May 23, 1933. W. A. ABEGG 1,909,925

DRILLING BIT

Filed June 5, 1929 2 Sheets-Sheet 1

Fig. 1.

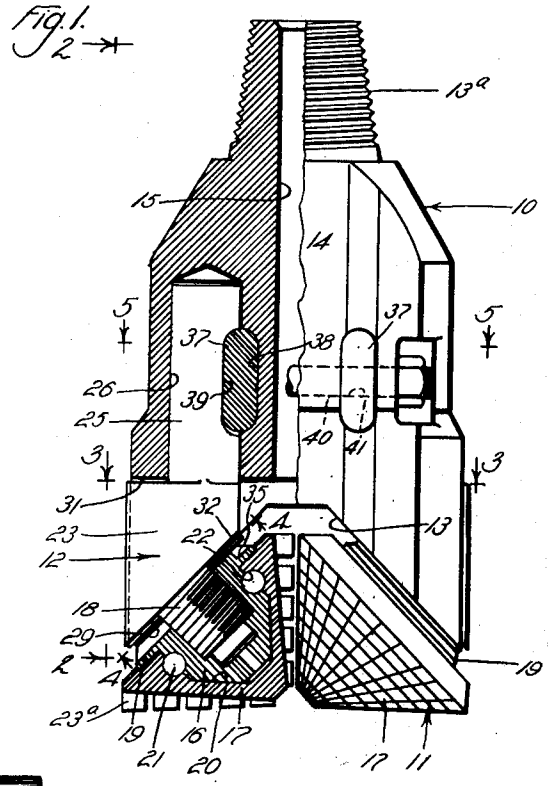


Fig. 2.

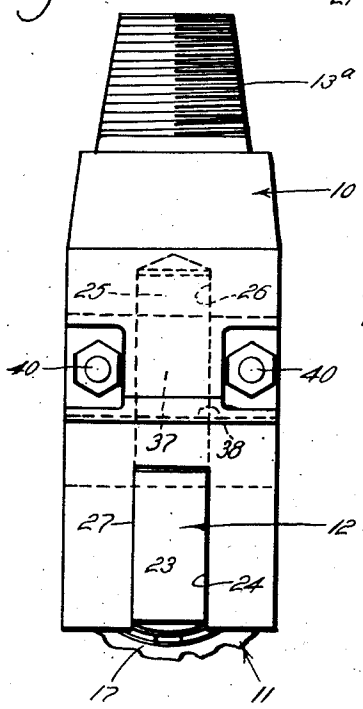
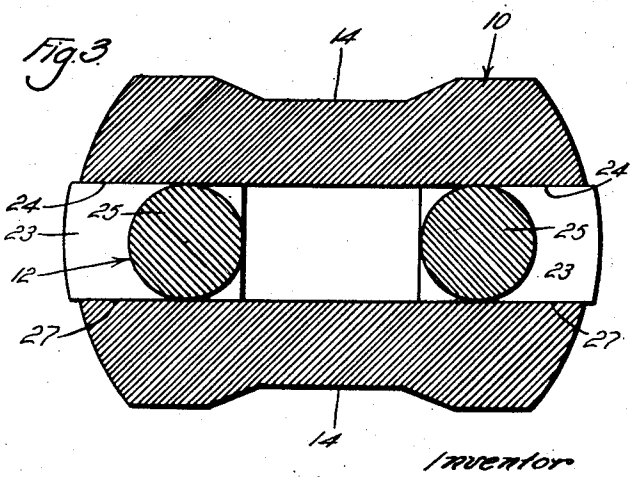


Fig. 3



Inventor
Walter A. Abegg
by
H. H. Maxwell
his Attorney

May 23, 1933. W. A. ABEGG 1,909,925

DRILLING BIT

Filed June 5, 1929 2 Sheets-Sheet 2

Fig. 4.

