

June 17, 1924.

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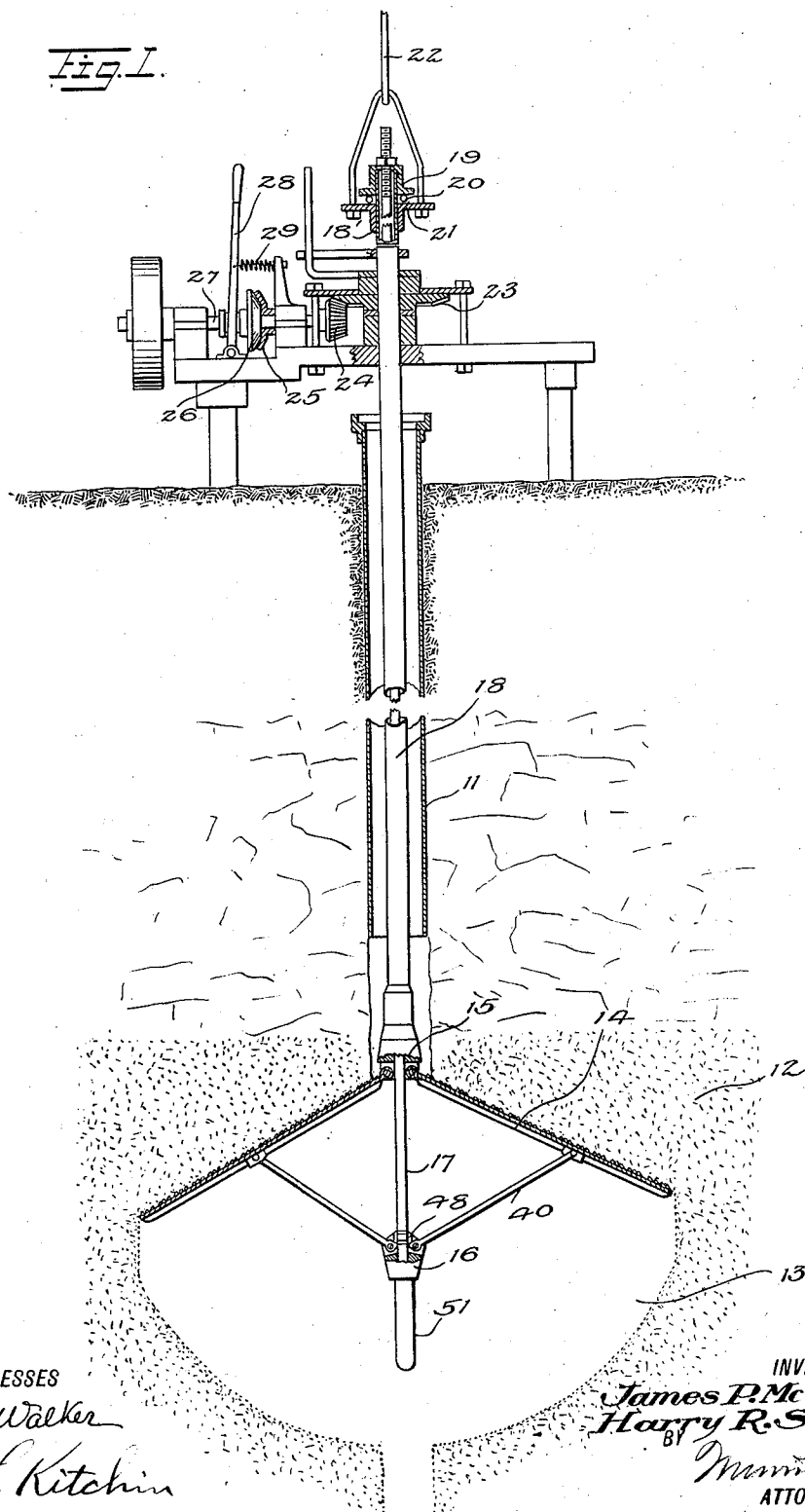
J. P. McCLOSKEY ET AL

OIL WELL REAMER

Filed Oct. 26, 1922

3 Sheets-Sheet 1

Fig. 1.



