(No Model.) 4 Sheets—Sheet 1.

C. W. LANPHER.

CAR BRAKE.

No. 386,639. Patented July 24, 1888.

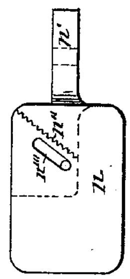

Fig. 9

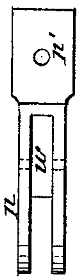

Fig. 10

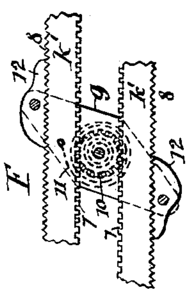

Fig. 11

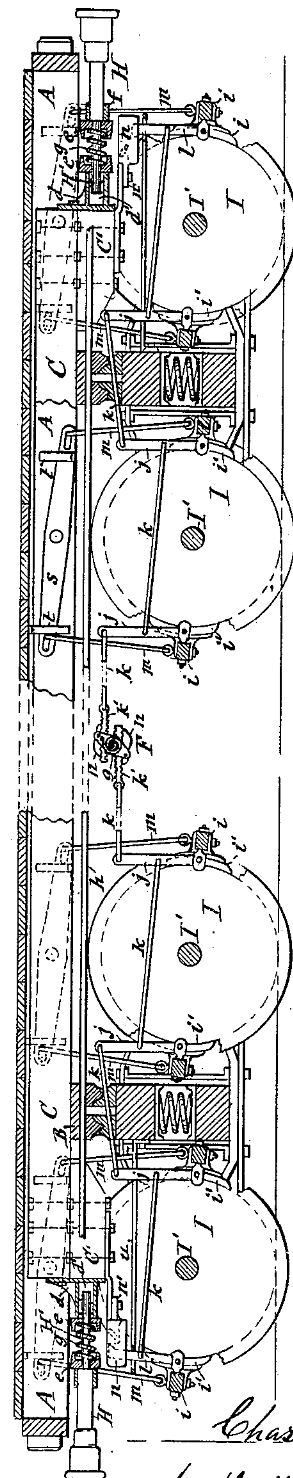

Fig. 1

WITNESSES.

C. Bendixon

A. F. Walz

INVENTOR.

Charles W. Lanpher

per Duell, Laass & Hey.

Attys

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

(No Model.)

4 Sheets—Sheet 2.

C. W. LANPHER.

CAR BRAKE.

No. 386,639. Patented July 24, 1888.

