July 7, 1931. T. W. BELL 1,813,015

JAR

Filed June 29, 1929

Fig. 1.

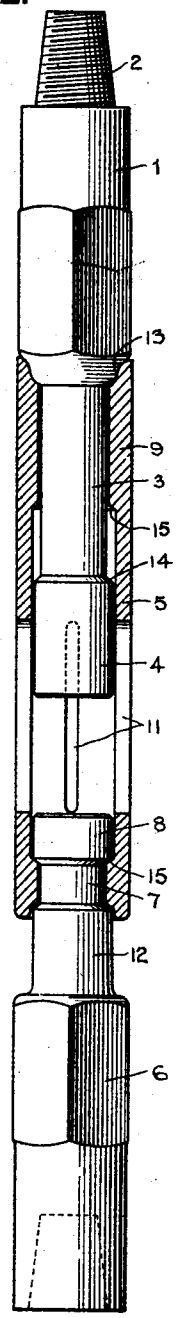


Fig. 2.

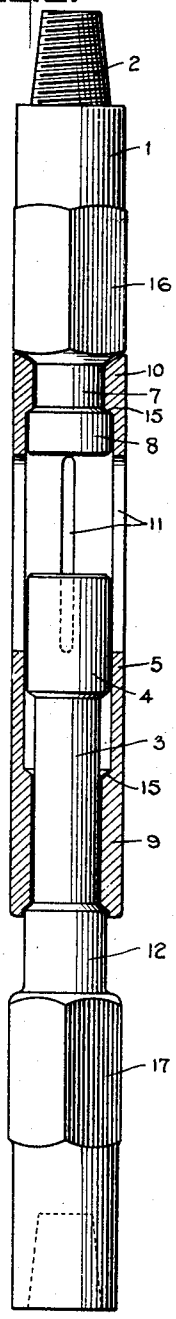
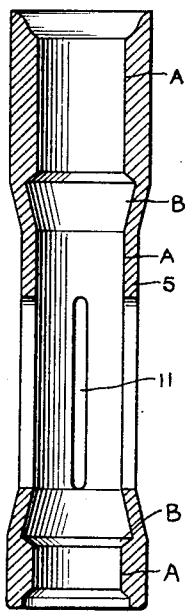


Fig. 3.



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UNITED STATES PATENT OFFICE

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JAR

Application filed June 29, 1929. Serial No. 374,244.

This invention relates to a drill jar, for keeping the drilling tools from sticking during well drilling, or a fishing jar for loosening a string of tools accidentally stuck in a well.

It is among the objects of the invention to provide a tool of the type described which will permit the string to have a double swivelling action at the jar, which will provide for rapid and easy displacement of water, slush or detritus caught within the jar, and hence insure efficient jarring action; which may be readily grasped by a fishing tool for removal, if broken in the hole; which may be made initially of maximum strength, though having maximum ease of manipulation; which may be cheaply and economically repaired and replaced when broken or worn; and which may be manufactured without welding any of the parts. As far as I am aware, all prior jars have been deficient in one or more of the above mentioned desirable characteristics.

To this end the invention in a broad aspect of its preferred form, consists of an upper element for attachment to a tool string and having a head thereon, a lower element having a reversely placed head, these elements cooperating with a sleeve which encloses both heads to permit free rotation between the parts and a limited reciprocatory movement between one element and the sleeve. The sleeve is provided with a vertical slot of such extent that the water, slush or detritus in the hole, finding its way into the space between the headed elements, may readily move therethrough without clogging when the tool string is reciprocated.

The invention further consists in the novel arrangement, combination and construction of parts more fully hereinafter described and shown in the drawings.

In the drawings:

Fig. 1 is a sectional view of a preferred embodiment of the invention.

Fig. 2 is a similar view of a modified form.

Fig. 3 is a view showing a sleeve in the course of its manufacture.

Referring now to the drawings there is shown at 1 an upper element having a threaded shank 2 for connecting the jar to the usual rope socket or sinker bar of a tool string. The main body of element 1 is provided with a restricted neck 3 and a headed portion 4 which has a limited reciprocatory movement within the sleeve 5.

A lower element 6 is provided, to the bottom of which a sinker bar or other tools may be attached if desired, this element having a neck 7 and a head 8 somewhat similar to the parts 3 and 4 of the upper element, but reversely placed and of less extent.

As shown, the sleeve 5 at the extreme top and bottom thereof is provided with a thicker wall 9 and 10, closely fitting the necks 3 and 7 respectively, the three parts fitting together, however, so as to permit a swivelling action or free rotation between them.

The sleeve 5 is provided at one or more places with an elongated slot or slots 11, of an extent substantially equal to the distance between the opposing faces of heads 4 and 8, and of substantial width so as to permit rapid movement of water, slush or detritus therethrough, when the head 4 reciprocates for a jar, as the tool string frequently operates under water or other flushing fluid.

