No. 696,905. Patented Apr. 1, 1902.

W. S. JOHNSON.

APPARATUS FOR APPLYING FLUID PRESSURE.

(Application filed Aug. 9, 1900.)

(No Model.) 2 Sheets—Sheet 1.

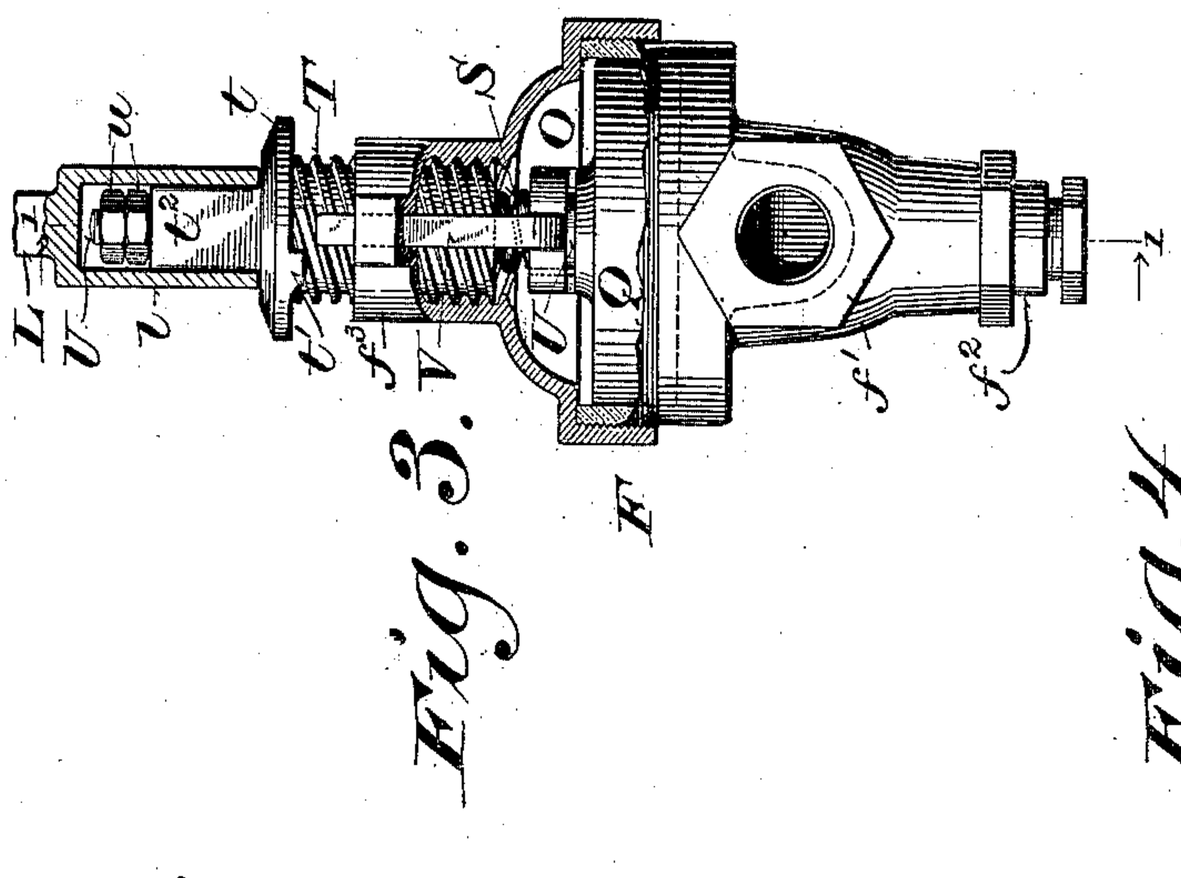

Fig. 3.

