W. O. MAXWELL AND H. SCHWAB.

METHOD OF REINFORCING DRILL PIPES.

APPLICATION FILED JULY 22, 1918.

1,302,690. Patented May 6, 1919.

Fig. 1.

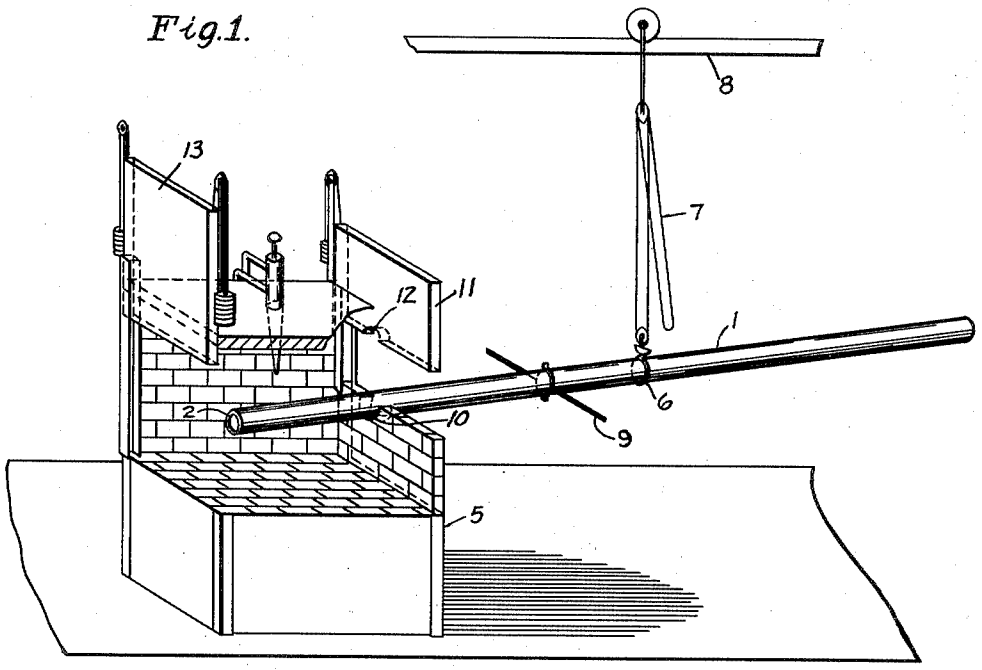


Fig. 2.

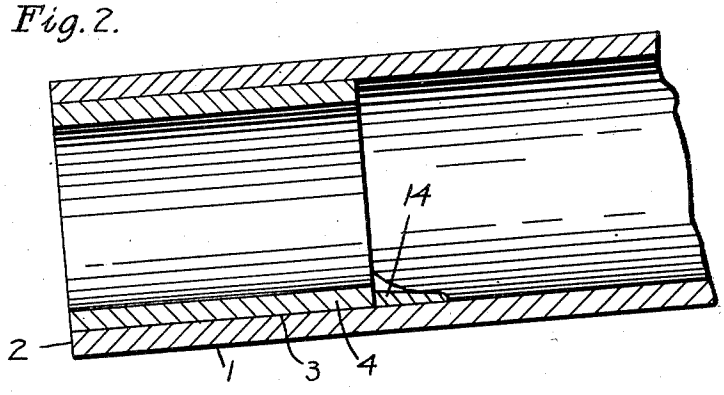
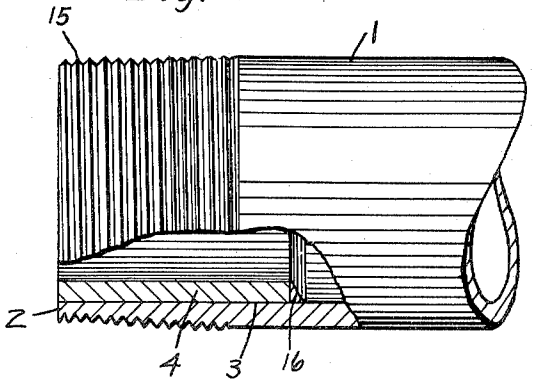


Fig. 3.



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METHOD OF REINFORCING DRILL-PIPES.

1,302,690. Specification of Letters Patent. Patented May 6, 1919.

Application filed July 22, 1918. Serial No. 246,160.

To all whom it may concern:

Be it known that we, WILLIAM O. MAXWELL and HENRY SCHWAB, citizens of the United States, residing at Los Angeles and Fellows, respectively, in the counties of Los Angeles and Kern and State of California, have invented new and useful Improvements in Methods of Reinforcing Drill-Pipes, of which the following is a specification.

Our principal object is to rebuild tubular drill stems, that is to take worn out drill stems and put them in condition for use, and our invention consists of the novel features herein shown, described and claimed.

Figure 1 is a fragmentary perspective illustrating our method of rebuilding tubular drill stems.

Fig. 2 is a sectional detail through the end of a drill stem and further illustrating the method.

Fig. 3 is a sectional detail of the rebuilt drill stem ready for use.

In the old oil fields there are large quantities of tubular drill stems which have been discarded as unfit for use. These old tubular drill stems have been weakened by rusting, the threads have become worn and broken and the bodies of the stems are too weak and thin to stand new threads, and it is the object of our invention to go into the oil fields and take these discarded drill stems and rebuild them and put them in condition for use.

