(No Model.)

W. SCHMID.

BRAKE.

No. 516,122. Patented Mar. 6, 1894.

Fig. 3.

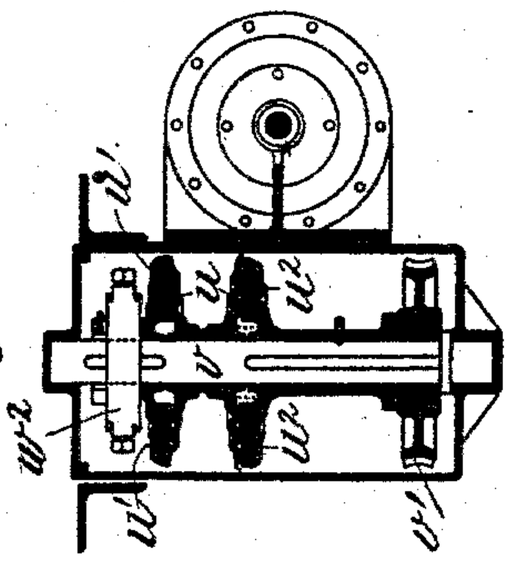


Fig. 4.

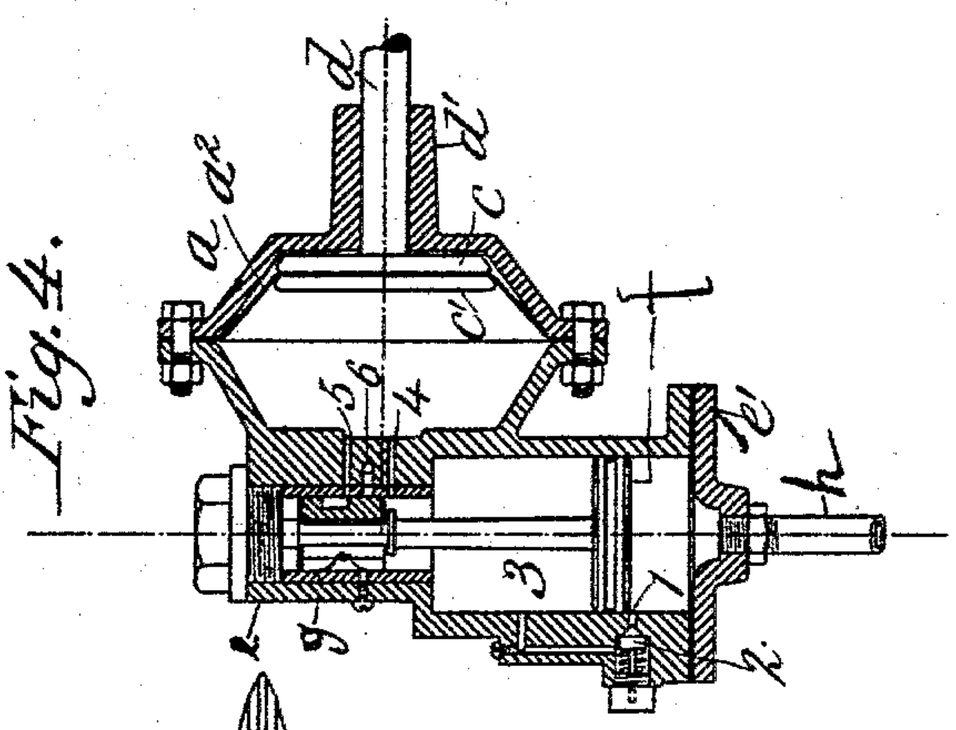


Fig. 1.

