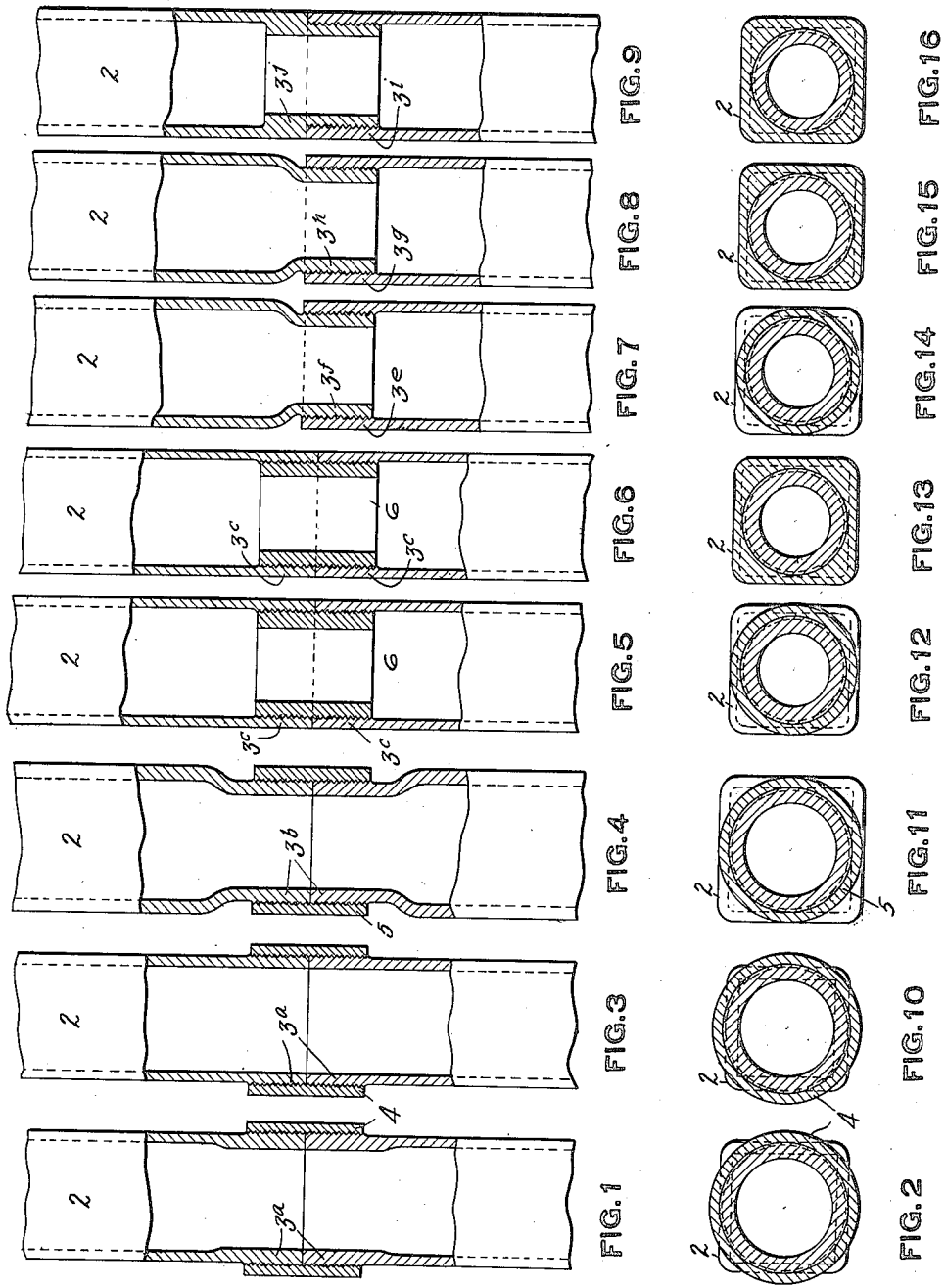


P. BOYD & A. M. SAUNDERS.
WELL CASING.
APPLICATION FILED MAY 5, 1915.

1,225,005.

Patented May 8, 1917.



WITNESSES

W. T. Johnson
R. D. Little

INVENTORS:

P. Boyd
A. M. Saunders
by *C. C. Hutchison*
their Attorneys

UNITED STATES PATENT OFFICE.

PETER BOYD, OF BEAVER, AND AUGUSTUS M. SAUNDERS, OF McKEESPORT, PENNSYLVANIA, ASSIGNORS TO NATIONAL TUBE COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

WELL-CASING.

1,225,005.

Specification of Letters Patent.

