PUBLISHED
MAY 11, 1943.
BY A. P. C.

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PNEUMATIC TOOLS, PARTICULARLY SUCH WITH RECIPROCATING PISTONS, SUCH AS ROCK DRILLS AND COAL PICKERS
Filed March 28, 1940

Serial No.
326,461

Fig.1

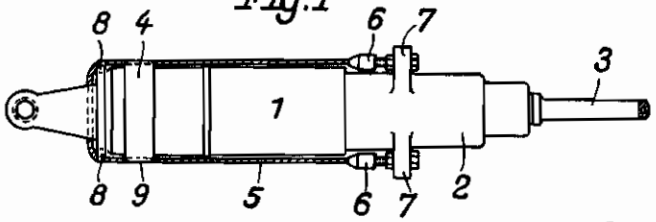



Fig.2


Fig.3

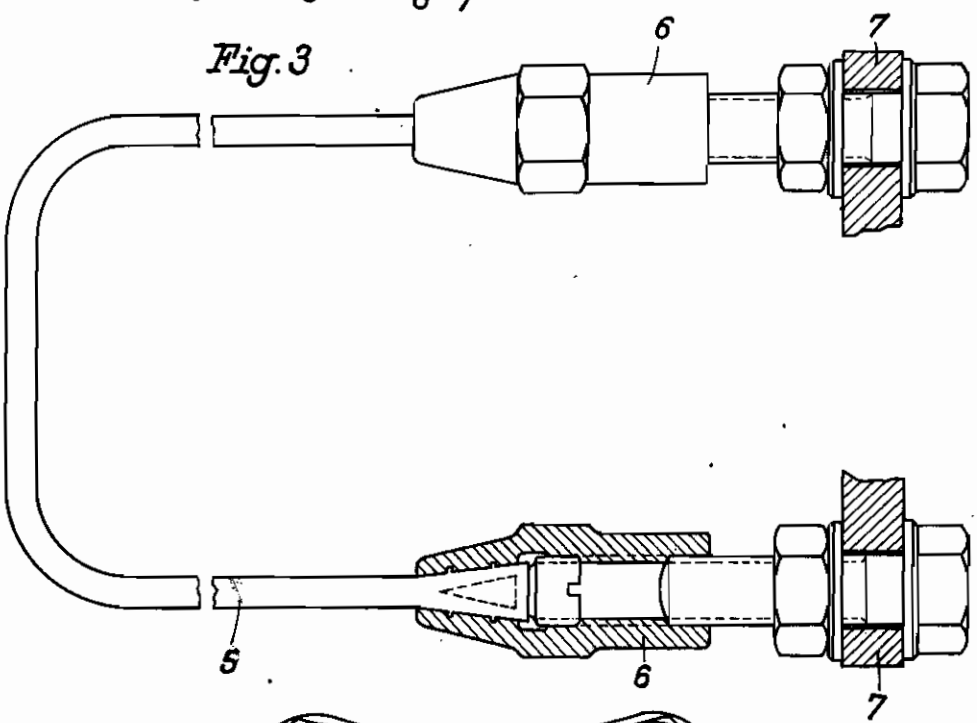
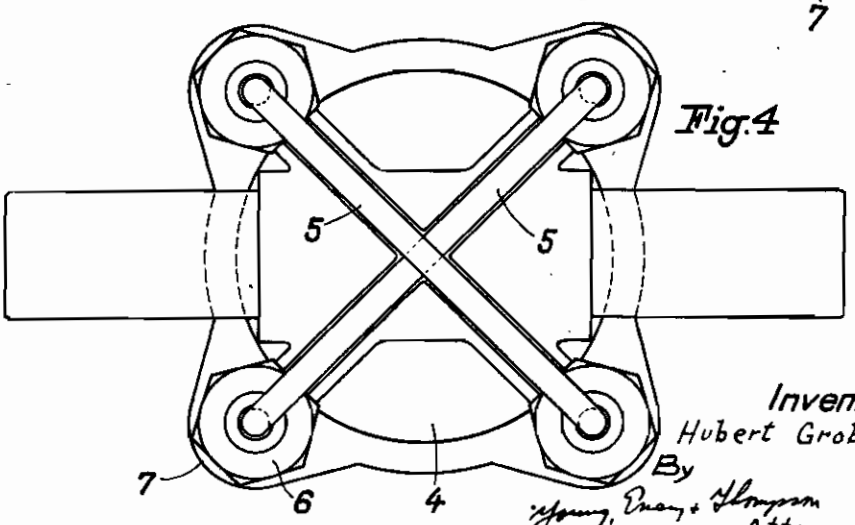



Fig.4

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Published May 11, 1943 Serial No. 326,461

# ALIEN PROPERTY CUSTODIAN

## PNEUMATIC TOOLS, PARTICULARLY SUCH WITH RECIPROCATING PISTONS, SUCH AS ROCK DRILLS AND COAL PICKERS

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Application filed March 28, 1940

