(No Model.)

3 Sheets—Sheet 1.

C. W. LANPHER.

CAR BRAKE.

No. 250,822. Patented Dec. 13, 1881.

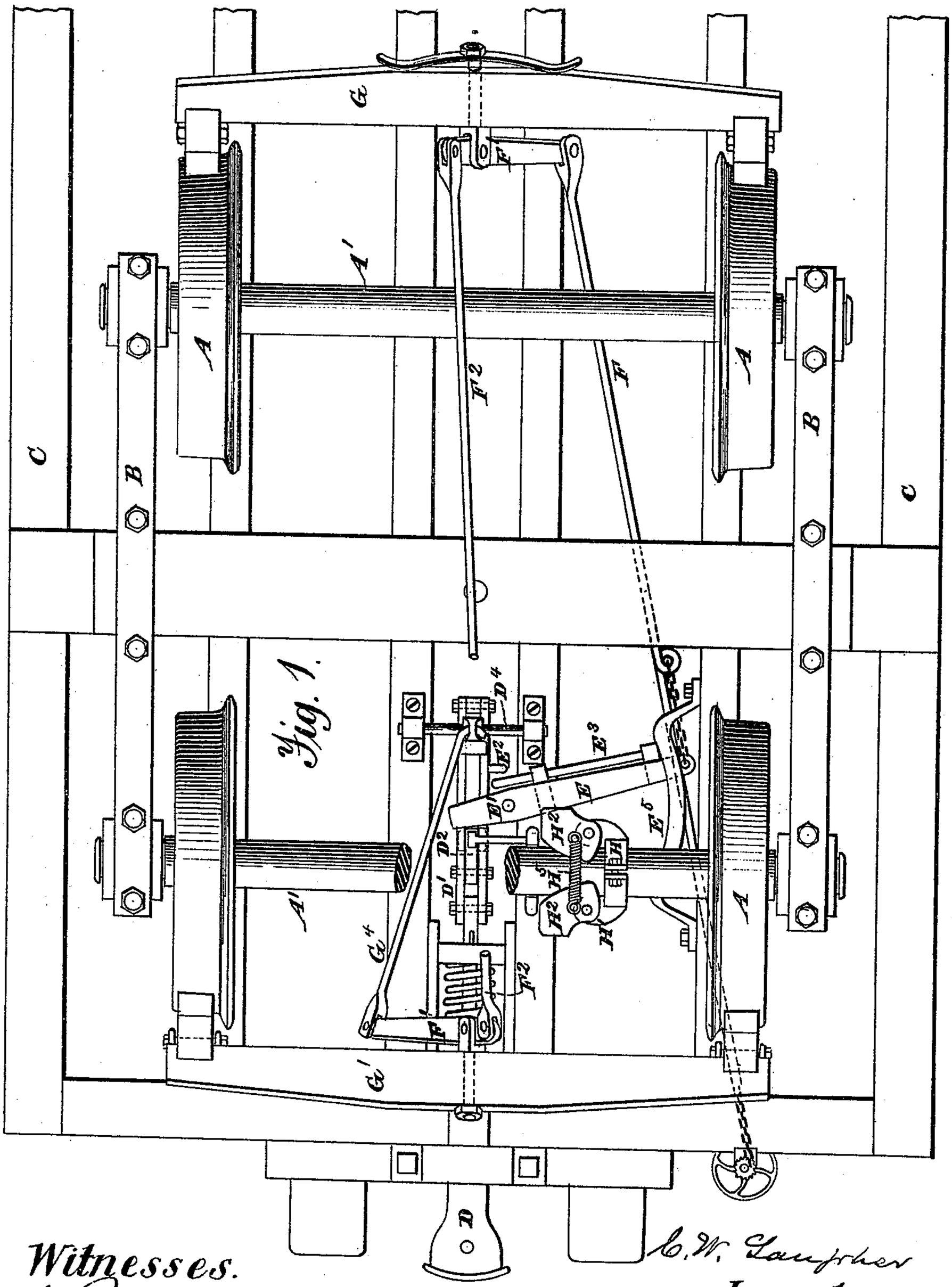

Fig. 1.

Witnesses.
A. Ruppert.
C. M. Connell

C. W. Lanpher
Inventor.
Holloway & Blanchard
Attys

(No Model.)

3 Sheets—Sheet 2.

C. W. LANPHER.

CAR BRAKE.

No. 250,822. Patented Dec. 13, 1881.

