No. 813,116. PATENTED FEB. 20, 1906.

H. RICHTER.

VALVE GEAR FOR EXPLOSION ENGINES.

APPLICATION FILED AUG. 23, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

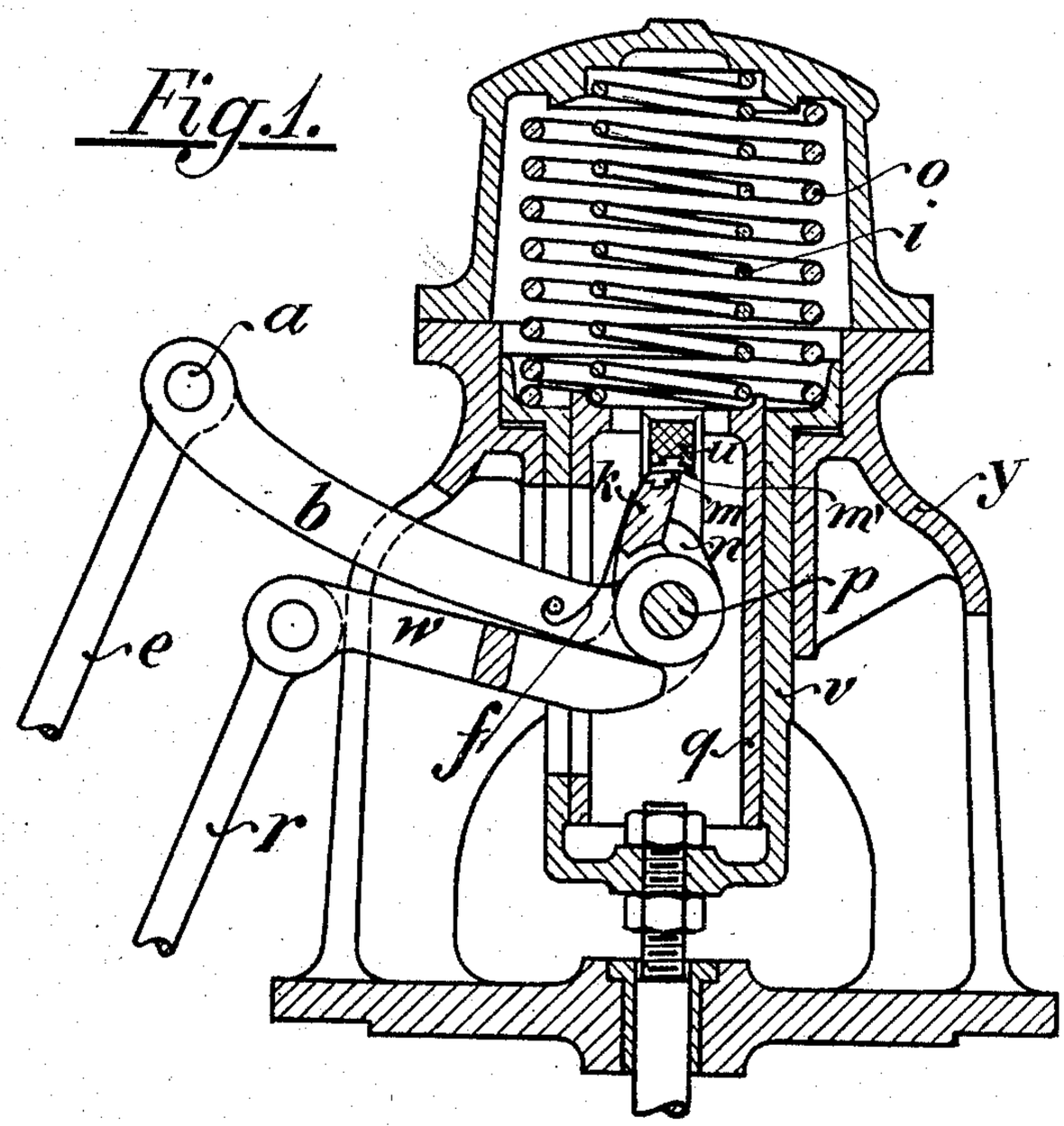

Fig. 2.