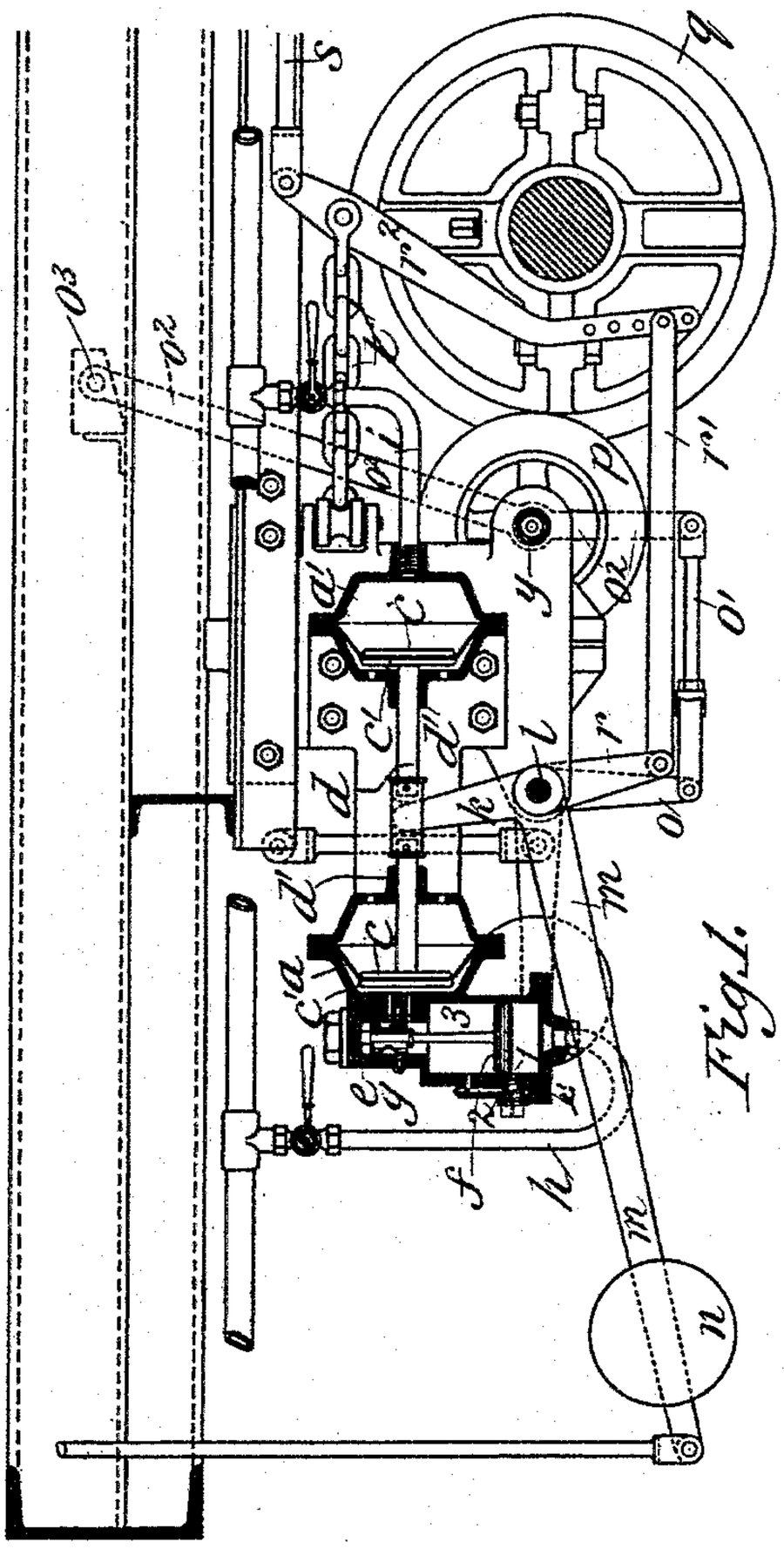
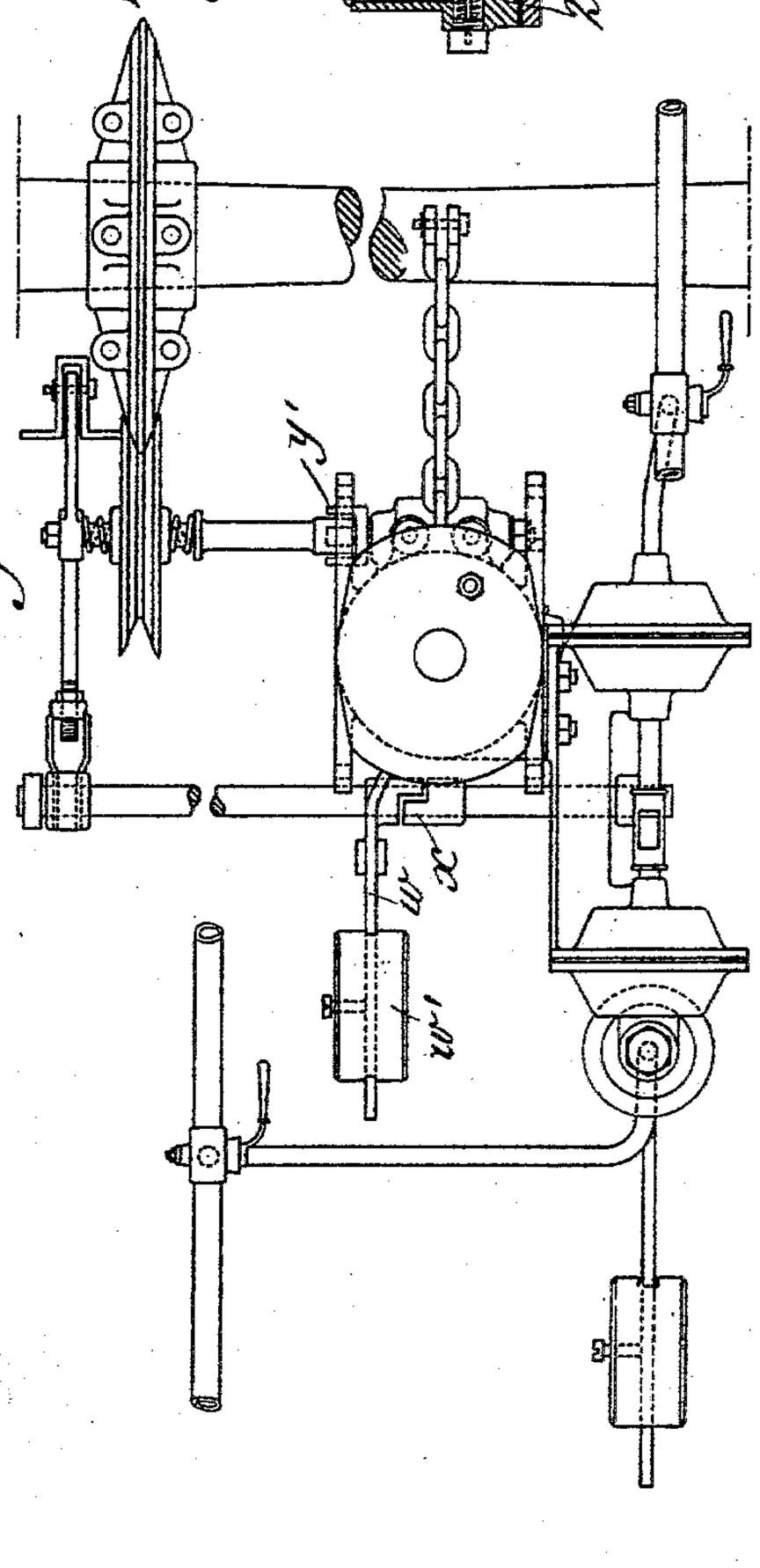


