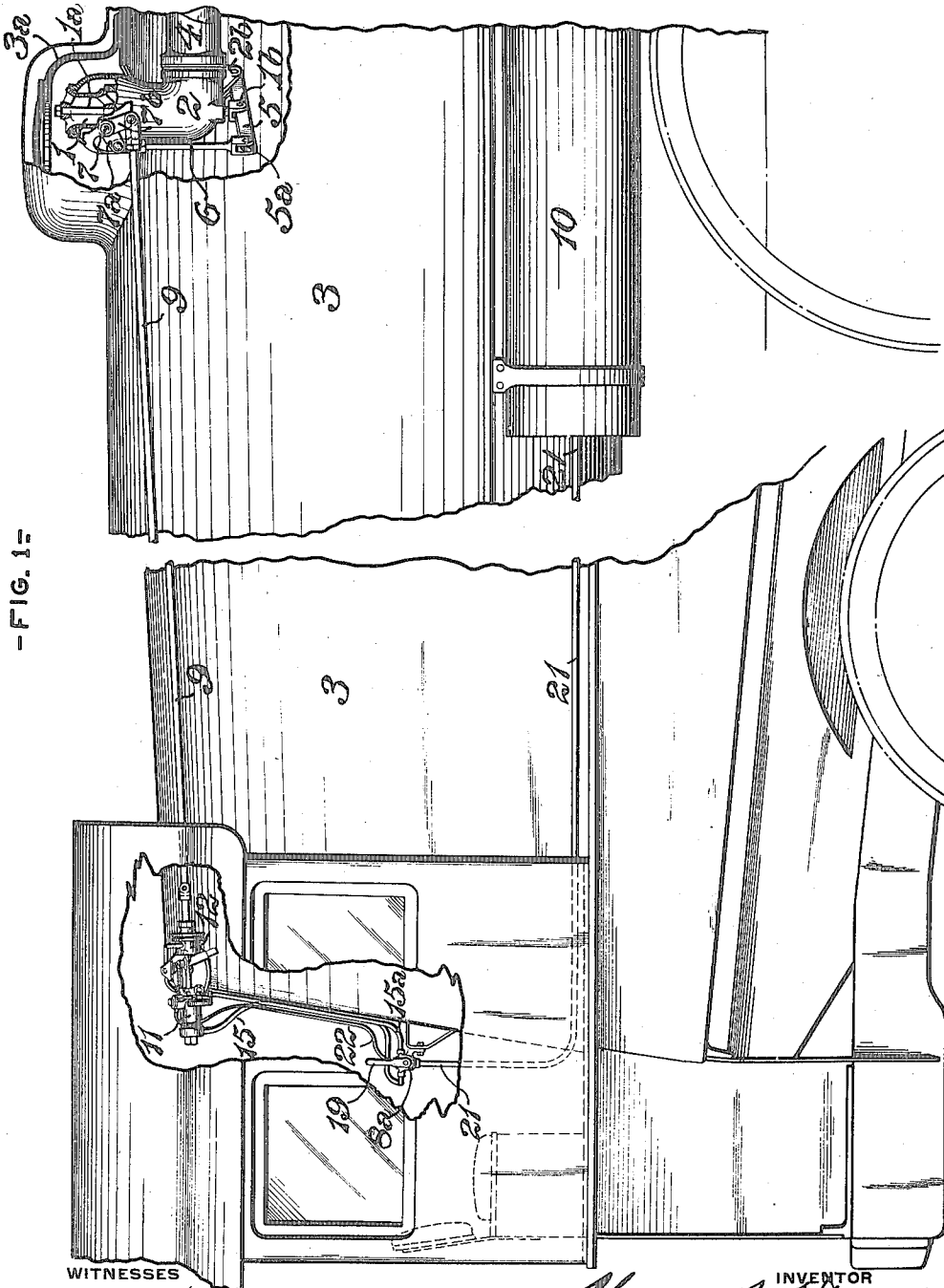


H. S. VINCENT.
 THROTTLE VALVE OPERATING MECHANISM.
 APPLICATION FILED JAN. 24, 1916.

1,187,946.

