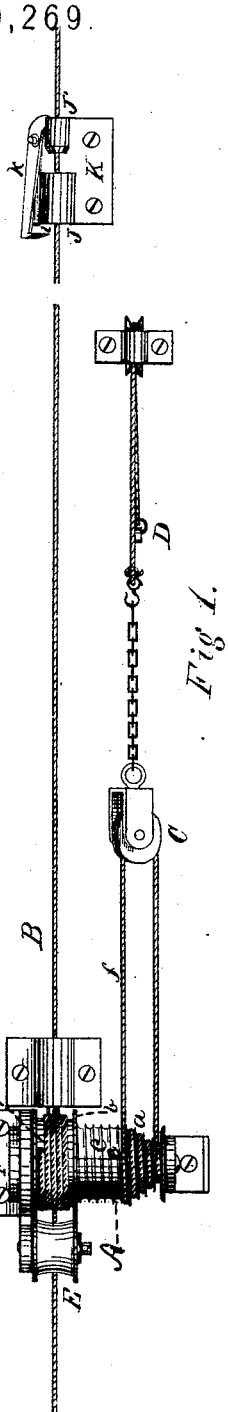
3 Sheets--Sheet 1.

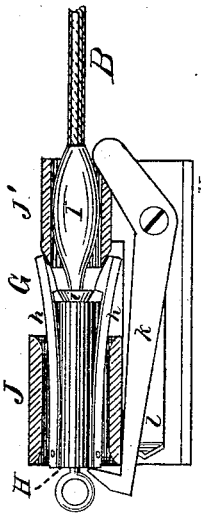
G. M. HOPKINS.

Car-Brake.

No. 160,269. Patented March 2, 1875.



Fig' 1.



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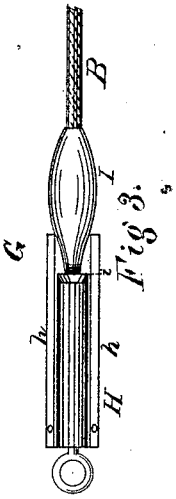
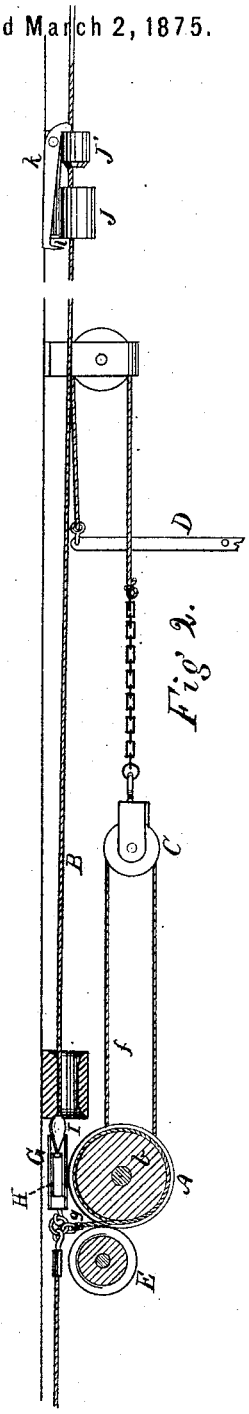


Fig' 3.



Fig' 2.

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G. M. HOPKINS.

Car-Brake.

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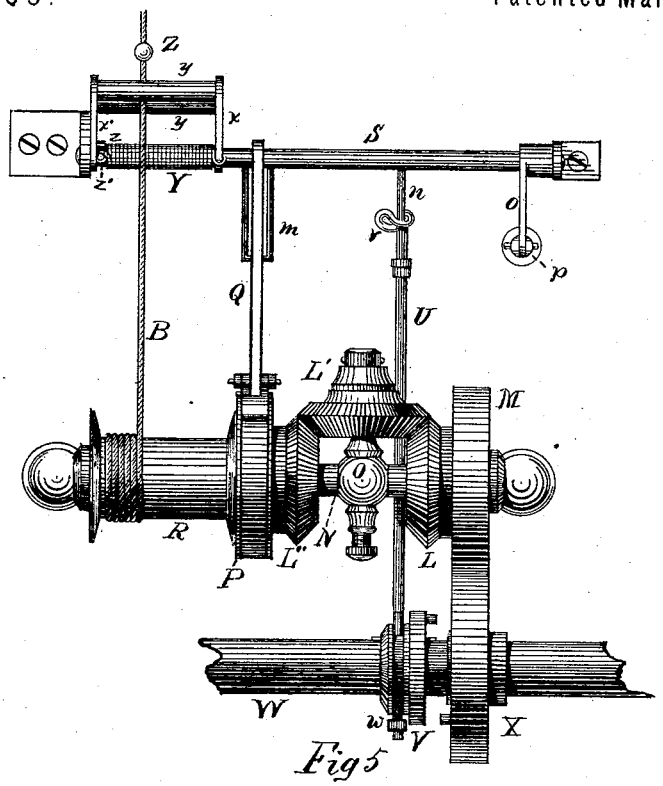

