

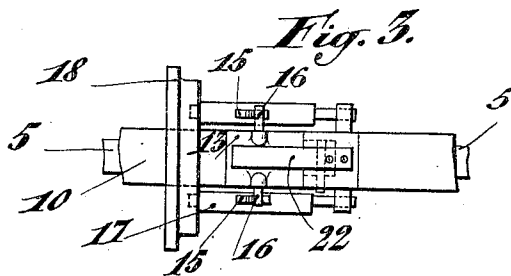
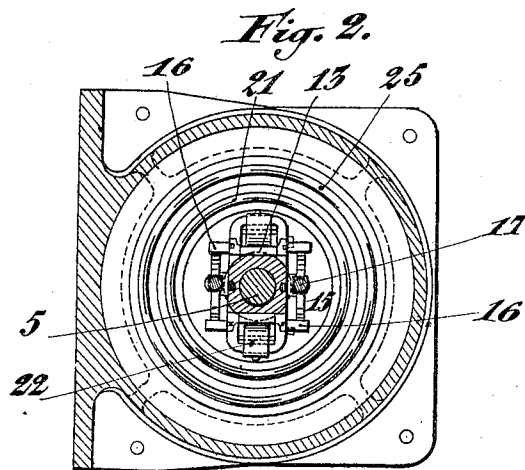
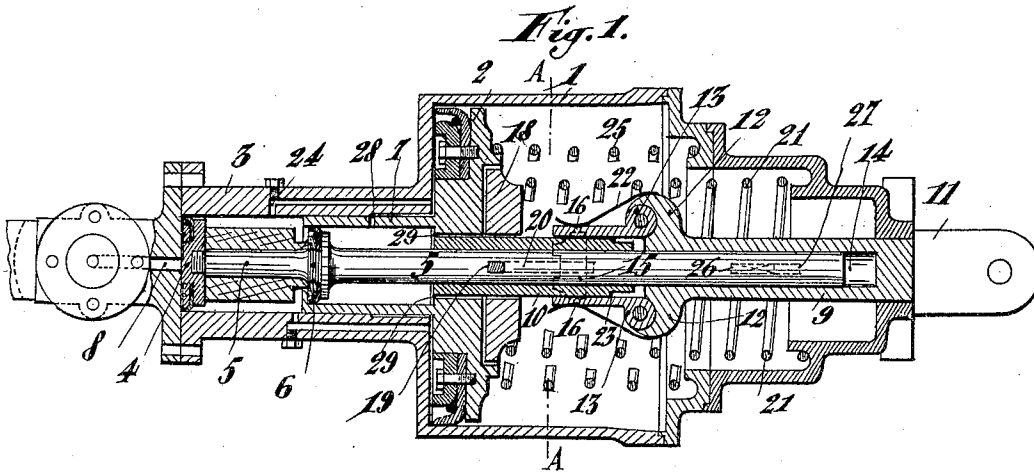
No. 798,429.

PATENTED AUG. 29, 1905.

C. LUYERS.  
COMPRESSED AIR BRAKE FOR RAILWAY TRAINS.

APPLICATION FILED DEC. 17, 1904.

