(No Model.) 2 Sheets—Sheet 1.

# J. J. S. LIST.

## AUTOMATIC CONTINUOUS RAILWAY BRAKE.

No. 495,499. Patented Apr. 18, 1893.

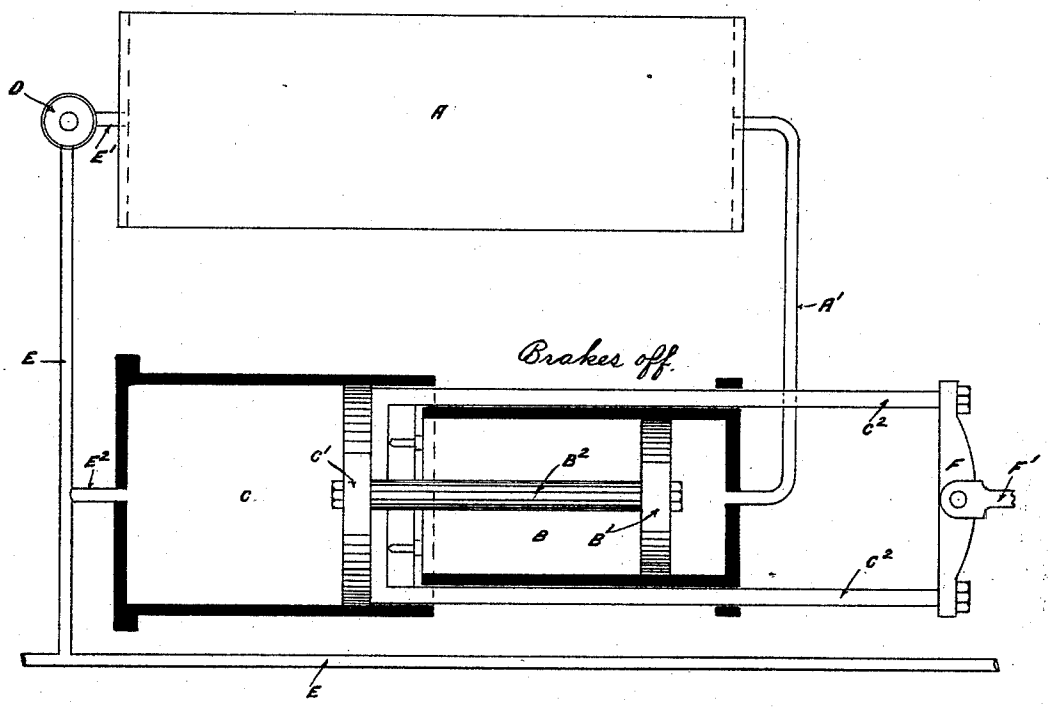


Fig 1

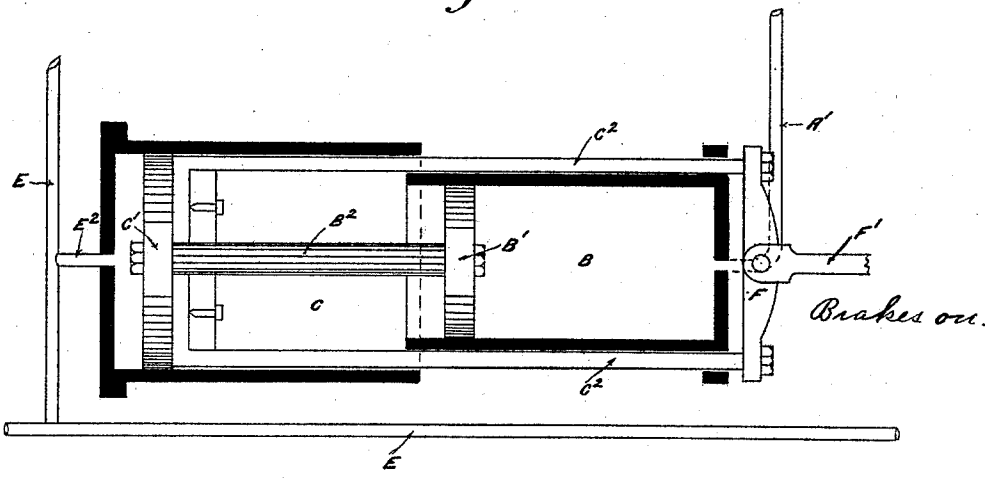


Fig 2

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Attorneys.

