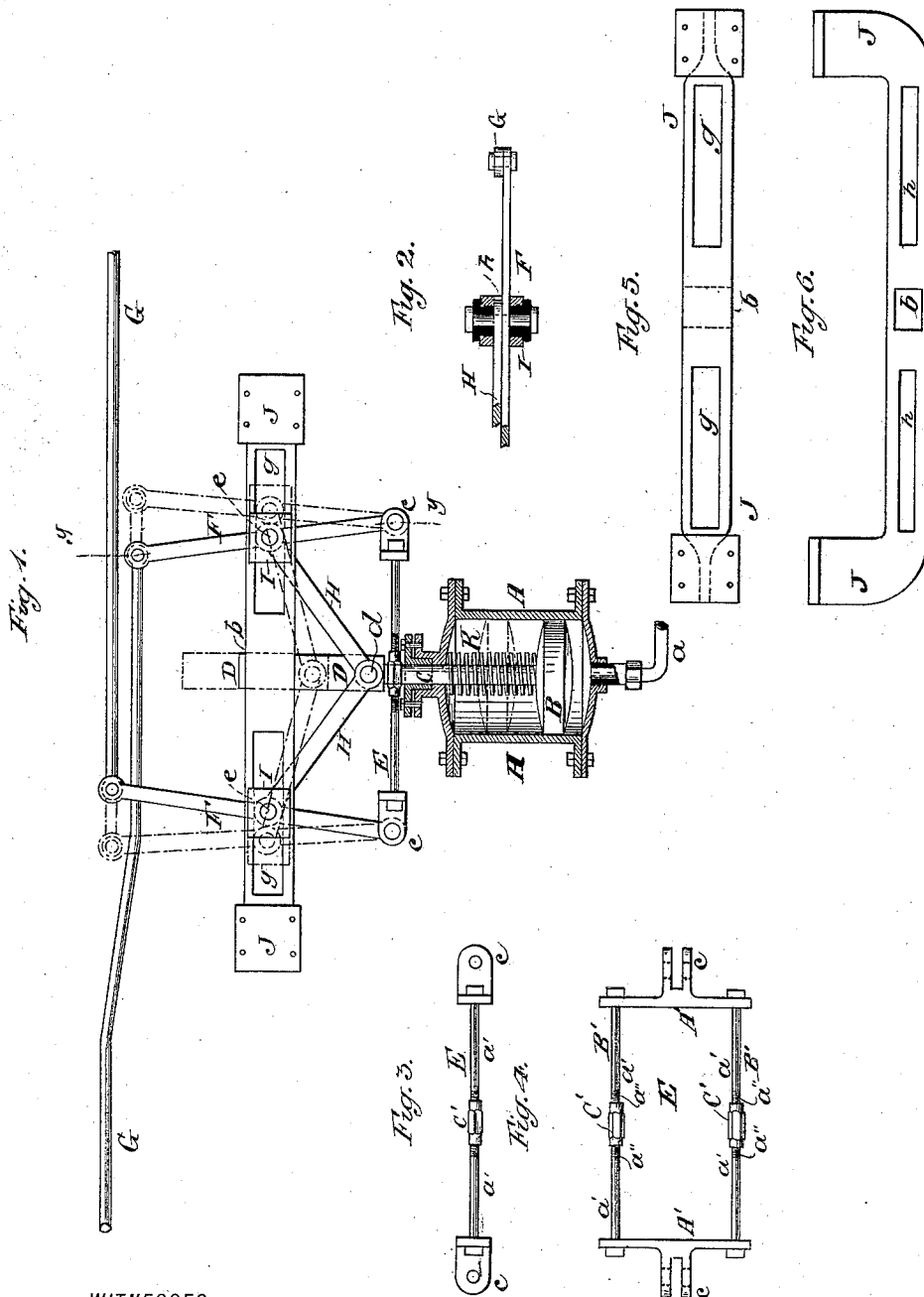


R. SOLANO.

ATMOSPHERIC RAILWAY BRAKE.

No. 344,058.

Patented June 22, 1886.



WITNESSES:

J. T. Bouey  
Chas. A. Went.

INVENTOR

Rinaldo Solano

R. SOLANO.

ATMOSPHERIC RAILWAY BRAKE.

No. 344,058.

