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PIPE RELEASING MEANS

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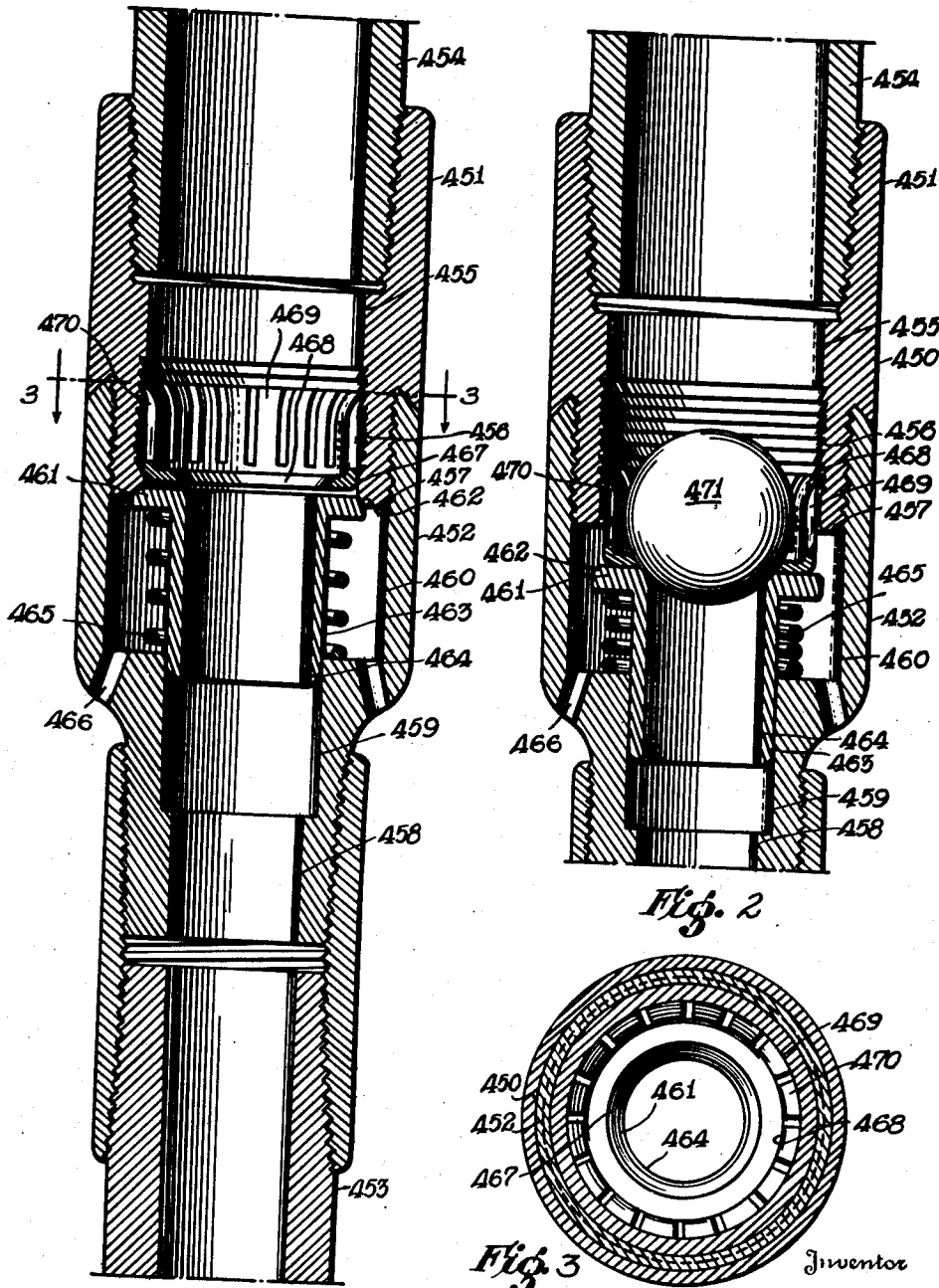


Fig. 1

Fig. 2

Fig. 3

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## PIPE RELEASING MEANS

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Application April 27, 1945, Serial No. 590,682, which is a division of application Serial No. 334,947, May 13, 1940. Divided and this application April 20, 1951, Serial No. 227,861

5 Claims. (Cl. 255—28)

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This invention relates to new and useful improvements in means for recovering elements from well bores.

