P. BOYD AND A. M. SAUNDERS.

DRILL TUBE.

APPLICATION FILED OCT. 11, 1919.

1,364,478.

Patented Jan. 4, 1921.

2 SHEETS—SHEET 1.

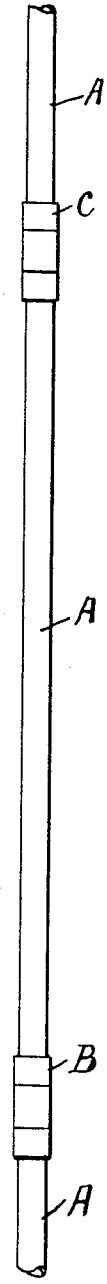


FIG. 1.

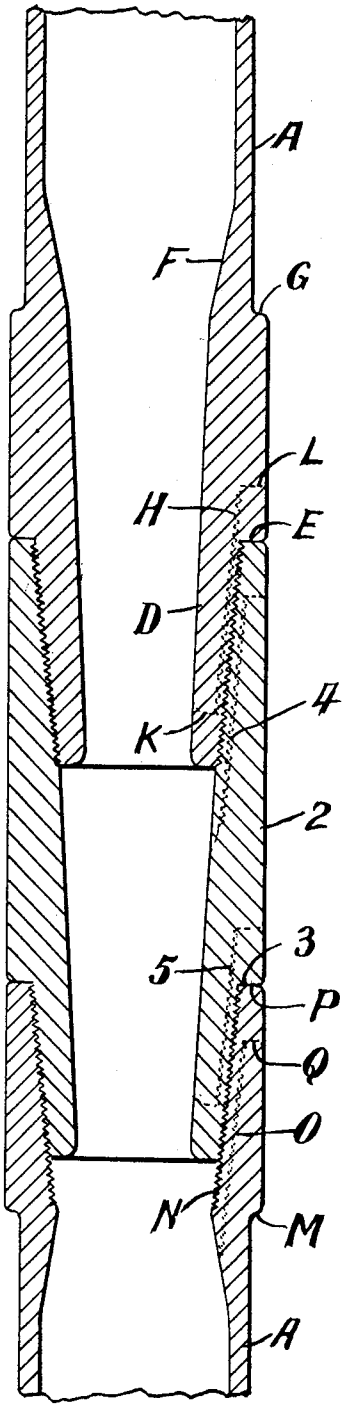


FIG. 2.

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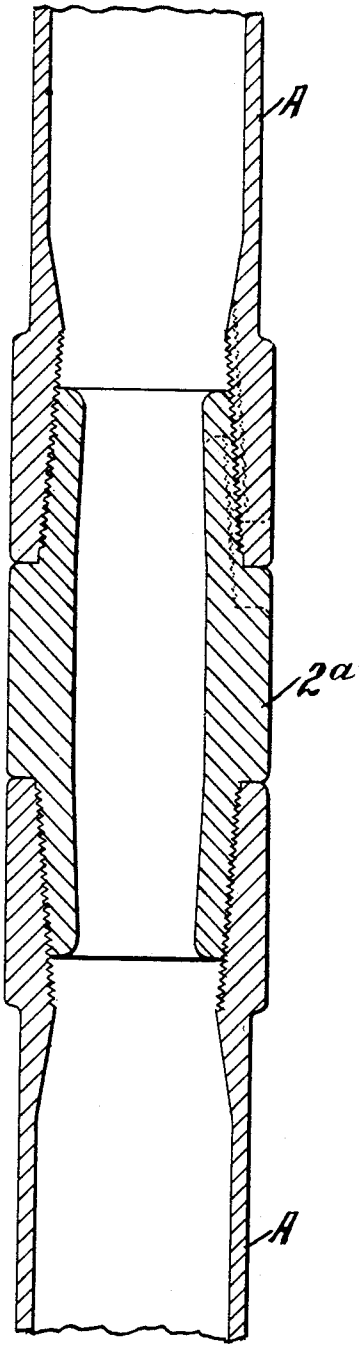


FIG. 3.

