J. L. CLARK.

Car Brake.

No. 1,548.

Patented Apr. 11, 1840.

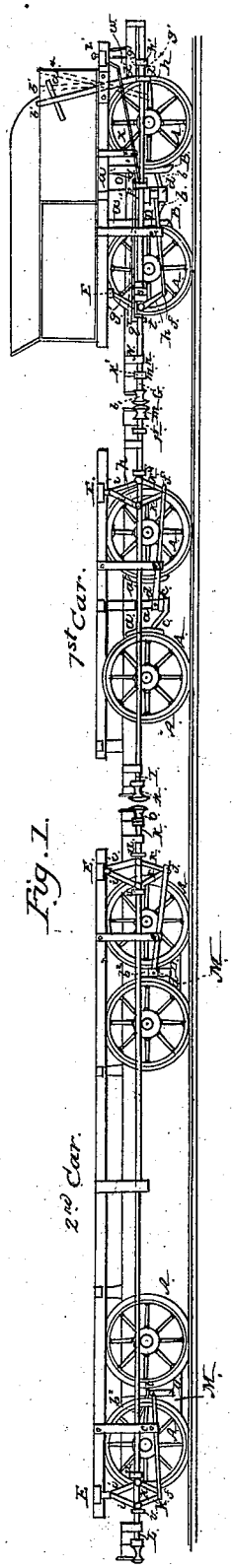

Fig. 1.

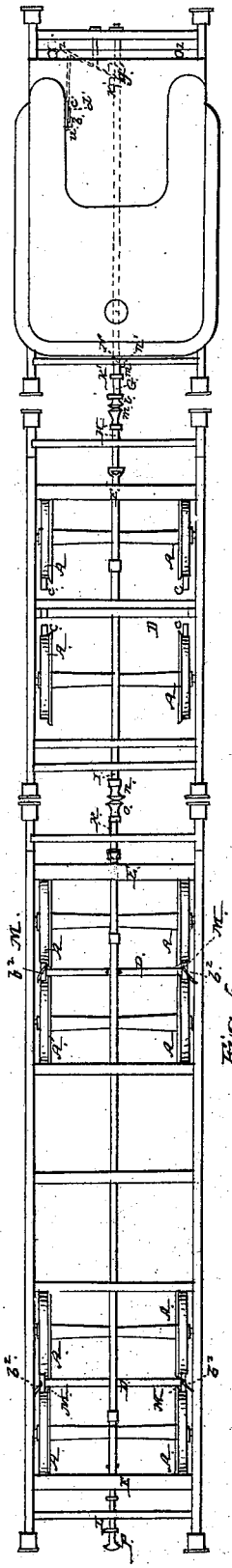

Fig. 2.

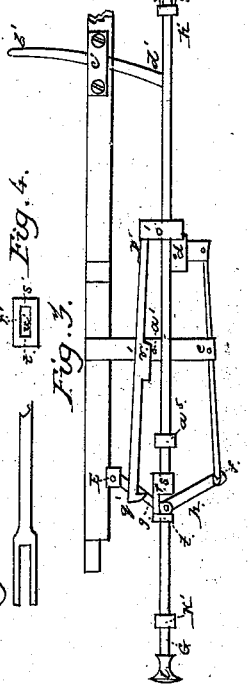

Fig. 3.

Fig. 4.

Fig. 5.

UNITED STATES PATENT OFFICE.

JOHN L. CLARKE, OF NASHUA, NEW HAMPSHIRE.

MACHINERY FOR OPERATING FRICTION-BRAKES FOR RAILROAD-CARS.

Specification of Letters Patent No. 1,548, dated April 11, 1840.

To all whom it may concern:

Be it known that I, JOHN L. CLARKE, of Nashua, New Hampshire, have invented new and useful improvements of machinery to be applied to the friction-brakes of railway-carriages in order to produce a more effectual action of the same on the peripheries of the wheels, so as to retard the revolutions of said wheels and thereby reduce the velocity of a car or a train of cars or entirely stop their motions in a much shorter period of time and in a much less distance of track than by any machinery heretofore used.

The said improvements, the principles thereof, and manner in which I have contemplated the application of the same by which they may be distinguished from other inventions of a like character and purpose, together with such parts or combinations I claim as my invention and consider original and new, I have herein described and set forth. The said description taken in connection with the accompanying drawings herein referred to, forms my specification.