(No Model.) 2 Sheets—Sheet 2.

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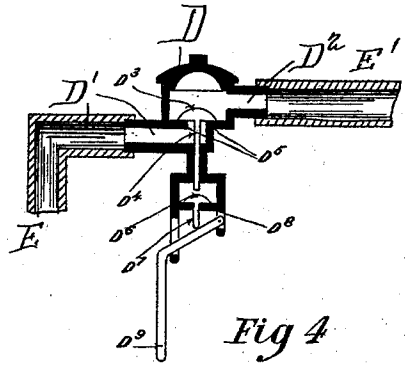


Fig 4

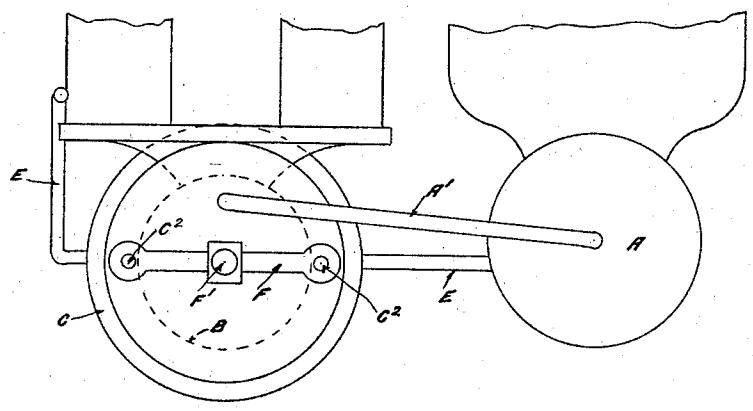


Fig 3

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# UNITED STATES PATENT OFFICE.

JOSEPH J. S. LIST, OF ROCKDALE, NEAR SYDNEY, NEW SOUTH WALES.

## AUTOMATIC CONTINUOUS RAILWAY-BRAKE.

SPECIFICATION forming part of Letters Patent No. 495,499, dated April 18, 1893.

Application filed August 28, 1890. Serial No. 363,381. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH JAMES SWITHIN LIST, joiner, a subject of the Queen of Great Britain, residing at Rockdale, near Sydney, in the British Colony of New South Wales, have invented a new and useful Improved Automatic Continuous Railway-Brake, of which the following is a specification.

This invention relates to an improved automatic continuous railway brake actuated by fluid pressure which brake is simple and cheap in construction as well as effective and economical in operation. This improved automatic continuous railway brake consists of three main parts, a reservoir (hereinafter termed the auxiliary reservoir), a compound cylinder (with connected pistons) and a back pressure valve preferably of peculiar construction all of which are combined and arranged with other parts of well known construction as a through "train" pipe a main reservoir of power and a regulator or triple valve with pressure gages, &c. The auxiliary reservoir is connected to the train pipe (which leads from the main reservoir) by the back pressure or dead valve and is also connected to one end of the compound cylinder. The compound cylinder has larger and smaller chambers with their axes longitudinally in line with each other and having cross-sectional areas in the ratio of not less than two to one and they are cast in the one piece without division of any kind between them and are fitted with pistons connected by an internal piston rod. The larger piston is connected to the outer gear or brake levers by side rods running from said piston through the set-off of the large chamber from the small one, parallel to and embracing said small cylinder and connecting with a crosshead to which the brake levers, &c., may be attached.

The improved automatic continuous railway brake constructed substantially as above set forth is actuated by fluid pressure say by compressed air from a pump and reservoir on the locomotive as well understood through the train pipe and connections to the auxiliary reservoir (by way of the back pressure valve) and to the compound brake cylinders so that both auxiliary reservoir and brake cylinders are supplied with the same pressure at the same time—say this pressure supplied throughout the train is eighty pounds to the square inch. Now to prepare the brake for use a certain amount of the pressure in the train pipe and in the larger chamber is released through the use of the engineer's valve until the total of the original pressure on the piston of the smaller chamber is about equal to the total of the lesser pressure on the piston of the larger chamber. In releasing the brakes the pressure of the main reservoir is turned into the train pipe and on to the larger piston and moves the whole gear to the normal positions. But in order that this invention may be clearly understood reference will now be made to the drawings herewith in which

Figure 1 is a plan partly in section of a brake cylinder and auxiliary reservoir constructed according to this invention with the pistons in the normal or "brakes off" position. Fig. 2 is a similar view in part of the same with the pistons in the "brakes on" position. Fig. 3 is a transverse elevation of the brake apparatus under a carriage, &c. Fig. 4 is a sectional elevation of the back pressure valve.

