

March 9, 1926.

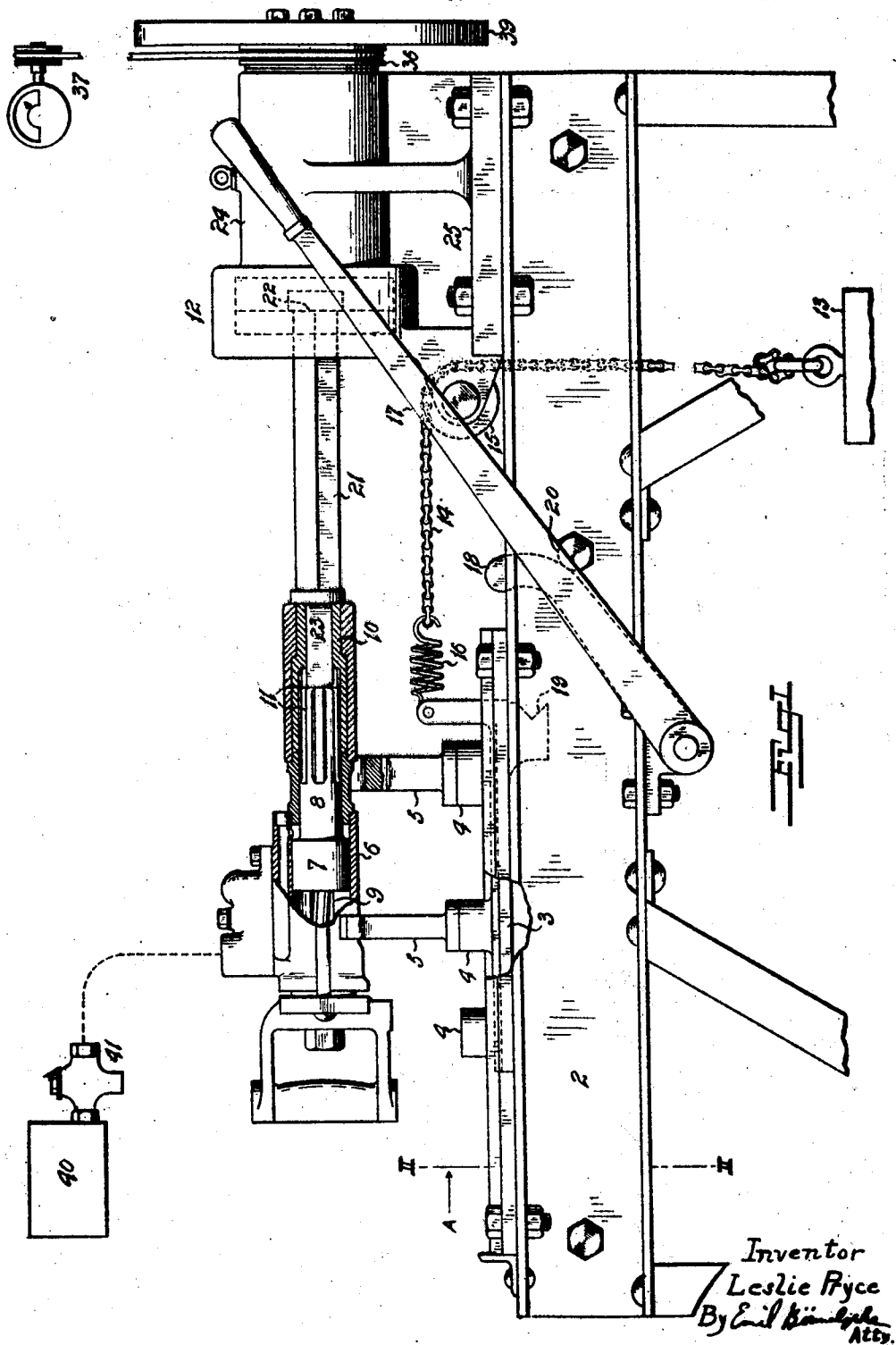
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TESTING HAMMER ROCK DRILL

