W. V. TURNER.

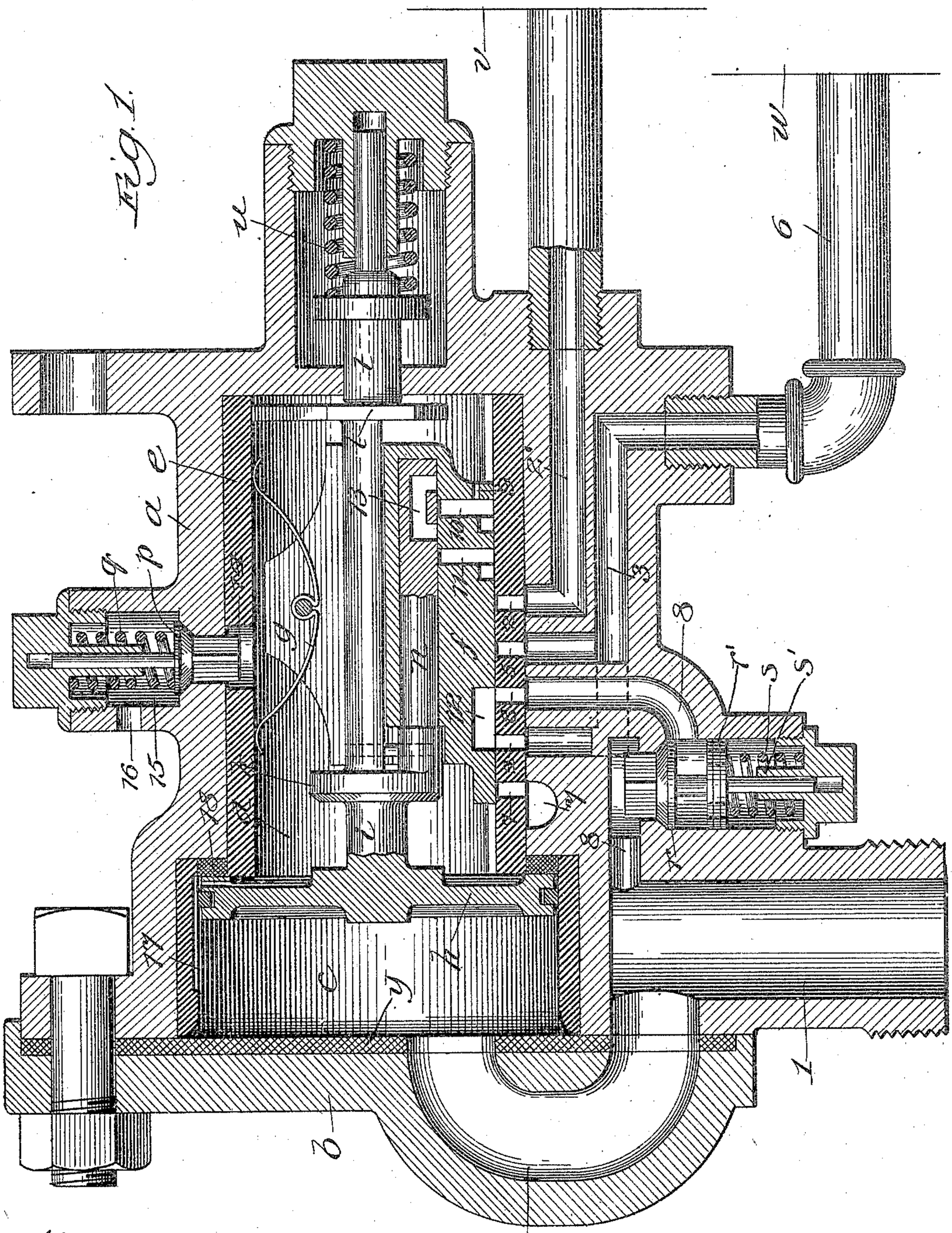
COMBINED AUTOMATIC AND STRAIGHT AIR BRAKE.

APPLICATION FILED JULY 6, 1903. RENEWED JUNE 25, 1906.

