wall of the hook which surrounds the space 22' in the hook. Since the locking member is in the path of counter-clockwise movement of the projection 48*b* to the open position of the latch member, the locking lever locks the latch member in its closed position.

The operation of this modified embodiment of the invention is similar to that of the apparatus shown in Figs. 1 and 2. However, when fluid under pressure is admitted to expansible chamber 35' of the apparatus shown in Fig. 3, a time delay intervenes before the latch member is opened. That time delay corresponds to the distance which the bell crank lever arm 23*c* must move till it contacts the inner surface of the projection 48*b* of the latch member.

During this interval, the locking lever 38' moves in a counter-clockwise direction out of the notch 51 and below the projection 48*b*, thus freeing the latch member for movement to its open position. Then the operation is the same as above, the bell crank lever arm 23*c* pressing the bearing projection 48*b* in a counter-clockwise direction to cause pivotal movement of the latch member 18' to its open position.

When the latch member 18' is to be moved to its closed position, the pressure of the fluid supplied to the expansible chamber 35' is released. The spring 28' will move the push rod 25' upwardly, moving the bell crank lever 23' in a counter-clockwise direction. Another time delay will ensue before the arm 23*c* reaches the bearing projection 48*a*. Then the pressure exerted by the spring will cause movement of the latch member 18' to its closed position. The locking lever 38' will again be moved in a clockwise direction by the arm 23*d* of the bell crank lever till its end 38*b* fits into the notch 51 of the projection 48*b*. At this time, as explained above, the locking lever 38' locks the latch member in its closed position.

In Fig. 4 there is shown a modification of the means for supplying fluid to the fluid operating mechanism. A fluid-conducting pipe 52 extends through and is welded, or in other suitable manner secured to the cap 16*a*. A section of flexible tubing 53 is connected at one end of the inner end of the pipe 52 and to the inlet 54 of a "rotor seal" 55 at its other end. The rotor seal is a known device which allows fluid to be conducted from a stationary inlet, here represented as the pipe 52, to a rotatable outlet such as the outlet 56 which is bolted or otherwise secured to the end of the piston rod and rotates therewith. The apparatus of Fig. 3 is otherwise identical with that shown in Fig. 1, and like parts are indicated by the same numerals with the subscript *a*.

A modification of the hook of Figs. 1, 2 and 3 is illustrated in Fig. 5, which shows the hook 1*b* as having a bail-receiving notch 17*c*, which is closed by a modified latch member 18*b* and receives a bail 17*d*, above described. The latch member 18*b* is pivotally mounted on a pin 19*b* on the hook and has a passage 57 through one of its distal extremities into which a lug 58, projecting outward of the hook, extends when the latch member is in its closed position.

The latch member 18*b* is recessed along its outer curved periphery to provide a surface 59, the lower end of which contacts a shoulder 60 formed on the hook when the latch member is in its open position (shown in dash lines in Fig. 5).

The portion of the latch member 18*b* on which the bail 17*d* lies is substantially channel-shaped in cross-section and fits over the portion 61 of the hook 1*b* which lies below the notch 17*c*. The latch member has a recessed space 62 into which one end of a link 63 projects, where it is pivotally connected to the latch member. The link 63 is connected by a piston rod 64 to a fluid-operated piston 65 positioned in a chamber or fluid cylinder 66 formed in the hook 1*b*. The piston rod 64 is fastened to the piston 65 by a threaded bolt 67 whose head fits in a recess in the outer surface of the piston 65. A sealing plug 68 is secured to the hook by bolts 69 and seals the outer end of the chamber 65. The sealing plug 68 and piston 5 form the ends of an expansible fluid chamber in the hook.

A compression spring 70 surrounding the piston rod 64 is interposed between the inner end of the chamber and the inner face of the piston 65 and normally urges the piston outwardly toward the sealing plug 68.

Fluid under pressure for operation of the piston 65 is admitted to the chamber 66 through a passage 71 in the seealing plug 68 by means to be described.

A modified locking lever 38'' is pivoted midway of its length on a pin 39*b* mounted on the hook. One end 38*c* of the locking lever swings into and out of a notch 72 formed in the wall of the latch member 18*b*. The other end of the locking lever 38'' is connected by a piston rod 73 to a fluid-operated piston 74 positioned in a hollow cylinder 75 in a space formed in the hook. The piston rod is attached to the piston 74 by a threaded bolt 76. The outer end of the cylinder 75 is closed by a closure member 77 attached to the hook in any suitable manner, with the result that an expansible fluid chamber is formed in the cylinder 75 between the closure member 77 and the piston 74.

