

R. EATON.
VALVE MECHANISM FOR STEAMBOAT ENGINES.
APPLICATION FILED AUG. 19, 1910.

976,790.

Patented Nov. 22, 1910.

3 SHEETS—SHEET 1.

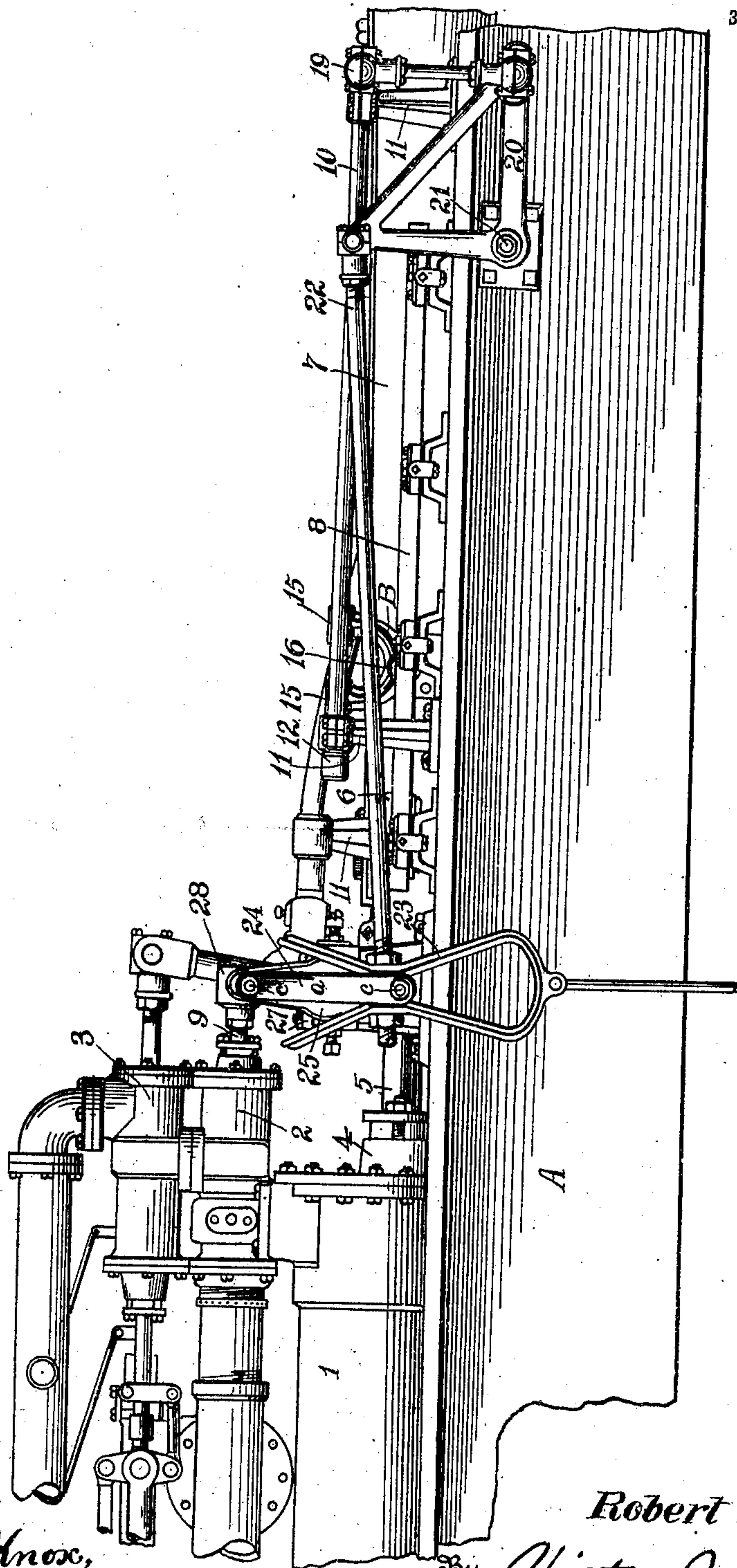


Fig. 1.