950,736. Patented Mar. 1, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



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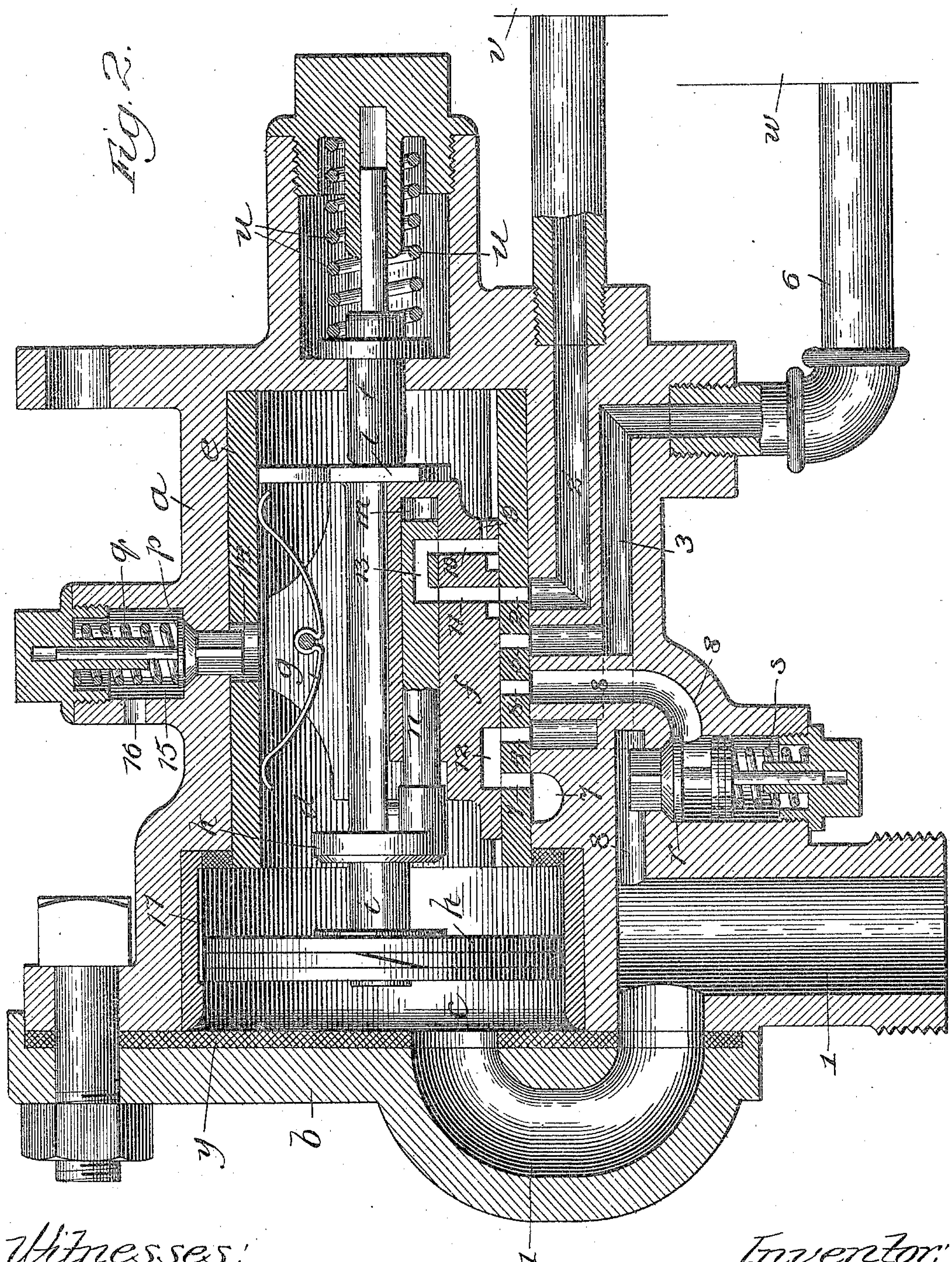
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

