W. A. SPARKS.

WELL DRILL JAR.

APPLICATION FILED OCT. 3, 1913.

1,209,347.

Patented Dec. 19, 1916.

Fig. 1.

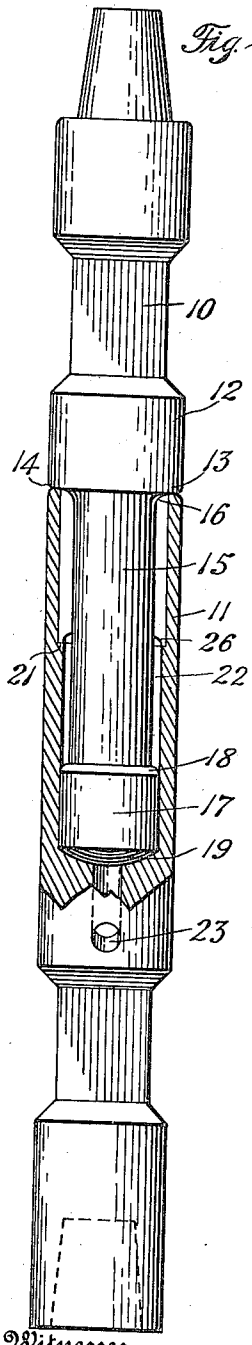


Fig. 3.

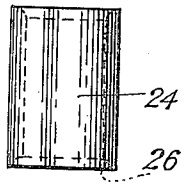


Fig. 4.

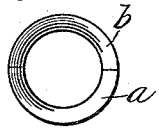


Fig. 2.

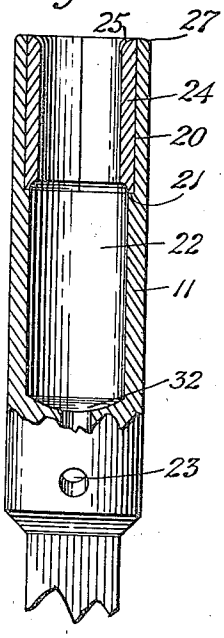


Fig. 7

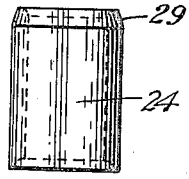


Fig. 6.

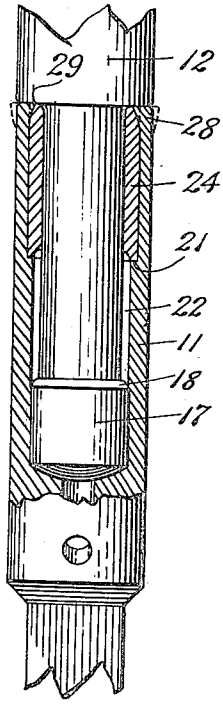
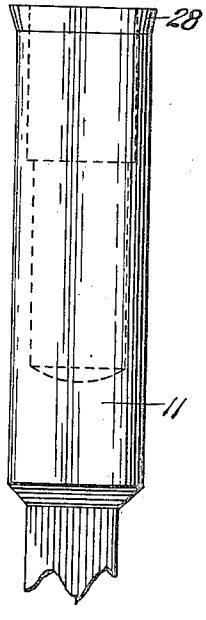


Fig. 5.



Witnesses

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WELL DRILL-JAR.

1,209,347. Specification of Letters Patent. Patented Dec. 19, 1916.

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To all whom it may concern:

Be it known that I, WILLIAM A. SPARKS, a citizen of the United States, residing at Charleston, in the county of Kanawha and State of West Virginia, have invented certain new and useful Improvements in Well Drill-Jars; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In the practical drilling of oil wells it is usually necessary that the well be drilled through rock, necessitating the employment of a heavy drilling tool. As a result nearly every descending blow of the drilling tool results in its binding or sticking in the rock. It is, therefore, customary to add a set of drill jars, to every string of drilling tools, the idea being that when the drill strikes on the downward blow it is immediately loosened by the impact of the jar, which follows the slackening of the operating cable.

