

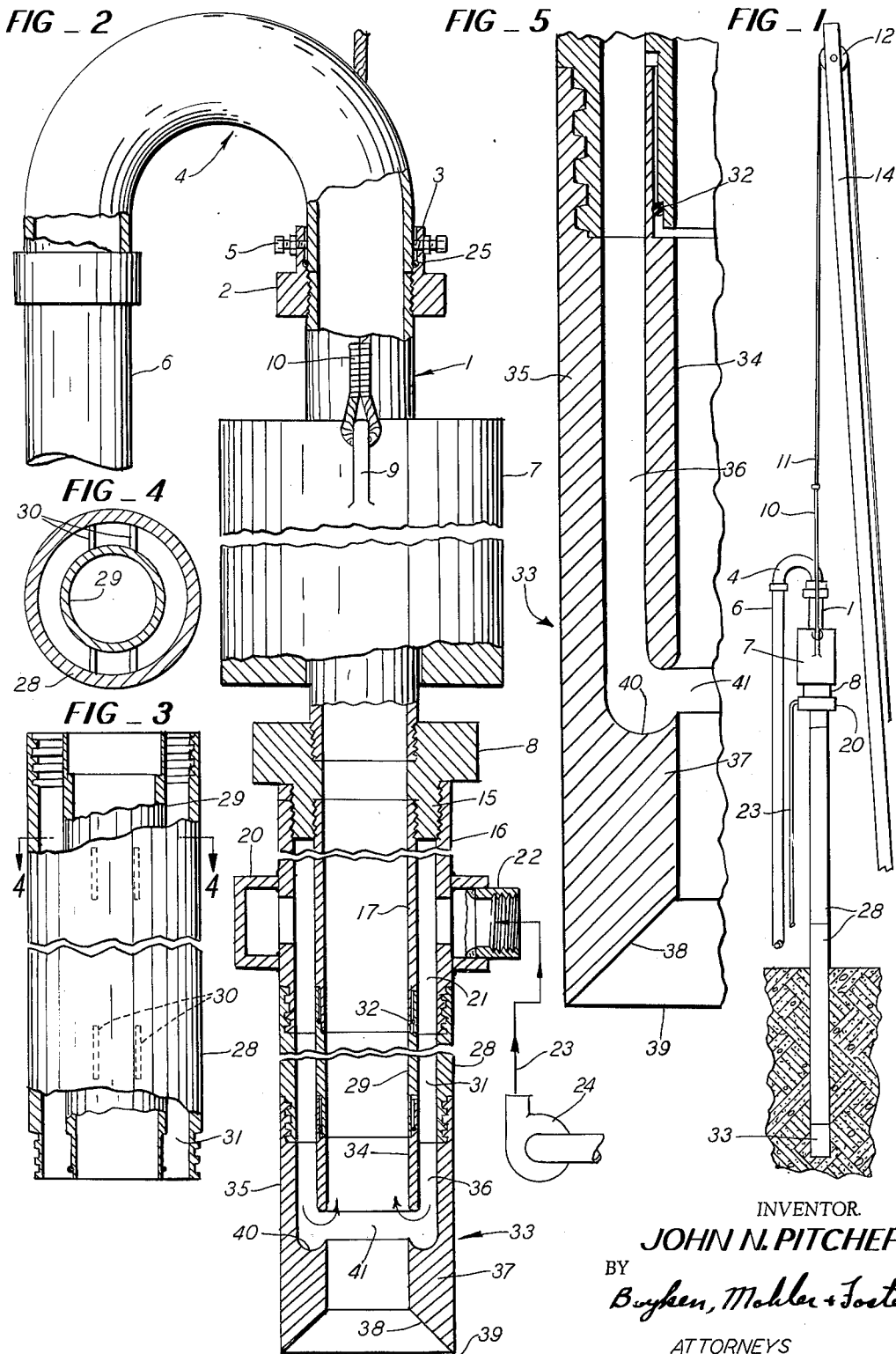
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MEANS FOR OBTAINING SAMPLES FROM PLACER FORMATION

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MEANS FOR OBTAINING SAMPLES FROM PLACER FORMATION

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4 Claims. (Cl. 175-135)

This invention relates to a casing for use in obtaining samples from placer formation, i.e., from ground comprised namely of gravel and sand.

Heretofore the method employed in obtaining placer samples from placer formation has been to alternately drive the hollow bit at the lower end of a casing into the placer formation and to bail out the material entering the bit. The frictional resistance to the entry of the material into the bit and also the bridging of the material within the bit results in material ahead of the bit being pushed away from the bit and out of the downwardly projecting confines of the outline of the bit.