Figure 1, is a vertical and longitudinal section of a train of two cars and a tender of a locomotive. Fig. 2, is a plan or top view of the same, the coach or wagon bodies not being represented in the figures on account of more completely exhibiting some of the important features of my invention, which otherwise would be hidden by the same.

A, A, A, throughout the drawings represent the wheels of the different carriages, whose velocity when moving along the railway may be retarded or diminished by the friction brakes B, B, C, C, D, D, which are operated or pressed against their circumferences by my improved machinery with a greater or less force according to circumstances which will be hereafter explained.

The brakes B B, C C, are each suspended at the top *a* (see Fig. 1) so as to vibrate with a slight pendulous motion. They are pressed outward or against the wheels by the progressive levers or toggle joints *b b*, *c c*, one end of each of which, is connected by a joint to each brake while the opposite extremities are attached to the end, (or a projection *d* therefrom as seen in the tender) of a horizontal and transverse cross beam D, (Figs. 1 and 2). In the tender, this cross beam rests on and is connected or joined to the extremity of a lever *d e f*, whose fulcrum or support is at *e*. In the first car, the end *d* of the lever is placed above the beam D. The other extremity is connected by a suitable joint to the lower links of a series of progressive levers or toggles *g h*, *i i*, *k k*, &c., arranged as seen in the drawings or otherwise suitably placed, the upper extremities of the upper links *g*, *i*, being attached by a suitable joint to the fixed transverse beam E, Figs. 1 and 2.

Long metallic rods F, G, H, I, K, L, properly supported in bearings so as to be moved to and fro longitudinally, pass through suitable openings in the central joints of the progressive levers *g h*, *i i*, *k k*, and have abutting heads *l*, *m*, *n*, *o*, *p*, placed on their extremities. Shoulders or collars *s*, *t*, *u*, *v*, are fixed on the rods H, I, K, L, (as seen in Fig. 1.) Now it will be observed that when either of the above rods H, I or K, L, are moved in a longitudinal direction, either to the right or left, the shoulders *s*, *t*, *u*, *v*, will be brought against the center joint of the progressive levers *i i*, *k k*, and cause these levers to close together, thereby depressing the extremity *f* of the lever *d*, *e*, *f*, and of course raising at the same time, the other end *d*, and cross beam D, and through the intervention of the side toggles *b b*, *c c*, the brakes C C will be pressed outward or against the peripheries of the wheels. When this action ceases the brakes are thrown off the wheels by springs a^2 b^2 applied as represented in the drawings or otherwise suitably arranged. In the second car, the brakes are represented as constructed in a somewhat different manner from those of the first car and tender, they being solid pieces of wood or other proper material M, M, whose sides are curved to the radii of the wheels as represented in the drawings. They are attached to the beams D, and when these beams are raised upward by the levers *d e f*, the curved sides of the blocks M M, are brought up against the peripheries of the wheels and friction thereby produced on the same.

If friction is applied to the wheels of the tender to retard its velocity, (when a train of cars is in motion on a railway) the momentum of the rear cars, will cause the buffers of the whole train to come in contact or be brought together. Now if the abutting head *l* of the rod F G, projects beyond the buffers of the tender as seen in Fig. 1, it will meet the opposite abutting head *m* of the rod H I, as the car is driven forward by its momentum. The consequence will be that the rod H I, will recede or be moved

back and thereby, by the operation herein before described, the brakes of the first car will be pressed against the peripheries of its wheels, with a force proportioned to its momentum. And so with the second and all the other cars or carriages of the train; for the rod F G, communicates a backward motion to the rod K L, through the intervention of H I. Thus it will be seen that the engineer standing on the tender has command of the whole train; whereas by the method heretofore practised of managing the brakes of a series of cars, several brakemen have been required, whose united strength applied to the levers, was the only force relied on to restrain the velocity. In my invention I employ the momentum of the several cars, and so effectual extensive and superior is the force generated, that the wheels may be so firmly locked as to stop a train in a very small distance of track, in proportion to that required, where the usual method of applying friction has been practised.

