

April 26, 1932.

C. E. GALLMAN ET AL

1,855,853

JAR-UP ROPE KNIFE

Filed Aug. 2, 1929

2 Sheets-Sheet 1

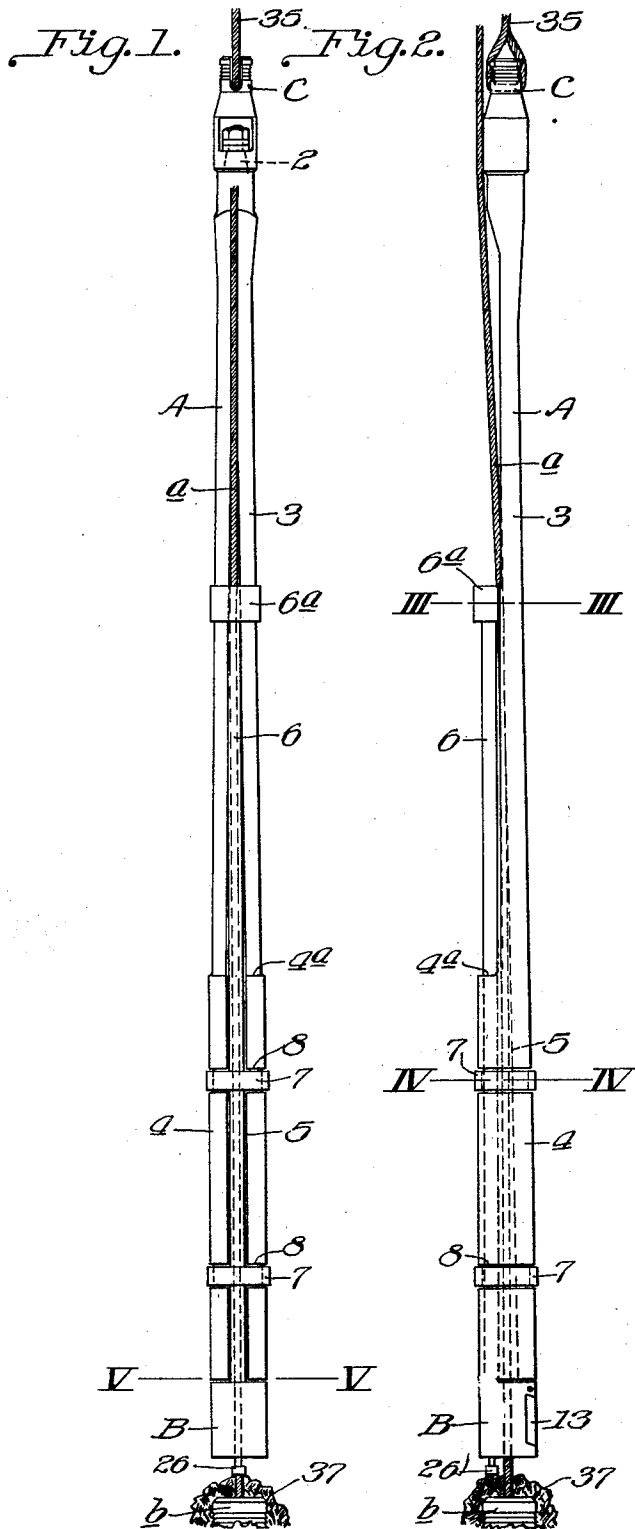


Fig. 3.

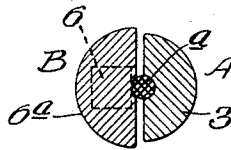
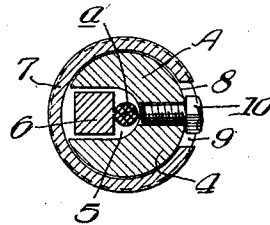


Fig. 4.



INVENTORS
C. E. GALLMAN
JACK HARSHAW
FRANK S. HAIRE
by *M. C. Doolittle*
Attorney.