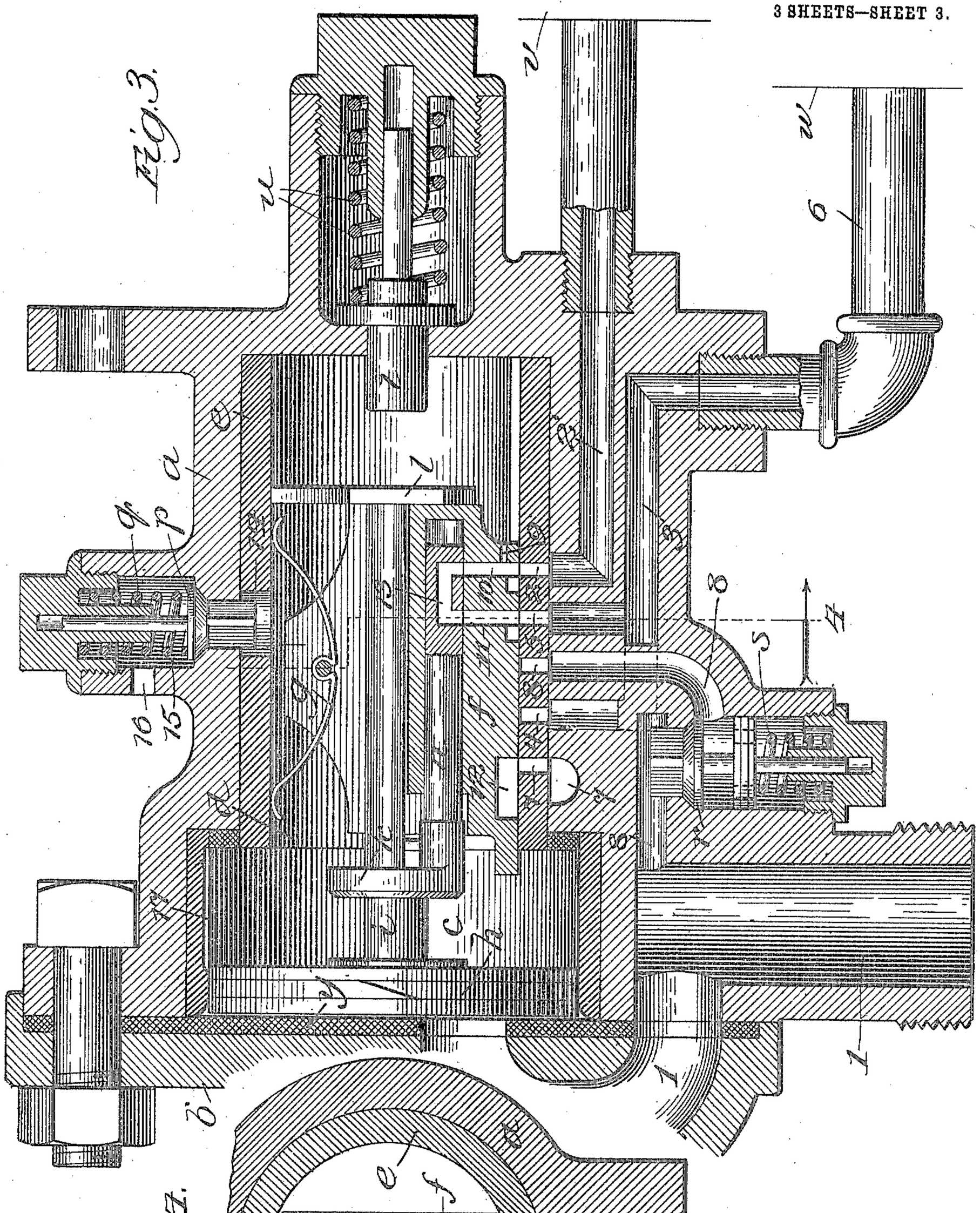
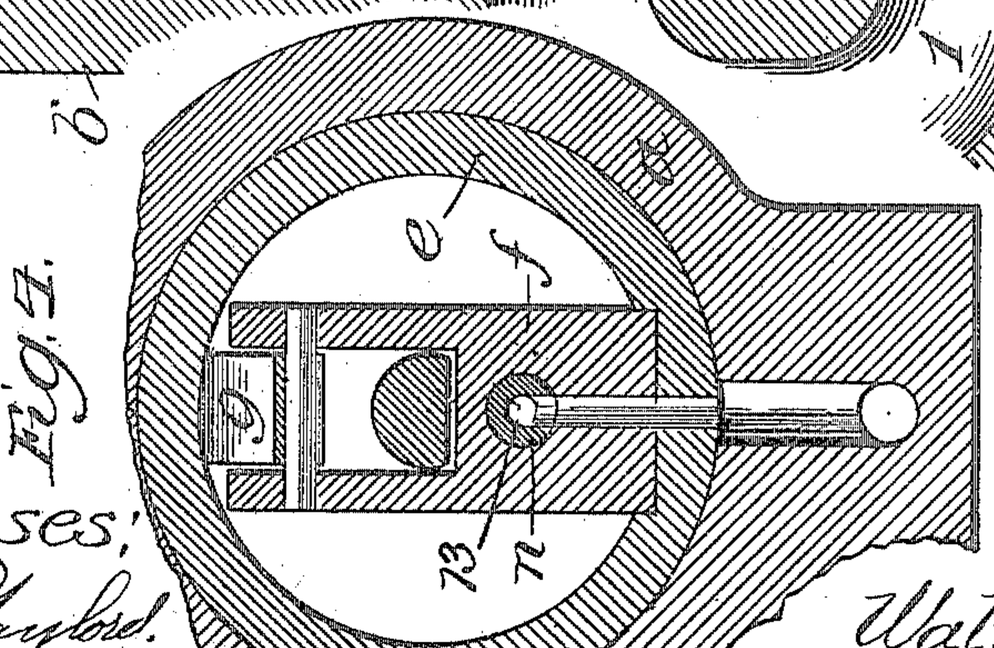


