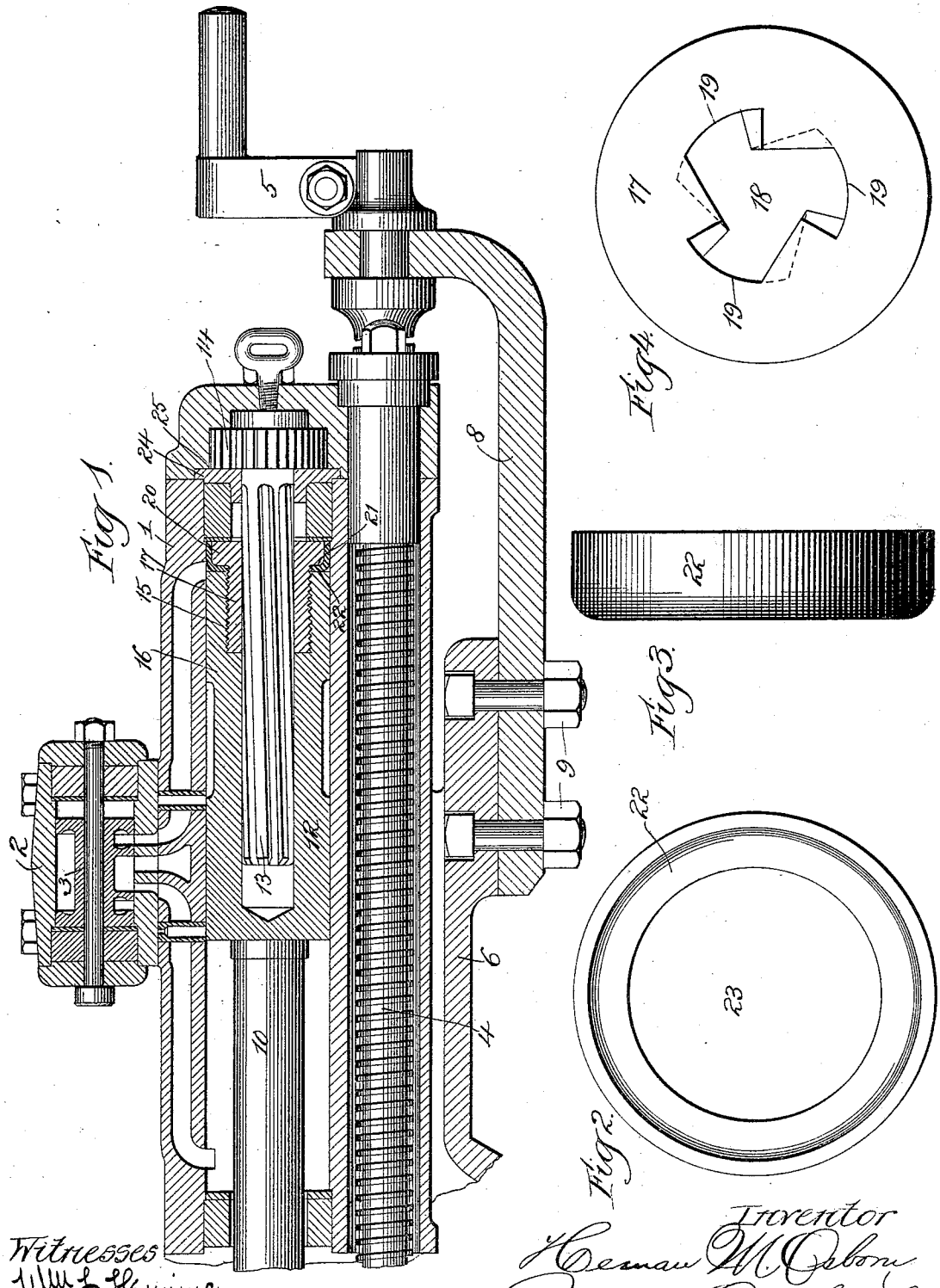
(No Model.)

H. M. OSBORN.

PACKING FOR PISTONS OF ROCK DRILLS.

No. 520,448. Patented May 29, 1894.



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PACKING FOR PISTONS OF ROCK-DRILLS.

SPECIFICATION forming part of Letters Patent No. 520,448, dated May 29, 1894.

