2 Sheets--Sheet 1.

A. JAMES.

Automatic Air-Brake for Cars.

No. 165,235. Patented July 6, 1875.

FIG. 1.

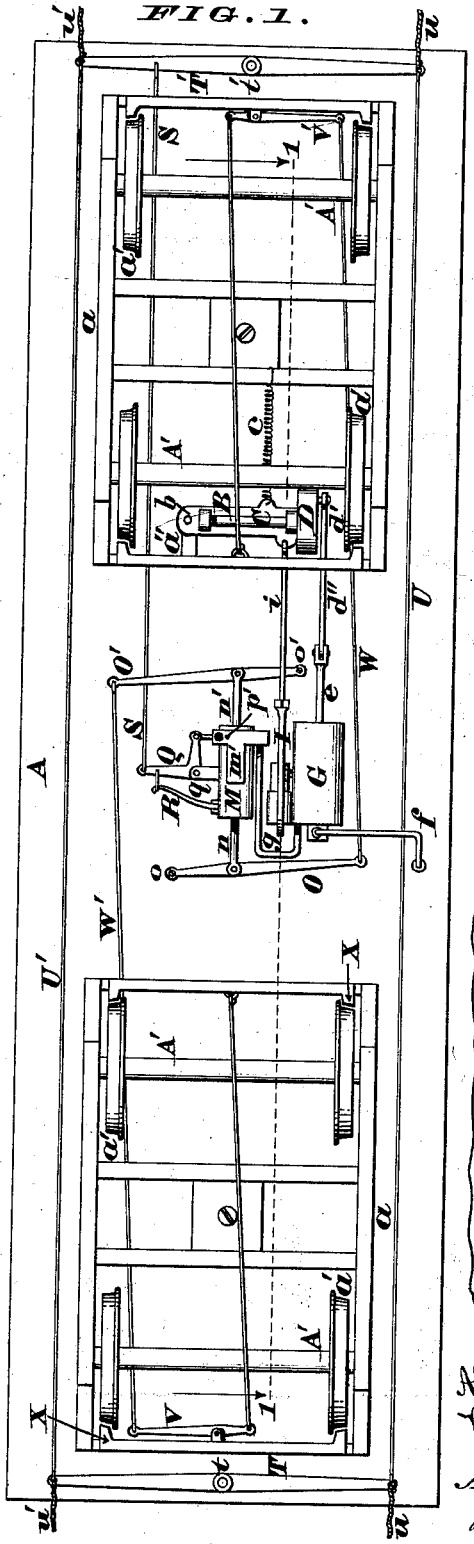
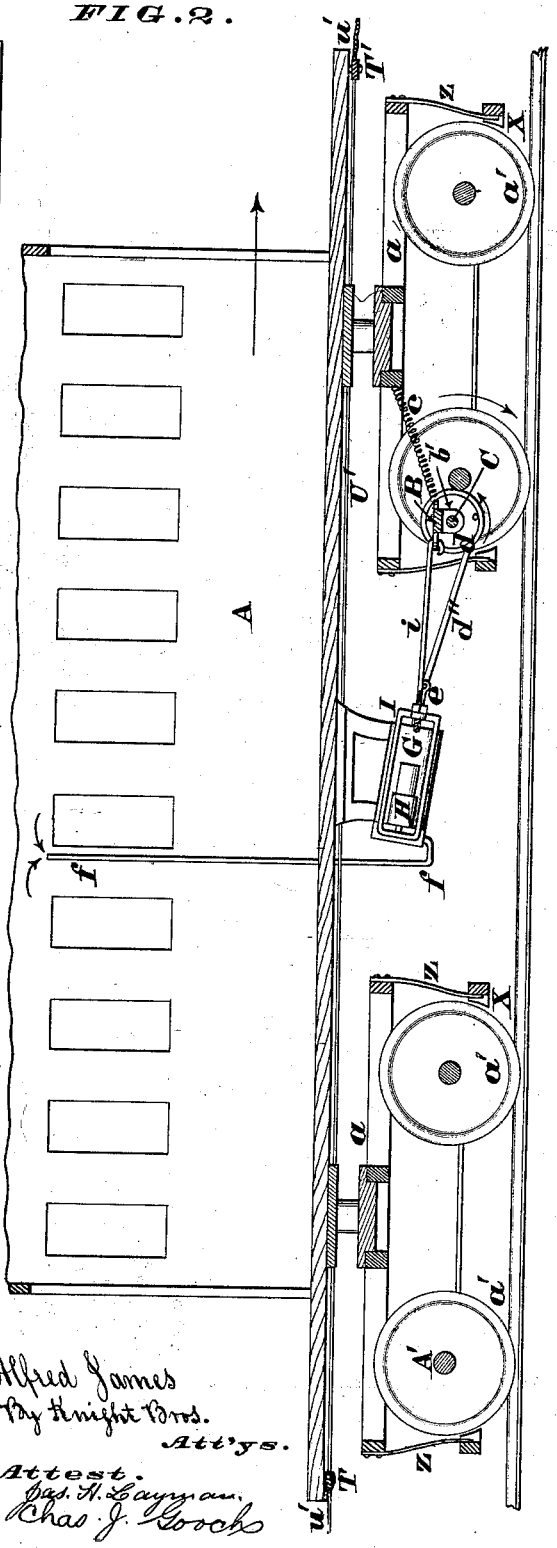


