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PATENTED SEPT. 5, 1905.

E. G. MOORE.  
ENGINE VALVE MECHANISM.

APPLICATION FILED FEB. 15, 1905.

2 SHEETS—SHEET 1.

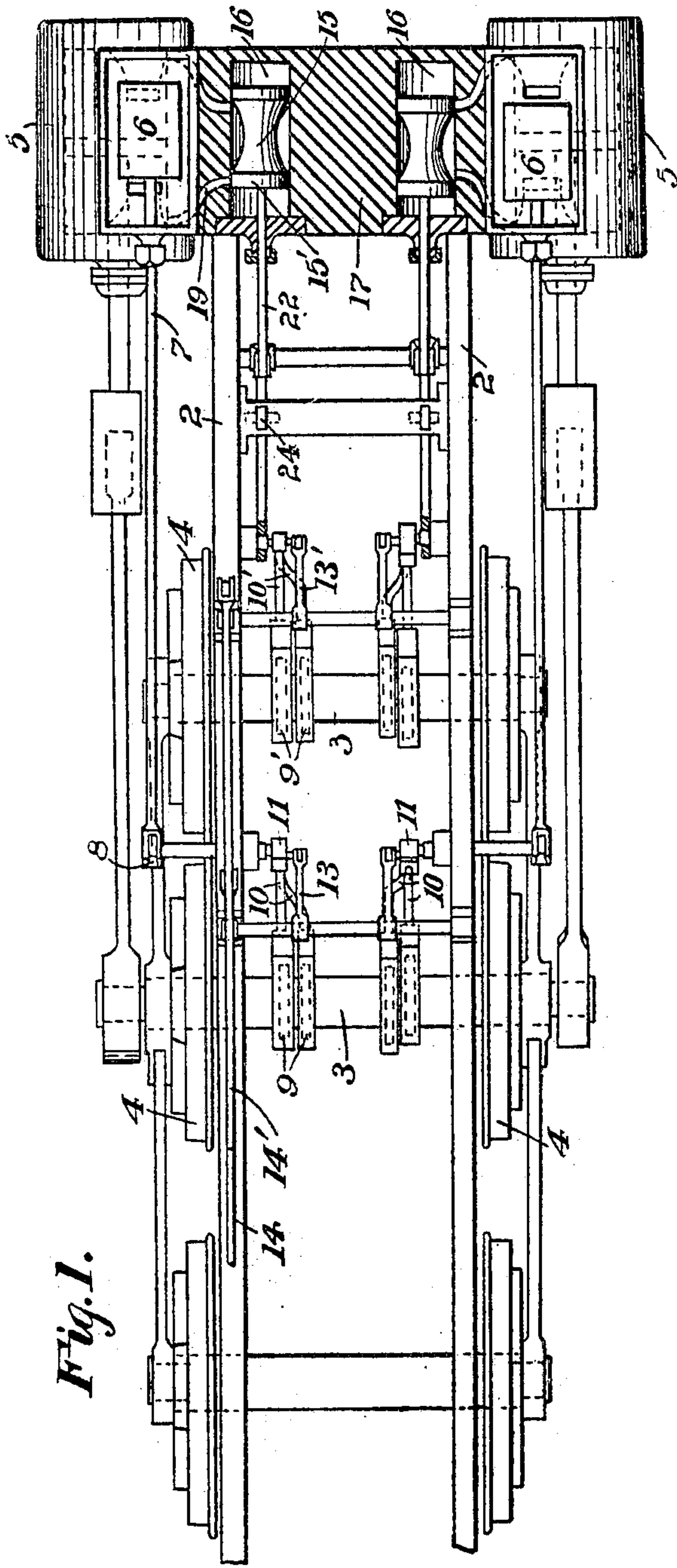


Fig. 1.