After each driving of the bit into the formation, the bit is stationary while the material that has entered it is bailed out from above by the usual method, involving suction with the result that an indefinite amount of material around the bit and normally outside the downwardly projected confines of the outline of the bit is usually drawn into the casing through the lower end of the bit and appears as part of the sample. Thus it is seen that a relatively long and expensive process is involved in obtaining the samples, and after they have been obtained, they do not accurately reflect the makeup of the material that is within the downwardly projected confines of the casing, which is the purpose of taking the samples.

The present invention provides a relatively simple and economical means for overcoming the above described objections to the present method.

By the present apparatus, the casing may be driven into the ground without stopping the driving means to bail out the casing, and the material within the lower end portion of the casing is continuously brought to the surface and delivered to a discharge point while the material ahead of the casing is isolated from the material being withdrawn from the casing by an amount of material insufficient to cause bridging or frictional resistance to force material ahead of the bit to the side. The result is a rapid procuring of placer material that is wholly disposed within the downwardly projected confines of the outline of the bit.

Other objects and advantages will appear in the description and claims.

FIG. 1 is a reduced size elevational view illustrating a casing, including the bit and driving assembly in association with the derrick of a conventional spudder type drill rig, the bit being indicated in the placer formation; and the discharge conduit and water inlet pipes being broken away at their lower ends.

FIG. 2 is an enlarged, part sectional, part elevational view of a casing, including the bit and driving assembly; a pump being diagrammatically indicated.

FIG. 3 is a part sectional, part elevational view of a length of an intermediate casing between the bit and drive assembly, and which may be one of many lengths according to the length of the string.

FIG. 4 is a cross sectional view taken along line 4-4 of FIG. 3.

FIG. 5 is an enlarged cross sectional view of one side of the bit, to illustrate the coupling between the bit and a length of the casing.

In detail the upper or drive assembly includes a vertical length of pipe 1. An internally threaded, relatively thick collar 2 threadedly receives, and is secured to, the upper end of the pipe 1, and which collar includes a co-

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axial cylindrical upward extension 3 adapted to receive therein one cylindrical end of an elbow 4. The latter may be in the form of an inverted U and the end that is within the extension 3 is releasably held therein, and against rotation relative to the extension 3 by bolts or set screws 5. As will later appear, it is important that the elbow 4 be rotatable in the collar in order to change the position of the opposite end of the elbow so that it will be directed outwardly of the derrick of the drill rig. A flexible conduit 6 is connected by any suitable detachable coupling with the opposite end of the U-bend or elbow.

An annular weight 7, concentric with pipe 1, is vertically reciprocable on the latter between an annular anvil 8 and collar 2. While the present invention is not restricted by any precise dimensions, in a practical example, the distance between the anvil 8 and collar 2 may be approximately eight or nine feet while the axial thickness of the weight 7 may be approximately three feet, and the inside diameter of pipe 1 approximately six inches.

A pair of diametrically opposite laterally projecting apertured ears 9 on the weight 7 are adapted to be connected with the lower ends of arms 10 of a yoke, which arms extend convergently upward past opposite sides of the U-bend or elbow 4 to substantially meeting relation where they may connect with an eye that, in turn, is connected with the line cable 11. This line 11 is conventional on the drill rig, leading over a sheave 12 (FIG. 1) on the upper end of the derrick 14 and then downwardly to the oscillating spudding beam (not shown), that effects alternate lifting and dropping of the weight 7 onto anvil 8.

The upper end of the sides of the central bore in anvil 8 is threaded to connect to connect with the outside threads on the lower end of pipe 1, and a cylindrical downward extension 15, coaxial with pipe 1, projects downwardly from and is integral with said anvil. This extension is exteriorly threaded to connect with the inside threads on the upper end of an outer, cylindrical casing 16, while the inner side of said extension is threaded to connect with the outside threads on a cylindrical inner casing 17. While the outer and inner casings 16, 17 may be welded to the anvil, the present structure is preferable for replacement purposes in the field.

The inside diameter of the pipe 1 and inner casing 17 and the inside diameter of the portion of the central opening in anvil 8 that is between the adjacent ends of the pipe 8 and casing 17 are preferably the same.