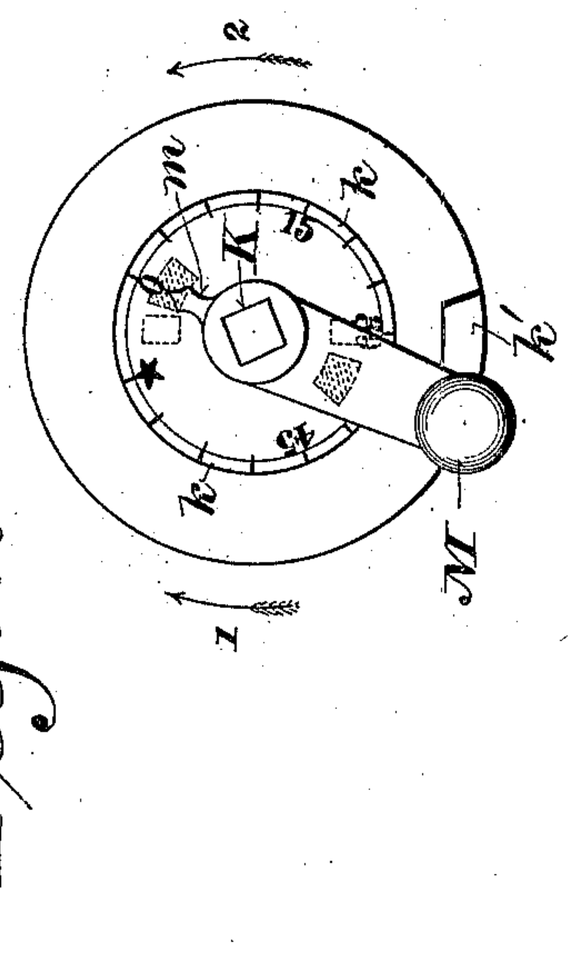

Fig. 4.

