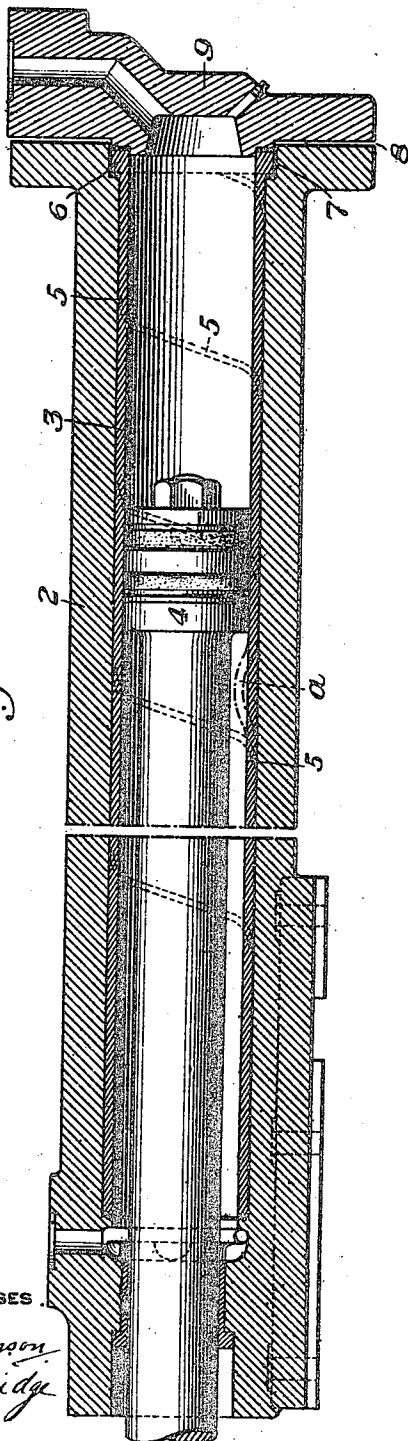


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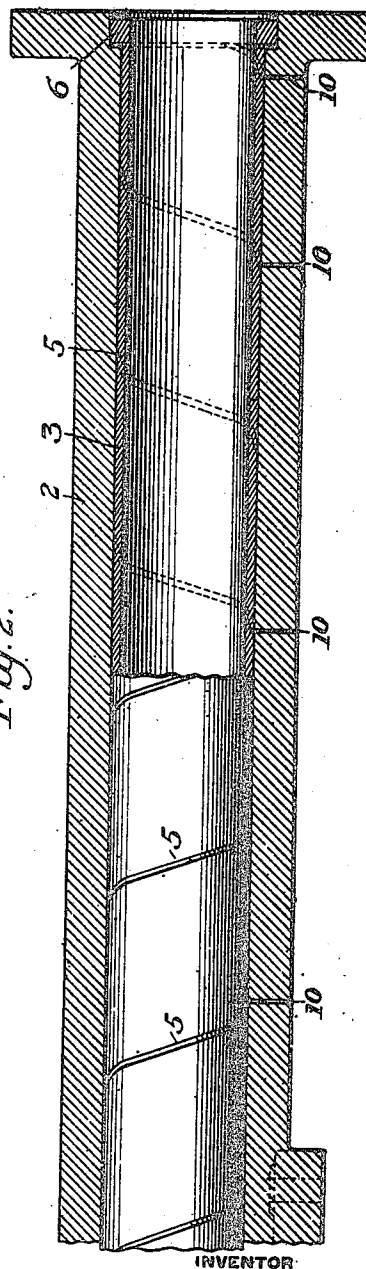
Fig. 1.



WITNESSES

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Fig. 2.



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Fig. 4.

Fig. 4.

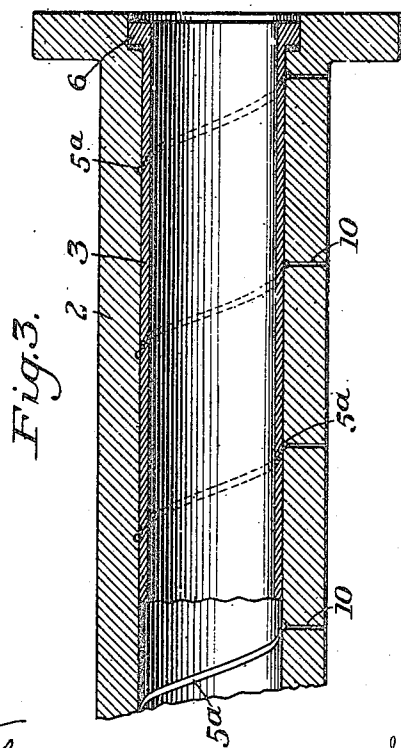


Fig. 3.

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UNITED STATES PATENT OFFICE.

JULIAN KENNEDY, OF PITTSBURGH, PENNSYLVANIA.

HYDRAULIC CYLINDER AND PISTON.

1,295,329.

Specification of Letters Patent.

Patented Feb. 25, 1919.

Application filed February 23, 1918. Serial No. 218,625.