FIG. 2.



Alfred James
By Knight Bros.
Att'ys.

Attest.
Jas. R. Layman.
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2 Sheets--Sheet 2.

A. JAMES.

Automatic Air-Brake for Cars.

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FIG. 3.

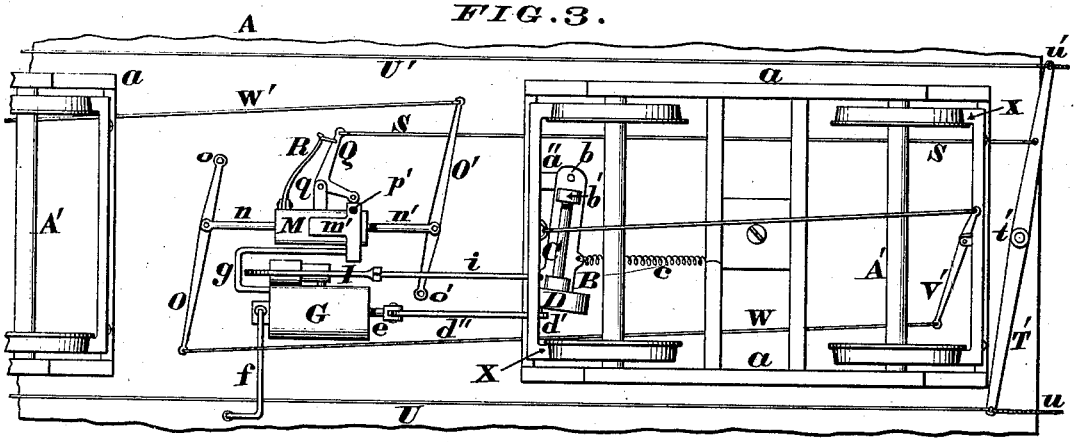


FIG. 4.

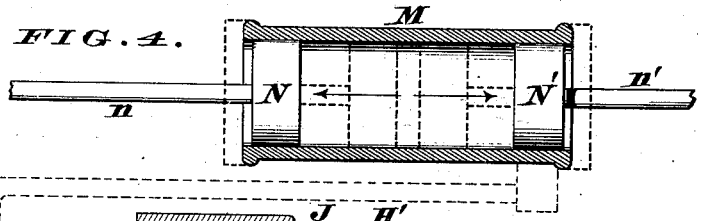
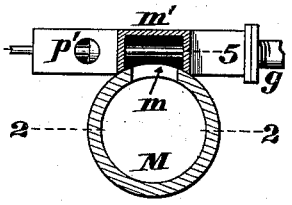


FIG. 9.