Patented June 20, 1916.

4 SHEETS—SHEET 1.



-FIG. 1-

WITNESSES

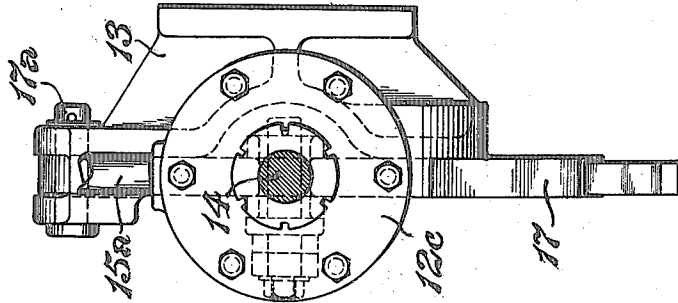
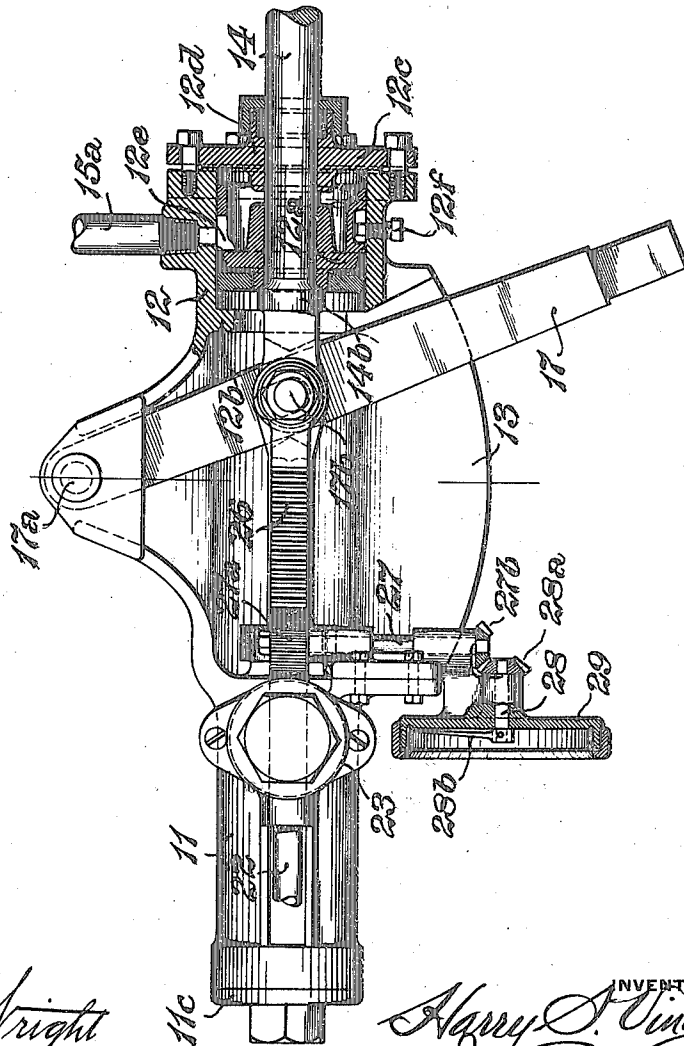
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4 SHEETS—SHEET 2.