Patented June 22, 1886.

Fig. 2.

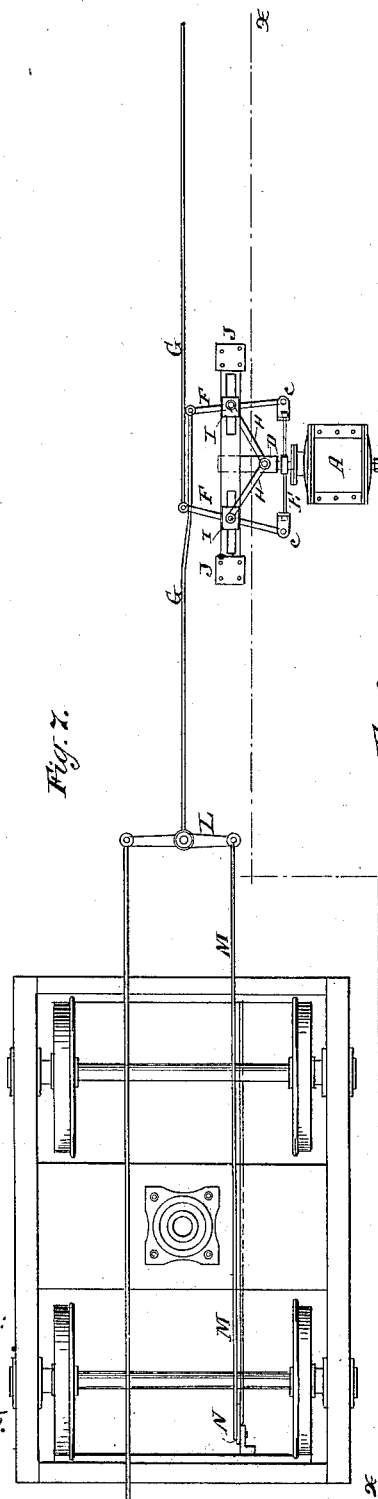
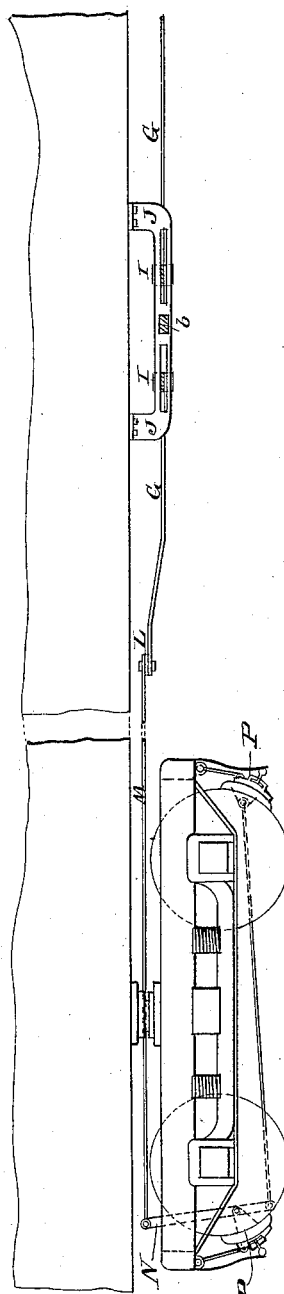


Fig. 3.



INVENTOR

Renaldo Solano,

WITNESSES:

J. T. Boujor  
Chas. A. Herbert.

(No Model.)

3 Sheets—Sheet 3.

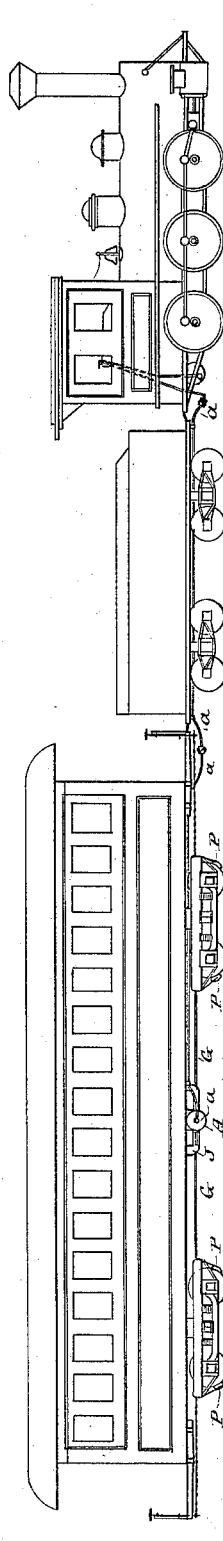
R. SOLANO.