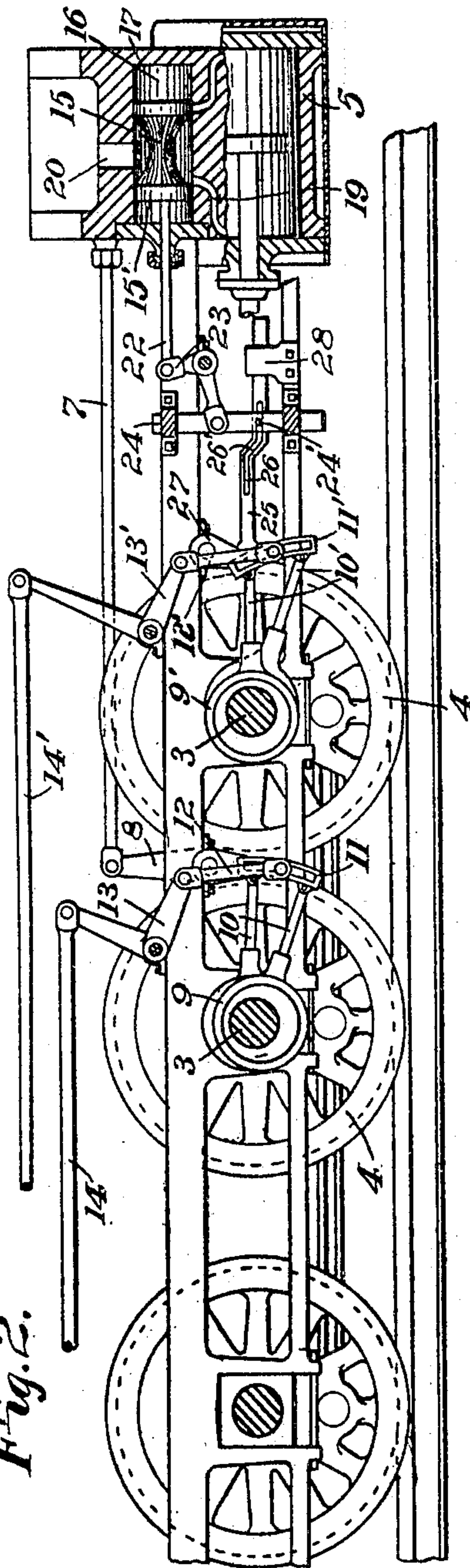


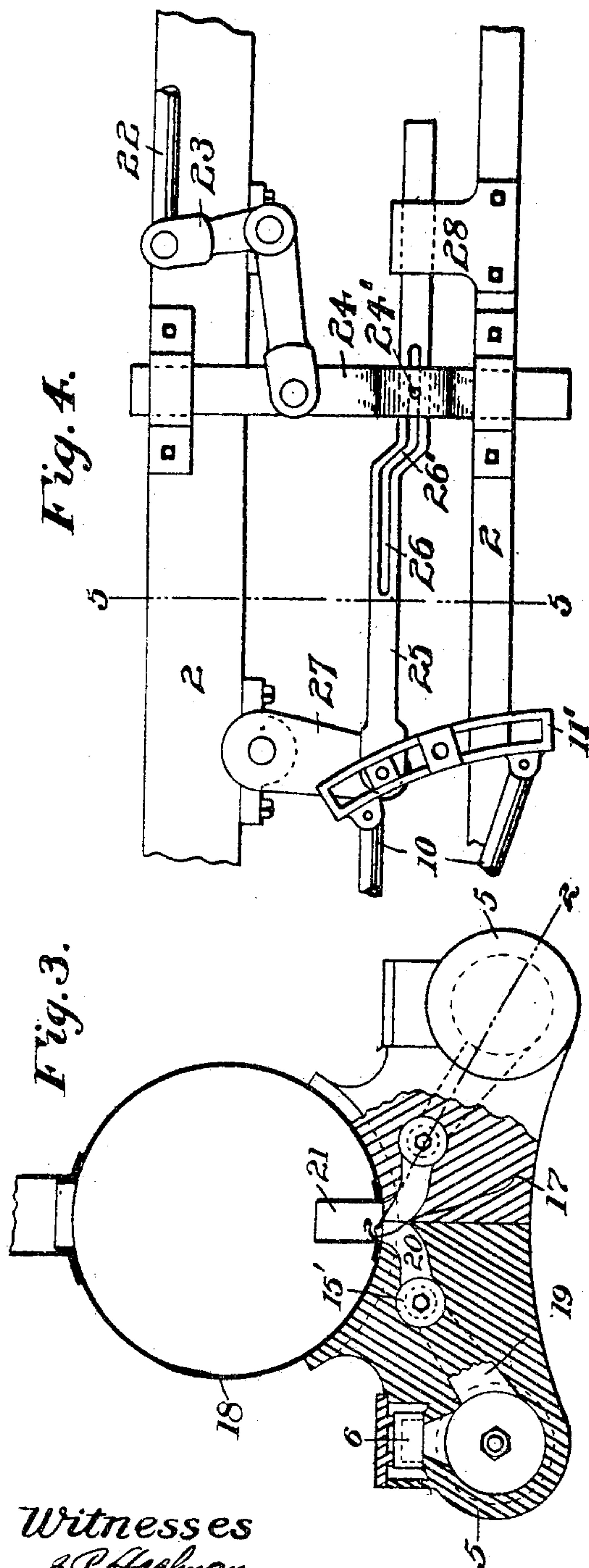
Fig. 2.

