Nov. 14, 1939. A. E. JOHNSON 2,179,594

WELL TOOL

Filed June 9, 1938

Fig. 1.

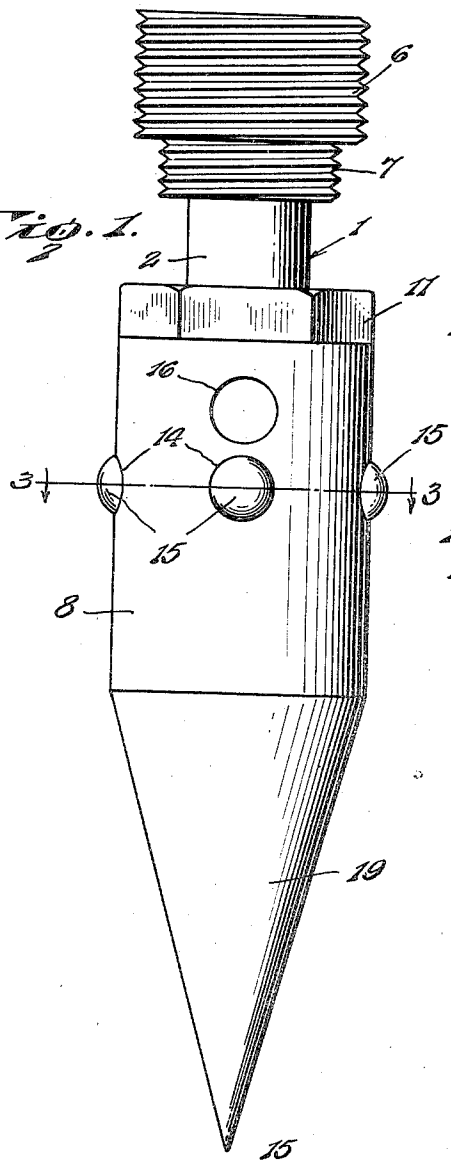


Fig. 2.

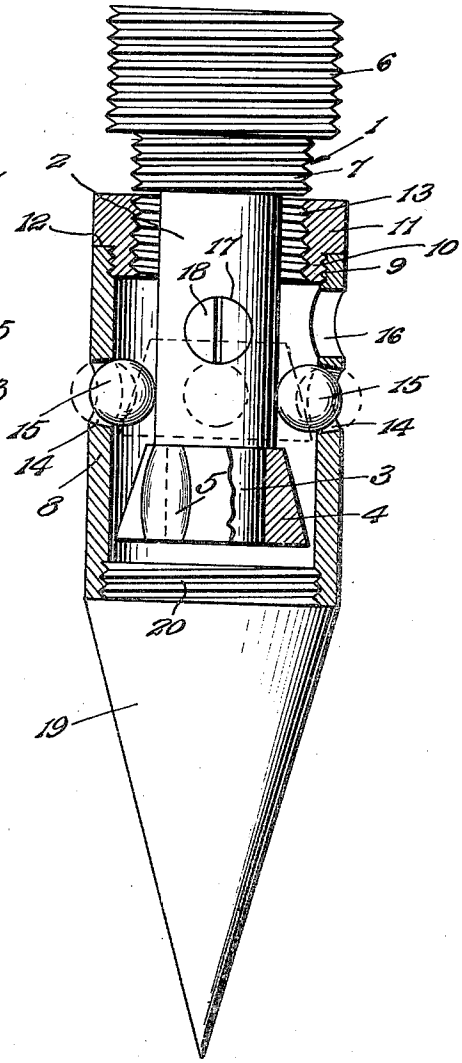
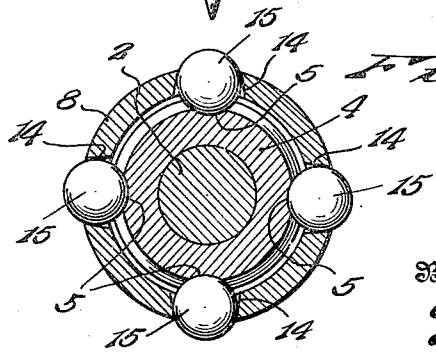


Fig. 3.



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WELL TOOL

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4 Claims. (Cl. 294—94)

This invention relates to a well tool and more particularly to a device for setting and pulling sand points in an oil well or for fishing lost pipe from a well.

One object of the invention is to provide a tool which may be used for setting an oil point or extracting a well point or lost pipe from a well and is so constructed that in one position of adjustment it may freely pass into or out of a sand point or pipe while in another position of adjustment it may have gripping engagement with walls of the sand point or pipe during lowering of the sand point into a well or extraction of the sand point or pipe from a well.