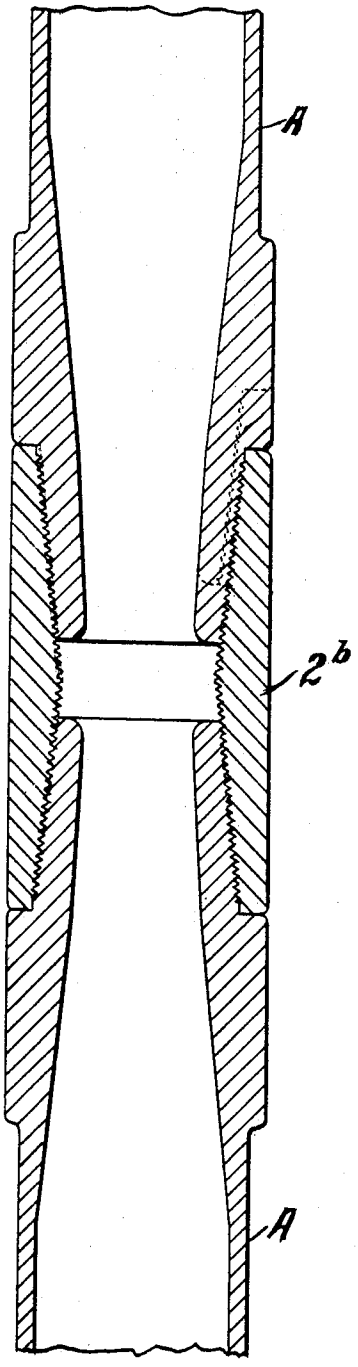


FIG. 4.

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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.

DRILL-TUBE.

1,364,478. Specification of Letters Patent. Patented Jan. 4, 1921.

Application filed October 11, 1919. Serial No. 330,127.

To all whom it may concern:

Be it known that we, PETER BOYD, of Beaver, in the county of Beaver, and AUGUSTUS M. SAUNDERS, of McKeesport, in the county of Allegheny, both in the State of Pennsylvania, have invented certain new and useful Improvements in Drill-Tubes, of which the following is a specification.

Our invention relates to drill tubes used in boring deep wells and formed of a series of detachably connected sections, carrying a boring tool at the lower end. The drill tube is rotated in practice and is subjected to torsional strains. The common construction of tube consists of comparatively short lengths of pipe, two of which are coupled together to constitute each section, and each section of which is connected to the next by a separate device referred to as the "tool joint" and usually of the box and pin type. Other styles of joint are in use, but this is the commonest form.

According to our Patent No. 1,287,203 the drill tube is made up of tubular sections which are in one piece from end to end and have their opposite ends shaped to form a box and pin connection, whereby the work of the driller is gradually simplified, the joints being capable of rethreading a number of times without weakening them and being originally of the simplest and strongest construction as well as providing a cheaper drill tube than theretofore used, reducing the number of joints and eliminating the welds previously used to obtain heavy ends.

The present invention provides a drill tube in which substantially or approximately the same advantages are secured by constructions differing from that shown in the previous patent and in which a cheap and strong joint is secured, with long lengths of tubing, without the direct connection of the tube sections to each other.

The accompanying drawings illustrate embodiments of the invention.

Figure 1 is an elevation of a drill tube; and Figs. 2, 3 and 4 are vertical sections of joints embodying the invention.

Referring to the embodiments of the invention illustrated, each section A, Fig. 1, of the tube extends unbrokenly from one joint B to the next joint C, these joints being made with upset and threaded ends of the tube sections and with intermediate members as shown in Figs. 2, 3 and 4.

The ends of the tube sections are integrally shaped and threaded, being upset outward to form shoulders for engagement by the lifting or other tools. The tool joint is completed by a short coupling member intermediate or between the sections which is integrally formed with an outside diameter equal to that of the upset ends of the tool sections. The coupling members may have two opposite pin ends or two opposite box ends or one box end and one pin end, the tube sections being shaped to correspond with the coupling member used.

According to Fig. 2 the tube section A has a pin end upset both inward and outward so as to increase the outside diameter and to decrease the inside diameter, the latter being gradually reduced from that indicated at A for the greater portion of the section to that shown at the lower end. The outside diameter is increased sufficiently and then swaged and drawn to leave room for the cutting of the tapered thread or pin D and to leave a shoulder E for engagement by the end of a box on the intermediate coupling member so as to limit the amount of turning movement of one on the other in fastening them together and thus prevent stripping or injury to the threads and also the cracking of one or the other which sometimes occurs with drill tubes because of torsional strains and the rough handling to which they are subjected. The tapered face F on the inside of the upset pin end is approximately parallel to the taper of the thread on the pin D. The total distance of the upset portion from the shoulder G to the end is made longer than is necessary for the screw joint initially cut. By reason of the surplus length from the end back to the shoulder G the tubes may be re-threaded a number of times when they become worn without weakening the joint. The constant screwing of the sections together as they are lowered into the well and unscrewing them as they are raised wears the threads and they are also sometimes injured in handling so that the possibility of numerous re-threadings is a substantial advantage.

