H. C. DENNING.

PARTING TOOL FOR WELL CASINGS.

APPLICATION FILED MAY 14, 1921.

1,413,522. Patented Apr. 18, 1922.

Fig. 1.

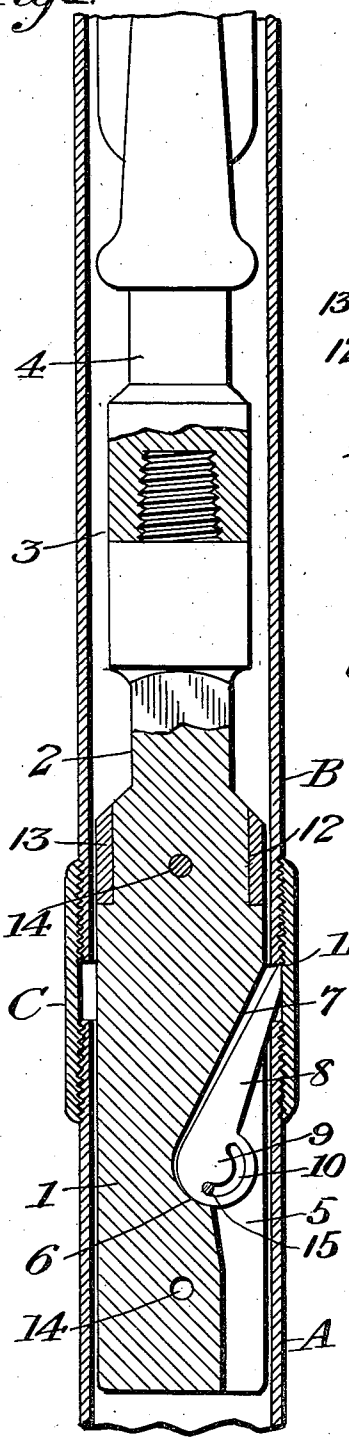


Fig. 2.

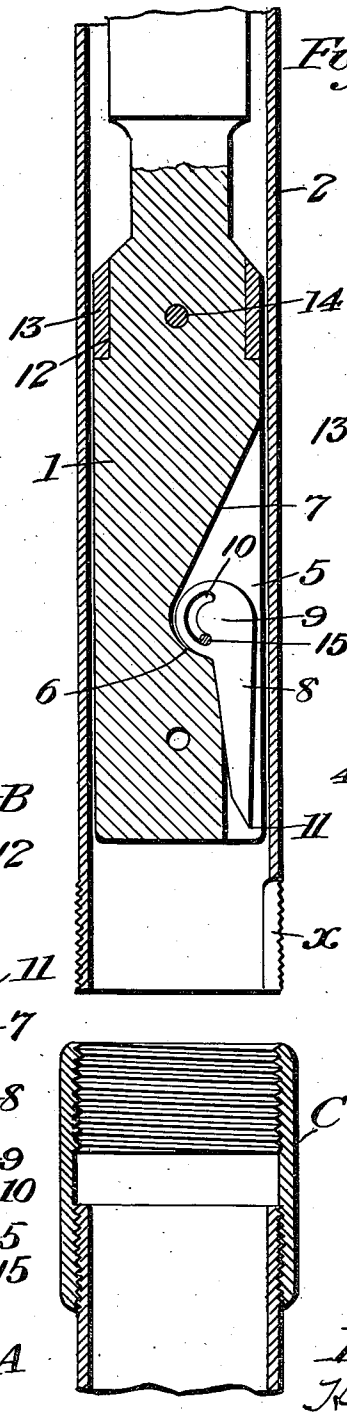


Fig. 3.

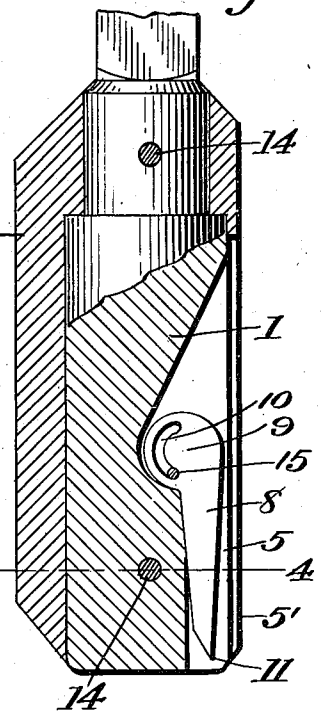
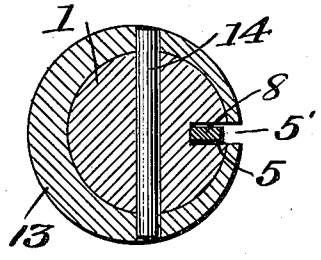


Fig. 4.



