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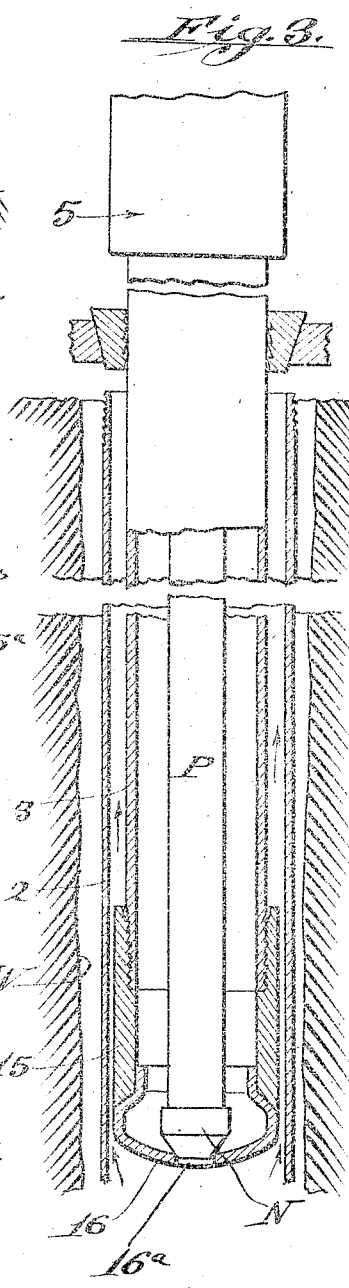
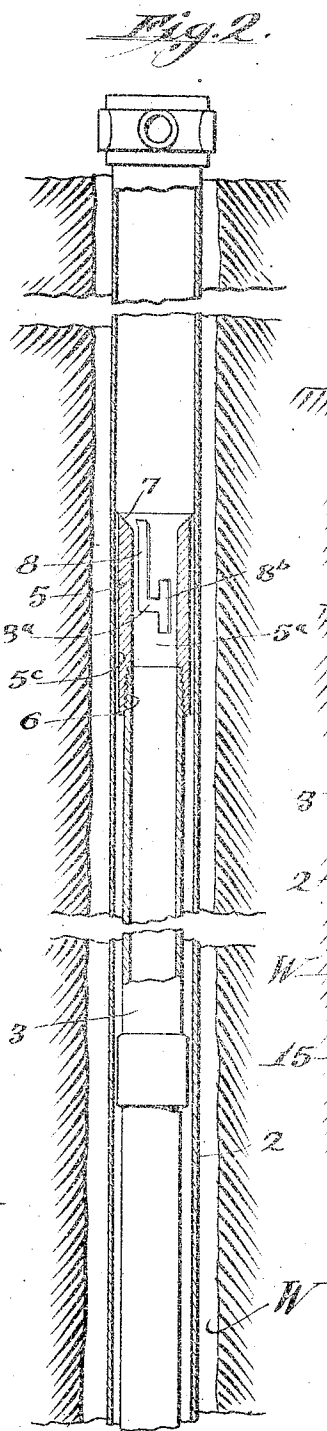
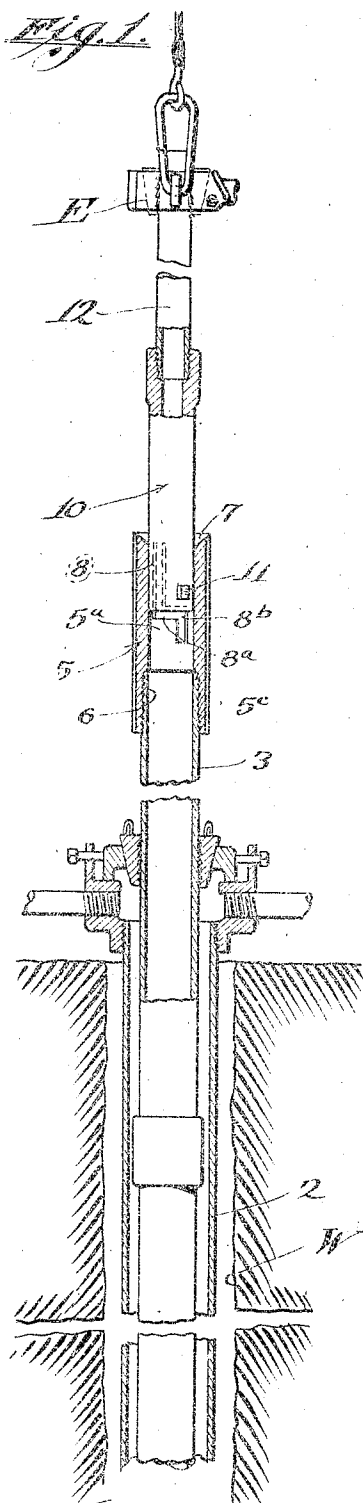
E. P. BERNEY ET AL

