

J. F. WRIGHT.
PIPE CUTTER.

APPLICATION FILED JUNE 2, 1919.

Patented May 11, 1920.

2 SHEETS—SHEET 1.

1,339,641.

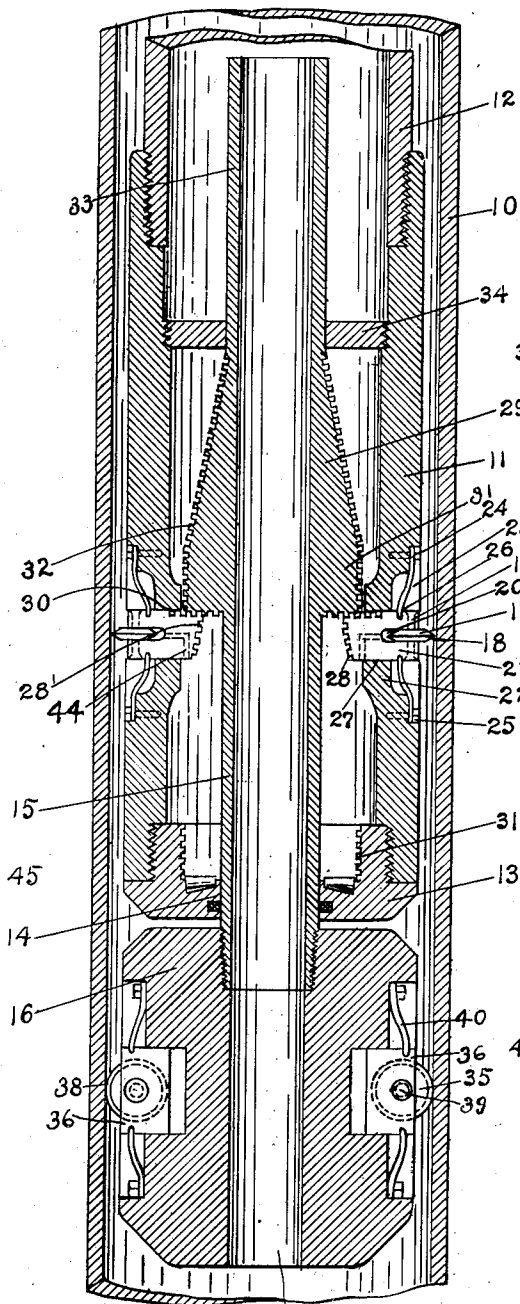


FIG. 1. 46

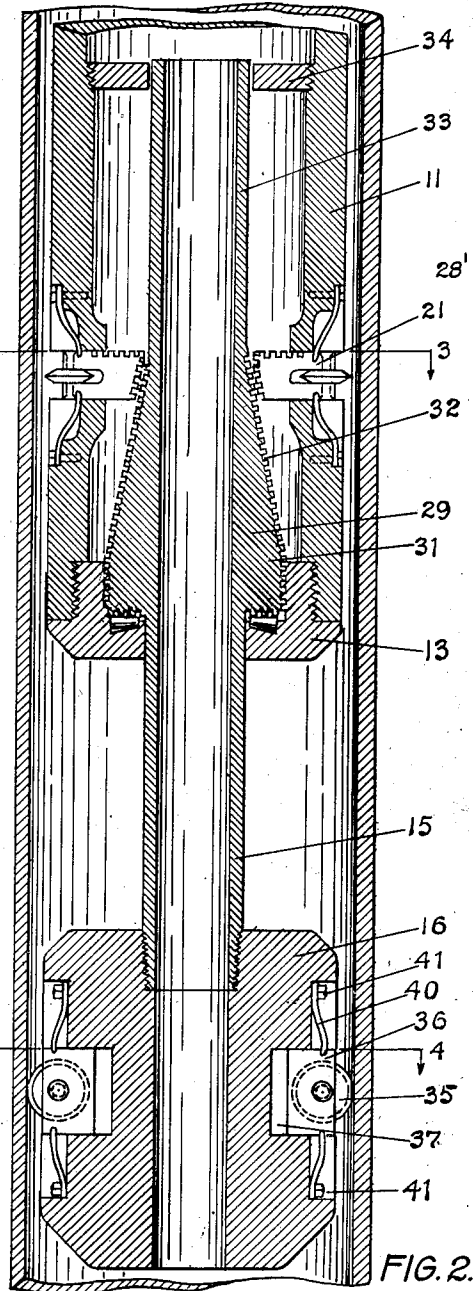


FIG. 2.