Witnesses;  
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2 SHEETS—SHEET 2.



Witnesses  
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*Vernie M. Myers.*

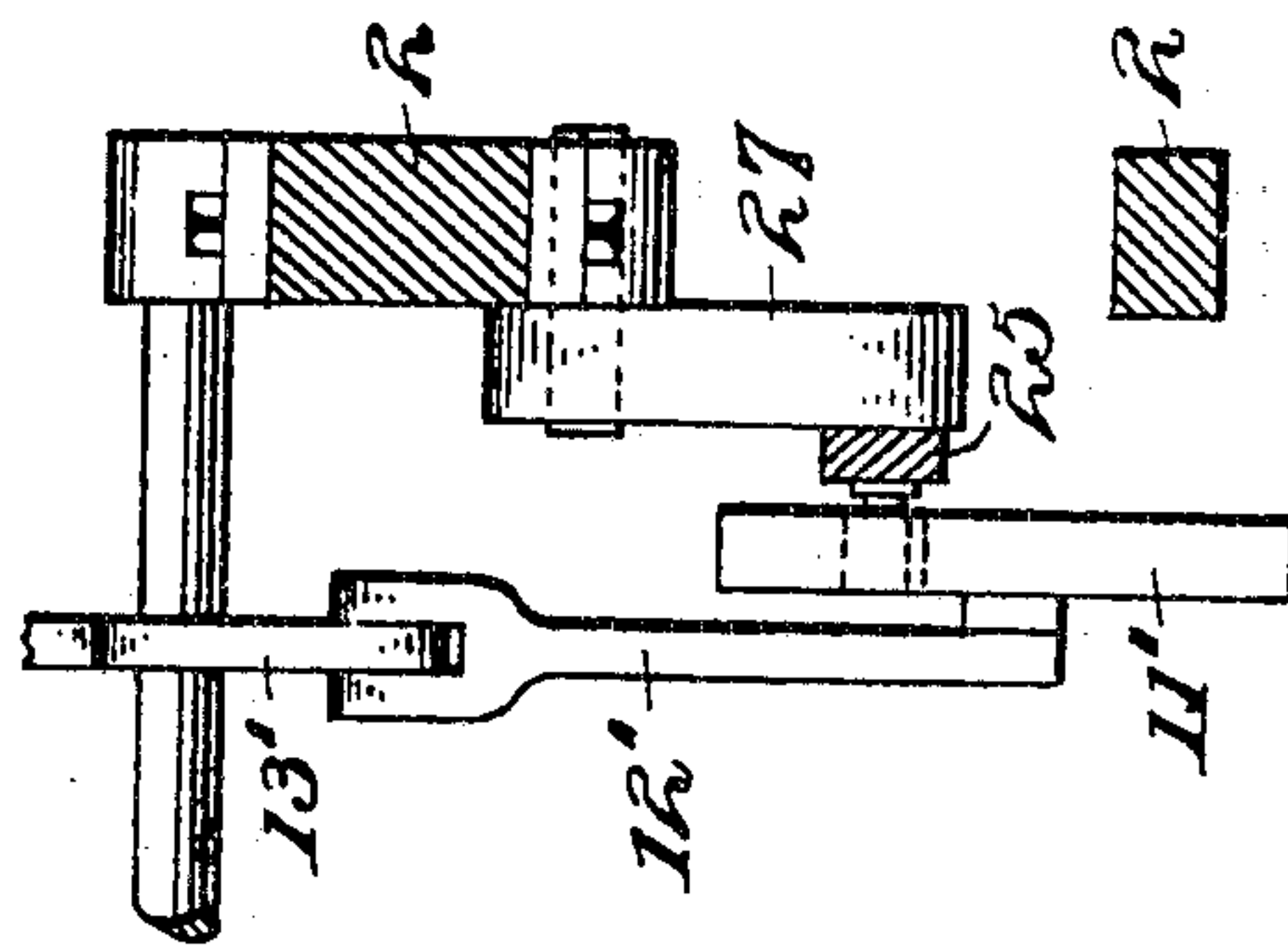