In the well art, it is well known that in the drilling and completion of wells, pipe, in one form or another, is substantially at all times extending into the well bore. During the actual drilling, the drill stem or pipe, which is made up of sections connected by coupling collars, has the drill bit mounted on its lower end and is rotatable so as to rotate the bit and perform the drilling operation. After the well is drilled in, well tubing and casing are disposed within the well bore and, of course, remain therein so long as the well is producing. The pipe extending into the well bore may separate, collapse or for other reasons, may fall downwardly in the bore to the bottom thereof; or the wall of the bore may cave in and firmly lodge the pipe, or a portion thereof, within the bore. When any of the foregoing occurs, it is necessary that the pipe be removed or "fished out" from the bore before the well operations may continue and manifestly, such removal, particularly where the pipe is firmly lodged or stuck within the bore, creates quite a problem.

The former practice has been to attempt to remove the lodged or stuck portion of the drill pipe, which is commonly referred to as the "fish," by grappling the pipe and pulling on the same with very powerful machinery, which often seriously damages the pipe by overstraining the upper portion of the pipe until the pipe is broken near the surface. Such breaking of the pipe causes the elastic stretch in that portion of pipe below to snap the lower portion of pipe downwardly with great force and most generally "corkscrews" this pipe and bends it over in the "cave-outs" and cavities, thereby damaging the same. After this happens, cutters, shooting, left-hand pipe, and other "fishing" tools are tried in an attempt to recover the pipe. The long sections of pipe are connected together by threaded collars or threaded tool joints. Sometimes the top of the lodged portion of pipe has been rotated to the left to affect disconnection of one of the many threaded joints, but when this is done, there is no way of determining which joint will be unscrewed. A joint at the top of the well, or only a few hundred feet from the surface of

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the ground will be broken out, because ordinarily the lower joints are made tighter due to the bit drag on said joints during the drilling operation. For this reason, merely rotating the pipe to unscrew the joints is not successful since it leaves the major portion of the pipe in the bore.

It is therefore, one object of this invention to provide an improved means for recovering and removing pipe, tubing, casing and other objects which may have become lodged, or which may have fallen downwardly, within a well bore.

Another object of the invention is to provide an improved circulation device for reestablishing circulation around the walls of a string of pipe, or the like, in which it is connected, whereby circulation may be established when the portion of the pipe below the circulation device has become stuck in the well bore.

A further object of the invention is to provide an improved circulation device for reestablishing circulation through the wall of a string of pipe into which it is connected, and in which the inside diameter is not restricted so as to prevent the passage of tools and other objects that will pass through the string of pipe.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, in which an example of the invention is shown and wherein:

Fig. 1 is an enlarged, vertical sectional view, showing a circulation breaker.

Fig. 2 is a view similar to Fig. 1, showing the circulation breaker of Fig. 1 in its operating or open position.

Fig. 3 is a horizontal cross-sectional view taken on the line 3—3 of Fig. 1.

A circulation breaker or by-pass valve device is shown in Figs. 1, 2 and 3. The numeral 450 designates a sectional tubular housing. The upper portion 451 of said housing has its upper end internally screw-threaded and its lower portion reduced and externally screw-threaded. The lower portion 452 of said housing is screw-threadedly attached to the lower end of the portion 451, and the lower end of the portion 452 is reduced and externally screw-threaded

3 so that a tubular pipe 453 may be attached thereto. It is pointed out that a tubular pipe 454 may be attached to the upper end of the portion 451 of the housing 450. Thus the housing may be connected into a string of tubing.

The portion 451 of the housing is provided with an axial bore 455. A plurality of ratchet teeth 456 are provided on the walls of said bore. An annular seat 457 is provided on the lower portion of the lower end of the housing 451 surrounding the bore 455. The housing 452 is provided with an axial bore 458 therein, the bore is enlarged at 459 and further enlarged at 460 at the upper end of the portion 452. A valve head 461 has a valve seat 462 on its upper periphery and seats upon the valve seat 457 located on the lower end of the housing 451. A sleeve 463 depends from said valve head and has its lower end extending into the enlarged bore 459. The head and sleeve have an axial bore 464 extending therethrough. The head 461 is slidable within the enlarged bore 460, while the sleeve 463 is slidable within the bore 459. A coiled spring 465 surrounds the sleeve 462 and has its upper end underlying the head 461, and its lower end resting upon the bottom of the enlarged bore 460. Thus said spring supports the head.

A plurality of orifices 466 are provided in the housing 452 at its reduced portion so that they establish communication between the enlarged bore 460 and the exterior of the housing 452. A disk 467 is disposed above the head 461 and has an axial opening 468 therethrough. Said disk is provided with a plurality of upwardly-extending, flexible fingers 469 which have their uppermost ends 470 bent outwardly so that they may engage within the ratchet teeth 456. Thus the spring 465 will support the head and will close the valve seats 457 and 462 so that any fluid passed through the device must flow through the sleeve 463.

