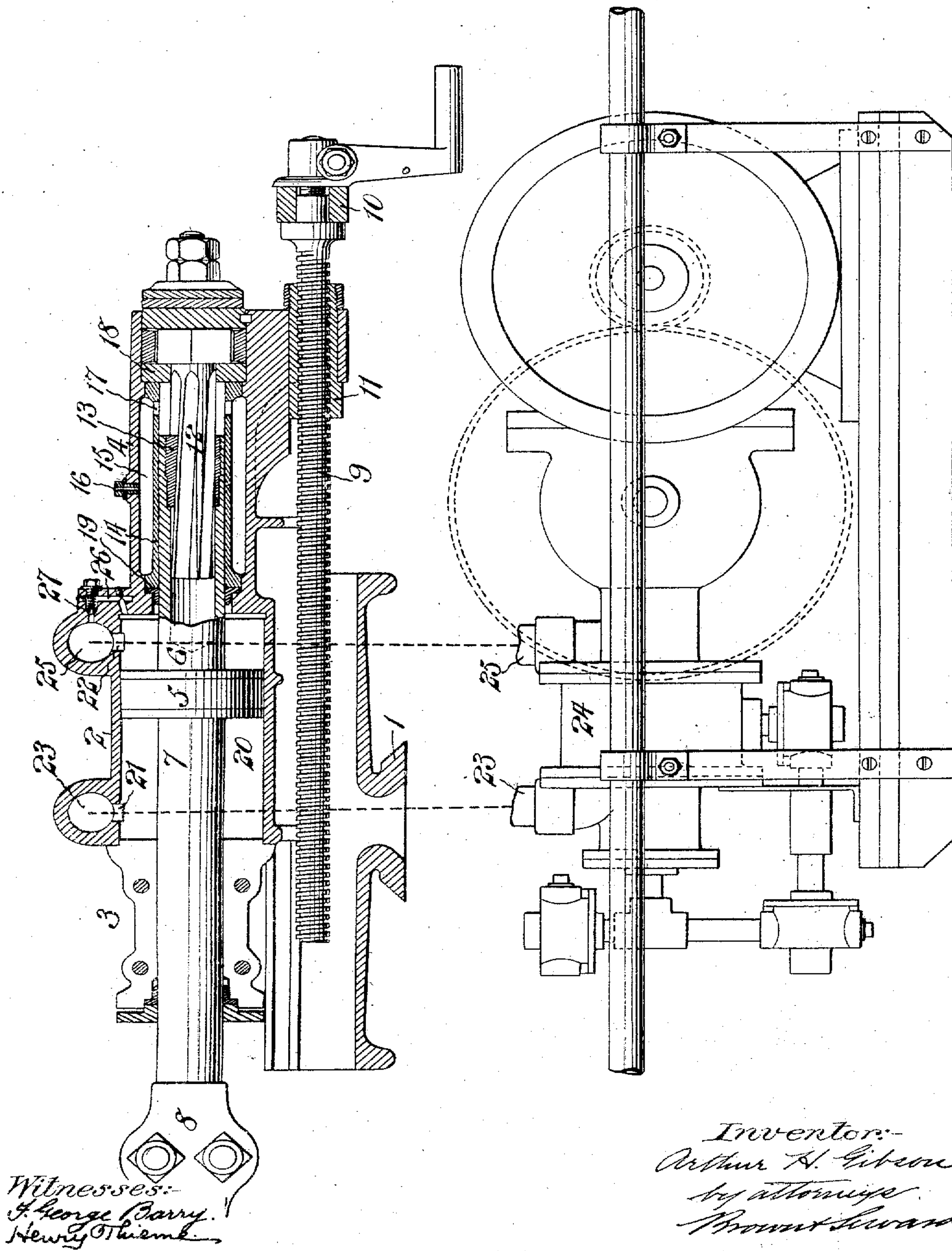


No. 810,639.

PATENTED JAN. 23, 1906.

A. H. GIBSON.
ROCK DRILL.

APPLICATION FILED JUNE 9, 1905.



UNITED STATES PATENT OFFICE.

