

April 14, 1931.

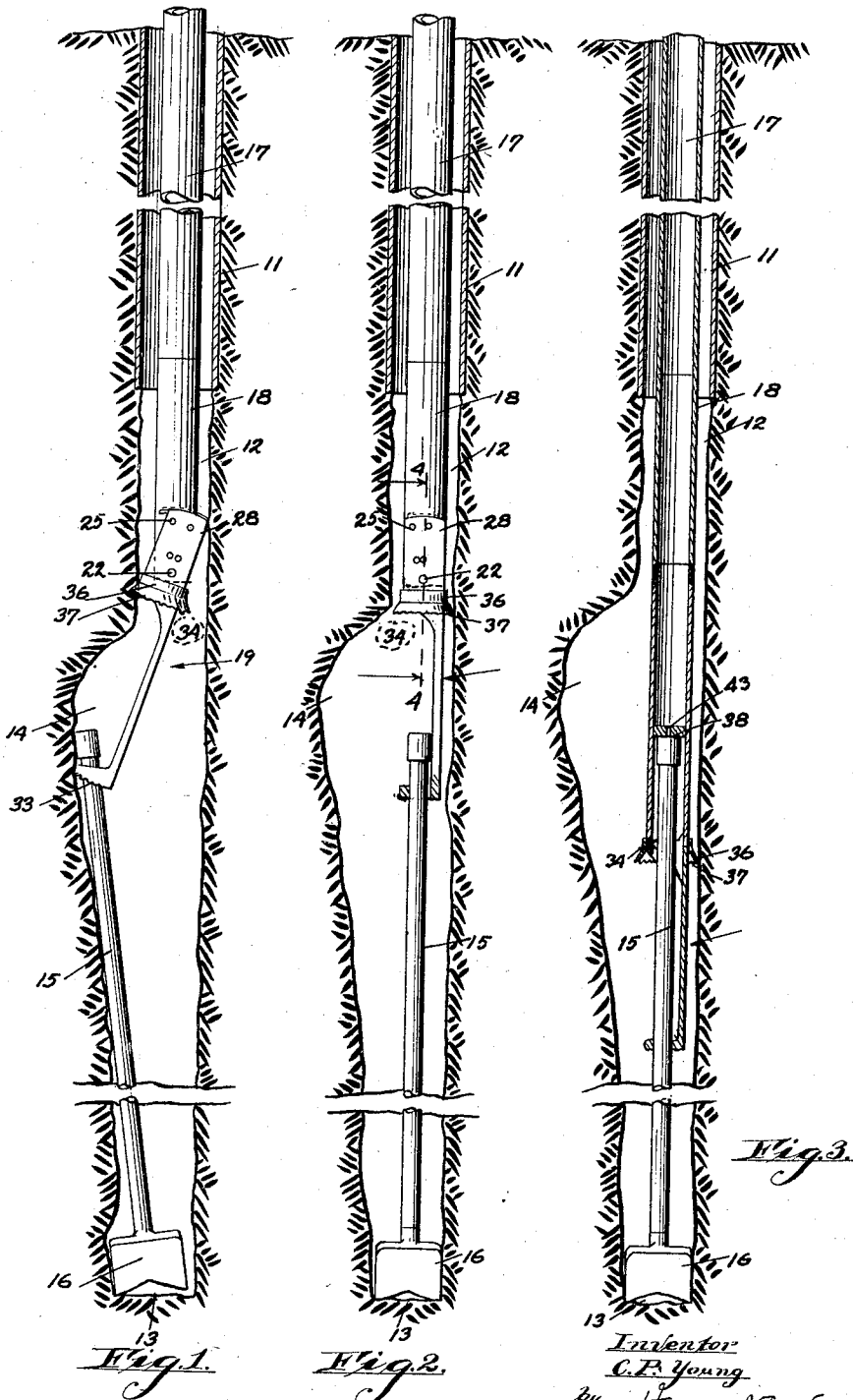
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WASHOVER HYDRAULIC WALL HOOK