These old drill stems are usually eighteen or twenty feet long and six inches in diameter and weigh about twenty-five pounds to the foot. We take the old drill stem 1 and cut off the damaged ends back of the original threads and back of the original blacksmithed or up-set reinforcements to produce a clean finished end 2. The inside of this end 2 is thoroughly cleaned and smoothed up for a distance of six or eight inches in length by running a shell reamer of the proper size into the end and by dipping the end in acid and by scrubbing with a wire brush. The particular requirements may differ with each drill stem. If the drill stem is smooth and unpitted on the inside, it is only necessary to clean with acid and scrub, but usually the old drill stem is not perfectly round and is internally pitted with rust, and it is better to run in a shell reamer so as to produce a perfectly round and smooth seat 3 for the reinforcement. The reinforcing ring 4 is a section of steel tubing or casing five and five-eighths inches in diameter, having a six inch drill stem and cut six or eight inches long. This reinforcement is cleaned on its outer face either by turning in a lathe or by dipping in acid and scrubbing, and then the reinforcement is forced into the seat 3 reasonably tight until the outer edges are flush. After the reinforcement ring has been properly applied the drill stem is taken to a furnace 5, which may be heated with gas or oil, lifting tongs 6 are applied to the center of the stem and the lifting tongs are operated by a block and tackle 7 mounted to run upon a track bar 8 so that the drill stem may be picked up bodily and the end 2 placed in the furnace in position to be heated. A two-handled wrench 9 is applied to the drill stem for rotating the drill stem. The furnace 5 has a semicircular seat 10 to receive the drill stem 1 and a vertically sliding door 11 with a seat 12 to match the seat 10. At the opposite side of the furnace from the door 11 is a vertically sliding door 13. The two doors are closed until the fire is well started and the furnace hot, then the door 11 is raised, the tubular drill stem 1 manipulated until the end 2 passes inwardly through the seat 10 or beyond to the center of the furnace, and an operator manipulates the block and tackle 7 and the wrench 9 to move the drill longitudinally in or out to properly locate the end 2 and to raise the opposite end of the tubular drill stem to a height considerably above the end 2. Then after the end 2 has been heated to about 2000° F., another operator raises the door 13 to place suitable flux, such as borax, in through the reinforcing ring 4 to a point beyond the inner end of the reinforcement, then as the tubular drill stem is rotated the flux will run around in the trough at the inner end of the reinforcing ring and run into the seat 3 around the reinforcing ring. This second operator uses a spoon or tongs to insert spelter through the reinforcing ring 4 and the spelter will melt to form a puddle 14, in the trough at the inner end of the reinforcing ring 4, and as the stem 1 is slowly rotated and the temperature slightly increased, the end of the stem will enlarge by expansion more than the reinforcement and the spelter will run into the seat 3 around the reinforcement and the operation may be continued until the opera-

tor is satisfied. Usually the spelter will run through the seat 3 until it may be seen at the end of the stem 1 in the crack between the stem and the reinforcement. Then the stem is removed from the furnace and cooled and in due course a new thread 15 is cut upon the periphery of the stem, the reinforcing ring 4 serving to support the material during the thread cutting operation and to support the threads during the life of the tubular drill stem. The reinforcement is considerably longer than the thread 15 so that there is no liability of the thread breaking.

The spelter used is a composition of copper and tin tempered with phosphorus and this spelter will easily run or flow into the seat 3 around the reinforcing ring 4 and a sufficient quantity should be applied to form the spelter fillet 16 at the inner end of the reinforcement. At the time the spelter is flowing the outer shell of the end 2 is directly receiving the heat from the furnace and will be considerably hotter than the reinforcing ring 4 and this difference in heat will cause the outer shell to expand enough to allow the spelter to flow freely to the seat and then when the parts cool the outer shell will turn up so that the outer shell, the spelter and the inner shell are practically one body.

By the use of our method it is perfectly practical to take an equipment, go out in an oil field, gather up the old discarded tubular drill stems and rebuild the drill stems and make them as good as new.

Many attempts have been made to rebuild tubular drill stems by black-smithing and welding, up-set and the like, but it has proven a failure, because the material of the old tubular drill stem will not stand the black-smithing and welding. It is oxidized and hard and brittle and deficient for the purpose of welding. The welding process requires a great deal higher temperature and destroys the substance of the drill stem. In the brazing method as above described the structure of the drill stem is not disturbed or reformed and consequently it is not injured or destroyed.

Various changes may be made without departing from the spirit of our invention, as claimed.

We claim:

1. The method of rebuilding tubular drill stems which consists in cutting off the damaged end of the old stem end to form a new end, cleaning out the new end, inserting a reinforcing ring, placing the new end in a furnace with the opposite end elevated, placing flux in through the reinforcing ring to its inner end, placing spelter in through the reinforcing ring to its inner end, and continuing the application of heat and rotating the stem so that the spelter and flux will flow between the reinforcing ring and the stem.

2. The method of rebuilding tubular drill stems which consists of cutting off the damaged end to form a new end, cleaning the new end, inserting a reinforcing ring, hoisting the drill stem and placing the new end in a furnace with the opposite end elevated, rotating and manipulating the drill stem, applying heat, placing flux in through the reinforcing ring to its inner end, placing spelter in through the reinforcing ring to its inner end, and continuing the application of heat and rotating the stem so that the stem will expand until the flux and spelter flows between the reinforcing ring and the stem.

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

WILLIAM O. MAXWELL.
HENRY SCHWAB.