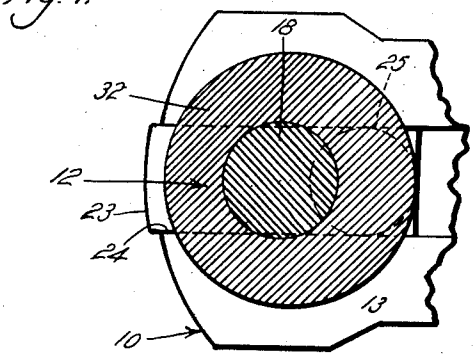
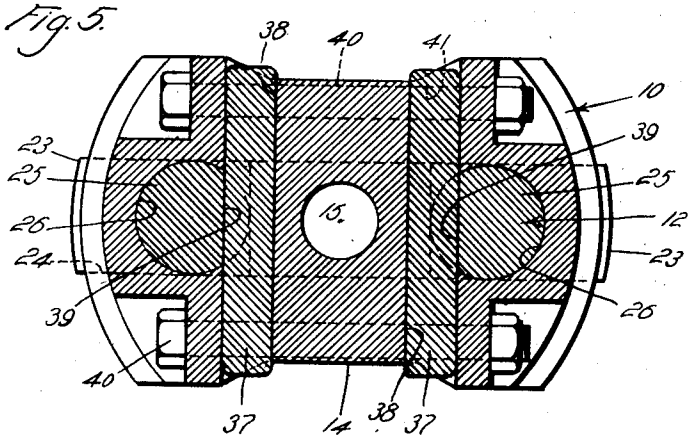


Fig. 5.



Inventor
Walter A. Abegg
by W. W. Caldwell
his Attorney

Patented May 23, 1933

1,909,925

UNITED STATES PATENT OFFICE

WALTER A. ABEGG, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO WIEMAN KAMMERER WRIGHT CO., INCORPORATED, OF HOLLYDALE, CALIFORNIA, A CORPORATION OF CALIFORNIA

DRILLING BIT

Application filed June 5, 1929. Serial No. 368,668.

This invention has to do with a well drilling bit, and it is an object of the invention to provide a simple, practical, and improved tool of this character.

It is a common practice to drill wells with bits including shanks and cutters rotatably mounted on the shanks. Considerable trouble is experienced in mounting the cutters so that they are secure and can be applied to and removed from the shanks easily and quickly. The cutters are usually mounted by means of threaded connections and the operation of the tools causes the threaded connections to become very tight or to jam, making it extremely difficult in some cases to remove the cutters for the purpose of replacement or repair. Further, difficulty is experienced in forming and relating various parts of well drilling bits so that they are strong and effective, economical of manufacture, and dependable in operation.

It is a general object of the present invention to provide a simple, effective, and improved mounting for the cutters of a bit.

Another object of the invention is to provide a cutter mounting that can be released to free the cutters so that they can be removed regardless of how tight they may be jammed or set.

It is a further object of the invention to provide a bit in which the parts subject to wear are simple and inexpensive of construction and can be easily and quickly repaired or replaced.

Another object of the present invention is to provide various improvements in the arrangement and formation of parts in a bit of the character mentioned. The bit provided by the invention is of simple, effective, and durable construction and its various parts are suited to economical production and to being handled in a practical, economical manner in the oil fields.

The various objects and features of the 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 side elevation of a bit embodying the present invention, the parts at one side of the center line being broken away to show in section. Fig. 2 is a side elevation of the bit being a view taken as indicated by line 2—2 on Fig. 1. Fig. 3 is an enlarged detailed plan sectional view taken as indicated by line 3—3 on Fig. 1. Fig. 4 is an enlarged detailed sectional view taken as indicated by line 4—4 on Fig. 1, and Fig. 5 is an enlarged detailed plan sectional view taken as indicated by line 5—5 on Fig. 1.

The bit provided by this invention includes, generally, a body 10, cutter units 11, and mounting means 12 for mounting the cutter units on the body. The principles of the invention are capable of embodiment in bits of various styles or forms, however, the invention is particularly suited to the roller type of bit, that is, the type of bit in which the cutting members are in the nature of rollers carried by the body and operate to drill by rolling or crushing action. For purpose of example, I will proceed with a description of a typical type or form of roller bit, it being understood that such description is not to be construed as limiting the invention to this particular form or type of bit or to the specific details referred to.

The body 10 forms a carrier or frame on which the other parts are assembled. The particular shape and proportioning of the body 10 depends upon various factors such as the arrangement, character, size, etc., of the cutters. In the case illustrated the body 10 is an elongated member provided at its upper end with a tapered screw threaded pin 13^a for attachment to a string of drill pipe, or the like, and formed at its lower end to accommodate cutter units 11.