For example, if the threads first formed on the pin D become worn or otherwise in-

jured the pin end may be re-threaded as indicated in dotted lines at H, cutting back the lower end J of the pin to the point K and carrying the shoulder E back to the point L. By reason of the shape and proportions of the upset end of the section the joint rethreaded in this way is just as good and just as strong as it was initially; in fact, it is substantially identical with the original joint.

On the upper end of each pipe section A, according to Fig. 2, it is upset to provide similar features of advantage. The external shoulder M provides a convenient means for attaching a lifting or holding tool when the tube is being withdrawn and the sections unscrewed from one another. The metal is thickened inwardly so that when the initial tapered box thread N is worn or otherwise injured a new thread O or other threads as wear takes place can be cut and the initial end P of the box may be carried back to the point Q, leaving a box which is substantially identical with that initially formed.

The intermediate coupling member 2 will not need upsetting but can be made of cheap short sections of heavy tubing, its outside diameter being equal to that of the upset ends of the tube sections. Its upper end will engage the shoulder E on the pin end of the tube section, and it will be provided with a shoulder 3 for engagement with the end P of the lower tube section, the shoulder 3 being similar to and having the same functions as the shoulder E. The member 2 will also be so proportioned that its threads can be re-cut as indicated at 4 and 5 respectively and its ends similarly cut down.

According to Fig. 3 each tube section is provided with two box ends, and the intermediate member 2^a is provided with two pin ends, the proportions and functions of the parts being otherwise the same as in Fig. 2. And according to Fig. 4 each pipe section is provided with two pin ends and the intermediate coupling member 2^b is provided with two box ends, the proportions here being also similar to those of Fig. 2 and the functions of the different parts being the same.

What we claim is:

1. An improved drill tube composed of sections extending continuously from one tool joint to the next, each section comprising a hollow metal tube having its ends integrally shaped and threaded to form parts of tapered threaded box and pin joints, the ends being upset outward to form shoulders for engagement by the lifting or other tools, in combination with an intermediate coupling member having its ends threaded for engagement with the ends of said tube sections, the coupling member being integrally formed with an outside diameter equal to that of the upset ends of the tube sections, the pin end for each of the threaded connections having a shoulder to be engaged by the box end to limit the movement of the parts together and prevent splitting of the box end and undue strain on the threads in screwing the parts together.

2. An improved drill tube composed of sections extending continuously from one tool joint to the next, each section comprising a hollow metal tube having its ends integrally shaped and threaded to form parts of tapered threaded box and pin joints, the ends being upset outward to form shoulders for engagement by the lifting or other tools, in combination with an intermediate coupling member having its ends threaded for engagement with the ends of said tube sections, the coupling member being integrally formed with an outside diameter equal to that of the upset ends of the tube sections, the pin end for each of the threaded connections having a shoulder to be engaged by the box end to limit the movement of the parts together and prevent splitting of the box end and undue strain on the threads in screwing the parts together, the ends of the pipes being also upset inward and for a length greater than is required for the joint when new so that new threads may be formed when the initial threads wear out and may be extended farther into the upset portions and the outer ends of said upset portions removed, thus providing a new joint practically identical with the original one.

3. An improved drill tube composed of sections extending continuously from one tool joint to the next, each section comprising a hollow metal tube having its ends integrally shaped and threaded to form parts of tapered threaded joints of the box and pin type, the ends being upset outward to form shoulders for engagement by the lifting or other tools, in combination with an intermediate coupling member having its ends threaded for engagement with the ends of said tube sections, the coupling member being integrally formed with an outside diameter equal to that of the upset ends of the tube sections, the pin end for each of the threaded connections having a shoulder to be engaged by the box end of the joint to limit the movement of the parts together and prevent splitting of the box end and undue strain on the threads in screwing the parts together.

In witness whereof, we have hereunto signed our names.

PETER BOYD.
AUGUSTUS M. SAUNDERS.