1,523,928

LINER SETTING TOOL AND SAFETY JOINT

Filed July 3, 1923

2 Sheets-Sheet 1



Witness:
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LINER SETTING TOOL AND SAFETY JOINT

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2 Sheets-Sheet 2

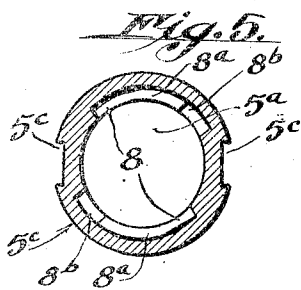
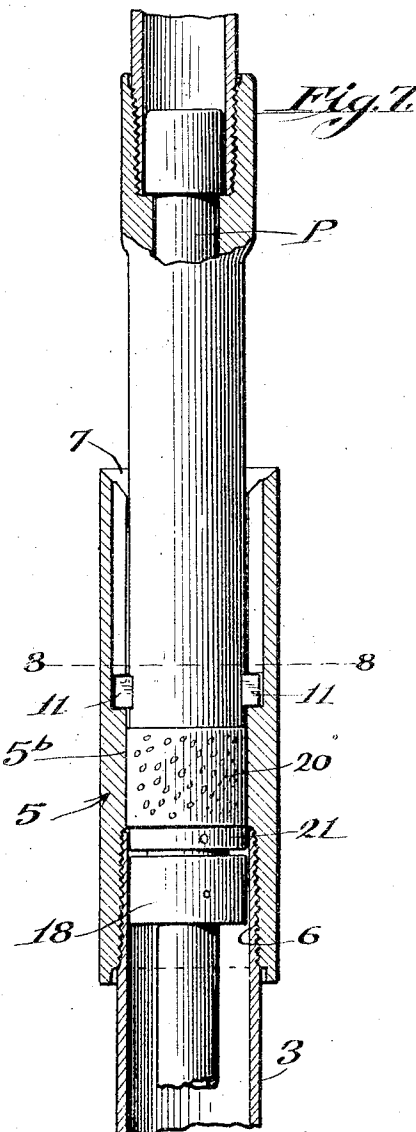
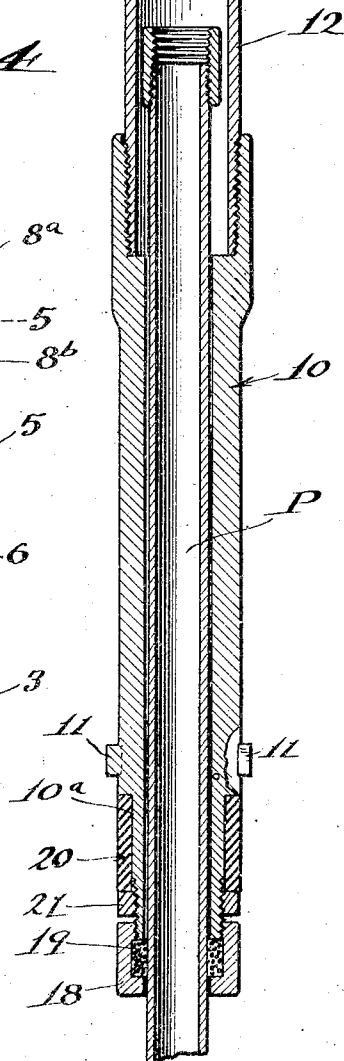
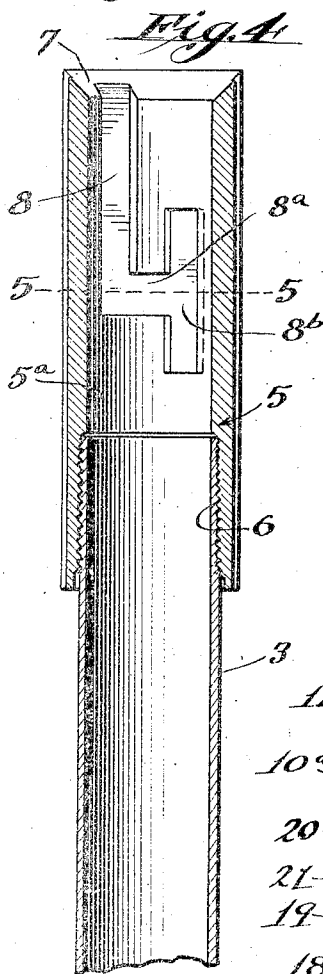
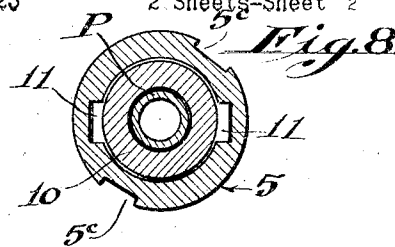


