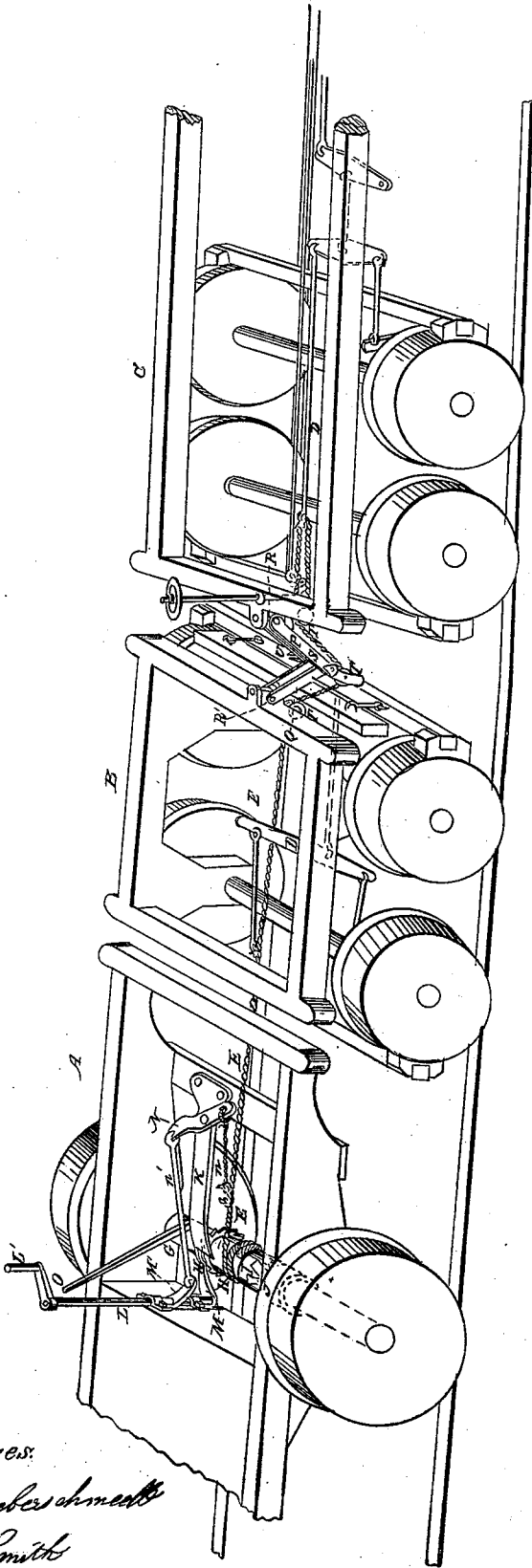


D. S. CROSS.

Car Brake.

No. 37,568.

Patented Feb. 3, 1863.



Witnesses:  
*J. A. P. Weber*  
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# UNITED STATES PATENT OFFICE.

DAVID S. CROSS, OF CINCINNATI, OHIO.

## IMPROVEMENT IN CAR-BRAKES.

Specification forming part of Letters Patent No. 37,568, dated February 3, 1863.

### *To all whom it may concern:*

Be it known that I, DAVID S. CROSS, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Railroad Car Brake; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

This improvement relates to the class of devices in which the brakes of an entire train are operated by the power of the engine under control of the engineer; and my invention relates to, first, a provision for the automatic limitation of the windlass-tension; second, a means of preserving a uniform tension of the brake-chain under every condition of the train.

A B C represent, respectively, the lower portions of a locomotive, a tender and part of a car.

D D may represent portions of a customary hand-brake.

E is a cord or chain which, extending from brake to brake, is attached by its forward end to a windlass, F, which revolves and slides freely upon the driver-axle G. The windlass F carries at one end a ratchet-wheel, H, and collar H', and at the other end a clutch, I, adapted to mesh, when desired, with a counter-clutch, J, which is attached to the axle G.

K is a pawl, which engages in ratchet H.

