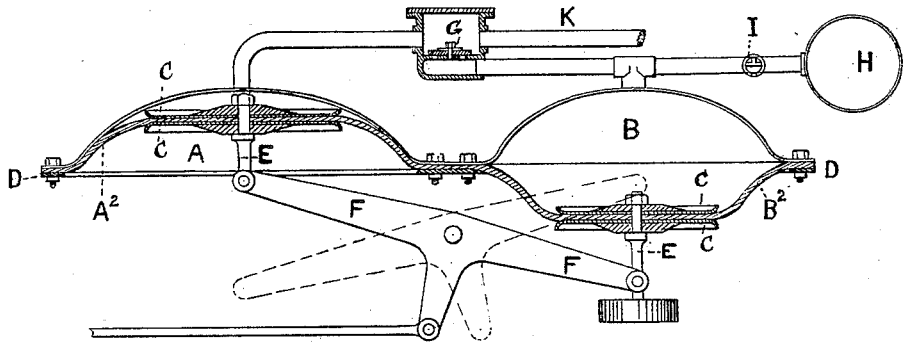
3 Sheets—Sheet 1.

R. D. SANDERS.

Brake for Railway Carriages.

No. 204,378. Patented May 28, 1878.

FIG 1



Witnesses,
George Stead
Richard Skerrett

Inventor
Richard David Sanders

3 Sheets—Sheet 2.

R. D. SANDERS.

Brake for Railway Carriages.

No. 204,378. Patented May 28, 1878.

Fig. II

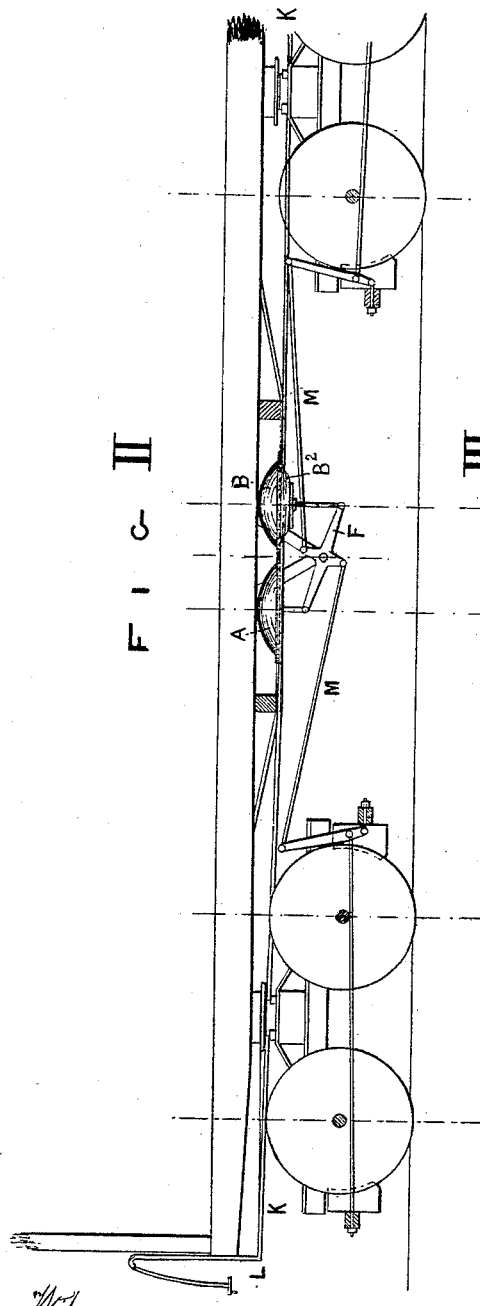
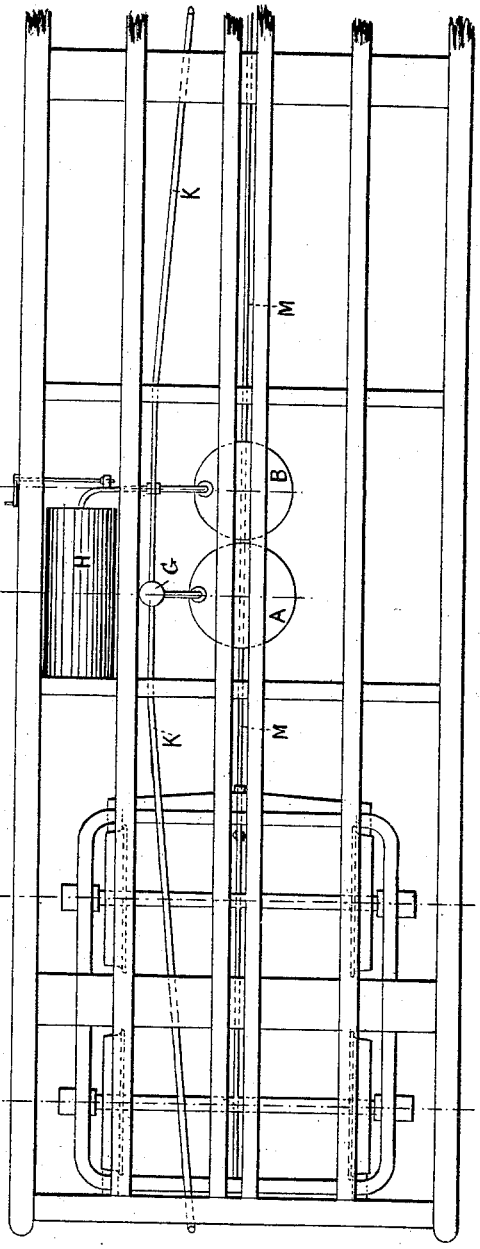


