

No. 843,619.

PATENTED FEB. 12, 1907.

C. H. MOORE.

ENGINE.

APPLICATION FILED JUNE 4, 1906.

3 SHEETS—SHEET 1.

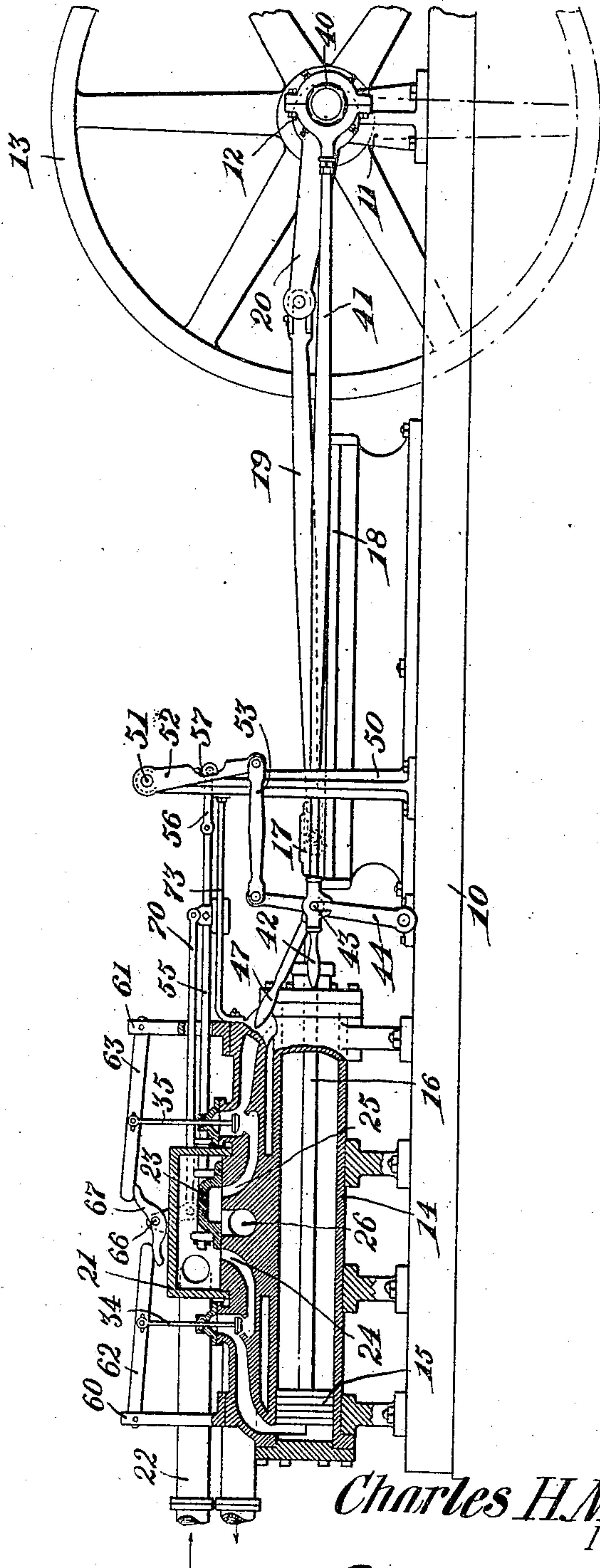


Fig. 1.

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Fig. 2.

