

No. 700,639.

Patented May 20, 1902.

R. R. HAGE & H. P. WALLER.
REVERSIBLE DEVICE FOR ENGINES.

(Application filed Aug. 31, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 2.

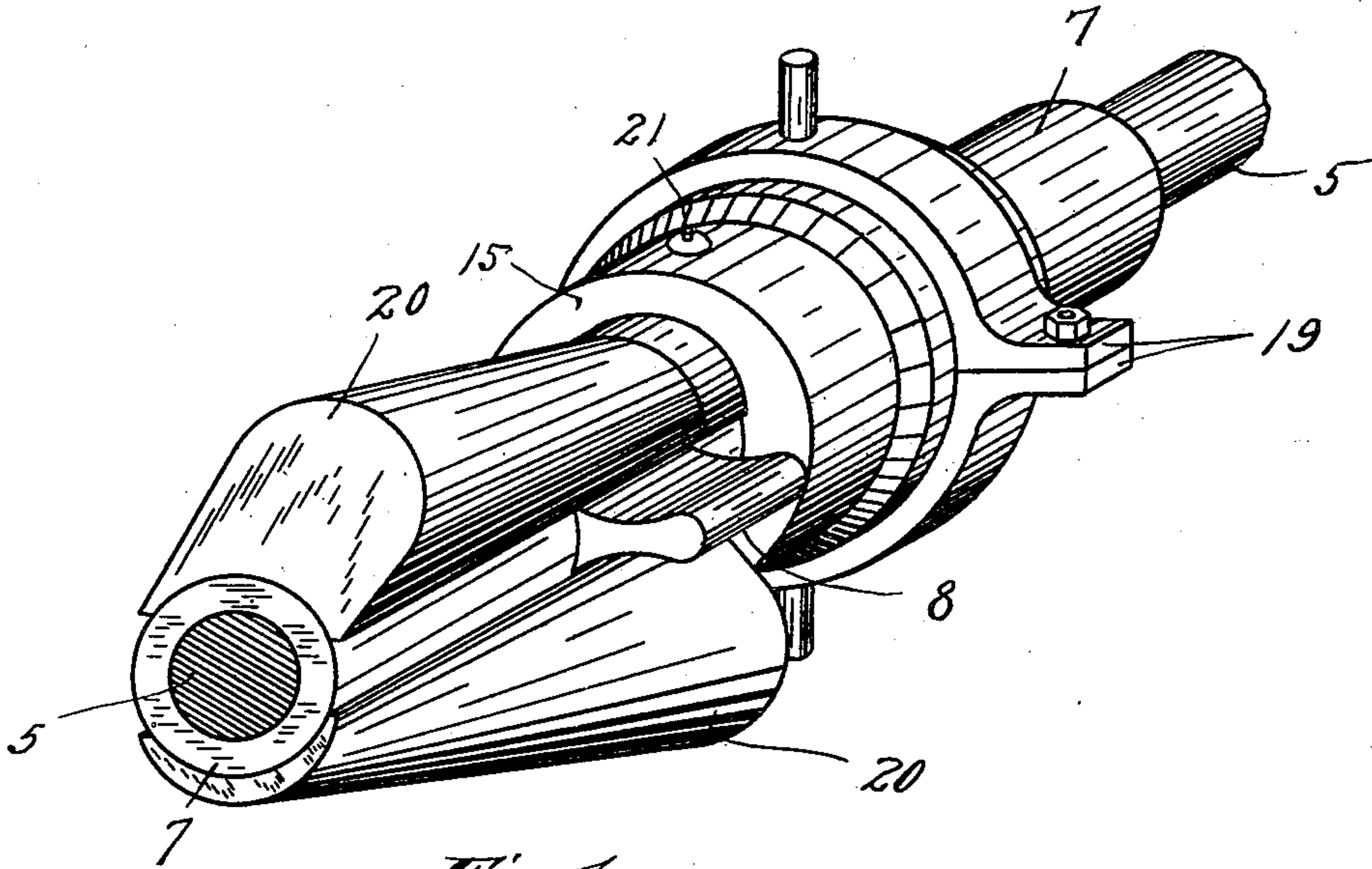
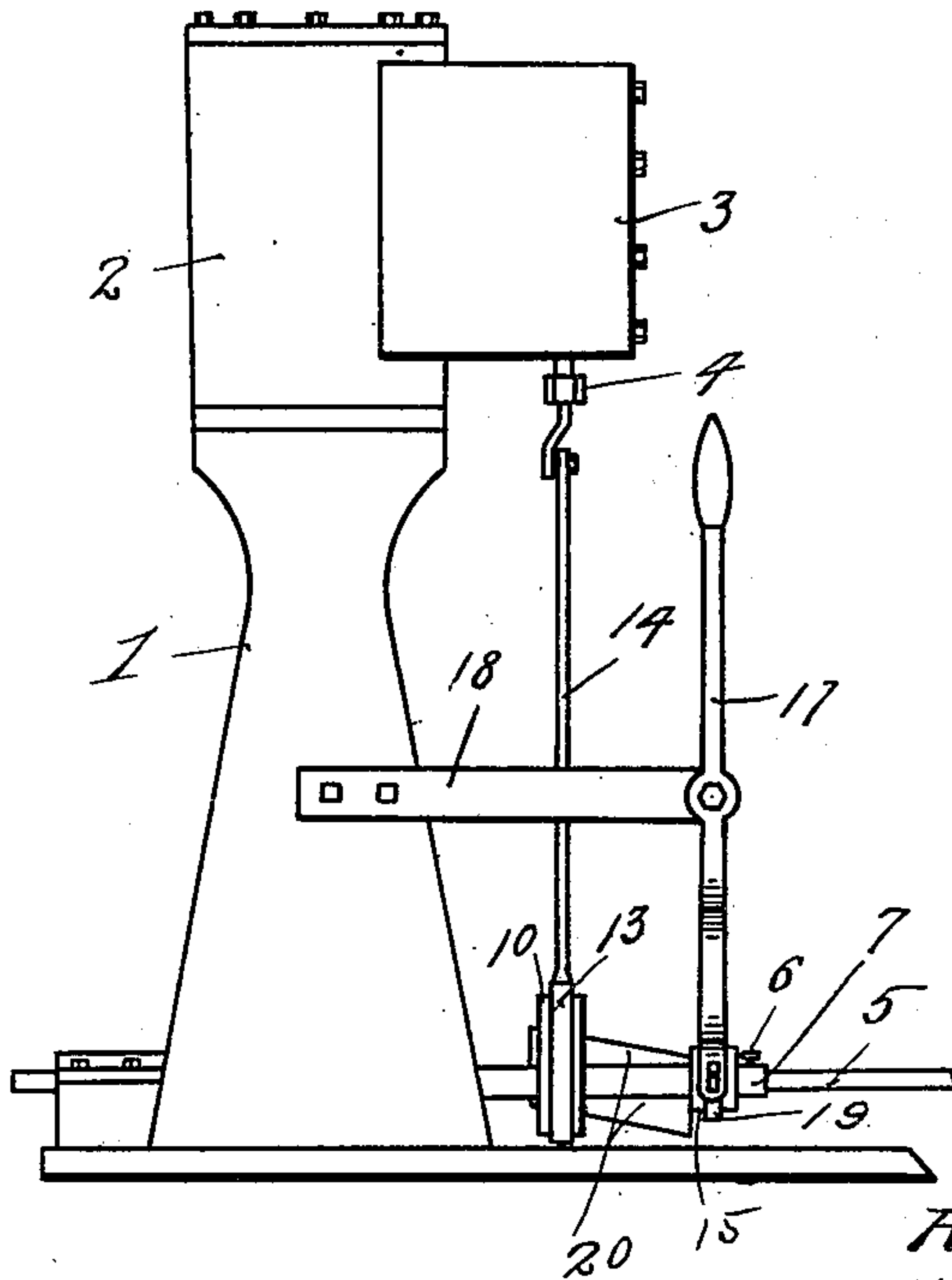