WITNESSES

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Fig. 2.

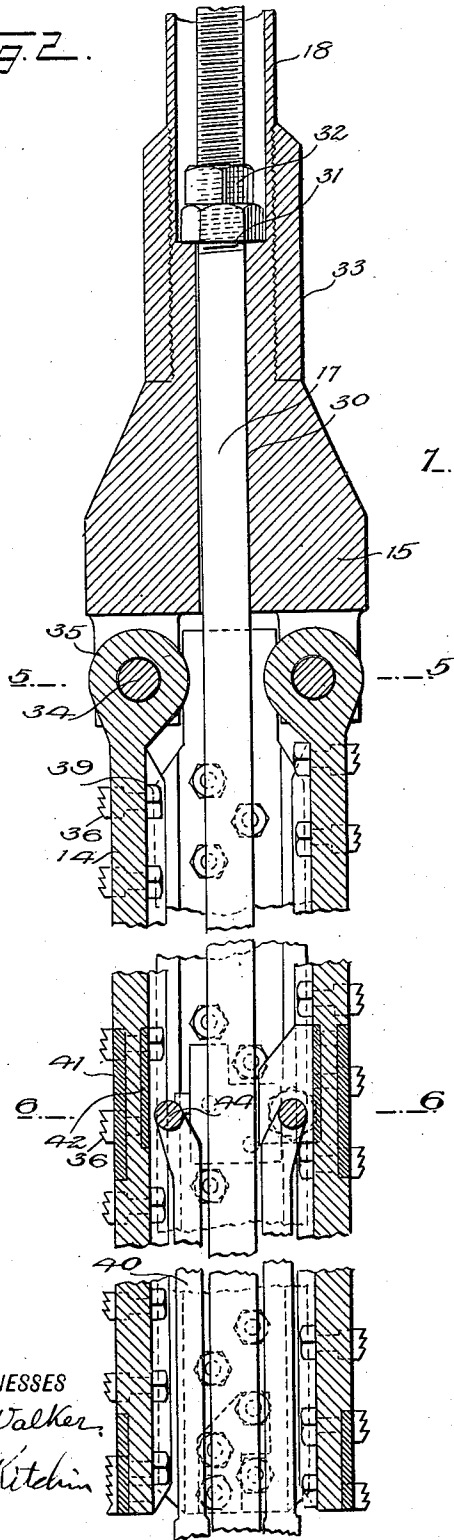
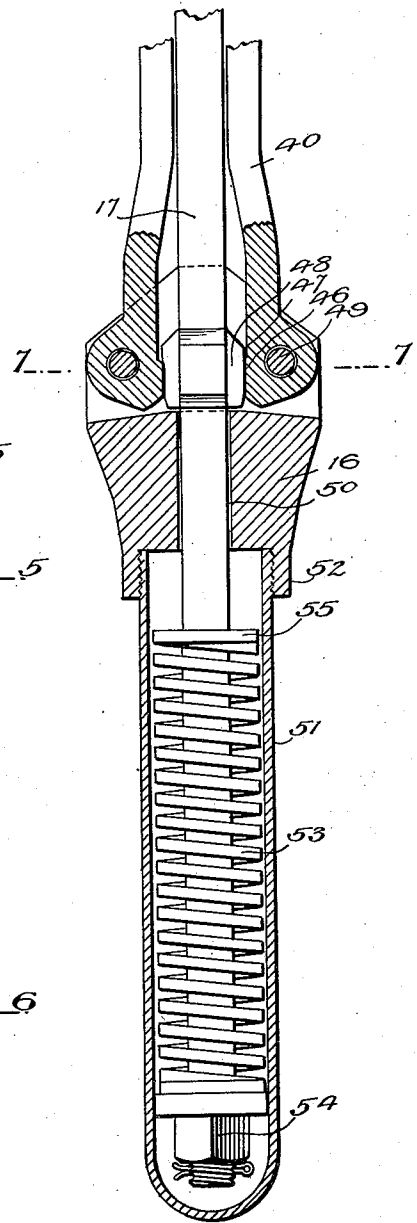


Fig. 3.