Fig 5

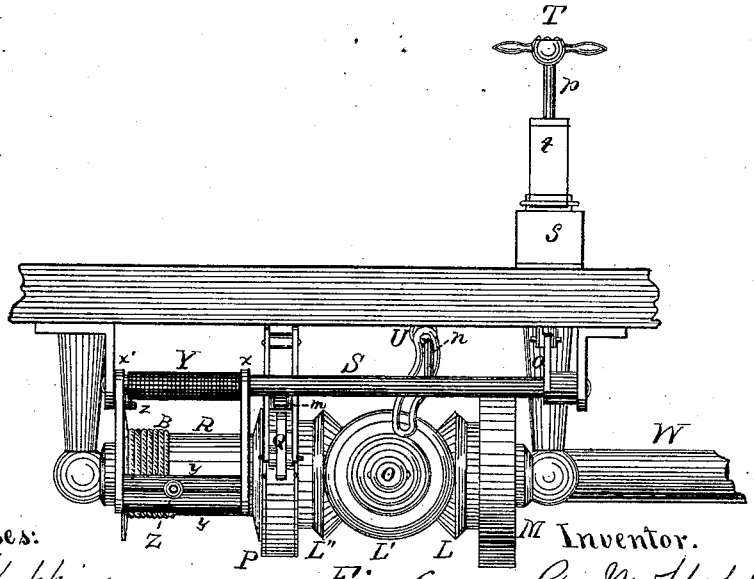

Fig. 6.

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Car-Brake.

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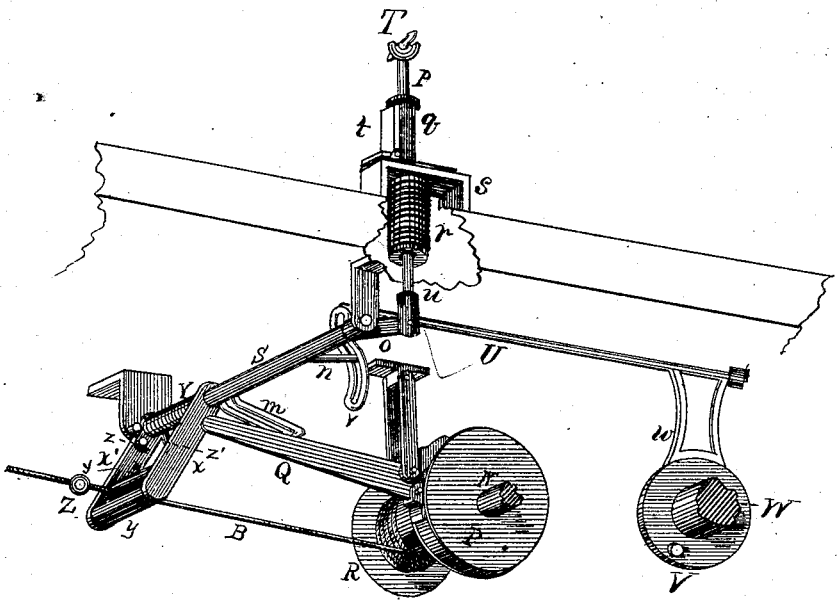

Fig 7

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UNITED STATES PATENT OFFICE.

GEORGE M. HOPKINS, OF ALBION, NEW YORK, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN A. STRAIGHT, OF SAME PLACE.

IMPROVEMENT IN CAR-BRAKES.

Specification forming part of Letters Patent No. **160,269**, dated March 2, 1875; application filed October 5, 1874.

To all whom it may concern:

Be it known that I, GEORGE M. HOPKINS, of Albion, in the county of Orleans and State of New York, have invented certain Improvements in Railway-Car Brakes, of which the following is a specification:

My invention relates to that class of brakes known as "continuous brakes," the power for braking the entire train being applied and controlled by the engineer, or some other person who may have it in charge.

The first part of my invention consists in the combination of a modified form of the mechanical movement known as the "Chinese windlass," with a cable, chain, or rod running the entire length of the train, so arranged as to revolve the windlass always in one direction when the cable is drawn toward either end of the train, the said cable being provided with suitable couplings between the cars for ordinary use, and also with other couplings which are capable of becoming detached automatically when the cable is drawn beyond a certain limit, and which shall, when uncoupled, retain the brakes on until the detached portion of the coupling is replaced, and the whole is liberated together from the device which retains it.