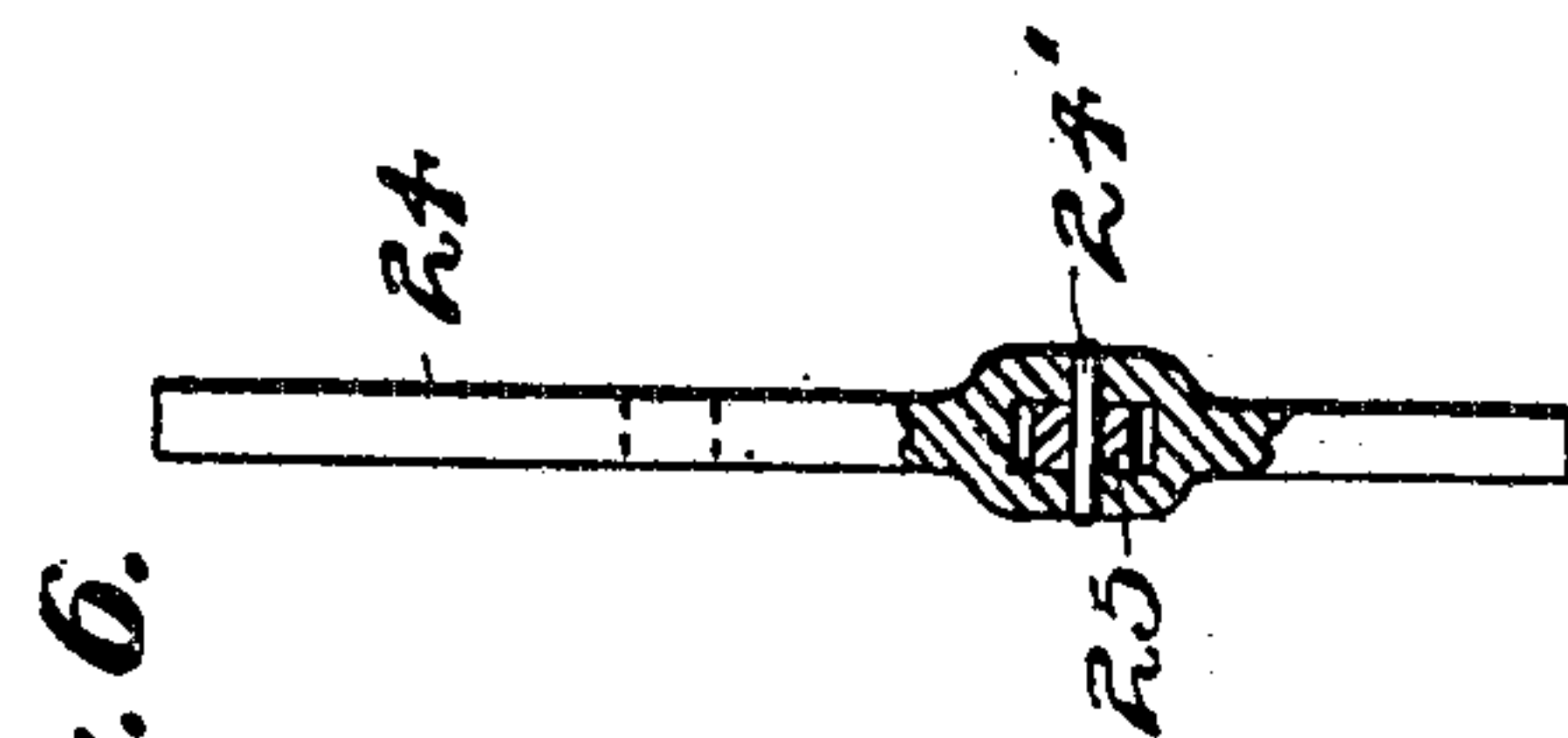
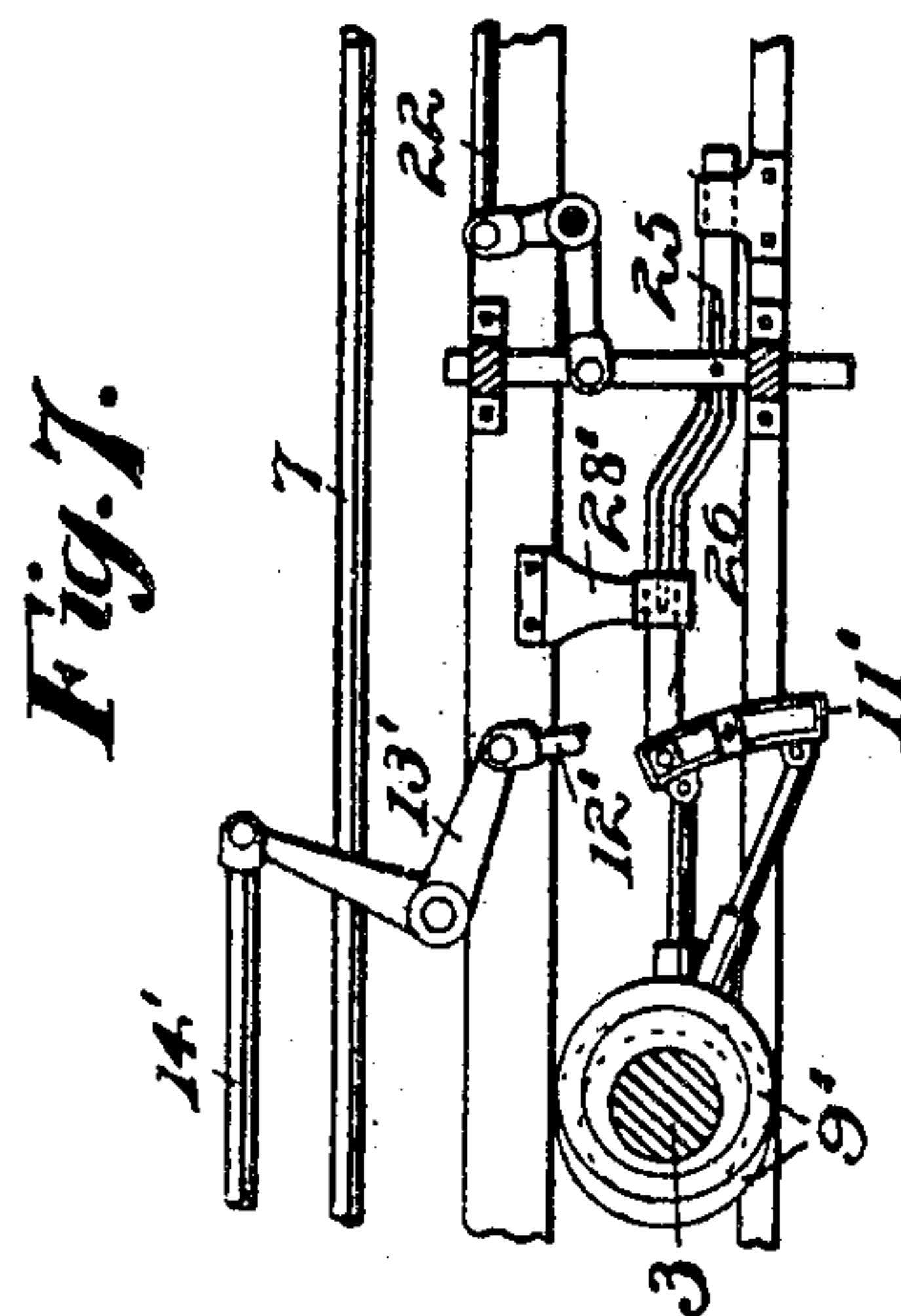