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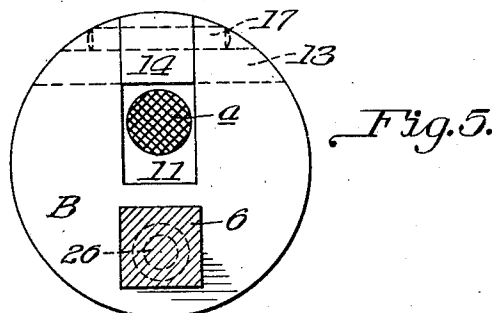
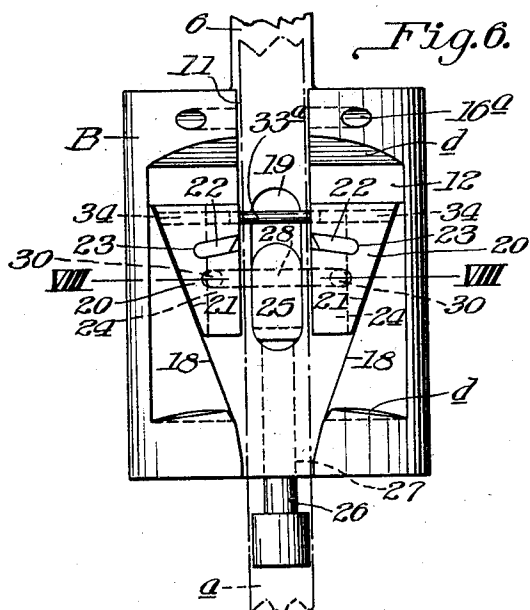
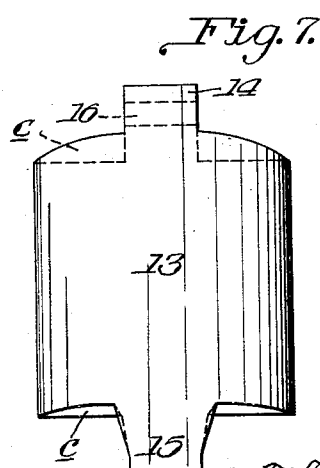
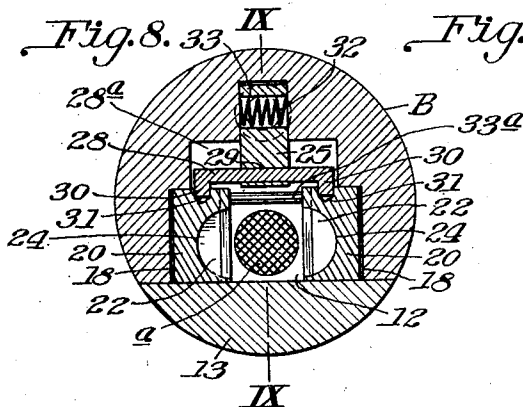
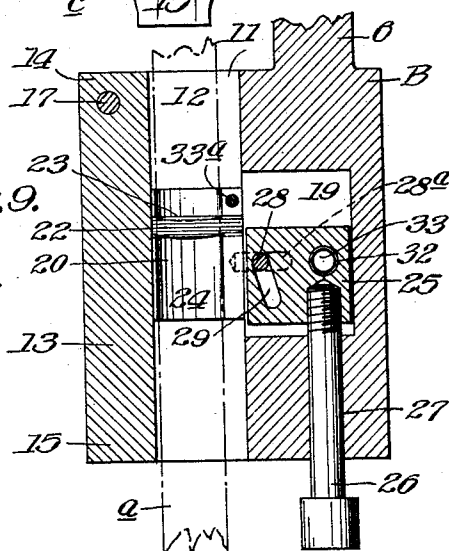
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2 Sheets-Sheet 2



INVENTORS
C. E. GALLMAN
JACK HARSHAW
FRANK S. HAIRE
by *V. F. Doolink*
Attorney.

UNITED STATES PATENT OFFICE

CHARLES E. GAILMAN, JACK HARSHAW, AND FRANK S. HAIRE, OF TULSA, OKLAHOMA,
ASSIGNORS, BY MESNE ASSIGNMENTS, TO OIL WELL SUPPLY COMPANY, OF PITTS-
BURGH, PENNSYLVANIA, A CORPORATION OF NEW JERSEY

JAR-UP ROPE KNIFE

Application filed August 2, 1929. Serial No. 383,008.

This invention relates to improvements in rope knives of the character employed in connection with well drilling apparatus, and more particularly to that class of rope knives known as jar-up rope knives.

In drilling an oil or gas well, a string of tools often becomes stuck in the hole, and a fishing tool must be used to remove it. The rope from which the tools are suspended is secured in the uppermost portion of the string, and must necessarily be removed before the fishing tool may be used. It is accordingly desirable to cut the rope as close to the upper member of the string of tools as possible.

When said upper member is uncovered and accessible, a jar-down rope knife may be employed. But when the drill string is covered with a sluffing formation or the like, a jar-down rope knife will not operate efficiently, and it is necessary to use a jar-up rope knife to cut the rope.

It is a prime object of our invention to provide a rope knife of the character stated comprising a bumper and rope-cutting means proper or knife-head, means for demountably securing the bumper and the knife-head member around the rope to be cut, and co-operating means for forcing the knife cutters through the rope upon the application of a jarring-up action.

A further object is to provide new and improved knife cutter blocks for mounting the knife cutters, and means for releasing the knife cutter blocks when the knife is lowered into the well.

Additional objects and advantages will become apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is an elevational view of a rope knife embodying our invention;

Fig. 2, a side elevational view taken at right angles to Fig. 1;

Fig. 3, a section on the line III—III of Fig. 2;

Fig. 4, a section on the line IV—IV of Fig. 2, particularly showing the rings for demountably securing the knife around the rope;

Fig. 5, an enlarged horizontal section, taken on the line V—V of Fig. 1;

Fig. 6, an elevational view of the knife head and its parts, with the knife head cap removed;

Fig. 7, an elevational view of the knife head cap detached;

Fig. 8, a sectional view on the line VIII—VIII of Fig. 6; and

Fig. 9, a sectional view on the line IX—IX of Fig. 8.