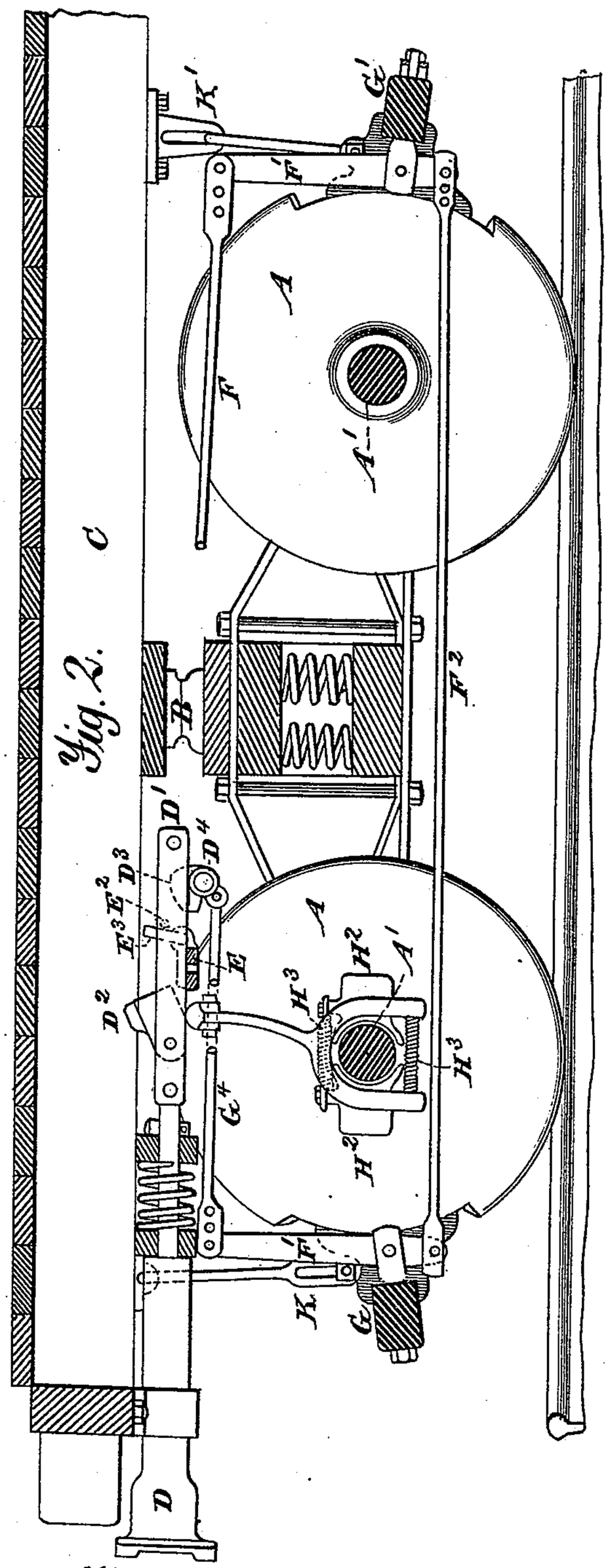

Fig. 2.