Fig. 2.



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BRAKE.

SPECIFICATION forming part of Letters Patent No. 516,122, dated March 6, 1894.

Application filed May 4, 1893. Serial No. 472,938. (No model.)

To all whom it may concern:

Be it known that I, WOLFGANG SCHMID, a subject of the King of Bavaria, residing at Munich, Bavaria, Germany, have invented certain new and useful Improvements in Brakes, of which the following is a specification.

This invention relates to brakes for railway cars and locomotives and is especially designed as an improvement in the railway-brake set forth and claimed in my Letters Patent of the United States, No. 408,756, dated August 13, 1889, although it may be applied to brakes of other descriptions.

The object of the said invention is to simplify the mechanism set forth in said patent and to substitute for the brake-rope or cord, the agency of compressed air or the suction of rarefied or exhausted air.

The railway-brake constructed under the said Patent No. 408,756 has hitherto been controlled by a brake-cord or rope, the said cord being wound upon a windlass, whereby all the brakes of the system were made inoperative, or unwound therefrom or loosened to operate the brakes. This mode of operation by means of a brake-cord was, however, only adapted for short trains, and the present invention, therefore, consists in providing the brake set forth in the above United States patent, and other mechanical brakes, such as gravity-brakes, buffer-brakes and the like, with a controlling mechanism actuated by pneumatic pressure through the agency of compressed air, or suction air, or both combined.

The said invention consists in such other features, means and combinations of parts as will be hereinafter described and pointed out in the claims.

In the accompanying drawings—Figure 1 represents a side elevation, partly in section, of so much of a brake mechanism as is necessary to illustrate the preferred embodiment of my invention; Fig. 2 a plan thereof; and Figs. 3 and 4 detail views to be hereinafter explained.

One of the principal features of my invention consists in two air-pots or receivers provided with diaphragm-pistons, in conjunction with an air-controlling device of novel construction, as more fully described hereinafter.

