(No Model.)

F. M. ASHLEY.

BRAKE SYSTEM.

No. 587,911. Patented Aug. 10, 1897.

Fig. 1.

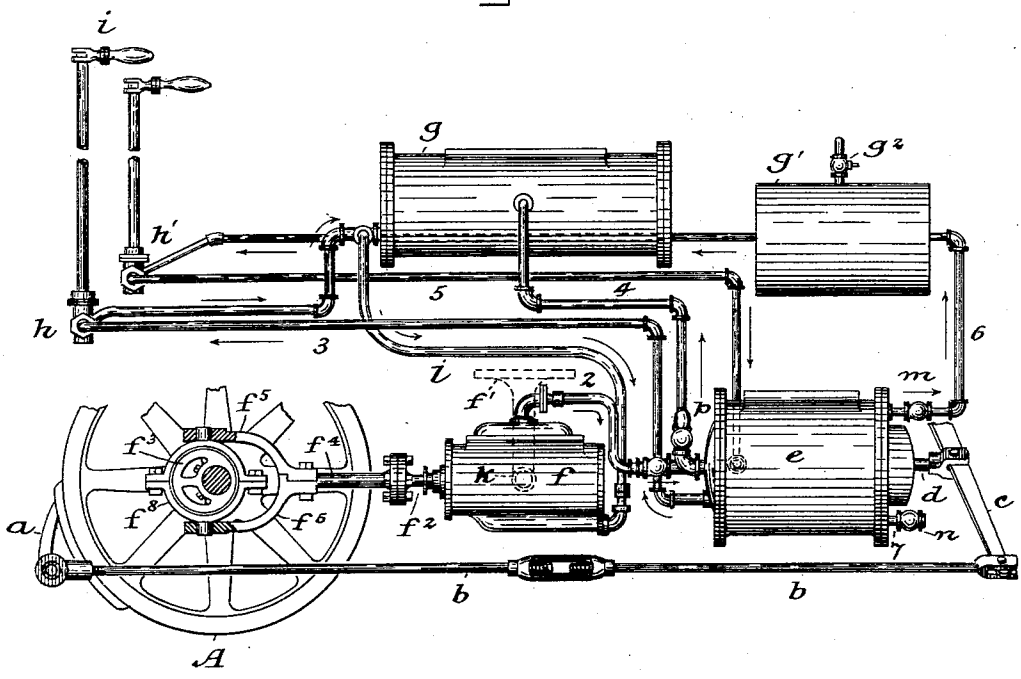


Fig. 2.

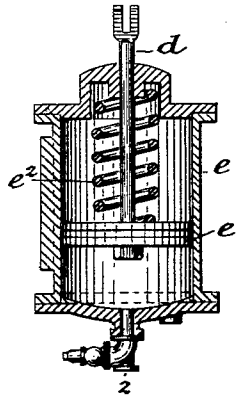


Fig. 3.

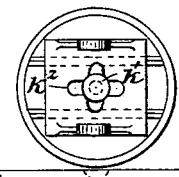
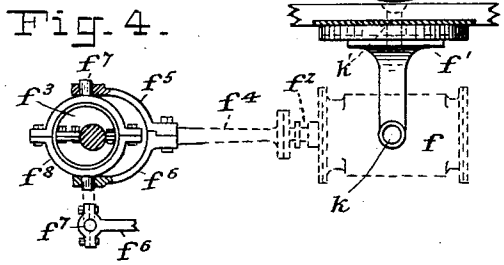


Fig. 4.



Witnesses
Abm Kopf
Braumwell Davis.

Inventor
Frank M. Ashley
By Lawyer & Edwards.
his Attorneys

UNITED STATES PATENT OFFICE.

FRANK M. ASHLEY, OF HAWTHORNE, NEW JERSEY.

BRAKE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 587,911, dated August 10, 1897.

Application filed June 18, 1895. Renewed July 8, 1897. Serial No. 643,864. (No model.)

To all whom it may concern:

Be it known that I, FRANK M. ASHLEY, a citizen of the United States, and a resident of Hawthorne, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Brake Systems, of which the following is a specification.

This invention relates to brakes operated by air or fluid pressure, and is particularly adapted for use on railway cars or vehicles where it is necessary to exert great pressure in a short space of time.

