

Jan. 10, 1950

R. D. PATRICK, JR
INSIDE PIPE CUTTER

2,494,193

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2 Sheets-Sheet 1

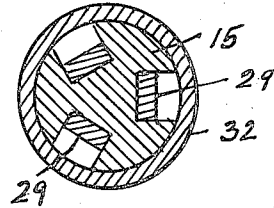
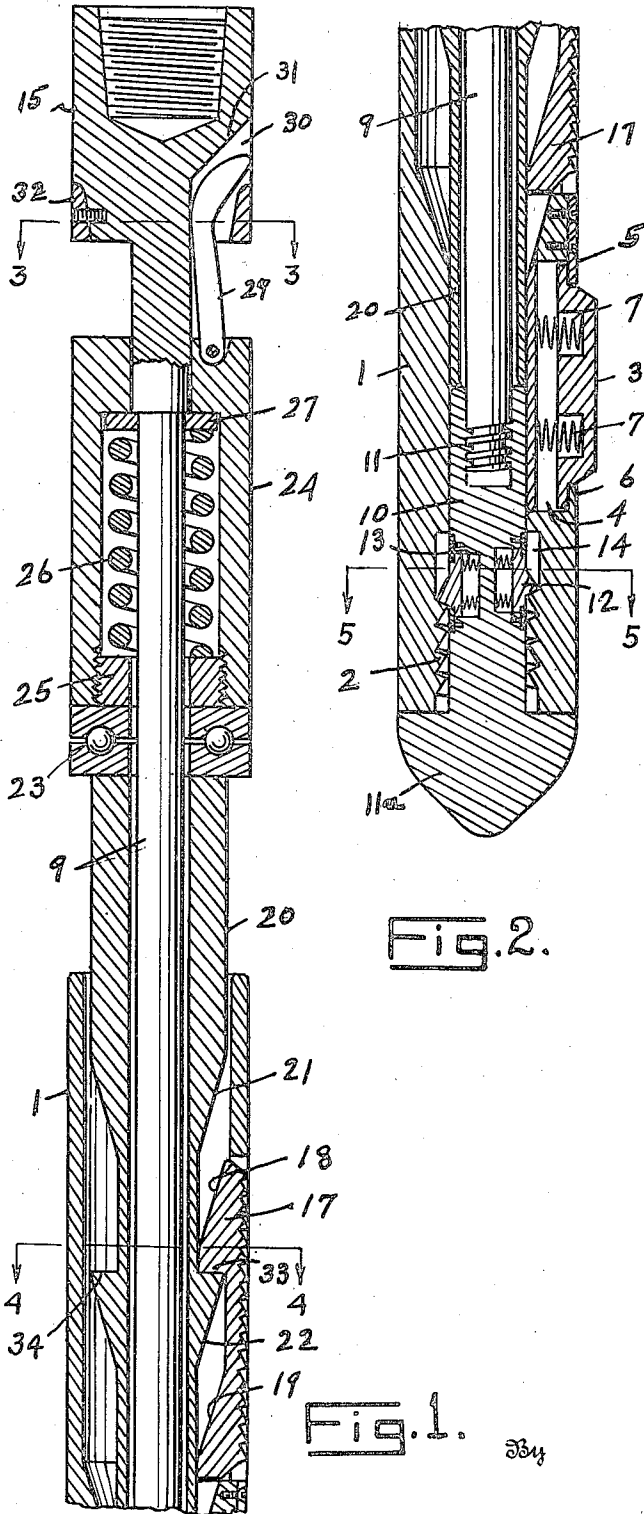


Fig. 3.

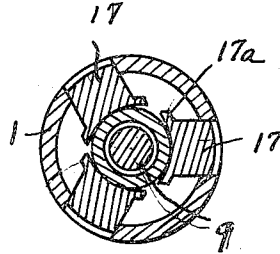


Fig. 4.

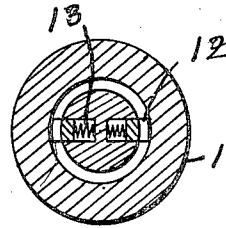


Fig. 5.

Inventor
Robert D. Patrick Jr.