Filed Oct. 5, 1923

2 Sheets-Sheet 1



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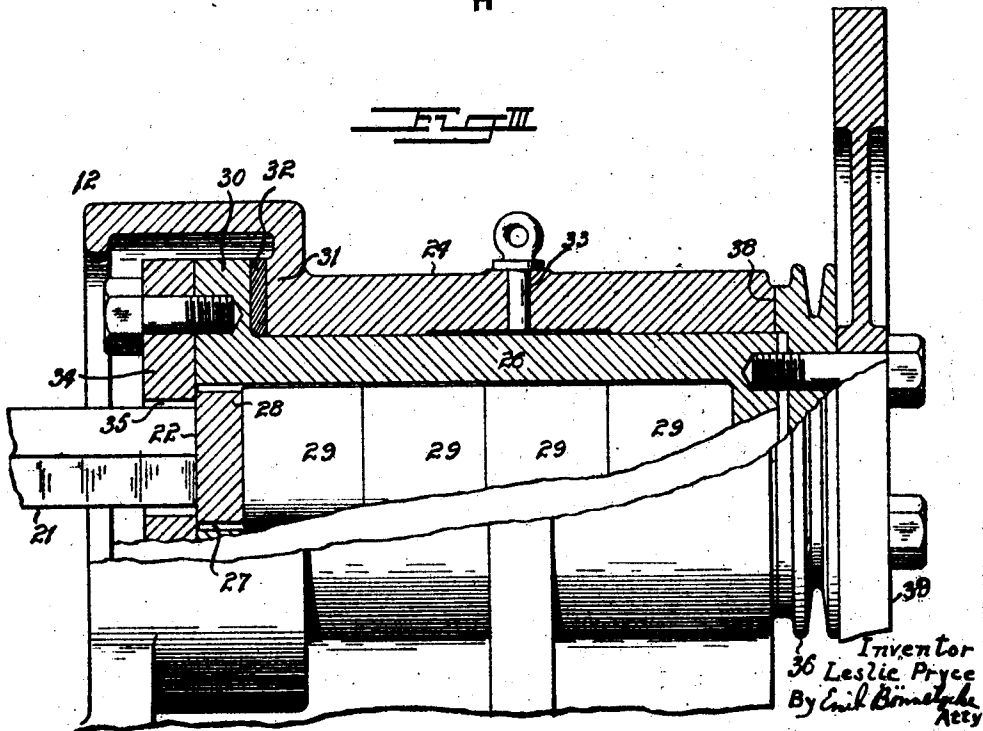
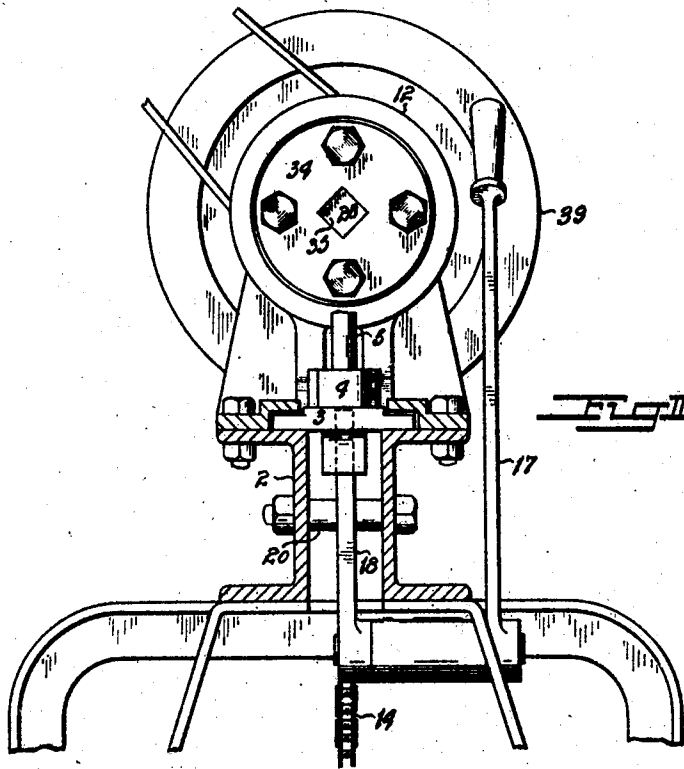
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE.

LESLIE PRYCE, OF JOHANNESBURG, TRANSVAAL, SOUTH AFRICA.

TESTING HAMMER ROCK DRILL.

Application filed October 5, 1923. Serial No. 666,826.

To all whom it may concern:

Be it known that I, LESLIE PRYCE, engineer, British subject, residing at Corner House, Commissioner Street, Johannesburg, Transvaal, Union of South Africa, have invented certain new and useful Improvements in Testing Hammer Rock Drills, of which the following is a specification.

