Nov. 3, 1925. 1,560,019

R. E. COOPER

TRIP REAMER

Filed April 15, 1925

Fig. 1.

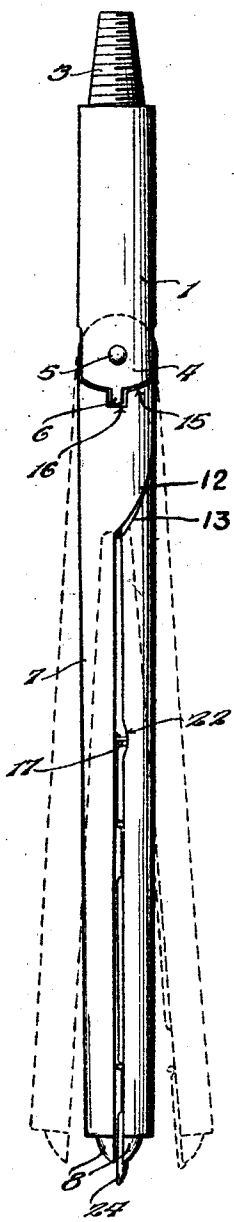


Fig. 3.

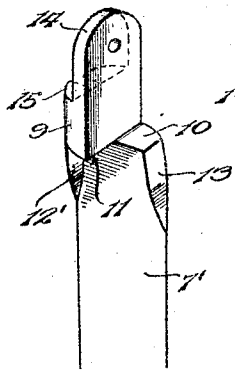


Fig. 4.

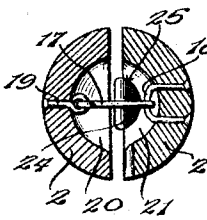


Fig. 5.

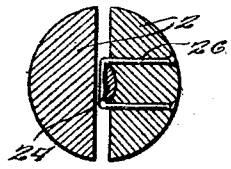
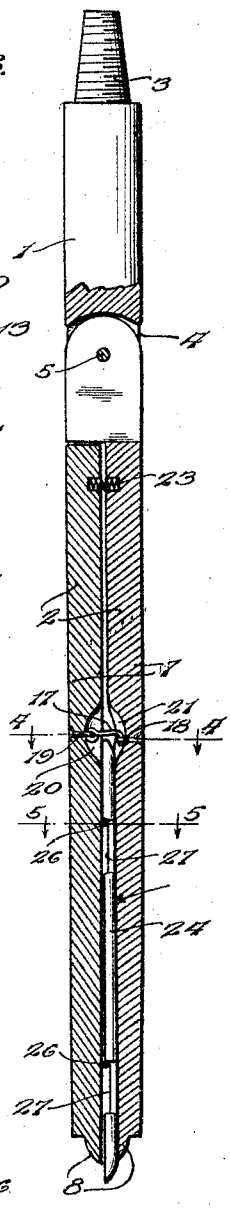


Fig. 2.



Inventor

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UNITED STATES PATENT OFFICE.

ROY E. COOPER, OF SHIDLER, OKLAHOMA.

TRIP REAMER.

Application filed April 15, 1925. Serial No. 23,320.

To all whom it may concern:

Be it known that I, ROY E. COOPER, a citizen of the United States, residing at Shidler, in the county of Osage and State of Oklahoma, have invented certain new and useful Improvements in Trip Reamers, of which the following is a specification.

This invention relates to an improved reamer for use in digging oil wells and the like and one object of the invention is to provide a reamer having arms provided with cutting edges at their lower ends and at their upper ends, pivotally connected with a shank portion in an improved manner so that these arms may have swinging movement toward and away from each other and be controlled in their movement.

Another object of the invention is to so form the joint connecting the arms in operative relation to each other and in pivotal connection with the shank that the arms when mounted and in close engagement with each other may provide a structure circular in cross section and having a diameter corresponding to the diameter of the shank.

Another object of the invention is to provide a reamer having pivotally connected arms and latch means for releasably holding them in close engagement with each other, means also being provided for permitting the latch to be released when the reamer reaches the bottom of a well hole.

Another object of the invention is to provide an improved type of latch-releasing means which will be slidably carried by one of the arms and extend beyond the lower end of the arm so that it may strike the bottom of the well and be moved upwardly to a retracted position to release the latch.

This invention is illustrated in the accompanying drawing, wherein—

Figure 1 is a view showing the improved reamer in side elevation;

Fig. 2 is a longitudinal section through the reamer;

Fig. 3 is a perspective view of the upper end portion of one of the reamer arms;

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 2, and

Fig. 5 is a transverse sectional view taken on the line 5—5 of Fig. 2.