Inventor:

H. C. Denning

By Chas. J. Kiefer

Atty

UNITED STATES PATENT OFFICE.

HOMER C. DENNING, OF LANCE CREEK, WYOMING.

PARTING TOOL FOR WELL CASINGS.

1,413,522. Specification of Letters Patent. Patented Apr. 18, 1922.

Application filed May 14, 1921. Serial No. 469,430.

To all whom it may concern:

Be it known that I, HOMER C. DENNING, a citizen of the United States, residing at Lance Creek, in the county of Niobrara and State of Wyoming, have invented certain new and useful Improvements in Parting Tools for Well Casings; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to a special tool for slitting or cutting sections of casings of driven or bored wells to permit the casing to be "pulled" or withdrawn from the well, and to this end comprises a tool adapted to be attached to the lower end of the drill jars, or other suitable element, secured to the end of the cable or drill rope, said tool including a generally cylindrical body fitting the tubular well casing, having a longitudinal slot therein in which is mounted a blade having a cutting edge at its outer end and a pivotal connection within the slot at its inner end, so that, when the blade is turned to its upward position within the slot, the cutting edge thereof will be automatically projected beyond the walls of the slot and engage the lower edge of the casing section to be cut or slit, the cutting or slitting operation being effected by intermittent pulls or blows delivered to the tool by the operation of the drill rig, as will be more particularly pointed out hereinafter,

In the accompanying drawings:—

Fig. 1 is a vertical section through a portion of a well casing with the parting tool in operative relation therein;

Fig. 2 is a similar view showing the lower end of the casing section cut or slit and separated from the subjacent section;

Fig. 3 is a fragmentary view, partly in section, of the parting tool with a special thimble attachment applied thereto; and

Fig. 4 is a transverse section on line 4—4 of Fig. 3.

Referring to the drawings, 1 indicates the body of the parting tool which is preferably formed as a generally cylindrical element having a reduced neck or wrench portion 2 and a screw-threaded boss 3 on its upper end adapted to take in the screw-threaded socket in the lower member 4 of the usual set of drill jars employed in apparatus of this kind, which jars are operatively supported within the well casing, with the other elements of the tool string, from the cable or drill rope, which latter extends up through the casing to the operating rig. The body 1 of the tool is of sufficient diameter to allow a small clearance space between it and the inner walls of the casing.

The body 1 of the tool is provided with a longitudinal slot 5 extending from the bottom of the tool upwardly and having intermediate its length a rounded concavity forming an abutment 6, the bottom of the slot beyond said concavity being inclined outwardly as at 7.

Mounted for pivotal or swinging movement within the slot 5 is a cutting blade or knife 8, the inner end of which is provided with a generally circular enlargement 9 provided with an arcuate slot 10 to receive a pivot pin 15 passing transversely through the body 1. The outer end of the knife or cutting blade is provided with a cutting edge 11, as indicated. The body of the blade 8 is provided with a rear edge substantially tangential to the generally circular lower end of the knife, so that, when the knife is turned into its upper position, the back of the cutter blade will engage the inclined bottom 7 of the upper portion of the slot and the knife will lie wholly within the slot, so that the tool may be lowered in the casing. When the cutter blade or knife 8 is turned to its lowered or inoperative position it occupies the relation shown in Figs. 2 and 3 with the blade portion occupying the lower section of the slot, so that the knife lies wholly within the slot and admits of the tool being withdrawn from the casing.

As indicated, the tool is designed to cut or slit the lower end of a selected casing section to permit the same to be separated from the coupling, which unites it with the next subjacent section, to permit all of the casing sections above the slitted member to be withdrawn from the well. To effect this result the tool is attached to the lower member of the tool string of a standard drill ring, and preferably to the lower member of the jars, as indicated, with the cutter blade or knife 8 turned to its upper position, as indicated in Fig. 1, and the tool string lowered into the casing by the drill rope or cable until the parting tool is adjacent the particular casing section to be separated or parted from those lying below the same. During the downward movement of the tool string the knife or cutter blade 8 lies within the upper

