

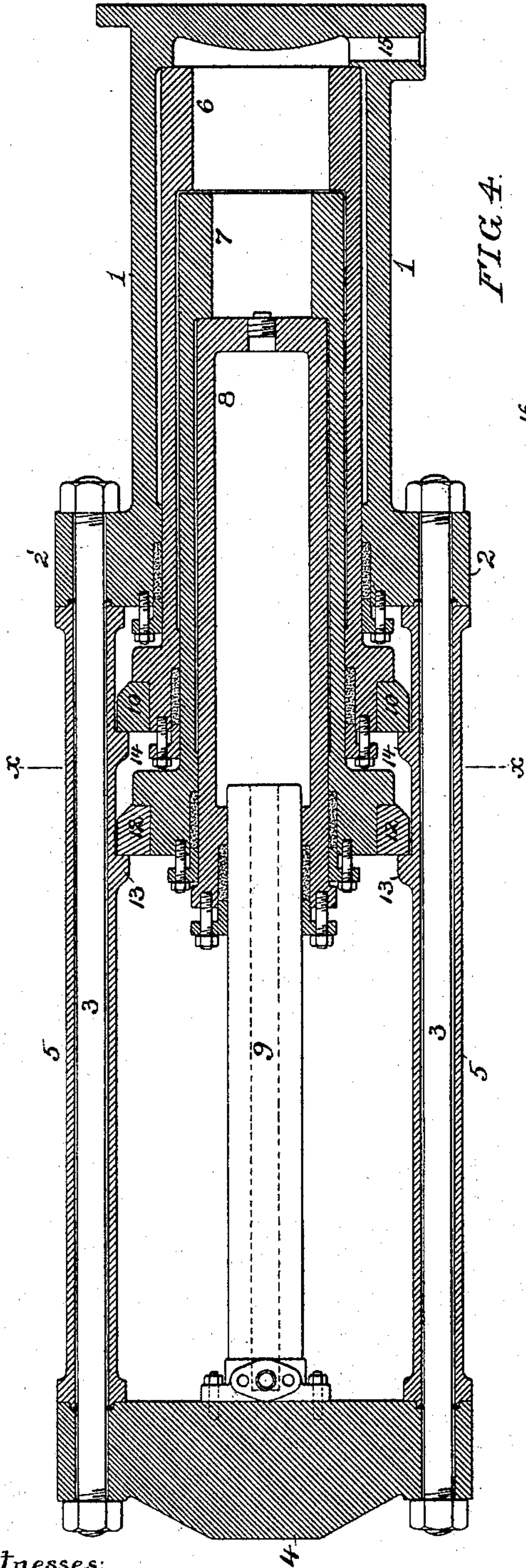
(No Model.)

G. W. SHEM.
HYDRAULIC INTENSIFIER.

No. 584,712.

Patented June 15, 1897.

FIG. 1.



Witnesses:
Hamilton S. Turner
Murray C. Boyer

FIG. 4.

