

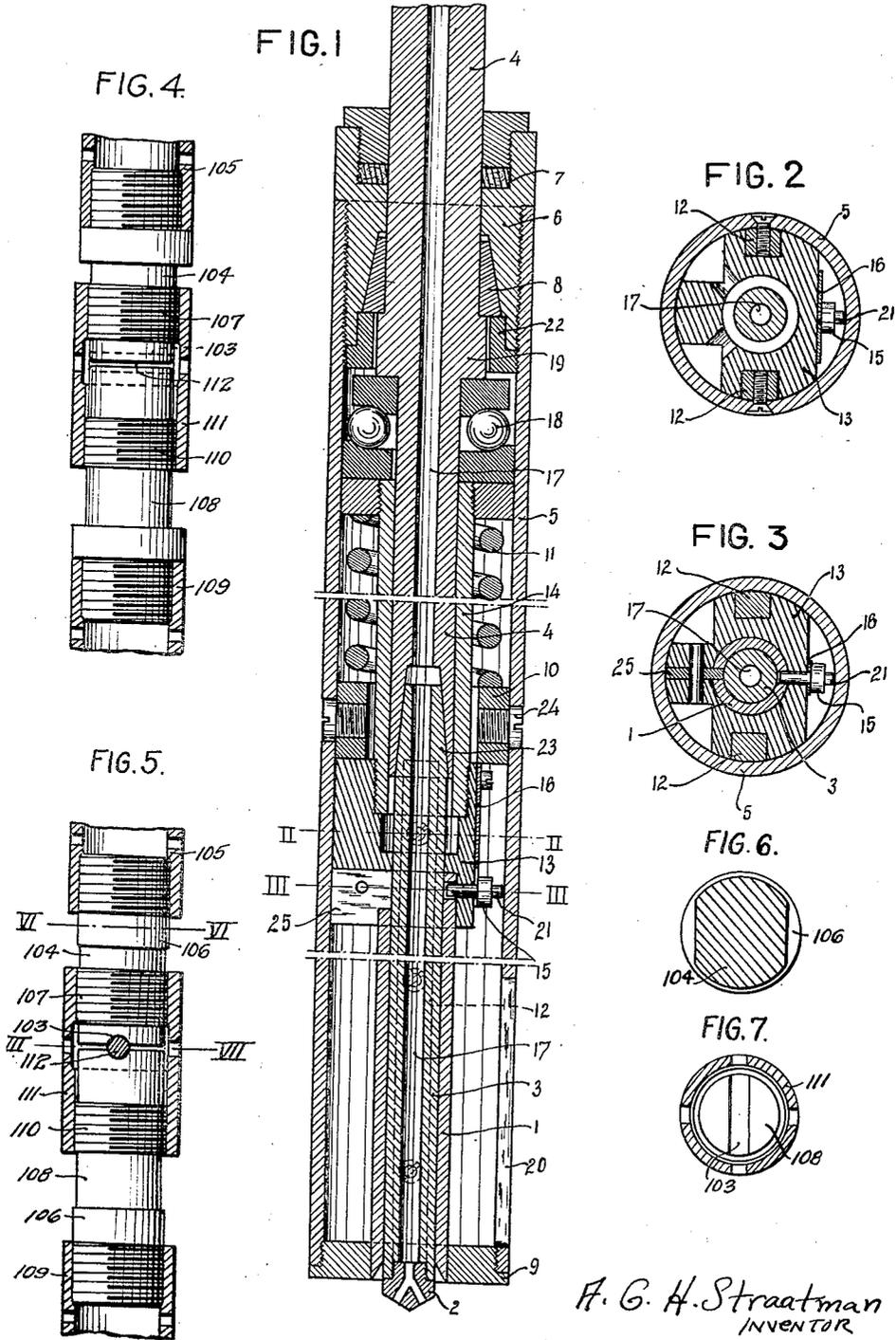
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A. G. H. STRAATMAN

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METHOD OF OBTAINING ORIENTATED DRILL CORES

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A. G. H. Straatman
INVENTOR

By: *Marks & Lee*
ATTYS.

