

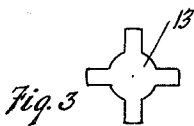
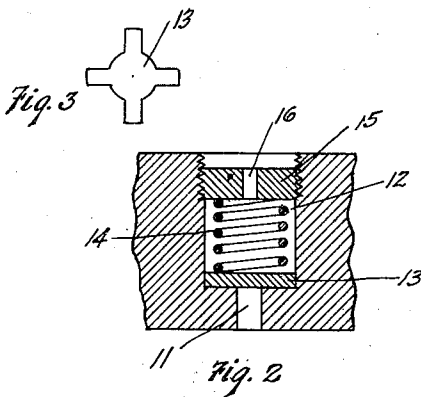
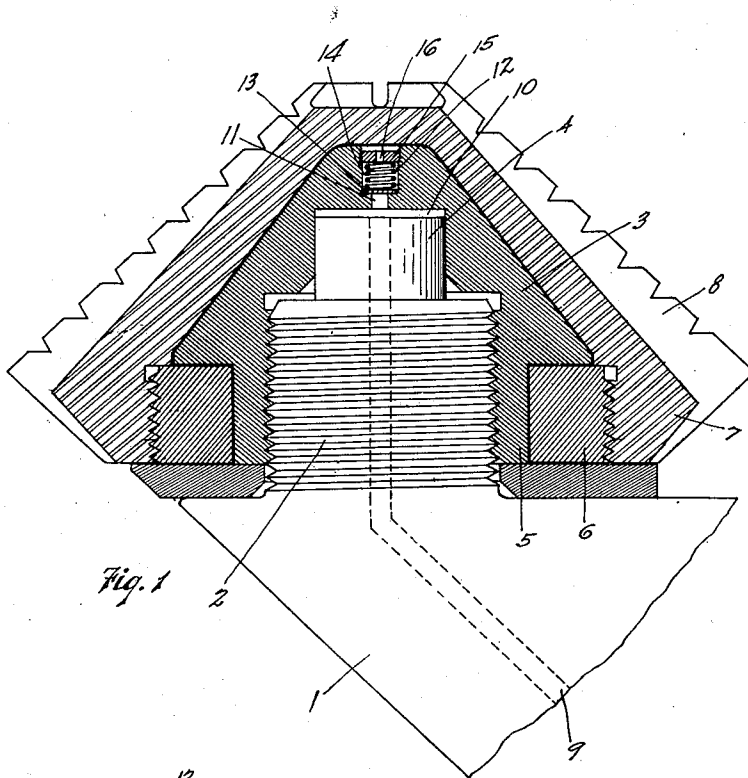
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1,483,487

F. L. SCOTT

ROLLER EARTH BORING DRILL CUTTER

Filed April 10, 1923



F. L. Scott, Inventor

By Jesse R. Stone

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UNITED STATES PATENT OFFICE.

FLOYD L. SCOTT, OF HOUSTON, TEXAS.

ROLLER EARTH-BORING DRILL CUTTER.

Application filed April 10, 1923. Serial No. 631,112.

To all whom it may concern:

Be it known that I, FLOYD L. SCOTT, a citizen of the United States, residing at Houston, Harris county, Texas, have invented a certain new and useful Improvement in Roller Earth-Boring Drill Cutters, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in roller earth boring drill cutters, and contemplates the prevention of mud and slush getting to the bearings of said cutters during that operation.

In the use of roller earth boring drills in the operation of drilling wells, especially deep wells for oil, gas, sulphur, etc., the drill is secured to the lower end of a hollow drill stem, and is rotated at the bottom of the well, the roller cutters acting to cut away the rock. The cuttings thus disintegrated by the bit are washed away and carried to the surface by a stream of flushing fluid which is pumped down through the drill stem and the bit against the cutters, and flows up outside of the drill stem in the well to the surface, carrying the cuttings in suspension therein. The flushing fluid which is used is ordinarily a thick mud, and in most of the fields, this mud carries with it a considerable quantity of sand and grit in suspension therein. Due to the heavy static pressure of the fluid in the hole, the mud tends to be forced inwardly around the bearings of the cutters, and causes excessive wear upon the bearings thereof.

The bearings are, under ordinary circumstances, lubricated by a force feed lubricator operated by the pressure of the fluid which is pumped down through the drill stem. The lubricant is forced to the bearings of the cutters through oil ducts in the head of the bit and the pin upon which the cutters are mounted. It is found, however, that while the bit is being lowered into the well the pumps are not operated, and as a result the back pressure of the fluid in the well will force the mud in around the bearings and fill the small spaces and chambers in the interior of the cutter and the oil duct in the bit. When the pumps are started in the operation of the bit, the oil is forced downwardly against this and the bit will operate for a con-

siderable time with mud only as a lubricant, and, even when the lubricant begins to flow, it is almost impossible to eliminate entirely the sand and grit which has worked in around the bearings.

It is the object of my invention to provide a means to prevent the mud from working into the oil ducts in the drill during the period when the drill is being lowered into the hole.

It is another object to provide a valve in the oil duct for the purpose described which may be located in the bushing of the cutter at a point where the entrance of the mud may be most effectively prevented.

