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INSIDE PIPE CUTTER

Filed June 1, 1928

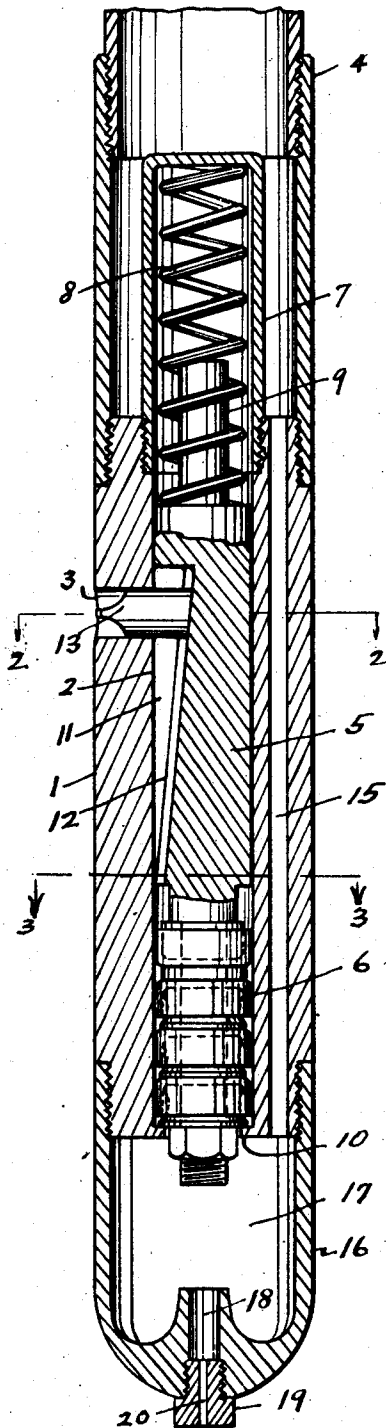


Fig. 1.

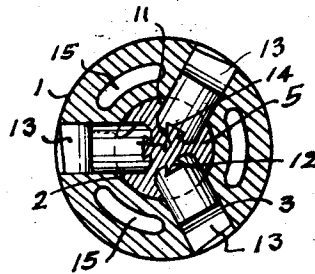


Fig. 2.

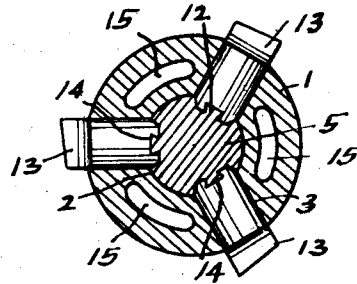


Fig. 3.



Fig. 4.

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INSIDE PIPE CUTTER

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This invention relates to new and useful improvements in an inside pipe cutter.

One object of the invention is to provide a pipe cutter embodying a body, having a cylinder therein, with radially movable cutters mounted in bearings in the body and a mandrel fitted in said cylinder and operatively connected with the cutters and operative to project the cutters outwardly into cutting position or to withdraw said cutters, said mandrel being operable in one direction by a yieldable member to withdraw the cutters and in another direction by fluid pressure beneath the mandrel to actuate the cutters outwardly into cutting relation with the pipe to be severed.

Another object of the invention is to provide, in a pipe cutter, a mandrel, which is fitted in the cylinder of the body and is supported thereby substantially throughout its length.

The cutter is particularly adapted to be used for cutting and removing pipe stuck in a well bore.

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 shows a vertical sectional view of the cutter.

Figure 2 shows a cross sectional view taken on the line 2—2 of Figure 1.

