

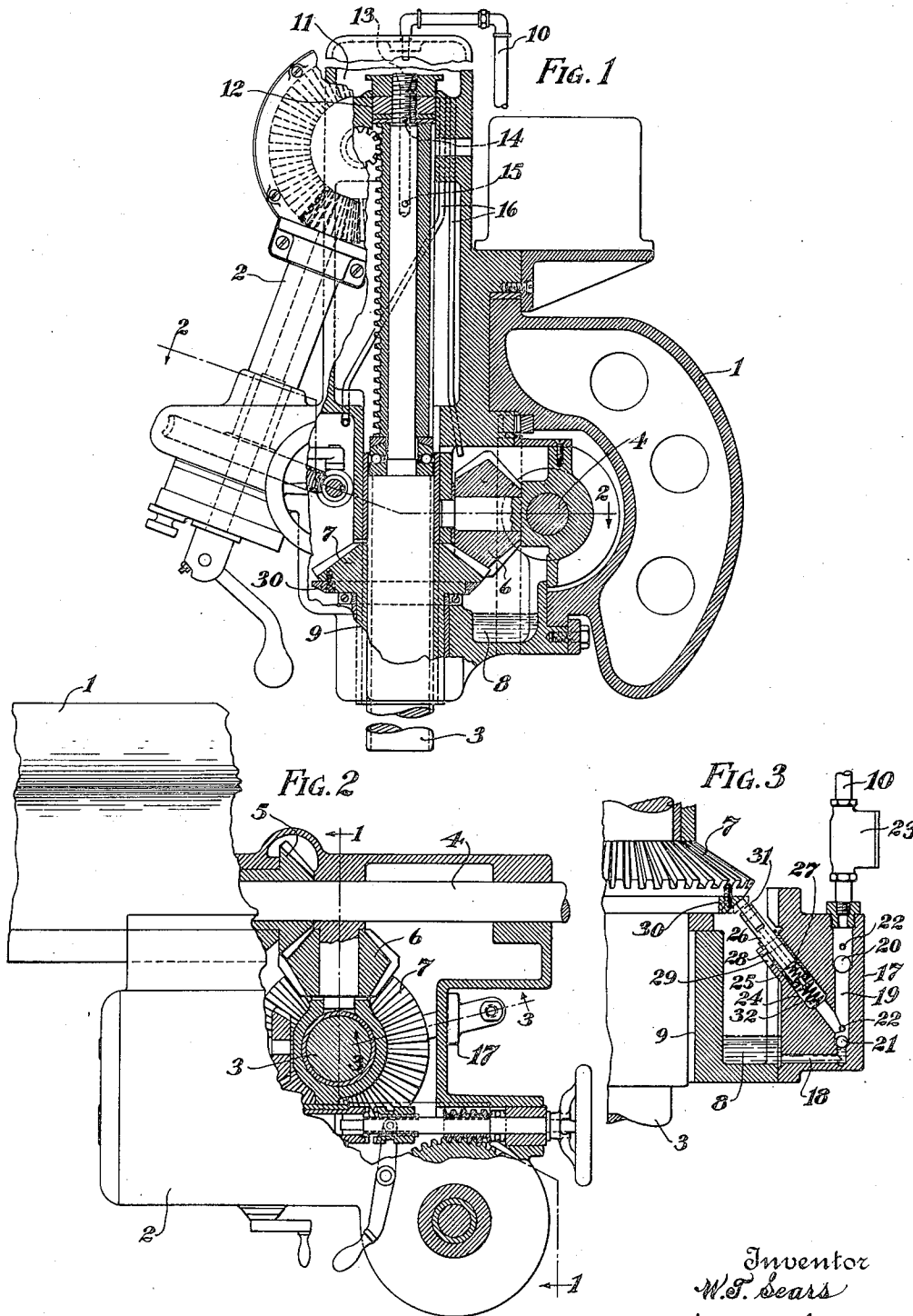
May 6, 1924.

1,492,653

W. T. SEARS

LUBRICATING SYSTEM FOR DRILL HEADS

Filed Dec. 8, 1920



Inventor
W. T. Sears
By *S. Jay Teller*
Attorney

UNITED STATES PATENT OFFICE.

WILLARD T. SEARS, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO NILES-REMENT-POND COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

LUBRICATING SYSTEM FOR DRILL HEADS.

Application filed December 8, 1920. Serial No. 429,185.

To all whom it may concern:

Be it known that I, WILLARD T. SEARS, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Lubricating Systems for Drill Heads, of which the following is a specification.

This invention relates to drilling machines and particularly to a lubricating system for the drill spindle and its operating mechanism within the drill head. In accordance with the invention a reservoir is provided in the lower portion of the head casing and by means of a small pump, preferably driven from the spindle operating mechanism, the oil is forced from the reservoir to the upper portion of the drill head from whence it is permitted to descend by gravity to the drill spindle and other operating parts within the drill head. The primary object of the invention is to provide an improved flood lubricating or oiling system of this general type.