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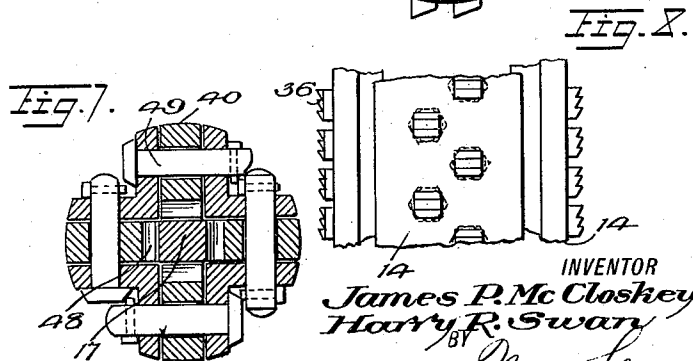
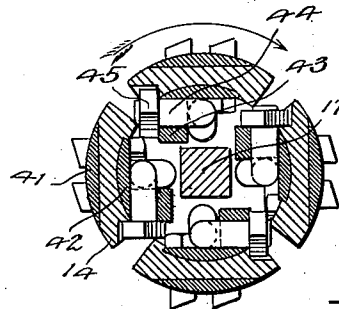
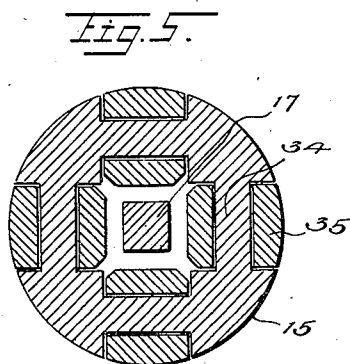
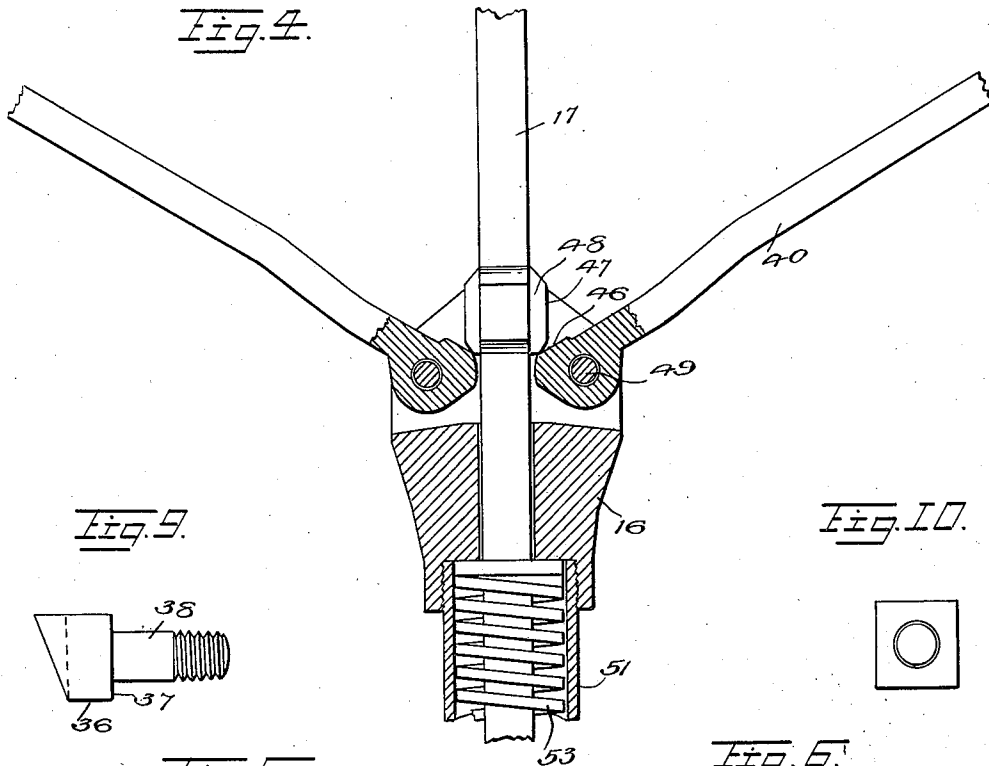
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3 Sheets-Sheet 3