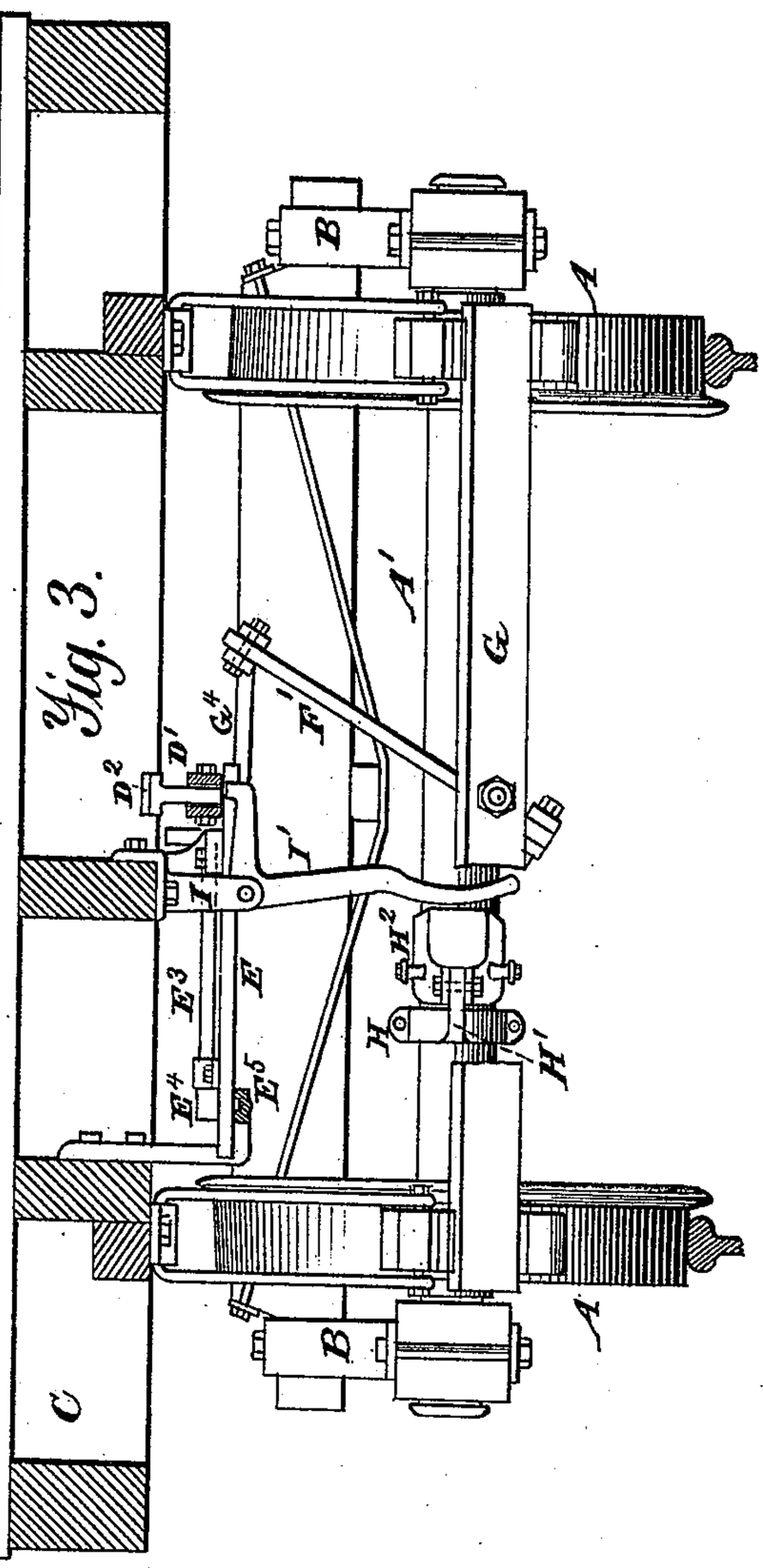

Fig. 3.

Witnesses.
A. Ruppert.
C. M. Connell

C. W. Lanpher
Inventor.
Holloway & Blanchard
Attys

(No Model.)

3 Sheets—Sheet 3.

C. W. LANPHER.

CAR BRAKE.

No. 250,822. Patented Dec. 13, 1881.

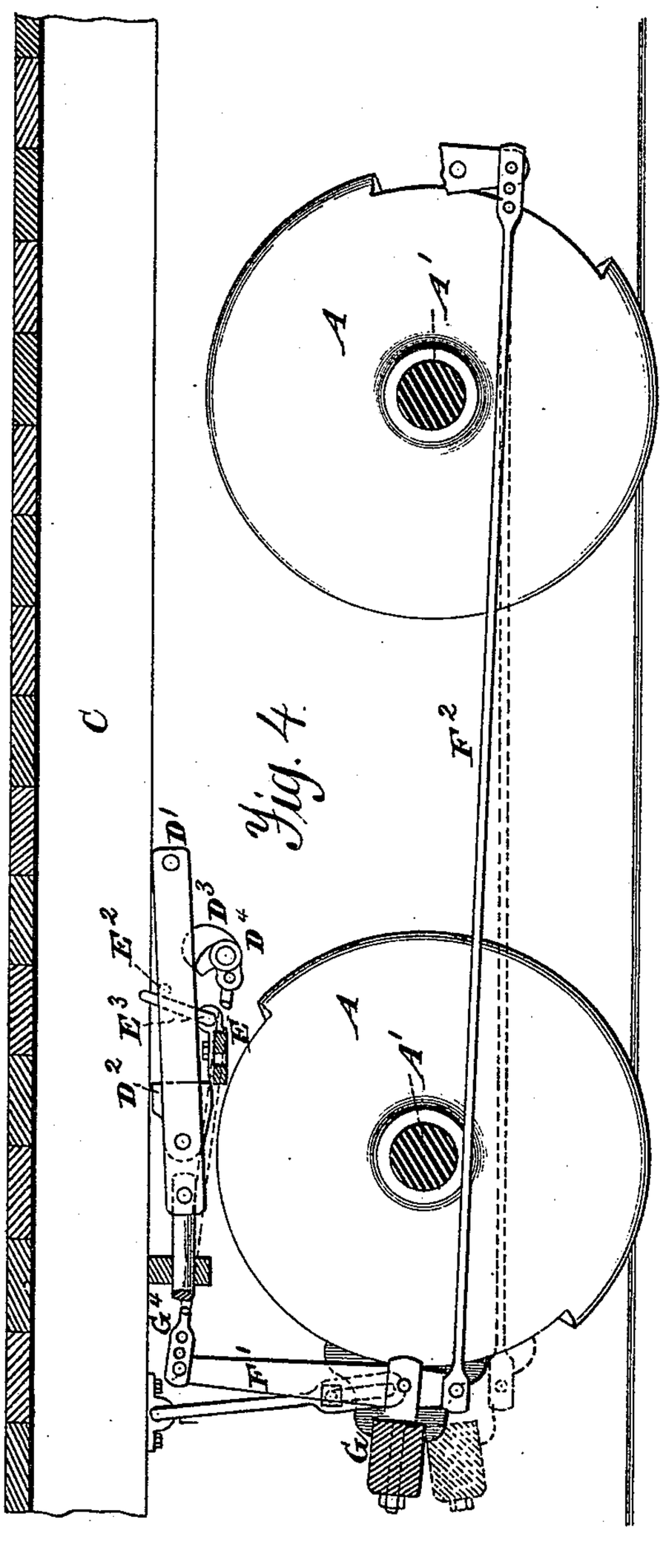

Fig. 4.