An annulus 20 concentric with the outer casing 16 is welded around the latter to provide an annular passage-way for water, and the casing 16 is apertured to provide an annularly extending inlet for water from said passage-way into the annular space 21 between the outer and inner casings 16, 17. One side of the annulus is provided with an outwardly opening inlet 22 adapted to be connected with one end of a hose or suitable conduit 23, the opposite end of which may be connected with a pump 24 or other source of water under pressure.

It should be noted that an O-ring 25 may be provided between the extension 3 of collar 2 and the end of the elbow 4 that is within the extension to insure a watertight seal.

The foregoing comprises the drive assembly.

Below and removably connected with outer and inner casings 16, 17 is an intermediate casing assembly comprising an outer casing 28 and an inner casing 29 that are concentrically positioned in spaced relation, and integrally connected by vertical pairs of web sections 30 (FIGS. 3, 4) that are spaced apart and spaced longitudinally of the casings.

The casings 28, 29 are preferably substantially coterminous at their opposite ends and they are respectively of the same diameter as the outer and inner casings 16,

17, thereby providing downward continuation of the casings 16, 17 and the space 31 between casings 28, 29 is a downward continuation of the space 21.

The lower end of the outer casing 16 and the upper end of the outer casing 28 are formed to provide a conventional box-pin coupling for removable securement of the said ends together, with the lower end of the casing 16 inside the upper end of casing 28.

The lower end portion of the inner casing 17 and the upper end portion of the inner intermediate casing 29 are in lapping, telescopic relation, the said end portions being cut away on their adjacent sides so that the inner surfaces of the casings are flush with each other, and an O-ring 32 is disposed between the opposed, lapped surfaces to prevent leakage of water therepast. The upper portion of the lower casing 29 encloses the lower portion of casing 17 to insure against leakage in the event the flow of water and material in the inner casing 17 should be reversed. Normally, the flow is upward in the casing 17, as will later appear.

The lower end portions of the intermediate casings 28, 29 are formed to correspond to the lower ends of the casings 16, 17 to provide a box-pin coupling with the bit, or with another intermediate casing assembly.

The bit section is generally designated 33 and is relatively short compared to the length of the intermediate casing, and comprises an inner casing section 34 that is integrally connected with an outer casing section 35 by webs similar to webs 30.

The upper end portions of the casing sections 34, 35 are formed in the same manner as the upper ends of the casings 28, 29 to provide a box-pin connection with the lower end of the lowermost of the intermediate sections, it being understood that one or many intermediate casings may be between the driving assembly and the bit.

The lower end of the inner casing section 34 terminates at a level above the lower most end of the outer casing section, and the lower end portion of the outer casing section of the bit is of a thickness equal to the space 36 that is between the inner and outer casing sections 34, 35 and that is a downward extension of passageway 21, and the thickness of the wall of the inner casing section 34. This thickened portion is designated 37 and is formed around the terminating lower end with an inside bevel 38 so that the circular cutting edge 39 is the same as the outside diameter of the outer casing section 35.

The upper surface 40 of the thickened bit 37 is spaced below the lower end of the inner casing section 34 a distance that may be approximately equal to the distance across space 36, and said upper surface is concavely curved in cross section. The space between surface 40 and the lower edge of the inner casing section 34 provides a generally upwardly and radially inwardly directed annular discharge opening 41 for water that flows downwardly under pressure in the passageways 21, 31, 36. The distance from the cutting edge of the bit to the opening may be approximately three or four inches.

FIG. 5, while illustrative of a portion of the bit, also clearly shows the box-pin coupling between the outer casings and also the slidable connection between the inner casings. As noted, the walls of the outer casings extending from the drive assembly to the bit are substantially greater in thickness than the thickness of the inner casings, since the impact of the weight 7 is transmitted to the bit through the outer casings.

In operation, with each impact of the weight 7, the bit may be driven into the placer formation a distance of approximately six inches. There is no budging or outward urging of the placer material ahead of the bit at this point.

Water under pressure is continuously admitted to the space between the outer and inner casings and the placer material at and above the level of the discharge opening 41 is instantly carried up the inner casings and through the conduit 6 to the point where it is collected. There

is no cessation in the reciprocable actuation of the driving weight 7, and between each impact the placer material at and above the discharge opening 41 will be cleared for the next column of material, while the material below the discharge opening 41 forms a plug so water will not escape out of the lower end of the bit to cause any dispersion of material ahead of the bit.

It is preferable that the elbow or inverted U-bend 4 be directed outwardly relative to the derrick 14, which is effected by releasing the set screws and adjusting the elbow so it will be directed outwardly (FIG. 1).

