

Sept. 4, 1934.

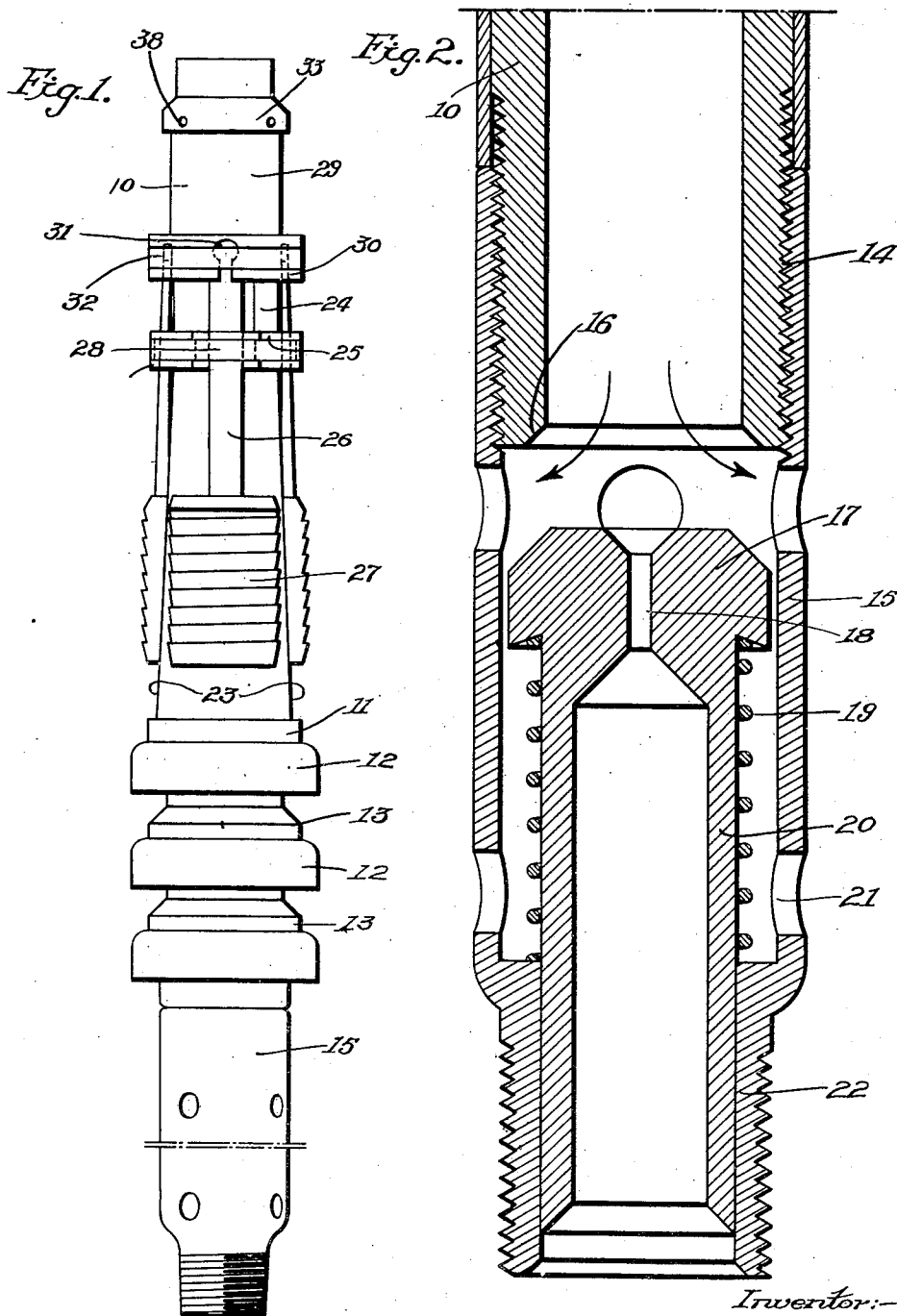
H. C. OTIS

1,972,791

REMOVABLE CHOKE

Filed Aug. 4, 1932

2 Sheets-Sheet 1



Inventor:
Herbert C. Otis
by his Attorneys
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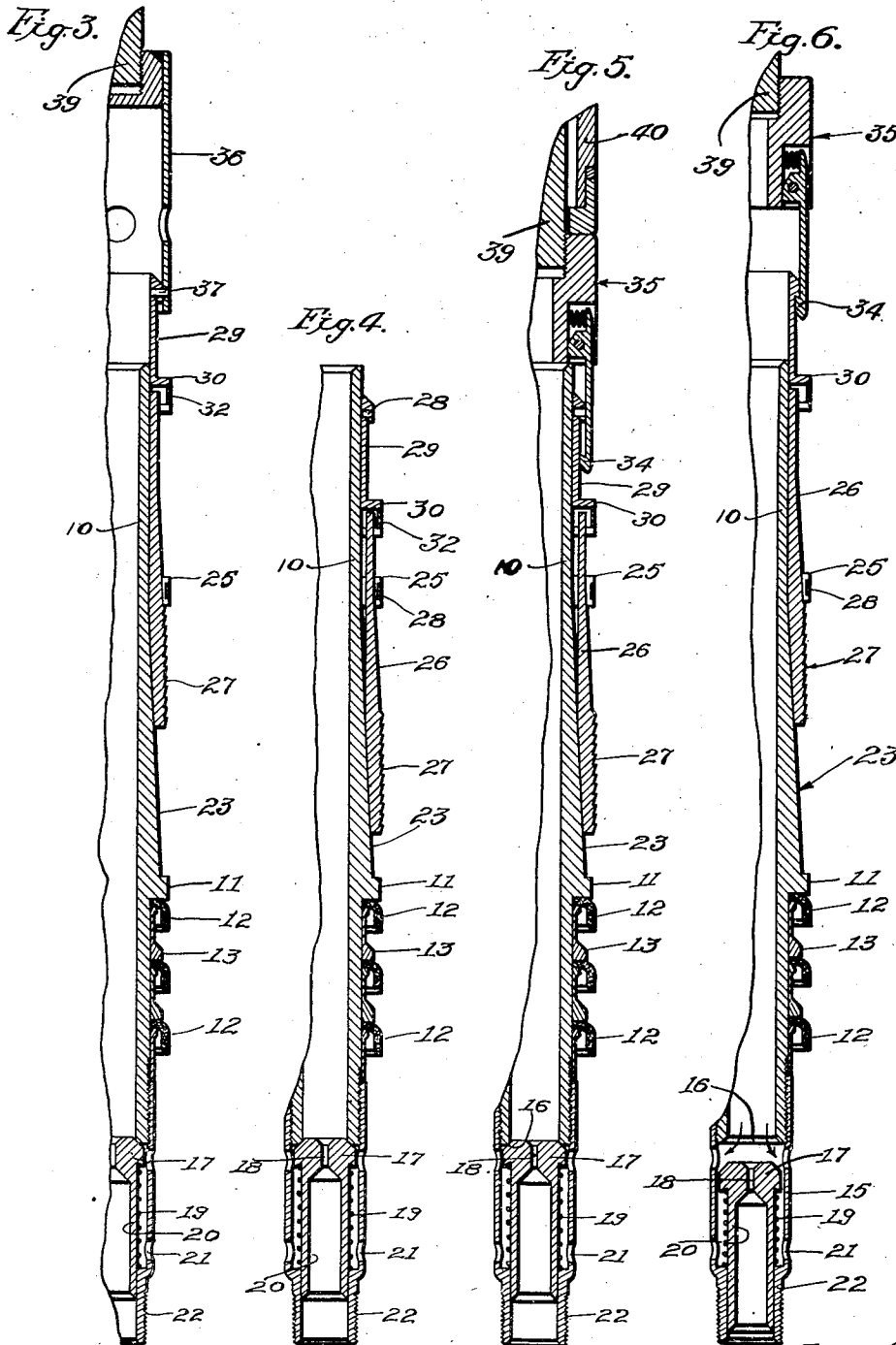
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UNITED STATES PATENT OFFICE

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REMOVABLE CHOKE

Herbert C. Otis, Shreveport, La.

Application August 4, 1932, Serial No. 627,479

6 Claims. (Cl. 166—2)

This invention relates to removable chokes for use in oil wells and has for a primary object thereof the provision of a removable choke in which the bean is so mounted that increased drainage is provided in event it becomes necessary to remove the choke at any time.

A further and more specific object is the provision of a choke in which the bean is, instead of being rigidly mounted in the choke as is usual, mounted so that it is lightly held against a seat by a spring, and may move downwardly from this seat uncovering discharge openings through which fluids collected above the choke may escape.