Figure 3 shows a cross sectional view taken on the line 3—3 of Figure 1, and

Figure 4 shows a side view of a modified type of cutter which may be employed.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in each of the figures the numeral 1 designates the cutter body, which is tubular in form, having the inside cylinder 2 with the radiating cutter bearings

3, radially disposed therein. Attached to the upper end of the body, there is an operating string of pipe as 4. Fitted in the cylinder, there is an elongated mandrel 5 whose lower end is fitted with suitable cup rings as 6 which fit closely in said cylinder and which form, in effect, a plunger. Screwed into the upper end of the cylinder there is a thimble 7 and within this thimble there is the coil spring 8 which is interposed between the outer end of the thimble and the upper end of the mandrel. The end of the mandrel adjacent the spring carries a pin 9 which is surrounded by said spring. The mandrel is limited in one direction by said spring and in the other direction by the inwardly extending annular flange 10 against which the lower end of the plunger is adapted to abut. The mandrel has the external upwardly converging grooves 11 and the bottoms of these grooves have the lengthwise dovetailed tenons 12. There are the radial cutters 13, in the bearings 3, whose inner ends have the dovetailed cortises 14 which receive the corresponding tenons 12.

The body has the longitudinal channels 15 leading from the upper to the lower end thereof and arranged around the cylinder 2. There is a guide point 16 threaded onto the lower end of the body having the internal chamber 17 in which the channels 15 terminate. The guide point 16 has an axial outlet opening 18 into the lower end of which the plug 19 is threaded said plug having a respective axial channel 20 therethrough.

In operation the device is let down into the pipe to be cut to the desired point, and fluid, under pressure, is then forced through the string 4, and will pass around the thimble 7 and through the channels 15 and into the chamber 17 and will force the mandrel upwardly and the cutters outwardly into contact with the pipe to be cut and the cutter is rotated. During the rotation of the cutter the pressure is applied against the plunger 6 to gradually force said cutters outwardly un-

til the stuck pipe has been severed. There-
upon the pressure may be relieved by stop-
ping the pump and the spring 8 will force the
mandrel downwardly and draw the cutters
inwardly clear of the pipe and the entire de-
vice may then be removed from the pipe.

As above stated, the mandrel 5 fits closely
in the cylinder and is thus supported against
the lateral strain due to cutting operations
so that should one or more of the cutters 13
become broken the remaining cutter will ef-
fectively operate against the pipe to be cut.

While going into the bore the fluid in the
well will pass inwardly through the channels
18 and 20 so as to fill the string 4 thus pre-
venting the string from being crushed by the
outside fluid pressure and when withdrawing
the device from the bore the fluid in the
string 4 will be drained out through said
channels 18 and 20. In case the channel 20
becomes worn by the grit and sand in the
fluid until it is too large the plug 19 may be
removed and a new one substituted.

The type of cutter designated by the nu-
meral 13' and shown in Figure 4 may be em-
ployed if desired. This cutter has a side
notch 21 and if this type of cutter is used the
grooves 11 should have side tenons to be re-
ceived by said notches 21 to retain the cutters
13' in the body 1.

As stated the grooves converge upwardly
and their sides form lateral supports for the
cutters thus reinforcing, or strengthening,
the cutters while in operation.

While I have shown what I now consider
the preferred forms of the invention it is
obvious that mechanical changes may be
made therein and equivalents substituted for
the parts shown and I reserve the right to
make such changes and substitutions as may
be found desirable within the scope of the
appended claims.

What I claim is:—

1. A device of the character described in-
cluding a body having an axial cylinder
therein, a mandrel in the cylinder, cutters
mounted in the body and operatively con-
nected with the mandrel, said mandrel being
adapted to move said cutters radially as the
mandrel is moved longitudinally, said de-
vice having a chamber beneath the mandrel,
said body having a channel leading from the
upper end thereof and terminating in said
chamber, said chamber having an outlet port,
a thimble anchored to the upper end of the
body, and a yieldable member enclosed by the
thimble normally resisting the upward move-
ment of the mandrel.

2. A casing cutter having a cylinder and a
pressure chamber at one end of the cylinder,
a mandrel in the cylinder one end of which
is exposed to the pressure of fluid in said
chamber, a radially movable cutter opera-
tively connected with the mandrel, an oper-
ating string to the lower end of which the

cylinder is attached, there being a fluid chan-
nel leading from within the string and ter-
minating in said chamber, a yieldable mem-
ber normally resisting the upward movement
of the mandrel and means in the stem at-
tached to the upper end of the cylinder and
enclosing said yieldable member and exclud-
ing the pressure fluid from the upper end of
the mandrel.

In testimony whereof I have signed my
name to this specification.

HARVEY J. DENNEY.