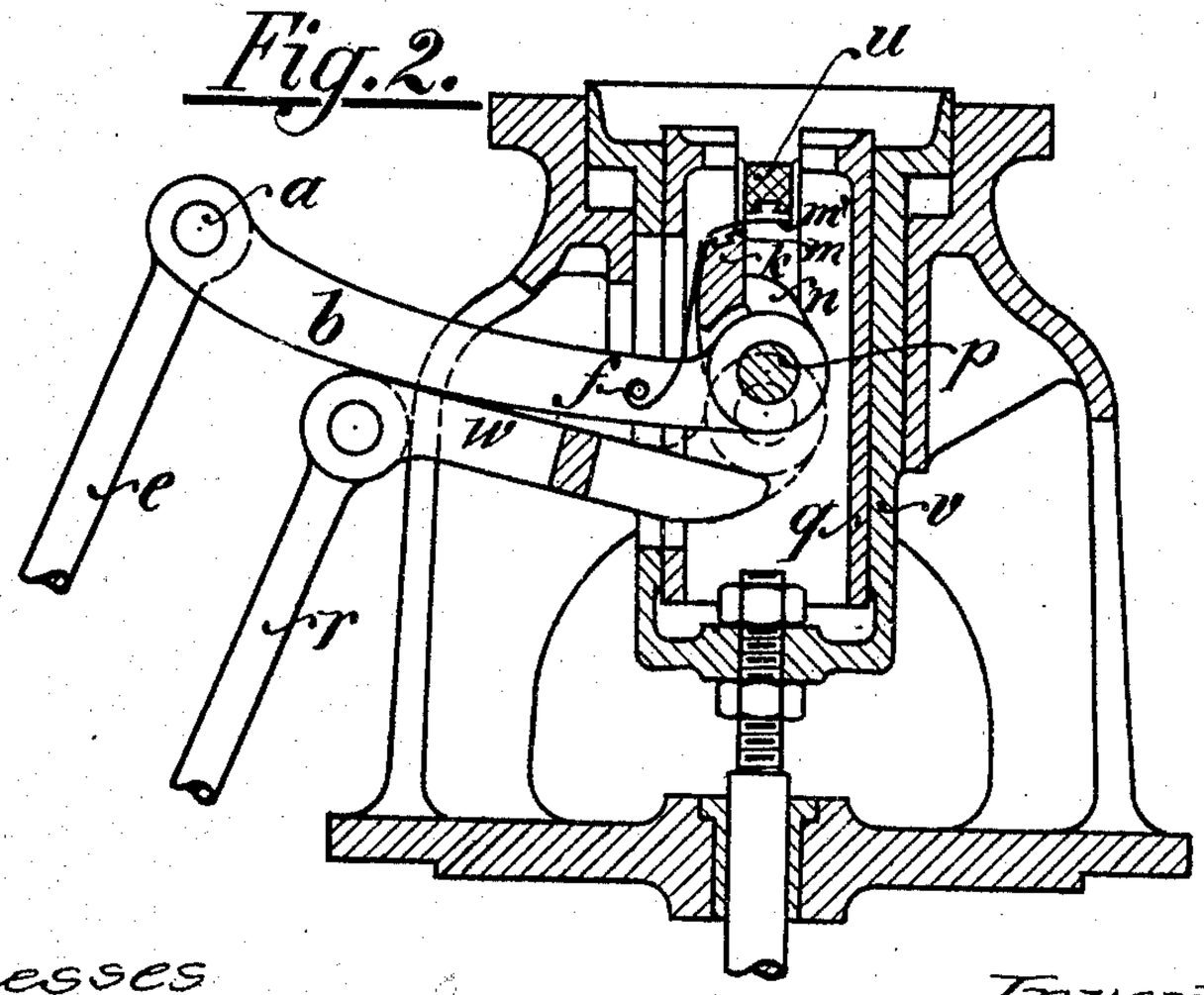

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Fig. 3.