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To all whom it may concern:

Be it known that I, HEMAN M. OSBORN, a citizen of the United States, residing at Calumet, in the county of Houghton and State of Michigan, have invented certain new and useful Improvements in Packings for the Pistons of Rock-Drills, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to the packings of the pistons of rock-drills generally, and more particularly to the piston packings of such rock-drills as are designed to utilize compressed air as their motive or actuating medium; my invention being nevertheless equally applicable to rock-drills using steam or other fluid under pressure as their actuating or motive medium.

Among the primary objects of my invention is included that of producing a packing which shall avoid all cutting of the drill-cylinders, and also all consequent pounding of the pistons against the backs of the cylinders, such as interferes with the proper manipulation of the feed-screw cranks of the drills. A further primary object of the invention is to produce a packing which shall be free from all liability to fracture, and thus avoid the frequent disablement of the drills due to such fracture. Also to produce a packing which shall render the use of expansion-springs for the packing unnecessary and which shall consequently avoid the present frequent disablement of the drills from breakage of such springs. Still further, to produce a packing which shall neutralize any injurious effects of breakage of certain adjacent parts of the drill; which shall absorb lubricants and thus assist in the lubricating action upon the parts, and which finally shall avoid the wiping away of the lubricant and the consequent disablement of the drills due to the sticking of the pistons in the cylinders.

To the above purposes as also to such others as may appear from the ensuing description my invention consists in certain peculiar and novel features of construction and arrangement, as hereinafter described and claimed.

The more precise nature of my invention will be better understood when described with reference to the accompanying drawings, in which—

Figure 1 is a central longitudinal section of a part of a rock-drill having its pistons provided with a packing embodying my invention. Fig. 2 is an end-elevation of a packing embodying my invention; the said packing being in detached condition. Fig. 3 is a side elevation of the packing. Fig. 4 is an end-elevation of the rotating nut.

Before giving a detailed description of the structure shown in the drawings as embodying my invention, I will state, as clearly and briefly as possible, the principal defects which are found in the spring-pressed sectional metal piston packings heretofore commonly used in such rock-drills as the "Ingersoll" and "Sargeant" drills, the "Rand" and "Bullock" drills, and similar rock-drills now in most general use. These drills are all provided with packings, for their piston-bars, consisting of steel sections pressed outwardly by spring-action. When these drills are new, or when their packings are in even the most perfect condition, they are seriously defective, because since the contacting surfaces of the cylinders and the metal packing ring sections are necessarily made as smooth as possible, the moisture, which is always present in compressed air, works through between these smooth contacting surfaces and thus causes the lubricating oil to be wiped off by the moving metal packing. The result is that the piston-bars stick so firmly in the cylinders that the miners cannot dislodge them and they have to be sent back to the shops for repairs. Furthermore, at the commencement of drilling-operations, the surface upon which the drilling-bits strike are usually uneven (the miners not taking time to first level off such surfaces) and the consequence is that the piston-bars are subjected to violent lateral shocks or strains which cause the metal packing-sections to cut into the smooth surfaces of the cylinders and thus rapidly wear the bores of the cylinders out of true; this cutting action usually causing the cylinders to assume internally a "barrel-form" at one or more points and the resulting leakage of air or steam around the packings, lessening the effective power of the drills and soon

totally disabling them. It is a fact that an enlargement of only three or four one-thousandths of an inch is sufficient to seriously impair the effectiveness of a drill, and hence the importance of this defective action is apparent. As a further consequence of this lateral wearing of the cylinder-bores, the necessary cushioning of the piston-bars on the back-stroke is prevented (owing to the leakage around the packings) and the piston-bars consequently pound so violently against the backs of the cylinders that it is impossible for the operators to retain a steady grasp upon the feed-screw cranks.

The previous forms of piston-bar packings are still further seriously objectionable, inasmuch as the metal-ring sections and also their springs are exceedingly liable to become fractured under the violent action of the drills, and the broken fragments resulting from such fractures speedily cut or score the interior walls of the cylinders, rendering the machine useless by reason of the resulting leakage around the piston-bars. This objection also applies to the internal shoulders at the backs of the cylinders, which are also liable to fracture from the described pounding of the piston-bars, on their back-strokes, and the fragments of which similarly cut or score the cylinder-walls.