A compression spring 78 is positioned between the inner end wall of the cylinder 75 and the inner side of the piston 74 and acts to urge the piston toward the closure member 77.

Fluid under pressure for operation of the piston 74 is supplied to the cylinder 75 through a fluid passage 79 in the closure member 77 to which fluid is conducted by a pipe 36b connected to an external source, not shown. Fluid may appropriately be conducted to the pipe 36b from the external source through a conduit extending through the hook body, as shown in Figs. 1 and 4.

A fluid passage 80 in the wall of the cylinder 75 communicates at one end with the chamber within the cylinder 75, and at its other end with a fluid passage 81 in the closure member 77. A length of fluid tubing 82 connects the passage 81 to the passage 71 in the sealing plug 68.

An exhaust port 83 extends through the inner end wall of the cylinder 75 and allows air compressed by inward movement of the piston 74 to pass out of the cylinder 75.

In the operation of this modified form of the invention, the latch member 18b is normally in the closed position shown in solid lines in Fig. 5, so that the bail-receiving notch 17c is closed. When it is desired to open the bail-receiving notch, fluid under pressure is supplied from the external source to the pipe 36b, from which it passes through the fluid passage 79 into the cylinder 75. The piston 74 is moved inwardly by the force of the fluid against the action of the spring 78 and swings the locking lever 38'' counter-clockwise about the pivot 39b to move the end 38c of the locking lever 38'' out of the notch 72 in the wall of the latch member, thus permitting the latch member to be swung in a counter-clockwise direction, as will now be described.

After the piston 74 has moved inwardly past the entrance to the fluid passage 80, fluid under pressure will pass from the cylinder 75 into the passage 80, through the passage 81, the tube 82 and the passage 71 into the chamber 66. The force of the fluid in the chamber 66 will cause the piston 65 to move inwardly against the action of the spring 70, thus causing the link 63 to move the latch member 18b counter-clockwise to the position shown in broken lines in Fig. 5, until the lower portion of the surface 59 of the latch member engages the shoulder 60 which prevents farther movement of the latch member.

When the latch member is to be returned to its closed position, the supply of fluid under pressure to the pipe 36b is discontinued, allowing the springs 70 and 78 to return the link 63 and the locking lever 38'', respectively, to their normal positions. The weight of the bail 17d and the apparatus suspended by it from the hook will cause clockwise movement of the latch member 18b to its closed position. When the latch member is in its closed position, the end 38c of the locking lever 38'' will swing into the notch 72 in the latch member and lock the latch member against accidental opening.

It will now be evident that a device has been provided which will allow the latching member of a hook for rotary drilling rigs to be locked in a closed position and to be opened in a convenient and easy manner. The operation of the latch may be controlled from a position remote from the hook, yet no dangling fluid supply lines need be positioned adjacent the hook which might become entangled during the drilling operation.

It will be apparent that many minor changes could be made in the construction shown without departing from the scope of the invention as set out in the appended claims.

I claim:

1. In a hook assembly for oil well drilling apparatus comprising a hook and a hook body, the hook having a bail-receiving notch, a latch member adjacent said notch selectively movable with respect to the hook to positions to open and close said notch, a fluid cylinder, a piston reciprocable within said fluid cylinder, means for conducting fluid under pressure to said fluid cylinder to cause movement of said piston, means operable to move the latch member to one of its said positions from the other of its said positions, and means connected to the piston to operate said last-mentioned means when fluid under pressure is supplied to said fluid cylinder.

2. The apparatus of claim 1 having means for locking the latch member in its closed position.

3. The apparatus of claim 1 in which the latch member is pivotally mounted adjacent said notch and said last-mentioned means comprises a link connected to said latch member at a point remote from the pivotal axis of the latch member and movable to move said latch member about its pivotal axis from one of its said positions to the other.

4. The apparatus of claim 3 in which the means connected to the piston comprises a piston rod attached at one end to the piston and connected at its other end to said link.

5. The apparatus of claim 1 in which the latch member is pivotally mounted adjacent said notch and which has a locking lever movable selectively into and out of the path of pivotal movement of the latch member to lock the latch member in its closed position and release the latch member for movement to its open position.

6. The apparatus of claim 5 having fluid-operated means for moving the locking lever away from its locking position and means yieldingly urging the locking lever into its said locking position.

