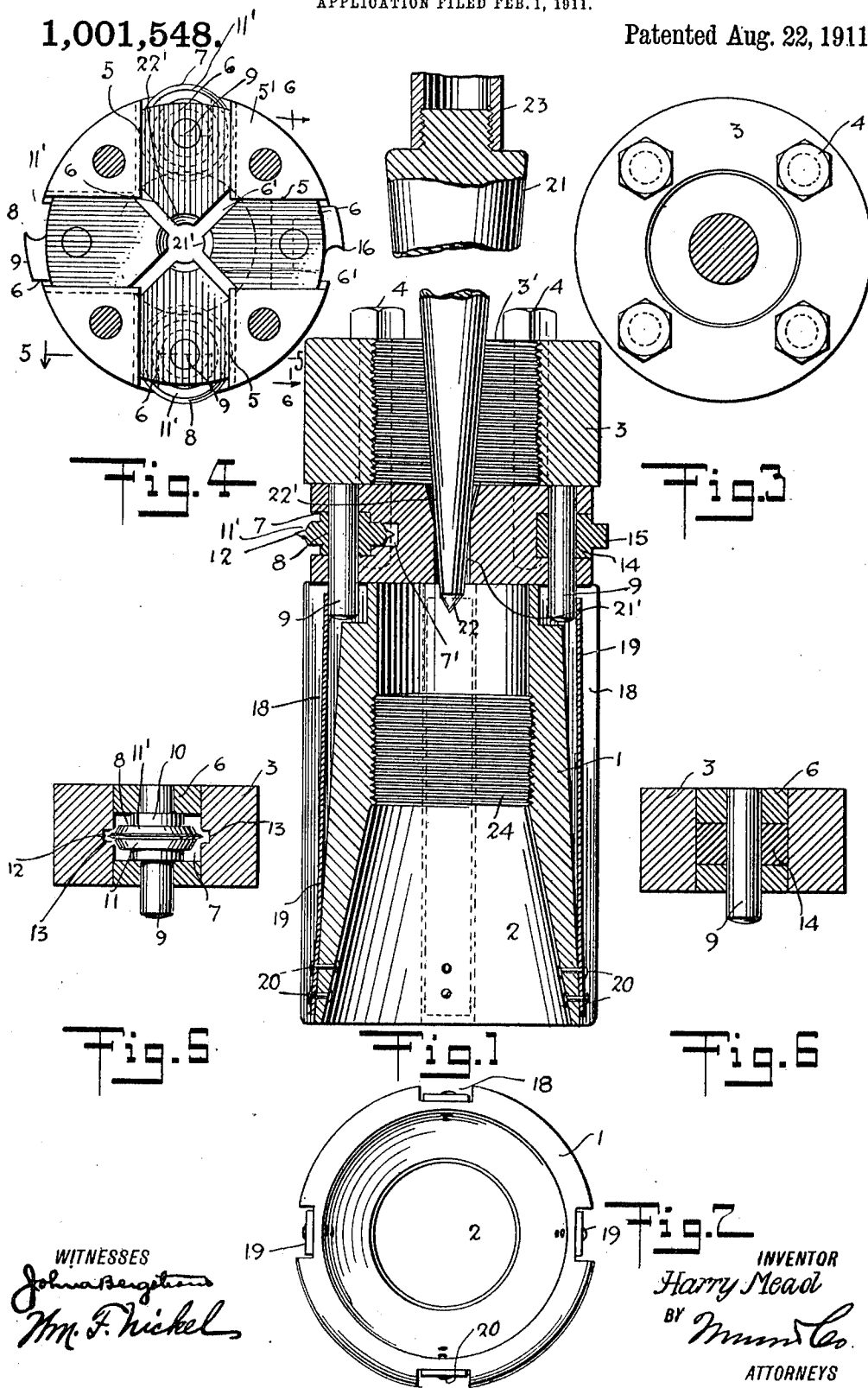


H. MEAD.
CUTTER FOR WELL CASINGS.
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UNITED STATES PATENT OFFICE.

HARRY MEAD, OF COALINGA, CALIFORNIA.