Patented May 8, 1917.

Original application filed November 17, 1911, Serial No. 660,846. Divided and this application filed May 5, 1915. Serial No. 25,905.

To all whom it may concern:

Be it known that we, PETER BOYD and AUGUSTUS M. SAUNDERS, both citizens of the United States, residing, respectively, at Beaver, in the county of Beaver, and McKeesport, in the county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in Well-Casings, of which the following is a specification.

Our invention relates to the means employed in forming bored wells by what is known as the hydraulic rotary system, and more particularly relates to the casing forming part of such means and particularly adapted for use with the well sinking apparatus shown and described in our co-pending application, Serial No. 660,846, filed November 17, 1911, (Patent No. 1,141,927, dated July 8, 1915) of which this application is a division.

Heretofore, in the hydraulic rotary system of sinking wells, both shallow and deep wells, it has been the universal practice to employ a casing which is cylindrical in cross section.

A cutting head or drill bit which is slightly larger than the diameter of the casing is removably attached to the lower end of the lowermost section of the casing, and water under considerable pressure is forced into the hollow casing through a swivel head detachably secured on the upper end of the casing so as to be rotatable therewith while the casing is being turned. The water issuing from the opening in the lower end of the casing is forced upwardly in the small annular space between the earth wall of the hole and the outer surface of the casing, and the stream of water in rising between the casing and earth wall of the well washes or carries all of the loosened earth or material dislodged by the cutting head or bit, upwardly out of the well to the surface at the ground level.

In sinking such wells with cylindrical casings, which are freely movable lengthwise relative to the casing rotating mechanism, the turning mechanism frictionally engages the cylindrical surfaces of the casing, and the sharp edges of the turning or rotating mechanism, having a point or line contact with the casing surfaces, dig or bite into and

cut deep grooves or channels in the walls of the casing sections.

When grooved or scored in this manner the casings are weakened to such extent as to frequently split or break, which is one cause of frequent delays in the well sinking operations and a source of great expense in removing and replacing the damaged sections of the well casing. It is also necessary with cylindrical casings to retract the gripping mechanism when engaged by the couplings used to connect the ends of the casing sections, on account of the larger diameter or size of these couplings.

One object of our invention is to provide a casing for forming or sinking such wells, of improved construction and having novel means whereby the clearance or area of the opening between the earth wall and outer surface of the casing is increased and the removal of the earth and finely divided solids from the hole or opening formed in the earth is facilitated.

Another object of our invention is to provide a casing of novel construction whereby the openings or holes are drilled straighter, liability of breakage or other damage to the well casing is prevented and overcome, and a stronger and more durable casing is provided.

Another object of our invention is to provide a well casing wherein splitting or other damage to the casing is avoided and overcome.

Another object of our invention is to provide a well casing having novel means enabling the casing to be rotated during the intervals the rotating mechanism is maintained in operative engagement with the connected ends of two adjacent sections of the casing during the passage lengthwise of the joints or connected ends of the casing sections through the rotating mechanism.

A further object of our invention is to provide novel means for connecting the adjoining ends of the casing sections whereby the flat sides of the squared end portions of the sections of the cylindrical casing are maintained in the same flat plane.

A still further object of this invention is to provide improved means for coupling the ends of the casing sections together in the

well forming operation, and still further objects of our invention will become apparent as the invention is more fully described hereinafter.

6 Referring to the accompanying drawings forming part of this specification, Figure 1 is a detail longitudinal section showing one form of coupling for the hollow casing of rectangular section forming this invention.

10 Fig. 2 is a transverse section through the joint of the coupling shown in Fig. 1.

Figs. 3 to 9 are views similar to Fig. 1, showing modifications in the coupling means employed in connecting together the abutting ends of two adjoining casing sections in accordance with our invention.

15 Figs. 10 to 16 are transverse sections similar to Fig. 2 showing further modifications in the construction of the joints or coupling means illustrated in Figs. 3 to 9, as made in accordance with our invention.

20 In the accompanying drawings, referring to Figs. 1 to 16, the body of the sections 2 forming the tubular well drilling rod is shown rectangular in cross section with integral cylindrical screw threaded end portions. As shown in Figs. 1 and 2, and also in Figs. 3 and 10, the cylindrical ends 3^a are thickened by upsetting or by welding a collar thereon, and a screw threaded coupling 4 is employed to connect the abutting ends of the adjoining casing sections. The outer diameter of the cylindrical end portions 3^a is approximately the same as the short diameter or width of the rectangular body of the casing 2.