Another object of the invention resides in the provision of a special lubricating pump particularly adapted for use in connection with the lubricating system outlined, such pump being of the reciprocating piston type and the piston thereof being adapted to yield under a predetermined pressure whereby to prevent the building up of a fluid pressure beyond a certain predetermined point.

The details of the invention will appear in the following description taken in connection with the accompanying drawing wherein:

Figure 1 is a vertical sectional view through the drill head and the supporting arm of a radial drilling machine, taken approximately on the line 1—1 of Fig. 2.

Fig. 2 is a fragmentary horizontal section thereof taken approximately on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary enlarged vertical section taken on the line 3—3 of Fig. 2 and showing particularly the lubricating pump.

While the invention herein has been illustrated in the accompanying drawing in connection with a radial drilling machine of the general type shown in Patent 1,368,294 granted to me February 15th, 1921, it will be understood that the same is applicable to drilling machines of other types without departing from the spirit of the invention. In

the drawing, 1 designates the drill head supporting arm of a radial drilling machine, 2 the drill head or saddle slidably mounted thereon, 3 the drill spindle and 4 the arm shaft operatively connected to the drill spindle through the bevel gears 5, 6 and 7. The feeding of the drill spindle is accomplished through the mechanism illustrated and more specifically described in my aforesaid patent.

As above pointed out, the lubricating system comprising the present invention includes an oil reservoir provided in the lower portion of the drill head and illustrated in the drawing at 8. I preferably form the reservoir in the drill head adjacent the lower spindle bearing 9, the reservoir extending below the upper end of said bearing whereby the oil level, as illustrated in Fig. 1, will be below the top of the bearing. From the reservoir the oil is adapted to be forced through a pipe or duct 10 to the upper portion of the drill head, preferably to a channel or reservoir 11 surrounding the drill spindle preferably above the spindle bearing 12 thereof. As seen in Fig. 1, the oil is delivered to a central opening 13 in the spindle from which it overflows into the channel 11 and is also delivered through the holes 14 and 15 to lubricate the spindle and its bearings. From channel 11 there preferably extends pipes or ducts 16 leading downward to the various operating parts of the head. One of these ducts is illustrated as being adapted to lubricate the spindle driving gears and another as being adapted to lubricate the spindle feeding mechanism. It will be understood however that such ducts may be provided to lead the lubricant wherever desired.

As seen particularly in Figs. 2 and 3, the oil pump is mounted in a bracket 17 secured to the side of the head, a horizontal duct 18 and a vertical duct 19 forming a communication between the reservoir and the pipe 10. Ball check valves 20 and 21 adapted to cooperate with the pump are provided in the duct 19, pins 22 being adapted to limit the upward movement of the balls. 23 illustrates a sight feed dial through which the flow of oil may be observed.

The pump comprises a cylinder 24 formed in the bracket 17. A piston 25 is adapted to be reciprocated within the cylinder by means of a plunger member 26 telescopically

mounted within the piston. The plunger is adapted to operate the piston in the working direction through a relatively strong spring 27 between the inner end of the plunger and the bottom of the piston opening. A pin 28 extends through the piston and plunger and is adapted to work in slots 29 in the bracket 17 and piston 25 whereby the piston and plunger are held against angular movement. The piston and plunger are operated in the working direction preferably from the spindle driving mechanism and are illustrated herein as being operated from a cam 30 on the spindle gear 7 engaging an anti-friction roller 31 on the outer end of the plunger. A relatively weak compression spring 32 in the bottom of the cylinder 24 engages the piston and is adapted to normally keep the roller 31 in engagement with the gear 7 and thereby operate the piston and plunger in the idle stroke direction.

It is believed that the operation of the lubricating system and the several parts thereof will be clear from the above description. It should be understood, however, that the circulation of the lubricant is continuous, the interior of the head casing being so formed that the oil from the several operating parts thereof drains back into the reservoir 8 to be used over again in the continuous lubricating process. As heretofore noted, I preferably form the reservoir 8 in such a position relative to the spindle bearing 9 that the oil level will be below the top of such bearing. By this construction the oil is securely contained within the reservoir without leakage thereof.

The spring 27 of the pump is stronger than the spring 32 and in the normal operation thereof, only the latter spring is compressed. However, should the oil passage become obstructed or for any other reason should the oil from the pump exceed a certain predetermined pressure, the spring 27 is adapted to yield, thus permitting the plunger 26 to reciprocate within the piston 25 instead of the piston reciprocating within the cylinder 24. Under such condition, the pump is operative only to maintain the predetermined pressure allowed by the strength of the spring 27. It will therefore be seen that the pump acts as a safety device to prevent the building up of too great an oil pressure in the lubricating system. It should be understood that the oil reservoirs and the oil ducts leading to and from the same are not necessarily limited to the construction and arrangement shown in the drawing but that the several parts of the lubricating system may be modified within the scope of the claims appended hereto.