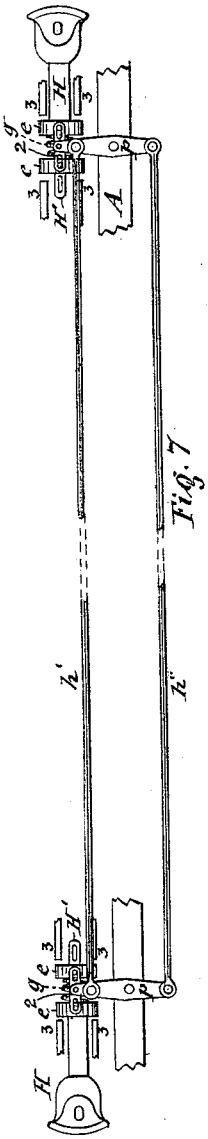

Fig. 7

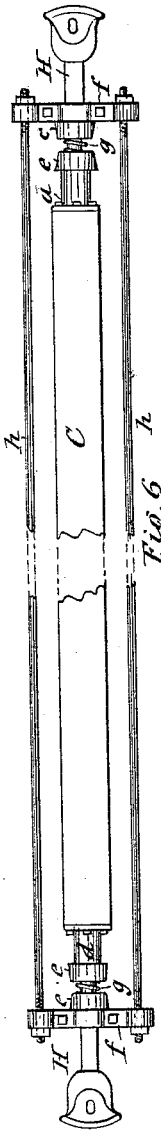

Fig. 6

Fig. 8

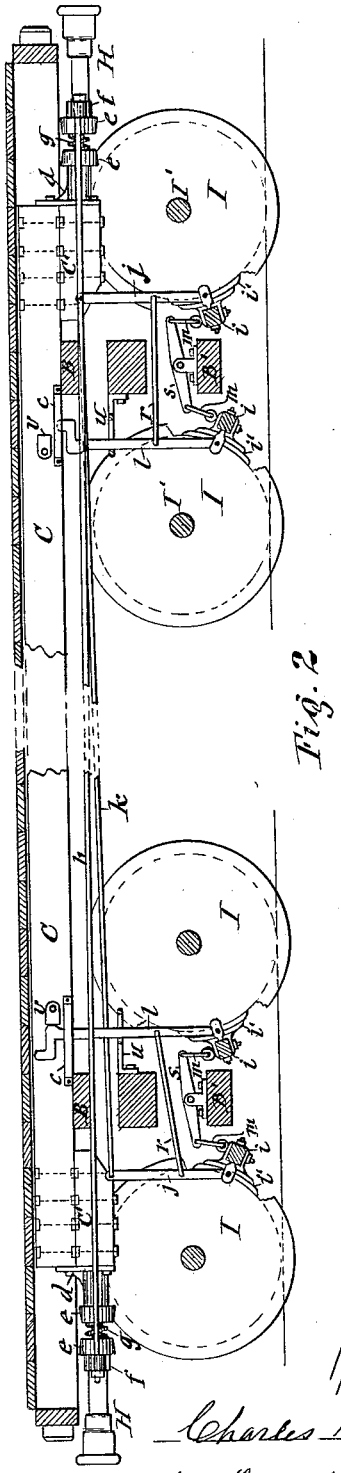

Fig. 2

WITNESSES

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(No Model.) 4 Sheets—Sheet 3.

C. W. LANPHER.

CAR BRAKE.

No. 386,639. Patented July 24, 1888.

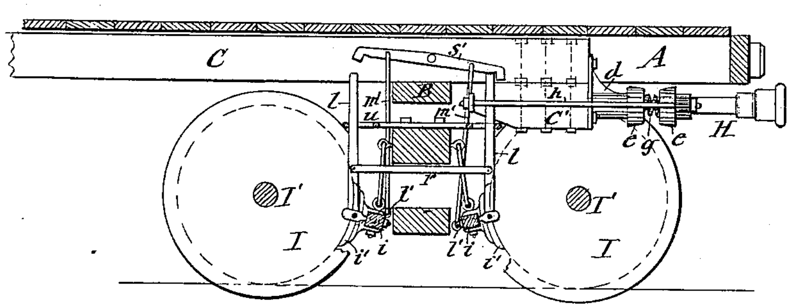

Fig. 3

WITNESSES.

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C. W. LANPHER.

CAR BRAKE.

No. 386,639. Patented July 24, 1888.