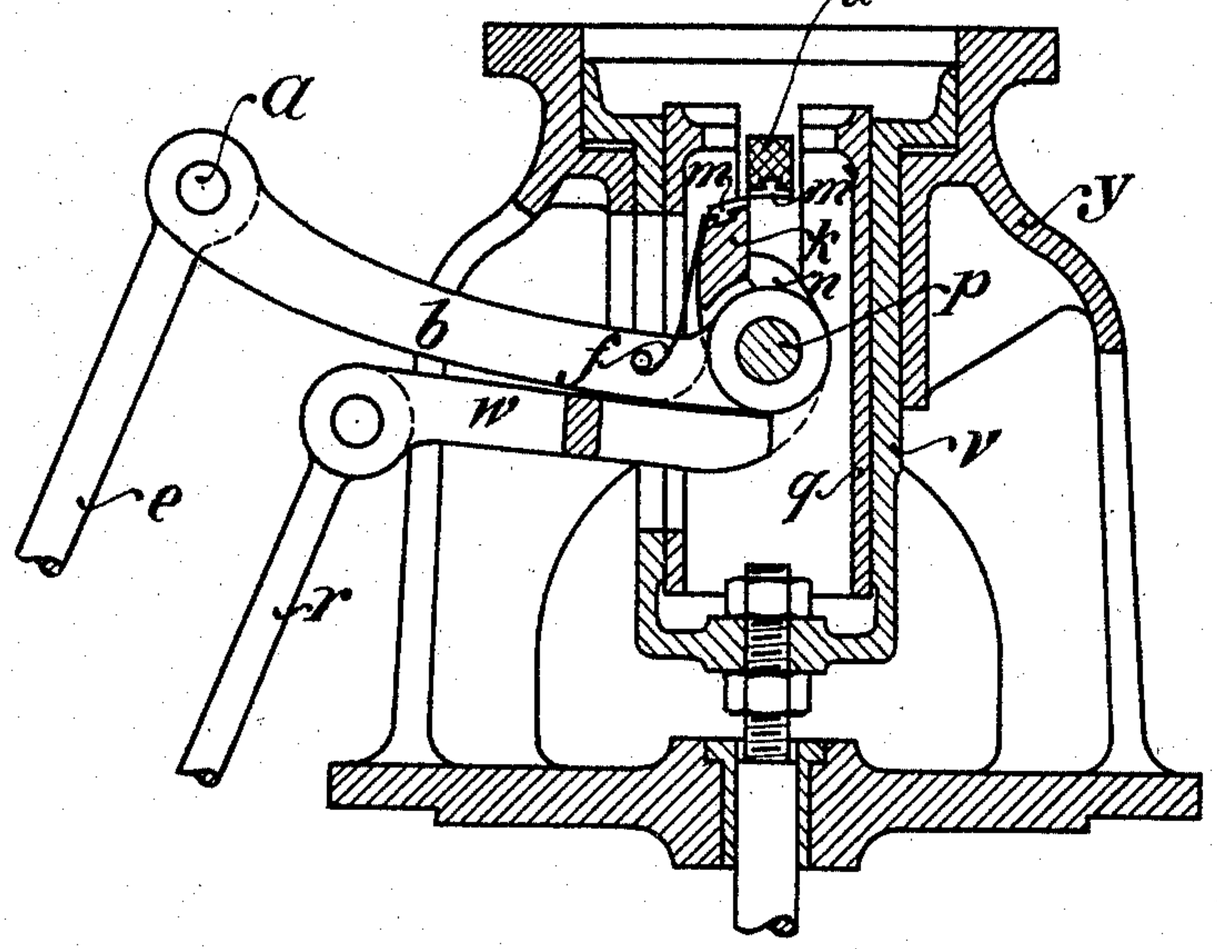
