May 8, 1923. 1,454,819

W. H. JONES ET AL

COMBINATION CASING CUTTER, OVERSHOT, AND MILLING TOOL

Filed Nov. 18, 1921

Fig. 1.

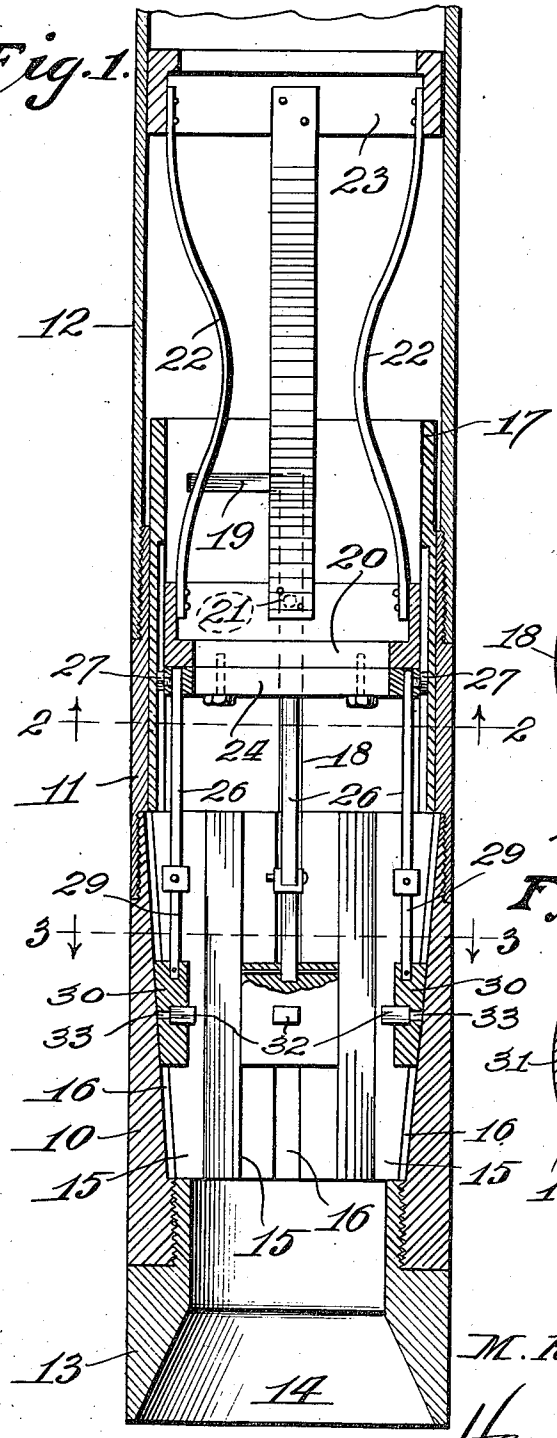


Fig. 4.

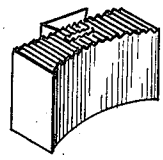


Fig. 2.

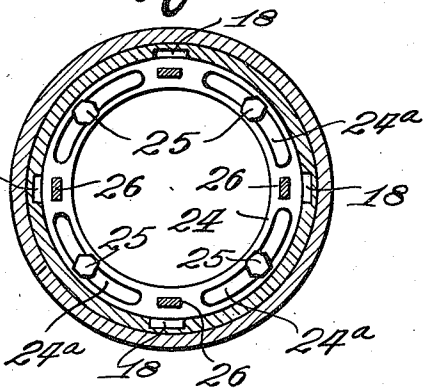
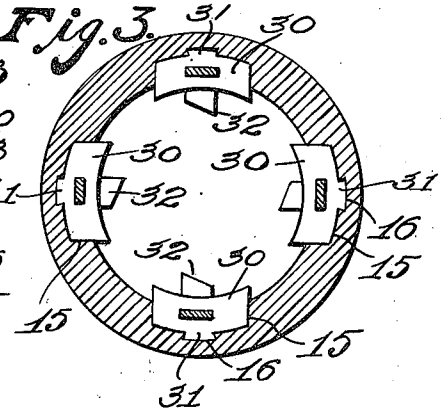


Fig. 3.



