No. 635,690. Patented Oct. 24, 1899.

O. KINNER.

ENGINE.

(Application filed June 27, 1898.)

(No Model.) 2 Sheets—Sheet 1.

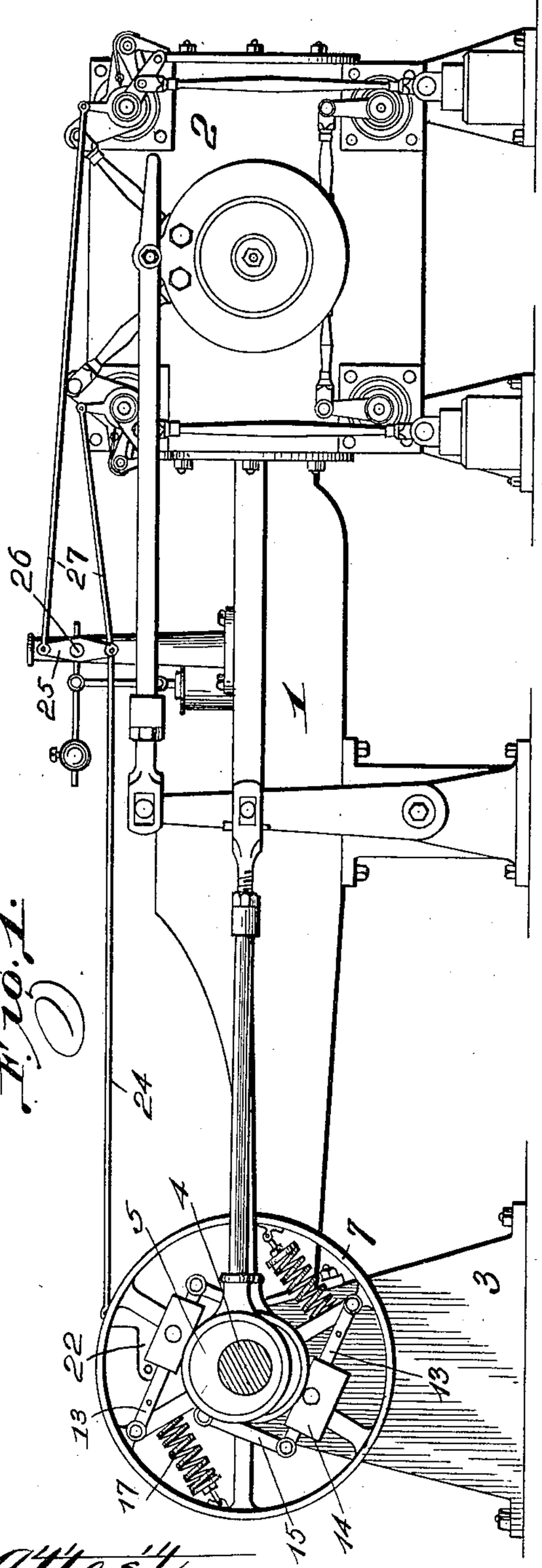

Fig. 1.