A is the auxiliary reservoir—B and C the compound brake cylinders—D the back pressure valve and E the "train pipe."

A′ is connecting pipe from the auxiliary reservoir to compound cylinder at the smaller end.

B is the smaller and C is the larger chamber of the brake cylinder.

B′ and C′ are pistons—$B^2$ connecting piston rod.

$C^2$ are side piston rods.

D′ is entrance and $D^2$ exit branch—$D^3$ back pressure valve—$D^4$ valve stem—$D^5$ valve seat.

$D^6$ is a tripping device for valve $D^3$ normally resting on seat $D^8$ and provided with downwardly extending stem $D^7$. The stem of valve $D^3$ extends down almost to tripping device $D^6$.

$D^9$ is hand lever to operate the tripping device.

E′ and $E^2$ are connecting pipes from train pipe to auxiliary reservoir and large cylinder chamber C respectively.

F is crosshead and F′ brake rod or lever.

In use this brake is made ready for operation by opening the pipe E by any well known regulating apparatus or engineer's valve to the main reservoir and charging the

auxiliary reservoir A with the fluid pressure say compressed air therefrom through the valve D the air passing in through branch D′ between valve $D^3$ and seat $D^5$, branch $D^2$ and connecting pipe E′; the compressed air also passes direct into the cylinder chamber C through pipe $E^2$ and through pipe A′ into small chamber thus keeping the whole apparatus in the extreme "brakes off" position by reason of the greater area of the piston C′. Now this charging having taken place the pipe E is closed to the main reservoir and opened to escape until the pressure therein is so reduced that the total of the high pressure (which is shut in the auxiliary reservior and the cylinder B by the closing of back pressure valve $D^3$ on seat $D^5$), upon the smaller piston B′ will equal the reduced pressure upon the larger piston C′. This degree of pressure in pipe E, &c., having been reached which may be known by the reduced pressure indicated by the engineer's gage as compared with the high pressure indicated by the gage before any escape was permitted, the brake is ready for application which may be carried out quickly or slowly and to the extent required up to the pressure in auxiliary reservoir A by the speed and extent of a further reduction of the pressure in the train pipe E controlled by the engineer's valve as understood. To remove the brakes again sufficient pressure is allowed to pass from the main reservoir into the train pipe E and larger cylinder C and such pressure is again reduced to "make ready" as before described. When a car or vehicle is cut out of a train and being shunted or otherwise moved the brakes are always "on" until the hand lever is pressed inward and tripping device $D^6$ from seat $D^8$ also presses stem $D^4$ and lifts valve $D^3$ from seat $D^5$ and if the couplings of the train pipe be closed allow the pressure in both chambers B and C to equalize and by the larger area of piston C′ cause the brake gear to take extreme "brakes off" position. Now if the brakes are required to be applied in second shunting the opening of the coupling will reduce the pressure in the train pipe with the effect of applying the brakes as before described. But if an end coupling be open when valve handle $D^9$ is manipulated to open valve $D^3$ all pressure will escape through said coupling from the auxiliary reservoir A and the chambers B and C and leave the brakes free.

Having now particularly described and explained the nature of this said invention and the manner in which the same is to be performed, I declare that what I claim is—

In combination the cylinder brake having the large and small pressure chambers B, C, the train pipe, the auxiliary reservoir, the pipe $E^2$ connecting the train pipe with the large pressure chamber, the pipe E′ connecting the train pipe with the reservoir, the pipe A′ connecting the reservoir with the small pressure chamber and the check valve between the reservoir and the train pipe whereby the pressure in the two pressure chambers may be controlled through the train pipe from the engineer's valve, the said check valve having a hand operating connection whereby the pressure in the reservoir and the large and small pressure chambers may be controlled when a car is detached or shunted, substantially as described.

JOSEPH J. S. LIST.

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