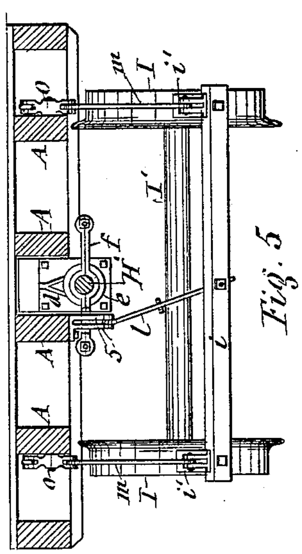

Fig. 5

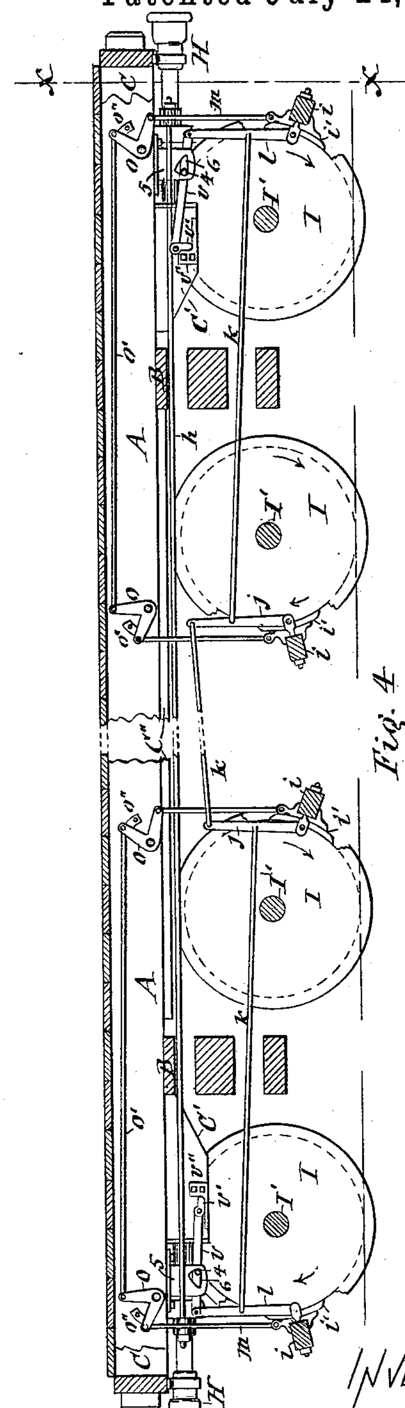

Fig. 4

WITNESSES.

C. Bendixon

A. F. Walz.

INVENTOR.

Charles W. Lanpher

per Duell, Laass & Hey.

Attys.

UNITED STATES PATENT OFFICE.

CHARLES W. LANPHER, OF NORWICH, NEW YORK.

CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 386,639, dated July 24, 1888.

Application filed April 2, 1886. Serial No. 197,594. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. LANPHER, of Norwich, in the county of Chenango, in the State of New York, have invented new and useful Improvements in Automatic Car-Brakes, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention consists, first, in a novel construction of a continuous draw-bar, which is arranged movable longitudinally on the car and transmits the propelling-power through the entire train of cars without subjecting either car to more strain than is required to move it individually, and such strain is applied to the back end of the car, so as to push instead of pulling the same, and consequently relieves the car-frame in a great measure of torsional strain; and the invention also consists in a novel construction and combination of an automatic brake mechanism actuated by the aforesaid continuous draw-bar, all as hereinafter more fully explained, and specifically set forth in the claims.

In the accompanying drawings, Figures 1, 2, 3, and 4 are vertical longitudinal sections of my invention, illustrating various modifications of the detail construction thereof. Fig. 5 is a vertical transverse section on line *x x*, Fig. 4. Fig. 6 is a detached plan view of my improved continuous draw-bar. Fig. 7 illustrates modifications thereof. Fig. 8 is a detached face view of one of the yokes by which the tension-rods of the continuous draw-bar are connected with the draw-heads. Figs. 9 and 10 are enlarged detached side and top plan views of the catch which is employed for transmitting motion from the continuous draw-bar to the primary brake-lever, and Fig. 11 is an enlarged detail view of the automatic take-up of the brake-rod.

Similar letters of reference indicate corresponding parts.

A A represent the usual longitudinal bottom stringers of the car-frame, and B B denote the transom-beams of the car-trucks, the wheels and axles of which latter are designated by the reference letters I I'.

H H are the draw-heads, which I convert into a continuous draw-bar by means of an intermediate push-bar, C, arranged movably longitudinally on the under side of the car-frame and connected with the two draw-heads H H by spring-couplings consisting of brackets *d d*, rigidly attached to the ends of the block C', secured to the under side of the ends of the bar C, said brackets having longitudinal sockets *d' d'*, in which the inner ends of the stale-bolts H' of the draw-heads are entered.