WITNESSES

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## UNITED STATES PATENT OFFICE.

JAMES P. McCLOSKEY AND HARRY R. SWAN, OF NEW YORK, N. Y., ASSIGNORS TO  
AMERICAN-ITALIAN PETROLEUM CO., OF NEW YORK, N. Y., A CORPORATION OF  
DELAWARE.

## OIL-WELL REAMER.

Application filed October 26, 1922. Serial No. 597,040.

*To all whom it may concern:*

Be it known that we, JAMES P. McCLOSKEY and HARRY R. SWAN, both citizens of the United States, and residents of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Oil-Well Reamer, of which the following is a full, clear, and exact description.

This invention relates to reamers for oil wells and has for an object to provide an improved construction which may be easily inserted into a well or removed therefrom.

Another object of the invention is to provide a reamer with reaming members and a driving mechanism so co-ordinated as to permit the operator to apply the driving force according to the resistance encountered by the reaming members.

Another object of the invention is to provide a reamer formed in such a manner that the reaming arms will be locked in a folded position as they are lowered into a well or raised therefrom.

A further object of the invention is to provide a reamer for oil wells in which the reaming members are resiliently held against the surface being reamed.

In the accompanying drawings—

Figure 1 is a longitudinal vertical sectional view through a well casing and associated parts disclosing an embodiment of the invention in operative position.

Figure 2 is a longitudinal vertical section through the upper part of the reaming head.

Figure 3 is a view similar to Figure 2 showing the lower part of the reaming head.

Figure 4 is a detail sectional view similar to Figure 3 but showing the parts in operative reaming position.

Figure 5 is a sectional view through Figure 2 approximately on line 5—5.

Figure 6 is a sectional view through Figure 2 approximately on line 6—6.

Figure 7 is a sectional view through Figure 3 approximately on line 7—7.

Figure 8 is a fragmentary elevation of a short section of the reaming arms and associated parts shown in Figure 2.

Figure 9 is an edge view of one of the reaming teeth or blocks shown in Figure 2.

Figure 10 is a bottom view of the structure shown in Figure 9.

Referring to the accompanying drawings

by numeral, 11 indicates an ordinary well casing which extends downwardly into the oil bearing sand 12, said sand being provided with a cavity 13 into which the oil flows. Operating against the side walls of the cavity 13 are a number of arms 14 connected as hereinafter fully described to the top head block 15 and the bottom head block 16, which blocks are rotated by the arm adjusting and locking shaft 17. The shaft 17 extends upwardly through the tube 18 and is supported by a cap 19. The cap 19 is supported by suitable bearings 20 resting on an annular plate 21 rigidly secured to the auxiliary tube 18', plate 21 being supported by any suitable means 22 which may raise and lower the shaft 17 as desired. A bevel gear wheel 23 is rigidly secured to the tube 18, said gear wheel meshing with the pinion 24 and said pinion in turn being rigidly secured to the clutch member 25 co-operating with the clutch member 26. The clutch member 26 is splined on the power shaft 27 and is moved back and forth by the lever 28, which lever is normally held in such a position as to cause the two clutch members to engage. A suitable spring 29 acts to maintain this normal engagement so that when power is being applied to the shaft 27, tube 18 will be rotating and will rotate the top block 15 and as this top block is provided with a square passage-way 30, said block will rotate the square shaft 17. The shaft 17 is square from near the nut 31 to the bottom end thereof while it is preferably round from said nut upwardly. A suitable lock nut 32 acts to lock the nut 31 against accidental movement. The tube 18 is connected to the head block 15 by a suitable sleeve 33. These various connections and the various members for supporting and rotating the head block 15 and parts associated therewith may be changed if desired, provided a proper support is provided and the rod or shaft 17 allowed to reciprocate within certain limits as hereinafter fully described.