Fig. 1.



Witnesses

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Fig. 3.

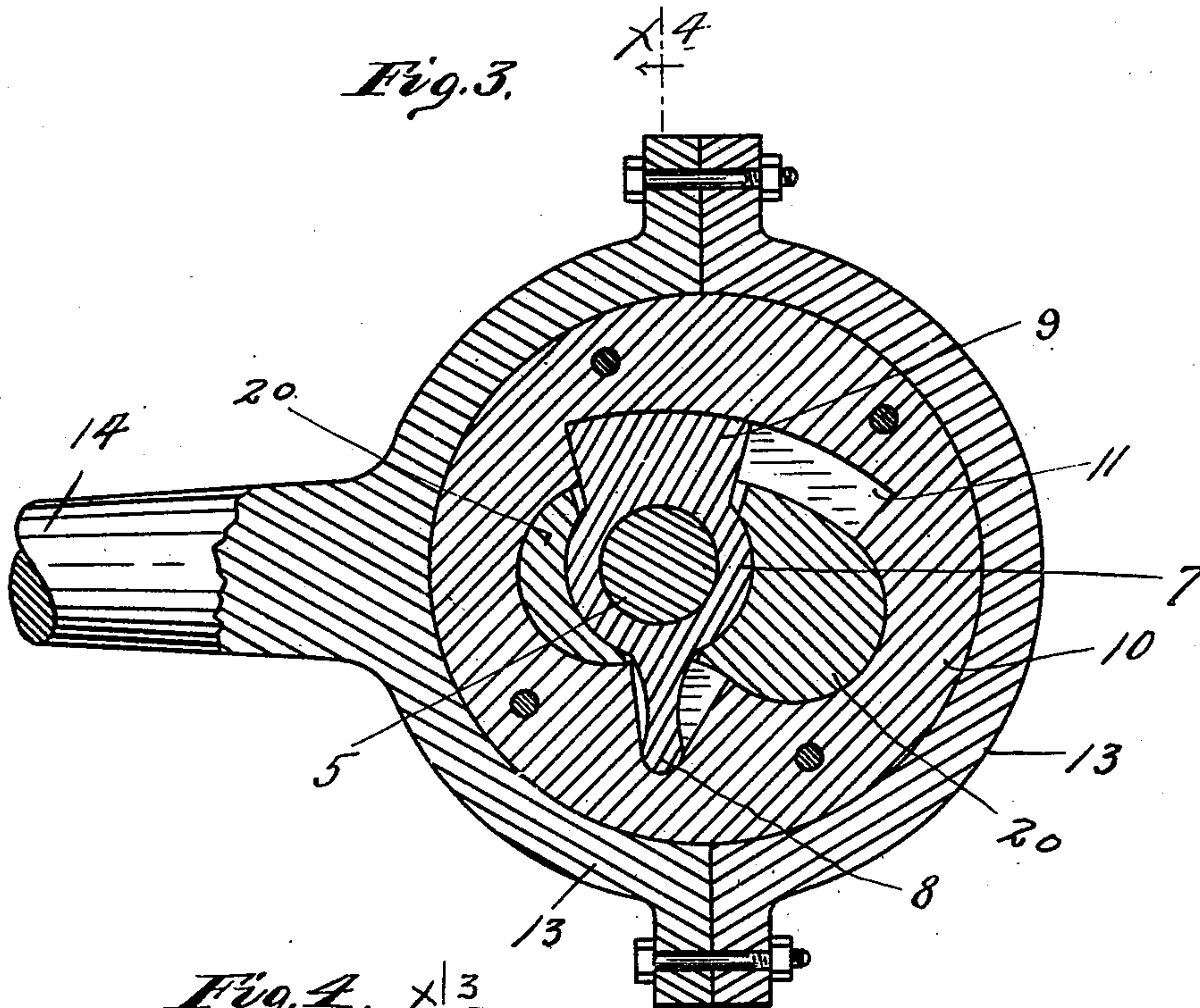
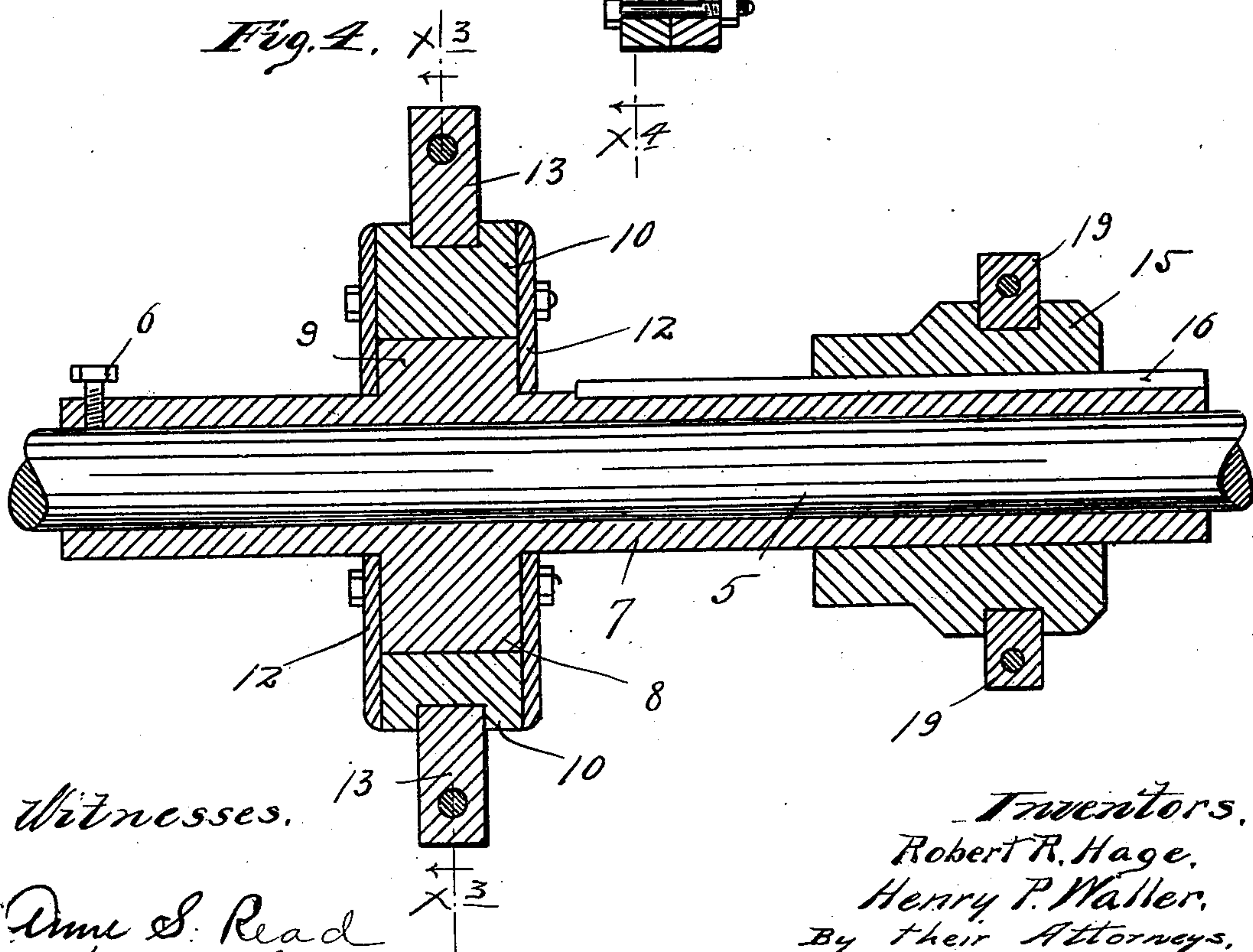