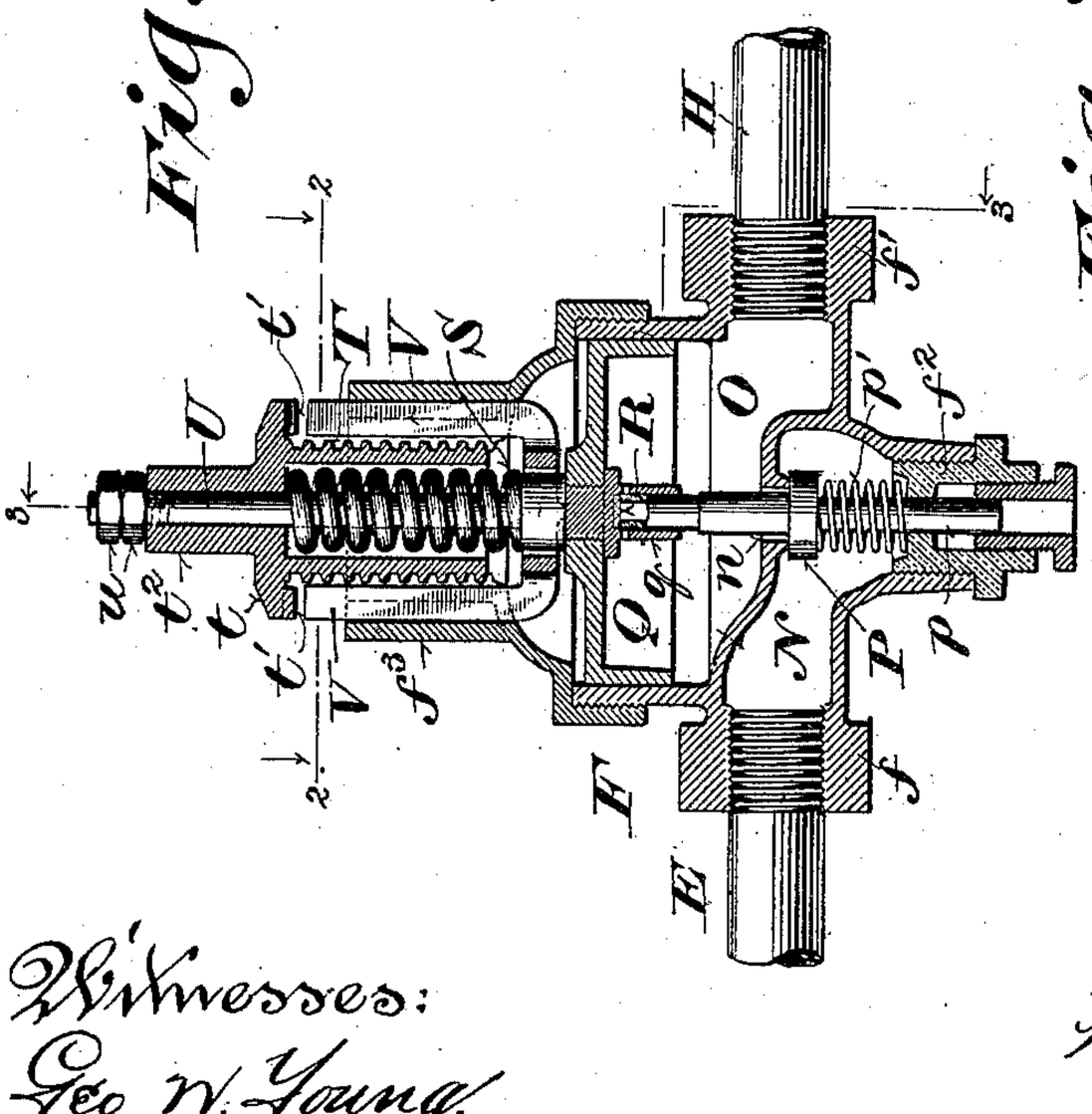

Fig. 1.

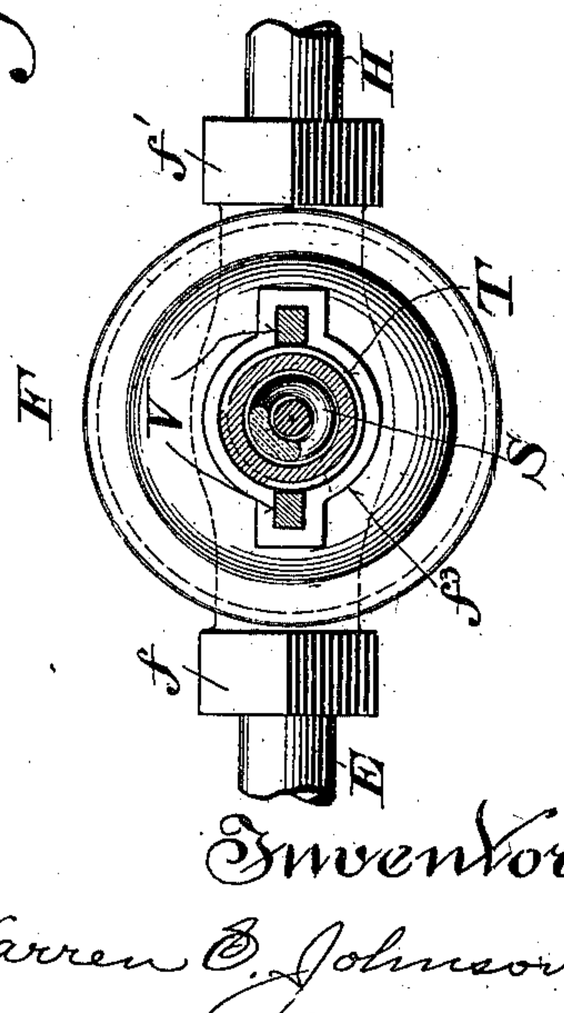

Fig. 2.

