Jan. 27, 1931. F. SWITZER 1,789,993

CASING RIPPER

Filed Aug. 2, 1929

Fig. 1.

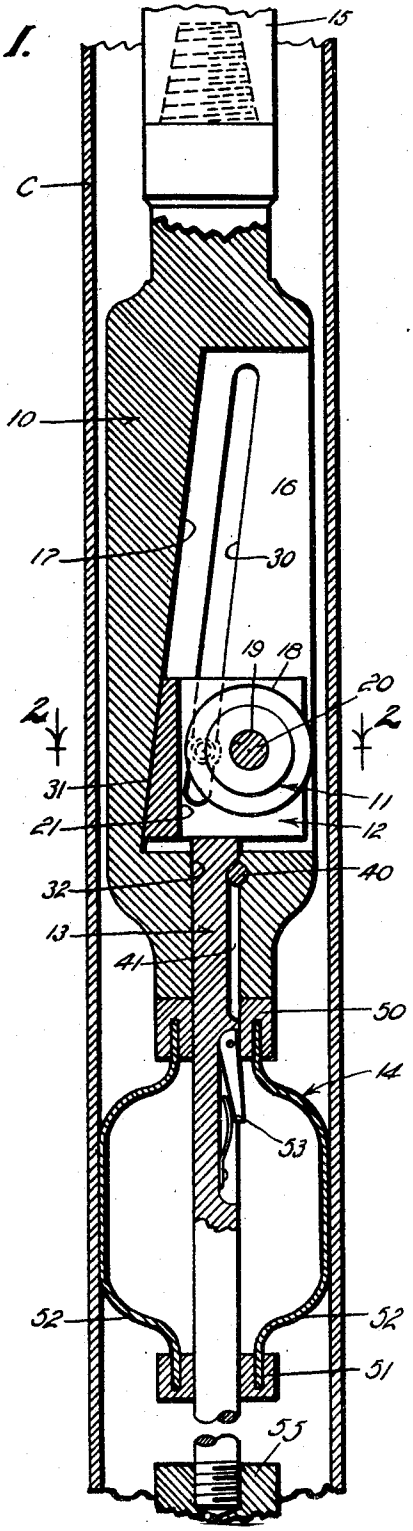


Fig. 2.

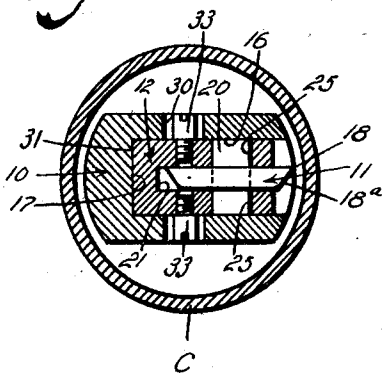
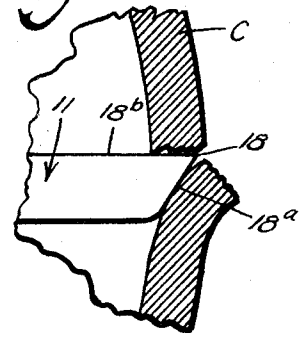


Fig. 3.



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by

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UNITED STATES PATENT OFFICE

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CASING RIPPER

Application filed August 2, 1929. Serial No. 382,872.

This invention has to do with a well tool and has particular reference to a device for ripping casing or pipe in a well.

In the course of drilling or operating a well, it is sometimes necessary to cut open or rip a casing or pipe located in the well. Devices known as rippers have been used for this purpose, the ordinary ripper being of the knife type in which a blade is operated to project from a body in a manner to extend through the wall of the casing. This ordinary type of casing ripper has certain disadvantages, for instance, the blade has a comparatively small cutting edge and therefore is rapidly dulled, the blade of necessity projects from the body so that it is easily broken, and the character of the blade is such that it is more or less inefficient.

It is an object of this invention to provide a casing ripper having a rotating cutter which presents a long cutting edge.

It is another object of this invention to provide a ripper having a cutter which is particularly strong and which is mounted so that it is not easily broken.

It is another object of this invention to provide a casing ripper with a cutter simple in design and simple and inexpensive of manufacture.

The various objects and features of my invention will be best and more fully understood from the following detailed description of a typical form and application of the invention, throughout which description reference is had to the accompanying drawings, in which:

Fig. 1 is a longitudinal detailed sectional view of the tool provided by this invention showing it in position in a well casing. Fig. 2 is a detailed transverse sectional view taken as indicated by line 2—2 on Fig. 1, and Fig. 3 is an enlarged detailed sectional view showing the cutter in operative position ripping a section of casing.