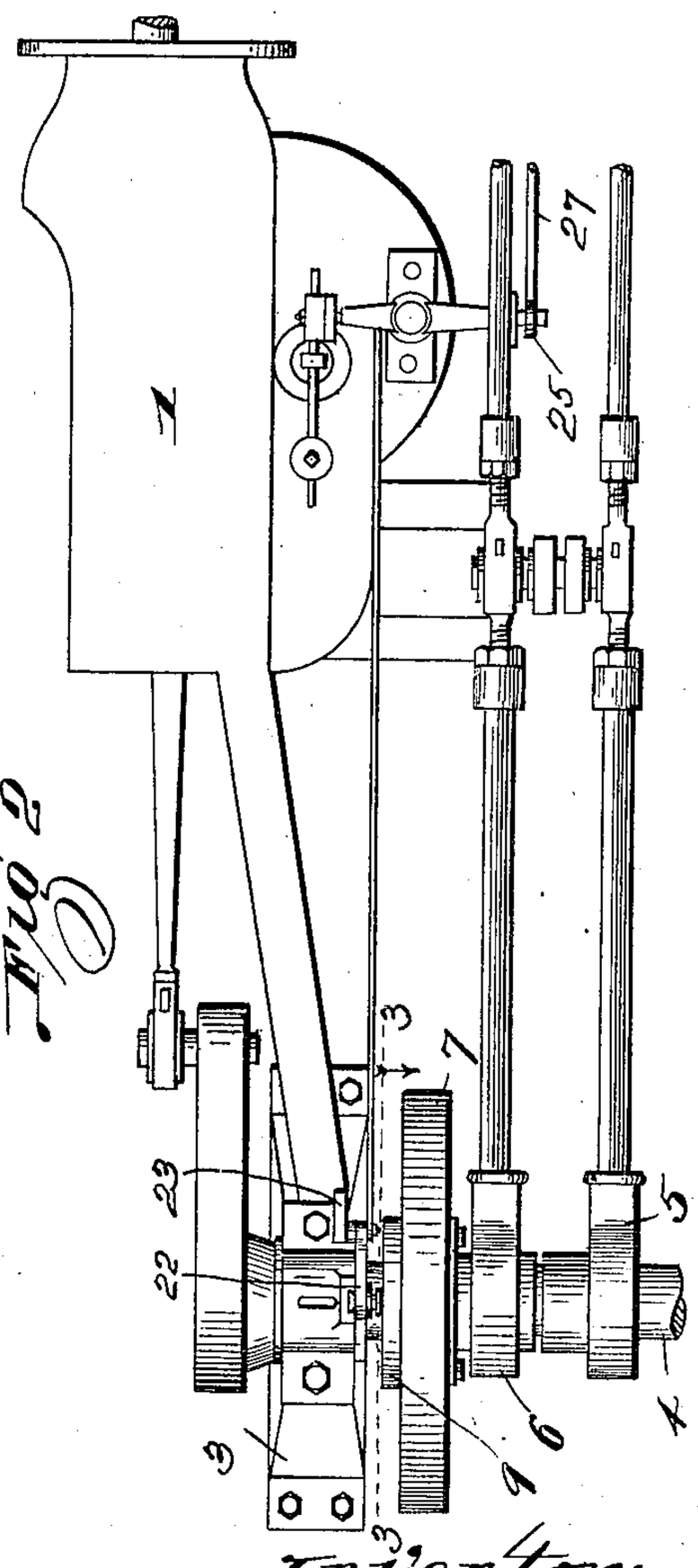

Fig. 2.