In Fig. 1, the lower thickened wall portion 10 of the sleeve 5 is of substantially the extent of the neck 7, so that no reciprocation can take place between these parts, thus the joint between the sleeve and the lower element constitutes simply a swivel to prevent kinking of the string or line.

Should the head 8 pull off or the element break anywhere in the neck 7, a fishing tool can readily grasp the stud 12 and the remainder of the tools may be lifted from the hole. It then becomes a simple problem to machine or turn another neck on the stud 12, so that the lower element may be readily salvaged and used again.

Should the sleeve 5 break at any place the lower portion may be removed by the use of the ordinary fishing spear, or socket, and the entire sleeve replaced with a new device.

The entire jarring effect is produced by the relative up or down movement between the upper element 1 and the sleeve 5. In

the position shown in Fig. 1 the parts are at the limit of their downward position and a down jar has just been imparted to the string by slackening the line and dropping the upper shoulder 13 onto the corresponding top of the sleeve 5. A reverse or upward movement will cause the upper shoulder 14 of the head 4 to jar against the lower shoulder 15 of the sleeve enlargement 9, and a lifting action is given the tools. Such action is continued until the frozen tool is loosened.

In operation it has been found that a considerable amount of silt, grit or other detritus finds its way into the sleeve, and this solid matter clogs up relief ports of the type shown in the patent to Bell, No. 1,277,683, so that free, quick and full reciprocation of the parts is prevented. In the present construction, however, a slot or slots 11 are located in the side wall of the sleeve 5 of a height substantially equal to the extreme distance between heads 4 and 8. Thus regardless of whether the head is moving up or down, the water, slush or mixture thereof with sand and grit or the like may have ready and quick access to or be expelled from the sleeve without producing a cushioning effect and decreasing the effectiveness of the jarring action. The slot 11 is of such width that it cannot be clogged by the detritus occurring in a hole.

Obviously, the parts may be reversed as shown in Fig. 2 in which the upper element 16 is solely a swivel, and the jarring action is secured by impact between the sleeve 5 and the lower element 17, the sleeve 5 being reversely placed as to the combination of Fig. 1.

In either of the above forms, the sleeve may be forged, rolled or swaged in place upon the two heads, or it may be interiorly bored to the proper configuration, and then worked on to the upper and lower elements.

In Fig. 3 there is illustrated a sleeve in its course of manufacture. Such an element may be formed from solid stock and interiorly bored throughout as at A to the greatest head diameter. An interior reamer is then inserted and the portions B formed thereby. Upon subjecting the sleeve to a swaging operation around the heads 4 and 8 the metal is made to flow and the shoulder configurations shown in Figs. 1 or 2 result. This forging operation gives a cylindrical shape to the exterior of the sleeve and forms the interior shoulders 15.

The above is given as one satisfactory method of producing the sleeve although obviously we do not wish to be limited to an element so made.

The above combination provides a tool having many points of superiority over those now used, and in addition to the advantages already pointed out, it will be seen that it is a much simpler and cheaper construction to provide a sleeve connection between the headed elements than that shown in Patent No. 1,277,683 above referred to, if for no other reason than that if breakage of the sleeve occurs, a new sleeve may be replaced at a comparatively small cost, while if one of the tubular parts of the above patent gives way the entire element of which it is a part must be replaced.

What I claim is:

1. A drill jar comprising an upper and a lower headed element, a sleeve connecting the elements and enclosing the heads thereof, the three parts being coupled for free rotation, one head being mounted on an elongated neck to permit reciprocation between said elements and the sleeve, the other element having no reciprocatory movement relative thereto.

2. A drill jar comprising an upper element having a body, a restricted neck and a head, a lower element having a body, a restricted neck, and a head, a sleeve connecting the two elements and having a thickened wall portion lying between the body and the head of each element, one of the thickened wall portions being of an extent substantially equal to that of the neck of one element, whereby rotation may be had between the sleeve and that element, but reciprocatory movement therebetween is prevented.

3. A drill jar comprising an upper element having a body, a restricted neck and a head, a lower element having a body, a restricted neck, and a head, a sleeve connecting the two elements and having a thickened wall portion lying between the body and the head of each element, one of the thickened wall portions being of an extent substantially equal to that of the neck of one element, whereby rotation may be had between the sleeve and that element, but reciprocatory movement therebetween is prevented, said sleeve also having another thickened wall portion of an extent less than that of the neck of the other element, whereby rotation and reciprocation may be had between the sleeve and that element.

In testimony whereof, I have hereunto subscribed my name this 21st day of May, 1929.

THOMAS W. BELL.