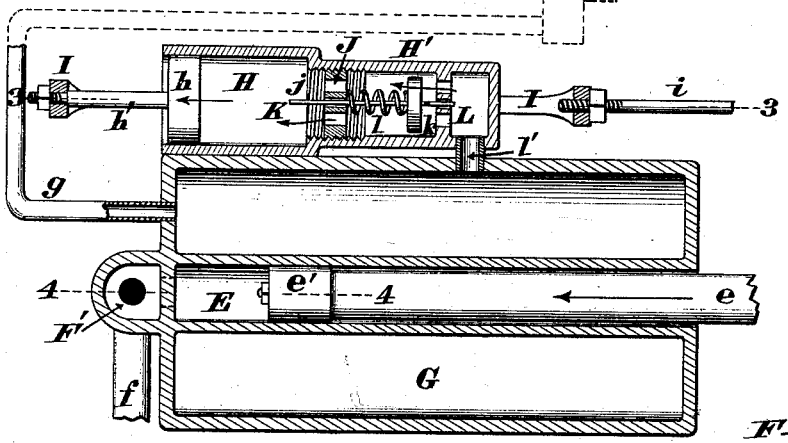


FIG. 6.

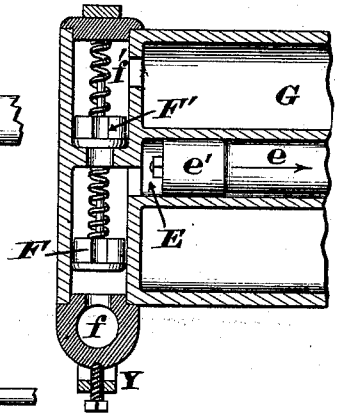


FIG. 5.

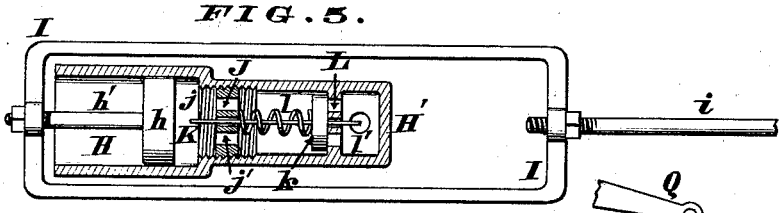


FIG. 7.

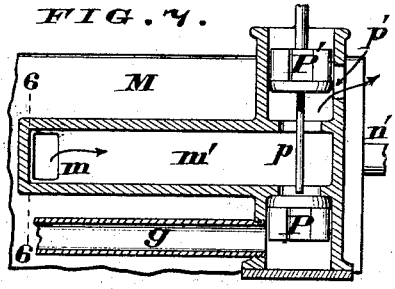
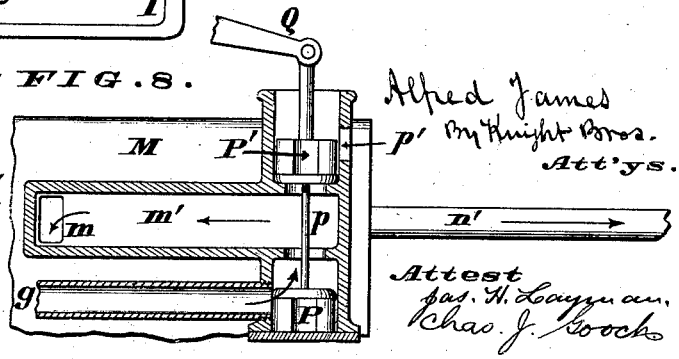


FIG. 8.



Alfred James
By Knight Bros.
Att'ys.

Attest
Jas. H. Layman.
Chas. J. Cooke

UNITED STATES PATENT OFFICE.

ALFRED JAMES, OF SEYMOUR, INDIANA.

IMPROVEMENT IN AUTOMATIC AIR-BRAKES FOR CARS.

Specification forming part of Letters Patent No. **165,235**, dated July 6, 1875; application filed May 31, 1875.