To all whom it may concern:

Be it known that I, JULIAN KENNEDY, a resident of Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Hydraulic Cylinders and Pistons, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1, 2 and 3 are longitudinal sectional views showing two different forms of my invention as applied to hydraulic cylinders; and

Fig. 4 is a sectional elevation showing the invention applied to a piston or plunger.

My invention has relation to hydraulic cylinders and pistons, and is particularly applicable to cylinders and pistons where relatively high working pressures are employed. Such cylinders usually have an internal lining in the form of a bronze bushing which forms the immediate bearing for the piston or plunger; and it is also common to provide the pistons or plungers with a similar bushing forming the wearing surface thereof.

In practice, it is difficult to obtain bushings of this character which are sufficiently free from porosities or other defects to prevent some of the working fluid from being forced through them under the working pressures employed in the cylinders. When such leakage occurs, even in relatively small volume, it frequently happens that the pressure in the cylinder forces the leakage liquid around the piston between the outer surface of the bushing and the inner wall of the cylinder proper. This is likely to cause the bushing to buckle or collapse inwardly in front of the piston in the manner indicated at *a* in Fig. 1, thereby destroying the bushing and perhaps causing serious results in the apparatus with which the cylinder is used. A similar result may follow from a defective piston bushing.

My invention is designed to provide means of simple and effective character for overcoming the effect of such leakage to thereby prevent buckling or collapsing of the cylinder or piston bushing; and it consists broadly in providing leakage release passages or channels intermediate the bushing and the body of the cylinder or piston proper and which are arranged to intercept any leakage which may occur through the bushing.

Referring first to that form of my invention shown in Fig. 1, the numeral 2 designates a hydraulic cylinder of any usual character having the lining bushing 3. 4 designates the piston or plunger also of any usual character.

In the specific form of my invention shown in this figure, I provide the outer surface of the bushing with a continuous helical shallow groove 5, extending throughout the major portion of the length of the bushing and running clear to the flanged end 6 thereof. At this end, said groove communicates with the leakage space 7, which is formed between said flange and the adjacent wall of the cylinder, and this space, in turn, is shown as communicating with a leakage opening 8 between the cylinder flange and the head 9.

Any leakage which may occur through the wall of the bushing will be intercepted by some portion of the helical groove before the liquid has traveled any considerable distance, and under the pressure in the cylinder, such liquid will ultimately find its way to the leakage escape openings at the end.

If desired, however, the wall of the cylinder may be provided at intervals with small escape openings 10, as shown in Fig. 2. Very small openings of this character will be sufficient and may, in some cases, be used without the relief passages between the cylinder wall and bushing.

I do not limit myself to the use of a helical groove in the bushing, as the means for intercepting the leakage, since the leakage-intercepting passages or channels may be of various forms and arrangement. They may also be formed in the inner wall of the cylinder, as shown at 5^a in Fig. 3, but it is usually more convenient to form them in the bushing prior to its insertion into the cylinder.

In Fig. 4, I have shown my invention applied to a piston or plunger. In this figure, 11 designates a cylinder and 12 its piston or plunger, these parts being shown by way of example, as used for actuating a die or press member 13. 14 designates the bushing and 15 is the helical groove which may be formed either in the external surface of the piston body, as shown, or in the inner surface of the bushing, the essential thing being that it shall be between the parts in position to catch leakage through the bushing.

My invention not only overcomes the difficulties hereinbefore referred to, and prevents buckling and collapse of cylinder and piston bushings, but it also enables the use of a thinner bushing than has heretofore been required, a thicker bushing having heretofore been necessary in an attempt to prevent leakage.

My invention also results in a considerable saving in the manufacture of the bushings, since heretofore it has frequently been necessary to discard a large percentage of the finished bushings, owing to the fact that they were sufficiently defective to permit leakage and could not, therefore, be used.

I claim:

1. A hydraulic cylinder or piston comprising a body and a bushing, said body and bushing having a leakage-intercepting passage or channel between them, substantially as described.

2. A hydraulic cylinder or piston having a body and a bushing, said body and bushing having a leakage-intercepting passage or channel having a discharge connection leading to the exterior of the cylinder, substantially as described.

3. A hydraulic cylinder having an interior lining or bushing, said parts having a

leakage-intercepting passage or channel between them, and the wall of the cylinder having escape openings therein, substantially as described.

4. A hydraulic cylinder having an interior lining or bushing, the latter having its external surface provided with a helical leakage-intercepting groove, substantially as described.

5. A hydraulic cylinder having an interior lining or bushing, the latter having its external surface provided with a helical leakage-intercepting groove, and the wall of the cylinder having a plurality of escape openings therethrough, substantially as described.

6. A bushing or lining for hydraulic cylinders, said bushing having its outer surface provided with a helical leakage-intercepting groove, substantially as described.

7. A hydraulic cylinder having an interior lining or bushing and the wall of the cylinder having therein a plurality of small leakage openings leading from the outer surface of the bushing, substantially as described.

In testimony whereof, I have hereunto set my hand.

JULIAN KENNEDY.