UNITED STATES PATENT OFFICE

ALPHONS GERAARD HUBERT STRAATMAN, OF THE HAGUE, NETHERLANDS, ASSIGNOR TO
 NAAMLooZE VENNOOTSCHAP DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ, OF
 THE HAGUE, NETHERLANDS

METHOD OF OBTAINING ORIENTATED DRILL CORES

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My invention relates generally to a method of obtaining orientated drill cores and to apparatus for carrying this method into effect, the present application being a division of my prior application, No. 247,992 of January 19, 1928.

When drilling deep holes it is of importance to know the position of the strata in respect to the meridian, which could be done in a simple manner if it were possible to bring a drill-core up to the surface without rotating it about its axis. The string of drilling and fishing tools itself being subjected, however, to torsion as soon as it has to exert any appreciable force at the bottom and the string being generally of great length, this torsion makes the orientation of the core brought up most uncertain.

The present invention aims at orientation of the drill-core with a great degree of certainty.

To this end the core is provided with a marker which may consist of a drilling bit or an expandible plug, cylinder or such like object driven into a hole in the core and remaining there while the core is being drilled out and brought up to the surface.

There are various means of orientating this distinctive marker. For instance, the marker driven into the core can carry another object upon which marks can be made, or can make marks itself, so that by means of a specially calibrated string of rods which is run into the hole or well the orientation of the distinctive marker can be transmitted to the surface before the core is drilled out and brought up to the well mouth.

The invention will now be described with reference to the accompanying drawings in which:

Figs. 1 to 3 show a longitudinal and two cross sections of a tool by means of which a cylinder can be driven into a hole in soft rock which, owing to its plasticity, would not be suitable to take a drill or bit as orientation marker. Moreover this tool can serve as an example of a centering tool to prevent a crooked hole being drilled in the rock for the orientation marker, avoiding the risk of the drill being broken.

Figs. 4-7 are couplings of orientation rods or tubes which have to carry down into the hole some device for orientation. The position of this string of rods or tubes, which is calibrated, has to be orientated at the surface.

The tool shown in Figures 1-3 serves to drive into the rock a tube (1) the bottom end of which is hard and sharp, while a drill (2) screwed into a hollow drill-holder (3) drills a relatively small hole in advance. The tube 1 has to cut into the rock by pressure, the drill removing the cuttings. The drill-holder 3 in connection with the drill spindle 4. The whole is enclosed in a cylinder (5) with a center-ring (6) at the top with packing box 7 and wedge-ring 8, and at the bottom a center-ring (9) which guides the tube 1. This casing 5 also contains a bearing-ring (10) for the spring (11) and two guide-keys (12). The latter guide the slide (13) suspended at the end of tube (14), which in its turn slides up and down the drill spindle 4. Slide 13 has a key-plate (25) which engages in a key-way on tube 1, and a suspending pin (15) under the head of which is one end of the leaf-spring (16). Flush liquid is fed via the central channel (17). The upward pressure of spring 11 is taken up by the ball-block (18) and the collar (19) of the drill-spindle.

Thus, when this tool is run into the hole at the end of drill-rods, the drill-stem 2 is centered, or at least guided, by tube 5. As soon as the drill has penetrated a few millimeters into the rock the center-ring 9 comes to rest against the top of the rock. Owing to the pressure brought to bear upon cylinder 1 by the drill-spindle via the balls 18, the tube 14 and the slide 13, cylinder 1 is forced into the rock, and while both the drill and the cylinder move downwards together spring 11 becomes compressed. In this movement the drill rotates, but not cylinder 1, casing 5 and the parts between these two, except of course the balls 18. As soon as the drill 2, drill-stem 3 and cylinder 1 have been sunk deep enough into the rock, pin 15 has reached a slot (20) in the casing 5. The leaf-spring can now spring outward, forcing the thin end (21) of the pin into the slot in the casing; the thick collar

of this pin, however, cannot enter the slot. Thus the other end of pin 15 is disengaged from the cylinder 1. The drill-spindle 4, which can be coupled to a recording instrument, is then stopped and the position of the tools at the bottom is registered, for instance with the said recording instrument. After this has been done, the tool of Figures 1-3 can be drawn up, leaving the cylinder 1 plugged tight in the rock. While the drill-spindle 4 is being drawn up, spring 11 is under great tension and endeavours to release itself until the casing 5 takes up the position shown in the drawings, but this is prevented by the conical wedge-ring 8, which has a saw-edge (not shown) and grips the drill spindle 4. The object of this is not to lose the orientation of the key-plate 25 in respect to the drill spindle and the bodies above and joined to it.