Fig. III



Witnesses,
George Shaw.
Richard Skerrett

Inventor
Richard David Sanders

3 Sheets—Sheet 3.

R. D. SANDERS.

Brake for Railway Carriages.

No. 204,378. Patented May 28, 1878.

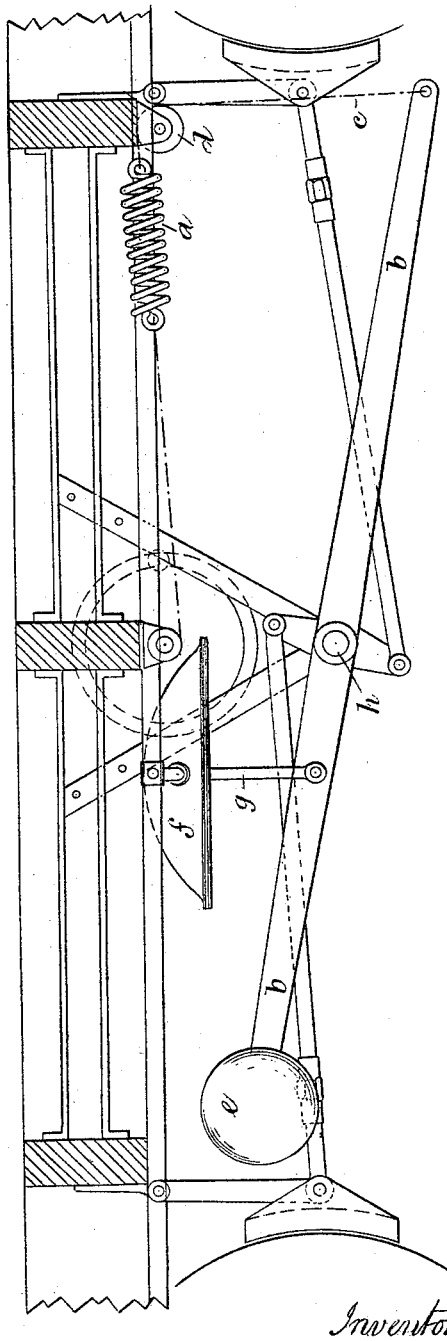


Fig IV

Witnesses,
George Shaw
Richard Skerrett

Inventor
Richard David Sanders

UNITED STATES PATENT OFFICE.

RICHARD D. SANDERS, OF BIRMINGHAM, ENGLAND.

IMPROVEMENT IN BRAKES FOR RAILWAY-CARRIAGES.

