HYDRAULIC CASING SPEAR

Fig. 1

Fig. 2

Fig. 3

Fig. 4

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This invention relates to a hydraulic casing spear.

An object of the invention is to provide a casing spear which is of novel, simple and durable construction, and which can be lowered into a well casing in contracted position, expanded hydraulically into engagement with the interior of the casing, and used as a tool for recovering casing.

Another object of the invention is to provide a hydraulic casing spear which is hydraulically expanded into engagement with the interior of a casing and which is so constructed that the casing can be easily disengaged and the tool recovered in the event that the casing is so frozen in the well that its recovery cannot be had.

With the foregoing and other objects in view, which will be made manifest in the following detailed description, and specifically pointed out in the appended claims, reference is had to the accompanying drawings for an illustrative embodiment of the invention, wherein:

- Fig. 1 is a vertical section through a section of casing, illustrating the improved hydraulic casing spear in contracted position therein.
- Fig. 2 is a view similar to Fig. 1, illustrating the casing spear in expanded position in the casing.
- Fig. 3 is a horizontal section taken substantially upon the line 3—3 upon Fig. 1.
- Fig. 4 is a horizontal section taken substantially upon the line 4—4 upon Fig. 1.
- Referring to the accompanying drawings, wherein similar reference characters designate similar parts throughout, the improved hydraulic casing spear comprises a cylindrical body 10 having its upper end internally threaded, as at 11, providing for attachment to a string of drill pipe D by means of the pin P of a tool joint. The body 10 preferably has its upper portion cylindrical and below this upper portion there is formed a frusto-conical portion, indicated at 12. Below the frusto-conical portion 12 the body is reduced, as at 13, and at its extreme bottom there is a reduced externally threaded extension 14. A vertical central circulation passage 15 extends from end to end through the body. In the exterior surface of the frusto-conical portion 12 there are formed dovetailed grooves 16 which form upwardly convergent guides for slips 17. In the upper portion of the body there are formed a plurality of bores 18, which are parallel to the grooves 16. The bores 18 constitute cylinders in which pistons 19 are slideable and these pistons may be provided with packing elements 20, if desirable.

The pistons in their simplest form merely comprise cylindrical rods which are threadedly attached to the tops of the slips 17. Beneath the frusto-conical portion 12 there is disposed an annular ring 21 adapted to be engaged by the slips 17 and forced downwardly thereby. A head 22, shown as having a hemispherical bottom, is threaded onto the extension 14 and located in place by a safety pin 23. This head, by virtue of its shape, facilitates entering the tool into casings and in instances where the casing is partially collapsed it may serve to swage out the casing.

The head 22 forms two shoulders, indicated at 24 and 25. The shoulder 24 constitutes a spring seat for a spring 26 compressed between the spring seat and the ring 21. The shoulder 25 forms a stop limiting the downward movement of the ring 21.

The operation of the device is as follows: The tool is lowered into the casing C and when it has reached the desired position the circulation pumps are turned on, forcing circulation fluid downwardly through the drill pipe. This circulation fluid flows downwardly through the circulation passage 15 but sufficient pressure is developed within the body 10 to force the pistons 19 downwardly against the action of the coil spring 26. The downward movement of the pistons 19 causes the slips to move downwardly on their inclined guides or grooves 16 until the slips have assumed the expanded position, shown in Fig. 2, wherein they engage the casing. As shown upon the drawings, the slips have upwardly directed teeth so that after they have engaged the casing they will hold it and permit its being lifted or carried by the tool.
Downward movement of the slips is limited by the ring 21 engaging the shoulder 25. If for any reason it should be desired to disengage the tool from the casing, the fluid pressure developed within the drill pipe D is released, allowing pressures on the inside and outside of the tool to be equalized. The spring 26 then becomes effective to force the ring 21 and slips upwardly, returning the slips into their contracted positions.

Frequently, however, after the teeth on the slips have dug into the casing it is necessary to lower the tool slightly and thus loosen the slips from the casing before the spring 26 will become effective. It will be appreciated that by the above described construction, after the casing has been engaged by the slips and the weight of the casing is being carried thereby, that it is no longer necessary to keep pressure developed within the tool or drill pipe D.

From the above described construction it will be appreciated that a simple, novel and durable hydraulic casing spear is provided which will satisfactorily perform the functions for which it was intended. The device has very few moving parts and cannot easily get out of order. Furthermore, it is possible to release the tool from the casing whenever this is found desirable.

A desirable advantage of the improved construction resides in the fact that each of the slips can be forced downwardly into expanded position independently of the other slips. By such an arrangement the tool can be satisfactorily employed in recovering or withdrawing partially collapsed casing. In view of the fact that each slip can be forced downwardly independently of the others, the tool will accommodate itself to partially collapsed or non-circular casing and establish a firm grip thereon, enabling its recovery. Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. A hydraulic casing spear comprising a body having inclined guides, slips movable upon the guides adapted to assume contracted or expanded positions thereon, and pistons, one for each slip, operable by fluid pressure developed in the interior of the body for moving the slips.
2. A hydraulic casing spear comprising a body having a plurality of upwardly convergent dovetail grooves formed thereon, there being cylinders in the body communicating with its interior, each cylinder being arranged parallel to its respective groove, slips slidable in their respective grooves, and pistons reciprocable in their respective cylinders and connected to their respective slips.
3. A hydraulic casing spear comprising a body having a plurality of upwardly convergent dovetail grooves formed thereon, there being cylinders in the body communicating with its interior, each cylinder being arranged parallel to its respective groove, slips slidable in their respective grooves, pistons reciprocable in their respective cylinders and connected to their respective slips.

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