

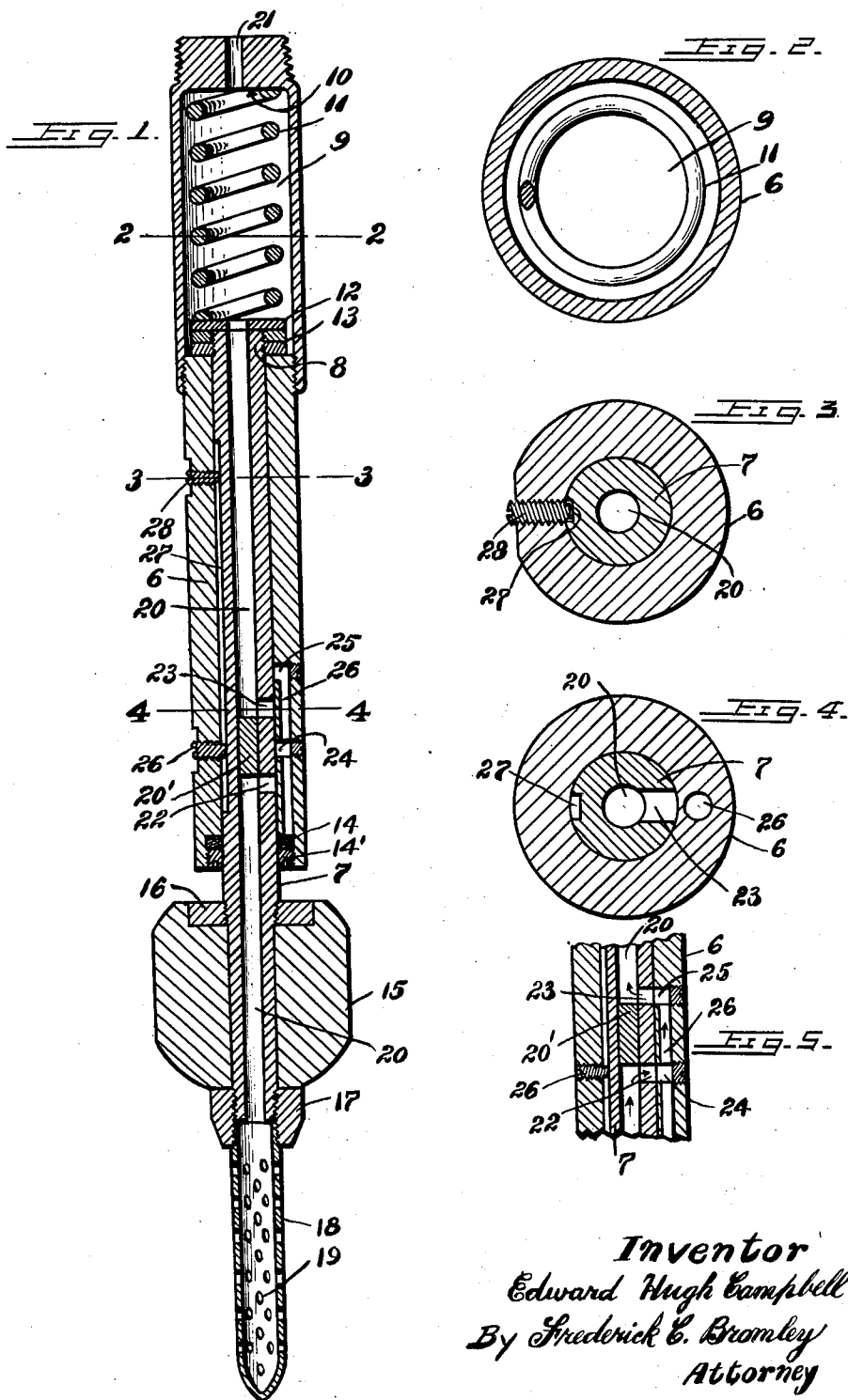
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FORMATION TESTING AND WELL FLOWING DEVICE

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FORMATION TESTING AND WELL FLOWING DEVICE

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The aim of the invention is to obviate the necessity of landing and cementing in a string of casing in order to test a gas or oil sand incident to the boring of a well. To employ the ordinary string of casing is highly expensive and in the event of a dry hole is utterly wasted. The tool of the present invention enables a well to be tested at any point during drilling operations.

This tool is used in conjunction with the drill stem, the bit of which is removed for this purpose. The tool can be readily attached to the lower end of the drill stem and lowered into the well hole to determine the nature of the strata as the boring of the well progresses.

The invention comprehends a hollow cylinder having a reciprocable plunger extending from its lower end and bearing a strainer in advance of a packer. The plunger has a lengthwise passage communicating with the strainer, which passage is blocked intermediate of its length, and the plunger is normally retained in an advanced position by a spring housed in the rear end of the cylinder. The cylinder has a by-pass disposed at the blocked portion of the plunger passage so that upon the packer engaging the walls of the hole the weight of the drill stem compresses the spring and thus shifts the cylinder on the plunger to throw the by-pass in communication with the aforesaid passage. This draws up fluid through the strainer and the passage into the drill stem where it is trapped as the weight is taken off the packer. The fluid is used as a sample for test purposes.