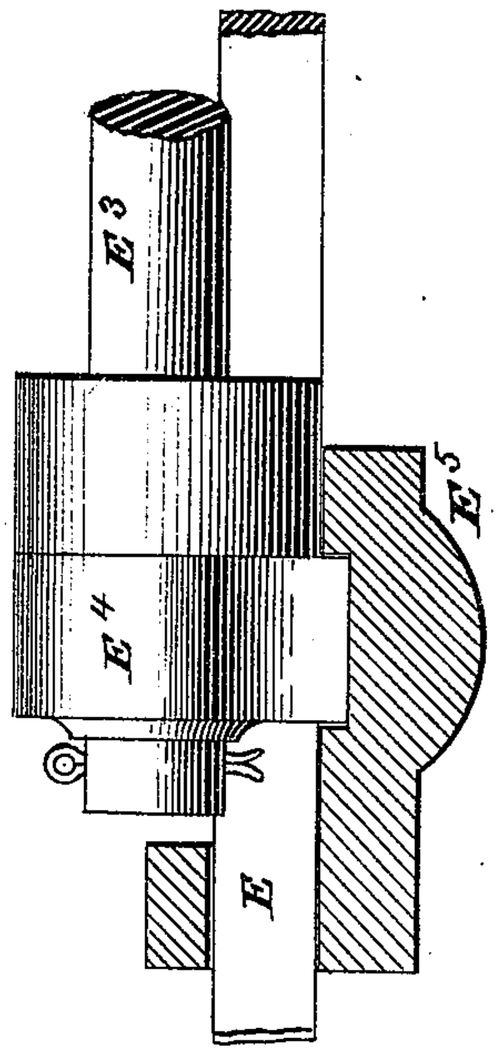

Fig. 6.

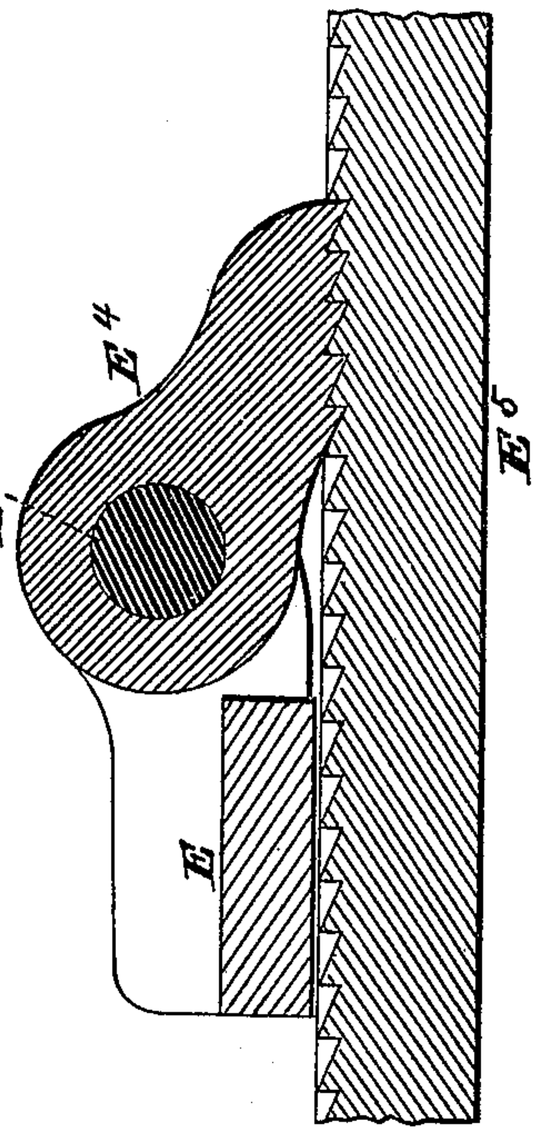

Fig. 5.

Witnesses.
A. Ruppert.
C. M. Connell.

C. W. Lanpher
Inventor.
Holloway & Blanchard
Attys

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

CHARLES W. LANPHER, OF NORWICH, NEW YORK.

CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 250,822, dated December 13, 1881.