In order to retard the velocity of a tender I use the ordinary machinery as applied to the brakes. This is seen in Figs. 1 and 2, where a lever $w\ x\ y$ whose fulcrum is at x is connected at its end y to the cross beam D. Its other end is depressed by the fire man or engineer placing his foot and treading on the step Z thereto connected. The brake lever, generally used, should always be applied to the car directly in the rear of the tender, on the top of which I suppose the baggage master to be seated who shall have the same under his control. Said levers should be attached to the rod H I, so that by applying the hand or foot on its top, the rod H I, may be pressed outward and thus cause the friction brakes to act on the wheels. It is often the case, that when the train arrives near the depot, the engine and tender are detached from the cars, and proceed onward, with such an increased velocity as to pass out of the main track upon a lateral branch ere the cars in the rear, can reach the switch; which switch is immediately turned back so that the train, moving under the momentum generated therein, shall pass on to its point of destination. Thus it will be seen that if the first carriage of the train is retarded by the baggage master, heretofore mentioned as on the same, the momentum of the rear carriages acts on the rod H I, K L, forcing them back, and of course causing the brakes of the whole train to act by its momentum.

When it is desirable to give the train a retrograde movement on the railway, the rod F G should be drawn back, so that its abutting head l shall be brought into a position even with the face of the buffers. Therefore the abutting heads $l\ m$ do not come in contact before the buffers meet together, and consequently no friction is produced to retard the retrograde motion of the train.

The machinery for throwing the rod F G forward, and drawing it back, is thus described: A hand lever $b'\ c'\ d'$ (Fig. 1) moving on a fulcrum c' is connected to another lever $e'\ f'\ g'$, Fig. 2, by means of an intervening link or connecting rod $d'\ e'$. The lever $e'\ f'\ g'$ is supported by and moves on a fixed fulcrum f'. Its end g' is forked and clasps the rod F G between two shoulders or collars $h\ i$, (Figs. 1 and 2). Therefore by applying the hand with sufficient force to the top of the lever $b'\ c'\ d'$ to pull it backward, the rod F G is drawn back, until the side of the collar k comes in contact with the side of the cross rail N (Figs. 1 and 2). The lever $b'\ c'\ d'$ is fastened at its upper end or abuts against a projection a^4 so that no pressure acting upon the rod F G at the end G can thrust it back, and the distance $m'\ n'$ at which the collar k' shall be beyond the face or side of the rail N, or the distance to which the rod must be projected and there secured, when it is desired to stop the car, should be such, as will place the toggles nearly in a vertical line with each other. We will now suppose the rod F G to be thrown back so that the collar k' shall rest against the side of the cross rail N, or so that the top b' of the lever $b'\ c'\ d'$ shall be in the position denoted by the red dotted lines in (Fig. 1), and that the train is in rapid motion on the railway. The rod F G, has a standard o' affixed or fastened thereon as seen in Fig. 3. One extremity of a dog or catch $p'\ q'$ is hinged to the top of the standard o' the other end is forked, as represented in Fig. 5, and clasps the toggle g', and is bent downward at right angles as seen in the drawings at Figs. 1 and 3. When the brake apparatus is not in use, the dog $p'\ q'$ is seen in the position represented in Fig. 3. A rectangular collar r' is placed on the rod F G, Fig. 3, the rod passing and moving freely through its vertical sides $s'\ t'$ and the upper toggle g' passes through the slot u' (Fig. 4) forward on its top. Now suppose, as we have heretofore mentioned, the cars to be in rapid motion, and all things as above, if we wish to retard the train without causing the rod F G of the tender to act on the brakes of its wheels (through the intervention of the toggles $g\ h$ and the dog or catch $p'\ q'$,) we press forward the top h' of the lever $b'\ c'\ d'$ until it comes into the position denoted by the black dotted lines Fig. 1, when the rod F G, and catch or dog $p'\ q'$ will be carried forward, and the latter will rest on the top of the rectangular collar r' as exhibited by the black dotted representation of said catch in Fig. 1, in which case now for clearer illustration we will suppose the dog $p'\ q'$ and toggles $g\ h$, with their machinery connecting them to the brakes B B, to be entirely removed as it will be seen that the same is not necessary to be