In the bit illustrated there are two cutting units 11 each having a conical shaped cutter. The lower end portion of the body has a V-shaped opening or recess extending across or through it forming opposite downwardly and inwardly facing walls 13 from which the cutters are adapted to project. The sides 14 of the body, between which the recess extends, are preferably cut away or flattened in a manner such as is illustrated in the drawings.

Provision is made for the handling of circulation fluid, for instance, in the case illustrated a central vertical circulation opening 15 extends through the body 10 from the upper end of the pin 13ª to the top or crotch of the recess at the lower end of the body.

The cutter units 11 may be of various forms or types, for instance, they may be the type embodying a bushing 16 to be applied to a mounting projection or stud, and a cutter 17 rotatably mounted on the bushing. In the drawings I have illustrated a form of cutter unit which is the subject of my co-pending application entitled Joint and method of making same filed June 1, 1929, Serial No. 367,820. Each cutter unit of this particular type includes a bushing 16 to be applied, for instance, screw threaded to a stud 18, or the like, and having a radially projecting flange 19 at its base end to bear on or against a part beyond which the stud projects. The cutter 17 is a conical member having an opening 20 formed in it from its base to receive the bushing 16. The cutter fits against the flange 19 and surrounds the bushing with the exception of a portion of the flange. The cutter 17 is retained on the bushing by a key 21 carried in registering recesses 22 in adjoining parts of the bushing and cutter. The outer or operating portion of the cutter may be provided with cutting parts or teeth 23ª in the manner common to devices of this character.

The mounting means provided by this invention provides studs 18 to project beyond the walls 13 of the body 10 to carry the bushing 16 and blocks carrying the studs. The blocks are adapted to be mounted in the body and each includes a head 23 to be seated in an opening 24 formed in the body in communication with one of the walls 13 and a stem 25 projecting upwardly from the head 23 to extend into a socket 26 extending upwardly in the body from the opening 24. The openings 24 formed in the body 10 to receive the heads 23 may be in the nature of notches or slots cut through the lower end portion of the body. The openings 24 communicate with or open into the recess at the walls 13 and the vertical side walls of the opening 24 are at right angles to the walls 13. The openings 24 are formed so that they are diametrically opposite each other and extend a suitable distance upwardly in the lower end portion of the body as shown throughout the drawings. Further, it is to be noted that the openings 24 are formed so that they have flat spaced parallel vertical side walls. The head 23 of each mounting is shaped to fit more or less closely between the side walls of an opening 24 and is provided with flat sides 27 to bear on the sides of the opening 24. The lower or outer end of the head is provided with a face 29 pitched at the same angle as the wall 13. In accordance with the invention, the parts are proportioned so that the lower end face 29 of the head 23 is somewhat above the wall 13 when the head is seated in the opening 24. The significance of this proportioning will be appreciated from the description to follow.

The stud 18 is preferably formed integral with the headed 23 and projects from the head at right angles to the face 29 to receive and carry a cutter unit in the manner illustrated in Fig. 1 of the drawings. In the preferred application a washer 32 is interposed between the flange 19 of the bushing 16 and the wall 13 so that the flange does not directly engage the wall 13. The diameter of the stud 18 corresponds approximately to the width or thickness of the head 23 so that the washer 32 which surrounds the stud 18 bridges or extends across the opening 24 and has a substantial bearing area on the wall 13 at the two sides of the opening 24. In practice the flange 19 of the bushing 16 is provided with notches 35 to receive a suitable tool so that the bushing can be properly tightened onto the stud as the tool is assembled.

The stem 25 of the mounting is preferably formed integral with the head 23 and projects upwardly from the head to extend into the socket 26. The stem 25 may be round in cross section in which case the socket 26 may be in the form of a bore extending upwardly in the body from the top 31 of the opening 24.

The invention provides means for locking or retaining the stem 25 in the socket 26 in order to hold the mounting in place in the body. In the preferred form of the invention a locking key 37 is carried in an opening 38 formed transversely through the body. The key, when in position in the opening 38 projects into a notch 39 formed in one side of the stem 25 holding its against displacement from the socket 26. The key 37 preferably fits more or less closely in the opening 38 so that it is adapted to be driven into place from either side of the body. As a means of securing the key 37, a lock bolt 40 may extend through the body 10 at right angles to the key 37 so that it extends through an opening 41 in the key. Figs. 2 and 5 of the drawings illustrate the manner in which bolts 40 may be arranged in the body so that both of the keys 37 are engaged by two bolts 40, thus making the construction absolutely secure and safe against the keys 37 becoming displaced, and allowing the mountings to be released from the body.