Packing box 7 serves to keep the drill spindle clean so as to ensure that the wedge-ring 8 performs its function properly. A spring may also be placed between the nut 22 and ring 8, in which case the nut will have to be made of somewhat different dimensions.

The drill-stem 3 is fixed into the drill-spindle with a cone 23; rotation is prevented by a key (not shown).

Ring 10 is fixed to the casing 5 by screws (24).

For orientation purposes specially designed orientation rods are run into the hole, the orientation of the bottom end of those rods having a fixed relation to that of the visible end at the surface. At the end of these rods an automatic punch can be run down to make a certain orientation mark or marks on the object fixed in the core below, or a leaden disc can be run down adapted to take up an orientation mark or marks, made by said object.

The complete couplings shown in Figs. 4-7 make it possible to orientate above ground an apparatus like tube 1 while it is in the well.

A coupling piece (104) is screwed permanently into tube 105. Wrench faces (106) serve also to check the proper coupling of two measuring rods (tubes) mutually. Part 104 has a rather coarse thread (107), say 10 threads per inch. The other coupling piece (108) is permanently screwed into measuring rod (or tube) 109 and is longer than 104. Part 108 has a finer thread (110), say 12 threads per inch. The two parts 104 and 108 are connected together by a collar (111) with corresponding threads; thus this collar works as a differential screw drawing the two couplings together when turned. The front face of each coupling has a cylindrical groove (103) in which a small cylindrical rod is placed which not only takes up the pressure exerted by the collar but also provides particularly for the measuring tubes 105 and 109 being coupled together in such a way as to

prevent any measurable error arising from a possible rotation of one tube in respect to the other. In this manner, therefore, an "orientating" coupling is obtained. When the coupling collars are unscrewed the two couplings are parted and the collar finally drops over the long neck of coupling 108, enabling the small rod (112) to be removed. Of course, it is evident that every measuring tube has a coupling like 104 at one end and another like 108 at the other end.

At the lower end of the described string of rods or tubes a leaden disc may be run into the hole until the under surface of said disc strikes the upper surface of the tube 1 fixed at the bottom of the hole. The top surface of tube 1 makes on the leaden disc an impression showing the form of a ring with a gap at the place of the key-way for key 25, so that the position of the tube can be ascertained.

A closer study of this method of working, given here as example, will show in the first place that several details can be altered. For instance the marker left in the core for orientation purposes may be different both as regards shape and construction.

The manner in which an orientation body is fixed into the core may be varied, several constructions being possible according to the nature of the rock.

What I claim is:

1. A method of obtaining orientated drill cores consisting in drilling a preliminary hole concentric with the desired core, inserting a direction marker within said hole during the drilling thereof, determining the position of said direction marker after its insertion in relation to the cardinal points of the compass and extracting the core together with said marker.

2. A method of obtaining orientated drill cores according to claim 1, in which the position of the direction marker is determined from above ground by means of a special string of torsion-free rods and couplings.

3. Apparatus for providing drill cores with a direction marker, comprising a small drill being encased in a disconnectably arranged cylinder showing a direction-indicating mark.

4. Apparatus according to claim 3, in which the cylinder is automatically disconnected after it has reached the desired depth in the core.

5. Apparatus for providing drill cores with a direction marker, comprising a cylindrical housing slidably connected to the lower end of a drill stem and concentric thereto, a small drill attached to said drill stem and adapted to emerge from the bottom end of said housing against the action of a spring, a cylinder surrounding the drill and detachably connected to a member moving together with the drill stem when the latter is moved towards its emerged position.

6. Apparatus according to claim 5, in which the cylinder is automatically disconnected from the member moving together with the drill stem after said member has
5 been moved towards the bottom end of the housing into a given position.

In testimony whereof I have hereunto set my hand.

ALPHONS GERARD HUBERT STRAATMAN.

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