E. V. Hardyway
Attorney

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2 Sheets-Sheet 2

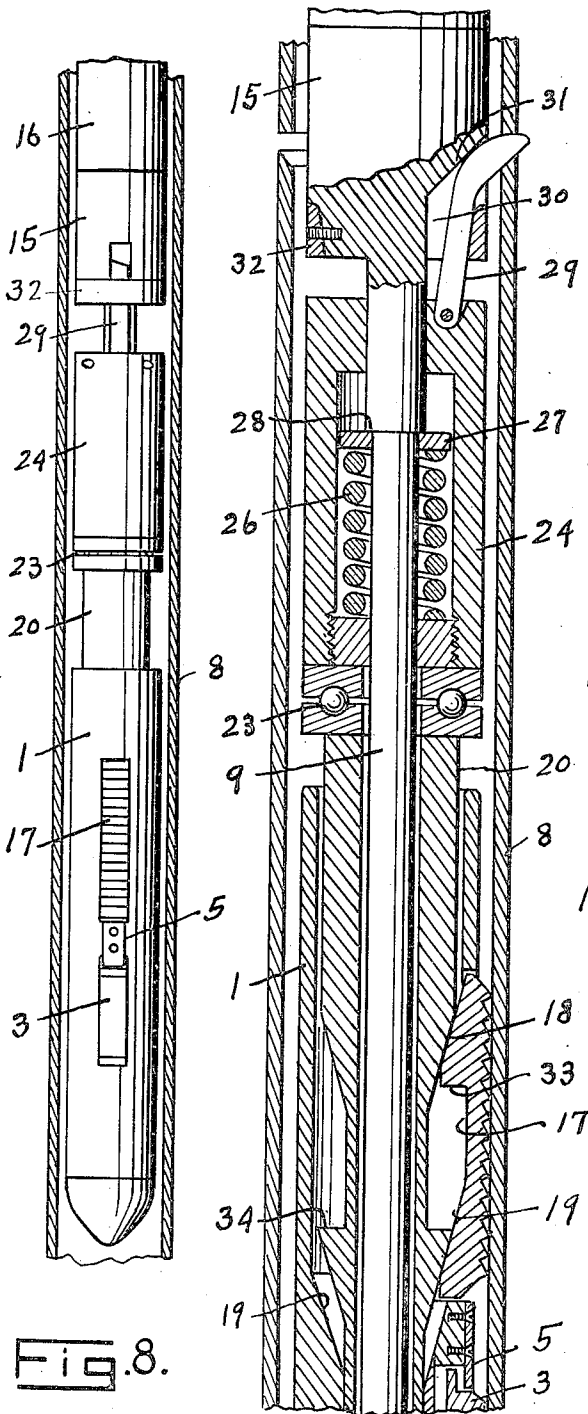


Fig. 8.

Fig. 6.

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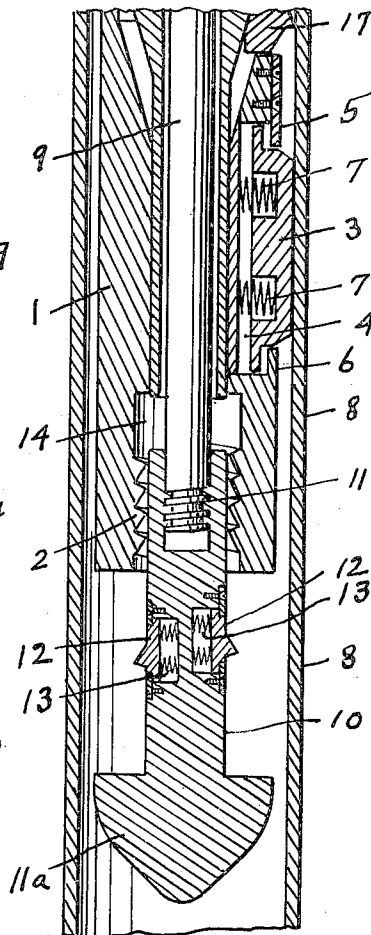


Fig. 7.

Inventor
Robert D. Patrick, Jr.

E. V. Hardway,
Attorney

UNITED STATES PATENT OFFICE

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INSIDE PIPE CUTTER

Robert D. Patrick, Jr., Bellaire, Tex.

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2 Claims. (Cl. 164—0.7)

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This invention relates to an inside pipe cutter. It is an object of the present invention to provide a pipe cutter of the character described shaped to be lowered into a pipe stuck in a well bore and to cut by rotation so as to sever the pipe in order that it may be removed from the bore a section at a time.