Application filed March 23, 1881. Renewed November 18, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. LANPHER, a citizen of the United States, residing at Norwich, in the county of Chenango and State of New York, have invented certain new and useful Improvements in Car-Brakes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in that type of car-brakes which are operated automatically by the movements of the buffer or coupling-bar attached to the car; and the objects of my improvements are, first, to provide certain mechanism and the requisite combinations thereof for applying the brakes to a certain graduated extent by the movements of the buffer, and then to add to the pressure upon the brake-shoes by the movement of one of the brake-beams and the parts connected therewith; second, to provide such a combination of devices as to permit the parts to be so adjusted as to regulate the amount of force applied to the brakes up to the full amount that can be used without slipping the wheels, and to maintain the parts in their proper positions for producing such a result, whether the car is more or less loaded or empty; third, to provide such a combination of devices as will enable the engineer to release the brakes at any time by causing the engine to advance more rapidly than the cars are moving at the time, and thus drawing out the draw-bar; fourth, to provide certain combinations of devices whereby any longitudinal motion of the body of the car is neutralized and prevented from having any effect upon the brakes; and, fifth, to provide the necessary combinations of the parts of which the device is composed, to enable them to produce the results attributed to them. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a portion of a car-body and a car-truck with its wheels and brakes, the latter having my improvements attached thereto, which, as there shown, consist of a governor attached to one of the axles, a push-bar carrying suitable pawls, and the requisite levers and rods for applying the brakes and for holding them in position until released by the operator. Fig. 2 is a sectional elevation, showing a portion of a car-body and truck, a buffer with its spring, and a push-bar carrying pawls for operating the other parts, and a bell-crank lever connected with the governor on the car-axle, and showing also a slotted hanger for the brake-beam, and an equivalent slotted stand or bracket attached to the body of the car, and levers and rods for connecting the brake-beams upon opposite ends of the truck and for applying them to the wheels. Fig. 3 is an end elevation, the body of the car being shown in section, showing the relation of the governor to the operating bell-cranked lever, and also a partially-rotating shaft for controlling the movements of the operating-pawl. Fig. 4 is a longitudinal sectional elevation, showing the parts of the brake as they appear when the shoes are applied to the wheels. Fig. 5 is an enlarged sectional view of a dog and a part of a casting with which it engages for the purpose of holding the brake in its applied or graduated position; and Fig. 6 is a side elevation thereof.

Similar letters refer to similar parts throughout the several views.

In constructing and applying my improvements I employ any of the well-known forms of wheels and axles, as well as of trucks and car-bodies, such parts being designated respectively by the letters A, A′, B, and C, which, in the accompanying drawings, are represented as adapted to freight-cars; but I wish it understood that while I regard my improvements as particularly adapted to that type of cars, yet I by no means limit myself to their application thereto, but intend to apply them to passenger as well as to burden cars.

In applying my improvements to cars already in use it is designed not only to use the parts already named, but at the same time to utilize the buffers, brakes, rods, and other forms of connection now in use, it being only necessary to make such slight changes as are required to adapt them to be operated by my improved method, and to add thereto the necessary parts for producing the results aimed at.

In combining the different parts of the mechanism and adapting them to use, there is secured to the rear end of the buffers D a device which is herein designated as a push-bar, and is lettered D′. This bar is by preference made of two bars of flat iron; but it may consist of a single piece having a slot in it for the reception of a pawl, soon to be described, said bar in either case being pivoted to the rear end, or some other convenient part of the buffer D. It is provided with two pawls, D^2 and D^3, the former being pivoted between the two portions composing the push-bar by a bolt which passes through both. The upper portion of this pawl is provided with projections or lugs upon its sides, as shown in Fig. 3, which prevent it from falling to a lower position than the one shown in Fig. 4. The pawl D^3, also carried upon push-bar D′, is placed near the rear end thereof, so as to cause it to form a support therefor, it being supported upon a shaft, D^4, secured to the frame-work of the car. This pawl is constructed with a central projection, which passes between the plates of the push-bar, and thus forms a guide for it. It is also provided with projections upon its sides, upon which the edges of said plates rest, the projections being cam-shaped, in order that as the shaft D^4 is turned the rear end of the push-bar will be elevated, as shown in Fig. 4, its normal position being that shown in Fig. 2, in which position it remains when the brake is not applied.

For the purpose of communicating the motion of the buffers and push-bars to the levers, rods, chains, brake-bars, and shoes for applying the brakes, there is provided a lever, E, which is pivoted at E′ to the body of the car, or to a hanger depending from the same, it being so arranged that its short arm shall pass over or under the push-bar, as circumstances may require. This lever E derives its motion from the push-bar, it being communicated by means of the pawl D^2, which comes in contact with the short arm of lever E. A shaft, E^3, one end of which is bent at a right angle, as shown in Figs. 2 and 4, is carried in bearings secured to and moving with lever E.