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BY *Jesse R. Stone*

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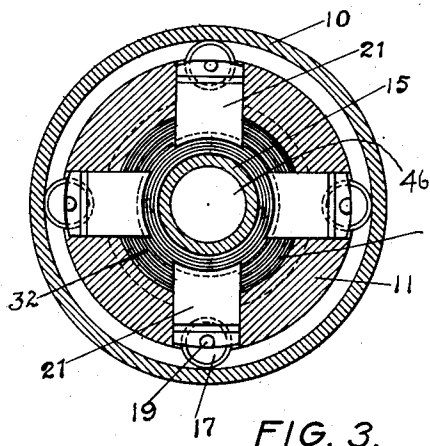


FIG. 3.

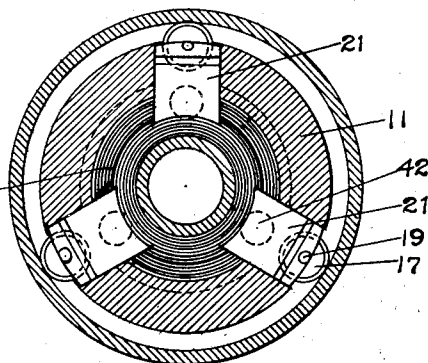


FIG. 5.

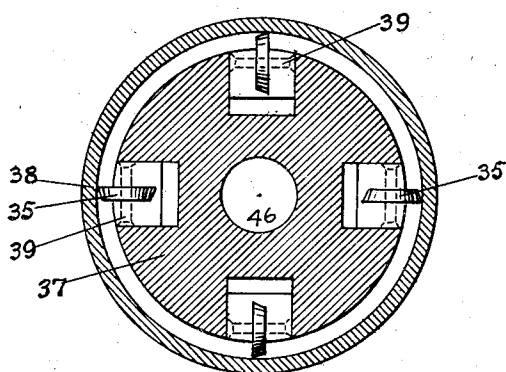


FIG. 4.

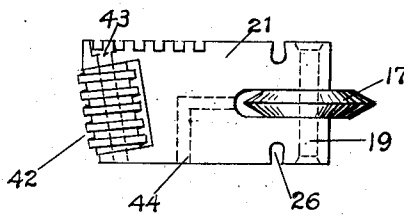


FIG. 6.

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UNITED STATES PATENT OFFICE.

JOHN F. WRIGHT, OF DAMON, TEXAS.

PIPE-CUTTER.

1,339,641.

Specification of Letters Patent.

Patented May 11, 1920.

Application filed June 2, 1919. Serial No. 301,169.

To all whom it may concern:

Be it known that I, JOHN F. WRIGHT, a citizen of the United States, residing at Damon, Brazoria county, Texas, have invented a certain new and useful Improvement in Pipe-Cutters, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in means for cutting pipe or casing in wells or mines. It has particular reference to a rotating cutter which may be inserted down inside a pipe in an oil or water well, and employed to sever the pipe at the desired point so that the length of pipe may be thereafter withdrawn from the well.

An object of my invention is to provide a device of the character described which will be simple and strong in structure so that it may withstand the heavy strains to which it is subjected and which will positively act to completely sever the pipe.

Another object is to provide a means for positively expanding the cutters and holding them in rigid contact with the side of the pipe being cut so that the cutters will be certain in their action. Other objects and advantages will appear from the specification which follows, and will be pointed out with more particularity in the claims.

Referring to the drawings forming a part of this specification, and wherein like parts are designated by like numerals throughout the several views, Figure 1 is a central longitudinal section showing my improved cutter inserted within a pipe to be cut; Fig. 2 is a similar view with the parts in a different position from that shown in Fig. 1; Fig. 3 is a transverse section on the plane 3—3 of Fig. 2; Fig. 4 is a transverse section on the plane 4—4 of Fig. 2; Fig. 5 is a transverse section similar to that shown in Fig. 3, but illustrating the use of three instead of four cutters; Fig. 6 is a side view of a modified form of one of the sliding blocks in which the cutters are mounted.

When a pipe, casing or strainer has been set in a well, it frequently becomes necessary to withdraw the same from the hole after it has become somewhat set or "froze" in the hole. In such cases it is practically impossible to unscrew the pipe at the joints, and it therefore becomes necessary to introduce a pipe cutting means down inside the pipe and

to expand the cutters and sever the said pipe in sections of a length which may be withdrawn from the well by means of a tap of ordinary construction. In the type of cutters now in ordinary use in this operation it is almost impossible to advance the cutters so that the pipe will be completely severed, and even when the pipe has been cut it can not be ascertained whether the complete operation has been performed. In my invention, I have provided a type of mounting for the cutter which is positive in its action and will serve to advance the cutters so that the same will be forced completely through the pipe, and, when the cutters have entirely severed the pipe or casing, the action of the operating means will indicate when the operation has been completed.