Fig. 6.



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UNITED STATES PATENT OFFICE.

EDWARD P. BERNEY, OF HUNTINGTON BEACH, AND EMMETT H. McMAHAN, OF BREA, CALIFORNIA.

LINER SETTING TOOL AND SAFETY JOINT.

Application filed July 3, 1923. Serial No. 649,302.

To all whom it may concern:

Be it known that we, EDWARD P. BERNEY and EMMETT H. McMAHAN, citizens of the United States, residing at Huntington Beach, county of Orange, State of California, and Brea, in the county of Orange and State of California, respectively, have invented new and useful Improvements in Liner Setting Tools and Safety Joints, of which the following is a specification.

This invention relates to deep well apparatus, and more particularly to deep well tools and joints.

As is well known in deep well operations, after or as the well is drilled, a casing is lowered into the well and for one or another cause the casing cannot be further lowered and takes a stationary position below which it is desired not only to sink the well, but to also provide a continuation of the casing. This continuation is commonly known as the "liner." In some cases, this liner can be lowered freely after the hole is deepened, but in other cases the well formation packs up in the casing and in the lower portion of the hole in the form of sand or mud, and it is an object of the present invention to provide means for facilitating the lowering of the liner into the desired position in the lower portion of the casing and to the bottom of the well.

A further object is to provide a liner setting tool and an improved joint of extremely simple construction, and which is substantial and reliable in action, and is readily operable both in the making and breaking of joints in the string of elements forming a liner lowering tool or tool for other purposes. An object, in this connection, is to provide a joint of substantially threadless, effective form which is of such design and construction that the joint provides for the ready attachment and detachment of associated elements without danger of unscrewing other screw threaded, connecting portions of the apparatus in hand.

Other objects and advantages will be made manifest in the following specification of an embodiment of the invention illustrated in the accompanying drawings, wherein—

Fig. 1 is a longitudinal section and par-

tial elevation of well apparatus in which a liner is being lowered by utilization of the present joint.

Fig. 2 is a vertical section and partial elevation of a well showing the liner in lowered position below the casing head.

Fig. 3 is a detail, vertical, sectional view showing a liner provided with a guide on its lower end, and showing the arrangement of the wash pipe nozzle resting in the nipple for the circulation of wash water upwardly about the liner being lowered and inside of the casing.

Fig. 4 is a longitudinal section of the joint body as applied to a liner.

Fig. 5 is a cross section on the line 5—5 of Figure 4.

Fig. 6 is a longitudinal section of the setting tool or mandrel assembled upon a water pipe which is to be lowered by the tool while the latter is connected to its combined, complementary joint body.

Fig. 7 is a longitudinal, central section showing the mandrel as interlocked with the joint body and packed therein.

Fig. 8 is a cross section on line 8—8 of Figure 7.

In Figure 1, the invention is illustrated as used for the lowering of a string of pipe sections or tubes 3, which is to be set in the well casing 2, which is positioned in the well W, so that the string of pipe sections will form a substantial continuation of the casing 2, and is commonly known as a liner. The present invention includes an improved means for making a joint between the upper end of the liner 3, and a liner setting tool whereby the liner can be lowered to the requisite position in the casing.

