

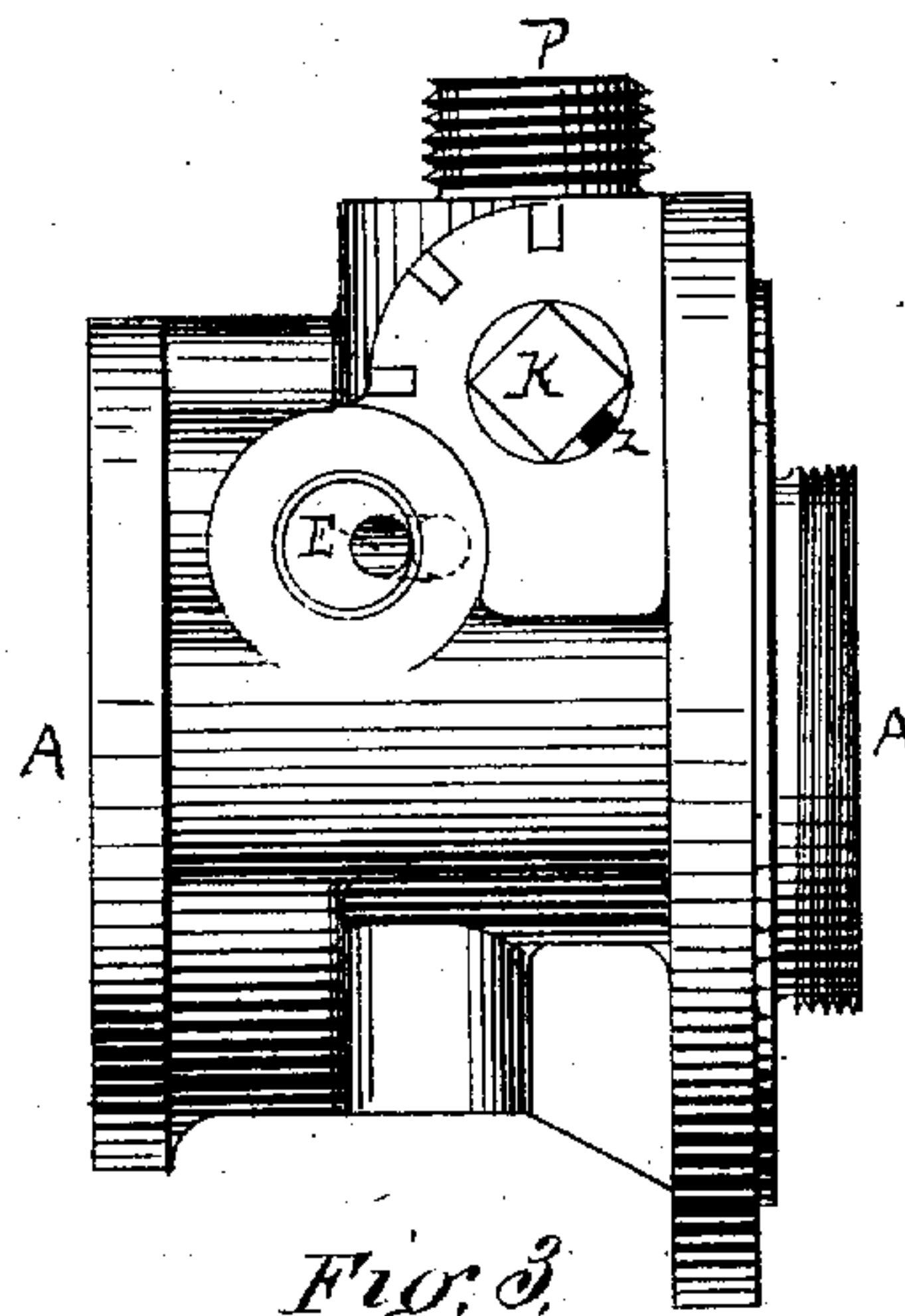