The tool provided by this invention includes, generally, a body 10, a cutter 11, a carrier 12 mounting the cutter in the body, an operating member 13 for the cutter carrier, and a control, for instance, a tail piece 14, in connection with the operating member.

The body 10 is an elongate member finished at its upper end for connection with an operating means, for instance, a string of drill pipe 15. The body 10 has a longitudinally disposed groove formed in it from one side and extending throughout a substantial portion of its length. The groove is provided with flat parallel side walls 16 and a bottom 17. The bottom 17 of the groove is diagonally disposed or inclined with reference to the longitudinal axis of the tool so that the groove is deeper at its lower end than at its upper end.

The cutter 11, in accordance with my invention, is in the form of a disc provided at its periphery with a single cutting edge 18 and provided with a central opening 19 to pass a mounting pin 20. In the drawings I have shown the disc cutter provided at its periphery with a single continuous cutting edge 18. In the preferred form of the invention the peripheral face 18^a of the cutter 11 is beveled and the edge 18 is at the line of joinder of the peripheral face 18^a and one side 18^b of the cutter. This form of cutting edge is particularly effective in ripping the casing. The edge 18 being formed between the peripheral face and one side of the cutter is effective in piercing and cutting the casing, and in making a clean cut in the casing.

The carrier 12 is in the form of a block slidably mounted in the groove or guideway in the body 10 and is notched from its outer side to receive the cutter 11. The notch 21 provided in the carrier block to receive the cutter is made sufficiently wide to carry the cutter with proper clearance and is made comparatively deep so that it receives a substantial portion of the cutter. The cutter 11 is rotatably mounted in the carrier 12 on the mounting pin 20 which extends through the opening 19 in the cutter and is carried in openings 25 provided in the block at opposite sides of the notch 21. The cutter is mounted in the carrier block so that it has a part projecting from the front or forward side of the block a distance sufficient to cut through the well casing C when the tool is operated as hereinafter described. The mounting pin 20 which operates to rotatably mount the cutter 11 in the

block 12 is prevented from becoming displaced from the opening 19 by the sides 16 of the groove in the body. The carrier 12 is vertically slidable in the grooves. Guide slots 30 are provided in the walls 16 of the groove in the body and pins 33 project from the block into the guide slots. The guide slots 30 are angularly disposed or inclined with reference to the longitudinal axis of the tool to be parallel with the bottom 17 of the guideway. In practice the pins 33 may be screw threaded into the carrier and project from the opposite sides of the carrier into the guide slots. With this arrangement the carrier 12 is free to operate in the groove and the cutter 11 is retained in the carrier so that it is free to rotate. The inner end 31 of the block 12 is beveled or finished to set on the bottom 17 of the guideway as clearly shown in Fig. 1 of the drawings. As the guide slots 30 are parallel to the bottom 17, the inner end 31 of the block 12 is always in engagement with the bottom 17.

The operating member 13 is provided to start upward operation of the carrier block 12 in the guideway and may be in the form of a rod slidably mounted in an opening 32 provided in the bottom of the body. The operating rod is preferably arranged concentric with the body 10 and has its upper end extending into the guideway in the body to engage under the block 12 and has its lower end projecting downwardly from the body. In practice I provide means for limiting the movement of the operating member with reference to the body, which means may include a stop pin 40 carried by the body to cooperate with a notch 41 in the side of the operating member. The control means or tail piece provided in connection with the operating member may include two rings 50 and 51 slidable on the lower end portion of the operating member below the body 10, a plurality of tail piece springs 52 connecting the rings and bearing outwardly against the interior of the casing C and a latch 53 for latching the upper ring 50 in a down position. A head 55 is applied to the lower end of the operating member to prevent displacement of the tail piece from the operating member.

In operation the tool is lowered into the casing C with parts in position as shown in Fig. 1. As the tool is lowered into place, the block 12 is at the lower end of the guideway in which case it is in the in position and the upper ring 50 of the tail piece is above the latch 53 and is in engagement with the lower end of the body 10. When it is desired to set the tool for operation, the body 10 is moved upwardly through the string of drill pipe 15 causing the operating member 13 to move upwardly through the rings of the tail piece until the latch 53 engages above the upper ring 50. After this latching operation downward movement of the body 10 will cause the operating member 13 to be moved up through the opening 32 so that it moves the cutter carrying block 12 upwardly in the guideway. The inclination or angularity of the bottom 17 of the guideway causes the block 12 to move laterally or outwardly as it moves up through the guideway, thus causing the cutter 11 to be moved into engagement with the casing C.