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UNITED STATES PATENT OFFICE.

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COMBINATION CASING CUTTER, OVERSHOT, AND MILLING TOOL.

Application filed November 18, 1921. Serial No. 516,151.

To all whom it may concern:

Be it known that we, WILLIAM H. JONES and MARCUS KINNEBREW, citizens of the United States, residing at Fellows, in the county of Kern and State of California, have invented new and useful Improvements in Combination Casing Cutters, Overshots, and Milling Tools, of which the following is a specification.

Our invention relates to a combination casing cutter, overshot and milling tool, the principal objects of our invention being to generally improve upon and simplify the construction of existing forms of similar devices, to provide a combination tool that may be advantageously utilized for either cutting drill pipe and removing that portion above the cut, for performing "fishing" operations that are sometimes necessary to effect the removal of broken sections of drill pipe or parts of tools, or for milling off the lower half of the collar that is utilized as a connection between two sections of drill pipe.

Further objects of our invention are to provide a combination casing cutter, overshot and milling tool that is of relatively simple structure, capable of being easily and cheaply produced and which will be very effective in performing its intended functions.

With the foregoing and other objects in view, our invention consists in the features of construction and combination and arrangement of parts hereinafter more fully described and claimed, reference being had to the accompanying drawings, wherein—

Figure 1 is a vertical section taken through the center of a combination tool of our improved construction;

Figure 2 is a horizontal section taken approximately on the line 2—2 of Figure 1;

Figure 3 is a horizontal section taken approximately on the line 3—3 of Figure 1;

Figure 4 is a perspective view of one of the milling tools utilized in our improved combination tool.

Referring by numerals to the accompanying drawings, which illustrate a practical embodiment of our invention, 10 designates the main body of the tool, the same being tubular in form and having its upper end externally threaded in order to receive the internally threaded lower end of a tubular coupling member 11, the latter having its upper end portion externally threaded in order to receive the internally threaded lower end of a section 12 of casing.

Screw seated in the lower end of the body 10 is the upper portion of a short cylindrical bushing 13, the lower portion of the opening through which is flared outwardly toward its lower end as designated by 14, in order to provide a tapered guide whereby the lower end of the tool may be readily manipulated and positioned over the upper end of a section of drill tube or the like.

Formed in the inner face of body 10 are vertically disposed grooves or channels 15, the bottoms of which are inclined, so that the lower ends thereof are nearer to the axis of the tool than their upper ends, and formed in the bottoms of said grooves 15 are centrally arranged shallow dovetailed grooves 16. Fixed to coupling member 11 in any suitable manner, preferably by means of rivets, is a tubular guide 17 that projects a short distance above the upper end of said coupling member 11, and formed on the inner face of said guide member and at diametrically opposite points are vertically disposed slots 18, the upper ends of a pair of which communicate with horizontally disposed slots, such as 19. Loosely arranged within tubular guide 17 is a ring 20 and projecting outwardly from the upper portion thereof are pins such as 21 that normally occupy the vertically disposed slots 18 and which are adapted to enter the horizontally disposed slots 19. Secured to ring 20 are the lower ends of inwardly bowed springs 22, the upper ends thereof being secured to a ring 23 that is adapted to frictionally engage the inner surface of the casing 12, to which the tool is applied.

Positioned against the under side of ring 20 is a link supporting ring 24 in which is formed a series of arcuate slots 24ª, and passing through said slots are the shanks of headed bolts 25, the threaded ends of which bolts are seated in the lower portion of ring 20. The heads of these bolts 25 are positioned directly against the under side of ring 24. Seated in vertically disposed apertures that are formed in the under side of ring 24 are the upper ends of vertically disposed rods or links 26, and the latter are secured to ring 24 by short bolts, such as 27, and the heads of the latter occupy and are adapted to slide vertically through grooves 18.