Witnesses

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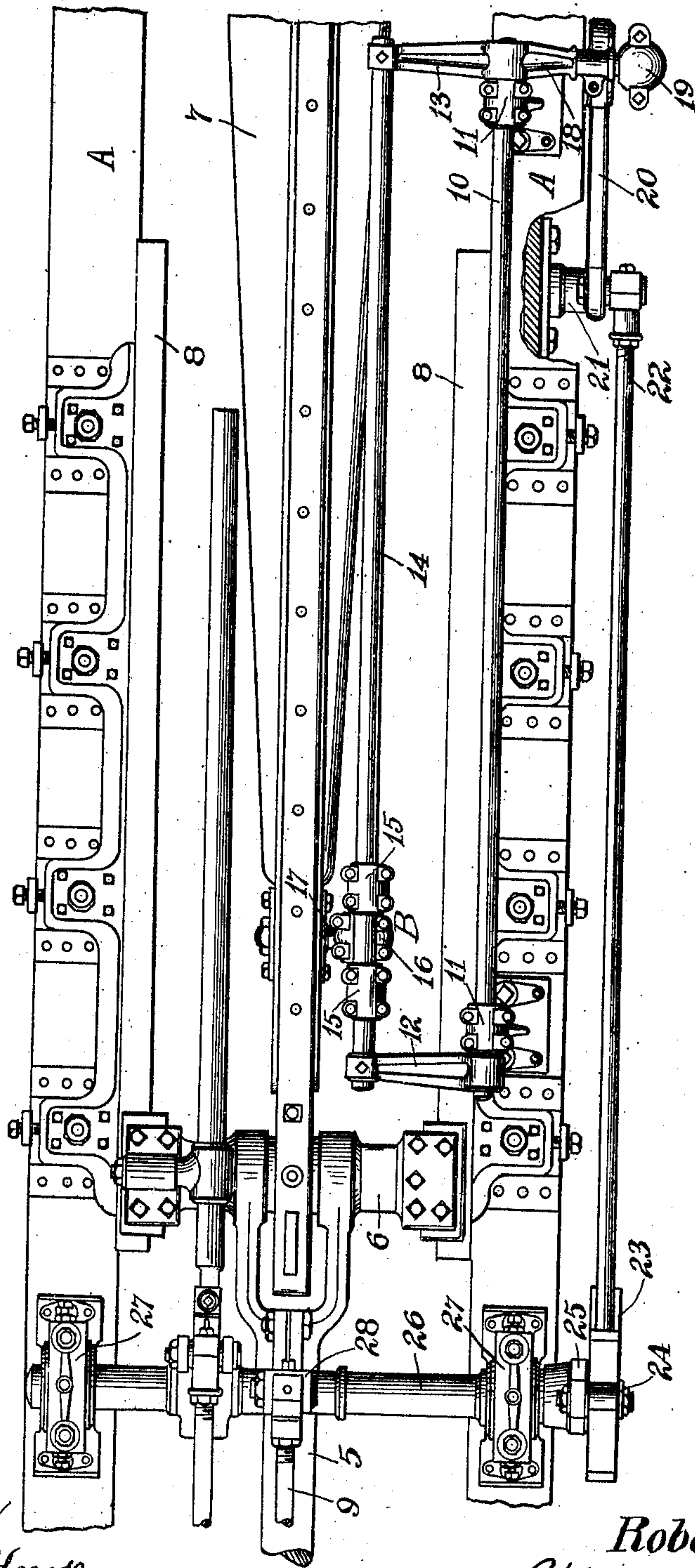


Fig. 2.