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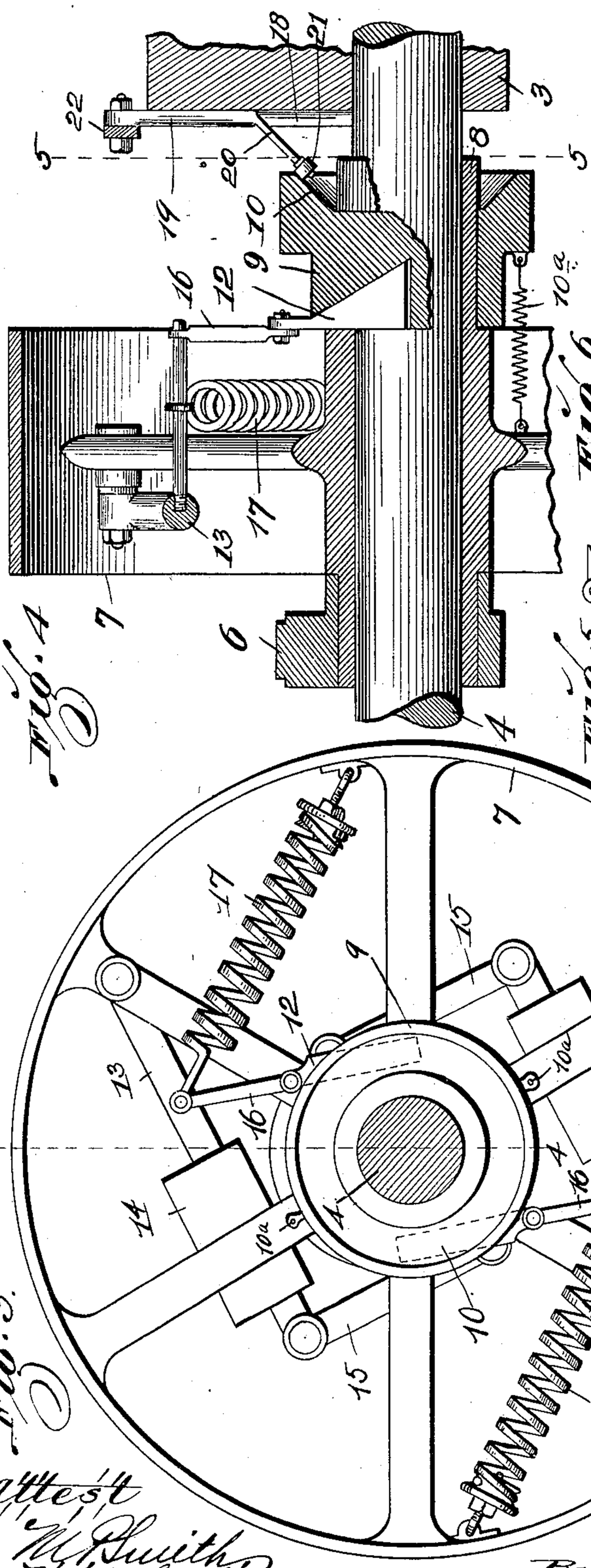

Fig. 4.

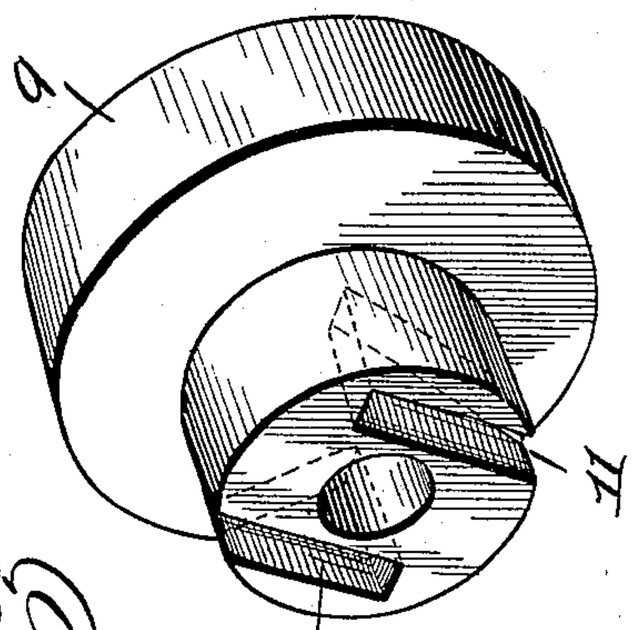

Fig. 6.

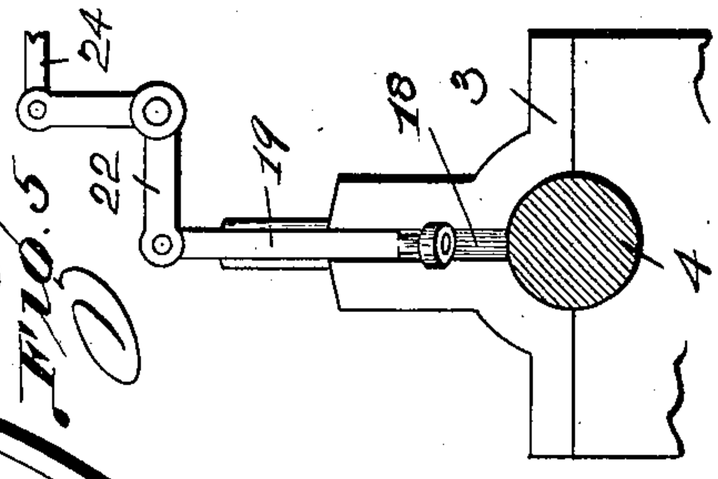

Fig. 5.