portion of slot 5 and offers no obstruction to the movement of the tool string downwardly in the casing. When the tool reaches the lower end of the casing section to be operated upon, the movement of the drill rope or cable is reversed and the tool string moved upwardly, which has the effect of causing the outer cutting edge 11 of the knife or cutter blade 8 to move outwardly and engage the lower end of the casing section, such as B, where the latter engages the coupling member C which connects it with the subjacent casing section A. The upward pull or strain on the cable causes the cutting edge of the knife to wedge in between the lower end of the casing section B and the inner wall of the coupling C, and at the same time forces the body 1 of the tool into engagement with the opposite wall of the casing and effectively wedges the tool in position in the casing and prevents further downward movement thereof. Reciprocation of the drill rope will impart a series of impacts or hammer-like blows on the parting tool and cause the cutting edge of the knife 8 to slit the lower end of the casing section, as indicated at X in Fig. 2, so that the casing section may be readily disengaged from the coupling member C. During the cutting operation the heavy downward thrust imposed on the knife 8 is taken up by the engagement of the rounded part or lower section of the knife engaging the rounded abutment 6 formed in the bottom of the slot 5, as indicated in Fig. 1, so that no severe strains are put upon the pivot pin 15 which works freely in the arcuate slot 10. As soon as the pipe section B has been parted or separated from the coupling C, upward pull on the drill cable will cause the knife or cutter blade 8 to swing on its pivot 15 to the position shown in Figs. 2 and 3, with the blade extending downwardly and occupying the lower section of the slot 5, so that the tool may be readily withdrawn from the casing.

In order to adapt the tool for use in casings of different sizes, the upper portion of the tool body is provided with a reduced section 12 terminating in a shoulder to receive and support adapter thimbles of varying sizes to fit the various diameters of the casing sections. For example, in the embodiment of the invention shown in Figs. 1 and 2, in which the body of the tool 1 is of substantially the same diameter as the bore of the casing, the adapter collar 13 is employed only to carry out the normal contour of the tool and obviate sharp angles in the tool which might tend to cause jamming of the tool at the casing joints. In Fig. 3, however, the tool is adapted to be applied to a casing of larger diameter than that shown in Figs. 1 and 2, and to meet the exigencies of this case there is provided a thimble 13′ which substantially encloses the lower portion of the tool and is of substantially the same diameter as the bore of the casing. In order to maintain the cutter blade or knife 8, however, in proper relation to the end of the casing section to be cut or slit, the thimble 13′ is provided with an eccentric bore into which the tool body 1 fits and with a slot 5′ which registers with the slot 5 in the tool body which will admit of the cutting end of the knife, when the latter is in operative position, extending through the registering slots 5 and 5′ and properly engaging the end of the casing section. It will be understood that the adapter thimbles may be made in different sizes to operate in casings of various diameters, which will, therefore, enable a single standard parting tool to be employed for practically all sizes of casings, within reasonable limits. The thimble sections 13, 13′ are secured to the tool by means of the cross pin or pins 14 engaging registering holes in the tool body and the thimble.

In order to produce the most efficient cutting and ripping effect on the casing ends, the knife or cutter blade 8 in its operative position should be as nearly vertical as possible. On the other hand, the knife must be inclined sufficiently to produce a material lateral component of the thrust, when the knife is drawn into engagement with the casing end, to cause an effective binding or locking of the tool in the casing during the cutting operation, which latter is effected by successive impacts on the knife by the upward movements of the cable, after the knife has been engaged with the casing end at the point to be cut or ripped.

What I claim is:

1. A tool for cutting well casing sections comprising a tool body having a longitudinal slot therein, and an elongated blade having a cutting edge at its outer end and a pivotal connection at its inner end within said slot, said blade being normally supported at its pivot end in substantially upright position in said slot, whereby the outer end of the blade will engage and cut the end of the casing section when the tool is moved upwardly.

2. A tool for cutting well casing sections comprising a tool body having a longitudinal slot therein, an elongated blade having a cutting edge at its outer end and a pivotal connection within said slot approximately intermediate the ends of the latter, said slot having an abutment in its bottom cooperating with the end of the blade to receive the shock of impact on the tool when the latter is in upright position and moved upwardly to effect the cutting operation.

3. A tool for cutting well casing sections comprising a tool body having a longitudinal slot therein provided with a rounded con-

cavity intermediate its length, and a blade pivotally mounted in said slot, said blade having a cutting edge at its outer end and a rounded section at its inner end engaging the bottom of said concavity, said blade being normally supported at its pivot end in substantially upright position in said slot, whereby the outer end of the blade will engage and cut the end of the casing section when the tool is moved upwardly.

4. A tool for cutting well casing sections comprising a substantially cylindrical body portion having a longitudinal slot therein, a blade pivotally mounted in said slot and having an outer cutting edge, and auxiliary thimbles of varying diameters adapted to be mounted on the tool body to increase the diameter of the tool to substantially that of the interior of the casing sections.

5. A tool for cutting well casing sections comprising a substantially cylindrical body portion having a longitudinal slot therein, a blade pivotally mounted in said slot and having an outer cutting edge, and auxiliary thimbles of varying diameters adapted to be mounted on the tool body to increase the diameter of the tool to substantially that of the interior of the casing sections, said thimbles having eccentric bores into which the tool body fits and longitudinal slots registering with the slot in the tool body.

In testimony whereof I affix my signature.

HOMER C. DENNING.