

No. 701,667.

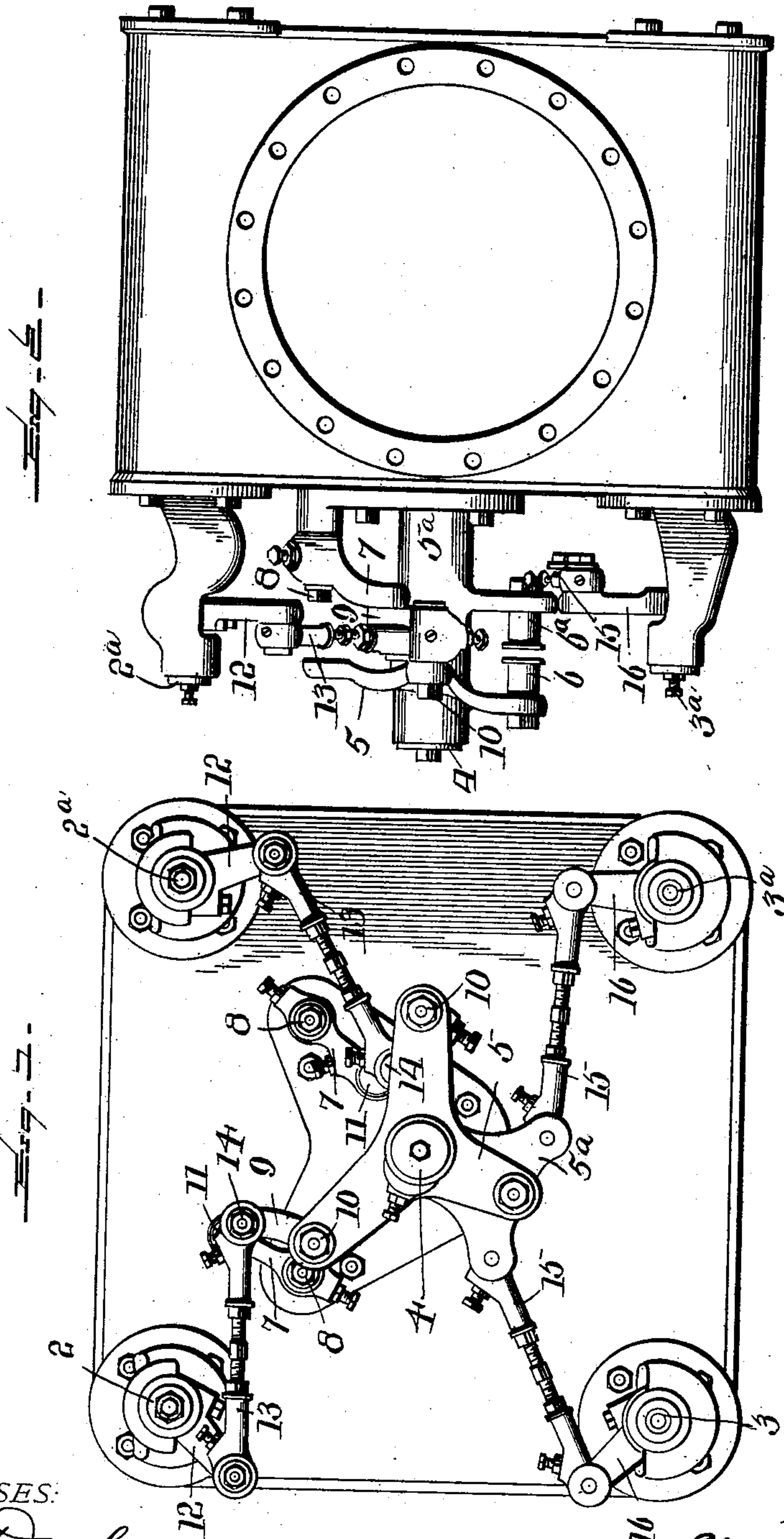
Patented June 3, 1902.