Fig. 5.  
Inventor,  
*E. G. Moore,*  
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Att'y.



# UNITED STATES PATENT OFFICE.

EZRA G. MOORE, OF SILSBEE, TEXAS, ASSIGNOR OF ONE-HALF TO FRANK T. MOORE, OF FAIRMONT, WEST VIRGINIA.

## ENGINE-VALVE MECHANISM.

No. 798,916.

Specification of Letters Patent.

Patented Sept. 5, 1905.

Application filed February 15, 1905. Serial No. 245,664.

*To all whom it may concern:*

Be it known that I, EZRA G. MOORE, a citizen of the United States, residing at Silsbee, in the county of Hardin and State of Texas, have invented certain new and useful Improvements in Steam-Engine Valve Mechanism, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to that class of steam-engines wherein the cylinder-inlet and exhaust-ports are controlled by separate and distinct valves; and the general object is to provide improved reversible mechanism for  
15 actuating the valves, also improved means for separately controlling and adjusting the valves.

The invention is designed with special reference to the requirements of locomotives, whereby an unvarying exhaust may be maintained without regard to the stroke of the inlet-valve, thereby utilizing the full expansive force of the steam at each stroke of the piston.

25 Although the invention is shown and described as applied to a locomotive, its use is not necessarily restricted thereto.

In the accompanying drawings, Figure 1 is a top plan view, partly in section, of a portion of the under part of a locomotive. Fig. 30 2 is a vertical longitudinal sectional view, the section of the cylinder and exhaust-valve being indicated by line 2 2 of Fig. 3. Fig. 3 is a view of the saddle and cylinder, shown partly in section and partly in elevation. Figs. 4, 5, and 6 are detail views of the valve-actuating mechanism, Fig. 5 being taken on line 5 5 of Fig. 4. Fig. 7 is an elevation of valve-actuating mechanism embodying a slight  
40 modification.

Referring to the drawings, 2 represents the side frames of a locomotive-truck, which are supported by axles 3 of drive-wheels 4.

5 represents the cylinders, and 6 the steam-  
45 admitting slide-valves, the latter being actuated in the usual manner by rods 7, extending from arms 8' of rock-shafts 8, mounted in frames 2. This oscillation is effected by valve-gear mechanism of usual construction consisting of eccentrics 9, blades 10, and link 11,  
50 the latter being supported by hanger 12, depending from bell-crank lever 13, to which is

connected reversing-rod 14, extending from the locomotive-cab. (Not shown.)

The exhaust-valves 15, which are separate  
55 and distinct from inlet-valves 6, are preferably located in cavities 16 of saddle 17 between cylinder 5 and boiler 18, with ports 19 connecting opposite ends of the cylinders with said cavities and ports 20 extending  
60 from the cavities to nozzle 21. Each of valves 15 is preferably spool-shaped, with heads 15' thereof of such form as to cover one of ports 19, while the other port is open to port 20, and vice versa, as shown. 65