The second part of my invention consists in an arrangement of friction-gearing, which is placed at the engine or under one of the cars, taking its power from one of the axles. This gearing is so arranged that more or less pressure may be had upon the brakes according to the will of the operator, or the whole force of the apparatus may be brought into action at once by liberating a spring which throws all in gear, and retains the full amount of pressure on so long as the spring is allowed to act.

By referring to the drawings a more explicit idea of the invention may be had.

Figure 1 is a bottom view of the winding apparatus, which is placed under each car. Fig. 2 is a side elevation in section of the same. Figs. 3 and 4 are detail views of the coupling and the uncoupling apparatus. Fig. 5 is a bottom view of the winding apparatus which operates the brakes. Fig. 6 is a front elevation of the same. Fig. 7 is a sectional perspective view of the same.

In Figs. 1 and 2, A is a winding-drum having three divisions, *a b c*. A cable or chain, *g*, which is connected with the operating cable B is wound upon the part *b*. The part *c* is smaller than the part *b*, and is grooved spirally to receive a chain or wire-rope, *f*. The part *a* is a fusee running from the size of the part *c* down, as small as may be desired. The wire-rope or chain *f* is wound upon the fusee *a*, being made fast at *e*, running off from the small portion of the fusee and around the pulley C, and is fastened with the other end at *e*. The pulley C is connected by means of a chain or rod to the ordinary truck-brake lever D. E is a sheave, which is placed on a part of the casting which supports one end of the winding-drum. F is a spring, which rewinds the wire-rope or chain *g* after the brake has been liberated. G is a coupling, consisting of the parts H and I. The part H having three or more spring-catches, *h h*, (see also Figs. 3 and 4,) which retain the conical head *i* of the part I under all circumstances, except when there is an undue strain upon the operating cable B. J J′ are sleeves, which are fixed to one bed-plate, K, one of them, J′, being smaller than the other, but both centrally in line. The sleeve J will allow the entire coupling to pass through, while the sleeve J, will only allow the part I to pass through, and in so doing brings the springs *h h* upon the beveled end of the sleeve J, thus liberating the part I. At the same time a spring-catch, *k*, is thrown over the end of the part H by means of the part I of the coupling engaging with the short arm of the catch *k* as it is drawn through the sleeve J′. A double-acting spring, *l*, is provided, which serves to hold the catch *k* either away from the cable or over the end of the part H, as circumstances may require.

The mechanism which operates the brake is represented in Figs. 5, 6, and 7. It consists in an epicyclic train composed of the miter-wheels L L′ L″, one of which, L, is attached to the spur-wheel N, and both revolve loosely on the shaft N. The wheel L′ revolves on the arm O, which is fixed to the shaft N.

The wheel L″ is fixed to the friction-wheel P, both revolving on the shaft N. The wheel P is surrounded by a strap, which is made to exert more or less pressure on it by means of the lever Q. R is a winding-drum, which is fixed to the shaft N. This part of the apparatus, as so far described, is not new; but the additional parts for controlling the winding apparatus hereinafter described are considered new.

S is a rocking shaft placed in suitable supports, and is provided with arms *m n o*. The rod *p*, which extends downward from the foot-pedal T, is pivoted to the arm *o*. A sleeve, *q*, is placed on the rod *p*, having a collar on each end. A spiral spring, *r*, is placed between the support *s* and the lower collar on the sleeve. A spring-catch, *t*, engages with the upper collar on the sleeve *q*, so as to retain the spring *r* under tension. The rod *p* moves freely through the sleeve *q*, and is provided with a shoulder at *u*, so that when the spring *r* is released it will carry the rod *p* and lever *o* down with it. The arm *n* works in a cam-slot in the lever *v*, which is fixed to the end of a rocking-shaft, U, running at right angles with the shaft N.

A clutch, V, is placed upon the car or engine axle W, and is capable of being moved longitudinally on the axle by means of a forked lever, *w*, which is fixed to the shaft U. A feather is fixed in the shaft, and a corresponding slot is made in the clutch V, so that it must always revolve with the axle. A spur-wheel, X, is placed on the axle W, so that it may mesh with the wheel M, and also allow the clutch V to engage with it. The lever *m* is placed above the lever Q, and is capable of depressing it when the lever *o* is thrown down by pressure of the foot on the pedal T, or by the spring *r*.

x x′ are arms, which swing loosely on the shaft S and support the rollers *y y*. A stud, *z*, is fixed in the arm *x′*, which is capable of engaging with a pin, *z′*, which is fixed in the shaft S.

Y′ is a spiral spring, which surrounds the shaft S between the arms *x x′*, fixed at one end to the pin *z′*, and at the other to the arm *x*. Its force is exerted in such a way as to throw the arms over, so that, in the ordinary working of the brake, the stud *z* will not strike the pin *z′*.