In operation, the bore of the device is unrestricted so that any tool may be passed therethrough. In the event the string of tubing becomes lodged or stuck in the well bore and it is desirable to attempt to establish circulation around said pipe, it is only necessary to drop or run into the well bore a suitable tool to close the bore of the sleeve 463. In the drawings, a ball 471 has been shown, however a go-devil or the like may be dropped or run in or a wire line so as to close said bore. With the bore closed, pump pressure is applied to said disk and plugging means and the disk and head are moved downwardly. It is pointed out that when the disk is moved downwardly, the fingers will also move downwardly, and the upper bent ends of said fingers engaging the teeth 456 will hold the disk in that position (Fig. 2) so that the spring cannot move the head upwardly. The washing fluid is free to pass between the fingers and into the bore 460 and out through the orifice 466, thus washing the exterior of the pipe. It is pointed out that said fingers and teeth may be left out of said structure and in this instance the pressure of the fluid may be depended upon to hold said head in its downward or ajar position.

This application is a division of my copending application, Serial No. 590,682, filed April 27, 1945, now Patent No. 2,586,015, granted February 19, 1952, for Pipe Releasing Means, which application is in turn a division of application Serial No. 334,947, filed May 13, 1940, now Pat-

ent No. 2,394,759, granted February 12, 1946, for Methods of and Means for Recovering Elements From Well Bores, which latter application is in turn a continuation-in-part of prior application Serial No. 301,762, filed August 24, 1928, now Patent No. 2,214,550, granted September 10, 1940, for Testing Device for Wells.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A circulation breaker comprising an exterior housing, ports extending therethrough, a valve seat in said housing, a sleeve valve slidably engaging said valve seat, a sleeve adapted to engage said sleeve valve, a spring mounted between said housing and said sleeve valve and normally urging said sleeve valve upwardly into a seating position to prevent circulation between the bore of said housing and the exterior thereof through said ports, said housing having ratchet teeth on an interior surface thereof, and said sleeve having fingers adapted to engage said teeth and prevent upward movement of said sleeve and said sleeve valve, thus permitting circulation through said ports.

2. A circulation breaker comprising an exterior housing, ports extending therethrough, a valve seat in said housing, a sleeve valve slidably engaging said valve seat, a sleeve adapted to engage said sleeve valve, a spring mounted between said housing and said sleeve valve and normally urging said sleeve valve upwardly into a seating position to prevent circulation between the bore of said housing and the exterior thereof through said ports, said sleeve comprising an annular base and upwardly extending resilient fingers, said base engaging an upper flange on said sleeve valve, said fingers engaging ratchet teeth on the interior of said housing.

3. A by-pass valve device comprising a tubular housing including upper and lower portions and having an enlarged bore at the upper end of said lower portion, ports in said housing leading into said enlarged bore, an annular valve seat at the lower end of said upper housing portion, a valve seating upon said valve seat including a sleeve slidably mounted in the lower end of said lower housing portion, a spring mounted between said housing and said valve normally urging said valve upwardly into seating position, ratchet teeth on the interior surface of said upper housing portion, a disk having an axial opening therethrough in said upper housing portion above said valve, and a plurality of upwardly extending fingers having outwardly bent upper ends on said disk, said fingers being adapted to engage said ratchet teeth to hold said valve in open position, said disk being axially slidable in said bore whereby downward movement of said disk opens said valve to provide communication between said bore and the exterior of said housing.

4. A by-pass valve device comprising a tubular housing including upper and lower portions and having an enlarged bore at the upper end of said lower portion, ports in said housing leading into said enlarged bore, an annular valve seat at the lower end of said upper housing portion, a valve seating upon said valve seat including a sleeve slidably mounted in the lower end of said lower housing portion, a spring mounted between said

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housing and said valve normally urging said valve upwardly into seating position, teeth on the interior surface of said upper housing portion, a disk having an axial opening there-through in said upper housing portion above said valve, and a plurality of upwardly extending fingers on said disk, said fingers being adapted to engage said teeth to hold said valve in open position, said disk being axially slidable in said bore whereby downward movement of said disk opens said valve to provide communication between said bore and the exterior of said housing.

5. A by-pass valve device comprising a tubular housing including upper and lower portions and having an enlarged bore at the upper end of said lower portion, ports in said housing leading into said enlarged bore, an annular valve seat at the

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lower end of said upper housing portion, a valve seating upon said valve seat including a sleeve slidably mounted in the lower end of said lower housing portion, said sleeve having a diameter substantially less than that of said enlarged bore, and a spring mounted around said sleeve and normally urging said valve upwardly into seating position.

CHARLES R. EDWARDS.

References Cited in the file of this patent

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