This improved reamer is provided with a shank 1 and arms 2 which are pivotally connected with the shank so that they may have swinging movement towards and away from each other. At its upper end the shank 1 is provided with a reduced and threaded portion 3 by means of which the shank may be connected with an operating rod. At the lower end of the shank there has been provided forks 4 which are disposed in spaced relation to each other and provided with alined openings to receive a pivot pin 5. A lug 6 extends downwardly from the lower end of each fork intermediate its width for engaging the arms 2 in a manner to be hereinafter brought out and limit the swinging movement of the arms.

The arms 2 are of practically identical construction and each is provided with an elongated body portion 7 which is hemispherical in cross section to provide a flat inner face 7′ and arcuate outer surface. At its lower end this body portion is reduced to provide a cutting tooth 8 for cutting into the walls of a well after the arms have been permitted to move away from each other. At its upper end each arm is provided with a head portion 9 which terminates intermediate the width of the body portion 7, thereby leaving an exposed upper end face 10 constituting an abutment shoulder. The head 9 extends beyond the flat inner face of the body 7 to provide an overhanging abutment shoulder 11 and a portion of this head is extended downwardly beyond the shoulder 11 to provide a finger 12 having a flat inner face 12′ adapted for flat engagement with the beveled face 13 of the other arm. It should be noted that the flat inner face of the finger 12 and the beveled face 13 will cooperate with each other when the two arms are placed together to assist in guiding swinging movement of the arms and cause the arms to fit properly together when moved to a closed position with the flat inner faces of the bodies 7 and heads 9 contacting. The extreme upper end portion of each head 9 is reduced in thickness from its outer face. This provides each arm with a hinge ear 14 at its upper end for fitting between the forks 4 of the shank 1 and also provides each head with a shoulder 15. These shoulders 15 will be disposed beneath the lower ends of the forks when the arms are mounted between the forks and each shoulder has a recess 16 leading from it to receive a lug 6 of the shank. From an inspection of Fig. 1, it will be noted that the recesses 16 are of sufficient width to permit the arms to have the proper amount of swinging movement but that the lugs will

engage the side walls of the recesses 16 and prevent the arms from swinging away from each other a greater distance than desired.

When the reamer is lowered into the well, the arms are to be held close to each other, as shown in Fig. 1, and therefore there has been provided a latch 17 and a keeper 18 for engagement by the latch. This latch 17 is in the form of a hook which is loosely connected with an eye 19 secured in one of the arms 2, as shown in Figs. 2 and 4. The keeper 18 is carried by the other arm and will be preferably formed as a U-shaped staple having its arms extending through the body portion 7 and riveted at their outer ends. Pockets 20 and 21 are provided in the inner faces of the arms 2 to receive the latch and keeper and in order to permit the hook or latch to be easily moved into engagement with the keeper the pocket 21 has been provided with curved walls, as shown in Fig. 2. Referring to this figure, it will be seen that, when the free end portion of the hook is disposed in the pocket 21 above the keeper 18, it may follow the curvature of the walls of this pocket and easily move into engagement with the keeper. It should also be noted that a portion of the arm at one side of the pocket 21 has been cut away, as shown at 22, so that, when the arms are moved to the position shown in Fig. 1, a small rod may be passed between these arms and engage the latch to assist in moving it into proper engagement with the keeper. This latch, when in engagement with the keeper, will securely hold the arms in the closed position and prevent them from being moved away from each other by the spring 23 while the reamer is being lowered in the well hole.

When the reamer reaches the bottom of the well hole, the latch is to be released so that the arms will be moved away from each other and permit the cutting edges of the arms to engage the walls of the well and enlarge the lower end portion of the well hole as the reamer is drawn upwardly. Therefore, there has been provided a latch-releasing strip 24 which is slidably disposed in a groove 25 formed in the arm having the keeper connected therewith. This groove 25 extends from the lower end of the arm and at its upper end communicates with the pocket 21 so that the latch-releasing strip 24 may slide upwardly to a retracted position with its upper end extending across the pocket 21. This latch strip is of such length that, when in the position shown in Fig. 2, its lower end portion will extend beyond the lower end of the arms for engagement with the bottom of the well hole. Therefore, when the reamer is lowered into the well hole and reaches the bottom thereof, the latch-releasing strip will first engage the bottom of the well hole and this strip will be moved upwardly and its upper end engage with the latch 17 to move the latch out of engagement with the keeper. The arms will, therefore, be released and be swung away from each other by the spring 23. This strip 24 must be slidably retained in the groove 25 and, therefore, there has been provided U-shaped clips 26 which are carried by the arm and are disposed about the reduced neck portions 27 of the strip. By having the strip reduced to provide the necks 27, there are also provided shoulders at the ends of these necks which will engage with the clips 26 and serve to limit sliding movement of the latch-releasing strip.