Witnesses

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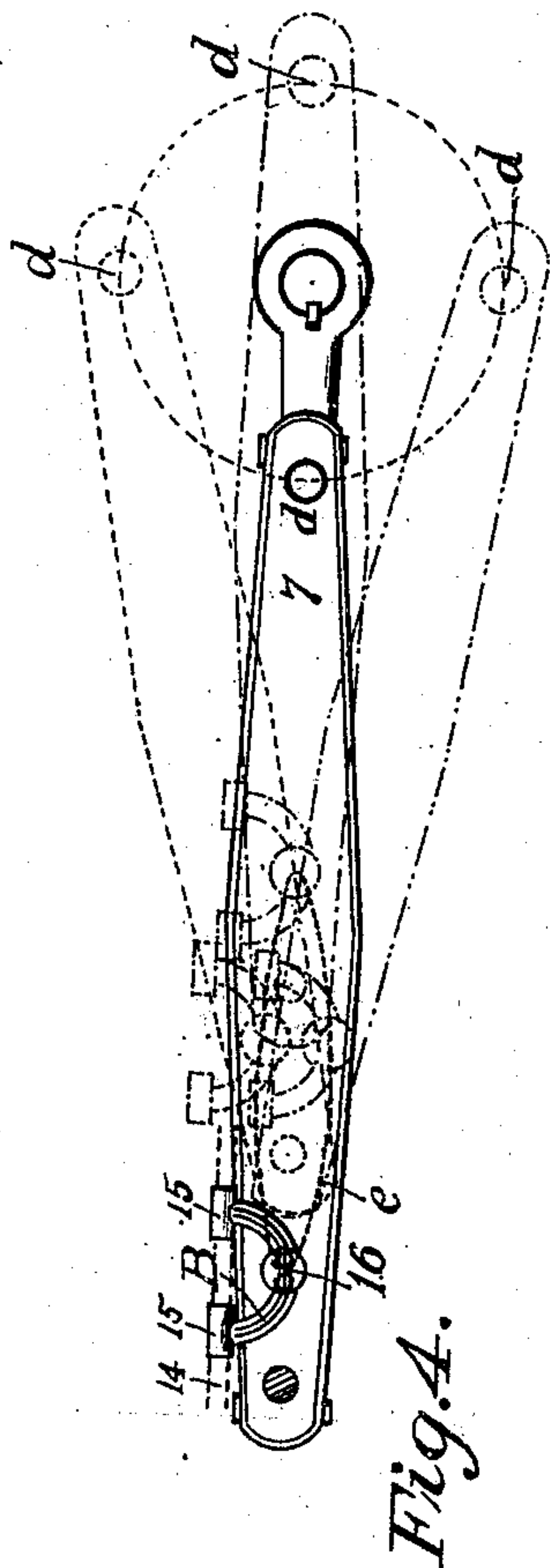


Fig. 4.

