

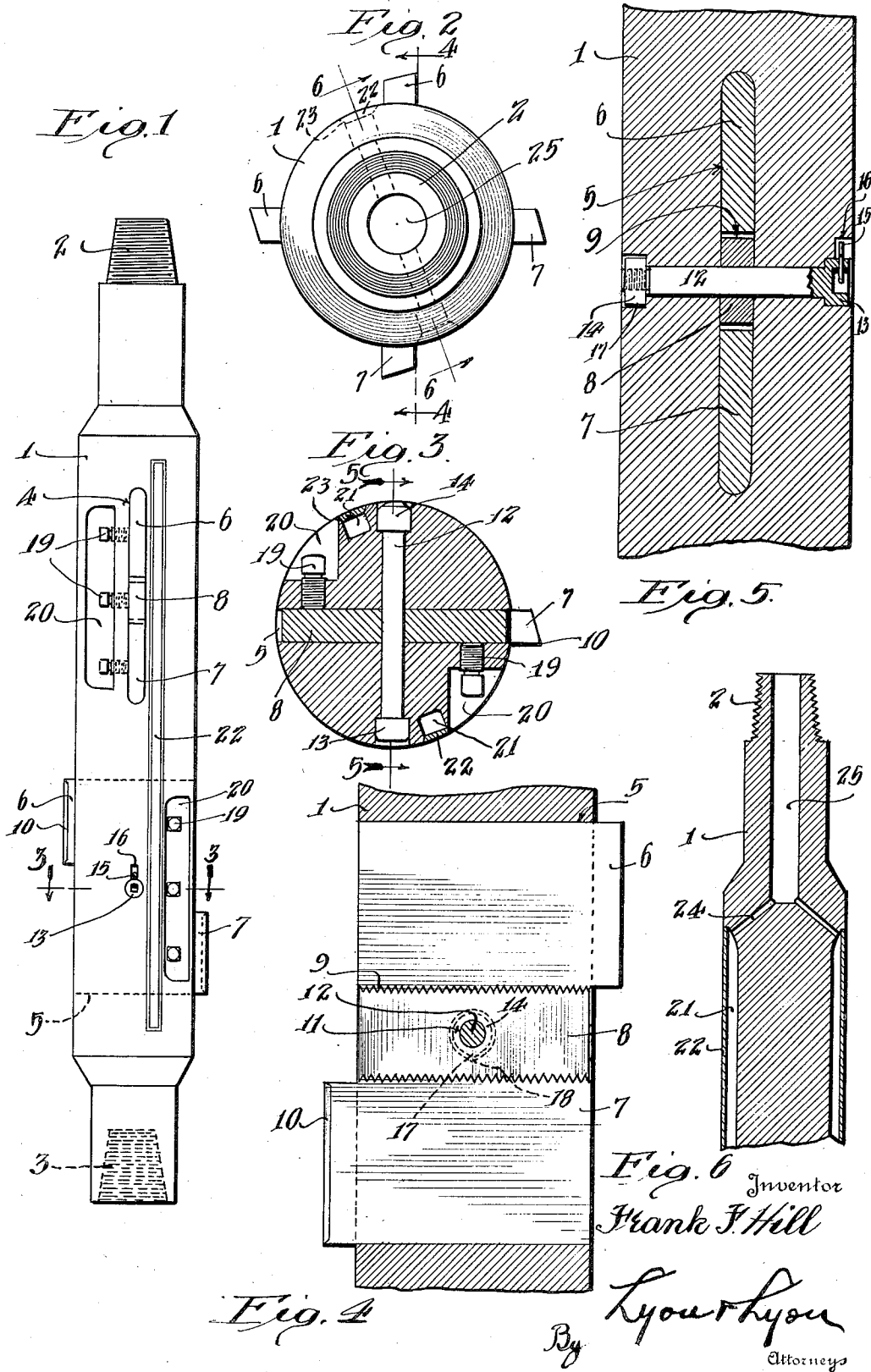
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WELL REAMER

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WELL REAMER.