It is another object of the invention to provide a pipe cutter of the type referred to which embodies a cutter anchor to which the cutting bits, or blades, are pivotally connected with a blade expander movable relative to the bits, or blades, whereby said bits, or blades may be moved to active, or cutting position, or to inactive position.

Generally speaking, the invention embodies a cutter body having casing engaging means thereon, a separate stem extended axially through the body, a blade anchor associated with said stem having a cutting blade, or blades, thereon with a blade expander and a releasable connection between the body and stem whereby the stem and expander may be maintained in selected positions to control the positions of the blades, or bits.

It is a further object of the invention to provide a pipe cutter of the character described which is of such construction that the stem may be freely rotated relative to the body while maintaining the blades, or cutters, in inactive position.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein—

Figure 1 is a vertical, sectional view of the upper end of the cutting tool showing the cutters in retracted, or inactive, position.

Figure 2 is a vertical, sectional view of the lower end showing the parts in inactive position.

Figure 3 is a cross-sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a cross-sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a cross-sectional view taken on the line 5—5 of Figure 2.

Figure 6 is a vertical, sectional view of the upper end of the tool showing the parts in active, or cutting, position.

Figure 7 is a vertical, sectional view of the lower end thereof, and

Figure 8 is a side elevation of the complete tool.

Referring now more particularly to the drawings wherein like numerals of reference designate

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the same parts in each of the figures, the numeral 1 designates the body of the tool which is, generally speaking, tubular in form and whose lower end is formed with internal coarse threads 2.

Yieldingly mounted on said body there are the friction members 3. The body is formed with the recesses 4 in which said friction members are located and the upper and lower ends of the friction members engage with the upper and lower retainers 5, 6 of the body, the former of which is removable for assembly purposes. The friction members are mounted on strong coil springs 7, 7 which hold them in outer positions so that they will frictionally engage with the well pipe 8 to be cut while the tool is being lowered into said pipe, and while being operated.

There is an operating stem 9 which extends axially through the body and whose lower end is connected to a tail piece 10 by means of the threaded connection 11. This tail piece is of a general cylindrical shape whose lower end is enlarged and of an inverted conical shape forming a guide 11a. Mounted on the tail piece are the dogs 12, 12. These dogs are maintained in their outer position by means of coil springs 13, 13 so as to intermesh with the threads 2. Above the threads 2 the body is formed with an internal, annular recess 14 to receive said dogs when the tool is assembled and in inactive position, as shown in Figure 2, and when in this position the stem 9 may be rotated in either direction relative to the body without said dogs 12, 12 coming into intermeshing relation with the threads 2.

The upper end of the stem 9 is formed into a coupling member 15 whose upper end is internally threaded to receive the lower threaded end of the operating string 16 which extends to the ground surface and by means of which the cutting tool is operated. This coupling member also forms a cutter expander as will be hereinafter explained.

Mounted in the cutter body above the friction members 3 are the casing engaging jaws 17 whose outer surfaces are toothed to engage the pipe 8 and whose inner surfaces have the upper and lower downwardly converging inside faces 18 and 19. The jaws 17 work through slots in the body 1 and are limited in their outward movement by the laterally extended side flanges 17a.

Within the cutter body and around the stem 9 there is a tubular jaw expander 20 having the upper and lower external downwardly tapering faces 21, 22.

The upper end of the jaw expander 20 extends above the body 1 and its lower end rests on

the upper end of the tail piece 10 when the tool is assembled and in inactive position, as shown in Figure 2.

Supported on the upper end of the jaw expander 20, by means of an antifriction bearing assembly 23, there is a tubular anchor 24 through which the stem 9 works axially. A retaining nut 25 is screwed into the lower end of the anchor and supported on this retaining nut and surrounding the stem 9 there is a strong coil spring 26 whose upper end works against a retaining washer 27 which, in turn, rests against an annular, downwardly facing shoulder 28 on the stem 9.

Pivotally connected to the upper end of the anchor 24 there are the blades, or bits, 29, three of said blades being shown in the present illustration. The upper ends of these blades work through slots 30 in the lower end of the coupling member 15 whose upper ends are formed with the outwardly diverging expanding faces 31.