7. The apparatus of claim 6 in which said fluid-operated means comprises a second fluid cylinder, a second piston positioned in said second fluid cylinder, means for conducting fluid under pressure to said second fluid cylinder, and means operatively connecting said second piston to said locking lever, to cause movement of said locking lever out of the path of movement of the latch member when fluid under pressure is admitted to said second cylinder.

8. The apparatus of claim 1 in which the latch member has an extension portion and said last-mentioned means comprises a bell crank lever pivotally mounted on said hook with a first one of its arms positioned to bear against said extension portion of the latch member, and said means connected to the piston contacts the second arm of said bell crank lever to move said bell crank lever in a direction to cause its said first arm to move the latch member from one of its said positions to the other of its said positions when fluid under pressure is admitted to said fluid cylinder.

9. The apparatus of claim 8 in which said second arm of the bell crank lever has a push rod connected thereto and the push rod is yieldingly urged to a position tending to move said first arm of the bell crank lever away from the extension portion of the latch member.

10. The apparatus of claim 8 in which said means connected to the piston comprises a pivotally-mounted locking lever connected at one end to the piston, its other end engaging the second arm of the bell crank lever, and means for yieldingly urging said second arm of the bell crank lever against said other end of the locking

lever to move said other end of the locking lever into the path of movement of the latch member to said one of its said positions.

11. The apparatus of claim 8 in which the latch member has a pair of spaced projections extending therefrom and said first arm of the bell crank lever is positioned for movement between and for engagement with said projections, said first arm of the bell crank lever is yieldingly urged against one of said projections to move the latch member to one of its said positions and said first arm of the bell crank lever is moved when fluid under pressure is supplied to said fluid cylinder against the other of said bearing projections to move the latch member to the other of its said positions.

12. In a hook assembly for oil well drilling apparatus comprising a hook and a hook body, the hook having a bail-receiving notch, a latch member pivotally mounted adjacent said notch selectively movable with respect to the hook to positions to open and close said notch, a piston reciprocable within a chamber formed in said hook, means sealing one end of said chamber, said piston and said sealing means defining the ends of an expansible fluid chamber, means for conducting fluid under pressure to said expansible chamber to cause movement of the piston, means operable to move the latch member to its open position from its closed position, means connected to the piston to operate said last-mentioned means when fluid under pressure is supplied to said expansible chamber, said means connected to the piston comprising a pivoted locking lever connected to the piston at one end and having its other end normally positioned in the path of movement of a portion of said latch member from its closed position to its open position, and means yieldingly urging said locking lever to its normal position, said locking lever being so arranged that movement of the piston in response to supply of fluid under pressure to said expansible chamber causes movement of the locking lever away from its normal position out of the path of movement of said portion of the latch member to permit the latch member to move to its open position when fluid under pressure is supplied to said expansible chamber.

13. In a hook assembly for oil well drilling apparatus comprising a hook and hook body, the hook having a notch for receiving a bail, a latch member pivotally mounted adjacent said notch selectively movable with respect to the hook to positions to open and close said notch, said latch member having an extension portion adapted to support a bail and extending inwardly from the pivot point of the latch member into a space formed within said hook, the bail urging said latch member to its closed position when it is supported on said extension portion thereof, a piston positioned in a chamber formed by the walls bounding said space, a sealing plug at one end of said chamber, said piston and said sealing plug defining the ends of an expansible fluid chamber, means for conducting fluid under pressure to said expansible chamber, a bell crank lever pivoted on the hook within said space and having one arm positioned at one side of the extension portion of the latch member, means yieldingly urging said one arm of the bell crank lever away from said extension portion of the latch member, a locking lever pivoted intermediate its ends connected at one end to the piston and bearing adjacent its other end against the other arm of said bell crank lever, said other end of the locking lever being urged by the last-mentioned means to a position in the path of movement of said extension portion of the latch member to the open position of the latch member, supply of fluid under pressure to said expansible chamber causing the piston to move the locking lever out of the path of the extension portion of the latch member to the open position of the latch member and against said other arm of the bell crank lever to move the bell crank lever against said last-mentioned means in a direction to cause said one arm of the bell crank lever to engage the extension portion of the latch member and move the latch member to its open position.

14. In a hook assembly for oil well drilling apparatus comprising a hook and a hook body, the hook having a notch for receiving a bail, a latch member pivotally mounted adjacent said notch and selectively movable with respect to the hook to positions to open and close said notch, said latch member having a portion thereof adapted to support a bail and extending inwardly from the pivot point of the latch member into a space formed in the hook, a piston positioned in a chamber formed by the walls of said space, sealing means adjacent one end of said chamber, the piston and the sealing means defining the ends of an expansible fluid chamber, means for admitting fluid under pressure to said expansible chamber, means operable to move the latch member to its open position from its closed position, and means connected to the piston to operate said operable means when fluid under pressure is admitted to said expansible chamber.