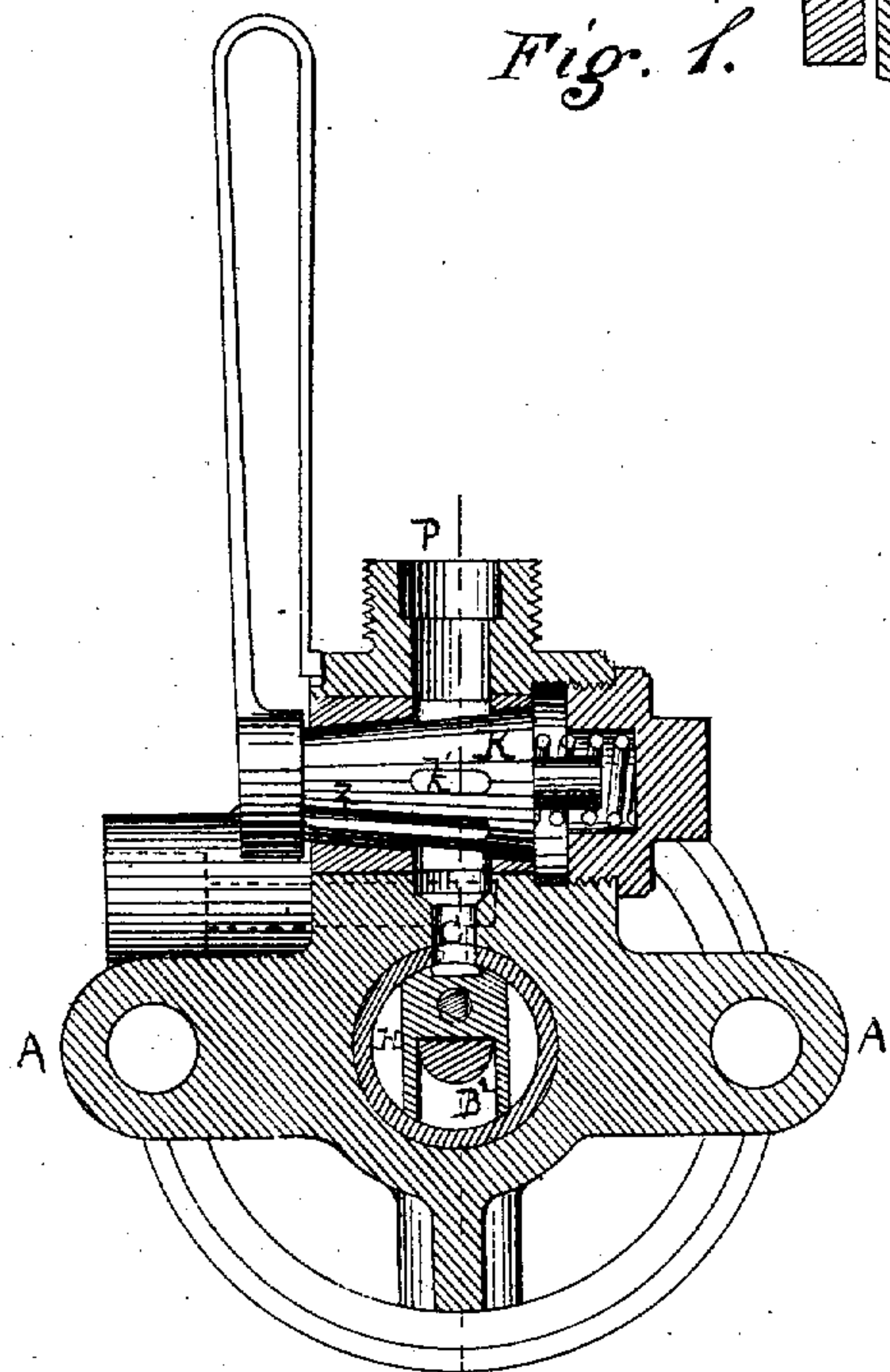