Specification forming part of Letters Patent No. **204,378**, dated May 28, 1878; application filed December 3, 1877; patented in England, April 30, 1874, No. 1522, and July 5, 1875, No. 2425; also in France, July 25, 1877.

To all whom it may concern:

Be it known that I, RICHARD DAVID SANDERS, of Birmingham, in the county of Warwick, England, mechanical engineer, have invented or discovered new and useful Improvements in Continuous Brakes for Railway-Carriages, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

My said invention consists principally of the improvements, hereinafter described, and illustrated in the accompanying drawings, in working the continuous brakes of railway-carriages by means of two power-drums, having flexible covers or diaphragms, the said power-drums being of different diameters. By means of an exhaust or vacuum in the said power-drums the excess of atmospheric pressure on the drum of larger diameter over that of smaller diameter causes the collapse of the flexible cover of the former, by which collapse the brake mechanism is so operated upon that the brakes are held out of action. When the exhaust or vacuum is destroyed in the power-drum of larger diameter, the exhaust or vacuum in that of smaller diameter, being now free to act, draws the flexible head of the said smaller power-drum inward, and so acts on the mechanism operating the brakes that the blocks are forced against the wheels.

The exhaust or vacuum in the power-drums is produced by a steam-jet, ejector, or exhausting-pump, worked by the moving locomotive, or by the steam of the locomotive-boiler, or otherwise. The power-drums are connected together and to the exhausting apparatus by a pipe running along the train of carriages, and the said pipe and power-drums are provided with appliances, as hereinafter described, whereby the exhaustion of both drums is maintained so long as the exhaust or vacuum is maintained in the connecting pipe, in which state of the power-drums the brakes are kept out of action. When, however, the vacuum is destroyed in the pipe connected with the power-drums, either by the opening of a valve or stop-cock, or the rupture of the said tube by a separation of the carriages of the train, or otherwise, the exhaust in the power-drum of larger diameter is destroyed, while that in the one of smaller diameter is preserved, and the brakes are brought into action.

The combination of power-drums described may be employed to work continuous brakes by means of compressed air instead of exhaust or vacuum.

Instead of using two power-drums of different diameters, a single power-drum may be employed, when the brakes are put into action by weighted levers or springs, the said single power-drum being employed only for the purpose of keeping the brakes off the wheels.

Figure 1 represents, in section, my arrangement for obtaining automatic action by the use of two power-drums of different diameters, acting in opposition to each other in the following manner: When the train is in motion a constant vacuum is maintained in both the drums A B; but in consequence of the area of the drum A being greater than that of the drum B, the pressure of the atmosphere, acting upon the flexible head A^2 of the drum A, overcomes that upon the flexible head of the drum B and brings the lever F into the position shown in Fig. 1, in which position of the lever the brakes are out of action. When air is admitted into the pipe along the train by the opening of a tap or valve on the engine or any of the carriages, or by an accidental separation of the train, the said air passes into the drum A and destroys the vacuum therein; but the said air is prevented from entering the drum B by a valve, G. The drum A being thus rendered powerless, the pressure of the atmosphere, acting upon the head B^2 of the drum B, raises the said head, and with it the bolt E, into the drum B, and thereby reverses the position of the lever F, as indicated in dotted lines in Fig. 1, and thus applies the brakes, as hereinafter explained.

H is a reservoir, for the purpose of storing up a vacuum or reserve power for maintaining the vacuum in the drum B. This reservoir may be omitted where the construction of the carriages will admit of the power-drum B being made deeper and of increased capacity.

I is a cock or valve, for the purpose of destroying the vacuum or letting the pressure out of the drum B when it is required to release the brakes by hand.

Fig. 2 represents, in side elevation, and Fig.

3, in plan of under side, a railway-carriage to which the power-drums A B and the apparatus connected therewith (represented in Fig. 1) are applied, K being the continuous pipe, and L the flexible coupling-pipes between the carriages.