Pivotally connected to the lower ends of

the rods or links 26 are the upper ends of short vertically disposed links 29 and detachably secured to the lower ends of said links 29 are blocks 30 that are arranged for sliding movement in the vertically disposed grooves 15, and each block is provided on its rear face with a dovetailed rib 31 that occupies the corresponding dovetailed groove 16. Removably seated in each block 30 is a small cutting member 32 of hardened metal, and formed through each block 30 to the rear of the recess in which the cutter is seated is an aperture 33 which permits the insertion of a tool to drive the cutter out of the block in which it is seated.

To set the tool for cutting and removing drill pipe or the like, rings 20 and 24 and parts carried thereby are moved upwardly until the pins 21 are out of the upper ends of the grooves 18, whereupon the parts are turned so that pins 21 are positioned at the ends of the horizontally disposed grooves 19. With the parts thus positioned, the cutter carrying blocks 30 will occupy positions at the upper ends of grooves 15 and at their greatest limit of movement away from the axis of the tool. The tool is now manipulated so that it receives the drill tube to be cut, and when the tool has been lowered to the point where the cut is to be made, said tool carried by the lower end of the casing 12 is rotated so that pins 21 are positioned at the upper ends of the grooves 18 and the entire tool is now pulled upwardly until the cutters 32 carried by the blocks 30 engage the surface of the drill pipe to be cut, and casing 12 carrying the tool is simultaneously rotated and pulled upward, which action forces the cutters 32 into and through the wall of the drill pipe. After the tool has been positioned over the pipe to be cut and said pipe is engaged by the springs 22, and when the tool is elevated with respect to the pipe, the body of the tool, including the tubular member 17, will be drawn upwardly independently of the rings 20 and 24, and following such action the cutter carrying blocks 30 will travel downwardly in the grooves 15, and as the bottoms of the latter are inclined the cutter carrying blocks will be moved toward each other until the periphery of the drill tube is engaged by the cutters 32. When the wall of the drill pipe has been completely severed, that portion of the pipe above the tool may be withdrawn from the well as casing 12 is elevated, and during such operation the lower end of the drill tube rests on top of the cutters 32.

Where the tool is used for fishing operations, the cutting members 32 are removed from the blocks 30 and the tool is lowered until the blocks are positioned below one of the collars on the drill tube and by pulling the tool upwardly the blocks 30 will engage beneath the collar and, consequently, elevate the broken section of the drill pipe from the well.

When it is desired to cut away or mill off the lower portion of a collar that connects an adjacent pair of drill pipe sections, milling cutters or tools of the type illustrated in Figure 4 are arranged in the grooves 15 and 16 at the lower ends of rods 29, and when the tool is raised the cutting teeth on the upper edges of the milling tools engage the lower portion of the collar and as the tool is rotated the lower half of said collar will be milled or cut away, thereby permitting that portion of the drill pipe above the milled collar to be removed.

The heads of bolts 27 that occupy the vertically disposed grooves 28 are for the purpose of holding the link ring 24 in position and to avoid any side strain on the links 26 and 29 while turning the ring 20 to set or trip the tool. The friction springs 22 serve to hold the cut portion of the pipe in central position while it is being elevated from the well or drill hole.

Thus it will be seen that we have produced a relatively simple structure that may be advantageously employed as an overshot fishing tool, as a drill tube cutter, or as a tool for milling off the lower portion of a collar that is utilized between drill pipe sections.

Various changes in the size, form and construction of the various parts of our improved combination tool may be made and substituted for those herein shown and described without departing from the spirit of our invention, the scope of which is set forth in the appended claims.

We claim as our invention:

1. In a combination tool, an elongated tubular member, a pair of rings arranged for vertical movement in the upper portion of said tubular member, the lower one of which rings is mounted for limited rotary movement upon the upper ring, springs secured to the upper ring and adapted to engage a member to which the tool is applied, links depending from the lower ring, and cutter carrying blocks carried by said links.

2. In a combination tool, an elongated tubular member, a pair of rings arranged for vertical movement in the upper portion of said tubular member, the lower one of which rings is mounted for limited rotary movement upon the upper ring, springs secured to the upper ring and adapted to engage a member to which the tool is applied, links depending from the lower ring, cutter carrying blocks carried by said links, said blocks being arranged for sliding movement in grooves formed in the lower portion of the tubular member, and the bottoms of which grooves are inclined so that said blocks move inwardly toward each other as

they travel downwardly through said grooves.