Filed Nov. 6, 1929

2 Sheets-Sheet 1



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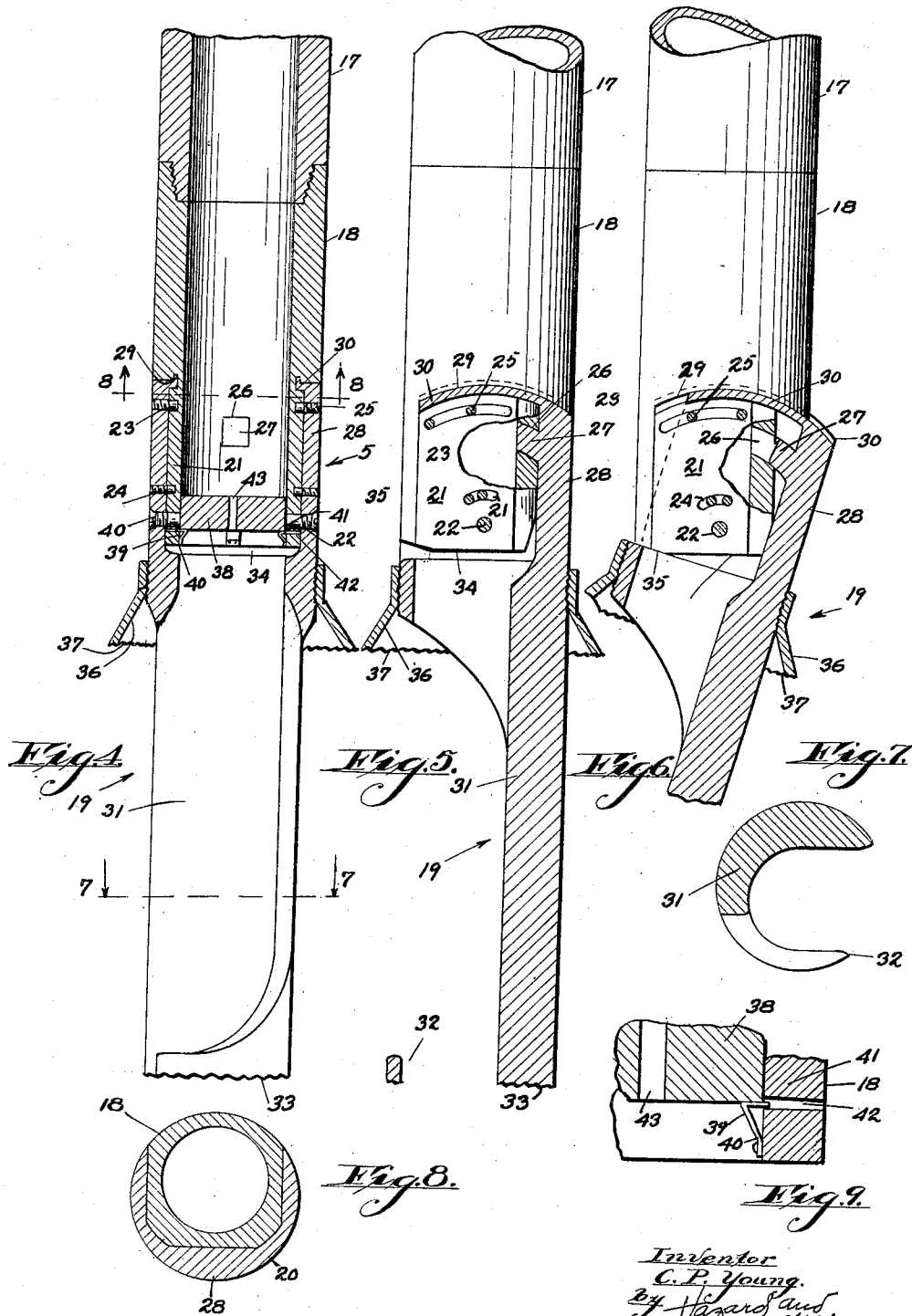
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UNITED STATES PATENT OFFICE

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WASH-OVER HYDRAULIC WALL HOOK

Application filed November 6, 1929. Serial No. 405,259.

My invention is a washer hydraulic wall hook for use in well drilling, to engage a drill pipe or the like which has become lodged in the well and shifted to one side due to a cave-in or the like.

An object of my invention is in one feature the construction of a wall hook attached to a string of pipe, which may be forced laterally by the slushing fluid pumped downwardly into a well and when such hook is forced laterally on rotation of the pipe, it may grip a string of drill pipe dislodged to one side on the hole due to a cave-in or other cavity in the side of the hole.

Another feature of my invention in connection with the positive lateral shifting of the wall hook, is a means for exerting substantially the full pressure of the slushing fluid to shift the wall hook and hold it shifted, this being done by means of a loose plug forming a closure for the lower end of the string of pipe. This plug therefore causes the pressure to be exerted on a small piston connected to the upper part of the wall hook and operating in a short pressure chamber. The wall hook is pivoted so that the small piston is formed arcuate as is the pressure chamber in which it operates.

Another object of my invention is a construction by which after the string of drill pipe having the bit at the lower end has been straightened into a vertical position, it may be forced upwardly into the pipe carrying the wall hook. The plug which is located in the lower end of the pipe and forms the closure against the hydraulic fluid is elevated while the string of drill pipe passes upwardly into the pipe carrying the wall hook as such pipe is lowered into the well, and in this operation the hydraulic slushing of the well may be carried on.