While the preferred form has been illustrated in the accompanying drawing, it will be understood that changes in details of construction may be found desirable and therefore the right is reserved to make use of all changes in construction which come within the scope of the appended claims.

Having thus described the invention, I claim:

1. A reamer comprising a shank having its upper end adapted for connection with an operating element and its lower end portion provided with forks, and arms each including an elongated body having a flat inner face adapted to contact with the flat inner face of the other arm when the arms are swung towards each other and a head portion having a flat inner side face disposed at right angles to the flat inner face of the body, said head portion extending beyond the flat inner face of the body to provide an overhanging shoulder and depending abutment face, said body having its upper end projecting from the flat inner side face of the head portion to provide an upper end face constituting an abutment shoulder for engaging the overhanging shoulder of the other arm and having a flat side edge face for engaging the depending abutment face of the other arm, the extreme upper ends of the heads being externally reduced to provide hinge ears fitting between said forks, and a pin passing through said forks and ears to pivotally mount the arms.

2. A reamer comprising a shank adapted for connection with an operating element and having forks at its lower end, and arms each having a body hemispherical in cross section and having their flat inner faces adapted to contact when the arms are swung towards each other, each arm having a head portion terminating intermediate the width of the body to provide a shoulder at the upper end of the body and extended beyond the flat inner face of its body in overlapping relation to the shoulder at the upper end of the body of the other arm, the extreme upper end of the head portion of the arm being reduced from its outer face to provide a hinge ear, the hinge ears of said arms

being pivotally mounted between the forks of said shank.

3. A reamer comprising a shank adapted for connection with an operating element, arms having their upper end portions pivotally connected with said shank for swinging movement towards and away from each other, cutting means upon said arms, means yieldably holding said arms swung away from each other to an operative position, latch means for releasably holding said arms in an inoperative position, and latch-releasing means slidably carried by one of said arms and movable longitudinally of the arm from a position with one end extending beyond the lower end of the arm to a retracted position for engaging and releasing the latch.

4. A reamer comprising a shank adapted for connection with an operating element, arms having their upper end portions pivotally connected with said shank for swinging movement towards and away from each other, the inner face of one arm having a longitudinally extending groove leading from its lower end and the other arm having a pocket in its inner face, a latch in said pocket, a keeper carried by the other arm for engagement by said latch, a latch-releasing element mounted in said groove for sliding movement from a position with its lower end extending beyond the arms to a retracted position for engaging and releasing said latch, and means for swinging said arms away from each other to an operative position when the latch is released.

5. A reamer comprising a shank adapted for connection with an operating element, arms having their upper ends pivotally connected with said shank and having swinging movement towards and away from each other, the inner face of one arm having a longitudinally extending groove leading from its lower end to a point intermediate its length and having its inner end portion formed to provide a pocket, the other arm having a pocket in its inner face in opposed relation to the pocket of the first arm, a keeper in one pocket, a latch in the other pocket for engaging said keeper and releasably holding said arms against movement away from each other, a latch-releasing rod slidable in said groove for movement from a position with its lower end extending beyond the lower ends of the arms to a retracted position for engaging and releasing said latch, and resilient means for swinging the arms away from each other when the latch is released.

6. A reamer comprising a shank adapted for connection with an operating element, arms having their upper ends pivotally connected with said shank and having swinging movement towards and away from each other, the inner face of one arm having a longitudinally extending groove leading from its lower end to a point intermediate its length and having its inner end portion formed to provide a pocket, the other arm having a pocket in its inner face in opposed relation to the pocket of the first arm, a keeper in one pocket, a latch in the other pocket for engaging said keeper and releasably holding said arms against movement away from each other, a latch-releasing rod slidable in said groove for movement from a position with its lower end extending beyond the lower ends of the arms to a retracted position for engaging and releasing said latch, said rod being reduced at points intermediate its length to provide necks having abutment shoulders at their ends, clips carried by the arm and engaging said rod about the necks to slidably hold the rod in said groove and limit sliding movement of the rod, and a spring for swinging said arms away from each other when said latch is released.

In testimony whereof I affix my signature.

ROY E. COOPER. [L. S.]