Dec. 6, 1938. A. GRAY 2,139,077

METHOD OF MAKING DRILLING JARS

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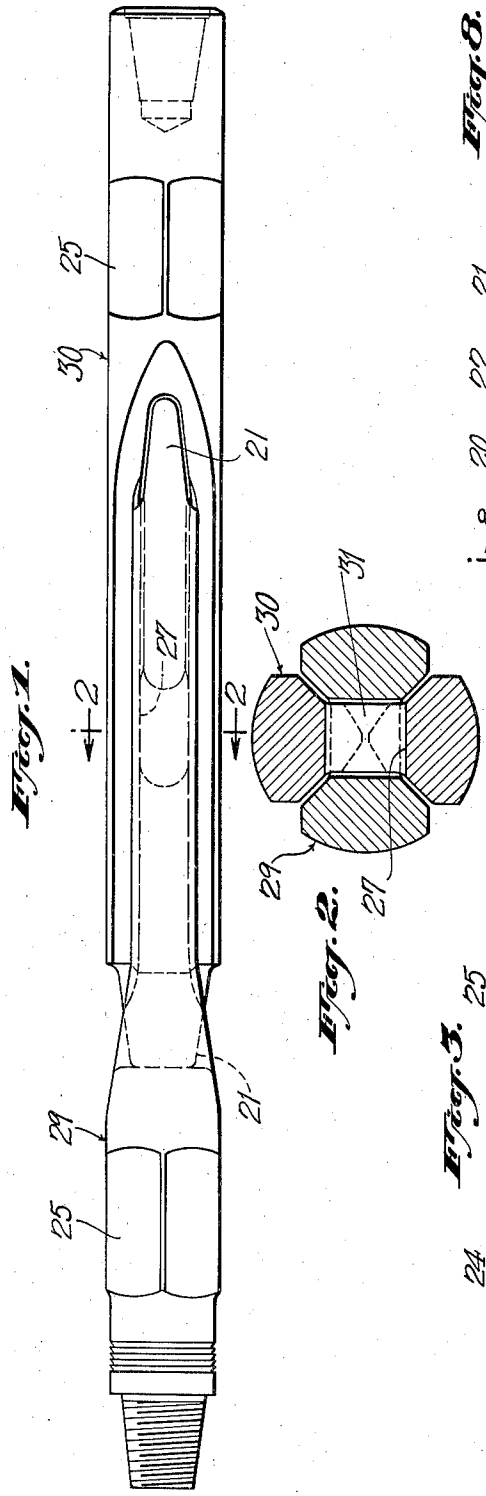

Fig. 1.

Fig. 2.

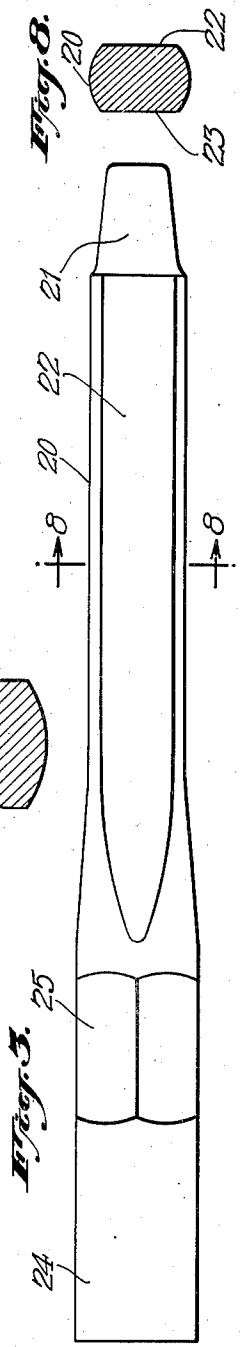

Fig. 3.

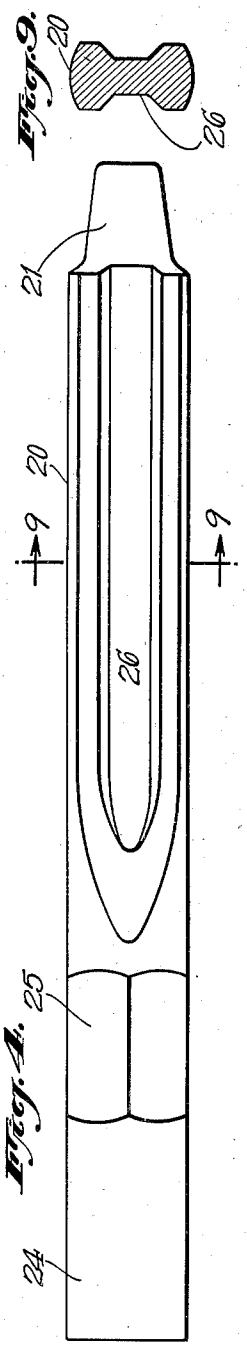

Fig. 4.