My invention is illustrated in the accompanying drawings, in which,

Fig. 1 is a side elevation of my invention showing the wall hook engaging a string of drill pipe lodged to one side of the hole;

Fig. 2 is a view similar to Fig. 1, illustrating the pipe straightened into a vertical position;

Fig. 3 is a view similar to Fig. 2, with the

pipe carrying the wall hook and part of the wall hook shown in section;

Fig. 4 is a vertical section substantially on the line 4—4 of Fig. 2, in the direction of the arrows;

Fig. 5 is a side elevation in the direction of the arrow 5 of Fig. 4, partly broken away;

Fig. 6 is a view similar to Fig. 5, showing the wall hook displaced to one side;

Fig. 7 is a section of the wall hook on the line 7—7 of Fig. 4, taken in the direction of the arrows;

Fig. 8 is a horizontal section on the line 8—8 of Fig. 4;

Fig. 9 is a detail enlarged view of the supporting springs for the plug of Fig. 4.

In the drawings, the well casing is indicated by the numeral 11, having the well hole 12 extending below the casing; the bottom of the hole being indicated at 13 and the cave-in or other cavity 14 at the side. A broken string of drill pipe is indicated by the numeral 15, having a drilling bit 16 at the bottom. This is the fish to be removed from the well as it first has to be engaged and centered by a wall hook. After straightening this string of drill pipe 15 into a vertical line, which is the function of the present apparatus, the string may be cut by a tool lowered into the well and then removed in sections or the drill bit forced to one side of the hole. The wall hook and other features of this invention may be considered as a further development of the hydraulic wall hook shown in the patent to Gates, et al., 1,594,668 of August 3, 1926.

A string of drill pipe 17, of a larger size than the string 15, is lowered into the well and preferably has a sub 18 on the bottom to which the wall hook designated generally by the numeral 19 is attached. The wall hook at the upper part is substantially U-shaped in cross section as indicated at 20 in Fig. 8 and the sub has a reduced section 21. The wall hook is pivoted to the sub by pivot screws 22. The sub has an upper and a lower arcuate slot 23 and 24 and the wall hook is provided with pins 25 which engage in these slots, forming a stop for the removal of the wall hook. A lateral pressure chamber 26 is

formed in the back of the sub, this being illustrated as square in vertical section and in this fits the piston 27 formed integral with the upper back portion 28 of the wall hook. The sub is provided with an upper arcuate slot 29 in which fits an arcuate projection 30 on the upper part of the wall hook. The lower part of the wall hook is somewhat U-shaped in cross section as indicated at 31 (note Figs. 4, 5 and 7) and has an encircling hook 32 at the bottom, the lower face 33 of this hook having a roughened cutting surface.

The sub terminates at the bottom on the line indicated at 34 and has a slight upward slope 35 at the front to accommodate the tilted wall hook. The wall hook is provided with a flared skirt 36 having a reaming edge 37. Located in the bottom of the sub there is a shiftable circular plug 38, this plug being supported adjacent its periphery by spring brackets 39. These spring brackets have their lower end 40 secured to the lower part of the wall of the sub and have horizontal flanges 41 adapted to recede into recesses 42 as hereinunder set forth. These springs support the plug and prevent its downward movement. The plug is provided with a central slushing duct 43 to allow downward flow of the slushing mud. This however, is restricted in size so that the pressure may be increased in the pipe 17 by increasing the pressure of the pumps.

When a string of drill pipe has been lodged at one side of the well as indicated in Fig. 1, a larger string 17 with the wall hook is lowered into the well. When this is at the proper depth to engage the broken string 15, an increased pressure is exerted by the mud pumps, which on account of the small opening through the plug 38 gives a considerable pressure against the piston 27 of the wall hook and thus forces the wall hook to one side as indicated in Fig. 1. The stop pins 25 operating in the slots 23 and 24 form a limit to the lateral movement of the hook. The string 17 is then rotated until the hook has engaged the string; the pressure may then be released and the string 17 rotated until the wall hook assumes the position in alignment with the larger string 17 and the broken string 15 is brought into a vertical position. The string 17 is then lowered, the upper end of the broken string 15 being forced upwardly through the upper part of the wall hook and engaging the plug 38 lifting this plug upwardly into the larger drill pipe 17 as indicated in Fig. 3.

The string 17 with its wall hook is then lowered until a desirable location for cutting the string 15 is arrived at, then the cutting tool (which forms no part of this immediate invention) is lowered over the drill string 17 and over the wall hook engaging the broken string 15 above the bit and cutting the string. The string 17 with its wall hook may then

be lifted, leaving the cut string 15 in the well and this may be removed as an ordinary fishing job. The drill bit may also be removed or broken and forced to one side of the well in the operation of the wall hook; the reamer 36 having the reaming edge 37 may be brought into operation, cutting the side formation of the hole when the wall hook is inclined to one side. It will be seen by the present invention that considerable pressure may be exerted to thrust the wall hook to one side, this action being by the pressure of the slushing fluid and at the same time a circulation in the well may be maintained.