To the end of shaft E^3 which is opposite to the one that is furnished with the right-angular arm there is firmly secured a dog, E^4, the under surface of which is provided with teeth, as shown in Fig. 5, said teeth engaging with similar ones formed on the upper surface of a curved bar of metal, E^5, which is suspended from the body of the car, and is so placed or arranged that the lever E and the outer end of rod or shaft E^3 pass through a slot formed in it, and the teeth of dog E^4 engage with those formed in said bar, and thus hold the lever E in the position to which it has been carried by the movements of the push-bar in applying the brakes, to which a movement has been imparted by the long arm of lever E, to which a rod, F, is connected by means of a chain, or it may be direct, the opposite end of said rod being connected to a lever, F′, which is pivoted to one of the brake-beams, and has extending from its opposite arm a rod or chain, F^2, which extends to and is connected with a lever pivoted to the brake-beam on the opposite end of the truck.

By connecting the rod F with a chain leading to a vertical shaft at the end of the car and supplying the same with a hand-wheel and ratchet and pawl, the brake can be operated by hand without any hinderance from the automatically-moving parts.

In arranging the brake levers and rods to be operated according to my method and by my improved devices, the levers F′ are attached to the brake-beams G and G′, they being pivoted to the beams in the usual or any approved manner, and having their short arms extending down far enough to permit a rod, F^2, connecting their lower ends, to pass under the truck and the axles of the wheels. To the upper end of one of the levers F′ there is connected a rod, G^4, whose opposite end is attached to an arm of the pawl D^3, as shown in Figs. 2 and 4, the object of which arrangement will be more fully explained hereinafter.

For the purpose of controlling the position of the pawl D^2, and thus bringing or not bringing the brakes into use, as circumstances may require, there is placed upon one of the axles of the truck a collar, H, to which there are fixed two arms, H′ H′, to the outer ends of which are attached governor balls or weights H^2 H^2, which, when the car is at rest or is running at a slow rate of speed, are held inward or in their closed position, and nearly or quite in contact with the axle, by the springs H^3 H^3, which are attached to said balls or weights at a point outside of the points where they are pivoted to the arms which carry them. The construction and arrangement of this governor is such that when the car is in a state of rest, or is running at a slow rate of speed determined upon when the brake is being constructed, the springs will by their tension hold the governor-balls in their inward positions, as shown in Fig. 1; but when that limit of speed is exceeded the centrifugal action of the balls will overcome the tension of the springs, and said balls will assume a position farther from the axle, in doing which they will operate upon a bell-crank lever, soon to be described, and cause it to determine the position of the pawl D^2. The bell-crank lever just alluded to is pivoted to a hanger, I, attached to one of the timbers of the car-body, it being designated by the letter I′, its lower end being forked, so as to cause it to span the axle just inside of the governor-balls, so that it may be held in position by them when the car is not running at or above the regulated rate of speed. The opposite short arm of this lever passes under the push-bar D′ and the pawl D^2, and thus causes the latter to rise or permits it to fall, as circumstances may require.

In making provision for the increased amount of force to be applied to the brakes at certain times, one of the brake-beams and its shoes are caused to rise, which action not only causes such shoes to be forced with increased power upon the wheels upon which they bear, but at

the same time the shoes bearing upon the other wheels of the truck are caused to exert an increased force due to the movements of the rising brake-beam and its shoes.

It is proper to say here that in this method of applying increased force to the brakes of cars only one of the brake-beams and its shoes rises at one and the same time, as when the car is running in one direction the tendency is to depress or carry down the brake-shoes bearing upon what is for the time the forward pair of wheels, and at the same time to elevate or carry up the shoes bearing upon the rear wheels; but when the car is running in the opposite direction the tendency is reversed, and hence the force may be applied without reference to the direction in which the car is running.

The devices employed in the present case for producing the results just described consist of slotted hangers, attached to the body of the car, as shown at K or K′ in Fig. 2, levers F′ F′, attached to the brake-beams, and rods F, F^2, and G^4. The hangers may be of either of the kinds shown, the essential feature being the slot formed therein, which permits the beam and its shoes to rise to the required height, while it is prevented from falling too low by the bolt passing through the slot. As the brake-shoes are placed originally below the centers of the wheels, it follows that when a pair of the shoes travel upward, following the curves of the wheels, the end of the rod F^2 fastened to the brake-lever F′ moves upward with the lever and brake-beam G, while the other end of the rod F^2, being pivoted to the lever F′ at the opposite end of the truck, retains its normal position. As the brake shoes, lever, and beam move upward they follow the curve described about the center of the axle, whereas the end of the rod F^2 fastened to the lever F′ at the moving end must, in this upward movement, travel in a curve described about the point as a center where the rod is pivoted to the lever F′ at the opposite end of the truck. Thus, while the brake-shoes tend to move away from the point where the rod F^2 is pivoted to the moving lever F′, they are prevented from doing so by the constant length of said rod F^2, the result being that levers F′ F′, with their respective beams and shoes, are drawn promptly toward the wheels, applying the brakes with greater force the farther the upward movement of the shoes continues, until the limit of their movement is reached. When a certain pressure upon the wheels has been produced by the application of the brakes an extra force is communicated by the brake-beam G to the lever F′, and thence by the rod G^4 to the arm of the pawl D^3, which raises said pawl, together with the rear end of push-bar D′, to the position shown in Fig. 4, thereby disengaging the pawl from the lever E; but the brake shoes and beam will continue to rise until stopped by the upper end of the slots. The arrangement of the parts of this brake mechanism last described is such that the pressure upon the wheels caused by them will barely permit said wheels to revolve, but will not cause them to slip under ordinary circumstances, and this condition will continue so long as the draw-bar is held inward from its central position.