Between the outer end of each bracket *d* and the usual shoulder on the inner end of the draw-head H are cup-shaped followers *e e*, which are perforated at the center for the reception of the stale-bolt H' through them. A key passing through the said stale-bolt back of the inner cup couples said parts together. The flanges of the cups facing each other support between the cups a spiral spring, *g*. The aforesaid flanges are of such a depth as to cause them to collide with each other when the spring *g* is subjected to maximum compressive strain by the compression of the draw-head. Said cups thus serve to guard against the breakage of the spring by undue strain.

Across the outer face of each outer cup, *e*, is arranged a yoke, *f*, which is formed with an eye, *f'*, (see Fig. 8 of the drawings,) by which eye the yoke slides on the draw-heads lengthwise the latter, and to opposite ends of said yoke are attached tension-rods *h h*, which are extended to the opposite end of the car, and are connected in a similar manner to the yoke *f* thereat, as illustrated in Fig. 6 of the drawings. The described continuous draw-bar is supported on the usual transom-beams, B B, of the car-frame, and is allowed a limited longitudinal movement thereon, the movement being limited by the collision of the rear ends of the blocks C' of the bar C against the adjacent transom-beam B of the car-frame. As the draft is applied to the forward draw-head H, the strain is transmitted to the yoke *f* on said draw-head by the coupling of the stale-bolt H' with the inner cup *e*, pressing said cup outward toward the companion cup, which abuts against the yoke *f*, the intervening spring, *g*, serving to yieldingly transmit the pressure to the yoke. From this yoke the draft is transmitted to the yoke *f* at the rear end of the car by the tension-rods *h h*, and thereby causes the latter yoke to exert a forward pressure on the rear end of the push-bar C, which pressure is

also rendered yielding by the spring *g* at said end of the push-bar.

In pushing the push-bar C forward the front end of the rear block C′ thereof collides with the adjacent transom-beam B, and thereby pushes along the car; hence the car-frame is relieved from the torsional strain incident to the ordinary connection of the draw-heads with the car-frame, and the transmission of the motive power to the car is made doubly elastic by the two springs *g g*.

It will also be observed that the described continuous draw-bar transmits the motive power through the entire train of cars without subjecting either car to more strain than is required to move it individually.

Although I consider the before-described construction of the continuous draw-bar the simplest and preferred form, yet I do not limit myself to this specific construction, inasmuch as it admits of several modifications, as illustrated in Fig. 7 of the drawings, which modifications are adapted to transmit the motive power to the car from the rear end thereof and under the resistance of two springs, and in that respect possesses the same advantages obtained by the draw-bar shown in Fig. 6 of the drawings. In the modified construction of this continuous draw-bar the push-bar C is dispensed with, and in lieu thereof two tension-rods, *h′ h″*, are connected to two levers, *p p*, each of which is pivoted between the connection of the rods *h′ h″* to the frame of the car, as shown at 1 in Fig. 7 of the drawings. One end of this lever is connected to a strap, 2, which in turn is connected to the followers *e e*, which are mounted loosely on the stale bolt of the draw-head H and have the spring *g* interposed between them. The connection of the said strap with the followers is made by longitudinal slots in the strap, the attaching-bolts passing through said slots and being fastened to the followers, said slots allowing the followers a limited longitudinal movement on the strap. The two followers *e e* are between abutments 3 3 on the car-frame, and are allowed a limited play between the same. When the car is pushed by pressure applied to the draw-head, the pressure is transmitted to the rear or inner follower *e* by the spring *g*, and said follower is pressed against the adjacent abutment 3. During this movement the strap 2 is drawn along by the aforesaid follower, and thus the lever *p* is turned on its pivot and caused to exert a tensile strain on the outer rod, *h″*, and this strain turns the lever *p* at the opposite end of the car, and thereby presses the inner follower *e* thereat rearward, and this follower crowds the outer companion follower against the adjacent abutment 3 on the car, and thus a part of the motive power is transmitted to this end of the car. When a draft is applied to the draw-head H, the action of the levers *p p* and movement of the followers *e e* are reversed, and the strain is transmitted from one of said levers to the other lever by the inner rod, *h′*; but the propelling-power for the forward movement is transmitted with the same effect as for the rearward movement of the car. It will be observed that by this system of the continuous draw-bar the strain is applied to both ends of the car, and is transmitted yieldingly at each end by the medium of the springs *g*, and therefore the action of this draw-bar is doubly elastic, like that of the draw-bar shown in Fig. 6 of the drawings.