To all whom it may concern:

Be it known that I, ALFRED JAMES, of Seymour, Jackson county, Indiana, have invented a new and useful Air-Brake for Railroad-Cars, of which brake the following is a specification:

With my improved apparatus the special steam-engine which has heretofore been employed for operating the air-compressing pump is dispensed with, and the receiver or reservoir is charged with air by means of a pump that is driven by one of the axles of the car or other vehicle to which the brake is applied. This air-compressing pump is not coupled to the car-axle by toothed gearing, but by suitable friction-wheels, in order that the pump action may be initiated at any instant without concussion, and that it may be readily checked the moment that the proper pressure has accumulated within the receiver. This suspension of the pumping action is effected automatically, and is continued as long as the desired pressure of air is maintained within the receiver, but the moment that the pressure is reduced therein, either by using the brakes or by leakage through the joints, or otherwise, the pump is again automatically set in operation, and continues to act until the original pressure is restored.

In order to prevent the pump being injured by having road-dust, cinders, soot, &c., drawn into it, the suction-pipe of the same is carried up within and almost to the roof of the car, at which point said pipe receives its supply of air. By this means the pump acts to draw off the vitiated air from the car, and thereby serves as an efficient ventilating apparatus in addition to its other functions.

In the accompanying drawings, Figure 1 is a plan view, showing the under side of a car, with my brake applied thereto, the friction-wheel of the pump being represented in contact with the car's axle and the brakes being represented "off." Fig. 2 is a section at the line 1 1 in the direction indicated by the arrows. Fig. 3 is a plan of a portion of the car with the driving-wheel of the pump out of contact with the car's axle and with the brakes "on." Fig. 4 is a horizontal section of the air-pump and its accessories at the line 2 2. Fig. 5 is a vertical section of the retracting plunger and its adjuncts at the line 3 3. Fig. 6 is a vertical section of the air-pump and its inclosing receiver at the line 4 4. Fig. 7 is a horizontal section at the line 5 5, the inlet-valve of the brake-cylinder being shut and the discharge-valve of the same being open. Fig. 8 is a section in the same plane, but with the inlet-valve open and the outlet closed. Fig. 9 is a vertical section of the brake-cylinder at the line 6 6.

Of the above illustrations, Figs. 4 to 9, inclusive, are on a larger scale than Figs. 1, 2, and 3.

A represents the body of a railroad-car or other wheeled vehicle, to which the brake is to be applied, said body being mounted upon customary axles A′, trucks *a*, and wheels *a′*. Projecting horizontally from one of these trucks, or from the frame of the car, is a bracket, *a″*, to which is pivoted, at *b*, one end of a swinging frame, B, within whose bearings *b′* a shaft, C, is journaled. The end of this shaft that is the most remote from the pivot *b* carries a disk or wheel, D, whose periphery is preferably covered with leather or rubber *d*, or any other suitable material that will increase the friction between said wheel and the axle A′.

In the normal condition of the braking apparatus the wheel D is maintained in contact with the aforesaid axle by means of a spring, *c*, or its equivalent. The friction-wheel D carries a wrist-pin, *d′*, from which a pitman, *d″*, extends to the piston *e* of the air-compressing pump E, said piston being provided with a cupped leather or other appropriate packing, *e′*. (See Figs. 4 and 6.) This pump is furnished with a suitable inlet-valve, F, and discharge-valve F′, of which the former is in communication with a pipe, *f*, while the latter, when lifted from its seat, allows air to be expelled from the pump E through port *f′* into an annular receiver or reservoir, G, that completely surrounds said compressor. The supply-pipe *f* of the pump is carried up within the car A as high as may be necessary, in order to prevent dust and cinders being drawn into said pump, as shown in Fig. 2, in which illustration the curved arrows represent the currents of vitiated air flowing to the inlet end of said pipe. The receiver G is preferably of

cylindrical shape, and is closed at ends and sides, except as hereinafter explained, and said receiver is made sufficiently stout to sustain the pressure to which it may be subjected, which pressure may range from thirty to fifty pounds per square inch. Located at the side of the receiver G is a cylinder, H H′, whose largest bore, H, is traversed by the retracting plunger *h*, whose rod *h′* bears against one end of a yoke, I, to whose other end a connecting-rod, *i*, is attached. This connecting-rod serves to communicate motion from the retractor *h* to the previously-described swinging frame B.