used, only in cases where we wish to employ the momentum of the cars to act on the brakes of the tender in conjunction with the force applied by the fireman. Therefore should we not desire to employ the momentum to retard the wheels of the tender, we can dispense with the dog or catch p' q' toggles g, h, and other apparatus immediately incident thereto, and employ only the rod F G and levers b' c' d, e' f' g' to operate said rod. When the lever b' c' d' is in the position denoted by the black dotted lines, Fig. 1, it is sprung over a stop or standard a^4 and abutting against the same is thereby so confined in this position that no force, tending to drive the rod F G back, can change the position of the lever. Now by shutting off the steam and applying the foot brakes to the tender, the abutting head l being in position to come in contact with the abutting head m of the rod H I, it will be evident that when the first car comes up, the abutting head m of its rod H I, will come in contact with the projected abutting head l of the tender (the velocity of the tender now being retarded) and will be forced back and thereby apply the brakes of the first car to its wheels. Thus as the rod H I is driven forward the abutting head n is now projected as was the case with the abutting head l of the tender, and is in position to, and will, operate in the same manner on the rod of the second car, as the said car comes up by its momentum. So on in succession throughout the train of cars the same result is produced on each car.

Now if it is desired to cause the rod F G, of the tender to act on the brakes B B, of its wheels, through the intervention of its toggles g h and the dog or catch p' q', so as to employ the momentum of the cars to act on the brakes of the tender in conjunction with the force applied by the fireman, we simply move the lever b' c' d' forward, until the right angular end q' of the dog or catch p' q' drops down over the end t' of the rectangular collar r', as seen in Fig. 1, and consequently locks or connects the toggles g h with the rod F G, so that when the rod F G is forced back, the right-angular ends of the dog p' q' bear against the end t' of the rectangular collar r' said collar r' moving freely on the rod F G only when the toggles and rod are not in connection. The said collar r', resting against the central joint of the toggles, carries back said toggles or brings them nearly in a straight line with each other, when the rod F G recedes; thus causing them to act on the brakes of the tender. It will be seen that when the abutting heads l m come in contact, the lever b' c' d' moves back until it comes into the position denoted by the black dotted lines, (Fig. 1,) where it abuts against the stop a^4 and remains fixed and brings the abutting head l into the same position that it should have, when we simply wish to employ the momentum of the cars to their brakes, without using the catch p' q' to lock or connect the rod F G with the brakes of the tender, as hereinabove described. When we employ the rod F G to act on the brakes of the tender, it is evident that its abutting head l must be thrown outward to a greater distance than it is, when used only to operate on the rods H I, K L, etc., of the cars in the rear and the distance to which the abutting head l must be pressed forward, will be regulated by the angle which the toggles g h make with each other, for the lever b' c' d' cannot recede farther than the stop a^4 consequently the abutting head l will now be out (as it will always be necessary that it should be) the same distance as when the momentum of the cars was not employed to arrest the progress of the tender.

The lever b' c' d' should be so constructed that by applying a force to it, sidewise, it may be easily sprung, so as to pass by the stop a^4 and be brought into the position denoted by the red dotted lines Fig. 1. When we do not wish to employ the momentum of the cars to assist in arresting the progress of the tender, the lever b' c' d' should always be brought from the position denoted by the red dotted lines, to that represented by the black dotted lines, in which case the dog or catch p' q' is represented as by the black dotted lines Fig. 1.

A stop or collar a^5 (Figs. 1 and 3) is firmly fixed on and moves with the rod F G, so that when the dog or catch p' q' moves forward in order to drop downward and connect the toggles with the rod F G, this collar will meet the side s' of the collar r' and press the collar r' forward if the toggles should be out of their true position.

The catch p' q' has a reversed inclined plane or cam v' on its underside. When the lever b' c' d' is changed from the position of the black dotted lines to the red dotted lines or when the dog p' q' is drawn back, the said plane meets and rises upon a pin w', Fig. 3, thereby lifting the catch upward so as to unlock the connection of the toggles and rod F G whenever the necessity of applying the friction of all the brakes ceases. Therefore the leading principle of my invention is the application of the momentum of moving cars in such a manner as to arrest their progress almost instantly and without occasioning any shock to be felt by the passengers, as is the case under the different modes heretofore practised of applying the machinery of brakes; for as the cars are connected by chains, when the brake is applied to the forward car the next in the rear immediately comes up with a smart shock and so on throughout the series.

In my arrangement it will be seen, that

by the abutting heads of the rods F G, H I, K L, meeting each other successively before the buffers can come in contact, the shock of buffers is consequently prevented.

There will be of necessity some little variety in the application of my machinery to cars of different construction but all this will be readily understood by carriage builders, and being secondary and not connected with the main features of my invention requires no further remarks on my part.