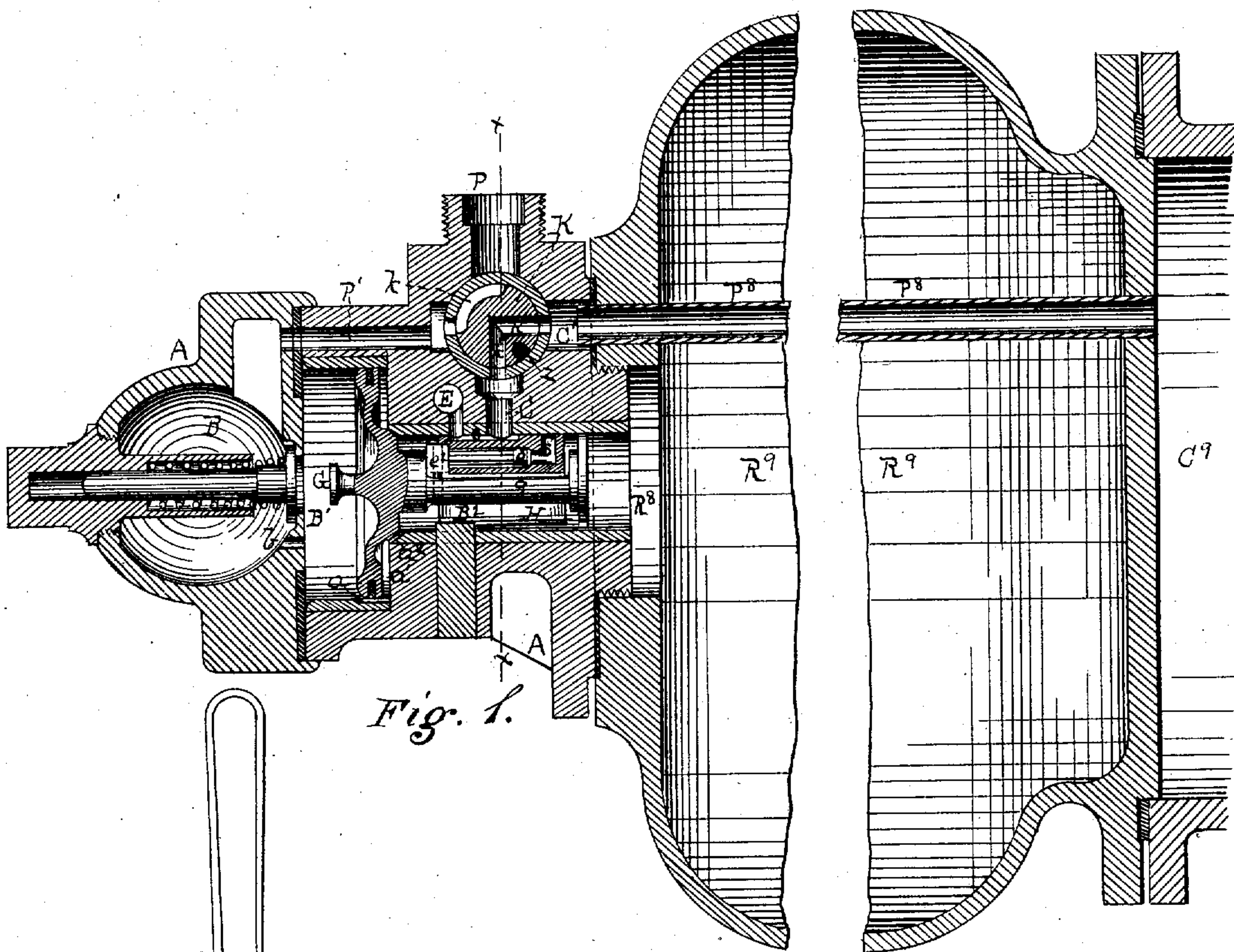
(No Model.)