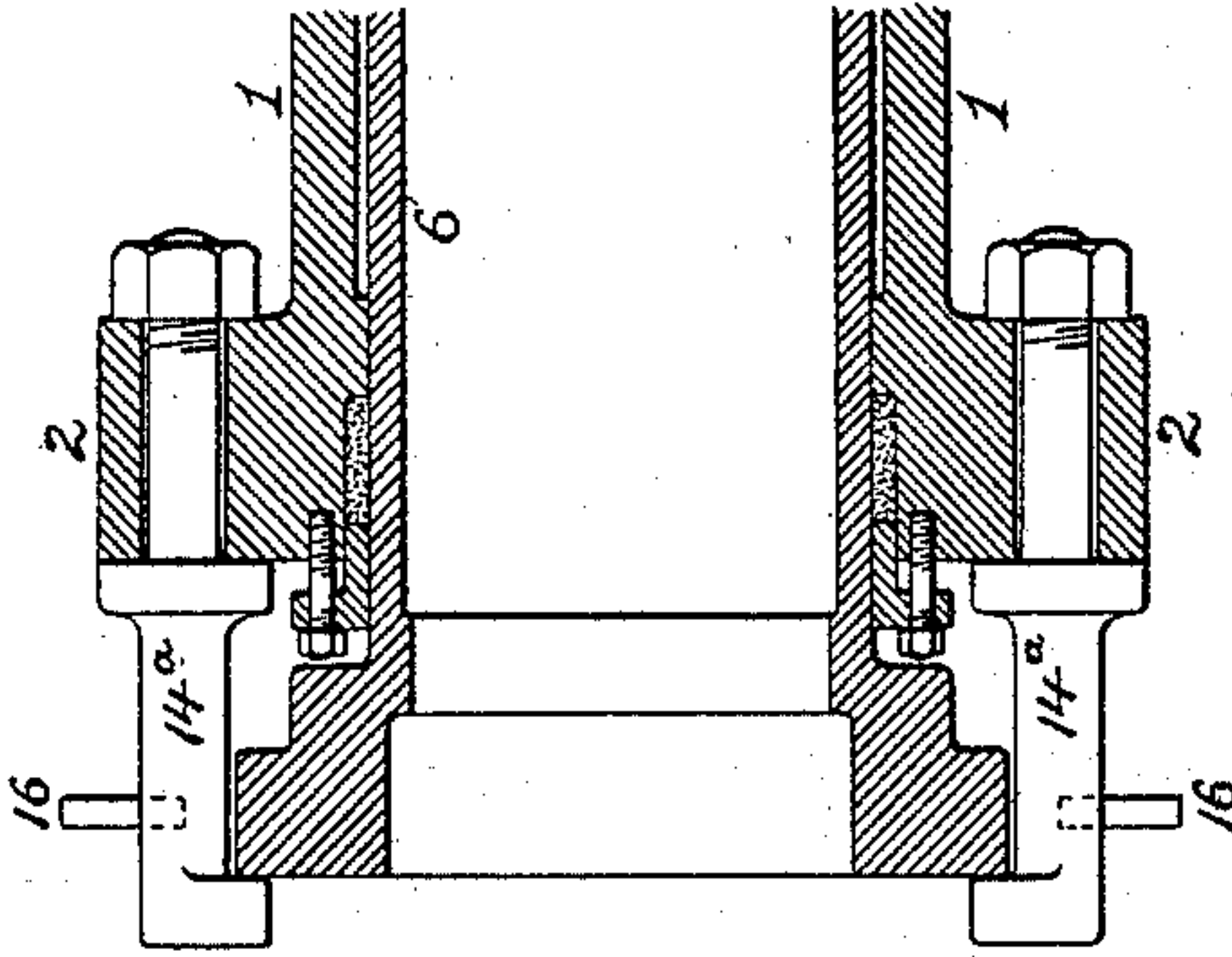


FIG. 2.