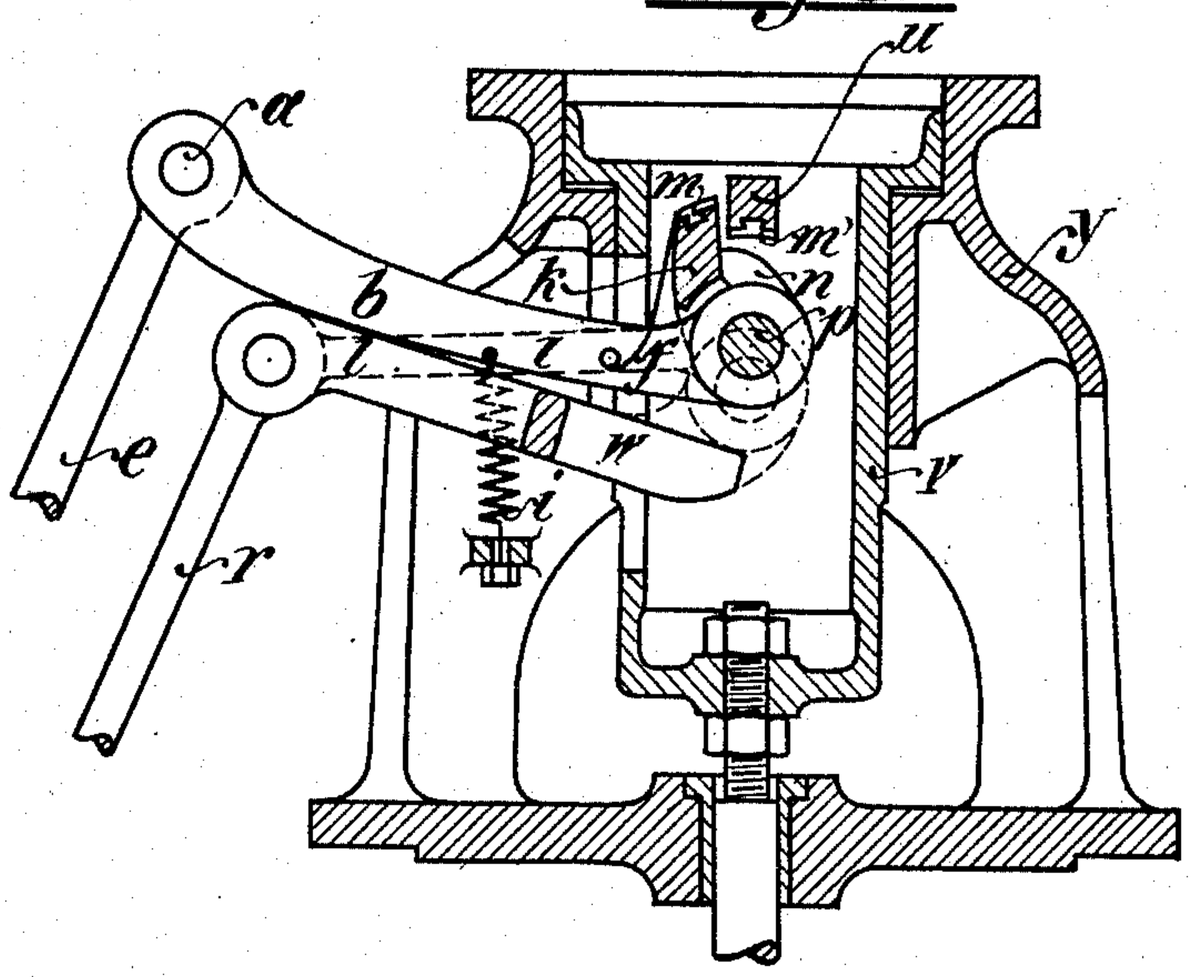