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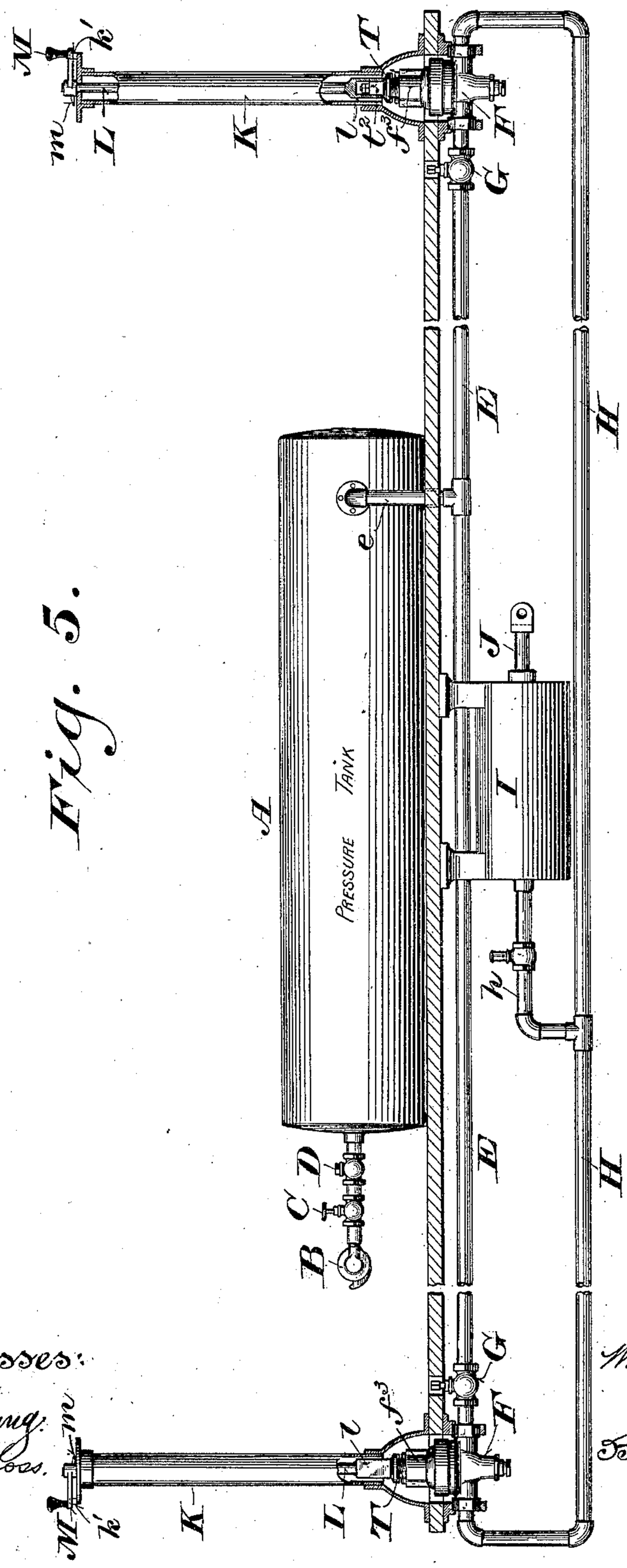
Fig. 5.



Witnesses:
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UNITED STATES PATENT OFFICE.

WARREN S. JOHNSON, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO JOHNSON ELECTRIC SERVICE COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

APPARATUS FOR APPLYING FLUID-PRESSURE.

SPECIFICATION forming part of Letters Patent No. 696,905, dated April 1, 1902.

Application filed August 9, 1900. Serial No. 26,349. (No model.)

To all whom it may concern:

Be it known that I, WARREN S. JOHNSON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Apparatus for Applying Fluid-Pressure, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The main object of my invention is to determinately apply fluid-pressure in varying degrees to the performance of various kinds of work.

It consists in the novel construction and arrangement of parts hereinafter described, and pointed out in the claims, for the accomplishment of the above-stated object.