CUTTER FOR WELL-CASINGS.

1,001,548.

Specification of Letters Patent. Patented Aug. 22, 1911.

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To all whom it may concern:

Be it known that I, HARRY MEAD, a citizen of the United States, and a resident of Coalinga, in the county of Fresno and State of California, have invented a new and Improved Cutter for Well-Casings, of which the following is a full, clear, and exact description.

My invention is a cutter for removing the casings of oil wells and the like when for any reason the whole string of tubing constituting the said casing cannot be pulled.

It comprises a supporting head or frame in which is mounted a series of cutter wheels or disks and cutter knives, the number of disks being equal to the number of the knives in each case, and all the knives and disks being located in the same transverse plane. The disks are each provided with a central hub portion thicker than the body of the disks, the body terminating in a circumferential shoulder from which projects a sharp circumferential edge which serves to cut a groove on the interior surface of the casing, the edges of which groove are trimmed off by the cutter knives. The cutter knives are of substantially the same thickness as the cutter disks up to the first shoulder. If at any time the sharp edges of the disks should encounter a soft section of metal in the well casing, or tend to sink more deeply thereinto than is permitted by the conditions of working, the circumferential shoulder of the disks will arrest the disks, thus keeping the head of the cutter properly centered at all times in the casing and thus preventing the cutter from becoming jammed so that the cut clear around the side of the casing cannot be finished.

Reference is to be had to the accompanying drawings forming a part of this specification, in which the same characters of reference indicate the same parts in all the views.

Figure 1 is a longitudinal section of my improved cutter; Fig. 2 is a bottom plan thereof; Fig. 3 is a top plan of the cutter-head cap for the head that supports the carrying members in which the cutter wheels and cutter elements are held; Fig. 4 is a top plan of the main portion of the cutter head

with the cap removed, showing the carrier members with the cutter disks or wheels and the cutter knives in place; Fig. 5 is a section on the line 5—5 of Fig. 4, looking in the direction of the arrows; and Fig. 6 is a similar section on the line 6—6 of Fig. 4.

My cutter consists of a head 1, which is preferably cylindrical in form and has a longitudinal bore 2 passing longitudinally from end to end thereof. A cap is designated by the numeral 3, and this cap is held in position on the head 1 by means of bolts or screws 4. The cap also has a perforation extending longitudinally therethrough, and this perforation is internally threaded to receive the end of the member which operates the cutter. The head 1 has a series of transverse recesses or notches through its wall at the top, these notches forming in effect transverse passages 5, separated by three-cornered projections 5'. These three-cornered projections receive the binding screws or bolts 4. The transverse passages 5 are shown as four in number and they are diametrically arranged, but I may use a smaller or greater number if desired. These transverse passages 5 receive carrying members 6, in the outer face of which the cutter wheels and the cutting-knives, presently to be described, are mounted. The outer sides of these carrying members are curved to correspond to the outer curvature of the head, and their inner ends are beveled, as shown at 6', and terminate in a concave end surface which is cylindrical for a portion of its length, as shown at 21', and the remaining surface of the end has a conical cavity therein, as shown at 22'.

Each of the blocks 6 has a recess 7 in its outer face, these recesses being cut in a plane which is transverse to the longitudinal axis of the cutter head. The recesses in the carrying blocks which receive the cutter knives are of the same size throughout, but the recesses in the other carrying members which serve to retain the cutter wheels in place are not of the same dimensions throughout, but are each provided with a reduced extension 7' in the inner wall thereof. Half of the number of carrying members 6 are provided with cutter disks 8, mounted therein and re-

ceived by the recesses 7. The other carrying members receive the trimmers or cutters 14, each of which has a projecting cutter or trimmer blade 15 which terminates in a sharp edge 16. Pins 9 are shown passing through the cutter disks and the cutter knives or elements 15 to hold the same firmly in place.