Preferably, the block 15 is made from a solid piece of metal and machined out at the lower part to produce four journal members 34, said journal members being preferably integral with the remaining part of the block as shown in Figure 5. For each of these journal members there is provided an arm 14 which has an eye 35 to receive the

journal. In practice the upper end of the arm is formed with an open eye which after having been engaged around the journal is closed and welded to form the closed eye 35 as shown in Figure 2. This method of forming the arm 14 and the block 15 is to positively prevent any disconnection of these members by reason of any loose connection of any part. In the drawing, four arms 14 have been shown but as they are all identical, the description of one will apply to all.

As indicated in Figure 6, each of the arms 14 is arc-shaped in cross section and when the arms are grouped together form a substantially tubular structure which is of less diameter than the block 15. Each of the arms 14 carries a large number of cutting teeth 36 which teeth are constructed as shown in Figures 2, 9 and 10 though some other form of cutting teeth might be provided if they could be secured properly to the arm 14.

As indicated in Figure 9, the teeth 36 are provided with a shoulder 37 and a shank 38 having a threaded end, said shank extending through a suitable bore in the arm 14 for receiving a nut 39 whereby the shoulder 37 may be drawn tightly against the arm. These cutters are arranged preferably in an offset structure as particularly shown in Figure 8 but at a point near the center a special construction is provided in order to provide means for pivotally connecting the respective links 40 to the arms 14. In the accompanying drawings, four links have been provided, there being one link for each arm though if a greater or less number of arms were used a corresponding difference in links would be provided.

As indicated in Figures 2 and 6, opposite the upper ends of the links 40 there is provided an outside plate 41 and an inside plate 42 which is countersunk or set into the arms 14. These plates are secured to the arms intermediate of their ends and preferably welded in place though they might be held in by rivets or other means without departing from the spirit of the invention. Usually each of the outside plates 41 carry two of the teeth 36 to which they are preferably welded or pinned. The threaded portions of the shanks of these teeth are cut off so that they may readily extend into the arm but not interfere with plate 42. This structure is provided so that it will not be necessary to provide nuts adjacent the upper ends of the links 40. Each of the inner plates 42 is provided with an inwardly extending lug 43 having an aperture therein for accommodating the turned over end or journal 44 extending from each of the links 40, each of said journals being provided with a suitable nut 45. By attaching the links 40 to the arms 14, intermediate of their ends, the teeth can be extended to the extreme lower end

of said arms, so that the lower end will cut clearance when in operation, and this connection does not interfere with the position of the cutting teeth. When the links 40 are raised vertically when moved downwardly, they will swing the arms 14 inwardly or outwardly as the case may be. The lower ends of the respective links 40 are shown in Figure 3 from which it will be noted that each of the links is provided with a projecting flat section 46 adapted to co-act with the flat surface 47 of the respective lugs 48 projecting from the shaft 17. The links 40 are journaled on suitable pins 49 mounted in the lower block 16 while the shaft 17 extends through a square passage-way 50 in said lower block whereby the lower block will positively rotate simultaneously with the upper block 15. A tubular casing 51 closed at the lower end, is threaded into the projecting annular flange 52 of block 16. This casing is to protect against sand and other objectionable matter the spring 53 surrounding the lower end of shaft 17. This spring is supported at the lower end by a suitable nut 54 secured to the shaft 17 and at the upper end carries a washer 55 arranged as shown in Figure 3 when the arms 14 are collapsed. After the reamer has been lowered into the well, the shaft 17 will be moved upwardly independently of the tube 18 and, consequently, the lugs 48 will move away from the projecting flat surfaces 46 and at the same time the spring 53 will move upwardly and press the washer 55 against the lower block 16. The parts are so proportioned that the washer 55 will engage the block 16 immediately after the lugs 48 have moved away from the projecting flat surfaces 46 whereby any further movement of the shaft 17 with the tube 18 standing still will result in forcing the links 40 upwardly and, consequently, swinging outwardly the various arms 14 as indicated in Figures 1 and 4. It will, therefore, be seen that the arms 14 are resiliently supported when moved to an operative position. As soon as the arms 14 strike the upper walls of the cavity 13, a resistance will be produced which will be caused by the lifting structure 22 and, consequently, the upward pull will be stopped. This will result in the spring 53 holding the arms 14 in firm contact with the upper walls of the cavity 13. The clutch members 25 and 26 are then brought into engagement after the power shaft 27 has been started.