Fig. 4.



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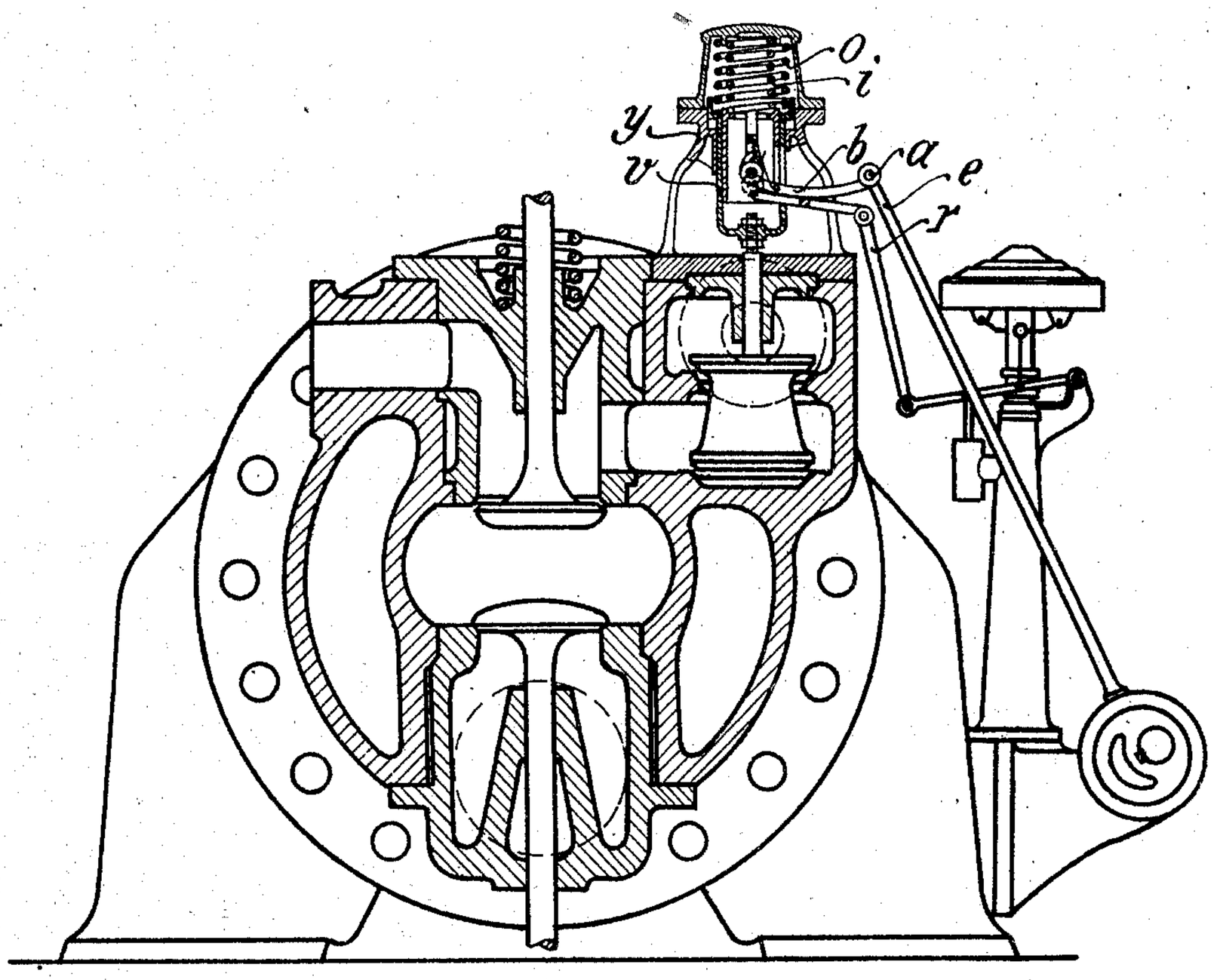
3 SHEETS—SHEET 3.