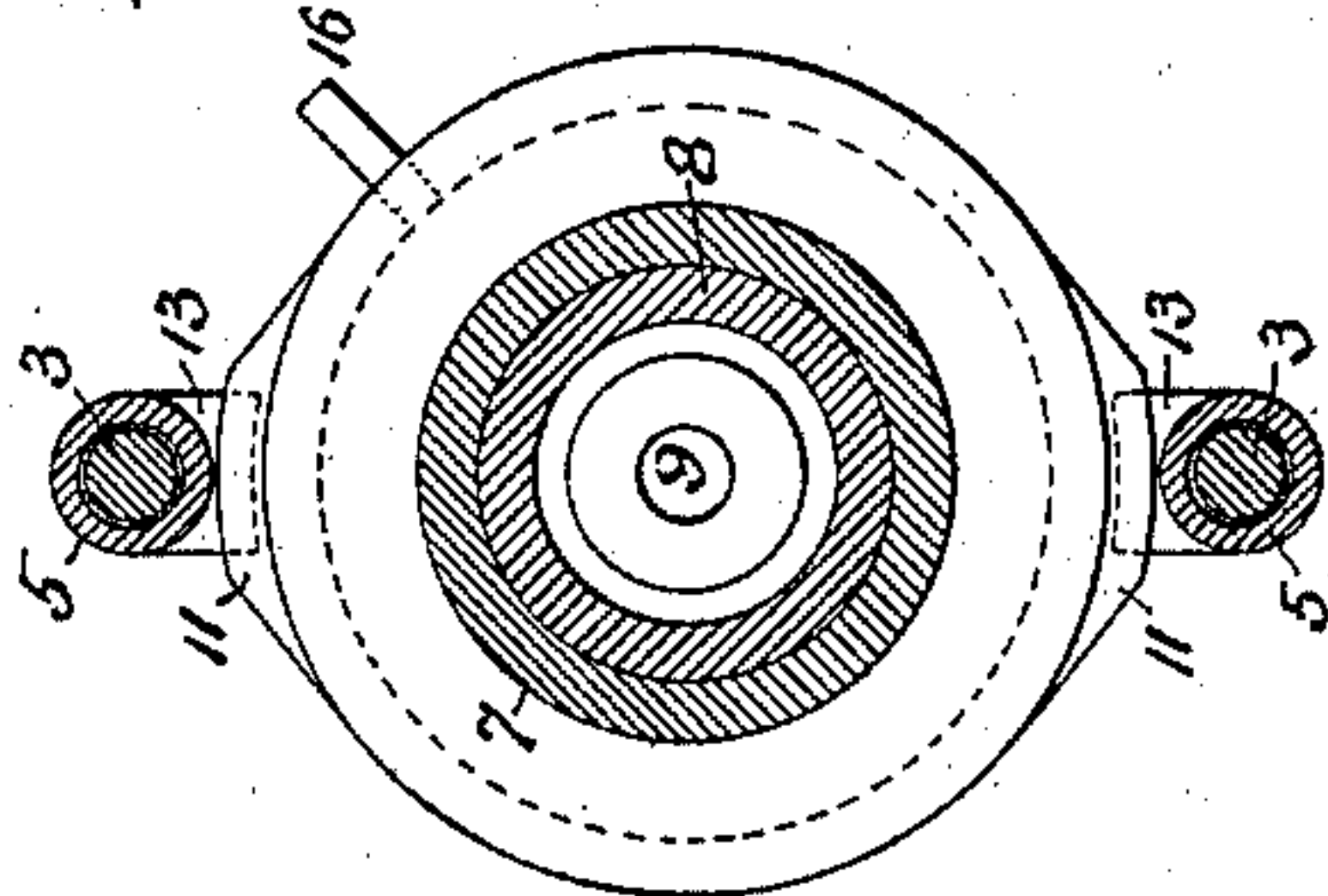
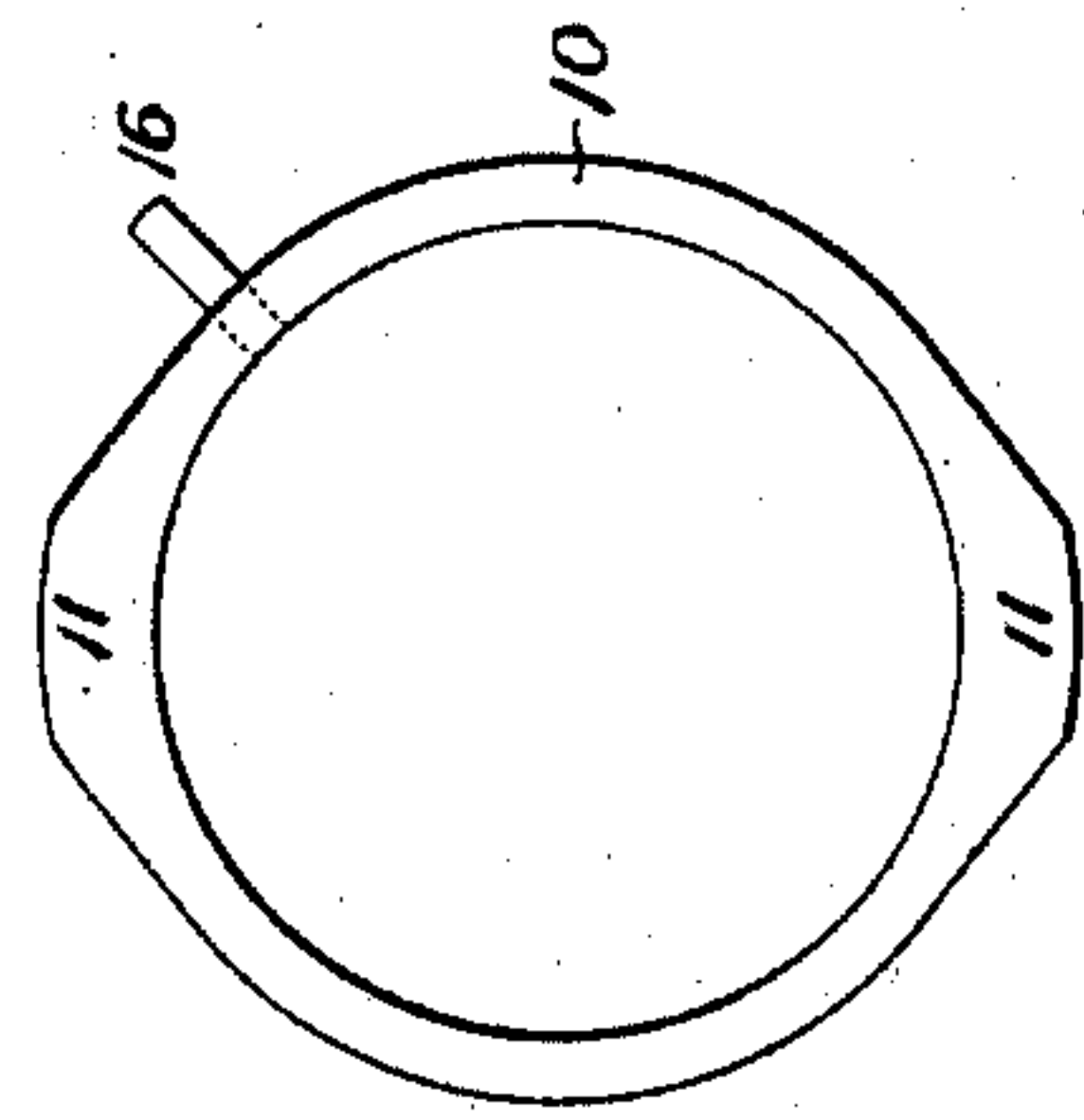