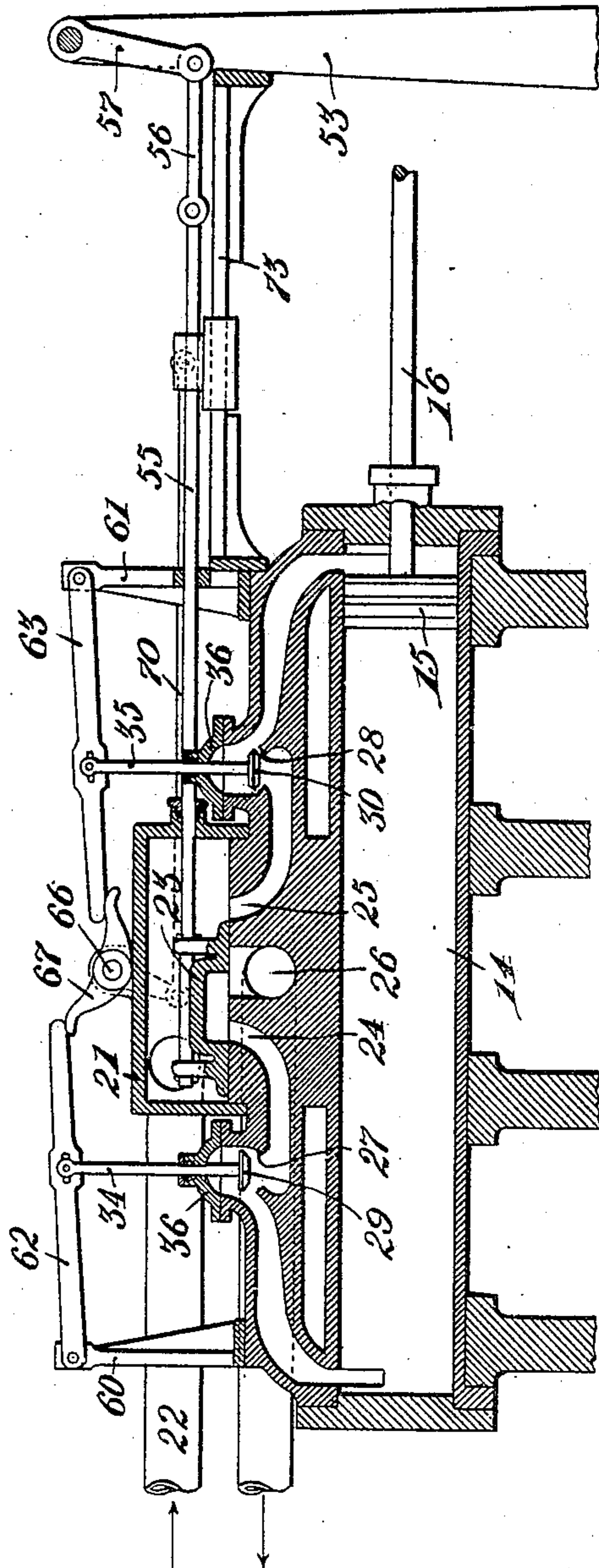
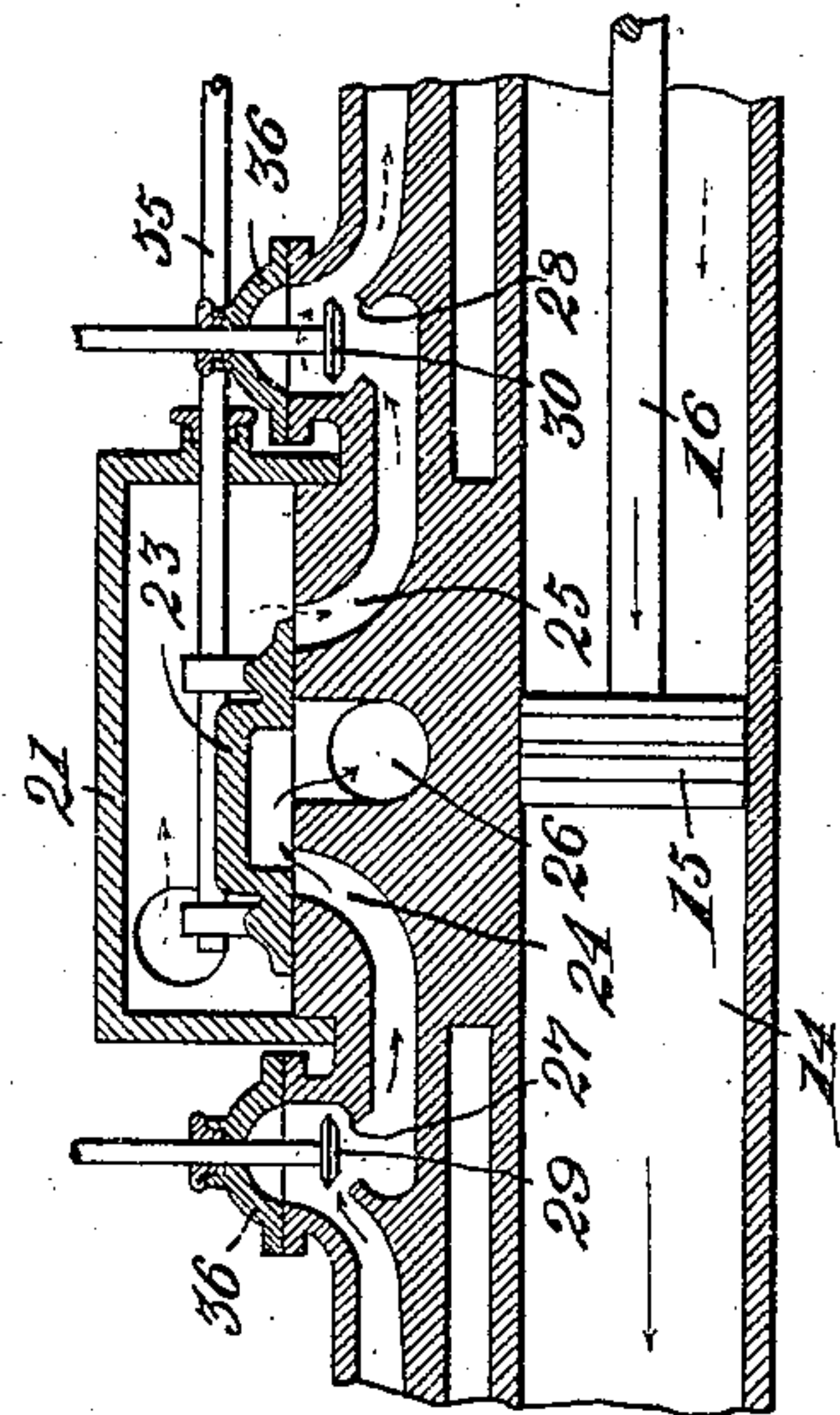