In the drawings, A designates the bumper, B the rope cutting means proper or the knife-head, and C the swivel, the latter being secured to the top of the bumper by means of a pin and box connection 2. Said bumper is formed with an offset shank portion 3 and a bumper block 4 having a striking shoulder 4a, and is provided with a longitudinally extending channel 5 for receiving the drill rope a secured to the rope socket b of a drill string that is assumed to be stuck in the well.

The knife head B is positioned below the bumper block 4, as shown, and is provided with a longitudinally extending off-set stem 6 adapted to be entered in the channel 5 and extend upwardly along the shank portion 3, for retaining the rope a in said channel. At its upper end, the stem 6 is provided with a striking head 6a for co-operation with the shoulder 4a during the jarring operation.

Bumper A and the knife head B, including its stem 6, are demountably secured around the rope a by means of non-continuous rings 7, retained in annular grooves 8 of the bumper block. Said rings have cut-out portions 9 to accommodate cap screws 10, the latter being threaded into the bumper block 4. As clearly shown in Fig. 4, a removal of the cap screws 10 will permit rotation of the rings 7 and allow the ring to be turned to register the cut-out portion 9 with the channel 5 of the bumper, thus permitting an assembly of the bumper and knife head on the rope a.

Knife head B is preferably cylindrical in form and has a longitudinally extending channel 11 designed to register with the channel 5 of the bumper. Said head is also recessed or cut out, as at 12, to form a space or chamber to receive the knife cutter parts. Chamber 12 is closed by means of a cap 13,

provided with projecting lugs 14 and 15 designed to be positioned in the channel 11. Lug 14 is formed with an opening 16 registering with an opening 16a of the knife head to receive a transverse retaining pin 17. Said cap and knife head are also provided with inclined co-operating shoulders *c* and *d* respectively.

18 designates inclined side walls of the recess 12. These walls taper downwardly and toward each other, and 19 is a vertically extending groove or chamber formed in the head and which communicates with chamber 12. Knife cutter blocks 20, provided with inclined faces 21 adapted to co-operate with the inclined sides 18 of the recess 12, are positioned therein, and on the inner faces of the cutter blocks we provide fixed cutters or blades 22, mounted in upwardly inclined slots or grooves 23. Said cutter blocks are also provided on their inner faces with vertically extending arcuate recesses or cut-away portions 24, to permit the cutters or blades to pass through the rope when the blocks are forced into cutting position by the jar-up action hereinafter more fully described.

The cutter blocks and cutters are maintained at the upper portions of the inclined walls 18 by means of a trip mechanism, including as shown a trip block 25 having a trip plunger 26 projecting downwardly through an opening 27 in the knife head, and a transverse trip release member 28. Trip block 25 is slidably mounted in the groove 19 of the knife head and is formed with a transverse slot 29 there-through for receiving the trip release member 28. Said member 28 is provided at its ends with projecting right angle pin portions 30, normally entered into openings 31 in the rear faces of the cutter blocks.

As particularly shown in Fig. 9, the member 28 is normally positioned in the upper end of the slot 29. A compression spring 32 mounted in a transverse opening 33 of the trip block 25 exerts a pressure on the sides of the grooves 19 for normally maintaining the cutter blocks in the raised position.

Slot 29 is inclined downwardly away from the cutter blocks, so that when trip plunger 26 is raised in the knife-head, pin portions 30 will be withdrawn from openings 31, releasing the cutter blocks. The member 28 will recede into a horizontal receiving slot 28a in the knife head. A transverse pin 33a is slidably mounted in openings 34 in the upper portion of the cutter blocks for equalizing the blocks during the cutter operation.

In operation, the knife is assembled around the rope *a*, as hereinbefore described, said rope passing between the cutter blocks 20, as indicated in Figs. 6 and 8. The knife is lowered into the well by means of a sand line 35. When trip plunger 26 strikes the sluffing or other foreign matter 37 covering the top

of the drill string, it will release the cutter blocks, as described, and the cutters or blades 22 will engage the rope *a*. Upon applying a jarring action to the knife, at each upward stroke, i. e., when the shoulder 4a engages the striking head 6a, the cutter blocks and cutters will be forced toward each other and the cutter blades forced through the rope, by means of the co-operating downwardly inclined walls 18 of the chamber 12 and faces 21 of the cutter blocks.

Various changes and modifications are contemplated, provided they fall within the scope of the following claim.

We claim:

In a rope cutter of the character described, a bumper member, a striking block carried by the bumper member and having a rope receiving channel formed therein, a knife head, an elongated stem carried by the knife head and having a portion disposed in said channel, a unitary rotatable split ring mounted on the striking block and encircling the block and stem, and a single screw bolt for preventing rotation of the ring when the parts are assembled.

In testimony whereof we affix our signatures.

CHARLES E. GALLMAN.
JACK HARSHAW.
FRANK S. HAIRE.