Dec. 23, 1952 R. A. RANSOM 2,622,679

INSIDE PIPE CUTTER

Filed Oct. 8, 1948 2 SHEETS—SHEET 1

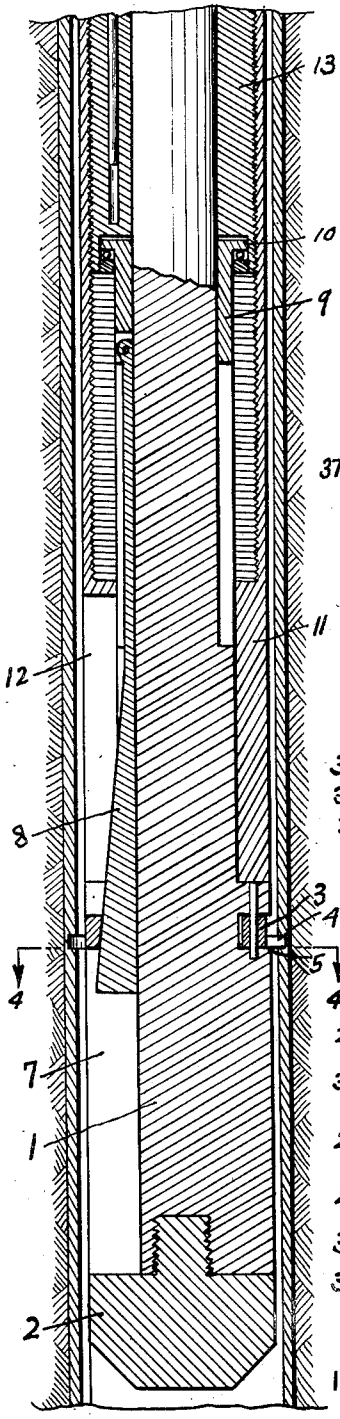


FIG. 1

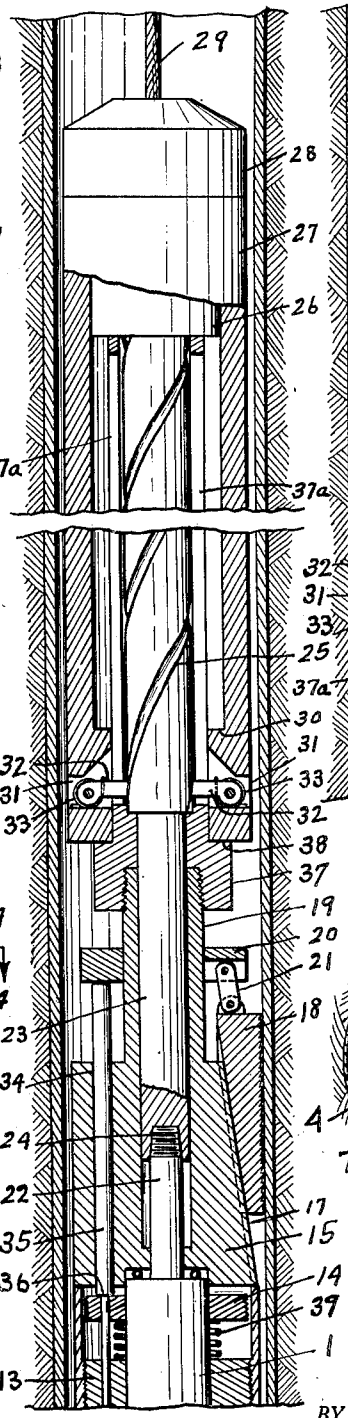


FIG. 2

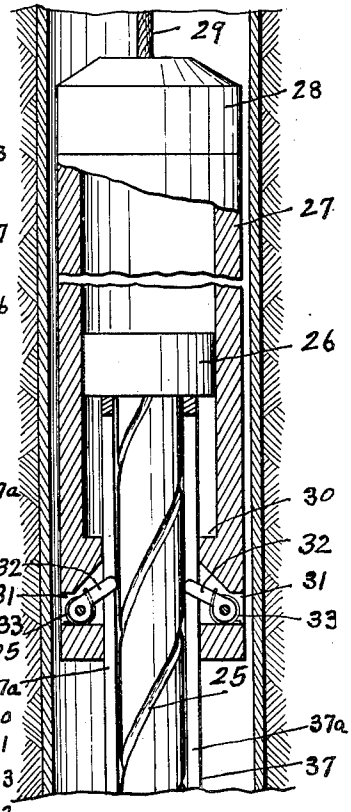


FIG. 3

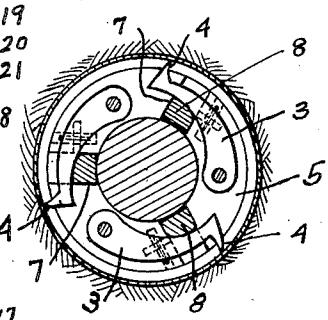


FIG. 4

INVENTOR.
Russell A. Ransom
BY
E. V. Hardway
ATTORNEY

Dec. 23, 1952 R. A. RANSOM 2,622,679

INSIDE PIPE CUTTER

Filed Oct. 8, 1948 2 SHEETS—SHEET 2

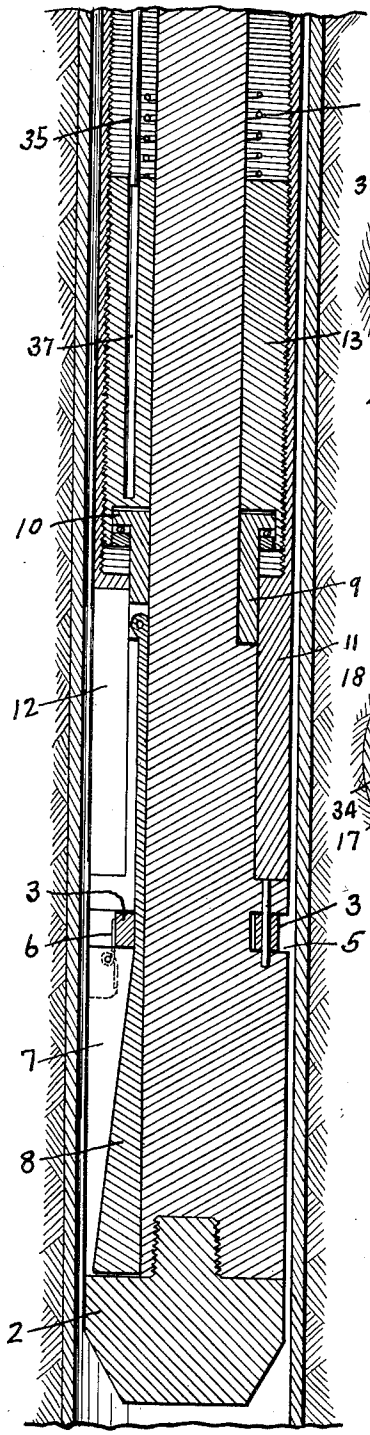


FIG. 5

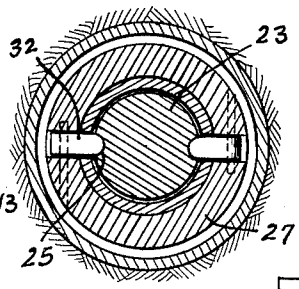


FIG. 7

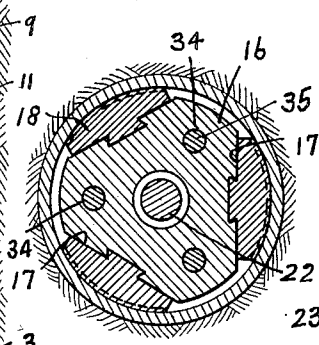


FIG. 8

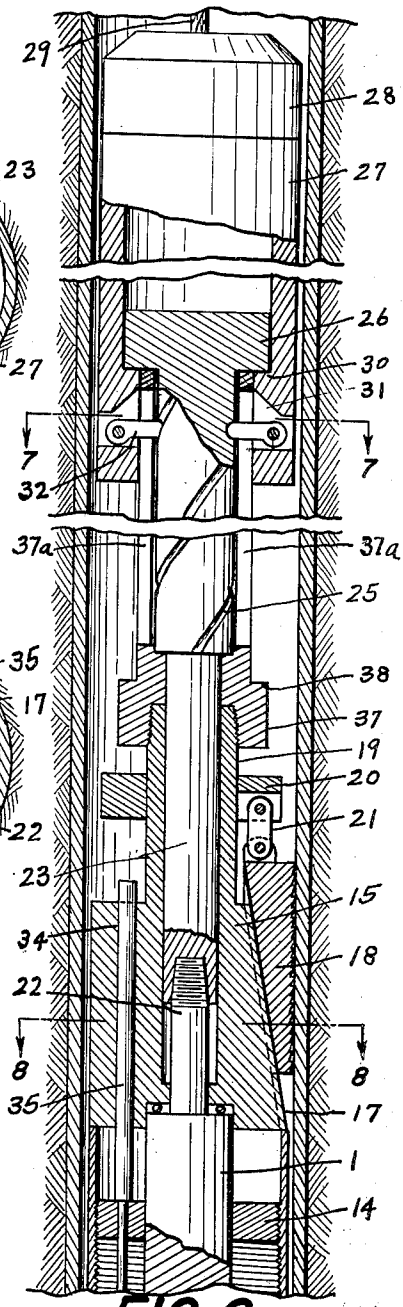


FIG. 6

INVENTOR.
Russell A. Ransom

BY

E. U. Hardway,
ATTORNEY

Patented Dec. 23, 1952

2,622,679

UNITED STATES PATENT OFFICE

2,622,679

INSIDE PIPE CUTTER

Russell A. Ransom, Houston, Tex.

Application October 8, 1948, Serial No. 53,476

5 Claims. (Cl. 164—0.7)

1

This invention relates to an inside pipe cutter.

An object of the invention is to provide a tool of the character described which may be lowered into the pipe, or casing, in a well bore, by means of a flexible line, such as a cable with means for anchoring the tool at a selected place where the cut is to be made, said tool having novel means for rotating and expanding the cutters to sever the well pipe or casing.

It is another object of the invention to provide a cutter of the character described which embodies a weight and novel means associated therewith and to be rotated thereby to rotate the cutter carrier and cutters with novel means associated therewith for at the same time expanding the cutters.