L is a shaft having at its upper end a handle, L', and at or near its lower end two arms, M M', of which one, M, engages in the collar H' of the windlass and enables the engine to instantly couple or uncouple the windlass-clutch, according to the exact tension desired. The bearing faces or sides of the clutch-teeth are made slightly oblique, in order both to facilitate the coupling and uncoupling and to make the clutch self-releasing the instant that the pressure of the drivers hand (or foot) is withdrawn from the handle L. The said obliquity of the teeth also enables the engineer to feel of the tension and to exercise discretion in its application; but, in order to make it impossible for the tension to be increased to a point which would endanger the apparatus, I provide the following self-releasing mechanism:

Pivoted to the pawl K is a lever, N, one end of which is connected to the chain E by cord or rod *n*, and the other end to arm M' by cord or rod *n'*. The effect of this connection is that

the winding of the brake-chain E acts at a certain point to forcibly uncouple the clutch, even in opposition, if necessary, to the pressure exerted by the engineer upon the handle L'. Such release of the clutch does not relax the windlass-tension, but only arrests its increase at a point beyond which it would endanger the machinery to carry it, and throws the duty of sustaining the windlass-tension wholly upon the pawl K. The engineer can at any moment instantly release the entire series of brakes by withdrawing the pawl K from the ratchet H, which he does by drawing toward him the lever O, pivoted to the pawl K and bearing against the axle G by a cam or eccentric edge or roller at its lower end, or by any other suitable device.

The above-described device is believed to be the most effective remedy yet contrived for the violent and destructive reactions to which a continuous car-brake is subject, but it is believed that no provision on the locomotive merely or at one end only of the brake-chain can be made to operate throughout the length of the train to compensate for the vicissitudes of tension due to the constantly-changing contraction and extension of the train itself. Thus, when the cars have crowded together, a large amount of slack occurs in the brake-chain, which dangerously impairs the promptness of the brake-action, especially upon the rearmost cars, the unavoidable friction of the chain around the numerous rollers, and the large amount of slack between all the cars, causing the brake-action to travel slowly to the rear, instead of acting instantaneously throughout the train, as it ought to do. Again, the slack having been taken up and the train beginning to lengthen out, either by the starting forward of the engine or by the reaction of the draw-bars and buffers, something must give way, and, from the friction above alluded to, a relaxation at the engine merely is inadequate to compensate for the stretch toward the rear end of the train, and hence the snapping of the chain and the straining and destruction of other parts of the apparatus, which now constantly takes place from this irresistible strain and which has been the chief cause of the impracticability and rejection of these otherwise valuable attachments.

The lack of promptness and the unequal strain and tension due to the above-cited

crowding together and separation of the cars I effectually obviate by the following means :

P Q are two bars or links joined together by a knuckle, S, so as to form a toggle, and connected by gimbal-joints R to their respective cars. The-link P is extended so as to carry a roller or pulley, T, around which and two carrier-pulleys, T' T'', the brake-chain E is stretched. The pintle U of the hinge S should be so constructed as to be readily inserted and withdrawn for the coupling and uncoupling of the cars. For the same reason the brake-chain E should be connected from car to car by a compact snap-hook, of form familiar in this class of devices.

The chain connection may be made with reference to a discretionary taking up or letting out of the chain to compensate for stretch, &c.

Operation : The engineer can at any instant throw on the brakes by shifting the handle L' to the left so as to couple the clutch, which he can maintain in gear, if desired, by a slight continuous pressure by hand or foot. The action of winding up the brake-chain is accompanied by the winding up of the liberating-chain n, which, when drawn taut, acts to uncouple the clutch, and by this means to discontinue the winding action and to prevent undue tension of the chain. Simultaneously with the above movements the slack of the brake-chain between every pair of cars, due to the crowding up of the train, is promptly taken up by the depression of the toggle P Q, which thus relieves the windlass of the duty of taking up the slack and enables it to oper-

ate instantaneously upon the entire series of brakes throughout the train. The benefit of the provision is conspicuous the moment that the train lengthens, either by the starting forward of the engine or the reaction of the buffers, draw-bars, &c., the unfolding toggle giving out slack so as exactly to compensate for the stretch of the train, and by this means preventing the snapping of the brake-chain, the straining of the trucks, flattening of the wheels (by sliding) and other injuries.

I claim herein as new and of my invention—

1. The arrangement of driving-axle G, sliding and revolving windlass F, ratchet and pawl H K, clutch I J, armed shaft L M M', and self-releasing attachment N n', in the described combination with the brake-chain E, the whole being combined and operating as and for the purposes set forth.

2. In the described combination with the above, the cam-headed lever O, connected to the pawl and operating substantially as set forth.

3. The provision of toggle P Q and rollers T T' T'', or their equivalents, in the described combination with the consecutive cars, and with the main brake chain E, for the equalization of tension of the said chain, in the manner set forth.

In testimony of which invention I hereunto set my hand.

DAVID S. CROSS.

Witnesses :

GEO. H. KNIGHT,  
A. S. LUDLOW.