Each of the cutter disks comprises a hub 10, which projects centrally from the body 11. The body 11 is of less thickness than the central hub and it terminates in an inclined circumferential shoulder 11', from which projects a shaft circumferential edge 12. This circumferential edge 12 is of slightly greater diameter than the length of the transverse recess 7 in the block 6, and is received in slots 13 in the sides of the extension 5'. The inner portion of the body 11 of the disk fits snugly into the bottom recess 7' in each of the blocks 6, so that the main recess 7, with its extensions 7', and the slots 13 in the sides of the extensions 5' of the body 1, form an open space in which the cutter disk 8 is received as snugly as possible while permitting free rotation.

In the sides of the lower portion of the head 1 are longitudinal recesses 18, in which are mounted flat springs 19, being secured at their lower ends by studs or rivets 20. These springs engage the lower ends of the pins 9 to hold the carrier members 6 in place and at the same time permit a certain amount of transverse outward movement.

21 is a mandrel having a conical end terminating in a point 22, which is normally in contact with the concave ends of the block 6.

23 is the end of a rod screw-threaded on a terminal boss attached to the mandrel 21. By raising or lowering this mandrel the blocks 6, with the cutter disks and cutter knives, are forced gradually from the center of the cutter outward, when the cutter is in operation. The lower part of the longitudinal bore 2 of the cutter is shown as provided with screw-threads 24.

In operation, when for any reason it is desired to cut through the side of a well casing, the cutter is lowered into the well casing until it reaches the desired point, and then the mandrel 21 is forced down to spread the carrying members 6 away from the center, and spreads the carrying members 6 outward until the edges of the cutter disks engage the interior wall of the casing. The operating rod which engages the cap 3 by means of the screw-threads 3' is then turned, causing the cutter head with the cutter disks and cutter blades to rotate on its longitudinal axis. The cutter disks 8 mark a groove around the interior surface of the casing, and a bur usually forms along the edges of this groove. The cutter blades following the wheels remove the bur, trimming

the edges of the groove off smoothly, and the back part of the knives bears on the interior of the tube at the sides of the groove as the cutter revolves. The continuous removal of this bur, as fast as it is formed, prevents the pinching of the edges of the cutter disks by the metal of the tube as the disks cut in farther. It will be understood that the point of this cutter blade 16 extends outward to a slightly less extent than the sharp edge of the disks 8. When in position, the circumferential shoulders 11' of the cutter disks extend outwardly to a slight extent beyond the outer faces of the carrying members 6. If a portion of the side of the casing should be encountered wherein the metal is softer than usual, so that the sharp edges of the cutter disks tend to bury themselves in the metal, the disks are arrested by the circumferential shoulders 11', and the apparatus is thus prevented from being jammed against further rotation. At the same time the sharp edges of these cutter disks continue cutting the groove or guideway, and the cutting action of my device is positive and certain. The cutter disks and the cutter knives also keep the cutter head properly centered, and the wall of the casing is cut through along the line of the first marking, which lies in a certain and definite transverse plane.

While I have shown and described my cutter as designed for use in the casings of wells, it is obvious that I may use it to cut sections of tubing. To this end I may insert a bar having a threaded end in the portion of the bore 2 bearing the threads 24. This bar will serve as a guide bar, by means of which the cutter head can be introduced into the pipe or tubing to be severed, and by using bars of various lengths, the point at which the cut through the pipe or tubing is to be made can be accurately gaged.

I have shown two cutter disks and two cutter knives, but I may use more knives and more cutters, or I may use a single knife and cutter if required.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a cutter for well casings and the like, the combination of a head, cutter means carried by the head and having a sharp edge projecting beyond the outside diameter thereof, and trimming means carried by the head, said trimming means also being provided with a sharp edge projecting beyond the outside diameter of the head, to trim the edges of the cut or groove made by the cutter means.

2. In a cutter for well casings and the like, the combination of a head, cutter means carried by the head and terminating in a sharp edge which projects beyond the outside diameter of the head, and trimming

means carried by the head, terminating in a blade which also projects beyond the outside diameter of the head, to trim the cut or groove made by the cutter means.