Fig. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

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VALVE-GEAR FOR EXPLOSION-ENGINES.

No. 813,116. Specification of Letters Patent. Patented Feb. 20, 1906.

Application filed August 23, 1904. Serial No. 221,863.

To all whom it may concern:

Be it known that I, HANS RICHTER, director, a subject of the German Emperor, residing at Nuremberg, Bavaria, Germany, have invented new and useful Improvements in Valve-Gear for Explosion-Engines, of which the following is a specification.

This invention relates to a valve-motion for explosion and steam engines, in which the adjustable or passive roller-track and the active roller-lever are so arranged to one another that the time of opening of the valve alters with the load of the machine, while the closing time of the valve constantly remains the same, the arrangement being such that the active moving parts execute a steady movement determined by the driving mechanism and the position of the governor and in the downward movement of the valve only the parts rigidly connected with it taking part.

In the drawings, Figure 1 shows the motion at the lowest position of the governor corresponding to the greatest machine-load at the beginning of the valve-lift, and Fig. 2 at the same position of the governor directly before the snapping. Fig. 3 shows the motion at the highest position of the governor corresponding to the smallest machine-load before snapping. In Fig. 4 is shown a slightly-modified form of construction of the valve-motion at the lowest position of the governor and at the lowest position of the driving eccentric mechanism after the valve has already fallen, while the inner end of the active roller-lever is still in its highest position. Fig. 5 is a sectional view showing the device applied to an engine.

The passive roller-track or bearing-surface w has its inner end formed like a fork and is mounted in the valve-casing y, while its outer end is operated in any known manner—for example, by means of a rod r from the governor. The active roller-lever b is pivoted at its outer end by a bolt a to the rod e, moved by the well-known eccentric on the steering-shaft, while the inner end, mounted on the pin p, is guided either (as in Figs. 1–3) by a cylindrical guide q or (as in Fig. 4) by guides l, which are revolubly mounted either in the valve-casing y or in the passive roller-lever w. The guide q, Figs. 1–3, is moved in the hollow head v of the valve-rod, which moves up and down in the valve-casing y. The dome of the latter contains the springs i and o, which press the guide-piece q and the valve-head v downward. In the form of construction shown in Fig. 4 the spring i is arranged between the guides l and the valve-casing y.

On the pin p a catch or pawl k is freely revoluble, which, either by means of a spring f or by a counterweight, has a constant tendency to lie against the nose n, fixed firmly on the active roller-lever b. The end of the catch or pawl forms a cylindrical track m concentric to the axis p, which can slide on and under a cross-piece u, arranged in the valve-head v.

In Fig. 3 the passive roller track or surface w is so adjusted by the governor that the active roller-lever b turns so much about p before it starts to run upon the roller-track w that the catch k is turned just out of reach of the surface u. The valve therefore remains closed.

The operation of the device is as follows: If the eccentric-rod e descends, the pin p and the guide-piece q are raised, compressing the spring i, Fig. 1, or extending the same, Fig. 4. The catch k, loosely mounted on the pin p, takes part in the upward movement of this latter and comes against the cross-piece u, Fig. 1, and lifts the valve-head v, the valve-rod, and the valve itself under compression of the spring o. As the lever b rolls it also rotates. The nose n in consequence presses the catch k farther from under the cross-piece u until it is finally quite free, Figs. 2 and 3, whereupon the valve under the influence of the spring o and its own weight closes, Fig. 4. Only the valve-rod and the valve-head v take part in the fall of the valve, while independently thereof the end of the roller-lever b, linked to the bolt p, completes its upward movement, Fig. 4, and gradually descends in proportion as the eccentric-rod e rises. At the same time the spring i insures that the lever b remains in contact with the roller track or surface w. On the descent of the inner end of the lever b the catch k slides down laterally on the cross-piece u till the upper end of the insertion-piece m of the catch k has passed the lower edge of the insertion-piece m' of the cross-piece u, whereupon the spring f or the counterweight of the