The invention also embodies means for releasing the tool from the well pipe upon completion of the cut to allow the tool to be withdrawn from the well.

Other objects and advantages will be apparent from the following specification which is illustrated by the accompanying drawings, wherein:

Figure 1 is a vertical, sectional view of the lower end of the tool showing the tool in cutting position.

Figure 2 is a vertical, sectional view of the upper end thereof.

Figure 3 is a vertical, sectional view of the upper end of the tool showing the weight being lowered to active position.

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

Figure 5 is a vertical, sectional view of the lower end of the tool in inactive position while being lowered into the well.

Figure 6 is a vertical, sectional view of the upper end thereof.

Figure 7 is a cross-sectional view taken on the line 7—7 of Figure 6, and

Figure 8 is a cross-sectional view taken on the line 8—8 of Figure 6.

Referring now more particularly to the drawings wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates the cutter body onto whose lower end there is screwed the guide 2 whose lower end is downwardly tapered.

The upper end of the cutter body is reduced in diameter and is cylindrical in shape.

Pivotally mounted in this cutter body there are the arcuate cutters 3 which are pivoted at corresponding ends in the body and whose other ends are free and terminate in outwardly directed bits 4. These cutters work in an external annular groove 5 in the cutter body and are normally held retracted inwardly by means of springs 6.

2

The body is provided with external longitudinal grooves 7 wherein the cutter expanders 8 are mounted. These expanders work against the inner sides of the cutters, as indicated in Figures 1, 4 and 5, and their lower ends are gradually widened, or wedge shaped, so that as the expanders move upwardly the cutters will be gradually expanded. The upper ends of these expanders are pivotally connected to a supporting sleeve 9 around the reduced upper end of the body and the upper end of sleeve 9 is provided with an external annular flange 10.

Fitted onto the lower end of the reduced upper end of the body 1 there is a cylindrical shield 11 which is provided with vertical slots 12 in registration grooves 7 and in which the expanders 8 work. The upper end of this shield is internally enlarged in diameter and internally threaded and screwed into said internally threaded upper end there is tubular anchor 13 whose lower end has a swivelling connection with the supporting sleeve 9. The reduced upper end of the cutter body extends axially through this tubular anchor 13.

The upper end of the cutter body works through a ring 14 which is screwed into the upper end of the shield 11.

Above the shield 11 and resting on it there is a jaw expander 15 having the downwardly and outwardly tapering faces 17 on which the casing engaging jaws 18 are slidably mounted and with which they have a dovetailed connection. The outer sides of the jaws 18 are toothed to engage the pipe to be cut.