ATMOSPHERIC RAILWAY BRAKE.

No. 344,058.

Patented June 22, 1886.

Fig. 9.



WITNESSES:

J. T. Conway  
Chas. A. Herbert.

INVENTOR

Rinaldo Solano

# UNITED STATES PATENT OFFICE.

RENALDO SOLANO, OF BROOKLYN, NEW YORK, ASSIGNOR OF TWO-THIRDS  
TO JOHN W. HOWARD AND DAVID R. MORSE, BOTH OF SAME PLACE.

## ATMOSPHERIC RAILWAY-BRAKE.

SPECIFICATION forming part of Letters Patent No. 344,058, dated June 22, 1886.

Application filed March 4, 1886. Serial No. 193,964. (No model.)

*To all whom it may concern:*

Be it known that I, RENALDO SOLANO, of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Atmospheric Railway-Brakes, of which the following is a specification.

The object of this invention is to equalize the several brakes of a railway car or train, so that the action of each brake shall be substantially the same as that of all the others, and also to enable the pressure of the brakes upon the wheels to be regulated or adjusted as circumstances may require.

My invention comprises certain novel combination of parts, whereby the objects aforesaid are effectually secured.

Figure 1 is a plan view and horizontal partial sectional view illustrating my said invention. Fig. 2 is a transverse sectional view taken in a vertical plane in a line, *y y*, Fig. 1. Figs. 3 to 6, inclusive, are detailed views of parts represented in Fig. 1. Fig. 7 is a plan view further illustrating my said invention, and Fig. 8 is a side view and partial sectional view on line *x x*, Fig. 7, also further illustrating my said invention. Fig. 9 is a side elevation illustrating my said invention as applied in connection with an engine, tender, or car.

A is a cylinder, provided with an air-inlet pipe, *a*, the latter being connected with a suitable reservoir of compressed air carried by the engine, tender, or car, preferably by the engine, and into which air is compressed by any suitable means or apparatus, the inlet-pipe *a* being provided with a suitable valve for admitting compressed air behind the piston B, which latter moves in the cylinder A, the piston-rod C of said piston extending through one end of the cylinder, and having attached thereto a slide, D, longitudinal therewith. This slide works through a fixed guide, *b*, indicated in dotted outline in Fig. 5, and more clearly in Fig. 6, which is a view taken at right angles to Figs. 1 and 5. A rectangular frame, E, fully shown in Fig. 4, is seen in a plane at right angles to that in Figs. 1 and 3, and straddles the piston-rod C and the slide D.

F are levers pivoted at their extremities to the opposite ends, *e*, of the frame E, the other

ends of the said levers F being connected with the brake-rods G, which extend in opposite directions, as represented in Figs. 1 and 7. The other or extreme ends of these brake-rods G are attached to the brake-rod levers. In other words, the devices which directly actuate the brakes, inasmuch as the constructional brakes and the brake-rod levers or equivalent devices, may be of any usual or suitable construction, and as brakes and brake-rod levers are well known the same require no special description here. The levers F, between their two extremities, are pivoted to the outer end of toggle-bars H, which are pivoted at their inner ends, as shown at *d*, to the inner part of the slide D, or, when desired, to the outer end of the piston-rod C.

The pivots of the toggle-bars H are indicated at *c*, and where the toggle-bars are so pivoted to the levers F the said levers are pivoted to cross heads or slides I, which run in guides *g*, (shown in Figs. 1 and 5,) the toggles and levers themselves playing through slots *h* at right angles to the guides *g*. It is of course to be understood that the guides *g* and the slots *h* are formed in a suitable part, bar, or bracket suitably affixed to the locomotive, tender, or car which carries the apparatus. Preferably the bracket J is employed for such purposes.

The relative connection of a cross-head, I, and its contiguous levers F and toggle-link H is illustrated in Fig. 2.

A spring, K, is so applied in the cylinder A, and its relation with the piston B, as to tend to force backward the piston B when the latter is relieved from the pressure of compressed air behind it.