3. In a cutter for well casings and the like, the combination of a head, disk-shaped cutter means carried by the head, said cutter means having a shoulder adjacent to the circumference and having a sharp circumferential edge which projects beyond the outside diameter of the head, and trimming means carried by the head, terminating in a sharp blade which also projects beyond the outside diameter of the head, said blade and the cutter means up to the shouldered portion being of substantially the same thickness.

4. In a cutter for well casings and the like, the combination of a head, rotatable disk-shaped cutter means carried by the head, said cutter means having a shoulder adjacent to the circumference and having a sharp circumferential edge which projects beyond the outside diameter of the head, and trimming means carried by the head, terminating in a sharp blade which also projects beyond the outside diameter of the head, said blade and the cutter means up to the shoulder being of substantially the same thickness.

5. In a cutter for well casings and the like, the combination of a head, rotatable disk-shaped cutter means carried by the head, said means having a shoulder adjacent to the circumference and having a sharp circumferential edge, said shoulder projecting beyond the outside diameter of the head, and trimming means carried by the head, terminating in a sharp blade which also projects beyond the outside diameter of the head, said blade and the cutter means up to the shoulder being of substantially the same thickness.

6. In a cutter for well casings and the like, the combination of a head, rotatable disk-shaped cutter means carried by the said head, said means comprising a thick central hub portion and a main disk portion having a circumferential shoulder and a sharp circumferential edge, the main disk portion and a section of the said shoulder being adapted to project beyond the outside diameter of the cutter head, and a trimming blade carried by said head and also projecting beyond the outside diameter of the head, the cutter means up to the shoulder and the blade being of substantially the same thickness.

7. In a cutter for well casings and the like, the combination of a head, rotatable disk-shaped cutter means carried by the head, said means consisting of a main disk portion terminating in a circumferential shoulder and a sharp edge, a section of the circumferential shoulder of said disk-shaped

cutter means being adapted to project beyond the outside diameter of the head, a trimmer having a blade carried by said head, said blade also projecting beyond the outside diameter of the head, said blade and the cutter means up to the shoulder being of substantially the same thickness, and carrying members for the cutter means and the trimmer blade, said carrying members being slidably mounted in the said head to permit their radial outward movement from the center.

8. In a cutter for well casings and the like, the combination of a head, rotatable disk-shaped cutter means carried by the head, said means consisting of a main disk portion terminating in a circumferential shoulder and a sharp edge, a section of the circumferential shoulder of said disk-shaped cutter means being adapted to project beyond the outside diameter of the head, a trimmer having a blade carried by said head, said blade also projecting beyond the outside diameter of the head, said blade and the cutter means up to the shoulder being of substantially the same thickness, carrying members for the cutter means and the blade, said carrying members being slidably mounted in the said head to permit their radial outward movement from the center, and retaining springs connected with the head and engaging the carrying members to hold them in place.

9. In a cutter for well casings and the like, the combination of a head, rotatable disk-shaped cutter means carried by the head, said means consisting of a main disk portion terminating in a circumferential shoulder and a sharp edge, a section of the circumferential shoulder of said disk-shaped cutter means being adapted to project beyond the outside diameter of the head, a trimmer having a blade carried by said head, said blade also projecting beyond the outside diameter of the head, said blade and cutter means up to the shoulder being of substantially the same thickness, carrying members for the cutter means and the blade, said carrying members being slidably mounted in the said head to permit their radial outward movement from the center, retaining springs connected with the head and engaging the carrying members to hold them in place, and means entering the head and engaging the carrying members at their inner ends to spread them outward when the cutter is in operation.

10. In a cutter for well casings and the like, the combination of a head, cutter disks carried by the head, each having a circumferential shoulder and terminating in a sharp circumferential edge which projects beyond the outside diameter of the head, and cutting and trimming blades carried by the head, the cutter disks and trimming blades being

equal in number and alternately arranged
in the head, the trimming blades also pro-
jecting beyond the outside diameter of the
head and being of substantially the same
5 thickness as the cutter disks up to the shoul-
der thereof.

In testimony whereof I have signed my

name to this specification in the presence of
two subscribing witnesses.

HARRY MEAD.

Witnesses:

H. P. JAYNE,

H. L. PIERCE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."