FIG. 3.



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UNITED STATES PATENT OFFICE.

GEORGE W. SHEM, OF CAMDEN, NEW JERSEY, ASSIGNOR TO THE CAMDEN
IRON WORKS, OF SAME PLACE.

HYDRAULIC INTENSIFIER.

SPECIFICATION forming part of Letters Patent No. 584,712, dated June 15, 1897.

Application filed December 4, 1896. Serial No. 614,517. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. SHEM, a citizen of the United States, and a resident of Camden, New Jersey, have invented certain
5 Improvements in Hydraulic Intensifiers, of which the following is a specification.

My invention relates to that class of pressure devices known as "hydraulic intensifiers," the purpose of which is to cause a volume of fluid under pressure to impart to a second volume of fluid a pressure in excess of the initial pressure.

The object of my invention is to so construct apparatus of this character as to readily
15 regulate the degree of pressure imparted to the secondary volume of fluid; and this object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

20 Figure 1 is a longitudinal sectional view of a hydraulic intensifier constructed in accordance with my invention. Fig. 2 is a transverse section of the same on the line *xx*, Fig. 1. Fig. 3 is a view of a locking-ring such as
25 is employed in connection with certain of the rams of the intensifier, and Fig. 4 is a view illustrating a modification of the invention.

The main cylinder 1 of the apparatus has at the upper end a heavy flange 2, which is
30 connected by means of bolts 3 to a substantial cross-head 4, located at such a distance from the main cylinder as the desired stroke of the rams may suggest. Interposed between the flange 2 of the cylinder 1 and the
35 cross-head 4 are sleeves 5, which surround the bolts 2 and serve to hold the cross-head 4 rigidly in its proper relation to the cylinder 1.

Within the cylinder 1 are, in the present instance, three hollow rams 6, 7, and 8 of different diameters, these rams fitting one within the other telescopically, and the rams 6 and 7 being open at the inner end, while the ram 8 is closed at the inner end.

40 The ram 7 is internally shouldered near its inner end, so as to provide a bearing for the ram 8, and in like manner the ram 6 is internally shouldered to provide a bearing for the ram 7.