So far as is known, the drill jars in use in the various oil fields are known as "link jars" wherein one member of the jar is so coupled to the other member as to permit of pivotal movement. In the manufacture of the ordinary link jar in commercial use it has been found necessary to submit them to a great number of welding heating operations, frequently as many as ten to fourteen welding heats being required. Whatever may be the character of the metal to begin with, it is well known that the subjection of the jars to a number of welding heats results in vitiating the quality of the metal, rendering the material of the jars soft and malleable. As a result, in the operation of link jars, they frequently become elongated from five inches to a foot, and the metal is thereby greatly drawn out, and weakened. The jars are therefore of short life, and owing to the spaces between the parts thereof are frequently cramped by broken pieces of rock and other debris, with the result that the force of the impact of the jar members is much weakened or entirely destroyed. Furthermore, the well drill jars should be capable of a revoluble movement to relieve the twist of the drill rope. The link jars do not permit of this revolving movement, and, consequently, if there is any sticking of the drill, or any difficulty in raising the string of tools, the jars are subjected not merely to the vertical twirl, but also to a twist from a tendency of the rope to straighten out under strain, resulting in an increased liability to the breaking of the jars.

When jars of the ordinary commercial type, especially the link jars, become broken, they leave several parts of metal standing in the well, these parts being usually small and of unequal height, making it extremely difficut to be seized by any "fishing tool". As a result, it is not infrequent that a hole must be abandoned through inability to remove the broken portion of the string of drill tools, after hundreds or thousands of dollars have been spent in drilling and in "fishing." It is therefore necessary that a new well be drilled adjacent to the abandoned hole.

In overcoming the objections to the drill jars in commercial use, I have produced a drill jar of the type disclosed in my copending application No. 816497 which matured into Patent No. 1134926, dated April 6, 1915, the members of which are capable of reciprocating and rotative movement with reference to each other. The members are permanently coupled together and free from screw threaded parts or joints. The jars of this invention present advantages over those previously known in the art, in that they can be manufactured at less cost and with greater durability; that they will give a greater impact or "jar" for the size and weight of the material; that the material of the jars retains its actual strength, not having been subjected to any welding heat, and in the event of a separation of the parts in a well, will render the fishing of the broken parts a comparatively easy task, thereby saving great sums of money to the contractors and owners of wells who have previously been compelled to fill in a bored well and start a new one, owing to the difficulty experienced in removing the broken parts from a well.

With these ends in view, the invention embodies a drill jar composed of two members, a piston member and a socket member, permanently interlocked and capable of recipirocating and a rotary motion with reference to each other. The piston member and socket member are so formed that when a substantially rounded cylindrical head of the piston member engages one seat of the socket member, that the abutting ends of

the socket and piston members will simultaneously come into engagement, thereby relieving the strain on the head of the piston member, preventing the head from spreading or thickening, as well as preventing the shank of the piston member from bending, buckling or expanding, and at the same time give a greater impact for a jar of a given size and weight.

The accompanying drawings illustrate the preferred embodiment of the invention, but it is to be understood that the constructions shown therein are for the purposes of illustration, only, and not as defining the limit of the invention.

In the drawings, Figure 1, is a front elevation of a complete set of jars, parts being in section. Fig. 2, is an enlarged sectional view through the socket member. Fig. 3, is a detail view of the sectional cylindrical member removed from the socket member. Fig. 4, is an end view of the cylindrical member or collar. Fig. 5, is a view of another embodiment of the socket member prior to the insertion of the cylindrical member therein. Fig. 6, is a sectional view of the construction illustrated in Fig. 5, after the said piston and socket members have been coupled together. Fig. 7, is a detail view of the collar of Figs. 5 and 6.

In the embodiment of the invention illustrated in Figs. 1 to 4, there is shown a piston member 10, and a socket member 11, each produced from a single piece of suitable metal, preferably high grade steel. The piston member 10, is shown provided with a hammer section 12, and also with a shoulder 13, having rounded non-battering edges 14, a shank 15 integral with the hammer 12, and shown flared outwardly into a rounded neck 16, where it joins the hammer 12. Integral with the shank 15 is a head 17, having an annular shoulder 18 formed where it joins the shank, and preferably provided with a rounded free end 19. This piston member may be formed in any suitable manner such as turned in a lathe. The socket member 11, is bored to produce a suitable chamber 20, forming a shoulder 21, at the lower end thereof, a chamber 22, of less diameter is then bored from the shoulder 21 to a predetermined distance in the socket member, where a rounded seat 32, is formed for the rounded end 19, of the head. A suitable waste opening 23, may now be provided in the smaller chamber if desired. A suitable collar 24 is adapted to be inserted into the larger chamber of the socket member, and this collar is retained in position to interlock the piston and the socket members in their operative positions. This collar 24, is shown in Figs. 2, 3, and 4, as a sectional cylindrical member, the upper portion terminating in a rounded end 25, to correspond with the neck 16 of the shank while the lower portion of the member 24 is shown in the form of a seat 26, corresponding substantially to the shape of the shoulder 18. The cylindrical member 24 is shown in the form of two complemental sections, *a* and *b*, to be readily placed around the shank 15 after the head 17 has been inserted into the chamber 22, although it is obvious that the member 24 may be made of a greater number of sections, if found desirable.