Fig. 3.

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UNITED STATES PATENT OFFICE.

OTTO KINNER, OF ST. LOUIS, MISSOURI.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 635,690, dated October 24, 1899.

Application filed June 27, 1898. Serial No. 684,540. (No model.)

To all whom it may concern:

Be it known that I, OTTO KINNER, of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to engines, and more particularly to means for regulating and governing the steam inlet and exhaust valves on an engine.

In steam-engines of the construction mostly used at the present time the cushion or pressure formed behind the piston within the cylinder remains practically the same, even though the pressure of the expanding steam in front of said piston fluctuates or varies. Consequently when the pressure of the expanding steam in front of the piston lowers and the cushion behind the piston remains the same as it was previous to the lowering of the steam in front of the piston the engine is working at a disadvantage. In other words, where the cushion is approximately correct for a certain pressure said cushion will be too great for lesser pressure.

It is the object of my invention to overcome this disadvantage by automatically reducing or increasing the cushion behind the piston commensurate with the reduction or increasing of the pressure of the steam in front of the piston.

To the above purposes my invention consists of the novel construction, combination, and arrangement of parts hereinafter shown, described, and claimed.

Figure 1 is a side elevation of an engine of the ordinary construction, the same being equipped with my improved regulating or governing device. Fig. 2 is a plan view of one end of the engine seen in Fig. 1. Fig. 3 is an enlarged cross-sectional view taken approximately on the line 3 3 of Fig. 2 and looking in the direction indicated by the arrow. Fig. 4 is an enlarged vertical sectional view taken approximately on the line 4 4 of Fig. 3. Fig. 5 is a vertical sectional view taken approximately on the line 5 5 of Fig. 4. Fig. 6 is a view in perspective of a sliding collar made use of in carrying out my invention.

Referring by numerals to the accompanying drawings, 1 indicates the engine-frame, 2 the cylinder thereof, and 3 the bearings, in which operates the ordinary crank-shaft 4.

Located upon the crank-shaft 4 is the fixed eccentric 5, to which eccentric 5 is connected a rod, which rod is connected to and operates the steam-inlet valves, and adjacent said fixed eccentric 5 is the movable eccentric 6, which operates the exhaust-valves.

Fixed upon the shaft 4 adjacent the movable eccentric is a wheel 7, which wheel is provided with an integral sleeve 8, upon which sleeve 8 is arranged to slide the collar 9, in the outer face of which is formed a beveled or inclined surface 10. Retractile coil-springs 10^a are secured to the collar 9 and to certain of the spokes of the wheel 7, which coil-springs are for the purpose of returning the collar to its normal position after it has moved laterally upon the sleeve 8. Formed in the rear face of this collar 9 is a pair of oppositely-arranged wedge-shaped openings 11. Adapted to operate in these wedge-shaped openings 11 are the wedges 12, the rear faces of which engage against the hub of the wheel 7. To a pair of the spokes in the wheel 7, adjacent the periphery thereof, are pivoted the outer ends of a pair of arms 13, on which are adjustably located weights 14, and to the inner ends of said arms 13 are pivoted short connecting-rods 15, their outer ends being pivotally connected to the movable eccentric 6. Pivotally connected to the arms 13, between the ends that are pivoted to the spokes and the weights 14, are the pivoted ends of short connecting-bars 16, the inner ends of which bars are pivoted to the points of the wedges 12.

Retractile coil-springs 17 have their outer ends secured to the rim of the wheel 7, their inner ends being connected to the pins that pivotally secure the connecting-bars 16 to the arms 13.