Extending from each of valves 15 is a stem 22, which is connected by bell-crank lever 23 with a vertical sliding member 24, mounted in suitable guides in frame 2. Slide 24 is actuated by a horizontally-reciprocating bar 25, 70 formed with a longitudinal slot 26, through which projects pin 24', carried by slide 24. Said slot intermediate its ends is formed with vertical offset or step 26', which in passing pin 24' operates to either raise or lower slide 24, 75 according to the direction of movement of the bar, and thus shift valve 15. The valve-gear for actuating this bar is here shown mounted on the front driver-axle 3 and is of the same construction as that above described for operating the steam-inlet valve, the same consisting of eccentrics 9', blades 10', and link 11', the latter being supported by hanger 12', depending from bell-crank 13', from which extends operating-rod 14' to the locomotive-cab. 85 The rear end of bar 25 is connected to and reciprocated by rocker-arm 27, which is actuated by link 11', as will be understood, the forward end of the bar moving in guide 28.

In the modified construction shown in Fig. 90 7 rocker-arm 27 is omitted, the rear end of bar 25 being directly connected to link 11', as shown, a guide 28' being provided for the rear portion of the bar.

The movement of the exhaust-valve is entirely independent of the movement of the inlet-valve, and as the exhaust-valve is moved intermittently, the exhausting end of the cylinder remaining open to the atmosphere during the entire stroke of the piston, so that all  
100 the spent steam is discharged, and there is no opportunity for the creation of back pressure. Also any steam that may leak around the piston is exhausted and cannot operate to re-



tard the movement of the same. With the non-working end of the cylinder thus open to the exhaust until the piston reaches the end of its stroke, the latter is effective its entire distance, thus greatly increasing the power of the engine and decreasing the consumption of fuel and water.

Locomotives equipped with the improvement are obviously more powerful and capable of drawing heavier trains than engines of the old type in which the steam is admitted to and exhausted from the cylinder through a single valve.

I claim—

1. In a locomotive, the combination of driver-axles, separate cylinder inlet and exhaust valves, and a separate link mechanism connected to each valve, the link mechanisms being mounted on the driver-axles.

2. In a steam-engine, the combination of a cylinder, a piston, an exhaust-valve, valve-gear including a link, and a connection between the link and valve having movement independent of the valve.

3. In a steam-engine, the combination of cylinder inlet and exhaust valves, valve-gear for the inlet-valve, a longitudinally-reciprocating bar having an offset, and motion-transmitting mechanism extending from the exhaust-valve and operatively connected to said bar and adapted to be moved by the bar-offset.

4. In a steam-engine, the combination of cylinder inlet and exhaust valves, valve-gear for the inlet-valve, a longitudinally-reciprocating bar having an offset and straight portions extending in opposite directions from the offset, and motion-transmitting mechanism extending from the exhaust-valve and slidably connected to said bar, whereby said mechanism is moved only when engaged by the bar-offset.

5. In a steam-engine, the combination of cylinder inlet and exhaust valves, valve-gear

for the inlet-valve, a longitudinally-reciprocating bar having an offset and straight portions extending from the offset in opposite directions, a transverse bar slidably connected to the reciprocating bar and adapted to be moved by contact with the bar-offset, and an operative connection between the transverse bar and the exhaust-valve.

6. In a steam-engine, the combination of cylinder inlet and exhaust valves, a separate link mechanism for each valve, an operative connection between the inlet-valve and one of said link mechanisms, and motion-transmitting mechanism extending from the other link mechanism to the exhaust-valve and constructed and arranged to impart intermittent movement to the latter.

7. In a steam-engine, the combination of cylinder inlet and exhaust valves, a separate link mechanism for each valve, an operative connection between the inlet-valve and its link mechanism, a bar adapted to be reciprocated by the other link mechanism, the bar having straight portions separated by an offset, and motion-transmitting mechanism extending from the exhaust-valve and slidably connected to said bar and adapted to be moved when engaged by the bar-offset.

8. In a locomotive, the combination of two driver-axles, separate link mechanisms operatively mounted on each axle, cylinder inlet and exhaust valves, an operative connection between the inlet-valve and one of the link mechanisms, and an operative connection between the exhaust-valve and the other link mechanism having movement independent of the valve.

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

EZRA G. MOORE.

Witnesses:

JOHN COOPER,  
G. W. MITCHELL.