These air-pots, a and a', represented in longitudinal vertical section in Fig. 1, each consist of two conical or flaring sections connected by bolts or screws passing through the continuous peripheral flanges, as best shown in Fig. 4. A flexible or elastic diaphragm or membrane, a^2, of india-rubber, leather, or other air-tight material, is clamped between the two flanges of each air-pot, and upon opposite sides of each diaphragm are mounted two clamping disks, c and c', which are secured to a common piston-rod, d, which piston-rod is guided in the necks or thimbles, d', of the air-pots, a and a'. The two clamping disks are clamped together air-tight and it will thus be seen that a complete isolation of the two bodies of air on either side of the piston is secured, while, at the same time, all frictional resistance to the movement of the piston is avoided. When compressed air is employed as the brake-controlling agency, the air-pot, a, is employed. As soon as compressed air is admitted into the air-pot, a, on the left side of the piston, c, which is located to the left in Fig. 1, the said piston is forced to the right.

The air-pot, a, is provided with an air-controlling valve consisting of a casing, e, a piston, f, and a slide valve, g. To the bottom of the casing is attached an air-inlet pipe, h. The controlling-valve has the important office of permitting the complete escape of compressed air from the air-pot, a, as soon as the excess of pneumatic pressure in the air-pipe, h, and the main air-conduit of the entire train is diminished by as much as from one-fourth to one-half of an atmosphere. The purpose of this controlling valve is to enable brakes of the character set forth in Patent No. 408,756 to be applied to trains equipped with and used simultaneously with Westinghouse and other air-brakes, and the manner of controlling these brakes by the engineer is precisely the same for both.

Fig. 4 serves to more clearly illustrate the operation of the air-controlling valve. When compressed air is admitted through inlet, h, the piston, f, and the slide valve, g, are pushed forward to the position indicated in Figs. 1 and 4. This causes the air-duct, 1, to be opened, and the air enters this air-duct, having first opened the valve, 2, which is pressed

against the valve seat with a slight pressure. From the air-duct, the air enters the chamber, 3, and thence passes through air-duct, 4, to the air-pot, *a*, where the excess of pressure urges the piston, *c*, forward until it reaches the other end of the air-pot, in which position it is held by the excess of pressure, whereby the brake, preferably of the construction set forth in my aforesaid patent, No. 408,756, is held out of action. In order to set the brake into action, the pressure in the air-pipes must be reduced whereupon the valve, 2, closes immediately and the excess of pressure in chamber, 3, causes the piston, *f*, with the slide, *g*, to be forced backward until it bears against the lid, *e'*. This causes the slide, *g*, first to cover the duct, 4, whereupon the recess of the said slide registers with the two ducts 5 and 6. The compressed air hence escapes from the air-pot through the duct, 5, into the recess of the slide and thence through the duct, 6, provided with an outlet at right angles, into the open air. As soon as the excess of pressure has escaped from the air-pot, *a*, the piston, *c*, returns to its first position, whereby the brake is caused to act.

The operation when applying suction or exhaust air is as follows: The air-pot, *a'*, is connected with the suction-air pipe or exhaust pipe, *i*, which extends through the entire train to the locomotive. By an air-suction device or air exhaust on the locomotive, a vacuum is produced throughout this exhaust-pipe and in all the air-pots, *a'*, communicating therewith. The pistons, *c'*, are thereby drawn to the right and the brakes are kept from operating as long as the said pistons remain to the right. As soon, however, as the vacuum is destroyed, the piston recedes and the brake is allowed to act. The arrangement just described results in an automatic action of the vacuum. The vacuum may, however, be applied also to a non-automatic system. In the latter case, the brake must be held out of action by a weight and it is caused to operate when a vacuum is generated.

The compressed-air and exhaust-air arrangement are both simultaneously combined with the brake in the following manner: The common piston-rod, *d*, connecting pistons, *c* and *c'*, is provided at an intermediate point with an opening for the reception of one end of a lever, *k*, keyed or fastened on shaft, *l*, (see Figs. 1 and 2). Upon the same shaft is fastened the lever, *m*, provided with a counterweight, *n*, and also the lever, *o*, connected by connecting rod, *o'*, with the hanger or rocking arm, o^2, pivoted or journaled in the bearing, o^3. The rocking arm, o^2, carries the friction roller, *p*, and it serves to either cause the said friction roller to engage with the axle roller, *q*, or to hold it away from the said axle roller, thereby either causing the brake to act or to remain inactive. A farther lever, *r*, is fixed to the shaft, *l*, which lever is connected by link, *r'*, with a lever, r^2, which in turn is connected at its upper end with a brake-rod, *s*, and a chain, *t*. The other end of the brake-chain, *t*, is secured to the chain-drum or windlass, *u*, in the interior of the worm-wheel cylinder (Fig. 3) by a pin or bolt, thereby enabling the chain to be wound upon the drum when the brake is to be applied. The worm-wheel cylinder shown in Fig. 3 consists of a cylindrical casing having a bottom cast thereto. The chain-drum, *u*, is loose upon said shaft, *v*, and is provided at top and bottom, with the annular and concentric ribs which are adapted to fit exactly into the corresponding annular grooves of the parts, *u'* and u^2. These three parts are firmly pressed together by means of a lever and rod, *w w*, and counterweight *w'*, (Fig. 2,) and hence form a powerfully acting friction clutch. When, therefore, the shaft, *v*, is rotated by the worm-wheel, the chain-drum is caused to rotate also and winds up the brake-chain, whereby the brake is applied. This construction will be fully understood by referring to my previous patent above mentioned. When the pressure of the counterweight, *w'*, is relieved and the parts, *u*, *u'* and u^2, of the clutch are separated somewhat the part, *u*, is revolved back to its original position by the tension of the chain, and hence the brake is opened. The raising and lowering of the weight, *w'*, is effected by the shaft, *l*, and the clutch coupling, *x*, on the shaft, *l*, (see Fig. 2.)