The cylinder 1 has at the outer end a stuffing-box for the outer or largest ram 6, and the latter has at its outer end a stuffing-box

for the intermediate ram 7, which is also provided at its outer end with a stuffing-box for the innermost ram 8, the latter having at the outer end a stuffing-box for a tubular plunger
55 9, which is rigidly secured at its outer end to the cross-head 4, the inner end of the plunger opening into the chamber within the ram 8, while the outer end of the plunger communicates in any available way with the connection into which fluid under high pressure is
60 to be forced.

Mounted upon the outer end of the ram 6, so as to be capable of turning thereon, is a ring 10, with thickened portions or lugs 11, and similarly mounted upon the outer end of the ram 7 is a like ring 12, and on the sleeves 5, which surround the connecting-bolts 2, are inwardly-projecting lugs 13 and 14, the former being adapted to engage with the lugs 11 of the ring
70 12, while the lugs 14 are adapted to engage with the lugs of the ring 10 when the rams 6 and 7 are in their innermost position.

Supposing that the parts are in the position shown in Fig. 1 and that the chamber of the
75 hollow ram 8 is filled with the fluid to which pressure is to be imparted, the rams 6 and 7 are locked to the sleeves 5 by reason of the engagement of their rings 10 and 12 with the lugs 14 and 13 of said sleeves. Hence the fluid
80 under initial pressure admitted to the cylinder 1 through the opening 15 can project only the innermost ram 8, and the pressure imparted to the fluid within said ram 8 will be governed by the difference between the area
85 of the plunger 9 and the area presented by the ram 8. If a greater pressure is desired, the ram 7 may be unlocked by turning its ring 12, by means of a handle 16, until the lugs 11 of said ring are free from engagement with
90 the lugs 13 of the sleeves 5, whereupon the ram 7 will be free to move and the effective area exposed to the pressure within the cylinder 1 will be increased correspondingly, and in like manner a further increase of pressure
95 may be obtained by unlocking the ram 6 by turning its ring 10 so as to release its lugs 11 from the control of the lugs 14. Hence the pressure may be graduated to accord with any requirement without using any more fluid
100 of initial pressure than is necessary for the purpose.

Although I have shown an apparatus employing but three rams, it will be evident that the number of rams may be multiplied to any desired extent, or, on the other hand, my invention may be embodied in an intensifier having but two rams, and various means of locking the rams in position may be resorted to. For instance, where the sleeves 5 are not used, the retaining-lugs may be formed directly upon the connecting-bolts 2, or special bolts may project from the flange of the cylinder 1 for engagement with the flanged outer ends of the rams, as shown, for instance, at 14^a in Fig. 4.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination in a hydraulic intensifier, of the initial-pressure cylinder, a plurality of rams telescopically arranged therein, the central ram being hollow and containing the chamber in which the increased pressure is generated, a fixed plunger closing the outer end of said central hollow ram, an outlet from said ram, and provision for locking and releasing the rams surrounding the central hollow ram, whereby the initial pressure may be exerted throughout the area presented by any one of the rams to generate pressure upon the fluid contained in the central hollow ram, substantially as specified.

2. The combination in a hydraulic intensi-

fier, of the initial-pressure cylinder, a plurality of rams telescopically arranged therein, the central ram being hollow and containing the chamber in which the increased pressure is generated, and each of the surrounding rams having an internal shoulder acting as a stop to limit the inward movement of the ram contained within it, an outlet from the central hollow ram, a fixed plunger closing the outer end of said central hollow ram, and provision for locking and releasing the rams surrounding the central hollow ram, substantially as specified.

3. The combination in a hydraulic intensifier, of the initial-pressure cylinder, a plurality of rams telescopically arranged therein, a plunger entering the central ram in which increased pressure is generated, an outlet from said central ram, a cross-head carrying the said plunger and connected to the cylinder by bolts, sleeves surrounding said bolts and having projecting lugs thereon, and rings revolubly mounted upon the rams and having projecting portions for engaging with the lugs on the sleeves, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE W. SHEM.

Witnesses:

JOS. H. KLEIN,
F. E. BECHTOLD.