If desired, an operator could hold the lever 28 and by the resistance offered as the reamer rotates, determine whether or not the reamer was properly functioning and also determine whether or not there are extra hard projections encountered by the reamer. If the action is comparatively smooth, the operator usually allows the

spring 29 to take care of the clutch action, which spring would permit any desired slipping in case an extra hard obstacle is encountered by the arms 14. In fact, if the arms 14 encountered an unyielding substance and was completely stopped, the clutch member 25 would stop and the clutch member 26 would merely slip. In this way the reamers are caused to perform their proper function without any appreciable liability of breaking. After the desired reaming has taken place and the operator wishes to remove the device from the well, the power is turned off and the rod 17 lowered independently of the tube 18 until the arms 14 have been completely folded and the lugs 48 moved back to the position shown in Figure 3. This takes place when the nut 31 rests against the upper end of the block 15. After the parts have been folded in this manner, the tube 18 is pulled upwardly and the strain therefrom will be transmitted to the top block 15, the lower part of shaft 17 and arms 14 and associated parts. In order to cause an independent vertical movement of the shaft 17, any suitable means may be connected to the upper end thereof to raise and lower the same independently of the tube 18.

What we claim is:—

1. In a reamer of the character described, a reaming head provided with a plurality of swinging arms, a link for each of said arms for swinging the arms, a shaft for operating said links, and a plurality of lugs on said shaft co-acting with the lower ends of said links for locking the links and said arms in a folded position when moving the reamer into and out of a well.

2. In a reamer for oil wells, a reamer head, reaming members pivotally mounted on said head, a pivotally mounted link for each of said reaming members for moving the same to an operative position, each of said links having on its lower end a projecting portion formed with a flat face, an operating shaft provided with projecting lugs

having flat faces co-acting with the flat faces on the links for holding the links and reaming members in a folded position, said shaft being adapted to move away from the lower ends of said links, and means co-acting with said shaft for resiliently forcing said links and reaming members to an operative position.

3. In an oil reamer, a driving tubular member, a shaft extending through said driving tubular member, said shaft having a section polygonal in cross section at the lower end and a reamer head secured to said tubular member and supported thereby, said reamer being formed with top and bottom blocks having passage-ways of the same shape in cross section as said section for permitting said section of said rod to extend therethrough, a stop mounted on said rod adapted to rest on the top block when the reamer is in a folded and inoperative position, a plurality of swinging reaming arms pivotally mounted on the top block, a plurality of links pivotally mounted on the lower block and pivotally connected with said arms intermediate their length, and a spring surrounding the lower part of said shaft and supported thereby, said spring being adapted to engage said lower block and raise the same as the shaft is raised for operating said links and thereby swinging said reaming arms outwardly to an operative position.

4. In a reamer for oil wells, a reamer head formed from a single piece of material having a central passage-way therethrough, and formed with a plurality of recesses forming integral journal pins in a plane transverse to the central passage.

5. In a reamer, a reaming head, and a plurality of reaming arms pivotally connected to said head, each of said arms being arc-shaped in cross section whereby when they are swung to a closed position they will present a substantially tubular structure.

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