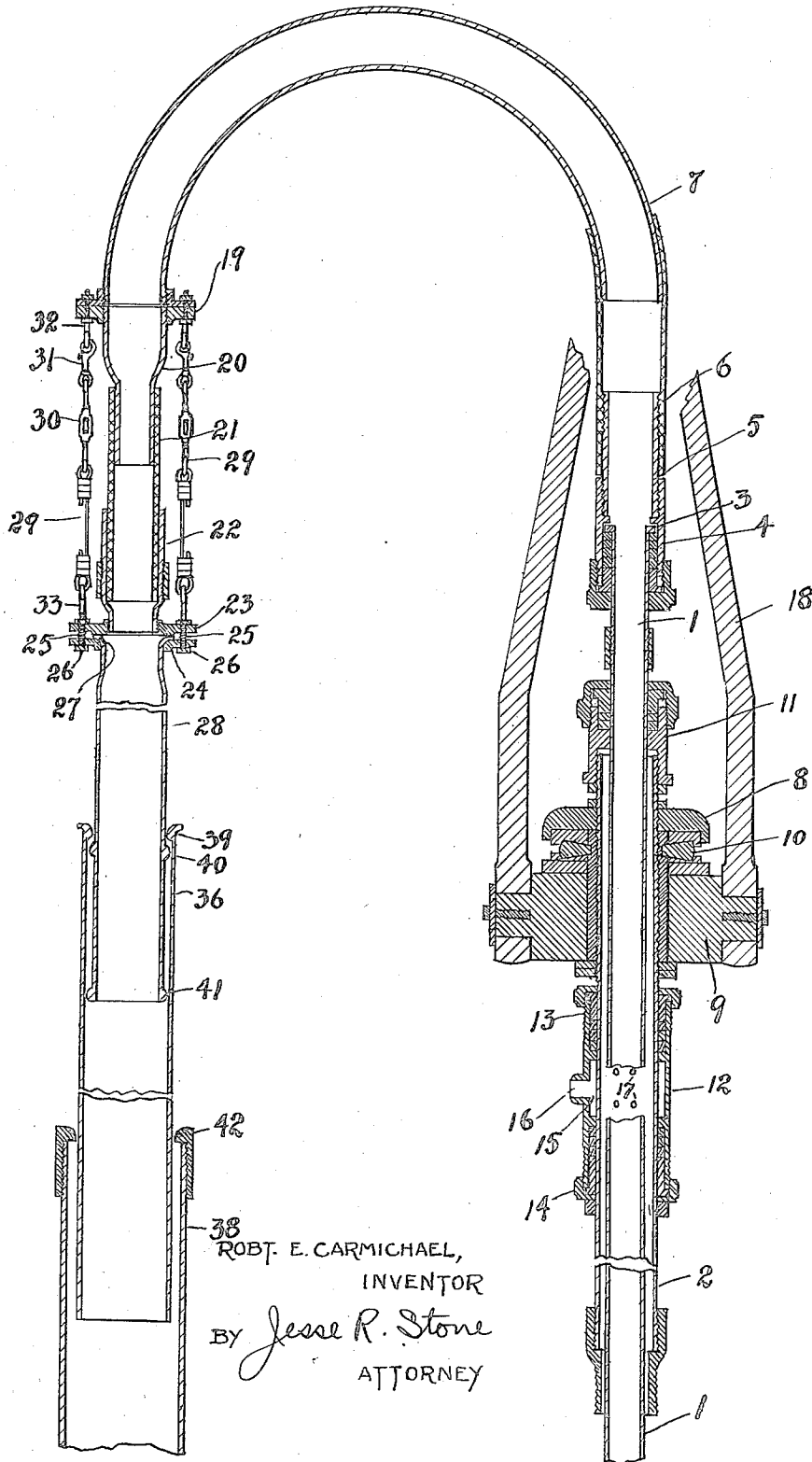


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CORE DISCHARGE APPARATUS.
APPLICATION FILED JUNE 28, 1918.