For releasing the brakes the locomotive is made to start forward at a greater rate of speed than the train is running at the time, which will cause the draw-bar D to be drawn forward or outward, and when it reaches its central position in this outward movement the pin E^2 in the push-bar D′ will come in contact with the bent end of rod or shaft E^3, carried upon lever E, thus turning said rod or shaft, and lifting the dog E^4 clear of the teeth of the segmental plate E^5, which movement will release the lever E and allow it to be moved back to its normal position by the tension of the rod F^2, or by springs arranged for that purpose upon the frame of the truck, said position being that shown in Fig. 2. The same movement of parts will also relieve the tension on the rods F^2 and G^4, as well as the pressure of the shoes upon the wheels, thus permitting the raised beam and its shoes to fall of their own weight to their normal positions, and as the force applied to the rod G^4 is removed the pawl D^3 will no longer be held in its elevated position, but will fall back to its normal position, as shown in Fig. 1, thereby permitting the rear end of push-bar D′ to fall back to the position shown in the same figure, which operation will release the brakes from their hold upon the wheels, and the parts will be in readiness for reapplication as soon as the car commences to move at the rate of speed at which the governor has been adjusted to put the parts upon which it acts in motion.

The general arrangement of the parts of this mechanism may be stated as follows:

First. The pin E^2 in the push-bar D′ is always in contact with the bent end of rod or shaft E^3 when the draw-bar D is pulled outward from its central position, whereby said rod is in such a position as to keep the dog E^4 lifted out of the teeth on the segmental bar E^5, and hence the brakes cannot be held in contact with the wheels except when the draw-bar is pushed back from its central position, or when they have been applied by the mechanism which is operated by hand.

Second. The pawl D^2 is always raised, as shown in Fig. 1, by the action of the governor-balls and bell-crank lever, so that it cannot come in contact with the lever E when the car is at rest or moving at any rate of speed below that at which the governor is arranged to be brought into action, and hence the draw-bar at such times may be pushed inward when the car is at rest, or such car or the train may be backed without applying the brakes. Should it become desirable to apply the brakes while the train is being backed at or above the rate of speed at which the governor is set to operate, it can be done by checking the speed of the engine, which will cause the draw-bar to

be drawn out, which will have the effect to permit the pawl D^2 to fall into the position in the push-bar shown in Fig. 5, when, by giving a fresh impetus to the engine, and thus pushing inward the draw-bar, the brakes will be applied as when the car was being drawn forward. The form of the governor balls or weights is such and the springs H^3 H^3 are so connected to them that when the car has attained the speed at which the governor is arranged to act the balls or weights move outward to their extreme positions by overcoming the tension of the springs, they being always in their outermost or innermost positions. The bell-crank lever being operated upon by the outward movement of the governor balls or weights always holds the pawl D^2 in its elevated position or permits it to fall to its lowest position in the push-bar, so that no partial contact can be formed by an intermediate position of the pawl to injure the mechanism.

Third. When the lever E has been moved by the pawl D^2 and the brakes have been applied to the wheels the dog E^4, engaging with the teeth on the segmental plate E^5, prevents the return of lever E, or the releasing of the braking force, should the inward pressure upon the draw-bar be diminished. When a certain pressure has been produced upon the wheels the tension caused thereby in the rod G^4 raises the pawl D^3 and the push-bar.

The pressure of the brake-shoes upon the wheels by which the action just described takes place is arbitrarily fixed in constructing the brake, as with any chosen pressure determined upon the arms of the pawl D^3 may be so proportioned as to produce the desired action, as above described. After the brakes have been applied the push-bar is entirely disconnected from the lever E and the draw-bar is free to move in to any extent due to the pressure put upon it by the engine without at all altering the pressure of the shoes upon the wheels or in any way affecting or being affected by the braking mechanism. Inasmuch as the pawl D^3 and the lever E are sustained by and rigidly attached to the car-body, when the brakes have been applied it follows that any longitudinal motion of said body in either direction on the truck cannot affect the braking force, as the slack given to either of the rods F^2 or G^4 which would affect the brake-shoes is compensated for by the increased tension caused in the other rod and communicated to its brake-lever by the motion of the car-body, which will cause an equalization in the effects produced.

It is well known that when a car is loaded the body of the same is lower than when unloaded, such difference being due to the compression of the springs. It is equally well known that the braking force admissible without sliding the wheels of a loaded car is much greater than that for an unloaded one.