From the foregoing explanation it is apparent that the present method is one in which a vertically extending, progressively deepened passageway of uniform diameter is formed in the ground and in the placer formation, and an upward flow of water is maintained in said passageway from a point spaced a uniform distance spaced above, but relatively close to the lowermost end of said passageway. Successive sections of a vertical column of said placer material in said formation are enclosed within the lower end of said passageway and as the material so enclosed extends upwardly past said point where the upward flow of water commences, the material is entrained in and carried upwardly in said water to the surface while the lower end of the passageway below said point is closed by the portion of the placer material enclosed in said passageway.

I claim:

1. Apparatus for obtaining samples from placer formation in the ground comprising:

- (a) a pair of rigidly connected, concentrically arranged cylindrical casings, one spaced within the other providing an outer casing and an inner casing and an inner central passageway within said inner casing and an annular outer passageway between said outer and said inner casings and around said central passageway;
- (b) one end of said outer casing terminating in a cylindrical bit having an annular, axially outwardly facing cutting edge that is substantially coterminous with the outer cylindrical surface of said outer casing and said inner casing terminating in an open end at one end thereof within said outer casing adjacent to said bit;
- (c) said annular passageway terminating at a point adjacent to said bit in an annular generally radially inwardly directed discharge aperture, one side of which aperture is said terminating end of said inner casing that is adjacent to said bit and the other side of which includes a portion of said bit;
- (d) means for supplying water to said annular passageway at a point therealong spaced from said annular discharge aperture for passage of said water through said annular passageway to said discharge aperture and through the latter into said inner passageway through said open end of the latter, whereby material forced into said bit and past said aperture will be carried by said water through said central passageway to the end of the latter that is opposite to said bit;
- (e) said inner casing being formed with a discharge opening at the end thereof that is opposite to its said open end.

2. In apparatus as defined in claim 1;

- (f) the wall of said bit adjacent to said cutting edge and extending to said aperture being solid and having an inside diameter approximately equal to the inside diameter of said inner casing and said wall being formed with an inside bevelled surface extending to said cutting edge whereby all of the placer material within the confines of the outline of said cutting edge will be forced into said bit and to and past said aperture for entrainment with the water adapted to be discharged through said aperture upon said bit being driven into said placer formation.

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3. In a construction as defined in claim 2:

- (g) a tubular extension on said inner casing coaxial therewith and in extension thereof projecting from said outer casing at the end of the latter that is opposite to said bit, 5
- (h) a driving weight reciprocally supported on the projecting end of said inner casing for driving said casings including said bit into the ground, upon reciprocal movement of said weight, and, 5
- (i) an annular anvil on said outer casing adjacent to the projecting end of said inner casing adapted to be intermittently impacted by said weight upon reciprocal movement of the latter for so driving said outer casing into the ground. 10
- 4. Apparatus for obtaining samples from placer formation in the ground, comprising: 15
- (a) a plurality of cylindrical casings connected together in longitudinal alignment, including a cylindrical bit at one end of said casings and a drive assembly at the opposite end thereof and at least one intermediate section; 20
- (b) said intermediate section comprising an inner cylindrical casing and an outer cylindrical casing rigidly connected together in concentric spaced relation providing an annular passageway between them extending from end to end thereof, and said inner and outer casings being substantially coterminous at their opposite ends; 25
- (c) said drive assembly comprising an extension casing coaxial with and in longitudinal extension of said inner casing; 30
- (d) a driving weight reciprocally supported on said extension casing and an annular anvil coaxial with said extension casing and said casing pipe adapted to be impacted by said driving weight upon said reciprocation of the latter; 35
- (e) means on said anvil connecting said outer casing with said anvil and connecting said inner casing with said extension casing;

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- (f) said means being a cylindrical outer member in extension of said outer casing coaxial with said anvil;
- (g) said anvil extending across said space between said extension casing and said cylindrical outer member closing the upper end of said annular passageway;
- (h) said outer cylindrical member being formed with an inlet for admitting water under pressure into said annular passageway;
- (i) said bit section comprising an inside casing in extension of said inner casing terminating at a point intermediate opposite ends of said bit section;
- (j) an outer cylindrical wall in extension of said outer casing of said intermediate section terminating in an annular cutting edge at the outermost end of said bit section;
- (k) an annular aperture in said bit section opening into said inside casing at the terminating end of said inside casing and directed generally toward and into the inner casing of said intermediate section for discharge of water from said annular passageway;
- (l) and means on said drive assembly, intermediate section and said bit section for respectively connecting them together in axial alignment.

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