One defect which exists in many, if not all, brake systems known to me is that if the brake be instantly applied and great pressure suddenly exerted it is apt to burst the pipe or other parts of the apparatus.

My invention is designed to reduce to a minimum the liability of bursting of any of the parts and to produce a brake which will be positive in action at all times, will possess great flexibility, and will be constructed of as few parts as possible.

In the accompanying drawings, Figure 1 is a perspective view of my improved brake system. Fig. 2 is a sectional view of the brake-cylinder, and Figs. 3 and 4 are details showing the method of mounting the pump on the car.

Referring to the drawings by letters and figures, A represents a wheel of the car or other vehicle to which the brake is applied; *a*, the brake; *b*, the brake-rod; *c*, the brake-beam, and *d* the thrust-rod of the brake-cylinder piston. The brake-cylinder is represented by *e* and its piston by *e'*. A spring e^2, inside of the brake-cylinder *e*, surrounds the thrust-rod *d* and exerts pressure against the piston *e'* and the head of the brake-cylinder, thus normally holding the brake away from the wheels.

f is a pump pivotally mounted on a bracket *f'*, fixed to the car, and f^2 is the piston-rod of the pump. A cam f^3 is fixed to the axle of the car-wheel and operates the driving-rod f^4, connected to the pistod-rod f^2 of the pump.

g is the main reservoir, which is filled with water, air, or other fluid. A pipe 1 leads from it to the inlet of the pump, and a pipe 2 leads from the outlet of the pump to the end of the brake-cylinder opposite that containing the spring e^2. The same end of the brake-cylinder is connected with the main reservoir by a pipe 3, having located in it at a convenient point a cut-off valve *h*, controlled by the engineer or other person operating the brake by means of the handle *i*. Another pipe 4 also connects the brake-cylinder and main reservoir in like manner, except that instead of having a cut-off valve it is provided with a pressure check-valve *p*, allowing liquid to pass from the brake-cylinder to the reservoir when under a certain pressure, the purpose of the pressure-valve being to prevent bursting of the cylinder, as will more fully hereinafter appear.

The operation of the system is as follows: The valve *h* being open and the car being in motion, pump *f* is operated and draws the water, air, or other fluid contained in the main reservoir *g* through pipe 1 and forces it through pipe 2 into the brake-cylinder, but the spring e^2 having sufficient strength to enable the piston-head *e'* to withstand the force of the water and pipe 3 being open the fluid leaves the brake-cylinder by way of pipes 3 and 4. The pressure of the liquid is not sufficient to open valve *p*. Hence it passes through pipe 3, valve *h*, and back into the main reservoir. As long as the valve *h* is open and the car is in motion this circulation will be kept up and piston-head *e'* will not be moved. When the engineer wishes to apply the brake, he simply shuts off valve *h*. Then the fluid backs up in pipe 3 and prevents the outflow of the liquid from the brake-cylinder except by pipe 4, but the pressure-valve therein is regulated to withstand a pressure just a little less than would burst the brake-cylinder, and therefore will not yield. The pump then draws the fluid from the main reservoir by way of pipe 1 and forces it directly against the piston-head *e'*, moving it and putting on the brake. It will be noted that the force of the inertia of the vehicle is applied directly in putting on the brake. Should the pressure of the liquid become too great in the brake-cylinder, it will itself open valve *p* and allow the liquid to return to the main reservoir.

To provide for the contingency of the apparatus described above getting out of order and refusing to work properly, I have pro-

vided an auxiliary reservoir g', from which a pipe 5 leads to a cut-off valve h' to the end of the brake-cylinder e opposite to that in which the spring e^2 is located. Another pipe 6, containing a check-valve m, connects the auxiliary reservoir g' to the end of the brake-cylinder and permits of the passage of air from the brake-cylinder into the auxiliary reservoir. An inlet-pipe 7, containing a check-valve n, leads into the same end of the brake-cylinder and permits the passage of air from the outside atmosphere into the same end of the brake-cylinder.

Each time the brake is applied the piston e' in its forward movement forces a quantity of air through pipe 6 into the auxiliary reservoir, and as valve h' is normally kept closed the air is stored in the auxiliary reservoir, where it is kept at any desired pressure, a safety-valve g^3 being provided for the purpose of regulation. To secure the application of the brakes by means of the auxiliary system above described, it is only necessary to open valve h', and the air is allowed to escape from the auxiliary reservoir g' through pipe 5 into the brake-cylinder e, where it exerts pressure against the piston-head e' and applies the brakes.