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Fig. 10.

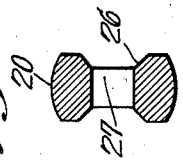


Fig. 11.

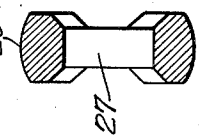


Fig. 12.

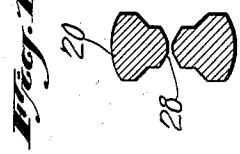


Fig. 5.

Fig. 6.

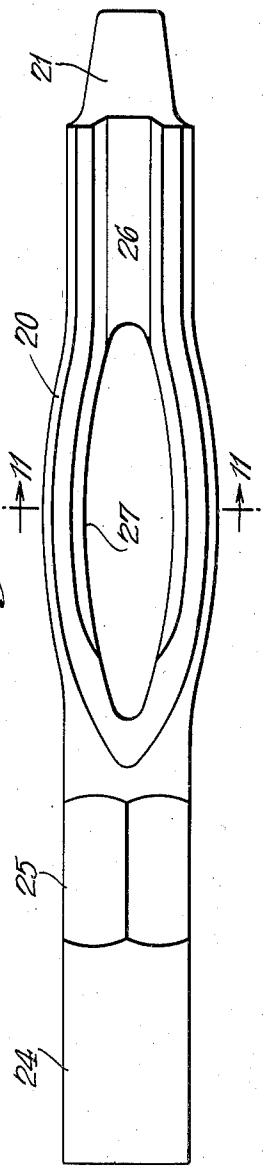
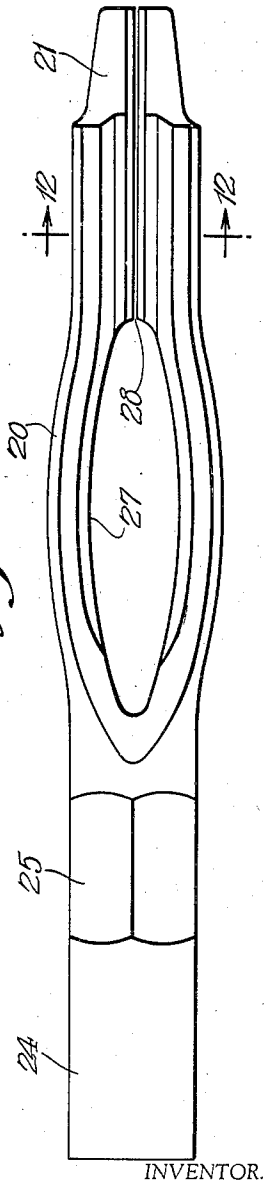


Fig. 7.



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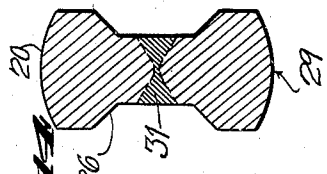

Fig. 1A.

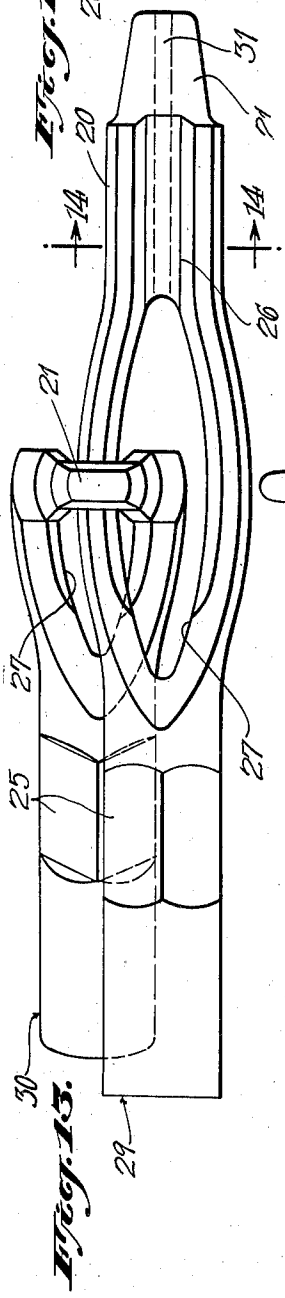

Fig. 1B.