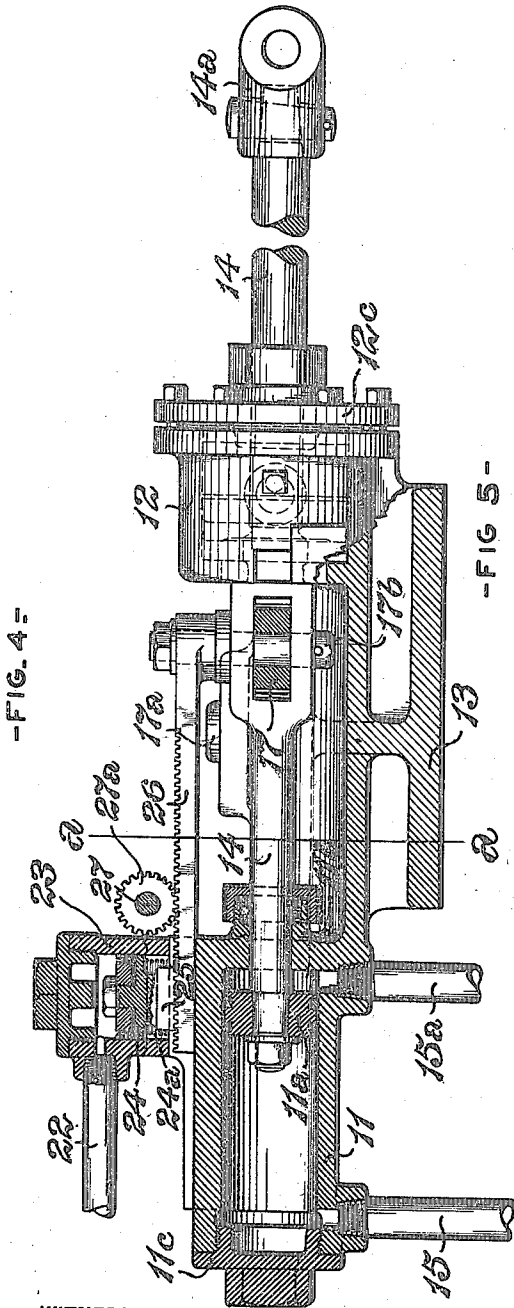
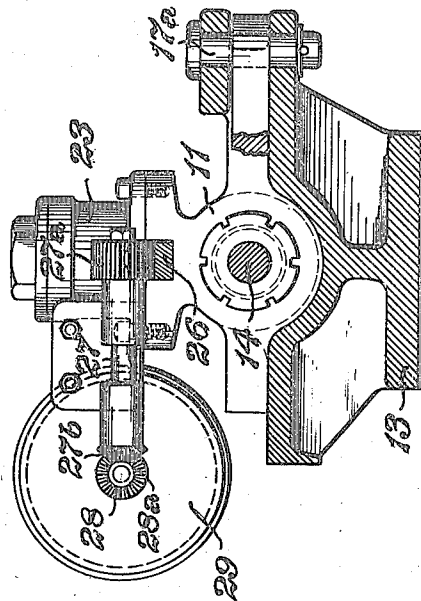
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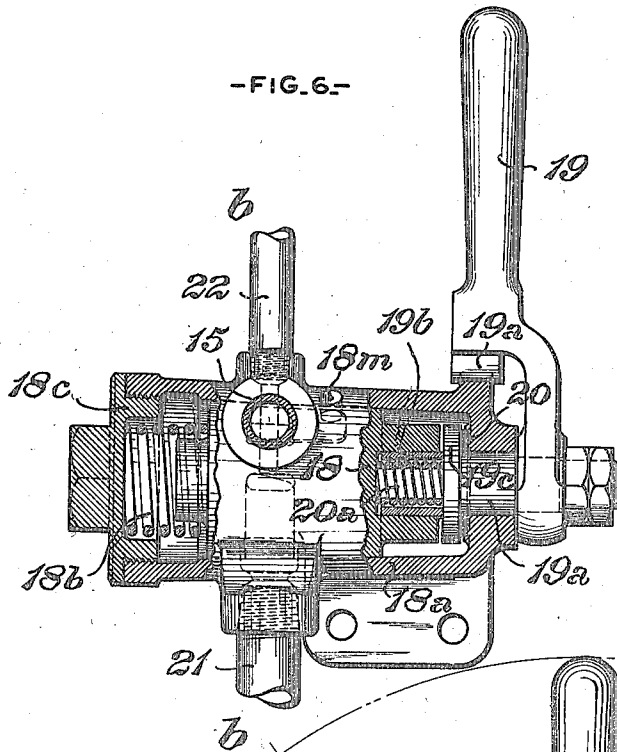
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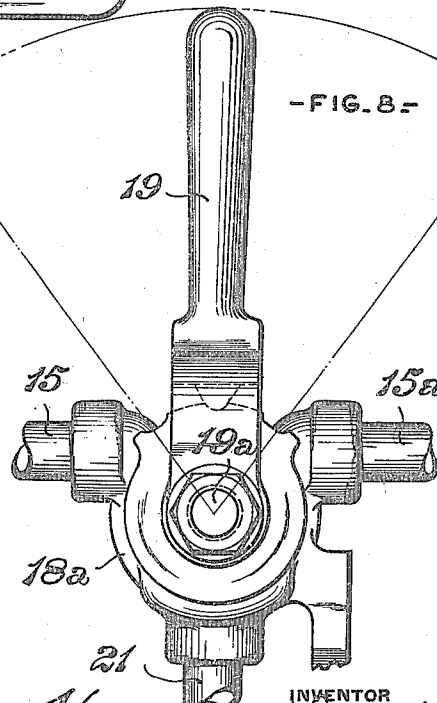
Patented June 20, 1916.