ARTHUR H. GIBSON, OF EASTON, PENNSYLVANIA, ASSIGNOR TO THE
INGERSOLL-SERGEANT DRILL COMPANY, OF NEW YORK, N. Y., A
CORPORATION OF WEST VIRGINIA.

ROCK-DRILL.

No. 810,639.

Specification of Letters Patent.

Patented Jan. 23, 1906.

Application filed June 9, 1905. Serial No. 264,433.

To all whom it may concern:

Be it known that I, ARTHUR H. GIBSON, a subject of the King of Great Britain, and a resident of Easton, in the county of Northampton and State of Pennsylvania, have invented a new and useful Improvement in Rock-Drills, of which the following is a specification.

The object of this present invention is to provide certain improvements in rock-drills, and especially that class of drill which is used in connection with reciprocating columns of air for moving the drill-piston in both directions.

A further object is to provide a rock-drill in which its piston comprises a piston-head, a front rod, and a tail-rod, the tail-rod being hollow and arranged to have the rifle-bar telescope therein, whereby the advantages of a balanced drill are obtained without the necessity of making the drill too long or clumsy for convenient operation, the tail-rod being at the same time entirely inclosed within the cylinder, and thereby protected from exposure to dust and dirt.

In the accompanying drawing an electropneumatic presser is represented in side elevation, and my improved rock-drill is represented in connection therewith in longitudinal central section.

The electropneumatic presser is of that type which will impart a reciprocatory motion to two columns of air for moving the drill-piston in both directions.

The shell of the drill is denoted by 1.

The drill-cylinder is denoted by 2, its front head by 3, and its rear-head extension by 4.

The piston-head of the drill is denoted by 5, its hollow tail-rod by 6, and its front rod by 7. This front rod extends through the front head 3 of the drill and is provided with the usual chuck 8 for the attachment of the drill-tool thereto.

The cylinder is adjusted along the shell 1 by the usual screw 9, mounted to rotate in the cross-bar 10 of the shell and turning in a traveling nut 11, carried by the drill-cylinder casing.

The rifle-bar is denoted by 12 and is mounted, as is usual, at the rear of the rear extension 4. The said bar extends forwardly into the interior of the hollow tail-rod 6 of the pis-

ton and is there engaged by a nut 13, fixed to the tail-rod. This tail-rod 6 is of substantially the same diameter as the front rod 7 and is fitted to slide in a sleeve 14, spaced from the inner walls of the rear extension 4, so as to form an annular air-chamber 15 around the said sleeve. A small aperture 16 leads from this annular air-chamber 15 to the exterior. The interior of the tail-rod 6 is open to the annular air-chamber 15 through one or more ports 17 through the walls of the sleeve 14. A washer 18 is located between the end of the sleeve 14 and the rotation device for the rifle-bar for preventing the leakage of air therethrough. A washer 19 surrounds the tail-rod 6 at the rear end of the piston-chamber 20 to the front of the hollow sleeve 14 for preventing the leakage of air as much as possible from the piston-chamber 20 along between the tail-rod and sleeve into the chamber 15 in the rear extension 4 of the cylinder. Ports 21, 22 open into the piston-chamber 20 at short distances from the ends of the chamber, the port 21 being connected by a pipe 23 with one side of the presser-cylinder 24 and the port 22 being connected by a pipe 25 with the other side of the presser-cylinder.

To liberate the piston after it has reached the inner end of its stroke and closed the port 22, I provide a by-pass 26, leading from the pipe 25 to the rear end of the piston-chamber 20, in which by-pass is located a spring-actuated ball-valve 27, arranged to be opened against the tension of its spring by pressure from within the pipe 25.

By making the tail-rod and front rod of the piston of substantially the same diameters and by making the tail-rod hollow and permitting the rifle-bar to telescope within the same I am enabled to produce a balanced drill without the necessity of causing the tail-rod to project outwardly through the rear head of the drill and also without the necessity of making the drill so long as to be unwieldy.

By providing the annular chamber 15 in the rear extension of the cylinder which communicates with the air-space within the hollow sleeve and tail-rod I am enabled to permit the free reciprocating movement of the piston without exposing the tail-rod to dust and dirt, the orifice 16 being used simply as a

relief for any excess of pressure which might be caused by leakage past the washer 19.