When the cutter has engaged the casing C it is no longer necessary for the block to be operated by the member 13 as the engagement of the cutter with the casing will cause further feeding of the block until the block reaches the upper end of the guideway at which time the cutter is fully projected and is in position to cut through the casing. With the cutter thus projected through the wall of the casing forcing of the body longitudinally through the casing causes the casing to be ripped. The manner in which the cutter 11 rips or cuts the casing is clearly illustrated in Fig. 3 of the drawings. The sharpened edge 18 pierces and cuts the casing while the beveled periphery of the cutter bends the casing away from one side of the cut and forms a lip along the cut. When it is desired to remove the tool from the casing, it is pulled upwardly causing the cutter carrying block to return to the lower end of the guideway. During the upward movement of the tool out of the casing the lower ring 51 of the tail piece is in engagement with the head 55 on the lower end of the operating member.

Having described only a typical preferred form of my invention I do not wish to limit myself to the specific details set forth, but wish to reserve to myself any changes or variations that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. A well casing ripper including a body having a longitudinal guideway with an inclined bottom, and having an opening in the side of the guideway parallel with the bottom, a carrier slidably mounted in the guideway in engagement with the bottom, a disc cutter having a beveled periphery joining one side of the cutter to form an edge, a pin rotatably mounting the cutter in the carrier, and a pin on the carrier extending into the opening.

2. A well casing ripper including, a body having a longitudinal guideway with an inclined bottom, and having openings in the sides of the guideway with an inclined bottom, and having openings in the sides of the guideway parallel with the bottom, a carrier slidably mounted in the guideway in engagement with the bottom, a disc cutter having a beveled periphery, a cutting edge at one edge of the beveled periphery, a pin rotatably mounting the cutter in the carrier, pins projecting from the carrier into the openings,

and means for operating the carrier in the guideway.

3. A well casing ripper including, a body having a longitudinal guideway with an inclined bottom, and having openings in the sides of the guideway parallel with the bottom, a carrier slidably mounted in the guideway in engagement with the bottom, a disc cutter having a beveled peripheral face joining one side of the cutter to form an edge, a pin rotatably mounting the cutter in the carrier, pins projecting from the carrier into the openings, and means for operating the carrier in the guideway, said means including an operating rod carried by the lower portion of the body and projecting into the guideway and a tail piece on the rod below the body.

4. A well casing ripper including, a body having a longitudinal guideway with an inclined bottom, and having openings in the sides of the guideway parallel with the bottom, a carrier slidably mounted in the guideway in engagement with the bottom, a disc cutter having a beveled periphery, a cutting edge at one edge of the periphery, a pin rotatably mounting the cutter in the carrier, pins projecting from the carrier into the openings, and means for operating the carrier in the guideway, said means including an operating rod carried by the lower portion of the body and projecting into the guideway, a tail piece on the rod below the body, and a control latch for operatively connecting the rod and tail piece.

5. A well casing ripper including, a body having a longitudinal guideway with an inclined bottom, and having diametrically opposite slots in the guideway parallel with the bottom, a carrier slidably mounted in the guideway in engagement with the bottom, a disc cutter having a beveled peripheral face joining one side of the cutter to form a single continuous cutting edge at one edge, a pin rotatably mounting the cutter in the carrier, pins at opposite sides of the carrier slidable in the slots, and means for operating the carrier in the guideway.

6. A well casing ripper including, a body having a guideway with an inclined bottom and having openings in the walls of the guideway parallel with the bottom, a carrier slidably mounted in the guideway, a disc cutter rotatably carried by the carrier the cutter having a beveled periphery, a cutting edge at the line of joinder of the beveled periphery and one side of the cutter to operate longitudinally of the casing, pins on the carrier extending into the openings, and means for operating the carrier.

7. A well casing ripper including, a body having a guideway with an inclined bottom and having openings in the wall of the guideway parallel with the bottom, a carrier slidable in the guideway, pins screw threaded into the carrier and extending into the openings, a disc cutter rotatably mounted on the carrier having a beveled periphery, a cutting edge on the cutter at the line of joinder of the beveled periphery and one side of the cutter to operate longitudinally of the casing, and means for operating the carrier in the guideway.

In witness that I claim the foregoing I have hereunto subscribed my name this 8th day of July, 1929.

FRANK SWITZER.