The tool and joint consists of what may be considered as an inverted shoe comprising substantially a cylindrical body 5 of substantial proportions, the lower end of which is internally threaded at 6 to receive the contiguous end of the liner 3, and the upper end of the joint body 5 is shown as inwardly and downwardly bevelled at 7 to provide a convenient and effective guide means for leading the tool or mandrel part 10 into the chamber 5^a of the joint 5; this chamber being preferably cylindrical, in form and having an inside diameter ap-

proximating the inside diameter of the liner 3 so as to form a continuous, substantially smooth bore.

The joint 5 is provided with a plurality of longitudinal, internal or inclosed slots or recesses 8, each of which has a transverse or L portion 8^a, and this intersects a blind slot 8^b having portions extending up and down from a cross slot 8^a. In other words, the slot 8, as a whole, is of generally bayonet slot form but has oppositely extending end portions formed by the slot 8^b.

The tool body or mandrel 10 is of substantial and tubular form, and has a lower end of such diameter as to slip into the bore of the body 5, and is provided with a plurality of slot entering pins 11, disposed so as to register with the respective open ends of the slots 8 in the joint 5. The upper end of the setting tool body 10, which will hereinafter be referred to as the mandrel, is internally threaded to receive the lower end of a string of tool sections 12, the upper ends of which are adapted to be received by any suitable elevator E, whereby the tool and the string of lining 3 can be lowered in progressive steps into the well casing 2 to the desired position, such as is indicated in Figure 2.

After the liner has been set by the tool, the joint connection between the tool and the liner is readily disconnected by the slight lowering of the tool string and the tool mandrel 10 so as to disengage the bayonet pins from the upper ends of the slot portions 8^b to bring the pins opposite to the transverse slot portions 8^a and then, by an upward pulling movement of the tool, the bayonet pins run freely out of the slots 8 and the disconnection is completed. In some operations it may happen that there will be a torque in the tool string, and it may happen that, without the knowledge of the driller, the bayonet pins may drop from the upper end of the bayonet slots 8^b, and in such case, because of the torque in the tool line, the bayonet pins would be thrown out into the cross slots 8^a, and then, should the tool string be pulled for any cause, the parts would be unintentionally disconnected. To prevent such an accident, which might result in the loss of the entire well and all of the labor expended, we provide a tool joint having the bayonet slots 8^b with portions extended down below the cross slots 8^a. This downward extension of the bayonet slots, therefore, serves to prevent the dropping bayonet pins from swinging into the cross slots 8^a until the bayonet pins have been intentionally lowered to the bottoms of the bayonet slots 8^b, and then intentional torque applied to the tool string followed by an elevating of the tool string will result in the bayonet pins being pulled into the cross slots and thence out of the

slots 8 when it is desired to make a disconnection.

After the well liner has been lowered into the casing, as is shown in Figure 2, then the disconnection is made and the setting tool is pulled from the well, leaving the joint body 5 attached to the upper end of the liner.

When conditions are involved in which the liner will not readily pass into the well because of the presence of formation sand or mud, it is then necessary to introduce into the liner a means for discharging circulating liquid ahead of the liner end so as to wash away the impeding formation material. Usually, the lower ends of the liners 3 are provided with shoes 15, and the shoes are provided with fittings known as guides, one of which is shown at 16, and this has a central, circulating opening 16^a.

When the liner is being lowered, a water pipe P is adapted to be lowered along with the liner, and the lower end of the water pipe has a nozzle N applied to and resting on the guide 6, and registering with the circulation hole 16^a so that circulating water or liquid may be forced down through the water pipe P and thence into the impeding sand, which latter will be washed away and carried up inside of the casing and outside of the liner, thus clearing the way for the liner to be lowered down.

When washing in a liner, as just described, the wash pipe P is run down into the liner through the hollow setting tool mandrel 10, and preferably the water-tight joint is made between the water pipe and the mandrel, and this is accomplished by a packing gland 18, in which may be compressed, against the pipe P, packing material 19, and also against the lower threaded end of the mandrel to which the packing gland 18 is secured.

It is also desired to provide a water-tight joint between the tool body or portion 5 and the mandrel 10, to prevent leakage of the circulating water upwardly between the mandrel and the joint body 5. For that purpose, there is around the lower end of the mandrel a packing band 20, one end of which is engaged by a packing compression ring 21. The lower end of the setting tool body or mandrel 10 is shown as turned down at 10^a to form a seat for the packing band 20, which is adapted to be expanded by compression under the ring 21 outwardly against the smooth, cylindrical face 5^b of the joint body 5, provided mediately of the ends of the body.