Fig. 4.



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UNITED STATES PATENT OFFICE.

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COMBINED AUTOMATIC AND STRAIGHT AIR BRAKE.

950,736. Specification of Letters Patent. Patented Mar. 1, 1910.

Application filed July 6, 1903, Serial No. 164,337. Renewed June 25, 1906. Serial No. 323,341.

To all whom it may concern:

Be it known that I, WALTER V. TURNER, a citizen of the United States, residing at Wilmerding, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Combined Automatic and Straight Air Brakes, of which the following is a specification.

This invention relates to fluid pressure brakes, and particularly to a combined automatic and straight air brake apparatus.

The principal object of my invention is to provide an improved apparatus of this character adapted to be governed by variations in fluid pressure through a single train pipe.

My invention, broadly considered, comprises a piston, subject to variations in train pipe pressure and valve means operated thereby for supplying air to the brake cylinder from the train pipe, in one position, on an increase in train pipe pressure above a predetermined normal degree of pressure, and for supplying air to the brake cylinder from the auxiliary reservoir in another position, on a reduction in train pipe pressure below said normal degree of pressure, and for establishing communication between an exhaust port and the brake cylinder in another intermediate position, and supplying air from the train pipe to the auxiliary reservoir.

In the accompanying drawings; Figure 1 is a central sectional view of a preferred construction embodying my invention, with the parts in straight air application position; Fig. 2 a similar view, showing the parts in full released position; Fig. 3 a similar view, with the parts in automatic air application position, and Fig. 4 a cross section on line 4 of Fig. 3, looking in the direction of the arrow.

In its preferred form, my invention comprises a casing *a*, having a valve chamber *d*, containing a main slide valve *f*, and a piston chamber *c*, containing an actuating piston *h*. The piston *h* also operates a graduating or auxiliary valve *n*, having a movement relative to the main slide valve *f*, and is subject on its outer face to fluid at train pipe pressure by way of the pipe 1.

The brake release position of the piston *h* and main slide valve *f* is shown in Fig. 2, and is intermediate the straight air and automatic application positions. A spring device *t* actuated by a spring *u* resists the inward movement of said valves and piston. In this position of the parts, the brake cylinder *w* is connected through pipe 6, passage 3, port 4, in the main slide valve seat, and cavity 12 in the main slide valve *f* with exhaust port 7. If the train pipe is supplied with fluid under pressure, it flows through feed groove 17 around piston *h* to valve chamber *d* and thence through a passage 9 and passage 10 in the main slide valve *f*, cavity 13 in the graduating valve *n*, passage 11, port and passage 2 to pipe 2′ and the auxiliary reservoir *v*, charging the auxiliary reservoir and the valve chamber *d* to train pipe pressure.