E. J. ARMSTRONG.  
VALVE MECHANISM.

(Application filed Nov. 20, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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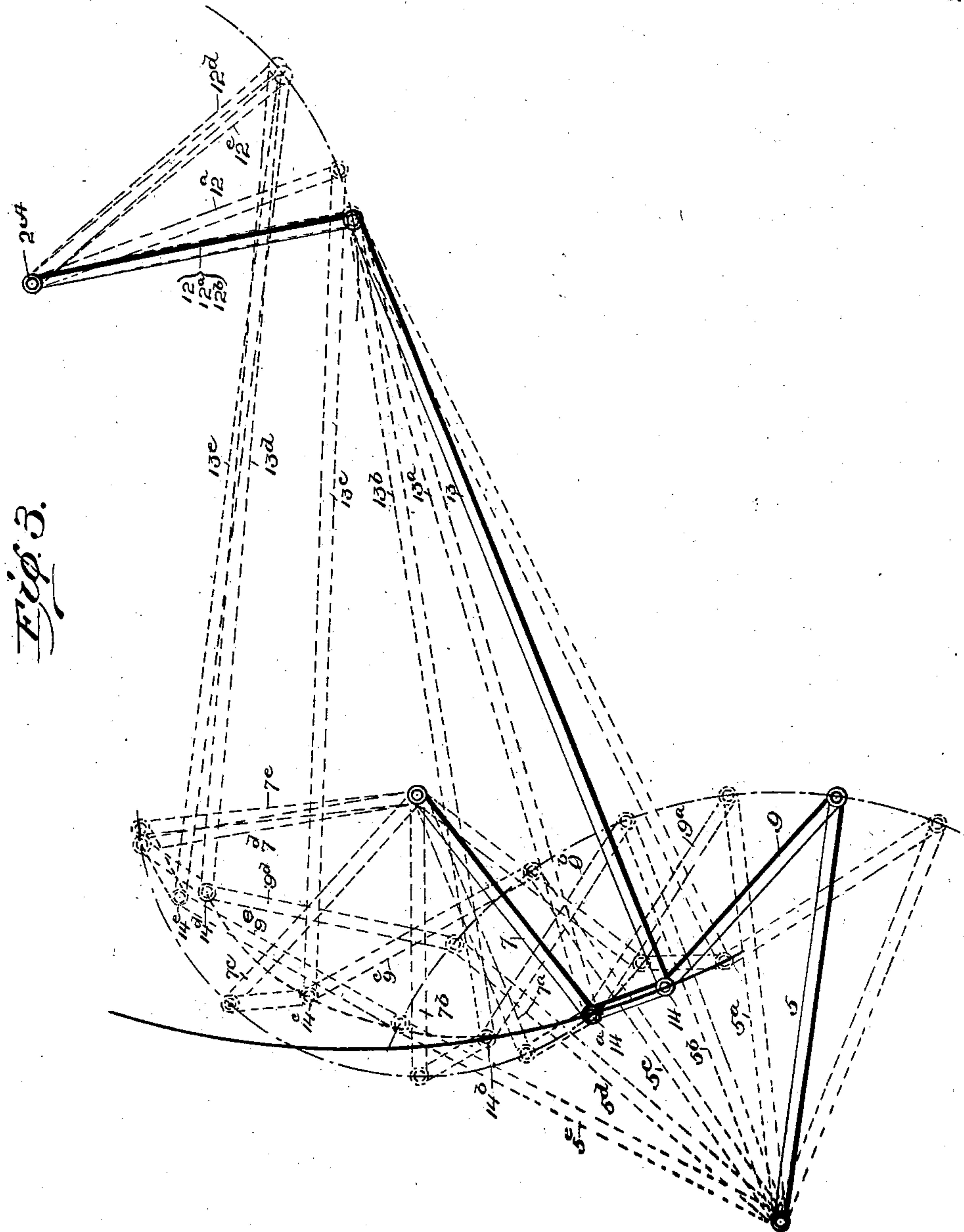
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# UNITED STATES PATENT OFFICE.

EDWIN J. ARMSTRONG, OF ERIE, PENNSYLVANIA.

## VALVE MECHANISM.

SPECIFICATION forming part of Letters Patent No. 701,667, dated June 3, 1902.

Application filed November 20, 1901. Serial No. 83,058. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN J. ARMSTRONG, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Valve Mechanism; and I do declare the following to be a full, clear, and exact description of the invention, such as it appertains to make and use the same.

My invention relates to an improved valve mechanism; and it consists in the parts and combinations of parts hereinafter described and claimed.

The object of my invention is to provide a valve mechanism in which the valve will remain at rest from shortly after the point of cut-off until just before the point of admission, will have a rapid motion when opening and closing, be adapted for use on either a high-speed or low-speed engine, and have other material advantages which will be apparent from this specification. Heretofore a long dwell or rest of the valve and a rapid motion when opening or closing have been obtained by some form of detachment valve-gear, the Corliss valve-gear being the most widely-known type. While detachment valve-gears have many peculiar advantages, they have also peculiar practical disadvantages inherent in this type of valve-gear. Thus a dash-pot or spring is required for closing the admission-valves in detachment valve-gears, and such closing means is liable to become out of order and is not adapted for use on high-speed engines.

Referring now to the accompanying drawings, forming part of this specification, and in which similar numerals indicate corresponding parts in the several views, Figure 1 is a front elevation of an engine-cylinder provided with my improved valve mechanism. Fig. 2 is an end elevation taken from the right of Fig. 1. Fig. 3 is a view showing successive positions of the valve motion, the parts being shown in elemental form to aid in following their movement.

The numeral 1 represents the engine-cylinder, which is provided with two admission-valves 2 2<sup>a</sup> and two exhaust-valves 3 3<sup>a</sup>.