Fig. 3.



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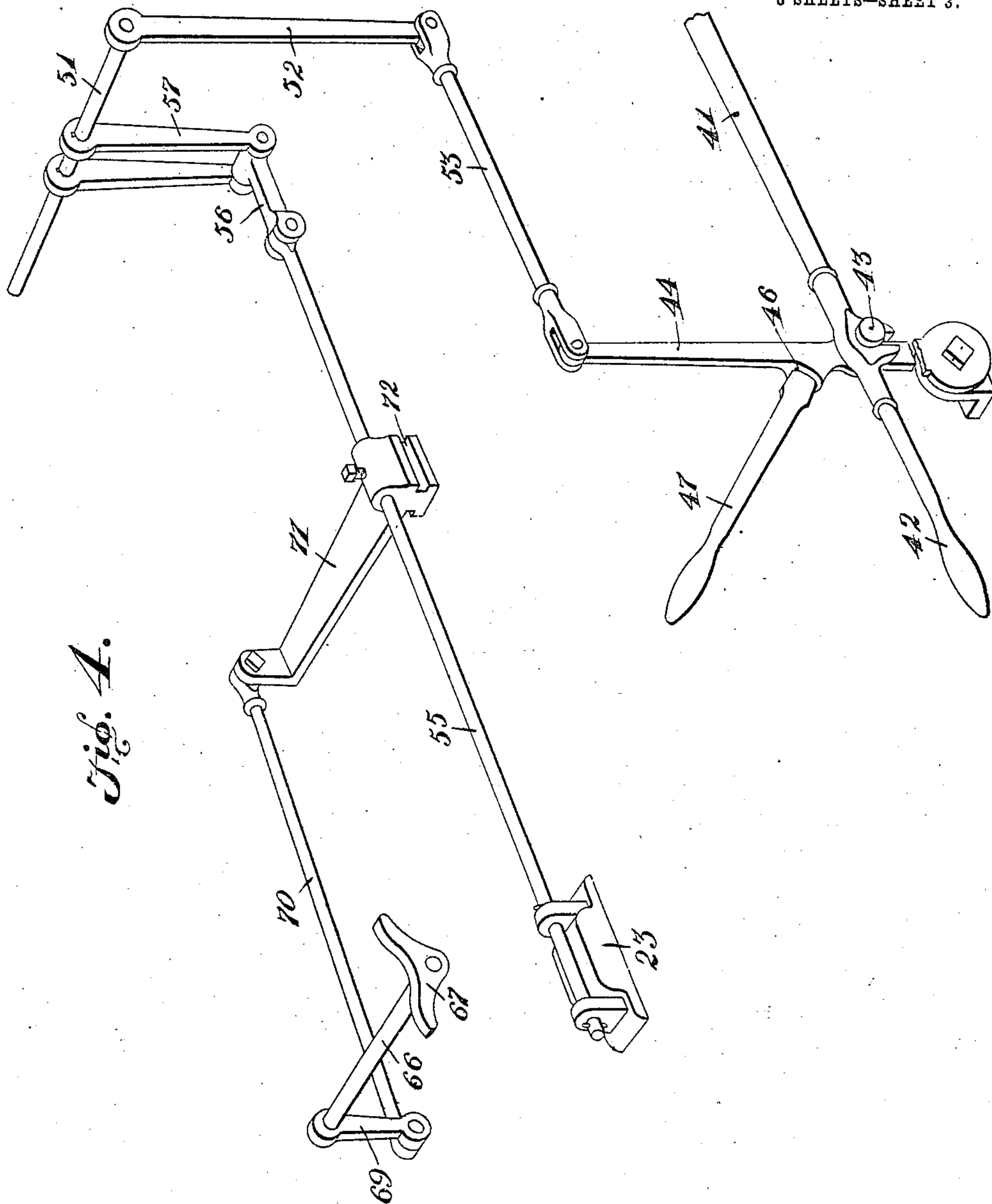
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WITNESSES:

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CHARLES H. MOORE, OF MOBILE, ALABAMA, ASSIGNOR OF ONE-HALF TO
JOSEPH BOHN, OF MOBILE, ALABAMA.

ENGINE.

No. 843,619.

Specification of Letters Patent.

Patented Feb. 12, 1907.

Application filed June 4, 1906. Serial No. 320,099.

To all whom it may concern:

Be it known that I, CHARLES H. MOORE, a citizen of the United States, residing at Mobile, in the county of Mobile and State of Alabama, have invented a new and useful Engine, of which the following is a specification.

This invention relates to steam-engines, and has for its principal object to provide means for accurately controlling the quantity of steam supplied to the engine, so that during the time the main valve is opening to admit steam and the area of the inlet-port is gradually increasing there will be no increase in the quantity of steam passing into the cylinder, but, on the contrary, the flow of steam will be regular and uniform throughout the length of the stroke of the piston or through such portion of the stroke as may be determined by the lead of the main valve.

A further object of the invention is to provide an engine in which the exhaust will be full and free during the greater portion of each stroke of the piston and which will be gradually retarded near the end of the stroke in order to form a cushion.

A still further object of the invention is to provide an engine in which the flow of steam to each end of the cylinder is under the control of two valves which operate in opposite directions, respectively—that is to say, while one is opening the other is closing, so that the effective area of the port will be practically the same throughout every portion of that part of the stroke which is under direct pressure.

A still further object of the invention is to provide an improved mechanism for operating the valve.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a sectional elevation of a steam-engine constructed in accordance with the invention.

Fig. 2 is a similar view of the cylinder and part of the valve-operating mechanism, drawn to an enlarged scale and showing the piston at the end of the crank-shaft stroke. Fig. 3 is a sectional view of a portion of the cylinder, the steam-chest, and valves, showing the piston in mid-position and on the back stroke. Fig. 4 is a detail perspective view of the valve-operating mechanism detached.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The engine is provided with a bed or sole plate 10, having bearings 11 for the support of a crank-shaft 12, on which is mounted a suitable balance or belt wheel 13 of any ordinary construction.

The cylinder 14 is of considerable length and contains a piston 15, having a rod 16, which is connected to a cross-head 17, slidable in suitable cross-head guides 18, and from the cross-head extends a connecting-rod 19, the outer end of which is connected to the main crank 20.

On top of the cylinder is placed a steam-chest 21, with which communicates a pipe 22, leading from the boiler or other source of fluid-pressure supply, and the top of the cylinder is faced off to form a seat for a D slide-valve 23, that is arranged to control two cylinder-ports 24 and 25 and an exhaust-port 26.

The cavity of the D-valve is much longer than is usual in engines of this general type in order to permit perfect freedom of exhaust, and the valve and valve mechanism are so arranged that the valve may open slowly from the beginning of the piston-stroke in both directions, attaining its maximum opening and then slowly closing without, however, resulting in increase or decrease in the rate of flow of steam to the cylinder.

The ports 24 and 25 lead, as usual, to the opposite ends of said cylinder, and in these ports are arranged valve-seats 27 and 28 for the reception of valves 29 and 30, respectively, said valves being carried by stems 34 and 35, that extend through suitable stuffing-boxes formed in caps 38, that are disposed immediately above the valves.