It is to be understood that in the operation of the drill the pressure in the annular chamber 15 should be substantially the same as atmospheric pressure when the drill is at a point intermediate the ends of its stroke. Furthermore, this is the mean pressure in the chamber 15 when the drill is working. As the drill-piston approaches the limit of its forward movement the pressure within the chamber 15 is brought slightly below atmospheric pressure, the aperture 16 being so small that it will not permit the air from the external atmosphere to be drawn into the chamber before the piston is started on its rearward movement. As the piston approaches the limit of its rearward movement the pressure in the chamber 15 will be raised slightly above atmospheric pressure, for the reason that the aperture 16 is again too small to permit the free escape of the air therethrough from the chamber 15 to the external atmosphere. The value of the aperture 16 is that it permits a mean pressure within the chamber 15 substantially equal to atmospheric pressure, even though a slight amount of air above atmospheric pressure is forced past the washer 19 and between the tail-rod and sleeve into the chamber 15. If this aperture were not provided, the mean pressure in the chamber 15 would rise above atmospheric pressure, and the drill would no longer be a balanced drill, and its proper working would be interfered with.

What I claim is—

The combination with a rock-drill cyl-

inder having a rear extension, of a piston having a hollow tail-rod extended into and entirely inclosed by said rear extension, a sleeve surrounding the tail-rod forming an annular chamber within the rear extension, a rifle-bar telescoping within the tail-rod and a port leading from the annular chamber to the air-space within the sleeve and tail-rod.

2. The combination with a rock-drill cylinder having a rear extension, of a piston having a hollow tail-rod extended into and entirely inclosed by said rear extension, a sleeve surrounding the tail-rod forming an annular chamber within the rear extension, a rifle-bar telescoping within the tail-rod, a port leading from the annular chamber to the air-space within the sleeve and tail-rod and an aperture leading from the annular chamber to the exterior.

3. The combination with a rock-drill cylinder having a rear extension, of a piston having a hollow tail-rod extended into and entirely inclosed by said rear extension, a hollow sleeve surrounding the tail-rod, a washer surrounding the tail-rod for preventing as much as possible the leakage of air past the same from the piston-chamber and a rifle-bar telescoping within the hollow tail-rod.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 7th day of June, 1905.

ARTHUR H. GIBSON.

Witnesses:

CHAS. B. BRUNNER,
JOHN SNYDER.

Corrections in Letters Patent No. 810,639.

It is hereby certified that in Letters Patent No. 810,639, granted January 23, 1906, upon the application of Arthur H. Gibson, of Easton, Pennsylvania, for an improvement in "Rock-Drills," errors appear requiring correction, as follows: In the specification and claims the word "presser" wherever it occurs should read *pressor* and the word "pressers" should read *pressors*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of February, A. D., 1906.

[SEAL.]

F. I. ALLEN,
Commissioner of Patents.

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It is to be understood that in the operation of the drill the pressure in the annular chamber 15 should be substantially the same as atmospheric pressure when the drill is at a point intermediate the ends of its stroke. Furthermore, this is the mean pressure in the chamber 15 when the drill is working. As the drill-piston approaches the limit of its forward movement the pressure within the chamber 15 is brought slightly below atmospheric pressure, the aperture 16 being so small that it will not permit the air from the external atmosphere to be drawn into the chamber before the piston is started on its rearward movement. As the piston approaches the limit of its rearward movement the pressure in the chamber 15 will be raised slightly above atmospheric pressure, for the reason that the aperture 16 is again too small to permit the free escape of the air therethrough from the chamber 15 to the external atmosphere. The value of the aperture 16 is that it permits a mean pressure within the chamber 15 substantially equal to atmospheric pressure, even though a slight amount of air above atmospheric pressure is forced past the washer 19 and between the tail-rod and sleeve into the chamber 15. If this aperture were not provided, the mean pressure in the chamber 15 would rise above atmospheric pressure, and the drill would no longer be a balanced drill, and its proper working would be interfered with.

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