I have thus explained in detail the defects of the metal-packing-rings heretofore used, because such defects are, each and all, entirely avoided by my invention. I do not use metal packing at all, nor do I use metal or any other springs. I use a packing which is so soft and pliable that it cannot possibly cut or wear the cylinder walls, and which utilizes the expansive force of the actuating fluid to effect its expansion, and which, furthermore, permits any fragments from the internal shoulder (in the very remote contingency of fracture of such shoulder) to so embed themselves in the packing that they cannot cut or score the cylinder-walls.

Referring now to the drawings, in which I have shown my invention as applied to a "Sargeant" rock-drill, 1 designates the cylinder of the drill, 2 the valve-chest and 3 the valve thereof.

4 designates the feed-screw, 5 the feed-screw crank, 6 the shell in which the drill-cylinder slides.

8 designates the goose-neck, shown as bolted at 9 to the shell 6 and as forming, at its rear end, a bearing for the feed-screw crank 5.

10 designates the piston-bar having at its outer end a suitable socket (not shown) for the bit and at its inner end formed with or properly connected to a piston 12.

13 designates the rifle-bar which extends into a longitudinal bore in the piston 12 and which at its rear end carries the rotating ratchet 14 acted upon by the usual rotating pawls (not shown).

A more detailed description of the drill is not deemed necessary herein, since such parts may be either of the precise form and arrangement here shown, or of any other form and arrangement usual with the class of drills of which that illustrated forms a type.

The rear end of the piston 12 is internally screw-threaded, as at 15, and is also externally somewhat enlarged as at 16; the internal screw-threading of this enlarged portion 16 being for the purpose of admitting the rotating or packing-nut 17. This packing-nut (or "rotating-nut," as it is usually called) is externally screw-threaded to engage the internal screw-threads 15 of the piston 12, and is formed with an internal longitudinal bore 18 extending throughout the entire length of the nut and having the usual lateral spiral grooves 19 to receive the external spiral ribs of the rifle-bar 13. This packing-nut 17 is formed at its rear end with an external circular enlargement 20 the front edge of which is perfectly rounded off as shown at 21.

22 designates the flexible packing, this packing having a central opening 23 the margin of which closely surrounds the body-portion of the nut 17 adjacent to the front end of the enlargement 20, so that said packing lies closely against said end of the enlargement. The width of the packing 22, from its outer margin to the margin of its opening 23, is such that, when, the packing is in proper position, the outer margin or edge of the packing shall protrude outward and backward between the outer surface of the enlargement 20 and the sides of the cylinder-bore; the external diameter of the enlargement 20 of the nut being just so much less than the external diameter of the enlargement 16 of the piston so as to afford room between the outer surface of the enlargement 20 and the cylinder-wall, for the outwardly and backwardly protruding portion of the packing 22. This packing 22 is preferably of leather, as such material best fulfills all of the various working-requirements of the packing, but it may be of any suitable soft and flexible and at the same time durable material. Owing to its softness, the packing cannot possibly cut or score the walls of the cylinder and it is sufficiently absorbent to take up moisture from the compressed air and also part of the oil used for lubricating the piston. Hence the packing assists in lubricating the piston, since, during each stroke of the piston, the packing applies some of its absorbed lubricant to the walls of the cylinder. Owing to the outward and backward extension of the packing, the compressed air expands the packing against the cylinder-walls, during each forward stroke of the piston, so that there can be no leakage of air around the packing. The only parts which could possibly become fractured are the rotary back washer 24 and the shoulder 25 within the cylinder, and in the improbable event of such fracture the softness of the packing enables the fragments to embed themselves into the packing without cutting

or scoring the cylinder-walls. It is also to be observed that it is impossible for the flexible packing to work out of its proper position, because the torsional action of the rifle-bar upon the packing-nut serves to constantly tighten the nut against the packing.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. The combination with the piston of a rock-drill, a rotating packing-nut having screw-threaded connection with said piston, and a rifle-bar working through said packing-nut, of a flexible and absorbent non-metallic packing surrounding the nut and interposed between said nut and the piston, and also protruding outwardly and rearwardly around the nut, substantially as set forth.

2. The combination with the piston of a rock-drill, a packing-nut screwed into said piston and having an enlarged rear end, and a rifle-bar working through said packing-nut, of a flexible and absorbent non-metallic packing surrounding the nut and interposed between said nut and the piston, and also protruding outwardly and rearwardly around the enlargement of the nut, substantially as set forth.

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