4 SHEETS—SHEET 4.

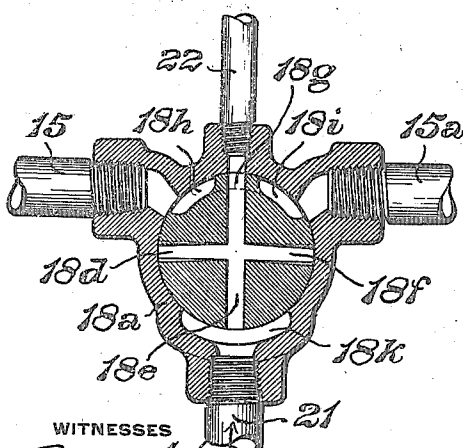
—FIG. 6—



—FIG. 8—



—FIG. 7—



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UNITED STATES PATENT OFFICE.

HARRY S. VINCENT, OF RIDGEWOOD, NEW JERSEY.

THROTTLE-VALVE-OPERATING MECHANISM.

1,187,946.

Specification of Letters Patent. Patented June 20, 1916.

Application filed January 24, 1916. Serial No. 73,856.

To all whom it may concern:

Be it known that I, HARRY S. VINCENT, of Ridgewood, in the county of Bergen and State of New Jersey, have invented a certain new and useful Improvement in Throttle-Valve-Operating Mechanism, of which improvement the following is a specification.

My invention, while more particularly designed for application in connection with the throttle valves of locomotive engines, is also applicable to those which control the flow of fluid under pressure in mechanisms of other types.

The object of my invention is to provide simple and effective means for operating a throttle valve by the action of fluid pressure, which shall be readily and conveniently controllable by the engineer, with the minimum of effort, and be automatically indicative to him of the position of the valve relatively to its seat.

A further object of the invention is to enable the valve to be securely held against accidental displacement from any predetermined position.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a side view, in elevation, of the rear portion of a locomotive boiler, illustrating an application of my invention; Fig. 2, a plan view, partly in section, of the operating motor; Fig. 3, an end view of the same, as seen from the front; Fig. 4, a view, partly in vertical longitudinal central section and partly in side elevation; Fig. 5, a vertical transverse section, on the line *a a* of Fig. 4; Fig. 6, a view, partly in side elevation and partly in longitudinal central section, of the controlling valve mechanism; Fig. 7, a transverse section through the same, on the line *b b* of Fig. 6; and, Fig. 8, an end view, as seen from the right.