The exterior face of the joint body 5 is provided with longitudinal circulation channels 5^c to permit the ready upward flow of the circulating liquid within the casing 2 and outside of the liner 3.

From the above it will be seen that we

have provided an extremely simple, practicable, substantial and readily operable means for providing a readily disconnectible joint between associated elements in a pipe and tool line, and further, have provided means for adapting the device to form a packing means in cases where pressure liquid is forced down through the liner setting tool and joint. Further, it will be seen that the improved joint forms a safety type of connection between combined means adapted to be lowered into a deep well, the joint providing for the reliably acting, disconnecting device, so that the lower elements which may be jammed in a well may be released from the upper sections, which latter can then be recovered and pulled from the well.

The improved joint is adapted for ready combination with various forms of fishing tools which, when lowered into the well and ultimately lost, may be freed from the tool string and the latter safely recovered, since, by the present invention, the danger of unscrewing parts of the apparatus above the safety joint is substantially eliminated by reason of the provision of the present bayonet slot joint structure which enables disconnection of jointed sections without tendency to unscrew the usual threaded joints of the strings.

Further embodiments, modifications and variations may be resorted to within the principle of the invention.

What is claimed is:

1. A combined setting tool and safety joint comprising a hollow tubular joint body provided with a recess extending downwardly upon the interior surface thereof, a second recess formed upon the interior surface of said body communicating with the first recess and extending substantially horizontally of the body, recesses extending above and below the second recess and communicating therewith, and a lining setter including a mandrel provided with a pin receivable in said recesses.

2. A combined setting tool and safety joint comprising a hollow, tubular joint body provided with bayonet slots, and a lining setter including a mandrel provided with bayonet pins adapted to interlock in the slots of the joint body, the bayonet slots each consisting of an open end receiving slot having a transverse part merging with oppositely extending slot portions which are in alignment, so that when the bayonet pins of the mandrel drop from the upper of said portions, they will tend to pass into the lower of said portions and thereby be held against unintentional disconnection.

3. A combination setting tool and safety joint comprising a hollow, tubular joint body provided with bayonet slots, and a lining setter including a mandrel provided with bay-

onet pins adapted to interlock in the slots of the joint body, the joint body being provided with longitudinally extending, exterior circulation channels.

4. A combined setting tool and safety joint comprising a hollow, tubular joint body provided with bayonet slots, a lining setter including a mandrel provided with bayonet pins adapted to interlock in the slots of the joint body, and means for forming a liquid-tight joint between the inserted mandrel and the joint body.

5. A combined setting tool and safety joint comprising a hollow, tubular joint body provided with bayonet slots, a lining setter including a mandrel provided with bayonet pins adapted to interlock in the slots of the joint body, and means for forming a liquid-tight joint between the inserted mandrel and the joint body, the joint body having a smooth, cylindrical portion, and said means including a packing medium adapted to be expanded against said portion and compressed on the mandrel.

6. A combined setting tool and safety joint comprising a hollow, tubular joint body provided with bayonet slots, a lining setter including a mandrel provided with bayonet pins adapted to interlock in the slots of the joint body, and means for forming a liquid-tight joint between the inserted mandrel and the joint body, the joint body having a smooth, cylindrical portion below the said bayonet slots, and said means including a packing medium adapted to be expanded against said portion and compressed on the mandrel.

7. A combined setting tool and safety joint comprising a hollow, tubular joint body provided with bayonet slots, a lining setter including a mandrel provided with bayonet pins adapted to interlock in the slots of the joint body, and means for forming a liquid-tight joint between the inserted mandrel and the joint body, the joint body having a smooth, cylindrical portion, and said means including a packing medium adapted to be expanded against said portion and compressed on the mandrel, the mandrel having a reduced end on which the packing means is arranged.

8. A combined setting tool and safety joint comprising a hollow, tubular joint body provided with bayonet slots, and a lining setter including a mandrel provided with bayonet pins adapted to interlock in the slots of the joint body, the mandrel being tubular and adapted to receive a water pipe, and means on the mandrel for making a leak-proof joint between the mandrel and an inserted water pipe.

In testimony whereof we have signed our names to this specification.

E. P. BERNEY.

E. H. McMAHAN.