2 Sheets—Sheet 1.

G. WESTINGHOUSE, Jr.
Air Brake Apparatus.

No. 243,415.

Patented June 28, 1881.



Witnesses
R. H. Whitley
C. L. Parker

Inventor George Westinghouse Jr.
By Attorney George H. Christy

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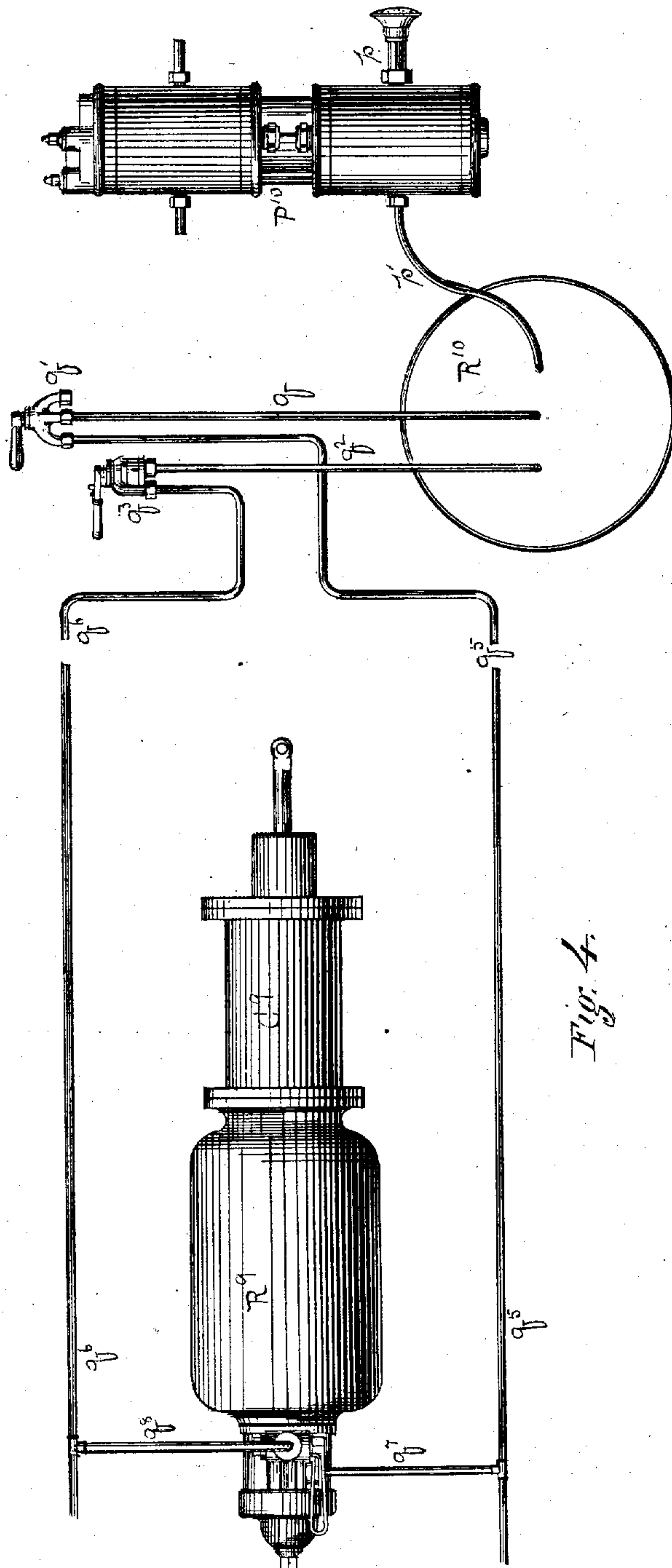


Fig. 4.

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UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

AIR-BRAKE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 243,415, dated June 28, 1881.

Application filed April 1, 1881. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, Jr., of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Air-Brake Apparatus; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, is a longitudinal sectional view of the "triple" or automatic valve employed in my present improvement, with its ports and connections, and also showing, in part, an auxiliary reservoir and valve-chamber. Fig. 2 is a transverse sectional view in the plane of the line *x x* of Fig. 1, looking to the left, and showing the cock, plug, or key *K* in elevation. Fig. 3 is a side elevation of the triple-valve case as looked at from the left of Fig. 2; and Fig. 4, Sheet 2, is a diagram view illustrative of the organization of a brake apparatus embodying the present improvements.