One advantage of my system, it will be observed, is that should the valve h be instantly closed entirely all the force of the pump will not be exerted immediately, but the fluid, becoming backed up in pipe 3, will act in the nature of a cushion for a moment and thus greatly reduce the danger of bursting pipes or breaking other parts of the apparatus. Furthermore, it may be noted that the pressure of the brakes may be varied by simply regulating the degree of the opening of the valve and also that the entire force of the momentum of the vehicle is utilized in applying the brake.

It will of course be seen that so long as the reservoir and brake-cylinder are in open communication with the pipes, so as to be open to allow the gas or fluid to enter and pass through the same, it is entirely within the spirit of my invention, as illustrated at the junction of the pipes 3 and 5 in the drawings, where the liquid is free to flow either actually into the reservoir or into pipes 5 without actually entering the reservoir. It is necessary, however, as shown in the drawings, that the pipes be in open communication with the reservoir and brake-cylinder, particularly the former.

Another feature of my invention is the arrangement of the pump in reference to the car on which it is mounted. In apparatus of this character great flexibility must be maintained at all times between the parts in order that in passing around curves or over sudden changes of grade the apparatus will not be broken by reason of changes of position of the parts causing twisting or strain. To provide for changes of grade and the reciprocatory motion of the piston-rod, I have mounted the pump e on a horizontal pivot k on the bracket f', and to provide for curves and sudden wrenches from side to side I have vertically pivoted the bracket f' to the car, as at k', and have also provided the connecting-rod f^4 with a pair of arms f^5 and f^6, vertically pivoted to pins f^7 on the upper and lower sides of strap f^8, embracing the cam f^3. The pivot-pin k' is adapted to slide in the groove k^2 in order to guard against sudden jerks.

The valve p, located in pipe 4, serves a further purpose besides preventing bursting of the brake-cylinder. It is well known that if the brakes are applied hard enough to stop the revolution of the wheels the latter will slide or "skid" along the track and offer less resistance than when revolving slowly. To prevent this, the valve p may be so regulated that the air or fluid will pass through at a pressure lower than that which would apply the brakes hard enough to skid the wheels.

Having thus described my invention, I claim—

1. In a brake system, the combination with a main reservoir, a brake-cylinder and a pump, located apart from but connected with each other, of a gas or fluid normally circulating continuously in open communication with said reservoir, pump and brake-cylinder in the order named, and means to prevent the outflow of said gas or fluid from the brake-cylinder, for the purpose set forth.

2. In a brake system, the combination with a main reservoir, a brake-cylinder and a pump, located apart from but connected with each other, of a gas or fluid circulating continuously through said reservoir, pump and brake-cylinder in the order named, and a valve located in said system at some point other than intermediate said pump and brake-cylinder, whereby the closing of said valve will effect the putting on of the brakes, substantially as described.

3. In a brake system, the combination with a main reservoir, a brake-cylinder and a pump located apart from, but connected with each other, said pump being operated by the movement of the vehicle, of a gas or fluid circulating continuously through said reservoir, pump and brake-cylinder, in the order named, and a valve located in said system at some point other than intermediate said pump and brake-cylinder, whereby the closing of said valve will effect the putting on of the brakes substantially as described.

4. In a brake system, the combination with a main reservoir, a brake-cylinder and a pump, located apart from but connected with each other, of a gas or fluid normally circulating continuously in open communication with said reservoir, pump and brake-cylinder in the order named, and means to prevent the outflow of said gas or fluid from the brake-cylinder, said means being provided with

means to allow said gas or fluid to pass from the brake-cylinder when the pressure reaches a predetermined point, as and for the purpose set forth.

5. The combination of a vehicle, a bracket pivoted vertically thereto, and capable of reciprocatory motion with regard to the same, and a pump horizontally pivoted to said bracket and having its piston-rod vertically pivoted to a strap embracing a cam on the axle of the vehicle, substantially as described.

Signed at New York, in the county of New York and State of New York, this 16th day of March, A. D. 1895.

FRANK M. ASHLEY.

Witnesses:
C. V. EDWARDS,
ABM. KOPEL.