The present invention has reference to hammer rock drills and particularly to such drills in which the rotational movement of the chuck is positive with the reciprocatory movement of the piston. The purpose of the invention is to enable a short period test of such drills to be made in a fitting shop or testing room, which gives a practical measure of their fitness for actual drilling.

Accordingly the drill is run with standard air pressure and under a standard load which approximates in kind and amount to the normal working load, and the speed of movement is measured. In a hammer drill in which the tool rotation and the piston reciprocation are positive with one another, the rotational power of the drill furnishes a reliable index of the working capacity of the drill; and accordingly in carrying out the invention in the preferred manner, with this type of drill, the load from which the measurement is derived is arranged to resist the rotational movement, and the speed of rotation under the load is measured.

A testing apparatus according to the invention is illustrated in the accompanying drawings in which—

Fig. I is a side elevation, showing the drill in position for test.

Fig. II is a cross section on line II, II of Fig. I, seen from the direction of the arrow A, the drill being removed.

Fig. III is a longitudinal section of the testing block, drawn to an enlarged scale.

2 indicates a table on which a cradle 3 is free to slide. The cradle is provided with lugs 4 in which are removably secured mountings 5 adapted to carry the kind of drill under test.

The drill shown is of a well known construction comprising a cylinder 6 and a loose hammer piston 7 reciprocating therein. The piston is provided with a forward extension 8 which strikes the drill. The piston is

rotated by a rifle bar 9 and in turn rotates the tool chuck 10 and the tool 21 therein by means of interengaging flutes 11, on the extension and the chuck.

The cradle 3 is pressed towards the testing block 12 by means exerting a constant force, such as the weight 13 hanging from a chain 14 which passes over a fixed pulley 15 and is connected to the cradle through a tension spring 16. The latter prevents the rapid vibrations which are set up in the cradle from being transmitted to the weight 13.

For holding the cradle from its operative position, there is provided a lever 17 operating an arm 18 which can engage the front end of the cradle. When the lever is fully retracted, the arm 18 engages in a notch 19 in the cradle and so locks the parts in the retracted position. When in its forward position the arm 18 lies against a stop 20.

21 indicates a tool which is similar to the regular drilling tool for the hammer drill under test, except that it has a flat end 22 and is usually shorter than the regular drill tool. It is shanked at 23 as may be necessary, similarly to the regular tool, to receive the blows of the hammer piston 7 and to receive rotary motion from the tool chuck 10.

The testing block 12 comprises resilient means for resisting the impacts of the tool 21, constantly loaded rotary means, rotated by said tool, and means for measuring the angular speed of said rotary means.

In the form shown it consists of a cylindrical casing 24 provided with a foot 25 bolted to the table 2. A cylinder 26 is rotatably mounted within the casing; the internal surface of the casing and the external surface of the cylinder preferably being polished to insure uniform bearing friction between them. Loosely inserted in the bore 27 of the cylinder is a hard steel disc 28 against which the tool 21 presses. Said disc is resiliently supported by a number of rubber blocks 29 accommodated in the bore 27.

The endwise thrust of the cylinder 26 is taken up by a thrust bearing consisting of a flange 30 on the cylinder 26, a similar flange 31 on the casing 24 and a loose brass washer 32 interposed between them. The

frictional surfaces between the casing 24 and the cylinder 26 may be lubricated by oil introduced through the hole 33. On the flange 30 is fixed a plate 34 formed with a non-circular hole 35, into which is engaged the similarly sectioned end of the tool 21, whereby rotation of the latter is imparted to the cylinder.

36 is a belt pulley fixed to the cylinder 26 and driving a revolution indicator 37. The pulley is shown as bearing on the end 38 of the casing 24, in order to keep the thrust bearing elements 30, 31, 32 in contact. The rotational impulses from the drill being intermittent, it is desirable in order to obtain a regular indicator reading, to regulate the rotation of the cylinder 26 by means of a fly wheel 39.

Compressed air from a source 40 is supplied to actuate the drill under test, through a reducing valve 41, which ensures the maintenance of a uniform and standard pressure.