My present invention is more particularly directed to the construction and combination of apparatus whereby the two styles or systems of air-brake apparatus commonly known as the "Westinghouse compressed-air brake" and the "Westinghouse automatic brake" may be combined in use and operation at the same time on the same train.

While I do not limit myself to any particular train use of this combination, I have devised it with particular reference to train purposes, especially on roads which have long and heavy grades, and where a moderate but comparatively constant degree or amount of brake-power has to be applied for a considerable time; and I also provide an improved means for releasing and cutting off or out of action the automatic part of the apparatus in case, for any reason, it should get out of order when out on the line where repairs cannot be made.

Some of the features of construction of the present apparatus are shown in Patent No. 235,922, granted to me December 28, 1880. Here, as there, the brake-cylinder, the auxiliary reservoir, and the valve-case which contains the valve apparatus employed for giving proper direction to the flow of the fluid-pressure in the

automatic brake, are, by preference, included in what may be termed a "single structure," one of such structures being applied to each car as a part of the automatic appliances.

In the diagram, Fig. 4, I have shown in outline, but with sufficient clearness for the present purpose, an air-compressing pump, *P*¹⁰, a main reservoir, *R*¹⁰, the air inlet-pipe *p*, which supplies air to the pumping-cylinder, and the air-pipe *p'*, which leads to the main reservoir. From this main reservoir, usually arranged on the locomotive, two lines of brake-pipe extend back beneath the cars of the train. The one line, *q*, leads, by the ordinary three-way cock *q'*, to the brake-pipe *q*⁵, which pipe and cock may represent such as are used with the "Westinghouse compressed-air brake," so called, wherein the power is first stored up in the reservoir, and then by manipulation of the cock is allowed to flow back through the brake-pipes when, and only when, it is desired to apply the brakes. In the other line a pipe, *q*², leads to a cock, *q*³, such as is used or is adapted for use in working the Westinghouse automatic brake, and from this the brake-pipe *q*⁶ leads back beneath the cars, as before. This line may be called the "automatic line." The usual hose and couplings are to be added between cars, and in other respects (not herein specified) these appliances are to be fitted up in any of the ways known in the art.

The apparatus through which both lines of pipe, *q*⁵ and *q*⁶, are brought into conjoint use is illustrated in all the figures, but more fully in Fig. 1, where *R*⁹ represents the auxiliary reservoir, and *C*⁹ the brake-cylinder, a portion of each being broken away for convenience of illustration. The outer end of the reservoir *R*⁹ has a large open port, *R*⁸, and over this port is secured, by bolting or otherwise, the valve-case *A* of what is termed in the Westinghouse automatic brake a "triple valve." This triple-valve device has substantially the construction described in United States Patent No. 220,556, granted to me October 14, 1879, with more particular reference to Fig. 4 thereof, with the exception that the port there marked *C*, and here marked *C C'*, leads by pipe *P*³ directly through the auxiliary reservoir *R*⁹ to the brake-cylinder, here marked *C*⁹, though obviously it may pass around outside the auxiliary reservoir, if so preferred; also,

the escape-port there, as here, lettered E, instead of opening into the open air, opens into a branch, q^7 , Fig. 4, of the line of brake-pipe q^5 ; also, the cock K, in addition to the ports k k' , has an additional port, z , which opens to the external atmosphere, Figs. 2 and 3.

The construction and operation of devices not herein specifically described will be readily understood by reference to the patent last named, where similar devices have like lettering; but even this reference is unnecessary, as the devices in question are already in extensive public use, and, as such, constitute a part of the art already known to those skilled therein.