A further object of the invention is the provision in a removable choke of the type shown in my prior application Serial No. 499,372, filed December 1, 1930, for Well tool, to decrease the distance through which the pulling tool must be moved below the upper end of the choke barrel before it may operatively engage the slips for the purpose of releasing the same. In operation of wells while employing a choke therein there is often a collection of solid matter, usually sand, at the upper end of the choke barrel. Since the slips and pulling mechanism therefor must be disposed at the outer surface of the choke barrel, where the collection of sand has settled, it will be obvious that in order to engage the pulling mechanism with the slips this pulling mechanism must be driven down through packed sand to an extent determined by the position of the upper end of the slip carriage or mounting from which the slips are suspended. It is, therefore, important that the distance through which the upper end of the slip carriage is spaced below the upper end of the slip barrel be reduced to a minimum, this being accomplished in the present construction by employing the slips themselves as a means for limiting upward movement of the carriage on the barrel.

These and other objects I attain by the construction shown in the accompanying drawings wherein, for the purpose of illustration, I have shown a preferred embodiment of my invention and wherein:

Fig. 1 is a side elevation of a removable choke constructed in accordance with my invention;

Fig. 2 is an enlarged sectional view through the bean mounting, the bean being shown in the position which it occupies at such times as the pressure from above exceeds that from below; and

Figs. 3, 4, 5 and 6 are fragmentary sectional views illustrating various positions of the choke

elements and operations in inserting and removing the choke.

Referring now more particularly to the drawings, the numeral 10 generally designates a choke barrel which, in accordance with my invention, is provided at a point spaced above the lower end thereof with a shoulder 11 against which seats the upper end of a series of cup packings 12 with their usual interposed spacing elements 13. The lower end of the barrel is exteriorly threaded at 14 to receive the upper end of a cage 15, which cage acts as a clamping element to maintain the cup packings in position. At its lower face the barrel is formed with a seat 16 for engagement by a valve element 17, which valve preferably constitutes a bean having a small orifice 18 formed therein, this orifice being of such size that a considerable area of the valve is subjected to pressures above the valve when the valve is seated. A spring 19 urges the valve into engagement with its seat, this spring being of just sufficient strength to overcome the weight of the valve. The hollow stem 20 of the valve is guided in the lower end of the cage and above this guide the cage is provided with openings 21 in its side walls, certain of these openings being preferably arranged immediately adjacent the top of the cage so that they are exposed when the valve is forced downwardly and others thereof being located immediately above the guide 22 so that any accumulation of sand in the cage below the valve head is prevented.

Above the shoulder 11 the choke barrel is exteriorly upwardly tapered as at 23 to a point spaced below the upper end thereof and from this point to the upper end is of uniform diameter as indicated at 24. Adjacent the junction of the uniform and tapered sections the exterior of the choke barrel is provided with circumferentially spaced guiding lugs 25, the spacing between which is sufficient to accommodate the shanks 26 of slips 27 operating upon the taper 23. The slips 27 themselves are wider than this spacing so that when the slips are drawn upwardly a predetermined distance they will engage beneath the lugs and serve as a means for elevating the choke barrel. Retainers 28 connect the lugs 25 and maintain the slip shanks against accidental dislodgment. The slip carriage comprises a sleeve 29 freely slidable over the uniform upper end 24 of the choke barrel, the lower end of this sleeve having a flange 30 provided with sockets 31 in which the upper ends of the slips are mounted and secured by a suitable retainer 32. The upper end of the sleeve has a

flange 33 provided with an inclined upper face and a shouldered lower face for co-action with the jaws 34 of the pulling tool generally designated at 35.

5 In Fig. 3 the choke is illustrated with the parts in the position assumed as the same is being inserted in the well, the upper end of the slip carrier being connected to the lower end of a running tool 36 by readily frangible rivets indicated at 37, the upper carrier flange 33 being provided with openings 38 for the reception of these rivets. The running tool is connected to the inner member 39 of a pair of telescopic jars and a line to the outer member 40 thereof. The assembly is then lubricated into the tubing under pressure and lowered to the desired seating point which may be at any point in the tubing string. Due to the difference in weight and in comparative friction surfaces between the choke barrel, packing cups, bean and cage on the one hand, and the jars, running tool and slips on the other, there is always a tendency while lowering into the well for the jars and slips to overtravel the remainder of the mechanism. This, during lowering of the choke, requires that a fairly tight line be maintained. When the desired level has been reached, a sudden release of this line permits the slips to travel downwardly more rapidly than the barrel and assembly. The slips, riding the taper of the barrel, wedge between the barrel and the walls of the tubing, bringing the barrel to a sudden stop. Slight jarring with the jars then shears the copper rivets, this jarring tending to further wedge the slips between the barrel and the tubing walls. The running tool is then removed from the well and the well turned into the line. The well differential around the choke will expand the packing cups and will seat the ground upper surface of the bean against the seat at the base of the barrel, leaving the parts in the position shown in Fig. 4. During the running-in operation the bean has been held against its seat by the action of the light coil spring 19.