1,280,159.

Patented Oct. 1, 1918.



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CORE-DISCHARGE APPARATUS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ROBERT E. CARMICHAEL, a citizen of the United States, residing at Damon, Brazoria county, Texas, have invented a certain new and useful Improvement in Core-Discharge Apparatus, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in core discharge means for use in connection with core drills in well or mine drilling. In the use of rotary core drills in obtaining samples of rock, ore, or other hard material it is necessary to provide means by which the core may be raised to the surface and discharged in a receptacle provided therefor, during the operation of the drill, thus making it possible to examine the sample of the material being drilled and to ascertain the character of the same.

A core drill of any ordinary construction may be used to drill the well. Such a drill is attached to a hollow drill stem and is itself hollow and digs an annular hole in the material. The part thus left in the center of the hole forms a core which breaks off from the bottom at intervals by the whipping about of the drill stem. This core is adapted to be carried to the surface by an air-lift pump. Water is almost invariably present in wells of any depth and, where not present, is pumped down outside the drill stem. Air is pumped under compression down an outer pipe and bubbles up inside the drill stem thus causing an upward current of water inside the drill stem carrying with it the cuttings of the drill and the broken pieces of core.

One object of my invention is to provide a means, at the upper end of the drill stem, whereby the core may be discharged at a desired point without interfering with the progress of the drilling operation.

Another object is to provide a core discharge which shall be capable of movement in a vertical and also a lateral direction and yet permit of no obstruction to the outward passage of the core.

Another object is to provide a core discharge means which shall be strong and rugged and of steel or other metal construc-

tion at all points where the structure is exposed to wear.

Other objects and advantages will more clearly appear in the description which follows and will be set forth with more particularity in the claims.

With reference to the drawing forming a part of this specification, I have shown in the figure, a longitudinal central cross section of the apparatus constituting one embodiment of my invention.

The apparatus here disclosed is suspended in a drill derrick by the usual tackle employed in connection with drilling and, as the supporting means is old and well known, I have shown only so much of the discharge means as illustrates my invention. To the right of the figure I have shown the upper end of the drill stem 1 to the lower end of which a core drill is attached. This stem is shown broken off some distance above the rotary on the derrick platform. It extends upwardly inside an outer air pipe 2 through the swivel block 9 and is provided at its upper end with an outwardly flaring flange 3 seated rotatably within a non-rotatable stuffing box 4 of ordinary construction. The upper end of the stuffing box 4 is connected through a nipple 5 to a short length of flexible rubber hose 6. The hose 6 is connected at its upper end to a curved steel pipe or goose-neck 7.

The outer air pipe 2 is connected at its lower end in the well with the drill stem 1, and at its upper end, it is attached to the bearing block 8 resting rotatably upon the stationary swivel block 9 suspended by the usual bail 18 to the tackle and the derrick. Between these two blocks are the usual roller bearings 10 for the purpose of reducing the friction between the rotating parts. Above the swivel is a stuffing box 11 closing the upper end of the pipe 2 and maintaining a fluid tight closure with the inner drill stem 1.

In order that compressed air may be forced down inside the pipe 2 and between the same and the stem 1 at the time the pipes are rotating, there is provided a swivel connection 12 outside said pipe 2. The pipe 2 is rotatable in said connection which has stuffing boxes 13 and 14 at its upper and lower ends. Centrally thereof, outside pipe 2, is an annular chamber 15 having a hose

nipple 16 leading therefrom. Within the chamber 15 the pipe 2 is perforated at 17 so that the compressed air entering by the opening at 16 will pass through said perforations as the pipe 2 rotates and thence downwardly to the lower end of the pipe. It there finds entrance to the drill stem 1 and bubbles up lifting therewith a current of water and broken pieces of core.