25 In Figs. 4 and 11 the cylindrical end portions 3^b are reduced in diameter and are screw threaded to receive the coupling 5, the outside diameter of the coupling being approximately the same as the short diameter or width of the body of the casing sections.

30 In Figs. 5 and 12 a construction is shown in which a nipple 6 is employed to connect the abutting cylindrical end portions 3^c of adjoining casing sections, and in Figs. 6 and 13 the connecting nipple 6 is the same, the outer surface of the ends 3^c of the casing sections being rectangular in cross section, so that the cross section of the assembled casing is rectangular throughout its entire length.

35 As shown in Figs. 7 and 14 the ends 3^e, 3^f, of the casing sections are cylindrical, and one end 3^e of each section is reduced in diameter and externally threaded. The cylindrical opposite end portion 3^e of each casing section is provided with internal threads to receive the externally threaded end of the adjacent section so that the separate coupling member is dispensed with.

40 In Figs. 8 and 15 a construction is shown which is similar to that of Figs. 7 and 14 in having one end 3^e of the casing sections

threaded internally, and in having the opposite end 3^b of each section cylindrical and reduced in diameter with external threads thereon, and which differs from that of Figs. 7 and 14 in having the outer surface of the one internally threaded end 3^e of each section rectangular in cross section instead of being cylindrical.

45 In Figs. 9 and 16 the casing sections 2, when connected together, are of the same rectangular cross section throughout. One end 3^f of each section is increased in thickness and is provided with internal screw threads, the other end of each section having a reduced screw threaded portion 3^f adapted to engage the internal screw threads of the adjoining section of the casing.

50 The advantages of our invention will be apparent to those skilled in the art. By the use of a tubular casing or drill rod which is square in cross section the necessity for frictionally engaging the casing in rotating the casing in the drilling operations is avoided and overcome, and the formation of grooves and resultant splitting of the casing or drill rod is avoided and overcome. The area of the opening between the earth wall of the well and the flat sides of the casing is much greater than when a cylindrical casing is employed. The corners of the square casing ream the opening formed by the drill bit and this results in the well's being drilled straighter than when drilled with a cylindrical casing. The use of our improved casing enables turning mechanism having a surface contact therewith to be employed instead of a line contact as heretofore, and the positive rotation of the casing and the prevention of slippage is insured.

55 Modifications in the construction and arrangement of the parts may be made without departing from our invention as defined in the claims.

We claim:

1. A combined reamer and well casing consisting of a tubular section having cylindrical ends, the tubular section being angular in cross section throughout its length between the cylindrical end portions.

2. A combined reamer and well casing consisting of a tubular section having cylindrical threaded ends, the tubular section being angular in cross section throughout its length between the cylindrical end portions.

3. A tubular well-drilling rod which is angular in external cross section, the longitudinal external corners of the tubular rod constituting reamer elements.

4. A combined reamer and well casing consisting of a tubular member which is angular in cross section and is provided with a cylindrical terminal portion.

5. A combined reamer and well casing consisting of a tubular member which is angular in cross section and is provided

70

75

80

85

90

95

100

105

110

115

120

125

130

with a cylindrical threaded terminal portion.

5 6. A combined reamer and well casing consisting of a tubular section which is angular in cross section and has a cylindrical terminal.

10 7. A combined reamer and well casing consisting of a tubular section which is angular in cross section and has a threaded cylindrical terminal.

15 8. A combined reamer and well casing comprising a pair of tubular alined and connected sections, each section being angular in cross-section, corresponding flat faces of the sections being in alinement, the adjacent ends of the tubular sections having a threaded connection.

20 9. A combined reamer and well casing comprising a pair of tubular alined and connected sections, each section being angular in cross section, corresponding flat faces of the sections being in alinement, and the connected terminals of the sections being cylindrical.

25 10. A combined reamer and well casing comprising a pair of tubular alined and

connected sections, each section being angular in cross section, corresponding flat faces of the sections being in alinement, the adjacent ends of the tubular sections being cylindrical and having a threaded connection. 30

11. A combined reamer and well casing comprising a pair of tubular alined and connected sections, each section being angular in cross section, corresponding flat faces of the sections being in alinement, the adjacent ends of the tubular sections being cylindrical and reduced and having a threaded connection. 35

12. A combined reamer and well casing 40 comprising a pair of tubular members which are angular in cross section, the adjacent ends of the members being cylindrical, one of said ends being reduced, and the two ends having a threaded connection. 45

In testimony whereof, we have hereunto set our hands.

PETER BOYD.

AUGUSTUS M. SAUNDERS.

Witnesses:

JAS. H. MITCHELL,

CHARLES D. TERRY.