The upper end of the jaw expander is reduced in diameter and extended upwardly forming a tubular guide 19 on which an annular anchor 20 is slidably mounted and this anchor is connected to the jaws beneath by means of suitable links, as 21.

The upper end of the body 1 has a reduced upwardly extended stem 22 which extends up axially into the expander 15 and a driving shaft 23 is provided whose lower end is extended axially through the guide 19 and is connected, by means of left hand threads 24 to the upper end of said stem 22.

The upper end of the shaft 23 is enlarged and is provided with deep spiralled grooves 25 in the external surface thereof and secured to the upper end of the shaft 23 there is an enlarged cylindrical head 26.

There is a tubular weight 27 whose lower end

is tubular in form and whose upper end is formed into a head 28 which is secured in place in any preferred manner and to which the lower end of the operating cable 29 is secured. This cable extends to the ground surface and is provided to lower and withdraw the tool.

The lower end of the weight 27 is reduced, internally, in diameter forming an internal annular shoulder 30 and the head 26 fits closely within said weight 27 above the shoulder 30.

The lower end of the weight 27 is provided with radial slots 31, 31 whose inner ends are widened upwardly and mounted in these slots there are the actuating dogs 32, 32 which are normally held in horizontal position by means of the coil springs 33, 33 which operate thereagainst so as to hold the free ends thereof extending radially inwardly.

The jaw expander 15 is provided with vertical bearings 34 in which the release rods 35 are slidably mounted. The lower ends of these rods, beneath said expander, are reduced in diameter thus forming the external annular downwardly facing shoulders 36 on said rods 35. The reduced lower ends of the rods 35 extend through bearings in the ring 14 and extend on down into aligned bores 37 in the tubular anchor 13.

In operation the tool is assembled, as shown in Figures 5 and 6, and is lowered into the well casing to be cut. When the point is reached at which the cut is to be made an upward pull may be taken on the cable 29 thus elevating the expander 15 into contact with the jaws 18 and thus wedging the jaws out securely against the casing. The cable 29 may then be slacked off and the weight 27 will move downwardly as is indicated in Figure 3 but the jaw expander 15 is wedged tightly in place and will not move downwardly.

Screwed onto the upper end of the guide 19, with left hand threads, there is a tubular housing 37 through which the shaft 23 works and which is provided with an external annular shoulder 38 at its lower end. The housing has the vertical side slots 37*a*, 37*a* through which the dogs 32 work. The upper end of this housing extends into the weight 27.

When the weight 27 reaches the limit of its downward movement it will land on said shoulder 38 and its downward movement will be stopped.

An upward pull may then be taken on the cable 29 and the dogs 32 will engage in the grooves 25 and upon further upward pull the driving shaft 23 will be thereby rotated thus rotating the cutter body 1 and the cutters. As the cutter body 1 is rotated the anchor 13, which is held against rotation by the rods 35 will be gradually moved upwardly thus elevating the expanders 8 and forcing the cutters outwardly.

The tubular anchor 13 is moved upwardly by the rotation of the shield 11 and this shield is rotated by the rotation of the expanders 8 which work in the radial slots 12 of the shield. The operation of lowering the weight 27 and elevating it may be repeated until the cut through the casing is completed.

The rotation of the shield 11 will also unscrew the ring 14 from said shield allowing said ring 14 to move upwardly against the shoulders 36 of release rods 35 under the influence of the coil spring 39.

When the cut has been completed the expanders 8 will have passed above the cutters 3 and said cutters will then be retracted by the springs 6.

The head 37 and guide 19 and expander 15 may then be jarred slightly downwardly to release the jaws 18 and said jaws will be held upwardly in inactive position by the rods 35 which will then be held in elevated position by the ring 14 and spring 39 and the tool may then be withdrawn from the well.

If for any reason it should be decided to withdraw the cutter from the well pipe or casing before said pipe or casing has been completely severed, as is shown in Figure 1, but after the ring 14 has been unscrewed from the upper end of the shield 11 the head 37 and guide 19 and expander 15 may be jarred downwardly to release the jaws 18 and an upward pull then taken on the cable 29 which will shear off the bits 4 and allow the cutter to be withdrawn.