catch *k* moves the latter against the nose *n*, so that it comes to rest under the cross-piece *u*, whereafter the next lift of the valve can begin. As is obvious from the foregoing and the drawings, the valve closing thus takes place independently of the position of the governor, while the time of the valve opening or the extent of the valve lift depends on the position of the roller-track *w*, controlled by the governor.

As the bolt *p* forms at one and the same time the point about which both the catch *k* and the nose *n* rotate, it conveys its movement directly to the valve, so that no injurious lateral strains on the valve are produced.

I declare that what I claim is—

1. In valve-motions for explosion-engines, the combination, of a passive roller-track *w* actuated by the governor and an active roller-lever *b* working upon said passive roller-track *w* and actuated by the eccentric-rod *e* with a catch *k* loosely mounted on a bolt *p* in the inner end of the active roller-lever *b* and adapted to come in engagement with a cross-piece *u* arranged in the head *v* of the valve-rod and to be brought out of engagement with said cross-piece *u* by a nose *n* fixed on the active roller-lever *b*, substantially as described.

2. In valve-motions for explosion-engines, the combination, of a passive roller-track *w* actuated by the governor and an active roller-lever *b* working upon said passive roller-track *w* and actuated by the eccentric-rod *e*, with a catch *k* loosely mounted on a bolt *p* in the inner end of the active roller-lever *b* and adapted to come in engagement with a cross-piece *u* arranged in the head *v* of the valve-rod and to be brought out of engagement with said cross-piece *u* by a nose *n* fixed on the active roller-lever *b*, the said bolt *p* being guided in slots of the head *v* of the valve-rod, substantially as described.

3. In valve-motions for explosion-engines, the combination, of a passive roller-track *w* actuated by the governor and an active roller-lever *b* working upon said passive roller-track *w* and actuated by the eccentric-rod *e*, with a catch *k* loosely mounted on a bolt *p* in the inner end of the active roller-lever *b* and adapted to come in engagement with a cross-piece *u* arranged in the head *v* of the valve-rod and to be brought out of engagement with said cross-piece *u* by a nose *n* fixed on the active roller-lever *b*, the said bolt *p* being guided by links *l*, substantially as described.

4. In valve-motions for explosion-engines, the combination, of a passive roller-track *w* actuated by the governor and an active roller-lever *b* working upon said passive roller-track *w* and actuated by the eccentric-rod *e*, with a catch *k* loosely mounted on a bolt *p* in the inner end of the active roller-lever *b* and adapted to come in engagement with a cross-piece *u* arranged in the head *v* of the valve-rod and to be brought out of engagement with said cross-piece *u* by a nose *n* fixed on the active roller-lever *b*, and springs *i*, *f* holding the active roller-lever *b* in contact with the passive roller-track *w*, and the catch *k* in contact with the nose *n* respectively, substantially as described.

5. In valve-motions for explosion-engines, the combination, of a passive roller-track *w* actuated by the governor and an active roller-lever *b* working upon said passive roller-track *w* and actuated by the eccentric-rod *e*, with a catch *k* loosely mounted on a bolt *p* in the inner end of the active roller-lever *b* and adapted to come in engagement with a cross-piece *u* arranged in the head *v* of the valve-rod and to be brought out of engagement with said cross-piece *u* by a nose *n* fixed on the active roller-lever *b*, a spring *i* holding the active roller-lever *b* in contact with the passive roller-track *w*, and a means for holding the catch *k* in contact with the nose *n*, substantially as described.

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

HANS RICHTER.

Witnesses:

MARTIN OFFENBACHER,

GEORGE E. BALDWIN.