In order to effect an application of the brakes by straight air, the train pipe pressure is increased above the normal, which may be assumed at 50 pounds for the sake of illustration, the piston *h* is thereby moved inwardly, compressing the spring *v* and on its preliminary movement shifts the graduating valve *n*, closing communication through the passages 10 and 11 and thereby cutting off communication between the valve chamber and auxiliary reservoir, further movement of the piston *h* shifts the main slide valve *f*, and the parts assume the extreme inner position, as shown in Fig. 1. In this position, a passage 8 open to the train pipe 1 and leading to the main slide valve seat, is connected by cavity 12 with port 4, leading to passage 3 and the brake cylinder. Fluid from the train pipe then flows to the brake cylinder, but in order to prevent the full train pipe pressure from flowing to the brake cylinder, a pressure reducing valve is interposed in the passage 8. This valve may be of any desired construction, and as one form, I have shown a valve *r*, subject to the pressure of a spring *s*, the tension of the spring being preferably adjusted to the desired normal degree of pressure in the train pipe, so that any increase in train pipe pressure above that degree will open the valve and admit fluid to the brake cylinder, until the fluid pressure in the brake cylinder substantially equals the difference between the spring pressure and train pipe pressure, then the valve closes. Successive increases in brake cylinder pressure may be made, as will be readily understood, by gradually increasing the train pipe

pressure. The stem of the valve r may be provided, if desired, with a guide r', having openings therethrough for the free passage of air.

In order to prevent the pressure in the valve chamber d from exceeding the normal train pipe pressure, by reason of the increase in train pipe pressure, thereby tending to effect the release of the brakes, when not desired, a relief valve p, subject to a spring q, may be provided, for controlling the release of fluid from the valve chamber d through a passage 14, to an exhaust port 15. The spring may be adjusted to a pressure slightly above the normal train pipe pressure, say, for example, 52 or 53 pounds.

The brakes may be released after a straight air application, by reducing the train pipe pressure to substantially normal pressure, so that the fluid pressure on the piston h being balanced, the spring u shifts the piston and with it the graduating valve n until the cavity 13 registers with passages 10 and 11, then the main valve f moves, and the parts assume the release position, as shown in Fig. 2, in which the brake cylinder is open to the exhaust port 7 and the auxiliary reservoir is open through the passage 9 to the valve chamber and train pipe, and is recharged.

In order to effect an automatic application of the brakes, the train pipe pressure is reduced below the normal pressure, and thereupon the higher pressure in the valve chamber d moves the piston h outwardly and with it the main and graduating valves. In this position, as shown in Fig. 3, the auxiliary reservoir passage 2 is connected through passage 10, cavity 13 in the graduating valve, passage 11 and port 5 with passage 3 leading to the brake cylinder, so that fluid from the auxiliary reservoir flows to the brake cylinder. When the pressure in the auxiliary reservoir and valve chamber has fallen to a point slightly less than the train pipe pressure, the piston h moves inwardly and shifts the graduating valve n, closing the passages 10 and 11. The brake cylinder pressure may be increased further by gradual reductions in train pipe pressure, the operation being similar to that of the ordinary triple valve. The brakes may be released by increasing the train pipe pressure, and thereby moving the piston h inwardly. It will be noted that the inward movement of the piston h moves the graduating valve relative to the main valve, and thus closes the passages 10 and 11, but as the increase in train pipe pressure is sufficient to compress the spring u, the piston h moves beyond the release position, and on equalization of fluid pressures on the piston, it moves outwardly, again connecting passages 10 and 11 so that the parts finally assume the position shown in Fig. 2.

A sudden reduction in train pipe pressure, as caused by the train pulling apart, or by the engineer's brake valve, shifts the piston h to its extreme outer position, seating on the gasket y. Passages 10 and 11, through cavity 13, connect the auxiliary reservoir with the brake cylinder and the auxiliary reservoir pressure equalizes into the brake cylinder, producing an emergency application of the brakes.

It will be apparent that it is desirable to employ an engineer's brake valve of the type having means for producing definite predetermined pressures in the train pipe, and for maintaining such pressures substantially constant.

I claim:—

1. In a fluid pressure brake, the combination with a train pipe, auxiliary reservoir, and brake cylinder, of a valve device operated by variations in train pipe pressure for opening communication from the train pipe to the auxiliary reservoir in one position, from the train pipe to the brake cylinder in another position, and from the auxiliary reservoir to the brake cylinder in another position.