A preferred form of the pipe cutter, hereinafter claimed, has been specifically shown and described by way of illustration merely while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. An inside pipe cutter comprising, a cutter body having an external longitudinal groove, a cutter pivoted on the body whose outer end is movable outwardly into cutting relation with the pipe, means normally holding the cutter retracted, a cutter expander in the groove inwardly of the cutter, an anchor above the expander, means having a swivelling connection with the anchor and to which the upper end of the expander is connected, a shield around the body in which the anchor is threaded and having a slot in which the expander works whereby upon rotation of the body the shield will be rotated to elevate the anchor and expander to move the cutter outwardly, means above the shield including a pipe engaging jaw engageable with the pipe to be cut to hold the cutter body against upward movement, a drive shaft connected to the upper end of the body, weight means operable from the ground surface and operatively connected with the shaft to rotate said shaft and body and means for maintaining the anchor against such rotation.

2. An inside pipe cutter comprising, a cutter body having an external longitudinal groove, a cutter pivoted on the body whose outer end is movable outwardly into cutting relation with the pipe, means normally holding the cutter retracted, a cutter expander in the groove inwardly of the cutter, an anchor above the expander, means having a swivelling connection with the anchor and to which the upper end of the expander is connected, a shield around the body into which the anchor is threaded said shield having a slot in which the expander works whereby upon rotation of the body the shield will be rotated to move the anchor and expander to actuate the cutter outwardly, means above the shield engageable with the pipe to be cut to hold the cutter body against upward movement, a drive shaft connected to the upper end of the body, weight means operable from the ground surface and operatively connected with the shaft to rotate the shaft and body and means for maintaining the anchor against such rotation.

3. An inside pipe cutter comprising, a cutter body having an external longitudinal groove, a cutter pivoted on the body whose outer end is movable outwardly into cutting relation with the pipe, means normally holding the cutter retracted, a cutter expander in the groove inwardly

of the cutter, an anchor above the expander, means having a swivelling connection with the anchor and to which the expander is connected, a shield around the body in which the anchor is threaded, said shield having a slot in which the expander works whereby upon rotation of the body the shield will be rotated to cause upward movement of the anchor and expander to thereby move the cutter outwardly, anchoring means above the shield engageable with, and releasable from, the pipe to be cut, a driving shaft connected to the upper end of the body, weight means operable from the ground surface and engageable with the shaft to rotate the shaft and body, a release ring threaded into the upper end of the shield, a release rod extending through the anchoring means and release ring and into the anchor to hold the anchor and release ring against rotation with the body.

4. An inside pipe cutter comprising, a cutter body, a cutter pivoted on the body whose outer end is movable outwardly into cutting relation with the pipe, means normally holding the cutter retracted, a cutter expander in the body inwardly of the cutter, an anchor above the expander, means having a swivelling connection with the anchor and to which the upper end of the expander is connected, a shield around the body into which the anchor is threaded, said expander interlocking the body and shield for simultaneous rotation whereby upon rotation of the body the shield will be rotated to move the anchor and expander to actuate the cutter ouwardly, anchoring means above the shield engageable with the pipe to be cut to hold the cutter body against upward movement, a drive shaft connected to the upper end of the body, weight means operable from the ground surface and operatively connected with the shaft to rotate said shaft and body, means for maintaining the anchor against such rotation.

5. An inside pipe cutter comprising, a cutter

body, a cutter pivoted on the body whose outer end is movable outwardly into cutting relation with the pipe, means normally holding the cutter retracted, a cutter expander in the body inwardly of the cutter, an anchor above the expander, means having a swivelling connection with the anchor and to which the upper end of the expander is connected, a shield around the body into which the anchor is threaded, a release ring threaded into the shield above the anchor, said expander interlocking the body and shield for simultaneous rotation whereby upon rotation of the body the shield will be rotated to move the anchor and expander to actuate the cutter outwardly and to unscrew the release ring, anchoring means above the shield engageable with the pipe to be cut to hold the cutter body against upward movement, a drive shaft connected to the upper end of the body, weight means operable from the ground surface and operatively connected with the shaft to rotate said shaft and body and means for maintaining the anchor against such rotation, a release rod extending through the anchoring means and release ring and into the anchor to hold the anchor and release ring against rotation with the body, interengaging means between said rod and release ring to move the rod upwardly, upon release of said ring, to maintain said anchoring means inactive.

RUSSELL A. RANSOM.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,460,894	Dix	July 3, 1923
2,188,409	Lane	Jan. 30, 1940
2,200,172	Howard	May 7, 1940