In my improved brake mechanism the hangers are attached to the car-body, as shown in Fig. 2, and hence it follows that when the car-body is depressed by being loaded the hangers move with it and lower the brake-shoes to a position considerably below the centers of the wheels. When the shoes are in this lowered position and the brakes are applied the shoes that are raised by the friction between them and the wheels cause, by their upward movement, a greater strain upon the rod F^2, which moves through an arc of nearly the same length as if the car were unloaded; but this arc being in a different position, or located differently with reference to the peripheries of the wheels, produces the difference in tension. This will be readily understood when it is remembered that the versed sines of two arcs are not proportional to the lengths of the arcs themselves, and that the difference of the versed sines of two arcs is greater than the versed sine of the difference of the two arcs. As my brake mechanism is constructed the tension upon the rod F^2 is produced, when the car is unloaded, mostly by moving one end of the said rod longitudinally through a distance differing but slightly from the versed sine of the arc through which the rising shoes move, while the opposite end is virtually fixed rigidly to the lever F′. When the shoes are lowered by loading the car the tension produced in the rod F^2 by the rising of the shoes is nearly equivalent to that of allowing the moving end of said rod F^2 to pass longitudinally through a distance equal to the difference of the versed sines of the two arcs, the difference of which arcs themselves is the arc always traveled by the shoes. Thus a greater tension is produced in the rod F^2 and a greater braking force is obtained and applied as the car is loaded. It will be observed that as a consequence of this construction and arrangement of the parts of the mechanism they are freed from all or nearly all frictional contact with each other, and consequently from liability to be worn and from the necessity of being lubricated.

I am aware that it is not a novel feature, broadly, to use a governor upon one of the axles of a car-truck for operating or aiding in operating the brake mechanism, as types of such brakes are shown in the patent of William L. Card and David S. Randolph, No. 231,535, of August 24, 1880, and that of William L. Card, No. 207,501, of August 27, 1878. I do not therefore claim, broadly, the combination of a governor with the axles and brake mechanism of a car; neither do I claim the combinations of devices shown in either of the patents above referred to, or any other existing combinations.

I am also aware that it is not novel, broadly, to apply force to the brakes of cars by the vertical movement of the brake-shoes, a device for effecting such a result by the downward movement of the forward shoes of a brake being shown in a patent granted to James Temple on the 5th of August, 1873, No. 141,608. I do not therefore claim, broadly, this method of giving additional force to brakes in their ap-

plication to the wheels of a car; neither do I claim the devices or their combinations shown in the patent of Temple; but,

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a car-brake in which the first or partial application of its shoes to the wheels is caused by the inward movements of the buffers which act upon the requisite mechanism, the combination of a buffer or draw-bar, a pivoted push-bar connected to said draw-bar and carrying pawls for transmitting the movements of the bar to the locking mechanism, a lever which is operated by the pawls carried on the push-bar, a governor placed on one of the axles of the car, and suitable rods or chains and levers for transmitting the movement of the parts to the brake bar and shoes, the parts being arranged to operate substantially as described, and for the purpose set forth.

2. In combination with the brake beams and shoes of a car, the levers F′ F′, rods F, F², and G⁴, and the vertically-moving hangers, the arrangement being substantially as described, whereby the amount of resisting force applied to the wheels is made to vary according to the load placed upon the car, substantially as set forth.

3. The herein-described combination of mechanism for enabling the engineer to relieve the brakes from their hold upon the wheels, it consisting of a buffer or draw-bar, a push-bar pivoted thereto and carrying pawls for communicating the movements of the buffer and push-bar to the other parts of the mechanism, a pin, E², carried by said push-bar, a lever, E, carrying the shaft E³, a dog, E⁴, and segmental toothed plate E⁵, or their equivalents, the parts being arranged for operation substantially as set forth, and for the purposes specified.

4. The combination, with a car-body, of the pawl D³, lever E, and rods F² and G⁴, their arrangement being substantially as herein described, whereby any longitudinal movement of the body upon the trucks is prevented from affecting the braking force applied to the wheels, as set forth.

5. The combination of the buffer or draw-bar D, push-bar D′, pawls D² and D³, lever I′, and governor H², the parts being arranged for joint operation substantially as set forth.

6. The combination of the push-bar D′, the bent rod or shaft E³, pin E², lever E, and rods for connecting the last-named lever to the brake-beams, substantially as set forth.

7. The combination of the push-bar D′, arm D³, rod G⁴, brake-levers F′ F′, rod F², and brake-beams G′ G′, the parts being arranged for joint operation substantially as set forth.

8. The combination of the governor H², lever I′, and pawl D², they being arranged substantially as and for the purpose set forth.

9. The combination of lever E and its connections with the segmental serrated bar E⁵, they being arranged for operation substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES W. LANPHER.

Witnesses:
ROBERT A. PARKE,
HOLDRIDGE OWEN.