The holding together of the constructional elements of pneumatic tools has been effected up to the present by screw bolts arranged on the side of the pneumatic cylinder and mounted in the front and rear cover plates of the cylinder. In order that these screw bolts can uniformly take up the vibrations occurring during the service and chiefly the idle strokes of the piston, these screw bolts had to be uniformly screwed up and to remain thus; a requirement which in most cases was not fulfilled. After a quite short time elongations of the screw bolts occur already, so that the vibrations were irregularly transmitted upon these screw bolts wherefrom resulted fracture owing to the slight elasticity of the material. Another inconvenience of these screw connections consisted therein that, owing to the elongation of individual screw bolts, the constructional elements to be connected adjust themselves mutually different, so that by jamming of the sliding parts serious damages and disturbances could occur on the pneumatic tool. It has therefore been proposed to obviate these inconveniences by the provision of springs which were coordinated to the screw bolts, or by interposition of an air bolster. It has however been soon ascertained that, when a spring breaks, similar inconveniences occur by the jamming of the sliding parts owing to the unequal loading of the screw bolts. By the springs arranged around the screw bolts and which had to be very strong the tool became wider and heavier and consequently more unhandy.

According to the invention these inconveniences are obviated thereby, that one or a certain number of wire ropes preferably twist free were used for bracing the constructional elements of the pneumatic tool. Wire ropes are less sensitive to bending stresses and, owing to their great elasticity, they do not break so easily as screw bolts. As the wire ropes to be connected at similar strength have, compared with screw bolts, a substantially shorter diameter (for instance only $\frac{1}{5}$ of the diameter of the screw bolts) and as they further may be laid tightly on the cylinder wall, the weight and the width of the pneumatic tools are reduced and thereby the handling of the same is facilitated.

The bracing of the constructional elements by means of wire ropes can be effected in various manners. Instead of the screw bolts, pieces of wire ropes may for instance be used. An especially suitable construction is, however, realised when the constructional elements are braced by one or several wire ropes conducted in U-shape around the body of the pneumatic tool. Especially on heavy hammers it is best, if two or more such U-shaped wire ropes are arranged crosswise or the one over the other at a corresponding angle. By the employment of such U-shaped bracing ropes, a bracing equalisation is produced automatically in the rope halves and which remains also when the wire ropes elongate. When several ropes are used, extending crosswise the one over the other on the cylinder cover, the advantage results that, even when one of the coupling nuts or ropes breaks, the other rope or ropes take up the stresses completely and uniformly.

The bracing equalisation in the ropes extending over the cylinder cover is favoured thereby, that the wire ropes are conducted over rollers or similar elements especially at the bending points. When several wire ropes extended crosswise over a cylinder cover, these rollers are arranged displaced from the central axis of the pneumatic tool in such a manner or stepped in diameter, so that the crossing, braced wire ropes are of equal length. Owing to this arrangement it is no longer necessary to use ropes of different lengths.

As the wire ropes are of relatively short diameter and conducted tightly along the cylinder walls, they may be laid completely or partly in grooves in the cylinder walls, open on the outer side, and protected in this manner against damaging. The ends of the wire ropes are fixed on the cylinder by interposition of coupling nuts. The ends of the ropes might be directly fixed on the cylinder cover and a coupling nut provided in the middle of the rope or at any other point.

An embodiment of the invention is illustrated by way of example in the accompanying drawing, in which

Fig. 1 shows a coal picker in side elevation,

Fig. 2 is a cross-section through the cylinder,

Fig. 3 shows the bracing rope on larger scale,

Fig. 4 shows in top plan view the rear cylinder cover on larger scale.

The pneumatic cylinder **1** of the pneumatic coal picker ends on the front side in a picker part **2** which has the hole through which the chisel **3** extends and on the rear side in a cover **4** with handle. The parts **2** and **4** are fixed on the cylinder ends and all parts are held together by a twist free wire rope **5**. The ends of the wire rope are fixed by means of coupling nuts **6** on projections **7** of the front part **2** of the picker and conducted in U-shape over the rear cylinder cover **4**. The wire rope **5** extends on the edge of the

cover 4 over rollers 8, so that the bracing of the rope on both cylinder sides can be equalised at any time without the necessity to overcome greater friction resistances. As shown in Figs. 1 and 2 the rope 5 may be laid on the side wall of the cylinder in grooves 9 so that the rope is protected against damaging. These grooves 9 may extend over the whole length of the cylinder.

Fig. 4 shows the bracing of the constructional cylinder elements by means of two wire ropes 5, extending crosswise over the rear cover of the cylinder. The rollers 8 of the one rope are preferably arranged relative to the rollers of the other rope displaced from the central axis of the pneumatic tool, so that the bracing ropes 5 are of equal length. The equalisation of these rope lengths may evidently be ensured by displacing the two projections 7 of the front cover 2 of the cylinder or by graduating the diameter of the rollers. If in this form of construction one of the ropes 5 should break, the constructional elements are still held together by the other rope. As this rope extends transversely over the center of the cylinder cover the forces to be taken up are uniformly distributed on both sides of the rope, so that bending of the cylinder covers by forces acting on one side only and thereby damages by jamming of the sliding elements cannot occur. Instead of two ropes 5, a greater number of ropes may be provided. These ropes may consist of short pieces, which are to be fixed in eyes or in projections instead of the rollers 8.

HUBERT GROBE.