Surrounding the cutters and detachably secured to the coupling member 15 there is a retaining collar 32.

The tool is shown in assembled position, ready to be lowered into the pipe, in Figures 1 and 2, with the stem 9, tail piece 10 and expander 20 in their upper position. It will be noted from an inspection of Figure 1 that each jaw 17 is provided with an inside, downwardly facing shoulder 33 which hangs on an external upwardly facing shoulder 34 of the expander 20.

When so assembled the tool may be lowered into the pipe to be cut by means of the string 16 until a point is reached at which it is desired to make the cut. The operating string may then be turned to the right and gradually lowered and the dogs 12 will intermesh with the threads 2 until they pass beneath said threads thus detaching the tail piece from the body 1. During this turning movement the body 1 will be held stationary by reason of the frictional engagement of the members 3 with the pipe to be cut.

Upon such downward movement the tapering faces 21, 22 will engage the corresponding tapering faces 18 and 19 and expand the jaws 17 into secure engagement with the pipe 8, as shown in Figure 6 thus supporting the cutter body and jaw expander against downward movement. The blade anchor 24 will also be supported against downward movement but will be rotatable with the operating string.

The operating string is thereafter rotated and gradually lowered causing the expander faces 31 to engage the upper outwardly curved ends of the blades 29 and to gradually expand said blades into contact with the pipe to be cut.

By reason of the fixed anchor 24 to which said blades are connected the blades are limited to a radial outward movement and cannot move downwardly with respect to the pipe so that the cutting bits will track and a definite, accurate, cut will be made through the pipe. This is a decided improvement over pipe cutters of this type commonly in use and wherein the cutting blades, or bits, have a range of movement longitudinally relative to the pipe to be cut. Mounting the cutters, or bits, on an anchor which is fixed relative to the pipe to be cut is a decided advantage for the reason that a minimum amount of the pipe need be cut away in order to complete the cut.

During the cutting operation the coil spring 26 serves the purpose of a shock absorber.

When the pipe has been cut and it is desired

to remove the tool the operating stem may be pulled directly upwardly, without rotation, and the dogs 12 will ride past the threads 2 into position above said threads and the upper end of the tail piece 10 will engage the lower end of the expander 20 and elevate said expander thus releasing the tapering faces 21, 22 of the expander from the faces 18, 19 of the jaws 17 thus permitting said jaws to release the pipe and allowing the tool to be moved into position to make another cut, if desired, or to be removed from the well.

What I claim is:

1. An inside pipe cutter adapted to cut by rotation and comprising, a body, a stem longitudinally moveable through the body to upper and lower positions, interconnecting means on the stem and body, said stem being rotatable relative to the body when in its upper position, friction members on the body adapted to frictionally engage the pipe to hold the body stationary, a pipe engaging jaw mounted on the body, an expander in the body moveable, upon release of the connecting means, into contact with said jaw to move the jaw outwardly into engagement with the pipe to anchor the tool, a blade anchor supported on and rotatable relative to the expander, a blade pivoted to the blade anchor, means on the stem arranged to contact the inner side of the blade and to move the blade outwardly into cutting relation with the pipe upon downward movement of the stem and means arranged to cause the blade to rotate with the stem whereby the pipe will be severed upon such rotation.

2. An inside pipe cutter adapted to cut by rotation and comprising, a body, an operating stem longitudinally moveable through the body, said stem and body being provided one with threads and the other with a yieldingly mounted dog which normally supports the stem in its upper position and which dog meshes with the threads and is releasable therefrom upon rotation and downward movement of the stem relative to the body, said dog being yieldably mounted to release said threads upon direct upward movement of the stem relative to the body, said stem being rotatable independent of the body when the stem is in said upper position, radially moveable friction means mounted on the body adapted to frictionally engage the well pipe to hold the body stationary in the pipe during said stem movement, radially moveable anchoring means mounted within the body, an expander in the body moveable, upon downward movement of the stem, into contact with said anchoring means to move the anchoring means outwardly into secure engagement with the pipe, a tubular cutter anchor supported on the expander, a cutting blade pivoted to the anchor, means on the stem arranged to move said blade outwardly into cutting relation with the pipe upon downward movement of the stem, whereby the pipe will be severed upon rotation of the stem.

ROBERT D. PATRICK, JR.

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The following references are of record in the file of this patent:

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