In Figs. 1 and 2, I have illustrated my device inserted within a casing 10 in a well. The cutters are mounted within a tubular housing 11 threaded interiorly at the upper end for attachment to a drill stem 12 of ordinary construction. The lower end of the housing 11 is also threaded for attachment to a cap 13, which closes the end thereof. The said cap, however, is provided with a central opening 14, through which may pass the lower cylindrical end of a mandrel 15. The lower end of said mandrel is threaded exteriorly for engagement with a non-rotatable block or chuck 16 adapted to prevent the rotation of the mandrel 15, as will be presently described.

Intermediate the ends of the housing 11 are mounted the slidable cutters 17. These cutters are disk-shaped, having a circular sharpened cutting edge 18. Said cutters are mounted upon vertical spindles 19, and are housed within slots 20 in the outer face of the sliding blocks or dogs 21 in the side of the housing. The said housing is extended inwardly somewhat, as shown at 22, to provide an outer recess 23 for the operation of leaf springs 24, which are secured at one end by means of set screws 25. These springs extend at their free ends into recesses 26 in the sides of the sliding blocks 21, and act, under ordinary conditions, to force the blocks inwardly, out of contact with the casing. The blocks are slidable radially of the housing through openings 27 in the walls 22 of the housing 11. The inner faces of the blocks 21 are threaded at 28 with a coarse thread and are beveled or tapered inwardly from the lower

end to a point above the central portion thereof. The upper portion at 28' is vertical and also threaded. The upper face of the block is likewise threaded toward the inner half thereof with a circular thread 30 adapted to engage with similar threads cut upon the mandrel 15.

The mandrel 15 is tubular in shape and has its walls thickened midway of its ends to provide an expanding cone 29. This cone has a lower cylindrical portion 31 having a threaded outer periphery thereon. The cylindrical portion terminates at its upper end in a tapered surface which is threaded for engagement with the threaded portion 28 upon the sliding blocks 21. The upper tubular end 33 of the mandrel is extended upwardly for a slight distance above the expanding cone to form a guide for the same. This guide is slidable within a guide ring 34, which is threaded within the upper end of the housing 11. The inner peripheral face of the cap 13 is also threaded at 31' for cooperation with the mandrel at 31.

The chuck 16 is a cylindrical block having a tubular passage 46 bored therein, this passage being a continuation of the tubular mandrel 15. The chuck is provided with a number of slidable anchoring disks 35. These disks are set vertically in slots in the outer faces of sliding blocks 36, set in radial recesses in the outer faces of the chuck. These disks are somewhat frusto-conical in shape, providing a sharp tooth 38 on one edge thereof. These cutters may also be toothed to provide a still better gripping edge upon the same for the purpose of engaging the inner face of the pipe. The disks are rotatable upon transverse pins 39. The blocks are engaged at the upper and lower faces thereof by leaf springs 40, which act to force the blocks 36, and the cutters 35 mounted therein, outwardly to engage with the casing. These leaf springs are mounted in recesses in the outer face of the chuck and are held rigidly at one end by means of set screws 41.

It will be possible in the larger sizes of pipe to use as many as four of the cutters 17 (as shown in Fig. 3) in cutting the pipe, but in smaller sizes of pipe it will be preferable to use a smaller number, as three cutters, shown particularly in Fig. 5. These cutters may also be provided, on their inner ends, with threaded pinions 42 mounted in an inclined position, as shown in Fig. 6, upon pins 43. These pinions will act in the same manner as the threaded faces 28 of the blocks previously described, but will be more easy of operation because of the lessening of friction, due to the rotating pinion.

The space between the expanding cone 29 and the housing 11 will serve as a grease container, and will be filled with grease be-

fore insertion of the device into the well. Branching passages or ducts 44 may then be provided in the sides of the blocks 21 to allow the passage of the grease outwardly for lubrication of the cutters 17, as shown in Figs. 1 and 6.

When it is desired to sever a length of pipe, my cutting device is secured to the lower end of the drill stem and inserted downwardly into the pipe, the chuck 16 preceding the cutting means into the well. The anchoring disks 35 will be expanded outwardly by the springs 40 so that as the device is inserted into the well the said disks will roll upon the side of the casing and will not impede the progress of the device into the pipe. The passage 46, through the chuck and the mandrel will allow the upward passage of fluid, which may be present in the well, as the device is inserted therein. The device would otherwise act as a piston as it is forced downwardly through the fluid and the fluid would prevent its insertion to the point desired.