It is another object of the invention to so form the tool that a sleeve carrying gripping balls will be slidably disposed about the body portion of the device, the body portion having means for releasably holding the sleeve in a position to maintain the gripping balls retracted and the body portion also having means for causing the balls to be moved to and maintained in an extended position for gripping the walls of a sand point or pipe.

It is another object of the invention to provide a device of this character which is of simple construction and very strong and durable.

The invention is illustrated in the accompanying drawing, wherein

Figure 1 is a view showing the improved well tool in side elevation.

Figure 2 is a view partially in side elevation and partially in section, the sleeve carrying the gripping balls being released and shifted upwardly out of the position in which the balls will be held in an extended position, and

Figure 3 is a sectional view taken transversely through the tool along the line 3—3 of Figure 1.

The body 1 of this well tool is formed of strong metal, such as steel, and this body is shaped to provide a shank 2 which is circular in cross section and has a reduced lower end portion 3, as shown in Figure 2. A ring 4 of hard steel is shrunken into place about the reduced lower end portion 3 of the shank and is of a frustoconical formation to provide a tapered annular shoulder about the lower end of the shank. This shoulder is of slightly greater diameter at its top than the shank and is formed with longitudinally extending recesses or grooves 5 spaced from each other circumferentially of the shoulder, as shown in Figure 3. The upper end of the body portion is formed with a head 6 which is threaded throughout its depth and between the head 6 and the shank 2 there has been provided a reduced portion which is also threaded and constitutes a neck 7 between the head and shank. The threaded head 6 serves as means for connecting the upper end of the body portion with means for lowering the tool into a well and drawing the tool upwardly therefrom and the upper end face of the head is flat to provide a striking surface against which a jar or the like may have striking contact in order to drive a sand point to its proper position at the bottom of a well.

About the shank is disposed a sleeve 8 which is also formed of steel or other strong metal and has its upper end portion internally threaded, as shown at 9, for engagement with the reduced and externally threaded lower end portion 10 of a collar 11 which has its large upper end portion formed with flat wrench-engaging surfaces, as shown in Figure 1, and defines a circumferential shoulder 12. The sleeve 8 is screwed into engagement with the collar 11 while hot and then shrunken into place. Therefore, while the sleeve and the collar when reheated may be detached from each other, they will be very firmly held together and will not be liable to become accidentally disconnected during use of the tool. The collar is internally threaded, as shown at 13, and, when engaged with the threads of the neck 7, will maintain the sleeve in a raised position but permit the sleeve and collar to be released from the neck when it is desired to have the sleeve and collar moved downwardly to the position shown in Figure 1. Openings 14 which are gradually reduced in diameter toward their outer ends are formed through walls of the sleeve 8, and in these openings are engaged balls 15 which are movable from a retracted position, such as shown in Figure 2, to an extended position, as shown in Figures 1 and 3, for gripping engagement with the walls of a sand point or a pipe which is to be extracted from a well. An opening 16 is formed in the upper end portion of the sleeve 8 in order that the balls may be inserted and since there must be provided sufficient space within the sleeve to permit such insertion there has been provided a pocket 17 drilled radially in the shank 2 and normally closed by a threaded plug 18. When the plug is unscrewed from the pocket 17 by a screwdriver inserted through the opening 16, a ball may be dropped into the pocket and the sleeve then shifted upwardly until the ball may be engaged in the opening 14 under the opening 16. The sleeve will then be again shifted downwardly to move the opening 16 into alinement with the pocket and another ball dropped into the pocket, after which the sleeve will be shifted upwardly

and turned to move another opening 14 into alinement with the pocket and the ball shifted into the opening 14. This will be repeated until all of the balls are engaged in the openings 14 and the plug 18 replaced in the pocket. The head of the screw will be flush with the surface of the shank 2 when screwed into the pocket and, therefore, will not interfere with free turning or vertical movements of the sleeve. As long as the sleeve is in the raised position shown in Figure 2 or in threaded engagement with the neck 7, the balls will remain in the retracted position and permit free insertion of the device into a sand point or pipe and also free removal thereof from the sand point or pipe, but as soon as the sleeve moves downwardly along the shank 2 to a position in which the balls will engage in the grooves or recesses 5, a cam action will take place which will force the balls outwardly through the openings 14 to the extended position shown in Figures 1 and 3 for gripping engagement with the walls of the sand point or pipe. Upward pull exerted upon the body portion while the balls are in contact with the walls of the sand point or pipe will cause outward pressure to be applied to the balls and a firmer grip exerted by the balls. It will thus be seen that the sand point or the pipe may be drawn upwardly without slippage occurring which would permit the sand point or the pipe to drop back into the well.