What I claim is:

1. In a drilling machine the combination of a drill head, a drill spindle mounted in the head, mechanism within the head for

rotating the spindle and feeding the same axially, and lubricating means for the spindle and its operating mechanism comprising an oil reservoir in the head beneath the said mechanism, a duct leading therefrom to the upper portion of the head and a pump for forcing the oil through the duct to the upper portion of the head from whence it is adapted to flow by gravity to the spindle and operating parts within the head and back into the reservoir.

2. In a radial drilling machine, the combination of a horizontal arm, a support slidably mounted thereon, a tool spindle mounted in the support, mechanism within the support for rotating the spindle and feeding the same axially, and lubricating means for the spindle and its operating mechanism comprising an oil reservoir in the head beneath the said mechanism, a duct leading therefrom to the upper portion of the head, a pump on the head for forcing the oil through the duct to the upper portion of the head, and means for distributing the oil therefrom to the spindle and operating parts within the head, the oil being adapted to drain back into the reservoir.

3. In a drilling machine the combination of a drill head, a drill spindle mounted in the head, gearing within the head for rotating the spindle and feeding the same axially, and lubricating means for the spindle and its operating mechanism comprising a lower oil reservoir in the head, an upper reservoir in the head, a duct leading from the lower reservoir to the upper reservoir, a pump for forcing the oil through the duct to the upper reservoir and duct means for distributing the oil therefrom to the spindle and operating parts within the head, the oil being adapted to drain back into the lower reservoir.

4. In a drilling machine the combination of a drill head, a drill spindle mounted vertically in lower and upper bearings in the head, mechanism within the head for rotating the spindle and feeding the same axially, and lubricating means for the spindle and its operating mechanism comprising a lower oil reservoir in the head extending below the upper end of the lower bearing, a duct leading therefrom to the upper portion of the head and a pump for forcing the oil from the duct to the upper portion of the head from whence it is adapted to flow by gravity to the spindle and operating parts within the head and back into the reservoir.

5. In a drilling machine the combination of a drill head, a drill spindle mounted vertically in lower and upper bearings in the head, gearing within the head for rotating and feeding the spindle, and lubricating means for the spindle and gearing comprising an oil reservoir in the head adjacent the lower bearing, a duct leading therefrom

to a point adjacent the upper bearing and a pump for forcing the oil through the duct to the upper bearing from whence it is adapted to flow by gravity to the spindle and gearing within the head and back into the reservoir.

6. In a drilling machine the combination of a drill head, a drill spindle mounted vertically in lower and upper bearings in the head, mechanism within the head for rotating the spindle and feeding the same axially, and lubricating means for the spindle and its operating mechanism comprising an oil reservoir in the head adjacent the lower bearing, an upper reservoir in the head adjacent the upper bearing, a duct leading from the lower reservoir to the upper reservoir, a pump for forcing the oil through the duct to the upper reservoir and duct means for distributing the oil therefrom to the spindle and the mechanism within the head.

7. In a drilling machine the combination of a drill head, a drill spindle mounted vertically in lower and upper bearings in the head, mechanism within the head for rotating the spindle and feeding the same axially, and lubricating means for the spindle and its operating mechanism comprising an oil reservoir in the head adjacent the lower bearing, an upper reservoir in the head adjacent the upper bearing, a duct leading from the lower to the upper reservoir, a pump on the head for forcing the oil through the duct to the upper reservoir and a plurality of ducts leading from the upper reservoir to the spindle and operating parts within the head.

8. In a drilling machine the combination of a drill head, a drill spindle mounted vertically in lower and upper bearings in the head, mechanism within the head for rotating the spindle and feeding the same axially, and lubricating means for the spindle and its operating mechanism comprising a lower

oil reservoir in the head extending below the upper end of the lower bearing, an upper reservoir in the head surrounding the upper bearing, a duct leading from the lower to the upper reservoir, a pump for forcing the oil through the duct to the upper reservoir and duct means for distributing the oil therefrom to the spindle and operating parts within the head.

9. In a radial drilling machine, the combination of a horizontal arm, a driving shaft extending therealong, a support slidably mounted on the arm, a drill spindle in the support, gearing operatively connecting the shaft to the spindle for rotating the latter, mechanism driven from the shaft for feeding the spindle axially, and lubricating means for the spindle and its operating mechanism comprising an oil reservoir in the support, a duct leading therefrom to the upper portion of the support, a pump on the support for forcing the oil through the duct to the upper portion of the support, and means for distributing the oil therefrom to the spindle and the mechanism within the head.

10. In a radial drilling machine, the combination of a horizontal arm, a driving shaft extending therealong, a support slidably mounted on the arm, a drill spindle in the support, gearing operatively connecting the shaft to the spindle for rotating the latter, mechanism driven from the shaft for feeding the spindle axially, and lubricating means for the spindle and its operating mechanism comprising a lower reservoir in the support, an upper reservoir in the support, a duct leading from the lower reservoir to the upper reservoir, a pump for forcing the oil through the duct to the upper reservoir and means for conducting the oil therefrom to the spindle.

In testimony whereof, I hereto affix my signature.

WILLARD T. SEARS.