The smallest bore H′ of the cylinder H H′ is provided with a female thread, *j*, for the engagement of an adjustable nut, J, having apertures *j′*, and a central perforation, that receives the stem K of a valve, *k*, which is closed against the perforated seat L by means of a spring, *l*. *l′* is an inlet-pipe, which allows compressed air to flow from the receiver G into the cylinder H H′, when the valve *k* is opened.

Attached to the car-body, in any suitable manner, is the brake-cylinder M, of uniform bore throughout, and traversed by two oppositely-acting pistons, N N′, whose respective rods *n n′* are jointed to levers O O′, which are pivoted at *o o′* to the car.

In order to permit the entrance of compressed air from receiver G into this brake-cylinder M, the latter is pierced at its mid-length with a port, *m*, that opens into a channel, *m′*, which has an inlet-valve, P, and an exit-valve, P′. (See Figs. 7 and 8.) The inlet-valve is held normally closed by the pressure of compressed air within the pipe *g*. The outlet-valve P′ is not acted upon by the compressed air, but is controlled by a bell-crank, Q, the latter being pivoted at *q* to a fixed support.

Projecting inwardly from the valve P′ is a stem, *p*, of such length as to avoid contact with the inlet-valve P, when said exit-valve P′ is opened, as seen in Fig. 7. *p′* is the outlet-port of the air-cylinder M.

If preferred, both ends of this cylinder may be closed with suitable heads, so as to exclude dust therefrom, as indicated by dotted lines in Fig. 4.

R is a spring, the stress of which tends to rock the bell-crank Q in such a manner as to open the discharge-valve P′. Attached to this bell-crank is a rod, S, that communicates with one of two precisely similar levers, T T′, which are pivoted at *t t* to the extreme opposite ends of the car. Uniform motion is communicated from one of these levers to the other by rods U U′. *u u′* are cords or chains for coupling the levers T T′ to the corresponding levers of the contiguous cars, it being understood that the braking apparatus, as shown fully in Fig. 1, is to be applied to every car composing the train. The levers O O′ are coupled to the ordinary brake-levers V V′ by rods W W′. X are the shoes or rubbers of the brakes. Y is a clamp wherewith the caps are secured to the valve-chamber of the compressor.

The manner of arranging and operating my brake is as follows: Previous to inserting the plunger *h* in the cylinder H the nut J is first screwed up, so as to impart any desired tension to the spring *l*, after which said retracting-plunger is attached to the yoke I in the manner shown in Fig. 5. The object of thus adjusting the nut J is to insure the valve *k* being maintained securely upon its seat L, until an effective pressure of air has accumulated in the receiver G. In the present case I will suppose that a pressure of twenty-five pounds to the square inch is sufficient to operate the brakes so forcibly as to arrest the train within the shortest practicable space.

In the normal condition of the apparatus the spring R serves to maintain the bell-crank Q and levers T T′ in the position indicated in Fig. 1, while the springs Z preserve the brake-shoes X out of contact with the wheels *a′*. This position of bell-crank opens the discharge-valve P′, as seen in Fig. 7. The pistons N N′ are brought very near each other, as shown by dotted lines in Fig. 4, while the spring *e* holds the friction-wheel D *d′* snugly against the axle A′.

The car, being now propelled in the direction indicated by arrow on the body A in Fig. 2, it is apparent that the frictional contact of the disk D *d′* with axle A′ will at once impart a reciprocating movement to the plunger *e* of the pump or compressor E, thereby drawing air into said pump through pipe *f*, and expelling air from said compressor through port *f′* into the receiver G. As soon as the pressure begins to accumulate in said receiver the air flows along pipe *g*, and automatically closes the inlet-valve P of brake-cylinder M, and thus prevents any operation of the pistons contained within said cylinder.

The continued action of pump E gradually increases the pressure in receiver G, until it slightly exceeds the predetermined maximum, say, twenty-five pounds per square inch, at which moment the valve *k* is forced away from the seat L, as seen in Fig. 4. This movement of the said valve is caused by the compressed air entering the cylinder H′ through the side pipe *l′*. From the cylinder H′ the compressed air escapes through apertures *j′* of nut J, into the enlarged cylinder H, where the air acts to force the plunger *h* outward, and in so doing the yoke I is retracted.