While the invention may be applied to various uses, and I do not wish to be understood as limiting myself to any of such various uses to the exclusion of others, for the purpose of illustration the invention is shown and particularly described as embodied in air-brake apparatus for railway-cars.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a vertical longitudinal section on the line 1 1, Fig. 3, of one form of fluid-pressure-controlling mechanism embodying my invention. Fig. 2 is a plan view and horizontal section on the line 2 2, Fig. 1. Fig. 3 is an end elevation and vertical cross-section on the broken line 3 3, Fig. 1. Fig. 4 is a plan view of the operating-handle, index, and scale for applying the fluid-pressure by predetermined degrees; and Fig. 5 is a general view in side elevation, on a reduced scale, of the pressure-controlling mechanism as applied to air-brake apparatus on a railway-car.

Referring to Fig. 5, which shows the apparatus embodying my invention as constructed for and applied to air-brake apparatus on railway-cars, A is a tank or reservoir for holding compressed air. B is a pipe or hose coupling, C a cut-off valve, and D an inwardly-opening check-valve for connecting said tank with an air-compressor, a tank on another car, or other source of compressed-air supply. E is the supply-pipe, arranged lengthwise of the car underneath the floor and connecting said tank, through a branch *e*, with the pressure-controlling device F at each end of the car. It is provided adjacent to said controlling device with cut-off valves G, the stems of which are accessible through openings in the platforms or floor of the car. H is the service-pipe, connecting said controlling devices through a branch *h* with the brake-cylinder I. The piston-rod J of the brake-cylinder is connected by the usual or any suitable means (not shown) with the brake-shoes. K is a tubular stand attached to the platform or floor of the car at each end thereof directly over the controlling device F, the operating stem or connection of which projects upwardly through or is accessible through an opening in the platform or floor. L is a valve-operating rod inclosed in said stand and provided at its upper end with a crank-handle M and at its lower end with a socket *l*, which engages with the squared operating-stem of the pressure-controlling device. The crank-handle is formed or provided with an index *m*, and the cap or cover of the stand K with a circular scale *k*, as shown in Fig. 4, for indicating the exact positions of the operating-handle M for different degrees of service-pressure. The cap of the stand is also provided with a stop *k'* for limiting the movement of the handle M in both directions at the proper points.

Referring to Figs. 1 to 3, inclusive, each controlling device F comprises a case having supply and service connections *f* and *f'* and divided by a partition into two chambers N and O; a supply-valve P, normally closing the port *n* in said partition and provided with a tubular stem *p*, which forms a waste-passage leading from the chamber O to the atmosphere; a piston or movable part Q, fitted in the upper part of the chamber O and provided with a pad or waste-valve R, which normally bears against the upper end of the stem *p* and closes the waste-passage; a spring S, acting on the upper side of the piston Q in opposition to the service-pressure in chamber O, and a screw T for varying the tension of said spring. The

tubular valve-stem p is guided at its upper end in a socket q, formed in or attached to the piston Q, and at its lower end in a stuffing-box f^2 in the lower side of the case in line with the port n. A spring p' tends to hold the valve P up against its seat and the upper end of the tubular stem p against the waste-valve R. The expansible chamber O is provided above the piston Q with a detachable cap or cover, which is formed with an internally-threaded sleeve or nut f^3. The screw T, which is externally threaded to engage with the nut f^3, is made hollow to receive the spring S and is formed at its upper end with a flange t, having inclines or cams t' on the under side, and with a squared stem t^2, which is fitted into the socket l in the lower end of the rod L, as shown in Figs. 3 and 5. The spring S is held in the hollow screw T, and its tension is adjusted by a bolt U, passing axially through said screw and its squared stem and threaded and provided with adjusting and jam nuts u at its upper end. The lower end of the spring bears against the head of said bolt, and its upper end bears against a shoulder in the screw T. The head of the bolt U bears centrally against the upper side of the piston Q. A U-shaped yoke V, having a collar which loosely surrounds the head of the bolt U and bears upon the upper side of the piston Q, is guided and vertically movable in grooves or recesses in opposite sides of the nut f^3. It projects at its upper end above said nut and terminates normally a short distance below the flange t on the screw T.