Various changes may be made in the principles of my invention without departing from the spirit thereof as set forth in the description, drawings and claims.

I claim:

1. In a device as described, a tubular supporting structure connectible to a string of pipe, a partial closure for the lower end of said structure, said structure having a pressure chamber therein, a wall hook pivotally connected to the structure and having a piston operating in the said pressure chamber, whereby a hydraulic fluid may tilt the wall hook laterally, the said partial closure means being adapted to shift when engaged by an article caught by the wall hook.

2. In a device as described, a tubular supporting structure adapted for connection to a string of pipe, a plug having an opening in the bottom of said structure, a wall hook connected to the structure, means to hydraulically operate the wall hook to shift same laterally to engage an article in the well, the said plug being shiftable by said article when brought into alignment with the string of pipe.

3. A device as described, comprising a string of pipe having a tubular structure at the bottom with a shiftable closure plug loosely retained at the bottom, a wall hook pivotally connected to the structure, a hydraulically operated means to shift the wall hook laterally, said hook having means to engage an article in the well and to bring such article into alignment with the pipe, the said plug being shiftable upwardly on lowering of the pipe and the wall hook relative to the said article.

4. A device as described, comprising a string of drill pipe having a tubular structure at the bottom, a shiftable plug mounted therein with a resilient supporting means for the plug, a wall hook pivotally connected to the structure, hydraulically operated means to shift the wall hook, whereby the lower end may engage an article in the well, said article when in alignment with the string of pipe and on lowering of such string, and the wall hook being adapted to shift the plug upwardly in the said tubular structure.

5. A device as claimed in claim 4, the resili-

ent support comprising springs secured to the lower portion of the tubular structure, with means to allow partial pressing of said springs outwardly on the movement of an article upwardly in the tubular structure.

5 6. A device as described, comprising in combination a string of drill pipe having a tubular structure at the bottom with an arcuate pressure chamber on one side, the inside
10 of said chamber being in communication with the inside of the structure, a pivotally mounted wall hook having an upward extension with a piston thereon fitting in the
15 said chamber, the piston being subject directly to a hydraulic pressure in the said tubular structure and thereby tilting the wall hook to one side, and means to limit the movement of such wall hook.

20 7. A device as claimed in claim 6, a shiftable plug retained at the bottom of the said tubular structure and obstructing the flow of hydraulic fluid, whereby pressure may be created against the said piston, the plug being
25 shiftable upwardly by an article engaged by the wall hook on lowering of the said structure and the wall hook.

8. A device as claimed in claim 6, the tiltable wall hook having a skirt structure connected thereto with a reaming edge on each
30 skirt structure, whereby the hole may be reamed to allow full tilting of the wall hook to one side.

9. A device as described, comprising a string of pipe having a tubular structure at
35 the bottom with a shiftable wall hook, a hydraulic means for moving said hook laterally, said hook having a cutting surface on the bottom to allow a cutting action on the formation.

40 10. A device as described, comprising a string of drill pipe having a tubular structure at the bottom with an arcuate pressure chamber on one side of said structure and a shiftable plug forming a closure at the bottom,
45 said plug having a small opening there-through, a wall hook pivotally mounted to the bottom of said structure and having an upper back portion extending upwardly on the outside of the lower portion of the tubular structure and having a piston operating
50 in the said pressure chamber and a downward extension below the pivot having an arcuate hook, means to limit the lateral movement of the hook, such movement being accomplished by hydraulic pressure in the tubular
55 structure, the said hook being adapted to engage an article in a well and to shift same into alignment with the tubular structure, said plug being shiftable upwardly on the
60 lowering of the wall hook and the said tubular structure over the said article.

11. A device as claimed in claim 10, a flaring skirt attached to the tiltable wall hook below the pivot point of the hook with the
65 tubular structure, said skirt having a cutting

edge and adapted to form a reamer when the hook is tilted.

12. A device as described, comprising a string of pipe having a relatively stationary tubular structure at the bottom with a lateral
70 pressure chamber, a tilting wall hook having a pivotal mounting on the structure and having an upward extension with a piston operating in the said chamber, arcuate guides formed in the tubular structure and engaged
75 by projections on the sides of the upper portion of the wall hook, the said wall hook being adapted to be shifted by the internal pressure of a hydraulic fluid on the piston in the said pressure chamber.

In testimony whereof I have signed my name to this specification.

CLARENCE P. YOUNG.

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