A distinctive feature of the invention is that the compression spring that closes the by-pass is enclosed within the cylinder and thus shielded against obstruction. Furthermore the tension may be increased by the simple expedient of inserting a disc between an end of the spring and its sustaining face.

A further distinctive feature resides in the by-pass structure whereby it controls the admission of fluid through the tool to the stem of the drill. The tool may be employed to flow the well if so desired.

The accompanying drawing is illustrative

of the invention and in which Figure 1 is a longitudinal sectional view of the device.

Figure 2 is a cross section taken on line 2-2 of Figure 1 depicting the spring within the cylinder.

Figure 3 is a cross section taken on line 3-3 of said Figure 1 showing the means for precluding the plunger from turning in the cylinder.

Figure 4 is a cross section taken on the line 4-4 of said Figure 1. This view discloses certain of the ports of the by-pass.

Figure 5 is a longitudinal fragmentary section of the by-pass portion of the tool showing the by-pass in its open position.

Like numerals of reference indicate corresponding parts in each of the figures throughout the drawing.

The practical embodiment of the device depicted in the drawing comprises a cylinder 6 having a lengthwise opening extending from end to end. Slidably mounted in the bore of the cylinder is a plunger 7, the frontal end of which protrudes while the rear end 8 terminates short of that end of the cylinder.

The cylinder bore is enlarged at 9 to form a spring housing that has an end face 10 which seats the compression spring 11. This housing may be made of a separate sleeve as shown. The other end of the spring is seated against a disc 12 that abuts one of a pair of check nuts 13. These nuts are threadedly engaged with the rear end of the plunger in order to limit its forward movement. It may be here remarked that by the insertion of one or more discs under the spring its tension can be increased.

It is suggested that a packing ring 14 or the like of suitable material be employed at the front end of the cylinder to preclude leakage. The packing may be held in place by a nut 14'. The nut is preferably lodged in a counterbore in the cylinder so as not to protrude.

A packer 15 is fixed to the projecting part of the plunger and may be of any suitable design and material. The packer is secured by a collar 16 threadedly engaged with the plunger and fitted in the rear face of the packer, and by a nut 17 or the like similarly

attached to the plunger at the front face of the packer. This member 17 also serves to attach the strainer 18, which is supplied with the usual perforations 19.

5 The plunger is hollow so as to provide a passage 20 from end to end, which is plugged at 20' to obstruct it intermediate of its length. The anterior portion of the passage communicates with the strainer, while the posterior
10 portion communicates with the drill stem via the opening 21.

A by-pass is constructed at the blocked region 20' of the plunger and comprises ports 22 and 23, one being arranged upon each side
15 of the plug. Similarly spaced ports are arranged in the cylinder at 24 and 25 and these ports communicate by a duct 26. The ports in the cylinder are so disposed that in the normally advanced position of the cylinder exhibited in Figure 1 they do not register with
20 the ports in the plunger, consequently the by-pass is closed. In the receded position of the plunger the ports register to establish an open by-pass as shown in Figure 5. To
25 prevent the plunger from turning it is suggested that it be grooved as at 27 to receive one or more grub screws 28 borne by the cylinder.

The operation of the tool is as follows:

30 The packer by its engagement with the walls of the well shut off fluid above when the strainer enters the core hole. By allowing weight of drill stem to rest on the packer the plunger is caused to recede against its
35 spring pressure until the collar 16 abuts the cylinder. In this manner the ports are brought into register to open the by-pass. Fluid is drawn up into the drill stem by the vacuum in the line and upon taking off the
40 weight from the packer the by-pass is closed to trap the fluid for sampling purposes.

What I claim is:—

1. A tool of the class described comprising a hollow cylinder for attachment to a
45 drill stem, a plunger reciprocably disposed therein, said plunger having an obstructed passage therethrough, lateral ports disposed at each side of the obstruction, a strainer communicating with the passage, a packer
50 borne by a projecting part of the plunger, a spring normally retaining the plunger in an advanced position, and a by-pass in the cylinder having ports adapted to register with the ports of said plunger by the receding
55 of the latter.

2. A tool of the class described comprising a hollow cylinder for attachment to a drill stem, a plunger reciprocably disposed therein, said plunger having a passage extending from end to end, a plug dividing the
60 passage into anterior and posterior sections, lateral ports disposed at each side of the plug, ports correspondingly spaced in the cylinder and communicating by means of a duct so as
65 to form a by-pass when in register with the

plunger ports in the receded position of the plunger, a strainer communicating with the anterior section of the passage, a packer borne by a projecting part of the plunger, and a spring normally retaining the plunger
70 in an advanced position.

Signed at Edmonton, Alberta, Canada, this 31st day of May, 1932.

EDWARD HUGH CAMPBELL.

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