- 10 Said pieces of core are sometimes of considerable length and the hose 6 and goose-neck 7 are of larger diameter than the drill stem to allow free movement thereof. This is especially desirable in the goose-neck 7
15 by means of which the core is turned from its upward movement from the well and discharged downwardly toward the receiving box. The discharge end of the goose-neck is threaded to receive a flanged block
20 19 by means of which it is connected to a swaged nipple 20. To this nipple I have attached a short length of hose 21 which fits loosely in the upper end of a larger nipple 22 the lower end of which is threaded
25 into a block 23. Below the block 23 is another similar block and through the outer flanges of the two blocks are passed the bolts 25, 25 on which are threaded nuts 26, 26 serving to clamp the two blocks together.
30 Between said clamping blocks is the flange 27 produced by bending outwardly the upper end of a length of pipe 28.

- In order to take any weight or downward pull off the length of hose 21 the blocks 19
35 and 23 are connected flexibly together by means of combined rod and wire rope supports, 29. In these supports I have provided turnbuckles 30 and detachable snaps 31 to make the said supports adjustable and
40 easily detachable. The supports are connected to said blocks 19 and 23 by means of eye-bolts 32, at the upper end, and 33 at the lower end. The bolts 33 also serve to clamp the blocks 23 and 24 together as shown.

- 45 The pipe 28 is of larger diameter than the hose 21 and is telescoped at its lower end within a pipe 36 of still larger diameter. The pipe 36 at its lower end telescopes into the outlet pipe 38 from which the core issues into any receptacle not shown.
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- These telescoping pipes are thus arranged to accommodate any vertical and also lateral movement of the apparatus. It is necessary, at intervals during the progress of the
55 drilling operation, to raise the apparatus and insert a new length of drill stem and air pipe 1 and 2 to provide for the increasing depth of the well. When this is done, the whole apparatus including the goose-neck 7 and discharge pipes 21, 28, and 36,
60 is elevated by means of block and tackle attached thereto. As the drill derrick decreases in width from the bottom to the top thereof, the goose-neck must be crowded
65 somewhat out of the vertical, at some points,

and this vertical and lateral play of the parts is accommodated by my discharge apparatus. The hose 6 at the entrance of the goose-neck allows a lateral play, as does the hose 21 at the other end. Some lateral play
70 is also allowed by the provision of each of the discharge connecting pipes fitting loosely into a pipe of increasingly larger diameter. Vertical play is of course permitted by the telescoping of the pipes.
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On the upper end of the pipe 36 is an inwardly projecting ring 39 rounded to contact slidably with the pipe 28 and partially close the space between said pipes. On the
80 pipe 28, spaced somewhat above the lower end thereof, is an annular ring or flange 40 rounded as is the ring 39. A similar ring 41 is formed on the lower end of the pipe 28. The annular ring or flange 41 serves as a guide or a lateral support for the lower
85 end of the pipe 28 to prevent too decided a play between the pipes as they are moved from one side to another. The flanges 39 and 40 are similar guides but also serve to prevent the pipe 28 from lifting out of the
90 pipe 36 when the apparatus is raised.

On the top of the discharge pipe 38 is threaded a shoe 42 having an inwardly projecting flange thereon and serving as a guide for the telescoping pipe 36 therein and to
95 prevent excessive wear on the upper end of the pipe 38 during the operation of the device.

The objects and operation of my invention will now be clear without further description. The core which is carried up from the hollow drill stem 1 by the current caused by the air lift, previously described, will be conducted through the hose connection 6 without anything more than a very slight
100 contact therewith as it is given a straight upward momentum by the current of air and water. The goose-neck 7 is of strong steel and serves to turn the core and direct it downwardly without excessive wear. The
105 goose-neck, because of the length of the cylindrical pieces of core that must pass through the same, must be bent in the arc of a circle of comparatively large diameter, as it is obvious a sharp turn in the pipe
110 would cause the core to become lodged therein and clog the pipe. The hose 21 also will get little wear because of its vertical arrangement. The core will drop from the nipple 20 directly therethrough with very
115 little wear and all necessary lateral play is accommodated by the supports 29, 29, said supports also serving to sustain the weight of the telescoping pipes 28, and 36. It is obvious that my device will serve to carry
120 out the sample of core and discharge it under control, and at the same time, the discharge means will not interfere with the continuation of the drilling operation. It will be adjustable and flexible and also
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strong, rugged and durable. At the same time my apparatus is simple in construction and economical to manufacture.