Other objects and advantages of the invention will more clearly appear in the specification which follows. Referring to the drawing herewith, wherein a preferred embodiment of my invention is disclosed, Fig. 1 is a central longitudinal section through a rock drill cutter showing the application of my invention thereto; Fig. 2 is a broken, enlarged detail through the valve employed; and Fig. 3 is a top plan view of the valve plate itself.

In the drawing I have shown my invention applied to a cutter for a rock drill bit of well known construction, such as shown in the patent to Hughes, No. 979,496, granted December 27, 1910. In this drawing, the head of the drill is shown at 1. The head has an outwardly projecting pin 2 to support the cutter. This pin is of large diameter adjacent to the head, and threaded for attachment to the bushing 3 for the cutter. The outer end of the pin 2 is reduced in diameter at 4 and is adapted to fit within the forward end of the bushing 3.

The bushing 3 is approximately frusto-conical in shape, and has a reduced shank 5, where it is secured to the cutter pin 2. The reduced shank provides a space to receive the locking ring 6, by means of which the cutter 7 is retained upon the bushing. This construction is old in the art as shown in the patent referred to and forms no part of my invention.

The outer surface of the cutter is provided with cutting teeth 8 by means of which the rock is disintegrated.

It will be noted that the bearing surface, where the cutter rotates upon the bushing, provides a very slight passage along the base of the cutter and up around the sur-

face of the bushing to the forward end of the said bushing. The lubricant from the lubricant holder, not shown, is fed to the surface of the bushing through an oil duct 9 in the head which passes through the center of the cutter pin and issues at the forward end of the reduced portion 4. At that point there is ordinarily a small chamber 10 from which the lubricant passes through a duct 11 to the outer surface of the bushing. In the forward end of the bushing I have formed a cylindrical recess or valve chamber 12. In the lower end of this chamber, and covering the opening from said duct 11, I place a valve plate 13. The form of this plate is shown particularly in Fig. 3. It is circular at the central portion, with a plurality of radial arms thereon which fit against the inner surface of the recess. This plate is held resiliently over the opening by means of a spiral spring 14. This spring bears at its outer end against a nut or set screw 15 having a central opening 16 therein. This valve serves to prevent the passage of fluid inwardly toward the lubricator duct and to allow the passage thereof of lubricant in an obvious manner.

In the use of a cutter with the valve arrangement thereon, the bushing is covered with a thick coating of viscous lubricating oil and is then placed within the cutter and the locking ring secured in place. In this way the slight space between the cutter and locking ring outside the bushing is entirely filled with the thick oil. The cutter is then screwed upon the pin and the bit is introduced into the hole. The heavy pressure of the mud upon the bearings, while the bit is being submerged in the mud in the well, will find no passage to the bearings. There will be no chance for the lubricant on the surface of the bushing to be forced back into the oil duct and into the air chambers about the cutter pin because of the valve 13. By placing the valve in the end of the bushing in this manner, a most effective means is provided to prevent the entrance of mud about the bearings in any manner. It is comparatively easy to completely fill the space about the bushing with lubricant, but when it is attempted to fill the oil ducts and air chambers within the bushing with lubricant, it is found that it cannot be done effectively, and, even when attempted, the pressure of the mud in the hole will force the lubricant not only in

through the bushings, but far up into the head of the bit. My valve prevents this.

By the use of this device, the wear upon the bushings of the cutters is largely eliminated and the cutters will last for much longer periods of time. This is of especial advantage in drilling, due to the fact that the bit may be left in the well until the lubricant in the lubricant holder is entirely exhausted with very little wear on the bushings of the cutters themselves.

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

1. In a roller drill, a head, a cutter pin thereon, a bushing fitting over the end of said pin, a rotatable cutter on said bushing, a cylindrical recess in the end of said bushing, an oil duct through said head, said pin, and said bushing, and terminating in said recess, a valve plate in said recess and means to hold said plate resiliently over the end of said duct.

2. In a roller drill, a head, a cutter pin, thereon, a bushing fitting over the end of said pin and screwed thereon, a cutter enclosing said bushing, a lubricating duct in said head, said pin and said bushing, a recess in said bushing at the end of said duct, an outwardly opening valve in said recess, and means to hold said valve in position.

3. In a cutter for roller drills, a supporting pin having an oil duct therein, a bushing on said pin, a cutter enclosing said bushing, a valve chamber in said bushing at the end of said oil duct and connected therewith, a valve therein, a spring holding said valve in position, and a perforated plug in said chamber in the manner described.

4. In a cutter for roller drills, an approximately frusto-conical shaped bushing, a valve chamber formed in the outer apex thereof and having an oil passage leading thereto, a valve in said chamber, and means to hold said valve resiliently in position over said passage.

5. In a cutter for roller drills, a cutter pin, a bushing thereon, an oil duct in said pin and said bushing, an outwardly opening valve in said bushing adapted to close said duct, and a cutter on said bushing.

In testimony whereof, I hereunto affix my signature, this the 31st day of March, A. D., 1923.

FLOYD L. SCOTT.