In order that the device may be guided into the upper end of a pipe to be withdrawn from a well, there has been provided a point 19 which is detachably applied to the lower end of the sleeve 8 by having its threaded shank 20 screwed into the lower end of the sleeve. This point tapers to its lower end in order that it may easily enter the upper end of a pipe to be removed from the well and guide the sleeve into the pipe. When a pipe is to be removed which has within it a rod, the rod may interfere with inward passage of the sleeve when the point 19 is in place. When such a pipe is to be removed, the point will be unscrewed from the sleeve and the device shifted vertically in the well until the lower end of the sleeve engages in the pipe.

When this well tool is in use for setting a sand point in place at the bottom of a well, the head 6 is screwed into engagement with a carrier by means of which it is to be lowered. The sleeve 6 with the point 19 removed therefrom is then thrust into the sand point with the balls 15 in the retracted position, after which the collar 11 will be unscrewed from the neck 7 and the collar and the sleeve allowed to slide downwardly along the shank 2 to a lowered position in which the balls will engage in the grooves 5 of the shoulder 4 and be moved to an extended position in which they will grip walls of the sand point. The well tool with the sand point applied thereto may then be lowered into the well and, when the sand point is firmly set in place at the bottom of the well, rotary movement will be imparted to the body portion to engage the threaded neck with the threads of the collar and the collar will then be held in a raised position which will permit the balls to move to their retracted positions and the tool may be drawn upwardly out of the well without disturbing the sand point. When it is desired to remove the sand point, the well tool is lowered with the point 19 applied thereto until the point guides it into the sand point, the collar at this time being in threaded engagement with the threaded neck. Rotary motion is then imparted to the body portion to release the neck from the collar and the body may be drawn upwardly through the collar so that the balls will be moved to an extended position by the shoulder 4 and have gripping engagement with the walls of the sand point. The sand point can then be very easily withdrawn. The same operation will take place when fishing for a lost pipe in a well, the well tool being lowered until the point 19 guides it into the pipe and the collar then being released from the neck 7 so that as upward pull is exerted the balls will be moved into an extended position for gripping the pipe and causing the pipe to be drawn upwardly with the tool. When fishing for a pipe having a rod therein, the point 19 will be removed so that it will not strike the rod and prevent the sleeve from entering the pipe a sufficient distance for the balls to grip walls of the pipe.

Having thus described the invention, what is claimed as new is:

1. A well tool of the character described comprising a body having a shank, a cam shoulder about the lower end of said shank, a threaded portion at the upper end of said shank, a sleeve fitting loosely about said shank and formed with openings through its wall, gripping members movable radially of the sleeve through the openings from a retracted position to an extended position, the gripping members being movable to the extended position by engagement with the cam shoulder when the sleeve is in a lowered position, said shank having a radial pocket and said sleeve having an opening adapted to be alined with the pocket for insertion of said gripping members, a removable plug normally filling said pocket, and a collar carried by the upper end of said sleeve and internally threaded for engagement with the threaded portion to releasably hold the sleeve in a raised position.

2. A well tool of the character described comprising a body having a shank, a cam shoulder about the lower end of said shank, recesses being formed in the shoulder in spaced relation to each other circumferentially thereof, a sleeve fitting loosely about said shank and slidable vertically thereon, a point detachably carried by the lower end of said sleeve and depending therefrom, said sleeve having openings through its wall, gripping members loosely carried by the sleeve and movable through the openings from a retracted position to an extended position, the gripping members being movable to an extended position by engagement in the recesses of the cam shoulder when the sleeve is in its lowered position, and means for releasably holding the sleeve in a raised position with the gripping members retracted.

3. A well tool of the character described comprising a body having a shank, a circumferentially extending cam shoulder at the lower end of said shank, a threaded neck at the upper end of said shank, a threaded head at the upper end of said neck, a sleeve fitting loosely about said shank and formed with outwardly tapered openings through its walls, a downwardly tapered point having its upper end screwed into the lower end of said sleeve to detachably mount the point, gripping balls mounted between the shank and said sleeve and freely shiftable through the openings of the sleeve from a retracted position to an extended position, the balls being adapted to be moved to an extended position by engagement with the cam shoulder when the sleeve is in a lowered position, and a collar threaded into the upper end portion of said sleeve and having its

upper end portion externally thickened to form an outstanding shoulder engaging the upper end of said sleeve, said collar being internally threaded from its upper end for engagement with the threaded neck to releasably hold the collar and sleeve in a raised position.

4. In a well tool, a body having a shank formed with a radial pocket, a sleeve fitting loosely about the body and having an opening adapted to aline with the radial pocket, and gripping members carried by the body and sleeve and being movable from a retracted position to extended position, said pocket and opening permitting insertion of the gripping members.

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