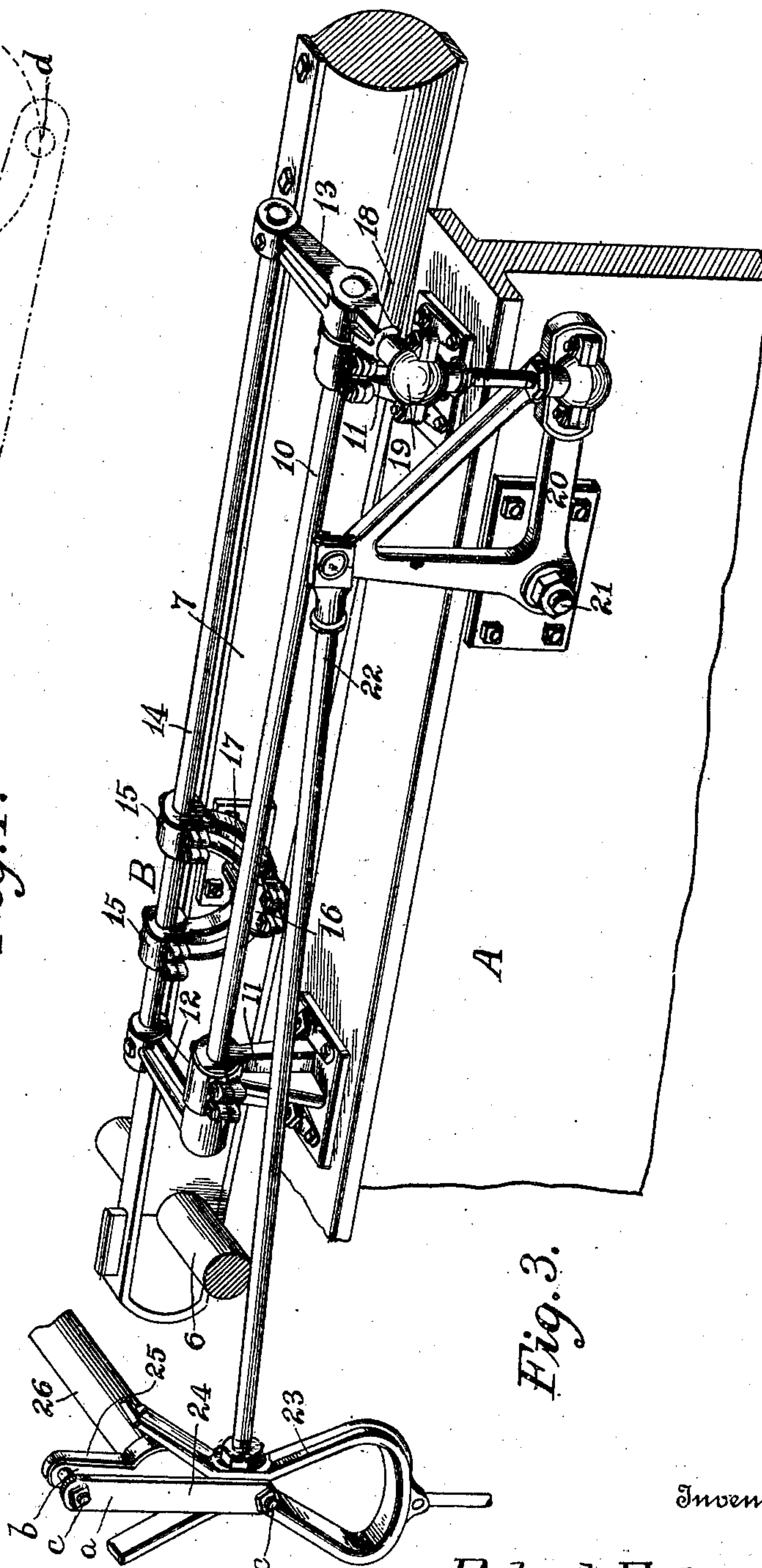


Fig. 3.

Witnesses

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VALVE MECHANISM FOR STEAMBOAT-ENGINES.

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Specification of Letters Patent.

Patented Nov. 22, 1910.

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To all whom it may concern:

Be it known that I, ROBERT EATON, a citizen of the United States, residing at Lake City, in the county of Wabasha and State of Minnesota, have invented new and useful Improvements in Valve Mechanism for Steamboat-Engines, of which the following is a specification.

This invention relates to valve mechanisms especially adapted for steam boat engines such, for instance, as that disclosed in U. S. Letters Patent No. 694,057.

The invention has for one of its objects to provide a novel valve mechanism by which the steam valves are actuated by means connected with the pitman or connecting rod of the engine.

Another object of the invention is to improve and simplify the construction and operation of valve operating mechanisms of this character so as to be comparatively simple and inexpensive to manufacture, reliable and efficient in use and readily adapted for variable cut-off valves.

With these objects in view, and others as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention:—Figure 1 is a side view of a portion of a steam boat engine showing the improved valve operating mechanism applied thereto. Fig. 2 is a plan view of the said mechanism drawn on an enlarged scale. Fig. 3 is a perspective view of the operating mechanism. Fig. 4 is a diagrammatic view illustrating the manner of transmitting motion to the mechanism from the pitman or connecting rod of the engine.

Similar reference characters are employed to designate corresponding parts throughout the several views.