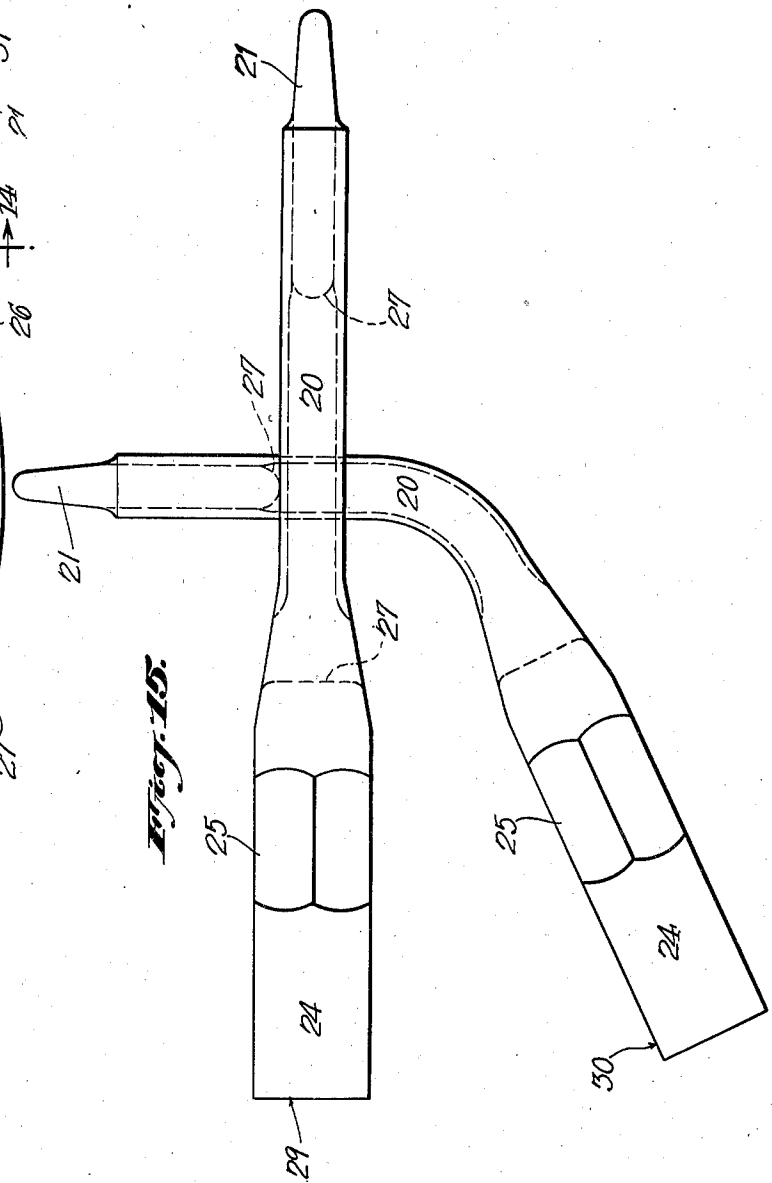

Fig. 1C.

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UNITED STATES PATENT OFFICE

2,139,077

METHOD OF MAKING DRILLING JARS

Allen Gray, Oil City, Pa., assignor to Oil Well Supply Company, Dallas, Tex., a corporation of New Jersey

Application August 16, 1935, Serial No. 36,579

2 Claims. (Cl. 76—101)

My invention relates to a method of making drilling jar construction which may be easily assembled and of a maximum strength.

Drilling jars are used in the drilling of oil wells and are placed between the drill stem and the bit to provide a lost motion between these two parts, so that if the bit becomes wedged or embedded in the bottom of the well, it will be freed by the upward momentum of the relatively very heavy drilling stem generated by its movement through the interval of lost motion provided by the jars. These jars have comprised an upper member commonly known as the pin end having a threaded pin to be screwed into the drill stem, and a lower member commonly known as the box end having a threaded socket into which the bit may be screwed. A pair of spaced reins extend from the end of each member into interlacing relation, the reins of one jar member being arranged at a 90° interval to those of the other. The extending ends of each rein are then joined in a tongue end so that the jars will be interlocked similar to the links of a chain.

The reins and the tongue and attaching ends, that is, both the pin and box members respectively, must be of limited diameter in order to move freely in the well and the tongue and attaching ends must be of considerable length to withstand the impacts during drilling. The tongue end of each jar member slides between the reins of the other jar member so that the pair of members is held in a general approximate alignment. The construction of the jar members has heretofore been such as to prevent their assembly into complete jars without cutting one of the reins and welding it together after interlocking. This welding of the reins tends to weaken the jars and is objectionable in that the impact stresses and momentum of the heavy drill stem must be imparted or transferred through the reins to the bit.