2 SHEETS—SHEET 1.



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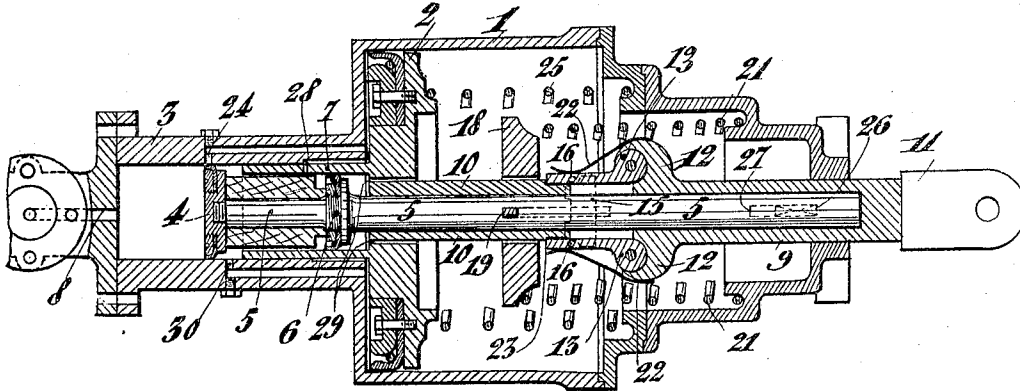
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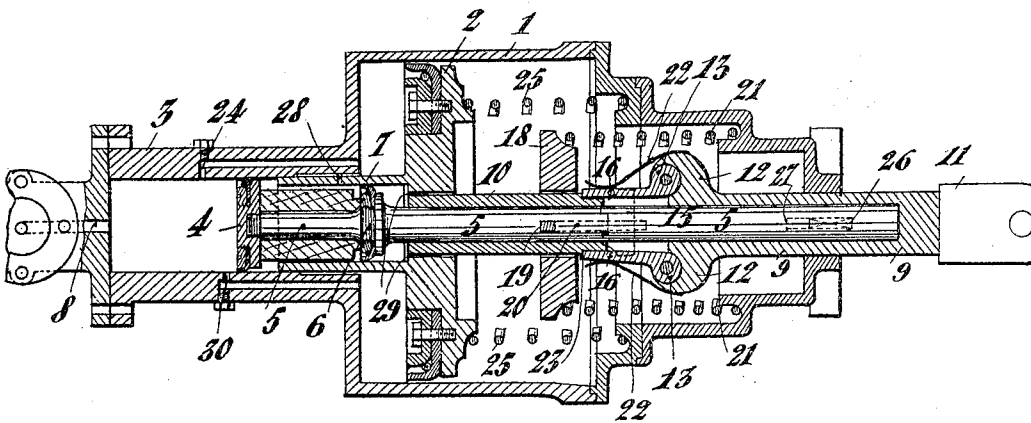
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2 SHEETS—SHEET 2.

*Fig. 4.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

CHARLES LUYERS, OF VILVORDE, BELGIUM.

## COMPRESSED-AIR BRAKE FOR RAILWAY-TRAINS.

No. 798,429.

Specification of Letters Patent.

Patented Aug. 29, 1905.

Original application filed September 28, 1903, Serial No. 174,931. Divided and this application filed December 17, 1904. Serial No. 237,196.

*To all whom it may concern:*

Be it known that I, CHARLES LUYERS, a citizen of Belgium, residing at Vilvorde, Belgium, have invented new and useful Improvements in Compressed - Air Brakes for Railway-Trains, of which the following is a specification.

This application is a division of the application filed by me September 28, 1903, Serial No. 174,931.

The invention has reference to the operating-cylinders of pneumatic brakes for railway-trains in which the admission of compressed air first causes the forward movement of a small piston whose rod is connected to the brake-blocks, so as to move these toward friction-pulleys that are mounted on the axle of the vehicle-wheels, and, secondly, causes the forward movement of a larger piston, which acts only to press the brake-blocks against the pulleys, and thus produce a braking action proportional to the quantity of air admitted to the cylinder. The two pistons are moved back by springs for the purpose of taking off the brakes as soon as the compressed air is discharged into the atmosphere.

The main object of the present invention is to produce a rapid and effective braking action with a minimum consumption of compressed air. To effect this object, it is necessary to insure perfect tightness against air leakage of the parts that are operated by the compressed air and the regular and certain working of the parts which serve to automatically establish and interrupt at the desired moments the community of action of the two pistons upon the rod for operating the brake-blocks.

Referring now to the accompanying drawings, Figures 1, 4, and 5 are axial longitudinal vertical sections through a brake-cylinder constructed according to this invention, showing the parts in the different positions they occupy successively during the working of the apparatus. Fig. 2 is a vertical cross-section thereof on the line A A of Fig. 1, and Fig. 3 is a partial plan showing the parts for operating the pawls.

The apparatus comprises a cylinder 1, in which are arranged the large piston 2, the pawls 13 for coupling its piston-rod 10 with the rod 5 of the small piston 4, and springs 21 and 25, which move the pistons back when the brakes are taken off. A rear cylindrical