In making a test, the drill 6 is mounted on the cradle 3, the tool 21 placed in the drill chuck 10 and the lever 17 thrown forward, so allowing the weight 13 to press the cradle, with a standard pressure, towards the test block 12; this pressure being transmitted through the tool 21 to the disc 28 and thrust bearing 30, 31, 32. Air is then turned on to operate the drill. The rebound of the tool 21 from the disc 28 and the rebound of the hammer piston from the tool, approximate to those which occur in actual drilling sufficiently for the purpose of the test, and it is found that a very rough approximation is all that is necessary. The rotation of the tool chuck 10 is transmitted by the tool 21 to the cylinder 26 and is resisted by the general frictional resistance of the cylinder 26 in the casing 24 but more particularly by that of the thrust bearing 30, 31, 32; these being found to provide sufficient resistance without the use of a special brake. The rate of rotation as indicated by the indicator 37 is noted and is taken as a measure of the drill's performance.

In practice a drill of a certain design and in a standard condition of fitness is first tested and the reading of the indicator 37 is noted. This is taken as the standard for that make; and a comparison of the reading of another drill of the same make with such standard reading, provides a reliable measure of the fitness of the second drill for its intended work.

I claim:

1. The process of testing a hammer rock drill in which the reciprocating movement of the piston and the rotative movement of the tool chuck are positive with one another, which consists in running the drill by means of working fluid at standard pressure and under a standard rotational load

and measuring the angular speed of the chuck.

2. The process of testing a hammer rock drill in which the reciprocating movement of the piston and the rotative movement of the tool chuck are positive with one another, which consists in establishing a standard by running a standard drill by means of working fluid at standard pressure, and under a standard rotational load, measuring the angular speed of the chuck, running another drill of the same make under the same conditions, and comparing the rotational speeds thus obtained.

3. A hammer drill testing machine, comprising means adapted to receive the impacts of the hammer piston and to offer a constant resistance to such impacts, means adapted for rotation under constant load conditions and further adapted to be rotated from the tool chuck of a hammer rock drill, and devices for measuring the angular speed of said means.

4. A hammer drill testing machine, comprising means adapted for rotation under constant load conditions and further adapted to be rotated from the tool chuck of a hammer drill, devices for measuring the angular speed of said means, and a resilient impact means adapted to receive the impact of a tool mounted in the hammer drill and to offer a constant resistance to such impact.

5. A hammer drill testing machine comprising a movable mounting for the drill, a testing block comprising means for resiliently resisting with constant resistance the impacts of a tool mounted in the drill, means for urging the drill mounting toward the testing block, rotary means adapted for rotation under constant load conditions and further adapted to be rotated by said tool, and devices for measuring the angular speed of said rotary means.

6. In a hammer drill testing machine, a testing block comprising a casing, a cylinder rotatable therein, a thrust bearing between the cylinder and the casing, the cylinder being constructed to be engaged by the tool of a hammer drill for rotation therewith, and means for measuring the angular speed of the cylinder.

7. In a hammer drill testing machine, a testing block comprising a casing, a cylinder rotatable therein, means in the cylinder for resiliently receiving the impacts of the tool of a hammer drill, a thrust bearing between the cylinder and the casing, the cylinder being constructed to be engaged by said tool for rotation thereof, and means for measuring the angular speed of the cylinder.

8. In a hammer drill testing machine, a testing block comprising a casing, rotary means rotatably supported therein and adapted to be rotated from the tool chuck of

a hammer drill, means to exert constant resistance to the rotation of said rotary means, a fly wheel regulating the rotation of said rotary means, and means on said rotary means for driving a revolution indicator.

9. In a hammer drill testing machine, a rotatable member adapted to be rotated by a hammer drill tool, means to exert constant resistance to the rotation of said member, and an impact piece movably mounted and resiliently supported in said member and adapted to receive the impacts of the tool.

10. In a hammer drill testing machine, a casing, a cylinder rotatable therein, a thrust bearing between the cylinder and the casing, means at the end of the cylinder forming a socket for insertion of a tool and providing rotational engagement between the tool and the cylinder, means in the cylinder for receiving the impacts of the tool, and means

for measuring the angular speed of the cylinder.

11. A hammer drill testing machine, comprising a table, a cradle slidably mounted thereon and adapted for mounting hammer drills, a testing block comprising a casing mounted on the table and formed with an internal bore, a cylinder rotatable in the bore, a thrust bearing between the cylinder and the casing, the front of the casing being constructed for receiving and rotatably engaging a tool, resilient impact receiving means in the cylinder engageable by such tool, a fly wheel on the cylinder, means on the cylinder for driving a revolution indicator, and a constant pressure device for urging the cradle toward the testing block.

In testimony whereof I have hereto appended my signature.

LESLIE PRYCE.