3. In a combination tool, an elongated tubular member in the lower portion of which is formed a series of longitudinally disposed grooves, the bottoms of which are inclined, cutter carrying blocks arranged for sliding movement in said grooves, links carrying said blocks, a ring arranged for longitudinal and rotary movement within the upper portion of the tubular member, which ring supports said links, and means for retaining said ring in elevated position within said tubular member.

4. In a combination tool, an elongated tubular member in the lower portion of which is formed a series of longitudinally disposed grooves, the bottoms of which are inclined, cutter carrying blocks arranged for sliding movement in said grooves, links carrying said blocks, a ring arranged for longitudinal and rotary movement within the upper portion of the tubular member, which ring supports said links, means for retaining said ring in elevated position within said tubular member, and means associated with said ring for frictionally engaging a member to which the tool is applied.

5. In a combination tool, a tubular body in the lower portion of which is formed a series of longitudinally disposed grooves, the bottoms of which are inclined, there being dovetailed grooves formed in the bottoms of said first mentioned grooves, cutter carrying blocks arranged for sliding movement within the first mentioned grooves and having dovetailed ribs on their rear faces which engage in said dovetailed grooves, links to which said cutter carrying blocks are detachably connected, and a ring arranged for rotary and longitudinal sliding movement within the upper portion of the tubular body.

6. In a combination tool, a tubular body in the lower portion of which is formed a series of longitudinally disposed grooves, the bottoms of which are inclined, there being dovetailed grooves formed in the bottoms of said first mentioned grooves, cutter carrying blocks arranged for sliding movement within the first mentioned grooves and having dovetailed ribs on their rear faces which engage in said dovetailed grooves, links to which said cutter carrying blocks are detachably connected, a ring arranged for rotary and longitudinal sliding movement within the upper portion of the tubular body, and means for holding said ring and the cutter carrying blocks at their upper limit of movement within said tubular body.

7. In a combination tool, a tubular body in the lower portion of which is formed a series of longitudinally disposed grooves, the bottoms of which are inclined, there being dovetailed grooves formed in the bottoms of said first mentioned grooves, cutter carrying blocks arranged for sliding movement within the first mentioned grooves and having dovetailed ribs on their rear faces which engage in said dovetailed grooves, links to which said cutter carrying blocks are detachably connected, a ring arranged for rotary and longitudinal sliding movement within the upper portion of the tubular body, means for holding said ring and the cutter carrying blocks at their upper limit of movement within said tubular body, and springs associated with said ring for frictionally engaging the member that is received by the tool.

8. In a combination tool, an elongated tubular member, a pair of rings arranged for vertical movement in the upper portion of said tubular member, the lower one of which rings is mounted for limited rotary movement upon the upper ring, springs secured to the upper ring and adapted to engage a member to which the tool is applied, links depending from the lower ring, and cutter carrying blocks carried by said links.

9. In a combination tool, an elongated tubular member, cutter carrying blocks arranged for sliding movement in said body, links carrying said blocks, a ring arranged for longitudinal and rotary movement within the upper portion of the tubular member, which ring supports said links, means for retaining said ring in elevated position within said tubular member, and means associated with said ring for frictionally engaging a member to which the tool is applied.

10. In a combination tool, a tubular body in the lower portion of which are cutter carrying blocks arranged for sliding movement, links to which said cutter carrying blocks are detachably connected, a ring arranged for rotary and longitudinal sliding movement within the upper portion of the tubular body, and means for holding said ring and the cutter carrying blocks at their upper limit of movement within said tubular body.

11. In a combination tool, a tubular body, cutter carrying blocks arranged for sliding movement within the body, links to which said cutter carrying blocks are detachably connected, a ring arranged for rotary and longitudinal sliding movement within the upper portion of the tubular body, means for holding said ring and the cutter carrying blocks at their upper limit of movement within said tubular body, and springs associated with said ring for frictionally engaging the member that is received by the tool.

In testimony whereof we have signed our names to this specification.

MARCUS KINNEBREW.
WILLIAM H. JONES.