prolongation 3 of smaller diameter incloses the small piston 4, which is concentric with the large piston 2. Between these two pistons the rod 5 of the small piston carries a third piston 6, which works in a tubular extension 7 of the large piston 2, that extends into the reduced cylindrical portion 3. This piston 6 forms an air-tight packing and permits the rod 5 to pass freely through the large piston 2—that is to say, through the tubular rod 10 of the latter. The rod 5 extends into the interior of another tubular rod 9, that terminates at one end in a cross-head connected to the brake-blocks and at the other end in enlarged portions 12, in which are pivoted the pawls 13, which serve to couple together the two hollow rods 9 and 10. As will be shown hereinafter, the piston 6 serves also to establish at the desired moment communication between the rear of the piston 2 and the atmosphere when the brakes are taken off. When the brakes are taken off, the parts occupy the positions shown in Fig. 1. The small piston 4 is situated close up to the end of the cylinder 3, and between the end of its rod 5 and the closed end of the tubular part of the rod 9 there is left a vacant space 14. A key 26, fixed to the rod 5, occupies the rear part of a groove 27, formed through the hollow rod 9. The pawls 13 are kept at a slight distance from the hollow rod 10 by means of tappets 15, on which bear lugs 16, that project from the side of the pawls. These tappets 15 are connected by rods 17 to a plate 18, connected to the rod 5 by means of a key 19, which extends through a longitudinal slot 20 in the hollow rod 10, so as to allow the plate 18 to slide on the latter.

When the compressed air is admitted to the cylinder by a duct 8, it first pushes back the small piston 4 and its rod 5 until the latter reaches the closed end of the hollow rod 9, after having moved through the space 14. The key 26 is then situated at the forward end of the groove 27. The rod 5 moves with it the plate 18, compressing the spring 21, which is intended to move this plate back again, and consequently the rods 17 and the tappets 15, which slide under the stops 16, and thus disengage the pawls, which are then pressed against the hollow rod 10 by means of flat springs 22. The small piston 4 in continuing to advance then moves with it the rod 9 and

the pawls 13, which slide on the hollow rod 10 until they reach the shoulder 23, formed near the end of the rod 10. They are then pressed by the springs 22 upon the contracted part of the rod 10 in order to effect the coupling together of the three rods 5, 9, and 10. At this moment, as will be seen from Fig. 4, the cross-head 11 has already accomplished a great part of its travel, which has for effect to move the brake-blocks toward the brake-pulleys, and the piston 4 is on the point of uncovering a port 24, through which the compressed air will have access to the large piston 2. In order to uncover this port, the piston 4 must still advance for a short distance, and this movement, which has the effect of causing the pawls 13 to slide on the contracted part of the rod 10, has for object to insure the certain engagement of the pawls with the shoulder 23. As soon as the piston 4 uncovers the port 24 the compressed air is admitted there-through and acts upon the rear face of the large piston 2 and compresses its spring 25. The pressure therefore acts both on the surface of the small piston and upon the surface of the large piston and both are pushed forward. The shoulder 23 of the rod 10 of the large piston first overtakes the end of the pawls 13, and from this moment the three rods 5, 9, and 10 constitute one rod to push forward the cross-head 11 and to press the brake-blocks against the brake-pulleys until the parts occupy the positions shown in Fig. 5. A second port 30, formed a little past the port 24, facilitates the access of the compressed air to the piston 2 after the latter has been set in operation.

The taking off of the brakes is effected by cutting off the admission of compressed air and placing the supply-duct 8 in communication with the atmosphere by means of a suitable device. The pistons and their rods are then moved back by the successional expansion of the springs 21 and 25. The fall in pressure is first experienced in the small cylinder 3, and the piston 4, with its rod 5, and the plate 18 are pushed back by the spring 21. The rod 5 slides in the hollow rod 9 until the key 26 reaches the rear end of the groove 27, and the plate 18 moves with it the tappets 15, which slide under the stops 16 of the pawls 13 and raise the latter, compressing the springs 22. By means of the key 26 the rod 5 then moves with it the hollow rod 9 and the pawls 13, and the latter slide over the hollow rod 10. The piston 6, which forms a packing, in following up the rearward movement of the piston 4 uncovers a port 28, through which the compressed air inclosed behind the large piston 2 escapes first into the interior of the cylindrical extension 7 and thence through a passage 29 in the piston 2 into the large cylinder 1 on its way to the atmosphere. The

spring 25 then moves the piston 2 back again and the parts occupy anew the positions shown in Fig. 1.

I claim—

1. In operating - cylinders of pneumatic brakes wherein the compressed air first actuates a small piston for moving forward the rod connected to the brake-blocks until the said rod becomes coupled by means of pawls with the rod of a larger piston which is afterward acted upon by the compressed air for completing the forward movement of the brake-blocks—the combination with the cylinder containing the larger piston and a rear extension of smaller diameter of the said cylinder containing the small piston, and connected by a side port with the cylinder behind the said larger piston, of a rear cylindrical extension of the larger piston movably located within the said rear extension of the cylinder and in which is formed a port terminating behind the large piston and a third piston mounted on the rod of the small piston within the said rear cylindrical extension of the larger piston.