My invention is herein exemplified as applied for the operation of a throttle valve, 1, which is of the usual hollow double puppet type, and is adapted to seat at the top of a vertical throttle pipe, 2, which is supported in the dome, 3^a, of a locomotive boiler, 3, and communicates, at its bottom, with the dry pipe or main steam supply pipe, 4, the throttle valve controlling, as usual, communication between the steam space within the boiler and dome and the interior of the

throttle pipe and dry pipe. The throttle valve, 1, is fixed upon a throttle stem, 1^a, which extends downwardly through a passage cored centrally in the throttle pipe, 2, and is coupled, at its lower end, by a pin, 1^b, to a lever, 5. The end of said lever which is nearer the axial line of the dome, is pivotally connected to a lug, 2^b, on the lower end of the throttle pipe, 2, and its opposite end is coupled, by a pin, 5^a, to the lower end of a vertical link, 6. A horizontal oscillatory throttle shaft, 7, is journaled in a support secured to the outside of the dome, 3^a, and extends inside thereof, leakage of steam being prevented by a suitable stuffing box on the support. The throttle shaft, 7, carries, on its inner end, an arm, 7^a, to which the upper end of the link, 6, is coupled, and carries, on its outer end, an arm, 7^b, which is coupled to a rod, 9, extending rearwardly, on the outside of the boiler, to the cab of the locomotive.

The specific throttle valve construction selected for exemplification and thus far described, which has heretofore been applied in practical railroad service, is set forth in Letters Patent of the United States No. 1,140,091, granted and issued to William E. Woodard, under date of May 18, 1915, and is not claimed as of my invention.

In the practice of my invention, I provide a fluid pressure operating motor, which is supported within the cab of the locomotive, adjacent to the rear end of the boiler, and is preferably, as indicated, actuated by compressed air supplied from the main air reservoir, 10, of the brake apparatus of the locomotive, although steam from the boiler may, if preferred, be employed as the motive fluid. As shown in Figs. 2 to 5 inclusive, the operating motor comprises a cylinder, 11, and a cylinder, 12, of relatively larger bore and shorter length, which cylinders are formed integral with a bed plate, 13, and project, in line axially, from opposite ends thereof. The cylinder, 11, is fitted with a properly packed piston, 11^a, which is secured upon the rear end of a piston rod, 14, which passes through a stuffing box, 11^b, on the inner end of the cylinder, and into and through the cylinder, 12, and is coupled at its forward end, by a jaw or clevis, 14^a, to the rear end of the throttle rod, 9. The cylinder, 12, is fitted with a piston, 12^a, which has a limited longitudinal movement

within the cylinder, its rearward or inward traverse being arrested by a stop or abutment, 12^b, at the inner end of the cylinder, which is open to the atmosphere, and its outer end is closed by a removable head, 12^c, having a stuffing box, 12^a, through which the piston rod, 14, passes. An opening, 12^a, is formed in the periphery of the piston, for the admission of motive fluid from a pipe, 15^a, to its side farther from the cylinder, 11, said opening being so located as to cut off the fluid supply before the piston comes in contact with the abutment, 12^b. The traverse of the piston may be limited by a pin, 12ⁱ, engaging the cylinder and entering a longitudinal slot in the piston. The outer end of the cylinder, 11, is closed by a removable head, 11^c, and fluid pressure supply and exhaust pipes, 15, 15^a, lead from the opposite ends of the cylinder to the casing, 18^a, of a controlling valve, to be presently described. Said casing is also connected with the cylinder, 12, by a branch of the fluid pressure supply and exhaust pipe, 15^a.