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This invention relates to a well reamer of the type employed for reaming or straightening up a well hole after the drilling operation. Tools for this purpose are usually known as "flat reaming bits" or "fourway reaming bits" and as the wear on the edges of these tools is considerable they must be continually redressed so as to maintain them of the proper gage. The fourway type of reaming bit also puts considerable strain upon the drill pipe because of the relatively large amount of contact with the wall of the hole in reaming. The general object of this invention is to produce a well reamer of simple construction with cutters mounted in the body of the tool in different positions or in a different relation so that they can be readily set to a desired diameter, and this without necessitating the constant redressing of the tool; also to provide a tool of this type in which the cutters can be very readily dressed or sharpened when desired.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient well reamer.

A preferred embodiment of the invention is described in the following specification while the broad scope of the invention is pointed out in the appended claims.

Figure 1 is a side elevation showing a well reamer embodying my invention.

Fig. 2 is a plan of the well reamer shown in Fig. 1 but upon an enlarged scale.

Fig. 3 is a horizontal cross section upon an enlarged scale taken on the line 3—3 of Fig. 1.

Fig. 4 is a vertical section through the reamer taken about on the line 4—4 of Fig. 2 with the upper and lower portions of the body broken away.

Fig. 5 is a vertical section taken on the line 5—5 of Fig. 3.

Fig. 6 is a vertical section taken through the upper portion of the body of the reamer on the line 6—6 of Fig. 2, and particularly illustrating the construction of the water ducts for carrying the circulating water through the tool, the lower portion of the body being broken away.

In practicing the invention I provide an elongated body 1 which may have the usual tapered pin 2 at its upper end and tapered box 3 at its lower end to enable the tool to

be connected in a drill pipe or drill string.

I also provide a cutter plate together with means for securing the same in, or to, this body 1, and mount the cutter plate with its cutting edge projecting from the body so that the cutter will operate to scrape the wall of the hole when the body is rotated on its longitudinal axis. I prefer to provide a plurality of cutter plates and construct them in such a way that they can be readily mounted in a plurality of different extended positions; this enables them to be set any desired diameter. These cutter plates are preferably mounted diametrically on the body and are preferably arranged in sets, there being two cutter plates in each set. Each set or pair of cutter plates is mounted in its transverse slot so that each plate of the pair is displaced from the other in a direction longitudinally of the body of the tool. And I provide interlocking means between the plates enabling them to be interlocked in a plurality of different adjusted positions with the cutting edge of each plate projecting on one side of the body.

In order to accomplish this I provide the body 1 with one or more transverse slots. In the present instance I provide two transverse slots 4 and 5 which are disposed in intersecting planes. Where there are only two slots as illustrated the planes of the slots should be at right angles to each other. I provide two cutter plates 6 and 7 corresponding to the lower slot 5 (see Fig. 4) and provide similar cutter plates in the upper slot 4.

The construction at one slot is the same as at the other and hence it will suffice to describe in detail the preferred construction at the slot 5.

Associated with the cutter plates 6 and 7 I provide interlocking means for holding the cutter plates in fixed relation with respect to each other. This interlocking means, in the present instance, is in the form of a locking plate 8; the two plates 6 and 7 and also the locking plate 8 are constructed with interlocking means which may be in the form of a row of uniform teeth placed along the adjacent edges of the plates; that is to say, the plate 2 is disposed between the two cutter plates and has V-shaped teeth on its upper and lower edges which mesh with similar V-shaped teeth on the adjacent edges of the cutter plates.

Before placing the cutters in the slot they

are applied to the locking plate so that their cutting edges 10 project an equal amount from the ends of the locking plate 8, and after being set together in this way the plates are slid longitudinally into the slot 5. At the middle point of the locking plate 8 a recess or opening 11 is provided with which cooperates means for securing the locking plate in place. This means, of course, also operates to hold the plates 6 and 7 against longitudinal movement because the upper and lower edges respectively of these plates engage the edges of the slot 5 which are preferably rounded as shown in Fig. 5. I prefer to employ a through bolt 12 which is diametrically disposed in the body 1 at right angles to the plane of the slot 5, and passes through the opening 11. This bolt has a nut 14 at one end which is counter-sunk into the side of the body and its other end is provided with a socket head 13 which is also counter-sunk into the body, and this head is provided with a split pin 15 which is received in a recess 16 (see Fig. 5)) which operates as a lock nut to prevent the bolt from working loose. Any suitable lock-nut device may be employed for this purpose. For convenience in manufacture, the nut 14 is made of substantially round form but is provided with a slight projection or toe 17 which is received in a corresponding recess 18 (see Fig. 4) and this prevents the nut from rotating on its axis. The socket in the head 13 may be a hexagon or of square form.