A further modification of the continuous draw-bar is illustrated in Fig. 3 of the drawings, where the tension-rods *h* are terminated at and connected with the inner end of the block C′, attached to the push-bar C. In this case said push-bar is made to transmit both tensile and compressive strain, according to the direction in which the motive power is applied to the draw-heads.

The described continuous draw-bar, together with the momentum of the car under motion, constitutes the prime motor of my improved automatic car-brake, which consists, essentially, in the combination, with the continuous draw-bar arranged yieldingly longitudinally on the car, of brake beams or bars supported movably vertically and carrying the brake shoes, a system of co-operating brake-levers connected with said brake-bars, and the primary brake-levers arranged to be actuated by the continuous draw-bar. The detail construction of the elements of this combination and their arrangement in relation to each other admit of many modifications, as will become apparent by the following descriptions.

i i represent the brake-bars, to which the brake-shoes *i′ i′* are attached in the usual manner. These brake-bars I support movably vertically by various means.

In Fig. 1 of the drawings the brake bars and shoes are arranged at diametrically-opposite points of each wheel, and four balance bars or levers, *s s s s*, are pivoted at the center of their length—two on either side of the car—to one of the longitudinal stringers A of the car-frame, and arranged, respectively, over the four wheels of the car-truck, and the ends of each of said levers are slotted, and from the slots are suspended rods *m m*, to the lower ends of which the brake-bars *i i* or shoes *i′ i′* are connected by a loose joint, which allows the said bars to rock on their axis. The object of the slots in the ends of the levers for the reception of the attaching bolt or pin of the rods *m m* is to allow said rods to slide toward and from the ends of the levers. The rod *m*, which is connected to the depressed end of the lever, slides toward the end of the lever, while the rod on the elevated end of said lever slides toward the center thereof, and since the rods *m m* are of equal weight, and the aforesaid shifting of said rods brings one of the rods farther from the fulcrum of the lever, while the other rod is brought nearer to said fulcrum, the said lever is thrown out of balance and retained in its inclined position by gravity. By means of straps *t t*, placed astride the

end portions of the levers *s s* and secured to the stringer A, the oscillation of said levers is limited.

j j denote the brake-levers, connected to the brake-bars and coupled with each other and with the sets of brake-levers at the opposite end of said car by rods *k k k k*, in such a manner as to cause all the brake-shoes to be applied to and released from the wheels simultaneously.

l l represent the primary brake-levers of the two sets of brakes at opposite ends of the car. These primary brake-levers are actuated by the continuous draw-bar, which is provided with suitable catches, by which it engages the upper ends of the said levers. These catches may be constructed in various ways. In this case they consist of vertically-slotted blocks or shoes *n n*, attached to the blocks C′ C′ on opposite ends of the continuous draw-bar. The interior of the shoe *n* is formed with a serrated or corrugated inclined end or heel, *n″*, and in front of this heel is a gravitating pawl, *w*, provided with a corresponding serrated inclined end facing the heel *n″*.