As a result of retraction of the yoke I the free end of frame B is swung away from the axle A′, and, consequently, the rotation of friction-wheel D is arrested. (See Fig. 3.) By this means the further action of pump E is automatically stopped as long as the desired pressure is maintained in the receiver G. Whenever it becomes necessary to use the brakes the engineer has only to pull the cord *u′*, or any suitable attachment to the same, in such a manner as to swing the lever T′, as shown in Fig. 3. The rod S at once imparts a corresponding movement to bell-crank Q, the result of which is to close the discharge-

valve P′ of brake-cylinder M. The closure of this valve causes its interior stem *p* to open the inlet-valve P, after which the compressed air instantly flows along channel *m′* and port *m* into cylinder M, as indicated in Fig. 8. As soon as the compressed air enters said cylinder the pistons N N′ are forced outward in opposite directions, as shown in Figs. 3 and 4. This opposite action of the two pistons operates, through the instrumentality of levers O *o* O′ *o′* V V′ and rods W W′, to bring the shoes X in contact with the peripheries of wheels *a′*, and thereby stop the train. It is, however, evident that the act of admitting air to the cylinder M must lower the pressure in receiver G, and this pressure is automatically restored in the following manner: The engineer first throws off the brakes by pulling the cord *n*, so as to restore the operative parts to their normal positions, which act allows the spent air from cylinder M to escape through port *p′*, as indicated in Fig. 7. As this escape of a cylinderful of air causes a corresponding diminution of pressure within receiver G and its connected cylinder H H′, the valve *k* is at once forced home upon its seat L by the stress of spring *l*. The spring *c* then draws the swinging frame B forward, so as to again bring its friction-wheel D *d* in contact with axle A′. As soon, now, as the train is started the pump again begins to act, and continues in action until the proper pressure is restored, when said pump is automatically thrown out of connection with the driving-axle, as previously explained.

From the above description it will be seen that the pump is operated only long enough to keep up the necessary pressure of air within the receiver when its action is automatically arrested, as already explained, and remains quiescent until the receiver has been somewhat exhausted either by putting on the brakes or by leakage, or both.

As the pump is not driven continuously, and as it draws its supply of air from a source that is comparatively free from any dust of a gritty or abradent nature, there is but very little wear of the pistons and other interior parts.

While describing the preferred form of my apparatus, I reserve the right to vary or modify the operative parts so as to adapt the brake to different forms of railroad-cars or other wheeled vehicles requiring such an appliance.

The gist of the invention consists in the means for automatically starting and stopping the pump, for the purpose designated.

I claim as new and of my invention—

1. The combination of swinging frame B *b b′*, shaft C, spring *c*, driving-wheel D, pump *d″* E *e*, receiver G *g*, cylinder H H′, plunger *h h′*, yoke I *i*, regulating-valve K L, cylinder M, and oppositely-acting pistons N N′, for operating the levers O O of the brake apparatus, substantially as herein explained.

2. In combination with the cylinder H H′ and retracting devices *h* I, the adjustable perforated nut J *j*, valve K *k*, seat L, and the inlet-pipe *l′*, which communicates with the receiver G, substantially as described.

3. In combination with the cylinder M and its oppositely-acting pistons N N′, the port *m*, channel *m′*, inlet-valve P, outlet-valve P′ *p*, exhaust-port *p′*, and the pipe *g*, leading to the receiver G, substantially as and for the purpose set forth.

4. The described combination of pivoted levers T *t* T′ *t′*, rods U U′, and connection S, for operating the bell-crank Q from either end of the car, for the purpose stated.

5. The suction-pipe *f* of pump E, when carried up within the car, so as to draw off the vitiated air from the same, substantially as set forth.

In testimony of which invention I hereunto set my hand.

ALFRED JAMES.

Attest:

GEO. H. KNIGHT,
JAMES H. LAYMAN.