When the tool is assembled for operation, the parts are arranged as shown throughout the drawings, that is, the stems 25 of the mountings are keyed in the sockets 26 with the heads 23 seated in the openings 24. The cutter units are tightly set on the studs 18 of the mounting means. When it is desired to remove the cutter units, for instance, after

the bit has been operated and the cutters 17 of the units are worn or need repair or replacement, the bolts 40 are removed and the keys 37 are driven or forced out of the openings 38, thus releasing the stems 25 from the sockets 26 so that the heads 23 with the cutter carrying studs 18 can be lowered out of the openings 24, thus detaching the mounting means and cutter units from the body. The cutter units having been set against the walls 13 of the body and against the faces 29 of the heads 23, it is then possible to freely rotate or remove the bushings from the studs. Through the construction provided by this invention it is possible to release or remove the cutter units easily and quickly, it being impossible for the cutter units to become jammed or tightened onto the studs so that they cannot be removed with ordinary tools. Further, it is to be noted that the principal parts subject to wear, that is, the mounting means and the cutter units, are of simple, inexpensive construction and such that they can be easily and quickly applied to and removed from the body.

Having described only a typical, preferred form and application of the 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 bit of the character described including, a body having a recess in its lower end with outwardly and downwardly inclined sides, two cutter units, individual mounting means for mounting the cutter units on opposite side walls of the recess, each including a block for carrying a cutter unit and having a head fitting an opening in the body, a stem on the head fitting a socket in the body, and a key carried by the body and engaging the stem to hold the stem against movement in the socket, and a single means holding the keys of the two mounting means against displacement.

2. A bit of the character described including, a body having a recess in its lower end with outwardly and downwardly inclined sides, two cutter units, individual mounting means for mounting the cutter units on opposite side walls of the recess, each including a block for carrying a cutter unit and having a head fitting an opening in the body, a stem on the head fitting a socket in the body, and a key carried by the body and engaging the stem to hold the stem against movement in the socket, and a bolt passing through transverse openings in the body and the keys of the two mounting means to hold the keys against displacement.

3. In a bit of the character described, a body having a transverse recess in its lower end with upwardly and inwardly converging walls, the body having diametrically opposite vertical slots in its lower end joining said recess at its convergent walls, the slots having flat parallel opposing walls, heads carried in the slots and having flat parallel faces on their opposite sides to cooperate with the said walls of the slots whereby the heads are non-rotatable in said slots, the heads having their lower ends spaced above said walls of the recess, a stem on each head projecting into a socket in the body, a stud on each head projecting downwardly into the recess, a bushing on each stud, a cutter rotatable on each bushing, and separable washers on the studs between the bushings and the said walls of the recess bridging the slots to engage said walls of the recess at opposite sides of the slots to transmit upward thrusts from the bushings to the body independently of the heads.

4. In a bit of the character described, a body having a transverse recess in its lower end, a cutter, and means for mounting the cutter in the recess adjacent one side of the recess including a head having flat parallel faces on its opposite sides, the head being carried in an opening formed in the end portion of the body transversely of the recess, said opening having flat parallel opposing walls for engagement by said faces of the head, the lower end of the head being spaced above the wall of the recess, a stud projecting downwardly from the head into the recess to carry the cutter, a separable washer on the stud between the cutter and the wall of the recess bridging the said opening to engage the wall of the recess, and a stem extending from the head into a socket in the body, the cutter being carried by the stud to bear on the wall of the recess through the washer.

5. In a bit of the character described, a body, a cutter unit, and a mounting for the cutter unit including a block detachably connected to the body and a stud projecting from the block to hold the cutter unit, the cutter unit including a bushing to be applied to the stud and a cutter rotatably mounted on the bushing, the block including a head having flat parallel faces on its opposite sides and carried in an opening in the body, the opening having flat parallel opposing walls for engagement by said faces of the head, and a stem projecting from the head into a socket in the body, and a separable washer on the stud between the bushing and body bridging the opening in the body whereby the bushing bears on the body through the washer independently of the head.

In witness that I claim the foregoing I have hereunto subscribed my name this 14th day of May, 1929.

WALTER A. ABEGG.