In order to assist in adjusting the plates into their proper position and also to prevent their chattering when in use, I provide a set screw 19 corresponding to each of the plates, and these set screws are mounted in a row with their heads received in an elongated recess 20 cut in the side of the body (see Fig. 3).

I provide improved means for carrying the circulating water from end to end through the body 1 of this tool. This means is particularly useful in a tool of this type because it obviates the necessity for drilling longitudinally through the body; while this improvement is especially adapted to use with this tool, evidently, it may be used in any kind of a tool where it is desired to provide special means for carrying the circulating water through the tool.

In order to accomplish this I provide a gutter or preferably a pair of gutters 21 which are formed in the outer face of the body 1. These gutters are located at points on the face of the body between the openings at the ends of the slots, and may be formed diametrically opposite to each other as shown in Fig. 3; they may be produced by milling a channel in the outer face of the body. After the milling operation these channels are sealed or closed on their outer

sides in any suitable manner, for example, by providing a cover plate 22 for each channel. These cover plates are welded in position, and if desired, to facilitate this welding operation the side walls of the channels may be provided with beveled faces 23 (see Fig. 2) and the plates 22 may be provided with oppositely beveled faces so that the effect of a small V-shaped groove is formed on each side of the plate. This groove is utilized to receive the welding metal.

However, before sealing the channels or grooves 21 in this way, inclined connecting passages 24 are drilled in from the ends of the channels to open communication with the bores 25 which are formed at the upper and lower ends of the tool body, but which are otherwise independent of each other.

A tool constructed in accordance with this invention will last indefinitely if the cutter plates are adjusted and redressed when necessary. In order to redress them or sharpen them, they should, of course, be removed from the body. Their simple form greatly facilitates the redressing and sharpening operations.

Furthermore, the cutters can be set to any required cutting diameter which gives each reamer tool a wider range of usefulness than when constructed of one piece. The tool attains all the desirable cutting effects of a fourway reamer, but avoids the disadvantages of that particular type of tool. When the cutters have become so worn that they cannot be used further, they can, of course, be removed and new cutters substituted.

It is understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take and I do not wish to be limited in the practice of my invention nor in my claims to the particular embodiment set forth.

I claim:

1. In a well reamer, the combination of a body having a transverse slot, a pair of plates mounted in the slot and displaced one beyond the other longitudinally of the body and having interlocking means for engaging the edges of said plates to enable the plates to be adjusted into a plurality of different extended positions with the cutting end of each plate projecting beyond the side of the body, and means for securing the plates against movement within the body.

2. In a well reamer, the combination of a body, a pair of cutter plates and a locking plate disposed in substantially the same plane therewith, said cutter plates and said locking plate having interlocking means co-operating to enable the cutter plates to be held in different extended positions, and means for securing the plates to said body.

3. In a well reamer, the combination of a

body, a pair of cutter plates, a locking plate, said cutter plates and said locking plate having interlocking teeth on their adjacent edges cooperating to enable the cutter plates to be held in different extended positions, and means for securing the plates to said body.

4. In a well reamer, the combination of a body having a transverse slot, a pair of cutter plates, a locking plate, said cutter plates and said locking plate having interlocking teeth on their adjacent edges cooperating to enable the cutter plates to be held in different extended positions, and means for securing the plates in the transverse slot.

5. In a well reamer, the combination of a body having a plurality of transverse slots disposed respectively in intersecting planes, each slot having a pair of cutter plates and a locking plate between them, the adjacent edges of the locking plate and cutter plates having interlocking teeth cooperating to enable the cutter plates to be held in different

positions, and means for securing the plates in their slots.

6. In a well reamer, the combination of a body, having a transverse slot, a pair of cutter plates disposed in the slot with a locking plate between the cutter plates, said cutter plates and locking plates having interlocking means, and means mounted in the body for securing the locking plate and the cutter plates in the slot.

7. In a well reamer, the combination of a body having a transverse slot, a pair of cutter plates with a locking plate disposed therebetween, said cutter plates and locking plate having interlocking means operating to prevent movement of the cutter plates in the slot and relative to the locking plate, a through bolt passing through the locking plate having its head countersunk into the body and a lock nut on the other end of the through bolt countersunk into the body.

Signed at Los Angeles, Calif., this 12th day of October, 1924.

FRANK F. HILL.