The present invention provides a method of forming and assembling jars from two separate billets or masses of metal while maintaining the reins integral and integrally joined with the tongue and attachment ends and without forming a weld at any place where it is subjected to direct tension resulting from the weight of the bit and the impact forces.

The various features of the invention and the method of assembling the jars are illustrated in the accompanying drawings, in which—

Fig. 1 is a side view of a pair of jars embodying the invention; Fig. 2 is a cross-section taken on line 2—2 of Fig. 1; Figs. 3, 4, 5, 6 and 7 are side views of a billet or piece of metal in successive operations in forming it into a jar; Figs. 8, 9, 10, 11 and 12 are cross-sections taken on lines 8—8, 9—9, 10—10, 11—11 and 12—12 of Figs. 3, 4, 5, 6 and 7 respectively; Fig. 13 is a side view showing two partly formed jars being assembled or interlocked; Fig. 14 is a cross-section of one jar member taken on the line 14—14; and Fig. 15 is a view of the two assembled jar members with one jar member bent so that it may be twisted into its normal position and then straightened to the relation shown in Fig. 1.

In my present invention, two elongated masses or billets of steel are forged to the general dimension and shape of the jar members that are to be united or married and metal in each member is then removed from an intermediate length to form a pair of separated reins and a tongue and attachment ends. The opening thus formed in one of the members is then widened and the tongue end split in approximate alignment with the space between the reins. One of the split portions of the tongue end is then inserted through the space in the other jar and then the split end is closed by welding. Inasmuch as the jars cannot in their normal shape be twisted into alignment, one of them is bent to permit this twisting. The jars are then twisted into alignment and the bent member straightened and shaped to its final form.

Referring more particularly to the accompanying drawings, a billet 20 of steel is forged into an elongated shape with one end flattened and thinned as at 21, and with a pair of flattened side faces 22 and 23. The opposite end 24 which is to form the attachment end, either the pin or box end, may be of cylindrical shape, but is provided with a squared portion 25, to which the wrench may be applied in screwing the jar onto the bit or drill stem. After this operation, the forged billet will have the shape shown in Figs. 3 and 8. The flat faces 22 and 23 are then depressed by means of dies to form the longitudinal grooves 26 shown in Figs. 4 and 9. Metal is then removed from a portion of the longitudinal groove 26 to form an elongated opening 27, as shown in Figs. 5 and 10. This opening in one of the jars is then enlarged to the form shown in Figs. 6 and 11 and the tongue end is split longitudinally as at 28 in Figs. 7 and 12.

One of these split ends in the member 29 thus formed is inserted through the opening 27 of the other member 30, the tongue end of which has not been split but which has the shape and construction shown in Figs. 5 and 10. When the two jars

have thus been interlocked as shown in Figs. 13 and 14, the split end of the member **29** is welded as at **31** in Figs. 13 and 14.

The two assembled members are now at approximately right angles, but cannot be brought into alignment without bending one of them. One of the members, as for example member **30**, is then bent as shown in Fig. 15, to an obtuse angle, and the members are twisted into normal position and the bent member straightened to the relative position shown in Fig. 1.

It will be apparent from the above description that each attaching end, either a box end or a pin end, is integral and that integral reins extend from the attaching ends in interlocked position similar to the links of a chain and are joined in tongue ends either integrally or by a longitudinal weld **31**, as shown in Fig. 2. The attaching ends and the reins, therefore, have their full strength unaffected by any welds. The only weld occurs in the longitudinal position in one of the tongue ends where there are no separating stresses, but only impact stresses which do not tend to weaken the weld, or to cause the weld to separate or to weaken.

What I claim is:—

1. A method of forming drilling jars which comprises forming elongated pieces of metal to the approximate shape of the drilling jar members, removing metal from an intermediate part of said elongated pieces to form a pair of spaced reins integral with the ends, one of said ends being an attachment end and the other a tongue end, splitting the tongue end of one of said jar members and inserting one of said split ends between the reins of the other jar member, welding together said split ends, bending one of said jar members and twisting it to aligned position and straightening to alignment with the other jar member.

2. A method of interlocking a pair of drilling jar members which comprises separating the tongue end of one jar member into two parts integral with the respective reins, inserting one of said parts and its rein between the reins of another jar member, welding said separated ends of said first jar member, bending one of said jar members, twisting it into alignment with the other jar member and straightening it to aligned position.

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