The pawl *w* is guided in its movement by a pin projecting from the pawl and through an oblique slot, *n‴*, in the side of the shoe parallel with the heel *n″*. The upper end of the primary brake-lever *l* projects into the shoe *n*, and below the latter is a rigid strut, *u*, which projects from the truck-frame, and is provided with shoulders or bearings in front and rear of the lever *l*.

The operation of the described mechanism is as follows: Assuming the right-hand end of the car shown in Fig. 1 of the drawings to be the forward end and the car drawn in that direction, it will be observed that the continuous draw-bar has been moved forward and the block C′ on the rear end of the said draw-bar is brought to bear on the back of the adjacent transom-beam B, and thereby pushes the car ahead. The wheels, revolving in the direction indicated by arrows, have, by frictional contact with the brake shoes *i′ i′*, drawn the front shoe below the axis of the wheel and lifted the rear shoe above said axis, the lever *s* being tilted correspondingly, and the suspension-rods *m m*, sliding on said lever, as hereinbefore described, retain the lever in its inclined position, the movement of said lever being limited by the straps *t t*. The lifting of the brake-bar at the rear end of the car raises the primary brake-lever *l* on said brake-bar, so as to bring the upper end of said lever to bear against the back of the pawl *w* in the shoe *n*, hereinbefore described. At the same time the primary lever *l* at the front end of the car is carried at its lowest position and clear of the pawl *w* thereat. If, then, the speed of the engine is slackened and the continuous draw-bar subjected to back-pressure, the momentum of the car causes the primary brake-lever *l* at the rear end of the car to press against the pawl *w*, and the resistance of this pawl received from the retarded continuous draw-bar actuates the primary brake-lever *l*, so as to apply the brake with a force in accordance with the momentum of the car to be overcome.

The braking force is transmitted through the brake-rods *k k k*, &c., through the entire system of brake-levers and to the forward primary brake-lever *l*, which latter is held at its upper end by the strut *u*, and this braking force will remain applied so long as the continuous draw-bar has to resist the momentum of the car, or until the car is stopped. Then by a forward movement of the continuous draw-bar the rear primary brake-lever *l* is released from the pressure of the pawl *w*, and thus the entire system of brake-levers is relieved from braking force, and the car is free to be drawn ahead or pushed back.

In backing the car the friction of the shoe on the treads of the wheels causes the brake-bars *i i* to follow the movement of the wheels sufficiently to draw down the rear lever *l* free from the pawl *w*. The primary lever *l* at the opposite end of the car is at the same time raised to a position to encounter the pawl *w* thereat; but the first forward impulse of the car causes the brake-shoes to obtain sufficient hold on the wheels to draw down the forward primary brake-lever, so as to clear the pawl *w* and allow the continuous draw-bar to be drawn forward without applying braking force to the brake-levers, and the brakes will remain dormant until the continuous draw-bar receives back-pressure by the slackening of the speed of the motor and resistance of the momentum of the car. The rear brake-lever *l*, having been thrown in position back of the pawl *w* during the first forward impulse, receives the back-pressure of the retarded continuous draw-bar, and consequently applies the brakes.

The object of the pawl *w* is to insure its engagement with the primary brake lever *l* in case the continuous draw-bar is moved only part way forward on the car. In such a case the said lever *l* will strike the bottom of the pawl *w* and shove it up obliquely until it slips off from the end of the lever and drops in front of it. The pawl subsequently settles to its normal position as the continuous draw-bar is drawn forward.

The serrated or corrugated faces of the pawl and adjacent heel of the shoe *n*, hereinbefore described, serve to prevent the pawl from sliding upward, while receiving the pressure of the lever *l* in a horizontal direction. In the modification illustrated in Fig. 2 of the drawings, the continuous draw-bar system is of the same construction and has the same action as that shown in Fig. 1 of the drawings; but in this case the brake system is applied between the wheels of each truck only, and the balance bars or levers *s s* are pivoted on brackets secured to one of the transom-beams, B′, of the truck-frame, and from these levers the brake-bars *i i* are suspended by the rods *m m*.