I have shown my invention applied to a rotary drill but it is obvious to those skilled in the art to which my invention appertains that the invention could readily be adapted to any core drill whether reciprocating or rotary and I do not wish to limit myself to the embodiment herein shown and described except as may be set forth in the claims.

Having thus described my invention, the uses and advantages of which will be clear without further explanation, what I claim as new and desire to protect by Letters Patent is:

1. In a device of the character described, a core discharge comprising a drill stem, a goose-neck connected therewith, a plurality of telescopic pipes and a flexible connection between the discharge end of said goose-neck and said telescopic pipes.

2. In a device of the character described, a core discharge comprising, a drill stem, a goose-neck connected therewith, a flexible outlet from said goose-neck comprising a flexible hose and a plurality of telescoping pipes, and flexible metallic supports between said goose-neck and said pipes outside said hose.

3. In a device of the character described, a core discharge comprising a drill stem, a goose-neck connected therewith, a series of telescopic pipes and a flexible connection between said goose-neck and said pipes, said pipes being of progressively larger diameter from the goose-neck outwardly and guides on said pipes for the purpose described.

4. In a core discharge for drills, a drill stem, a goose-neck, and flexible connection between said stem and goose-neck, a series of telescoping discharge pipes, a flexible connection between said goose-neck and the first of said pipes, said first pipe having an outer annular flange thereon near the lower end thereof, and an inner flange on the top of the next lower pipe, said flanges adapted to prevent said pipes from becoming disconnected.

5. In a device of the character described, a means for discharging the core from a rotating core drill stem, comprising a swivel connected therewith, a goose-neck of rigid material, a flexible connection between said goose-neck and swivel, a series of telescop-

ing discharge pipes, and a flexible connection between said discharge pipes and said goose-neck.

6. In a device of the character described, a means for discharging the samples of ore from a rotating drill stem, comprising a goose-neck of rigid material, a flexible connection between the goose-neck and said drill stem, a swivel in said connection, and a flexible means on the discharge end of said goose-neck to direct the outward passage of said samples.

7. In a core discharge means for core drills, a goose-neck curved on the arc of a circle of comparatively large radius, a connecting block secured at the discharge end of said goose-neck, a nipple in said block, a flexible pipe on said nipple, a pipe of larger diameter into which said flexible pipe projects, a block on said pipe, flexible supporting means between the two said blocks, and telescopic pipes connected with said last named block.

8. In a core discharge for rotary drills, a rotatable drill stem, a non-rotatable goose-neck, connected therewith, and a series of telescoping discharge pipes flexibly connected to said goose-neck.

9. In a core discharge for rotary drills, a rotatable drill stem, a non-rotatable goose-neck flexibly connected therewith, a series of telescopic discharge pipes and a flexible connection between said goose-neck and said discharge pipes.

10. In a core discharge for rotary drills, a rotatable drill stem, a non-rotatable goose-neck of rigid material, a flexible connection between said goose-neck and said drill stem, a series of telescopic discharge pipes and a flexible connection between said goose-neck and said discharge pipes, said flexible connections arranged to operate in approximately vertical position.

11. In a core discharge for rotary drills, a rotatable drill stem, a non-rotatable goose-neck, a series of downwardly directed telescopic discharge pipes and flexible, vertically arranged connections between said goose-neck and said drill stem and between said goose-neck and said discharge pipes.

In testimony whereof, I hereunto affix my signature this the 25th day of June, A. D., 1918.

ROBERT E. CARMICHAEL.