After the socket member 11 has been formed, as previously described, it is heated and the head 17 is inserted into the chamber 22, the sections *a b* of the member 24 are then placed around the shank 15 and driven into the member 11, until the ends 26 thereof abut against the shoulder 21, whereupon the end 27 of the socket member 12, which has been expanded by the heat and contracted around the outer walls of the cylindrical member 24, may now be trimmed down to permit of the engagement of the shoulder 13 with the end 27 substantially simultaneously with the engagement of the head 17 with its seat 32.

The cylindrical member, or sectional collar 24, not only affords an upper seat for the head 17, but also prevents the separation of the jar members, acts as a guide to the shank 15, in preventing the same from wabbling and directing the head into positive engagement with its seats 26 and 32. This collar 24, together with the engagement of cylinder 13 with the end 27, relieves the strain on the parts, with a consequent freedom from thickening or binding of the shank and head as a result of the operation of the device.

The socket member disclosed in Figs. 5 and 6 is substantially similar to that disclosed in Figs. 1 and 2, except that at the upper end the walls are flared upwardly as shown at 28, and the corresponding end 29 of the collar 24 is tapered inwardly, whereby when the open end of the socket member 11 is heated, the head 17 inserted into the chamber 22, the collar 24 forced to its operative position in the socket member 11, the flared walls 28 may be compressed around the tapered end 29 of the collar 24 and thereby lock all the parts in their operative position. It will be observed, should a set of these jars become broken, the entire parts thereof would not necessarily have to be destroyed, but the collar 24 could be removed and a new piston member and collar inserted into the old socket member. If any breakage should occur it would probably be of the piston or shank 15 as this member will bear the most wear, in which event the "fishing" out of the broken parts will be a comparatively easy and inexpensive matter.

Having thus described my invention, what I claim as new, is:—

1. A well drill jar comprising a piston

member and a socket member permanently coupled to permit of rotating and reciprocating movements, the piston member being provided with a shank and an enlarged head, the socket member being provided with a chamber and a collar adapted to be positioned within said chamber to close one end thereof and secure the piston head within the chamber, said collar being retained in position by compressing the wall of the socket member around said collar.

2. A well drill jar comprising a piston member and a socket member, the piston member being provided with a shank and a substantially cylindrical head integral therewith, the socket member being provided with a chamber having a seat for the head, and a divided collar to close one end of said chamber and providing another seat for the head.

3. A well drill jar comprising a piston member and a socket member, the piston member being provided with a shank and a substantially cylindrical head integral therewith, the socket member having a chamber provided with a seat at the lower end thereof and a shoulder intermediate the ends of the chamber, and a cylindrical member mounted within said socket member and engaging said shoulder to form a seat for the head.

4. A well drill jar comprising a piston member having a shank and a head formed integral therewith, a socket member provided with a substantially elongated chamber to permit of reciprocating and rotary movement of the piston head therein and a divided cylindrical member retained within said socket member and operating to substantially close the end of said chamber and also form a seat for said head.

5. A well drill jar comprising a piston member having a shank and a head integral therewith, a socket member provided with a cylindrical chamber permitting of reciprocating and rotary movement of the head therein, oppositely positioned seats within said chamber, a sectional cylindrical member at one end of the socket member, and means whereby the sectional member is retained in position on said socket member.

6. A well drill jar comprising a piston member and a socket member, the piston member being provided with a shank and an enlarged head, the socket member having a chamber of greater length than the head, the wall forming one end of the chambered portion of the socket member being of greater thickness than another part of said wall, and a sleeve adapted to be positioned into one end of said chamber and having a reduced portion at an end thereof, whereby when the wall of said socket chamber is compressed around said sleeve the thicker portion of said chamber wall will engage the reduced portion of said sleeve and serve to retain the sleeve within the socket chamber to lock the piston head within said chamber.

7. A well drill jar comprising a piston member having a shank and an enlarged head, a socket member having an elongated chamber, the wall at the chambered end of the socket member being of increased thickness, and a divided sleeve formed to receive retaining means and adapted to be positioned within the chambered end of said piston member for locking said piston head within said chamber, said sleeve being retained in its operative position by compressing the wall of said socket member into engagement with said sleeve and to have a thickened portion of said wall engage the retaining portion of said sleeve.

In testimony whereof, I affix my signature, in presence of two witnesses.

WILLIAM A. SPARKS.

Witnesses:

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L. G. SUMMERFIELD.