Referring to the drawings, A designates the bed of the engine on which is mounted a horizontal cylinder 1 having main and cut-off valve chests 2 and 3, respectively, in which are the usual piston valves controlling the admission and exhaust of steam. Extending through the stuffing box 4 is the piston rod 5 that is connected by the cross head 6 with the pitman 7 or connecting rod, the said cross head reciprocating in horizon-

tal guides 8 on the bed of the engine. The main valves of the engine are connected with a longitudinally movable valve rod or stem 9 that is adapted to be reciprocated by the pitman through the operating mechanism that constitutes the subject matter of the present invention. This operating mechanism includes a horizontal rock shaft 10 mounted in bearings or standards 11 on the bed A, and on the ends of this shaft are fastened arms 12 and 13, which cause the said shaft to rock and also prevent longitudinal movement of the latter by the hubs of the arms engaging the bearings 11. Extending from one arm to the other and secured to the outer ends thereof is a floating shaft 14 that is disposed parallel with the rock shaft 10 and also parallel with the pitman 7. Mounted for reciprocation on this shaft 14 is a connecting element or slide, designated generally by B, the same being in the form of a yoke having tubular bearings 15 through which the shaft 14 extends, and at the bottom of the yoke, is a bearing 16 in which is disposed a pivot 17 fastened on the pitman at a point inwardly from where the latter connects with the cross-head 6. The bearings 15 and 16 are made in separable parts so that the connecting device B can be taken off when required for inspection or repair.

As the pitman moves back and forth, it constantly changes its angular position with respect to the line of movement of the piston rod since the opposite end of the pitman travels in the path of a circle, and since the pivot 17 is eccentric to the cross head, the connecting device B will rise and fall with the pitman, and hence moves the floating shaft 14 up and down while the device B reciprocates on the latter. The lever 13 has an outwardly extending arm 18 which is connected by a link 19 with a bell crank lever 20, fulcrumed at 21 on the bed of the engine. This bell crank lever is adapted to actuate the valve rod 9 by a longitudinally movable rod 22 connected with the upwardly-extending arm of the lever, and on this rod is a double fork 23 which is connected by an open link 24 with the rocker 25 on the transverse valve shaft 26, which shaft is mounted in bearings 27 on the bed of the engine and has an upwardly-extending arm 28 suitably connected with the valve rod 9. This device 23 can be raised or lowered by any suitable mechanism under

the control of the operator, whereby the point of connection between the rod 22 and link 24 can be changed and the direction of the propulsion changed. The open link 24 is composed of two members *a* and *b* connected together in spaced relation by bolts *c* which attach the open link to the rocker 25 on the shaft 26, and the rod 22 extends between the members *a* and *b*.

As the pitman moves back and forth with the reciprocation of the piston in the cylinder 1, the floating shaft 14 will rise and fall and thus cause the shaft 10, that is rigidly connected with the shaft 14, to rock. This rocking movement oscillates the bell crank lever 20 that in turn operates through the rod 22, the reversible device 23, link 24, and the rocker 25 to rock the shaft 26 that, in turn, reciprocates the main valves of the engine. The means for operating the valves in the chests 3 need not here be described, since they form no part of the present invention.

The movement of the floating shaft 14 will be best understood by reference to Fig. 4, which is a diagrammatic view of the pitman, the latter being shown in different positions in the revolution of the crank pin *d* of the engine. When the crank pin is on either dead center, the floating shaft 14 is in its central position, but when the crank pin moves from either dead center, the floating shaft will move upwardly or downwardly in an arc of a circle concentric with the rock shaft 10, and the pivot 17 between the pitman and connecting devices B will travel in a relatively flat elliptical path as indicated by the dotted line *e*. The pivot 17 is located directly in the longitudinal center line of the pitman, and hence causes a true valve motion.

From the foregoing description taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention relates, and while I have described the principle of operation of the invention, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made when desired as are within the scope of the claims.

What I claim as new and desire to secure by Letters Patent is:—

1. In an engine, the combination of a cylinder, a valve controlling the admission and exhaust of steam, a pitman, a rock shaft operatively connected with the pitman and disposed parallel with the plane of movement thereof, and means for connecting the rock shaft with the valve.

2. In an engine, the combination of a cylinder, a valve therefor, a rock shaft, means

for connecting the rock shaft with the valve, said rock shaft extending transversely to the axis of the cylinder, a rock shaft disposed parallel with the axis of the cylinder and operatively connected with the first mentioned rock shaft, a pitman disposed parallel with the second rock shaft, and means for operatively connecting the pitman with the second rock shaft to rock the same.