Fig. 4.



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UNITED STATES PATENT OFFICE.

ROBERT R. HAGE AND HENRY P. WALLER, OF TWIN VALLEY, MINNESOTA.

REVERSIBLE DEVICE FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 700,639, dated May 20, 1902.

Application filed August 31, 1901. Serial No. 73,923. (No model.)

To all whom it may concern:

Be it known that we, ROBERT R. HAGE and HENRY P. WALLER, citizens of the United States, residing at Twin Valley, in the county of Norman and State of Minnesota, have invented certain new and useful Improvements in Reversible Devices for Engines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention has for its especial object to provide an improved reversing valve-gear for engines; and to this end it consists of the novel devices and combinations of devices hereinafter described, and defined in the claim.

The invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Figure 1 is a view in side elevation, illustrating a simple upright engine having our improved valve-gear applied thereto. Fig. 2 is a perspective view of a portion of the valve-gear. Fig. 3 is a section on the line $x^3 x^3$ of Fig. 4; and Fig. 4 is a section approximately on the line $x^4 x^4$ of Fig. 3, both of which views, Figs. 3 and 4, illustrate the valve-gear in detail.

The numeral 1 indicates the pedestal-casting, the numeral 2 the cylinder, and the numeral 3 the steam-chest, of an ordinary upright stationary engine. The distribution-valve, which may be of any suitable construction well understood, is not illustrated in detail; but its stem is shown as projecting at 4.

The numeral 5 indicates the crank-shaft of the engine.

On the crank-shaft 5 is rigidly secured by set-screw 6 or otherwise a sleeve 7, which is provided with a laterally-projecting fulcrum-lug 8 and with an alined or diametrically-projected stop-lug 9. The outer surface of the stop-lug 9 is preferably struck or formed on the line of an arc whose radius is the distance between the extremities of the said lugs 8 and 9. An eccentric 10 is provided with a segmental seat 11, which at the apex of its converging sides forms a fulcrum-seat for the fulcrum-lug 8, while the stop-lug 9 is free for considerable movement in the expanded por-

tion thereof, as best shown in Fig. 3. When the eccentric 10 is thrown to an intermediate position, its axis will coincide with the axis of the shaft 5. When the said eccentric 10 is moved from one extreme eccentric position to another, its axis moves on an arc struck from the bearing-surface of the fulcrum-lug 8 through the axis of the shaft 5. The purpose of this peculiar movement may be more clearly stated a little later on. As shown, the eccentric 10 is held in working position or against lateral movement by bolted retaining-plates or cheek-pieces 12, (best shown in Fig. 4,) which embrace the sides of the lugs 8 and 9.

The strap end 13 of an eccentric-rod 14 works on the eccentric 10 in the ordinary manner, the upper end of the rod being connected to the depending end of the valve-stem 4, as best shown in Figs. 1 and 4.

On one end of the sleeve 7 a sliding collar 15 is connected by a spline 16. As shown, this collar 15 is given its sliding movements by means of a shipper-lever 17, shown as pivoted to a projection 18 from the pedestal-casting 1 and connected at its lower end to a ring 19, which works in a groove in the said collar 15. Rigidly connected at their ends to the collar 15 and mounted to slide therewith on the sleeve 7 is a pair of reversely-tapered cams 20. These cams 20 are grooved to fit the sleeve 7, and they work in correspondingly-tapered seats in the eccentric 10. By reference to Fig. 2 it will be noted that the small end of the one wedge 20 is connected to the sliding collar 15, as shown by a screw 21. The large end of the other wedge is connected to the said sliding collar in a similar manner. It will also be noted by reference to Figs. 2 and 3 that the cams 20 do not extend transversely in diametrically opposite directions or in the same plane, but, on the contrary, that they extend in cross-section in the direction of a cylindrical surface which intersects the axis of the shaft 5. Hence by the longitudinal adjustments of the cams 20 the eccentric will be thrown from one extreme position to the other on the arc of a circle.

It is, as is a well-known fact, necessary to set the valve-gear so that it will give the distribution-valve a certain amount of lead or lap with respect to the dead-center of the

crank-shaft. With the valve-gear so set it of course follows that the engine cannot be reversed by shifting the eccentric diametrically from one position to another, as the lead and lap would thus be destroyed. However, by adjusting the eccentric on the arc of a circle intersecting the axis of the shaft the proper relation may be maintained both in the extreme and intermediate positions of the eccentric. The so-called "valve-gear" is also adapted for use to operate the sparking device or igniter of an explosive-engine, and the peculiar manner of adjusting the eccentric, moreover, is of equal importance here, inasmuch as the explosion should take place before the crank-shaft reaches the dead-center.

The term "reversing-gear for engines" is herein used broadly to cover the device, whether used in connection with the distribution-valve of a steam-engine or the igniter of an explosive-engine.

What we claim, and desire to secure by Letters Patent of the United States, is as follows:

The combination with a sleeve or rotary member having the lugs 8, 9 and the sliding collar 15, of the eccentric 10 having the seat 11 in which said lugs 8, 9 are mounted, the reversely-tapered cams 20 movable with said sliding collar and acting on said eccentric to adjust the same to and from concentricity with its axis of rotation, and an eccentric-strap driven by said eccentric, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

ROBERT R. HAGE.
HENRY P. WALLER.

Witnesses:

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OLE GRINDE.