The relative position of the parts will then be about as shown in Fig. 2. When the proper depth has been reached, the drill stem 12 will be rotated in a right hand direction. The threaded portion 31 of the mandrel will be in engagement with the threads 31' and will be unscrewed by this rotation forcing the mandrel upwardly. The anchoring rollers 35, upon the chuck 16, will, by their contact with the inner face of the casing, prevent the rotation of the chuck and the mandrel 15 attached thereto. It will be obvious, however, that the chuck may be drawn upwardly toward the cutter and this action occurs when the housing is rotated. The teeth 28, on the inner face of the cutters will then come into contact with the teeth 32 on the tapered face of the mandrel. Pipe 12 will then be held against longitudinal movement and will be rotated so as to draw the mandrel upwardly between the blocks, and thereby to expand the blocks and to thus force the cutters into contact with the inner face of the pipe to be cut. The continued rotation of the pipe and the housing 15 will then act to force the cutters gradually through the pipe as they are rolled around on the inner face thereof, and as the cutters progress through the pipe the mandrel will be drawn upwardly between the blocks. When the cutters have entirely severed the pipe, the blocks will be in their extreme outer position and will allow the mandrel to pass between the blocks. The cylindrical surface 31 will be engaged with the teeth on the vertical portion of the inner face of the block and will be drawn upwardly past the blocks. The springs will then act with the threads on the upper face of the blocks and on the coacting face of the mandrel to force the blocks inwardly

into the position shown in Fig. 1. The threads on the upper face of the blocks will then remain in mesh with those on the lower face of the mandrel, and the blocks will be held stationary. Further rotation of the drill stem will serve simply to rotate the housing. The release of the strain upon the drill pipe, due to the contact of the cutters with the casing, will then be observed, and the rotation of the pipe may be discontinued, and the cutters withdrawn from the well.

When it is desired to use the cutters a second time in the well, the chuck on the end of the cutter is rotated by hand in the reverse direction and the coaction of the teeth upon the mandrel and the blocks will cause the blocks to be again expanded so that the mandrel may be drawn downwardly into the position shown in Fig. 2, and in this position the device is ready to be again inserted into the well. The upper face of the cap 13 may be provided with a cone bearing so that the rotation of the housing relative to the mandrel will not mutilate the threads on the lower face thereof, and will not allow the mandrel to become too firmly seated in the lower end of the housing.

Having thus described my invention, the further objects and advantages of which will be obvious without more description, what I claim as new and desire to protect by Letters Patent is:

1. In a pipe cutter, the combination of a housing, cutters mounted in blocks slidable radially therein, the inner ends of said blocks being threaded, a tapered mandrel between said blocks, threads on said mandrel adapted to cooperate with said threaded blocks to advance said cutters and means operative when the larger end of said mandrel has passed said blocks to withdraw said cutters.

2. In a pipe cutter, a rotatable housing, cutters slidable therein, a non-rotatable mandrel in said housing to advance said cutters, when said housing is rotated in one direction, separate means to withdraw said cutters operative without reverse rotation of said housing when said cutting operation has been completed and separate means on said mandrel to again advance said cutters.

3. In a pipe cutter, a housing, cutters mounted in blocks slidable in said housing, a tapered mandrel, a shoulder at the larger end thereof, said tapered portion and shoulder being threaded, said blocks threaded to cooperate therewith, whereby said blocks may be advanced or withdrawn by means of the rotation of one of said threaded members relative to the other.

4. In a pipe cutter, a rotatable housing, cutters mounted in blocks slidable in said housing, a non-rotatable tapered mandrel threaded on its tapered surface, a cylindrical threaded surface at the larger end of said mandrel, said blocks being threaded to cooperate with said threaded portions of said mandrel so that the rotation of said housing in one direction will act to advance said cutters and allow them to be again withdrawn when the cutting operation has been completed.

5. In a pipe cutter, a rotatable housing, cutters slidable therein, a non-rotatable tapered mandrel bearing on said cutters and adapted to advance them, a shoulder on said mandrel, means to withdraw said cutters when said shoulder has passed said cutters, and means on said shoulder to again advance said cutters.

In testimony whereof I hereunto affix my signature this the 23rd day of May, A. D. 1919.

JOHN F. WRIGHT.