By an examination of Fig. 2 it will be seen that the brake-mechanism is connected with the lever F by means of the connecting-rods M M, and that, when the said lever F is in the position represented, the brakes are taken out of action. It will be further understood, by an examination of the said Fig. 2, that when the lever F takes the reverse position, by the raising of the flexible head B^2 of the power-drum B, the drawing inward of the connecting-rods M M causes the brake-blocks to press upon their respective wheels.

The power-drums, hereinbefore described and illustrated, may be used with compressed air instead of a vacuum, if desired; but in that case the valve G, Fig. 1, would have to be on the other side of its seat—that is, must open downward instead of upward.

Fig. 4 shows the application of one of the power-drums hereinbefore described to brakes which are actuated or made to press upon the wheels either by weighted levers or springs, or both. In this modification of my invention the exhaust in the single power-drum holds the brakes out of action; but when the exhaust in the power-drum is destroyed by the opening of the stop-cock or rupture of the train the brakes are brought into action by the weighted levers or springs, or both.

In the said Fig. 4, I have represented one of the brakes as being made to act upon the wheel by means of a coiled spring, *a*, acting on the lever *b* by means of the chain *c* passing over the pulley *d;* and I have represented the said lever *b* as provided with a weight, *e*, tending to move it in the same direction as the spring *a;* but it must be understood that either springs *a* alone may be used, or weights *e* alone may be used, or that weights and springs in conjunction may be used.

f is the power-drum, the bolt *g* of which is connected at top to the flexible cover of the drum *f*, and at bottom is jointed to the lever *b*. The area of the flexible head of the power-drum *f* is such that when the said drum is exhausted the atmospheric pressure upon it is largely in excess of that required to counteract the pressure of the springs and weights *a e*.

When, by the exhaustion in the power-drum *f*, its flexible head and bolt *g* are raised, the weighted end of the lever *b* is raised and the brake-blocks withdrawn from the wheel. The exhaustion in the power-drum *f* being destroyed, the brake-blocks are brought into action by the springs *a* or weights *e*, or both, as hereinbefore described.

The single power-drum *f*, Fig. 4, may be worked by compressed air instead of by exhaust. In this case the drum *f* is placed on the other side of the axis *h* of the lever *b*, so that the descent of the bolt *g* may produce the same motion of the lever *b* as is produced by the ascent of the said bolt *g* when in the position represented in the drawing.

My method of making the flexible heads of power-drums is represented in Fig. 1.

A^2 B^2 are the flexible heads of the power-drums A B, the said flexible heads consisting of flexible covers, which are manufactured, in suitable molds, to the form shown in the drawing. C C are center-plates, between which the central portions of the flexible covers A^2 B^2 are grasped and supported; and D is a ring, which secures the covering at the periphery by means of screw bolts and nuts. By this method of constructing the flexible covers or heads A^2 B^2 of the power-drums, the center-plates C and the said covers or heads A^2 B^2 and the bolts E E can be drawn inward or outward without straining the covering, and the length of the strokes of the bolts E is in no degree dependent upon the elasticity of the material used for the coverings A^2 B^2, but upon the amount of freedom given to them by the form adopted in their manufacture. By this method of manufacture great durability is also secured in the coverings A^2 B^2.

The means employed for maintaining the vacuum for the automatic action consists of an ordinary ejector, placed on some convenient part of the locomotive, and an exhausting-pump, worked from a reciprocating part of the engine or an eccentric. Before starting, the air is drawn out of the pipes and power-drums by means of the ejector, and the vacuum is then maintained by the pump after the train is put in motion.

A separate donkey-pump may be used; but I prefer to work it from the engine. The exhaust-steam from the locomotive-cylinders may also be used to work the donkey-pump or the ejector.

Having now described the nature of my invention, and the manner in which the same is to be performed, I wish it to be understood that I claim as my invention of improvements in continuous brakes for railway-carriages—

The combination, with brakes and suitable mechanism to operate or press the same against the wheels of railway-carriages, of two power-drums of different diameters, constructed and arranged, in relation to said brakes and intermediate mechanism, for operation in the manner herein shown and described.

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Witnesses:
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RICHARD SKERRETT,
Of 37 Temple Street, Birmingham.