Among the advantages secured by my invention the following may be suggested. First, as regards the interest of railroad corporations:

Economy of expenditures.—The services of brakemen are safely and altogether dispensed with, the baggage master being competent to do all that is required, both on the journey and also at the end of the same, when the tender and engine are detached. From the nature of the case it is scarcely among possibilities that brakemen will be ready at all times, when it is of the utmost importance to stop the cars as speedily as possible, as in the event of an unexpected obstacle on the railway or the approach of a train of cars in an opposite direction or the breaking of a wheel. From these causes, and the generally insufficient supply of brakemen (for economy's sake) very serious injuries have occurred to railroad property. By the use of my invention a train of cars of any length might be almost entirely stopped before a signal could be passed from the engineer to the brakeman that danger was ahead, as it is very generally known that they are not for the most part of the time in a situation to apply the brakes immediately, as they apprehend no danger and ever act upon the presumption that all is well, and especially is it so in cold weather when their own comfort is solely consulted.

The danger of damage to property on freight trains is in a very great degree removed, as upon these few if any brakemen are employed, and experience shows, that it is extremely difficult to arrest the progress of a freight train even with the assistance of one brakeman in addition to the tender brakes, so that if any obstacle, dangerous to be encountered, is seen soon enough to prevent a concussion by the use of my invention, it could not possibly be avoided under the present system. Again, in the event of breaking a wheel the advantage would be in the same proportion. Railroad corporations from these causes have suffered by the loss of their own property, and have been compelled to pay severely to the owners of property conveyed by them and injured in the transportation. And on passenger trains it is by no means uncommon that heavy damages have been recovered by persons injured by the meeting of trains coming in opposite directions, and occasioned by the want of brakemen, or their neglect to attend to their duties.

Economy of time.—As generally practised the velocity of cars is very much diminished, a considerable distance before, they arrive near the stopping place, in consequence of the difficulty of "taking up" in season; and upon roads where stops are frequent the sum total of minutes saved by my improved method is very considerable, as they can run at full speed very much nearer stopping places with great safety. And further, the engineer is influenced as to the time and place of shutting off the steam, by the brakemen's presumed attention to their duties—and it consequently happens not unfrequently that the cars are not seasonably stopped on account of their neglect in this behalf.

Economy touching their income.—The fear of riding so fast, as cars generally move, prevents many from improving railroad conveyances, and for the reason of a supposed impossibility to stop the cars soon enough, going at a rate so rapid, (and the rapidity of railroad traveling among this class is greatly overrated) in case of obstacles. It is believed that my method would create a greater and highly beneficial confidence in this mode of traveling, and consequently increase the income and especially so on roads where there are inclined planes. As, by this process, in ascending, the baggage master could ride upon the near car and in case the main rope should part, he could prevent accident; and in descending he could ride upon the first car with the like benefit.

As it regards the public.—The great end secured by my method is safety and in this behalf the public are interested, and every item going to this end will be called for by the public and must be adopted by those who live by the support of the public. When the train of cars is moving at a very slow rate, or should the buffers be in contact with each other, the brakes may be caused to act by force properly applied to the lesser *b′ c′ d′*, which (as the abutting heads of all the rods F G, H I, K L, are in this case in contact) will press back all the rods and therefore cause the brakes throughout the train to act on the wheels.

Having thus described the nature of my improvements I shall now proceed to specifically point out such parts thereof as I claim as my invention.

1. I claim arresting or retarding the progress of cars while in motion on a railway by a combination of rods F G, H I, K L, connected with the friction brakes by the intervention of the toggles or progressive levers *g*, *h*, *i i*, *k k*, lever *d e f*, transverse beam D or other suitable machinery, the whole

arranged and operating, by the momentum, or power applied to the lever b' c' d', substantially in the manner and on the principles herein above described and represented in the different drawings.

2. I claim the method of connecting the rod F G and toggles g, h, by means of the combination of machinery consisting of the dog or catch p' q' attached to the rod F G, piece of metal r' shaped and arranged together and acting in connection with the levers b' c' d', e' f' g' substantially as above described, for the purpose of operating the brakes of the tenders by the momentum of the cars, whenever the same may be necessary or desirable.

In testimony that the above is a true description of my said invention and improvement I have hereto set my signature this sixteenth day of March in the year of our Lord eighteen hundred and forty.

JOHN L. CLARKE.

Witnesses:
R. H. EDDY,
E. LINCOLN, Jr.