The operation of the pressure-controlling mechanism applied to air-brake apparatus, as hereinbefore described, is as follows: The tank A being charged or supplied with compressed air, the valve G at that end of the car from which the brakes are to be operated being opened, and the corresponding valve G at the other end of the car being closed, the brakes are applied with any desired degree of pressure by turning the handle M in the direction indicated by the arrow 1 on Fig. 4 till the index m points to the number or division on the scale k indicating the desired pressure. This movement of the handle turns the screw T into the nut f^3, opens the supply-valve P, and admits compressed air from the pipe E into the pipe H and brake-cylinder I. As soon as the pressure in the brake-cylinder I, service-pipe H, and expansible chamber O is equal to that indicated by the index m on the scale k it reacts on the piston Q, compresses the spring T, and allows the valve P to be closed by the spring p'. Further ingress of air from the supply-pipe E and reservoir to the service-pipe H and brake-cylinder is cut off, and the brakes are applied and held against the car-wheels with a pressure corresponding with the position of the operating-handle M and indicated on the scale k. The pressure will be increased in the brake-cylinder and the brakes applied with greater force in any desired degree by simply turning the handle M farther to the right in the direction indicated by the arrow 1 on Fig. 4, the degree of pressure in the brake-cylinder and the force with which the brakes are applied being determined by the position of the handle M, as indicated by the index m on the scale k. In case of emergency full reservoir-pressure may be admitted to the brake-cylinder and the brakes instantly applied with the greatest available force by turning the handle M to the extreme right. By this operation the inclines or cams t' on the flange t will be brought into engagement with the yoke V and will thus hold the piston Q depressed and the valve P open independently of the spring S, the said inclines or cams and the yoke V serving under these conditions as a clutch for rigidly connecting the piston Q and the screw T. To release the brakes, the handle M is turned to the left in the direction indicated by the arrow 2 on Fig. 4. This reduces the tension of the spring and allows the service-pressure to move the piston Q upward, and thus cause the waste-valve R to uncover the waste port or passage in the valve-stem p. When the pressure in the brake-cylinder and service-pipe H is reduced to that corresponding with the position into which the handle M is turned, as indicated by its index m on the scale k, the spring S, reacting on the piston Q, will cause the valve R to close the waste port or passage and the brakes will be held applied with any diminished degree of pressure corresponding with the position of the handle M and indicated on the scale k. When the handle is turned to the left against the stop k' into its initial or zero position, the head of the bolt U will be sufficiently elevated, with the screw T, to remove the pressure of the spring S from the piston Q, and thus allow air to escape from the brake-cylinder until the pressure therein is reduced to that of the atmosphere or nearly so. The brakes will thus be completely released.

It will be obvious from the illustration of the device in the drawings and from the foregoing explanation that the brakes may be gradually applied and released by predetermined degrees or that in case of emergency they may be instantly applied with all the pressure available and held so applied independently of the variable yielding resistance, which acts on the piston Q in opposition to the service-pressure to automatically close the supply and waste valves when the desired predetermined degrees of service-pressure are reached. It will also be obvious that by a single movement of the operating-handle any desired predetermined degree of pressure may be applied and maintained for any desired length of time.

Various modifications in the details of construction and arrangement of parts of the mechanism may be made in applying it to the various uses to which it is applicable without

affecting its principle or mode of operation and without departing from the spirit and intended scope of my invention.

I claim—

1. In apparatus for applying fluid-pressure the combination of an expansible chamber having supply, service and waste ports and a movable part exposed on one side to service-pressure, valve mechanism controlling the supply and waste ports and adapted to be operated by said movable part, a variable yielding resistance acting on said movable part in opposition to the service-pressure, means for varying said resistance by predetermined degrees and means for positively holding the valve mechanism in position to admit supply-pressure to the service-port independently of said yielding resistance, substantially as and for the purposes set forth.