The piston rod, 14, passes, with a sliding fit, through the piston, 12^a, of the cylinder, 12, and a collar, 14^b, is formed on the piston rod, against which collar the inner side of the piston abuts, during the traverse of the latter in either direction. The piston rod is thereby permitted a further traverse to the left, after the movement of the piston, 12^a, has been arrested, and, in its movement to the right, after the collar, 14^b, has been brought into contact with the piston, it moves the latter with it in its further traverse. An emergency throttle lever, 17, which is provided for the purpose of enabling the throttle valve to be manually operated, in the event of derangement of the motor, is coupled by a pin, 17^a, to the bed plate, 13, and is slotted to fit around the piston rod, 14, to which it is coupled by a pin, 17^b.

The supply and exhaust of motive fluid to and from the cylinders, 11 and 12, is effected, as from time to time desired, in the operation of the throttle valve, by a manually operated controlling valve, 18, which, in the instance shown, is of the plug cock type, and is fitted in a casing, 18^a, suitably supported in the cab of the locomotive within convenient reach of the engineer. The valve, 18, is held to its seat by a spring, 18^b, which is secured in position by a screw cap, 18^c, and is vibratable about its axis by a hand lever, 19, having a latch, 19^a, fitted to engage notches in the adjacent end of the casing, 18^a. The valve is provided with radial ports, 18^d, 18^e, 18^f and 18^g, and with peripheral recesses, 18^h, 18ⁱ, and 18^k, as clearly shown in Fig. 7. The operating handle, 19, is fixed on a short shaft, 19^a, which is journaled in the adjacent end of the casing, and is provided with a rectangular extension, 19^b, fitting in a corre-

sponding end recess in the valve. A flange, 19^c, on the shaft, is forced against a packing ring, 20, bearing on the end of the casing, by a spring, 20^a.

The valve casing is connected by a pipe, 21, with a suitable source of fluid pressure supply, which, in this instance, is the main air reservoir, 10, of the brake mechanism of the locomotive, and is also connected, by a pipe, 15, with the outer end of the cylinder, 11; by a pipe, 15^a, with the inner end of said cylinder and with the cylinder, 12; and by a pipe, 22, with a locking cylinder, 23. The casing is also provided with an exhaust port, 18^m, which is controlled by the valve, 18. The locking cylinder, 23, is fixed on one side of the cylinder, 11, and is fitted with a piston, 24, which is moved downwardly by fluid under pressure admitted through the pipe, 22, and upwardly by a spring, 24^a. The piston, 24, carries, on its lower side, a toothed latch, 25, adapted to engage a plurality of teeth formed on a locking bar, 26, which is coupled to the piston rod, 14, of the motor cylinders, 11 and 12, by the pin, 17^b.

A transverse shaft, 27, journaled above the cylinder, 11, carries, on one of its ends, a spur pinion 27^a, and, on the other, a bevel pinion, 27^b. The pinion, 27^a, engages the teeth of the locking bar, 26, and the pinion, 27^b, engages a corresponding pinion, 28^a, fixed on one end of an indicator shaft, 28, which is journaled in an indicating dial, 29, bolted to the top of the cylinder, 11. The bearings of the shaft, 27, are also formed integral with the dial, 29. The end of the indicator shaft farther from the pinion, 28^a, carries a pointer, 28^b, which is swung over the face of the dial by the movements of the locking bar in either direction, as transmitted to the indicator shaft through the train of gearing above described. The pointer is so located, relatively to the dial, as to stand at zero when the throttle valve is closed, and its movement, in correspondence with that of the throttle valve, indicates, at all times, the lift or distance of the latter from its seat.

In the operation of a throttle valve operating appliance embodying my invention, it being desired to open or unseat the throttle valve, the handle, 19, of the controlling valve, is moved by the engineer into its extreme backward position, thereby partially rotating the valve, 18, and bringing the port, 18^f, into communication with the pipe, 15^a. This movement of the valve also cuts the port, 18^e, out of communication with the pipe, 22, thereby releasing pressure from the piston of the locking cylinder, 23, by opening communication between its outer side and the exhaust port, 18^m, and permitting the spring, 24^a, to force the piston upwardly and release the latch, 25, from its normal engagement with the locking bar, 26. This

latter action is completed before the port, 18', registers with the pipe, 15'. Motive fluid then flows through the ports, 18' and 18", and pipe, 15', to the outer side of the motor piston, 12', and the inner side of the motor piston, 11', thereby unseating the throttle valve, 1, by the resultant movement of the pistons to the left, through the rod, 9, and its connections.