The power for operating the brake is derived from the rotating axle of the car or other vehicle, the rotation of the same being transferred to the shaft, *y*, by means of the wedge-shaped friction-rolls, *q* and *p*. This shaft is connected at *y'* with an endless screw by a universal joint, the endless screw meshing with and rotating the worm-wheel, *v'*. The manipulation of this mechanical brake is effected by a very small quantity of compressed or exhaust air, and the source of power costs nothing, being derived from the car wheels.

Fig. 1 represents the piston, *e*, of the compressed-air pot, *a*, standing to the left, the brake being applied, inasmuch as the rolls, *p* and *q*, are in engagement, whereby the power of the revolving axle of the car or other vehicle is transmitted to the brake-chain, *t*. The air-pot, *a*, is empty of air in this position of the parts. If, now, compressed air having a tension of one atmosphere is admitted through the pipe, *h*, the piston, *c*, is thrust to the right, the lever, *k*, being also moved to the right, causing the friction rolls, *p* and *q*, to become disengaged. At the same time, the clutch coupling, *x*, fixed to shaft, *l*, causes the counterweighted lever, *w*, to be raised thereby separating the parts *u u'* and u^2, as hereinbefore described, the brake-chain, *t*, being unwound and the brake released. During the motion of the vehicle, the atmospheric pressure in the air-pot, *a*, is at least one atmosphere. When the engineer desires to apply the brake, he reduces the pressure

in the air-pipe, whereby the air is exhausted from the air-pot and the brakes are brought into operation.

The above describes a compressed-air brake-applying device as it operates when using an air-escape valve. This air-escape valve is necessary when it is desired to employ worm-wheel brakes with a simple air-brake device and at the same time a rapid application of the brakes is desired. For long freight trains, however, the too rapid application of brakes is injurious and often results in the separation of the trains in braking. The compressed air-brakes are, moreover, unsuitable to freight trains on account of the great number of complex valves and pistons and slides which require continuous examination, repairs, lubricating and taking apart of the pistons and slides. When the revision of these parts has been discontinued for only three months the action of the compressed air-brakes becomes so uncertain that separation of trains of only ten cars may occur. Inasmuch as the freight cars in great number continually become "vagrants" which may run for years on every possible strange road, it is impossible to employ thereon any complicated brake arrangement.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a cylinder having an air-inlet at its bottom and a by-passage in one side, a valve-chest connecting with the cylinder, an air-pot having a piston-rod opening in one side, a series of air-inlet ports communicating with the valve-chest and air-pot, an exhaust-port communicating with the air, a piston-rod passing through the piston-rod opening, and a piston or diaphragm secured to the piston-rod within the air-pot, of a slide-valve movable over the exhaust and inlet ports, a valve-operating piston in the cylinder and connected to the slide valve, and a check-valve in the by-passage, substantially as set forth.

2. The combination, with a cylinder having an air-inlet at its bottom and a by-passage in one side, a valve-chest connecting with the cylinder, a pair of air-pots having piston-rod openings in their adjacent side, a series of air-inlet ports communicating with one of the air-pots and with the valve-chest, an exhaust port communicating with the air, a piston-rod passing through the piston-rod openings, and a piston in each air-pot, one at each end of the piston-rod, of a slide-valve movable over the exhaust and inlet ports, a valve-operating piston in the cylinder and connected to the slide-valve, a check-valve in the by-passage, and an air-pipe connecting the air-inlet at the bottom of the cylinder to the second air-pot, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

WOLFGANG SCHMID.

Witnesses:

ALBERT WEICKMAN,

C. MAYER.