For the operation of the several valves an eccentric 40 is arranged on the main crank-

shaft, and from a strap on said eccentric leads a valve-rod 41, provided with a terminal handle 42 and having a hooked connection with a pin 43 on a valve rocker-arm 44, the connection being such as to permit the engineer to disconnect the valve-rod from the rocker-arm when the engine is to be reversed. For this purpose the rocker-arm 44 has a socket 46 for the reception of a handle lever 47, which may be manually manipulated when the engine is being reversed, it being necessary, of course, to first detach the rod 41 from the pin 43.

Projecting from the bed-plate of the engine are standards 50, the upper ends of which are provided with bearings for a rock-shaft 51, that is provided at one end with a rocker-arm 52, connected by a link 53 to the upper end of the rocker-arm 44.

The slide valve-23 is provided with a suitable guide valve-stem 55, the upper end of which is connected by a link 56 to a rocker arm or arms 57, depending from the rock-shaft 51. The operation of these parts is properly timed with respect to the movement of the piston.

To the top of the cylinder are secured standards 60 and 61, to the upper end of which are pivoted rocker-arms 62 and 63, respectively, and these rocker-arms are connected to the upper ends of the valve-stems 34 and 35, respectively.

On top of the steam-chest is a bearing for the support of a rock-shaft 66, carrying a beveled cam-block 67, on which the arms 62 and 63 rest and by which said arms may be moved for the purpose of altering the positions of the valves 29 and 30.

One end of the rock-shaft 66 is provided with a depending arm 69, that is connected by a rod 70 to a bracket 71. This bracket is rigidly secured to and projects from the valve-stem 55, and as said stem is reciprocated the movement will be imparted to the shaft 66 and the rocking cam-block 67. For convenience the bracket is provided with slots 72, which receive guide-bars 73, carried by the frame and so arranged as to form a support for the bracket and a guide for the valve-stem.

In operation, the parts being in the position shown in Fig. 1, the valve 23 is fully open and steam is passing from the steam-chest through the port 24 to the cylinder; but the quantity of steam so passing is limited by the valve 29, which is nearly closed. At the same time the port 25 at the opposite end of the cylinder has free communication with the exhaust-port in order to allow the free escape of steam in advance of the piston. As the piston advances toward the crank-shaft the slide-valve will gradually move over the port 24 and tend to reduce the volume of steam flowing into said port; but as this occurs the double cam-block 67 is rocked from

the position shown in Fig. 1 to that shown in Fig. 2, and the rocker-arm 62 is raised, carrying with it the stem 34 and moving the valve 29 upward, thus increasing the effective area of the port at the valve-seat 27, the increase in area at this point corresponding to the gradual decrease in area at the steam-chest end of the port, and this operation is carried on throughout that portion of the stroke where the piston moves under direct pressure, and at all times the volume of steam entering the cylinder is the same. As the valve 23 moves to the left and piston 15 continues to travel to the right, the cam-block 67 will allow the rocker-arm 63 to descend and move the valve 30 toward the closed position, although said valve is never fully closed. The movement, however, tends to reduce the effective area of the port, and by reducing the area of the exhaust a portion of the exhaust-steam will be held in the cylinder to form a slight cushion for the piston. In this manner the supply of steam and the exhaust are both placed under control, so that the engine cannot run away in case of sudden reduction of the load, and a governor is therefore not necessary.

I claim—

1. In a steam-engine, a cylinder, a piston therein, a steam-chest, a slide-valve within the steam-chest, cylinder and exhaust ports under the control of the slide-valve, an auxiliary valve arranged in each cylinder-port, and means for operating the valves to effect gradual opening of the auxiliary valves during gradual closing of the ports by the slide-valves.

2. In a steam-engine, a cylinder, a piston therein, a steam-chest, a slide-valve in the steam-chest, cylinder and exhaust ports under the control of the slide-valve, a pair of ports arranged in the cylinder-valves, stems carrying said valves, pivotally-mounted rocker-arms to which the stems are secured, and a rocking cam-block engaging said arms.

3. In a steam-engine, a cylinder, a piston therein, a steam-chest, a slide-valve in the steam-chest, cylinder and exhaust ports under the control of the slide-valve, auxiliary controlling-valves in the steam-ports, stems carrying said valves, rocker-arms to which the stems are connected, a rocking cam-block engaging said arms, a valve-operating eccentric, a stem connected to the slide-valve and receiving motion from the eccentric, and means for connecting the rocker-block to said stem.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CHAS. H. MOORE.

Witnesses:

JOS. C. ROCHE,
H. H. SMITH.