With the appliances in their usual or normal condition—that is, with the pipe q^5 free of more than atmospheric pressure, the cock q' closed, the cock q^3 open, so that the pipe q^6 , with its branch q^8 , and the auxiliary reservoirs R^9 charged with a working fluid-pressure, and the triple valve in the position shown in Fig. 1, the train will be in running order and the brakes will be off. Each auxiliary reservoir will receive its charge of compressed air from q^8 by the appropriate ports and passages P, k , P' , B, b , B' , a a' a^2 , B^2 and R^8 . If, now, the engineer wishes to apply the brakes, he shifts his automatic cock q^3 in the usual way, which will result in the lowering of the pressure in the brake-pipe q^6 and chamber B' , cause a back-stroke of the piston G, which will shift the valve H, cut off the port E, and open communication from R^9 , through C, k' , and C' and P', to the brake-cylinder C', so as to apply the brakes with more or less force, according to the amount of the reduction of air-pressure in the pipe q^6 .

Thus far the operation varies in no material respect from what is described in the patents above referred to; but it is of great importance in the running of heavy trains down very long and steep gradients that a uniform and easily regulated variable pressure be maintained in the brake-pipes and cylinders, which is sometimes somewhat difficult with the automatic apparatus alone.

By my present invention, instead of exhausting into the open air the fluid-pressure as it escapes from the brake-cylinder when the brakes are partially or wholly released by the "automatic" method of operation, I connect the escape-port E, by the branch q^7 , with the pipe q^5 , so that the escaping air shall go into and be confined in such pipe. Then, as the brakes are successively applied and released in the automatic operation, the fluid-pressure escaping from the brake-cylinder on each release will be charged into the brake-pipe q^5 , and will soon accumulate to, or nearly to, the degree of pressure which the engineer may desire to preserve in his brake-cylinder, and the pipe q^5 and the brake-cylinder being brought into communication on each release, the same degree of pressure, or nearly the same, will soon exist in both. In case such degree of pressure should accidentally or by miscalcula-

tion, or in consequence of a change in the speed of the train, or on account of a change of grade, or for other cause, become too great, such operative pressure may be reduced much or little by shifting the cock q' so as to lower the pressure in q^5 , and, of course, in the brake-cylinder.

Should operative pressure at any time, for any reason, be too little, it may be increased by working the automatic, as before, or by shifting the cock q' so as to turn on pressure from the main reservoir through the pipe q^5 . In this way, through two separate lines of connection, each of which may be brought into action independently of the other, the engineer possesses the most perfect control over his brakes, and through them over his train, on all variations of track, grade, or speed; and it is also a further advantage that while the automatic acts the more quickly, it is possible, by combining the two systems of operation, particularly with engineers unskilled in the accurate use of the automatic, to get more accurate adjustments of brake-power by using the compressed-air system by pipe q^5 , for effecting slight variations of pressure after the average or approximately the desired pressure has been attained with the automatic. Also, it has sometimes happened in unskilled hands, or in consequence of injury or imperfect care, that the automatic brake would not release on the restoration of the pressure in pipe q^6 . When this happens the cock K may be turned so as to bring the port z into communication with the port C', and thereby let the air escape from the brake-cylinder C', and so release the brakes. To this end the port z is made lengthwise of the cock, key, or plug, and at its outer end opens to the atmosphere.

I have described the invention as applied to a single set of car equipment; but the apparatus described is merely duplicated on the different cars of the train. It should be stated, however, that the hose-couplings between the cars on the pipe q^5 , by preference, have no valves to close their ports when a train pulls in two, and the rear coupling of the last car should be closed by a dummy, special cock, or otherwise.

I claim herein as my invention—

1. The method of combining a compressed-air system of brake apparatus and an automatic system by connecting the brake-pipe of the former with the exhaust-port of the latter, substantially as set forth.

2. A cock, K, having an exhaust-port, z , in combination with the brake-cylinder and exhaust-pipe of an automatic brake apparatus, substantially as set forth.

In testimony whereof I have hereunto set my hand.

GEORGE WESTINGHOUSE, JR.

Witnesses:

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C. S. PARKER.