When it is desired to remove the choke from the well, the tubing is closed to permit the pressures to equalize above and below the choke. The jars 39, 40 and pulling tool 35 are lowered into the well until they come to rest. At this time, provided the well has been in operation for any appreciable period, there is probably an accumulation of sand about the upper end of the choke through which the jaws of the pulling tool must be forced. This may be readily accomplished by the operation of the jars and due to the fact that there is nothing at the upper end of the barrel to interfere with disposition of the upper end of slip carriage 29 at a point immediately adjacent the upper end of the barrel proper, the time required for this operation is considerably reduced and the chances of breakage or accidents in gripping the carriage likewise reduced. When the parts have assumed the position shown in Fig. 5, the jars act to force the barrel downwardly thus relieving radial thrust on the barrel so that the slips may be drawn upwardly. Strain is then placed on the line and first serves to elevate the slip carriage and slips, thus freeing the choke from the walls of the casing. The slips, after elevating a predetermined distance, engage against the lugs so that the lifting of the choke is now accomplished through the slips, as more clearly shown in Fig. 6. As the choke is pulled upwardly, displaced fluid readily passes downwardly through the choke barrel, for a few

ounces of over-pressure above the bean 17 will tend to unseat the same so that this fluid may drain out through the perforations in the cage. This avoids any tendency to swabbing action during removal of the choke.

Since the construction illustrated is, obviously, capable of a certain range of change and modification without in any manner departing from the spirit of the invention, I do not wish to be understood as limiting myself thereto except as hereinafter claimed.

I claim:

1. In a choke for oil wells, a barrel having sealing means, a slip carrier mounted on the body, said slip carrier being freely movable upon the body and freely removable from the upper end thereof, slips supported from the carrier and means on the barrel directly engaging said slips to limit upward movement of the slips and carrier on the barrel while permitting free downward movement thereof, the barrel co-acting with said slips upon downward movement thereof to urge the slips radially outwardly.

2. In a choke for oil wells, a bored barrel having means whereby it may be secured at a desired point in a well casing, means to seal the exterior of the barrel to a casing, a seat surrounding the bore of the barrel, an orificed bean co-acting with said seat and having a substantial area exposed to pressures above the orificed bean, and a spring to hold the bean against said seat.

3. In a choke for oil wells, a carrier, slips supported from the carrier for radial movement at their lower ends, a choke barrel supported from the slips for free relative movement with relation thereto in one direction, and means operated by such relative movement for moving the slips outwardly for engagement with a well casing, the barrel having means frictionally engaging a well casing, the carrier and slips being freely movable on the barrel thereby to permit overrunning of the slips and a consequent primary engagement of the slips with a well casing.

4. In combination, a choke barrel, means to detachably secure the choke barrel in a well casing; a bean having a restricted orifice closing the bore of the barrel, and means yieldably supporting the bean in its barrel bore closing position.

5. In a coke for oil wells, a bored barrel having means whereby it may be secured at a desired point in a well casing, means to seal the exterior of the barrel to a casing, a seat surrounding the bore of the barrel, an orificed bean coacting with said seat and having a substantial area exposed to pressures above the orificed bean, and a spring to hold the bean against said seat, said spring being of such strength as to hold the bean against the seat with a very light pressure.

6. In a choke for oil wells, a bored barrel, the barrel having sealing means, a slip carrier mounted on the body and freely removable from the upper end thereof, slips having reduced shanks suspended from the carrier, and circumferentially spaced lugs on the barrel between which said shanks extend and against which said slips engage when the carrier is elevated to a predetermined extent, the sealing means of the barrel being adapted for frictional engagement with the wall of a tubing within which the barrel is inserted, the shanks being freely slidable between said lugs.

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