The cable B passes between the rollers *y y*, and is provided with a ball, Z, which is of such size as to be incapable of passing between the rollers *y y*, and is placed at a point where it may strike the rollers *y y* when the maximum strain of the cable is reached.

The operation of the apparatus may be described as follows: The engineer or person having the brake in charge presses his foot on the pedal T. This moves the shaft S through the lever *o*. The arm *n*, working in the cam-slot in the lever *v*, rocks the shaft U, and by this means moves the clutch V so that it may engage with the wheel X. The motion of the shaft W is thus imparted to the wheel M, and consequently to the other wheels in the epicyclic train. The shaft N and drum R remaining stationary, and so long as no pressure is exerted on the lever Q, the friction-wheel P revolves in the strap which surrounds it, but on pressing the pedal farther down the lever *m* is nade to force the lever Q downward, tightening the strap on the friction-wheel P more or less, when the wheel L′ travels around upon the wheel L″, carrying the arm O, and consequently the shaft N and drum R with it, with more or less rapidity and force, depending entirely on the pressure exerted on the lever Q.

When the maximum strain on the cable B is reached the ball Z strikes the rollers *y y*, and carries the arms *x x′* toward the winding-drum R when the stud *z* strikes the pin *z′*, rocking the shaft S, and consequently throwing the arm *m* away from the lever Q. The friction on the wheel P is in this way reduced to just what is required to keep the cable B under strain without winding farther.

The spring Y serves the double purpose of holding the arms *x x′* in position and of throwing up the pedal T and the levers and arms attached to the shaft S when the pressure is removed.

In cases of emergency the spring-catch *t* is tripped, when the spring *r* throws all in gear, and the brake is operated in the same manner as when the pressure is exerted on the pedal T.

When the spring *r* is used the brake is taken off by compressing the spring by drawing up the rod *p*, by means of the handles which are fixed to the pedal T, until the catch *t* engages with the collar on the upper end of the sleeve *q*.

When the cable B is wound upon the drum R the drum A is made to revolve by means of the cable or chain *g* being unwound from the part *b*. This winds the chain *f* on the part *c* and unwinds it from the fusee *a*, in this manner drawing up the brake-lever D by shortening the cable or chain *f*, which passes around the pulley C.

Should it be found necessary to draw the cable B farther than is necessary to set the brakes on the first car in a train, it may be done without increasing the strain on the brake-lever D, as when the ultimate strain is reached the chain or cable which unwinds from the fusee has reached a point where it is of the same size of the part *c*, and the same quantity of cable is unwound from the part *a* as is wound upon the part *c*, and consequently no motion is produced in the pulley C or lever D.

In case of an accidental separation of the cars, or when the ordinary cable-couplings between the cars have been left coupled, while the cars are uncoupled and the cable is drawn farther than the prescribed limit, it is prevented from breaking by the coupling shown in detail in Figs. 3 and 4. The coupling is drawn into the sleeve J until the catches *h h*, &c., are forced apart by the sleeve J′ liberating the part I. At the same time this part strikes the catch

k, throwing it over the end of the part H, thus retaining the brakes on until the part I is replaced and the part H is liberated from the catch *k*. On releasing the cable B the spring F returns all the parts to their normal condition. By virtue of the combination of a fusee, *a*, with the part *c* the pulley C is drawn with a constantly-increasing force, but with diminishing speed.

Having thus described the construction and operation of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the winding-drum A, spring F, cables *g*, B, and *f*, pulley C, and lever D, substantially as shown and described.

2. The combination of the fusee *a*, part *c*, cable *f*, and pulley C, for producing a gradually-increasing strain with diminishing speed, as shown and described.

3. The combination of the coupling G and cable B, as set forth.

4. The combination of the parts H and I and springs *h h*, as shown and described.

5. The combination of the sleeves J J′, catch *k*, and spring *l*, as shown and described.

6. The combination of the pedal T, lever *o*, shaft S, lever *n*, shaft U, cam *v*, lever *w*, and clutch V, substantially as shown and described.

7. The combination of the arms *x x′*, rollers *y y*, ball Z, stud *z*, pin *z′*, spring Y, shaft S, and lever *m*, as set forth.

8. The combination of the spring *r*, sleeve *q*, rod *p*, and catch *t*, substantially as shown and described.

9. The combination of the axle W, spur-wheels X and M, epicycle-train, consisting of the wheels L L′ L″, friction-wheel P and strap surrounding it, lever Q, drum R, cable B, pedal T, shaft S, levers *m*, *n*, and *o*, rollers *y y*, arms *x x′*, stud *z*, pin *z′*, ball Z, spring Y, cam *v*, shaft U, lever *w*, and clutch V, substantially as shown and described.

GEORGE M. HOPKINS.

Witnesses:

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