4 is a stud secured to the cylinder or its casing.

5 is a rocking plate for actuating the admission-valves and mounted to oscillate on the stud 4.

6 is a journal carried by rocking plate 5 and adapted to be engaged by the end of an eccentric-rod for actuating said rocking plate.

5<sup>a</sup> is a rocking plate mounted on the stud 4 for actuating the exhaust-valves.

6<sup>a</sup> is a journal carried by rocking plate 5<sup>a</sup> and adapted to be engaged by an eccentric-rod for actuating said rocking plate.

7 7 are rock-arms pivoted at 8 8 to the cylinder or its casing.

9 9 are links which are pivoted to the rock-arms 7 at 11 11 and to the rocking plate 5 at 10 10.

12 12 are cranks carried by the admission-valves.

13 13 are valve-rods pivoted at one end to the valve-cranks 12 and at the other end to the links 9 at a point 14 intermediate the ends of said links 9.

15 15 are the exhaust-valve rods pivoted at one end to rocking plate 5<sup>a</sup> and at the other end to the cranks 16 16, carried by the exhaust-valves.

It will be seen that the admission-valve rods 13 receive their motion through a modification of the Watts parallel motion.

The rocking plate 5, which oscillates on the fixed stud 4, and the link 7, which oscillates about fixed stud 8, are connected at their outer or free ends by the rock-arm 9. In proportion these parts that during the desired period of rest or dwell of the admission-valve the point 14 on connecting-link 9, to which the admission-valve rod 13 is pivoted, will describe an arc of a circle concentric to the crank-pin of crank 12 and having a radius equal to the length of rod 13. It is evident that during such movement of the pivot 14 the rod 13 will simply swing on the crank-pin of the valve-crank 12 and that no movement of the admission-valve will occur. A further movement of the pivot 14 will, however, result in a rapid movement of the admission-valve, as illustrated in the position shown for valve 2 in Fig. 1 and also by reference to Fig. 3, in which figure five different positions of the rocking plate 5, rock-arm 7, and link 9, valve-rod 13, valve-crank 12, and pivotal point 14 are clearly shown. The rest or dwell of the ad-



mission-valve from cut-off to admission corresponds to the period in which the valve is subjected to the greatest difference in pressure between the steam in the steam-chest and that in the cylinder. This difference in the pressure on the two sides of the admission-valve causes a large frictional resistance to the movement of the valve on its seat and a resulting maximum strain and wear in the valve-gear.

10 The advantage of the long rest or dwell possible with my improved valve mechanism is well recognized.

While the drawings show a construction adapted to the use of oscillating valves of the Corliss type, it is evident that any other type of valve can be operated by this form of valve motion.

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

1. A valve mechanism for the purpose described, comprising a valve, a rocking plate and means for actuating it, and a link mechanism including an oscillating rock-arm connected with the rocking plate and through said connection with the valve, whereby said valve is given a rapid movement during portions of the movement of the rocking plate and remains at rest during the remaining movements of the plate.

2. A valve mechanism comprising a valve, a rocking plate, and means for actuating it, a fixed pivot-point, a rock-arm mounted to turn thereon, a link pivoted to the free end of said rock-arm and to the rocking plate, a crank carried by the valve, and a valve-rod

connected to said crank and pivoted to said link, the several elements being so proportioned that the valve will remain at rest during a considerable arc of travel of said rocking plate.

3. A valve mechanism comprising a valve, a fixed pivot-point, a link mounted to turn thereon, a rock-arm pivoted to the free end of said rock-arm, means constructed and arranged to move the free end of said link in a definite path, a valve-rod intermediate said link and said valve, the parts being so proportioned that the valve will remain at rest during a considerable movement of said rock-arm and link, but will be given a rapid motion when the said rock-arm and link approach their limit of travel.

4. A valve mechanism, comprising a valve, two fixed pivots, a rocking plate mounted on one of said pivots, and a rock-arm mounted on the other, a link pivotally connecting the free ends of said rocking plate and said rock-arm, and a valve-rod suitably connected to the valve and pivotally connected to said link, whereby said valve is given a rapid movement during portions of the movement of said rocking plate and rock-arm, and remains at rest during other portions of the movement of said rocking members.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN J. ARMSTRONG.

Witnesses:

JUSTIN P. SLOCUM,  
ANNA E. NUNN.

It is hereby certified that in Letters Patent No. 701,667, granted June 3, 1902, upon the application of Edwin J. Armstrong, of Erie, Pennsylvania, for an improvement in "Valve Mechanism," errors appear in the printed specification requiring correction as follows: Page 2, line 43, for the word "link" read *rock-arm*, and same page, line 44, for the compound word "rock-arm" read *link*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3rd day of September, A. D., 1912.

[SEAL.]

E. B. MOORE,  
*Commissioner of Patents.*