3. In an engine, the combination of a cylinder, a valve therefor, a pitman, a cross head to which the pitman is connected, a floating shaft disposed along side the pitman, a connecting device slidably connected with the floating shaft and connected with the pitman in its longitudinal center line and at a point inwardly from the cross head, and means between the floating shaft and valve for reciprocating the latter.

4. In an engine, the combination of a cylinder, a valve therefor, a pitman, a cross head to which the pitman is connected, a floating shaft disposed along side the pitman, a connecting device slidably connected with the floating shaft and connected with the pitman in its longitudinal center line and at a point inwardly from the connecting rod, a rock shaft to which the floating shaft is rigidly connected, a bell crank lever connected with the rock shaft, and means between the bell crank lever and valve for reciprocating the latter.

5. In an engine, the combination of a cylinder, a valve therefor, a pitman, a cross head to which the pitman is connected, a floating shaft disposed along side the pitman, a connecting device slidably connected with the floating shaft and connected with the pitman in its longitudinal center line and at a point inwardly from the cross head, a rock shaft to which the floating shaft is rigidly connected, a bell crank lever connected with the rock shaft, and means between the bell crank lever and valve for reciprocating the latter, said means including a variable stroke reversing device.

6. In an engine, the combination of a cylinder, a valve therefor, a pitman, a shaft disposed at one side of the and parallel with the plane of movement of the pitman, means for supporting the shaft to bodily move in one direction, a device slidable on the shaft and connected with the pitman to move the said shaft by the latter, and means between the shaft and valve for reciprocating the latter.

7. In an engine, the combination of a valve, a cross head, a pitman connected with the cross head, a pivot disposed in a longitudinal center line of the pitman and located at one side of the cross head, a device connected with the pivot, a floating shaft to which the device is slidably connected, a rock shaft disposed parallel with the first mentioned shaft, arms on the rock shaft for

supporting the floating shaft, and connecting means between the rock shaft and valve for reciprocating the latter.

8. In an engine, the combination of a
5 valve, a cross head, a pitman connected with the cross head, a pivot disposed in a longitudinal center line of the pitman and located at one side of the cross head, a device connected with the pivot, a floating shaft to
10 which the device is slidably connected, a rock shaft disposed parallel with the first mentioned shaft, arms on the rock shaft for supporting the floating shaft, an arm connected with the rock shaft, a link connected
15 with the last mentioned arm, a bell crank lever connected with the link, a longitudinally movable rod connected with the bell crank lever, and means connecting the said rod with the valve for reciprocating the same.
20 9. In an engine, the combination of a valve, a cross head, a pitman connected with the cross head, a pivot disposed in a longitudinal center line of the pitman and located at one side of the cross head, a device con-
25 nected with the pivot, a floating shaft to which the device is slidably connected, a rock shaft disposed parallel with the first mentioned shaft, arms on the rock shaft for supporting the floating shaft, an arm connected with the rock shaft, a link connected
30 with the last-mentioned arm, a bell crank lever connected with the link, a longitudinally movable rod connected with the bell crank lever, a rock shaft, and means between

the last mentioned rock shaft and valve for 35 reciprocating the same.

10. In an engine, the combination of a valve rod, a rock shaft extending transversely to the rod, a connection between the shaft and rod, a rocker on the said shaft, an
40 open link connected with the rocker, an actuating rod adjustably connected with the link, means for shifting the point of connection between the actuating rod and link, a pitman, a floating rod disposed parallel
45 with the pitman, means for connecting the rod with the pitman to receive motion from the latter, and connecting means between the floating rod and bell crank lever.

11. In an engine, the combination of a 50 bed, a cylinder mounted thereon, a cross head, guides on the bed for the cross head, a piston rod and a pitman connected with the cross head, bearings on the bed, a rock shaft mounted on the bearing and disposed
55 parallel with the plane in which the pitman moves, arms on the rock shaft, a floating shaft carried by the arms, a connecting device slidable on the floating shaft, a pivotal connection between the said device and pit-
60 man, a fluid controlling valve, and connecting means between the rock shaft and valve.

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

ROBERT EATON.

Witnesses:

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C. E. BUCKMINSTER, Jr.