Formed in the top of the bearing 3 adjacent the wheel 7 is a vertically-arranged dovetailed groove 18, in which is arranged for vertical movement a plate 19, with the lower end of which is formed integral a downwardly and outwardly projecting arm 20, that extends to a point adjacent the upper portion of the beveled surface 10, and rotatably arranged upon the lower end of said arm 20 is an antifric-

tion-roller 21. To the upper end of the plate 19 is pivotally connected the lower end of a bell-crank 22, the same being fulcrumed to a bracket 23, extending upwardly from the engine-frame 1, the upper end of said bell-crank 22 being pivotally connected to the rear end of the connecting-rod 24, that extends toward the steam-chest of the engine, the forward end of said rod being connected to the bell-crank 25, that is located upon the rock-shaft 26, to the ends of which bell-crank are pivotally connected rods 27, that lead to the trip-cams of the steam-inlet valves.

Assuming that the engine is running and that the speed of said engine increases for some reason or other, necessarily the weights 14, carried by the arms 13, will move outwardly from the center of the wheel by the well-known centrifugal action, and when said weights and arm move outwardly the connecting-bars 15 will change the position of the movable eccentric 6, which eccentric controls the movement of the exhaust-valves, and necessarily the position of said exhaust-valves will be slightly changed. When the arms 13 move outwardly with the weight 14, the connecting-bars 16 are necessarily moved outwardly, and the wedges 12 being connected to said bars 16 will be drawn outwardly from the wedge-shaped openings in the collar 9, and following this action said collar will move laterally upon the sleeve 8 and the inclined surface of said collar will ride upon the anti-friction-roller 21 and cause the same, together with the plate 19, to move downwardly. This movement will rock the bell-crank 22, which draws the connecting-rod 24 toward the crank-shaft of the engine, thus actuating the rock-shaft 26 and necessarily actuating the connecting-rods 27. As the connecting-rods 27 are connected to the trip-cams of the inlet-valves, said trip-cams will be moved to such a position as that the inlet-valves will cut off the steam-supply at an earlier period than they have previously been operating. This action necessarily reduces the pressure in the cylinder. Owing to the corresponding change in position of the exhaust-valves said exhaust-valves will close at a later period, thus confining a lesser amount of exhaust-steam, and consequently reducing the cushion in proportion to the reduction of the inlet of live steam. The reverse movement of the various parts is apparent, and when said reverse movements take place the steam-inlet valves will close at a later period and the exhaust-valves will close at an earlier period in the stroke, thus proportionately increasing the cushion and pressure.

A device of my improved construction is simple, inexpensive, readily applied to double-eccentric engines now in use, and the working power of the engine is materially increased by thus automatically proportioning the cushion and pressure.

I claim—

1. The combination with a double-eccentric engine, of a governor for simultaneously and proportionately regulating the opening and closing of the inlet and exhaust valves, which governor comprises a wheel carried by the crank-shaft of the engine, the sleeve 8 integral with the hub of said wheel, the collar 9 loosely mounted upon said sleeve, in the rear face of which collar is formed a pair of wedge-shaped recesses, the front face of said collar being beveled inwardly, weighted arms carried by the wheel, suitable connections between the outer ends of the wedges and the weighted arms, a fulcrumed bell-crank, means whereby said bell-crank is actuated by the movement of the collar upon the sleeve, and suitable connections between the bell-crank and the inlet-valve of the engine, substantially as specified.

2. In an engine, constructed with the usual crank-shaft, inlet and exhaust valves, a governor-wheel carried by the crank-shaft, the sleeve 8 integral with the hub of said governor-wheel, the weighted arms 13 carried by the governor-wheel, the collar 9 arranged to slide upon the sleeve, in the rear face of which collar is formed a pair of wedge-shaped recesses, the outer face of said collar being beveled inwardly, wedges 12 operating in the wedge-shaped openings, connecting-rods between the outer ends of said wedges and the weighted arms, the fulcrumed bell-crank lever 22, the vertically-moving plate 19 pivoted to one arm of the bell-crank lever, the anti-friction-roller 21 carried by the lower end of said plate and engaging upon the beveled face of the collar, and suitable connections from the opposite arm of the bell-crank lever to the inlet-valves of the engine, substantially as specified.

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

OTTO KINNER.

Witnesses:
EDWARD E. LONGAN,
M. P. SMITH.