The frame E, so far as concerns one feature of my invention, is composed of two end pieces, A', connected by rods B', each of which is composed of two sections, *a'*. The two sections *a'* of each rod B' have their inner ends screw-threaded in opposite directions, as shown at *a''*, which are connected by twin buckles C', so that the available length of the rods B' may be regulated at leisure by turning the twin buckles in one direction or the other to lengthen or shorten the rods B', as may be desired.

As concerns the compressed-air reservoir

hereinbefore referred to, it may be of any ordinary or suitable construction, and may be charged with compressed air to any requisite pressure by well-known means, and therefore requires no special description herein.

In use and operation of the apparatus, compressed air being admitted behind the piston B, forces outward the piston-rod C and slide D, thereby straightening the toggle-joint formed by the toggle-bars H, which in their turn spread apart the levers F, and thereby draw inward in opposite directions the brake-rods G, which latter, acting upon the usual brake-levers or devices hereinbefore referred to, apply the brake to the wheel. When the piston B is relieved from the pressure behind it of the compressed air, the spring K forces the said piston backward and thereby reverses the movement of the levers F to bring the brakes away from the wheels. The frame E, swinging clear of everything except the ends to which it is attached of the levers F, insures identically the same action of the toggle-bars H upon the said levers, and consequently causes an equal and uniform action of all the brakes which are actuated by the said levers. Furthermore, the frame E, swinging clear, as aforesaid, permits the slides I to operate without binding in their guides, although it is evident that the apparatus would operate with utility if the slide D were dispensed with. Yet the said slide forms an important device in steadying the piston-rod C, as the latter, through the toggle-bars H, actuates the levers F and cross-heads I, as hereinbefore set forth.

In Fig. 7 is illustrated the connection of the brake-rods G with an ordinary brake-lever, L, from which extends a rod, M, to actuate a brake connected to the shoe-lever N and its brake P, being illustrated in Fig. 8, and also on a smaller scale in Fig. 9.

By lengthening or shortening the frame E as hereinbefore explained to any desired extent the fulcra of the levers F may be placed at a greater or less distance apart, so as to permit the toggle-joint composed of the toggle-bars H to straighten to a greater or less degree when forced outward with the piston-rod to exert a greater or less degree of pressure on the brakes.

What I claim as my invention is—

1. A mechanism for actuating railway-brakes, comprising in combination the following elements, to wit: a cylinder, A, piston B, piston-rod C, swinging frame E, cross-heads I, levers F, toggle-bars H, and brake-rods G, substantially as and for the purpose herein set forth.

2. A mechanism for actuating railway-brakes, comprising in combination the following elements, to wit: a cylinder, A, piston B, piston-rod C, slide D, swinging frame E, cross-heads I, levers F, toggle-bars H, and brake-rods G, substantially as and for the purpose herein set forth.

3. A mechanism for actuating railway-brakes, comprising in combination the following elements, to wit: a cylinder, A, piston B, piston-rod C, spring K, swinging frame E, cross-heads I, levers F, toggle-bars H, and brake-rods G, substantially as and for the purpose herein set forth.

4. A mechanism for actuating railway-brakes, comprising in combination the following elements, to wit: a cylinder, A, piston B, piston-rod C, slide D, spring K, swinging frame E, cross-heads I, levers F, toggle-bars H, and brake-rods G, substantially as and for the purpose herein set forth.

5. A mechanism for actuating railway-brakes, comprising in combination the following elements, to wit: the frame E, composed of end pieces, A', sectional screw-threaded rods B', and turn-buckles C', in combination with the cylinder A, piston B, piston-rod C, toggle-bars H, levers F, cross-heads I, and brake-rods G, all substantially as and for the purpose herein set forth.

6. A mechanism for actuating railway-brakes, comprising in combination the following elements, to wit: the frame E, composed of end pieces, A', sectional screw-threaded rods B', and turn-buckles C', in combination with the cylinder A, piston B, piston-rod C, toggle-bars H, levers F, cross-heads I, brake-rods G, and the bracket or part J, constructed with the guides *g* and slots *h*, substantially as and for the purpose herein set forth.

RENALDO SOLANO.

Witnesses:

CHARLES A. HERBERT,  
J. T. LOVEJOY.