15. In a hook assembly for oil well drilling apparatus comprising a hook and a hook body, the hook having a notch for receiving a bail, a latch member pivotally mounted adjacent said notch and selectively movable with respect to the hook to positions to open and close said notch, said latch member having a portion adapted to support a bail and extending inwardly from the pivotal axis of the latch member, the bail urging said latch member to its closed position when it is supported on said extension portion thereof, a fluid chamber in the hook, a piston in said chamber, means for conducting fluid under pressure to said fluid chamber, means connected to the piston operable upon movement of the piston in response to admission of fluid under pressure to said fluid chamber to swing the latch member about its pivotal axis from its closed position to its open position, a fluid cylinder, a second piston in said fluid cylinder, means for conducting fluid under pressure to said fluid cylinder, the bail-supporting portion of the latch member having a notch formed therein, a pivoted locking lever having one of its ends yieldingly urged into said notch to lock the latch member against movement to its open position, means so connecting the other end of said locking lever to said second piston that movement of said second piston in response to admission of fluid under pressure into said fluid cylinder causes movement of said one end of the locking lever out of said notch, whereby said latch member is normally locked in its closed position but is unlocked therefrom when fluid under pressure is supplied to said fluid cylinder, and is moved to its open position when fluid under pressure is supplied to said fluid chamber.

16. In a hook assembly for oil well drilling apparatus comprising a hook and a hook body, the hook having a notch for receiving a bail, a

latch member pivotally mounted adjacent said notch and selectively movable with respect to the hook to positions to open and close said notch, said latch member having a portion thereof adapted to support a bail and extending inwardly from the pivotal axis of the latch member, the bail urging said latch member to its closed position when it is supported on said extension portion thereof, a first fluid chamber in the hook, a first piston in said first chamber, means for conducting fluid under pressure to said first chamber to cause movement of said first piston, means connected to said first piston movable by movement of said first piston to move said latch member from its closed position to its open position, a second fluid chamber in the hook, a second piston in said second chamber, means for sealing one end of said second chamber, means for conducting fluid to said one end of said second chamber to cause movement of said second piston, said portion of said latch member having a notch formed thereon, a pivoted locking lever having one of its ends yieldingly urged into said notch to lock the latch member against movement from its closed position to its open position, said locking lever having its other end so operatively connected to said second piston that supply of fluid under pressure to said second chamber causes movement of said second piston away from said one end of said second chamber to a predetermined position in said second chamber and moves said locking lever out of said notch, a fluid conduit communicating at one end with said second chamber at a point between said predetermined position and said one end of said second chamber and at its other end with said means for conducting fluid under pressure to said first chamber, whereby supply of fluid under pressure to said one end of said second chamber causes movement of said second piston to said predetermined position to move said locking lever out of said notch to unlock the latch member and allow the fluid to enter said fluid conduit and flow to said first fluid chamber to cause movement of said first piston to move the latch member from its closed to its open position.

17. In a hook assembly for oil well drilling apparatus comprising a hook and a hook body, the hook having a notch for receiving a bail, a latch member adjacent said notch selectively movable with respect to the hook to positions to open and close the notch, and means mounted on the hook assembly operatively engaged with said latch member and operable to move said latch member from its closed to its open position.

18. In a hook assembly for oil well drilling apparatus comprising a hook body having a fluid chamber therein, a piston reciprocable within said fluid chamber, a piston rod movable with said piston, a hook having a shank connected to said piston rod and means for supplying fluid under pressure to said fluid chamber to move said piston, said hook having a notch for receiving a bail, a latch member mounted on said hook selectively movable to positions to open and close said notch, means operable by fluid under pressure to move said latch member from one of its said positions to the other, and means including a conduit extending longitudinally within the piston rod for supplying fluid under pressure to said means operable by fluid under pressure.

19. The apparatus of claim 18 in which said piston rod has a central passageway therein extending longitudinally thereof, and said conduit comprises a fluid-conducting tube mounted at one of its ends on the hook body and extending within said passageway, said tube being so arranged in said passageway that the piston rod is longitudinally and rotatably movable with respect to the tube.

20. The apparatus of claim 18 in which said fluid-supplying means includes a pipe mounted on said hook body, and means mounted on said piston for rotatably connecting one end of the pipe to one end of said conduit.

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