2. In operating - cylinders of pneumatic brakes wherein the compressed air first actuates a small piston for moving forward the rod connected to the brake-blocks until the said rod becomes coupled by means of pawls with the rod of a larger piston which is afterward acted upon by the compressed air for completing the forward movement of the brake-blocks—the combination with the coupling-pawls pivoted to the rod of the brake-blocks, of springs pressing the said pawls toward the rod of the larger piston, tappets for keeping the said pawls away from the said rod of the larger piston against the action of the said springs and means actuated by the rod of the small piston for disconnecting the said tappets from the said pawls on the forward motion of the said small piston.

3. In operating - cylinders of pneumatic brakes wherein the compressed air first actuates a small piston for moving forward the rod connected to the brake-blocks until the said rod becomes coupled by means of pawls with the rod of a larger piston which is afterward acted upon by the compressed air for completing the forward movement of the brake-blocks—the combination with the coupling-pawls pivoted to the rod of the brake-blocks, of springs pressing the said pawls toward the rod of the larger piston, stops fixed to the sides of the said pawls, tappets upon which the said stops rest for keeping the said pawls away from the said rod of the larger piston against the action of the said springs and a plate connected with the rod of the small piston so as to move therewith against the action of a spring, said plate being rigidly connected with said tappets.

4. In operating-cylinders of pneumatic brakes wherein the compressed air first actuates a small piston for moving forward the rod connected to the brake-blocks until the said rod becomes coupled by means of pawls with the rod of a larger piston which is afterward acted upon by the compressed air for completing the forward movement of the brake-blocks, the combination with the coupling-pawls pivoted to the rod of the brake-blocks, of springs pressing the said pawls toward the rod of the larger piston, tappets for keeping the said pawls away from the said rod of the larger piston against the action of the said springs, a rear cylindrical extension of the operating-cylinder said extension containing the small piston and being connected by a port with the operating-cylinder at the back of the larger piston, and means actuated by the rod of the small piston in its forward motion for disconnecting the said tappets from the said pawls before the small piston has passed and uncovered the said port.

5. In operating-cylinders of pneumatic brakes wherein the compressed air first actuates a small piston for moving forward the rod connected to the brake-blocks until the said rod becomes coupled by means of pawls with the rod of a larger piston which is afterward acted upon by the compressed air for completing the forward movement of the brake-blocks, the combination with the coupling-pawls pivoted to the rod of the brake-blocks, of springs pressing the said pawls toward the rod of the larger piston, tappets for keeping the said pawls away from the said rod of the larger piston against the action of the said springs and means actuated by the rod of the small piston in its forward motion for disconnecting the said tappets from the said pawls before the rod of the small piston moves with it the rod connected to the brake-blocks.

6. In operating-cylinders of pneumatic brakes wherein the compressed air first actuates a small piston for moving forward the

rod connected to the brake-blocks until the said rod becomes coupled by means of pawls with the rod of a larger piston which is afterward acted upon by the compressed air for completing the forward movement of the brake-blocks—the combination with the coupling-pawls pivoted to the rod of the brake-blocks, of springs pressing the said pawls toward the rod of the larger piston, tappets for keeping the said pawls away from the said rod of the larger piston against the action of the said springs, means rigidly connecting the said tappets with the rod of the small piston and means for connecting the said tappets with the said pawls on the return motion of the small piston before the return of the rod of the brake-blocks.

7. In operating-cylinders of pneumatic brakes wherein the compressed air first actuates a small piston for moving forward the rod connected to the brake-blocks until the said rod becomes coupled by means of pawls with the rod of a larger piston which is afterward acted upon by the compressed air for completing the forward movement of the brake-blocks—the combination with the coupling-pawls pivoted to the rod of the brake-blocks, of springs pressing the said pawls toward the rod of the larger piston, tappets for keeping the said pawls away from the said rod of the larger piston against the action of the said springs, means rigidly connecting the said tappets with the rod of the small piston and means for connecting the said tappets with the said pawls on the return motion of the small piston before the compressed air is allowed to escape from behind the larger piston.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES LUYERS.

Witnesses:

H. T. E. KIRKPATRICK,  
L. PIÉRARD.