2. In a fluid pressure brake, the combination with a train pipe, auxiliary reservoir, and brake cylinder, of a piston operated by variations in train pipe pressure, a main slide valve actuated thereby and having ports for supplying air from the train pipe to the auxiliary reservoir in one position, and from the auxiliary reservoir to the brake cylinder in another position, and an auxiliary valve having a movement relative to said main valve for controlling said ports in the main valve.

3. In a fluid pressure brake, the combination with a train pipe, auxiliary reservoir, and brake cylinder, of a valve device operated at a predetermined degree of train pipe pressure to supply air from the train pipe to the auxiliary reservoir, and operated by an increase in train pipe pressure above said degree to supply air from the train pipe to the brake cylinder and by a reduction in train pipe pressure below said degree to supply air from the auxiliary reservoir to the brake cylinder.

4. In a combined automatic and straight air brake apparatus, the combination with a train pipe, auxiliary reservoir and brake cylinder of a valve device subject to the opposing pressures of the train pipe and the valve chamber, normally open to the auxiliary reservoir, for controlling the automatic and straight air applications of the brakes, and means operated by an increase in train pipe pressure for closing communication between the auxiliary reservoir and said valve chamber.

5. In a combined automatic and straight air brake apparatus, the combination with a train pipe, auxiliary reservoir, and brake

cylinder of a valve device subject to the opposing pressures of the train pipe and the valve chamber, normally open to the auxiliary reservoir, for controlling the automatic and straight air applications of the brakes, and means operated by an increase in train pipe pressure for closing communication between the auxiliary reservoir and said valve chamber and means for limiting the pressure in said chamber to a predetermined degree.

6. In a fluid pressure brake, the combination with a train pipe, auxiliary reservoir, and brake cylinder, of a valve means, and actuating piston therefor, subject to the opposing pressures of the train pipe and the valve chamber, and adapted at normal train pipe pressure to establish communication between the train pipe, valve chamber and auxiliary reservoir, and operated by an increase in train pipe pressure above normal to close communication between the valve chamber and auxiliary reservoir and admit fluid from the train pipe to the brake cylinder, and operated by a reduction in train pipe pressure below normal to close communication between the train pipe and valve chamber and admit fluid from the auxiliary reservoir to the brake cylinder.

7. In an air valve of the class described, the combination of a main valve body provided with ports and passages therein and therethrough connected with the train line pipe, auxiliary reservoir and brake cylinder, a slide valve therein arranged when in one position to connect the train line pipe with the auxiliary reservoir, in a second position to connect the train line pipe directly with the brake cylinder and in a third position to connect the auxiliary reservoir with the brake cylinder, and means for operating said slide valve by the variations of fluid pressure in the train line pipe, substantially as described.

8. In an air valve of the class described, the combination of a main valve body provided with a plurality of ports and passages therein and therethrough connected with the train line pipe, auxiliary reservoir, brake cylinder and an atmosphere exhaust, a slide valve movably mounted therein and arranged when in one position to connect the train line pipe indirectly with the auxiliary reservoir and the brake cylinder with the atmospheric exhaust in a second position to connect the train line pipe directly with the brake cylinder and in a third position to connect the auxiliary reservoir with the brake cylinder, and a main piston in such valve body operatively connected with said slide valve to operate the same by the variations of fluid pressure on each side of said piston, substantially as described.

9. In an air valve of the class described, the combination of a valve body provided with a plurality of passages therein and therethrough connected with the train line pipe auxiliary reservoir, brake cylinder and an atmospheric exhaust, a slide valve chamber and a main piston chamber, a slide valve in said chamber provided with ports and passages therein and therethrough arranged when said valve is in one position to connect the train line with the auxiliary reservoir and the brake cylinder with the atmospheric exhaust, when in a second position to disconnect the last named ports and passages and connect the brake cylinder directly with the train pipe and in a third position to connect the auxiliary reservoir and brake cylinders together, and a main piston operating in the piston chamber and subjected to the pressure of the train line on one side and to the pressure in the slide valve chamber on the other side so as to be operated by the variations of fluid pressure in the train line pipe, substantially as described.

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