10 In opening a throttle valve, it is necessary to exert a relatively greater force to start or "crack" the valve than is required to move it through the remaining portion of its traverse away from its seat. To this
15 end, the piston, 12', is made of relatively larger area than the piston, 11', but the former is of shorter traverse. The combined area of both pistons is effective for cracking open the valve, but the traverse of the piston, 12', being limited by the abutment, 12'', said piston becomes inactive after
20 the termination of its traverse, and the remainder of the opening movement of the throttle valve is effected by the unaided action of the smaller piston, 11'. In order to prevent violent contact of the piston, 12', with the abutment, 12'', the opening, 12', in the piston is so located that the motive fluid is cut off before the piston reaches the
25 limit of its traverse. When the throttle valve has been opened to the extent desired, the engineer moves the operating handle, 19, to the central position, thereby cutting off the supply of motive fluid to the pistons, 11' and 12', and releasing it through the exhaust port, 18'. The ports, 18' and 18'', are coincidentally brought into communication with the fluid pressure supply pipe, 21, and the pipe, 22, leading to the locking cylinder, 23, the piston, 24, of which is
30 thereby forced downwardly, engaging the latch, 25, with the locking bar, 26, and holding the throttle valve in the position to which it has been moved.

35 In order to close the throttle valve, the operating handle, 19, is moved to the full forward position, by which movement, the pressure of motive fluid on the piston of the locking cylinder, 23, is first cut off, as above described, and the ports, 18' and 18'', are thereafter brought into communication with the pipe, 15. Fluid pressure is thereby applied to the outer side of the piston, 11', by the movement of which, to the right, the
40 throttle valve is wholly or partially closed, as desired, upon which the operating handle is moved to the middle position and the throttle valve is locked by the piston of the locking cylinder.

I claim as my invention and desire to secure by Letters Patent:

1. The combination of a throttle valve; a steam supply pipe governed thereby; a fluid pressure motor; connections through which the throttle valve is moved to and from its seat in and by the operation of the motor; a manually operable controlling valve governing the supply and exhaust of fluid to and from the motor; and means for locking the throttle valve in any and all determined positions within its range of traverse.

2. The combination of a throttle valve; a steam supply pipe governed thereby; a fluid pressure motor; connections through which the throttle valve is moved to and from its seat in and by the operation of the motor; a manually operable controlling valve governing the supply and exhaust of fluid to and from the motor; and means, governed by the movements of the controlling valve, for locking the throttle valve in any and all determined positions within its range of traverse.

3. The combination of a throttle valve; a steam supply pipe governed thereby; a fluid pressure motor; connections through which the throttle valve is moved to and from its seat in and by the operation of the motor; a manually operated controlling valve governing the supply and exhaust of fluid to and from the motor; means for locking the throttle valve in any and all determined positions within its range of traverse; an indicating dial; a pointer journaled thereon; and gearing, actuated by the movements of the motor, for moving said pointer to indicate the position of the throttle valve relatively to its seat.

4. The combination of a throttle valve; a steam supply pipe governed thereby; a fluid pressure motor comprising two cylinders of different diameters; a piston fitting the smaller cylinder; a piston rod on which said piston is secured; a piston fitting the larger cylinder and fitting freely on the piston rod, said piston engaging the piston rod during a limited portion only of the traverse of the smaller piston; connections coupling the piston rod to the throttle valve; and a manually operable controlling valve governing the supply and exhaust of fluid under pressure to and from both of said pistons.

HARRY S. VINCENT.

Witnesses:

J. SNOWDEN BELL,
EDWARD A. WRIGHT.