2. In apparatus for applying fluid-pressure the combination of an expansible chamber having supply, service and waste ports and a movable part exposed on one side to service-pressure, valve mechanism controlling said supply and waste ports and adapted to be operated by said movable part, a spring acting on said movable part in opposition to the service-pressure, means for varying the tension of said spring by predetermined degrees, and means for positively shifting said movable part to open the supply-port independently of said spring, substantially as and for the purposes set forth.

3. In apparatus for applying fluid-pressure the combination of an expansible chamber having supply, service and waste ports and a movable part exposed on one side to service-pressure, valve mechanism controlling said supply and waste ports and adapted to be operated by said movable part, a spring acting on said movable part in opposition to the service-pressure, a screw for varying the tension of said spring, and a clutch for positively connecting said screw and movable part when the spring is compressed to a certain degree, substantially as and for the purposes set forth.

4. In apparatus for applying fluid-pressure the combination of an expansible chamber having supply and service ports and a movable part exposed on one side to service-pressure, a valve controlling said supply-port, having a waste-passage leading through it from said chamber to the atmosphere, a spring normally holding said valve against its seat, a variable yielding resistance acting in opposition to the service-pressure on said movable part which is constructed and arranged to open the supply-valve and to close the waste-passage through it, and means for manually varying said resistance by predetermined degrees, substantially as and for the purposes set forth.

5. In apparatus for applying fluid-pressure the combination of an expansible chamber having supply, service and waste ports and a movable part exposed on one side to service-pressure, valve mechanism controlling said supply and waste ports, and adapted to be operated by said movable part, a screw working in a fixed nut, and provided with a cam or incline, a spring interposed between said screw and movable part, and a part interposed between said movable part and the cam or incline on said screw and adapted, when said spring is compressed to a certain degree by said screw, to positively act on said movable part and valve mechanism independently of said spring, substantially as and for the purposes set forth.

6. In apparatus for applying fluid-pressure the combination of an expansible chamber having supply, service and waste ports and a movable part which is exposed on one side to service-pressure, valves controlling said supply and waste ports and adapted to be operated by said movable part, a hollow screw working in a fixed nut and provided with a cam or incline, a yoke guided in said nut and bearing at one end against said movable part and projecting at the other end into the path of said cam or incline, a bolt passing axially through and adjustably fastened in said screw and passing through an opening in said yoke and bearing at one end against said movable part, a spring held on said bolt in said screw and bearing at one end against the screw and at the other end against an abutment on the bolt, and a crank for turning said screw, substantially as and for the purposes set forth.

7. In apparatus for applying fluid-pressure the combination with a source of fluid-pressure and a fluid-pressure motor, of a controlling device comprising an expansible chamber having a waste-port and supply and service ports connected with said source of pressure and with said motor, respectively, valves normally closing said supply and waste ports, a movable part exposed on one side to service-pressure and adapted to open either valve when the other valve is closed, a spring adapted to act on said movable part in opposition to the service-pressure, a screw acting on said spring, means for manually turning said screw and varying the pressure of said spring on said movable part, and means operated by said screw for positively opening the supply-valve and holding it open when said spring is compressed to a certain degree, substantially as and for the purposes set forth.

8. In apparatus for applying fluid-pressure the combination with a source of fluid-pressure and a fluid-pressure motor, of a controlling device comprising an expansible chamber having a waste-port and supply and service ports connected with said source of pressure and with said motor, respectively, valves normally closing said supply and waste ports, a movable part exposed on one side to service-pressure and adapted to open either valve when the other valve is closed, a spring adapted to act on said movable part in opposition

to the service-pressure, a screw acting on said spring and provided with a cam or incline, a handle for turning said screw and compressing said spring to predetermined degrees, means for permanently adjusting the tension of said spring independently of said handle, and a part actuated by said cam or incline for positively opening and holding open the supply-valve independently of said spring when said handle is moved to its limit in one direction, substantially as and for the purposes set forth.

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

WARREN S. JOHNSON.

Witnesses:

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CHAS. L. GOSS.