The vertical movement of the brake-bars is limited by the collision of the oscillating ends

of the levers *s* with the transom-beam B'. In this arrangement of the brake system the connecting-rods *r r* are subjected to compressive strain when the brakes are set.

The primary brake-lever *l* is extended to the side of the push-bar of the continuous draw-bar, and is guided by a strap, *c*, placed astride the said lever and secured to the push-bar C. At the inner edge of the lever *l* is a pawl, *v*, pivoted on the push-bar C. When the car is moved forward or to the right, as here represented, and the speed of the engine is checked so as to produce a back-pressure on the continuous draw-bar, said draw-bar yields and causes the pawl *v* to press against the upper end of the primary brake-lever, and this applies the brakes with a force varying according to the momentum of the car and back-pressure on the continuous draw-bar. A forward motion of said draw-bar relieves the lever *l* from the pressure of the pawl *v*, and consequently the braking force is removed from the entire brake system. In case the car is pushed back instead of being moved forward after its speed has been retarded or completely stopped, then the first rearward movement of the wheels draws down the rear lever *l*, and thus allows the continuous draw-bar free rearward movement without actuating the brake-lever. At the same time the lever *l* at the opposite end of the car has been raised and brought into position to be actuated by the pawl *v* in case a forward pressure is applied to the continuous draw-bar to check the rearward movement of the car, in which case the pressure of the pawl *v* on the forward lever *l* applies the brakes; hence it will be observed that the brake action in this case is substantially the same as in the arrangement shown in Fig. 1 of the drawing.

In Fig. 3 of the drawings the brake-bars *i i* are suspended from a stationary support, and the brake-shoes are made movable vertically by attaching them to the ends of the short levers *l'*, which are pivoted near their centers to each end of the brake-beams *i i*. To the same ends of the levers *l'* are connected the brake-levers *l l*, the upper ends of which reach to the side of the continuous draw-bar, and on the latter is pivoted a lever, *s'*, having the pivot at the center and formed at its ends with hooks or offsets, by which it is adapted to engage the upper ends of the levers *l' l'*. The ends of the lever *s'* are connected to two rods, *m' m'*, the lower ends of which are connected to the inner ends of the short levers *l' l'*. When the car is moving forward or to the right by a force applied to the continuous draw-bar, said draw-bar is moved its limited distance on the car in the same direction, and the wheels, revolving in the direction indicated by arrows in the drawings, cause the brake-shoes to tilt the lever *s'* into a forwardly-inclined position by means of the rods *m' m'*, and thus the hook on the forward end of the lever *s'* is brought in front of the upper end of the forward brake-lever *l*. If, then, a backward pressure is exerted on the continuous draw-bar, the aforesaid hook of the lever *s'* presses the upper end of the forward brake-lever *l* rearward, and this rearward movement of said lever is transmitted to the other brake-lever *l*. The upper end of the latter, being held by the strut *u*, causes the strain to be transmitted to the lower ends of the two brake-levers, and thus applies the brake. If the car comes to a stop and is then backed, the friction of the wheels against the brake-shoes causes the forward brake-lever to be drawn down and out of engagement with the lever *s'*, and thus the brakes are relieved from the braking force, and the car is free to be moved backward.

If instead of completely stopping the car in its forward movement it receives only a temporary check, and is subsequently propelled by a force applied to the draw-bar, it is obvious that the forward movement of the said draw-bar independent of the car also relieves the forward brake-lever *l* from the pressure of the pawl *v*, and consequently the car is free to move forward.

Fig. 4 represents a further modification of my improved automatic brake system.

The action of the continuous draw-bar is substantially the same as hereinbefore described. The construction differs slightly in that I have re-enforced the intermediate push-bar, C, by securing to the underside thereof an additional bar, C'', extending lengthwise thereof between the two transom-beams B B of the car-frame, and serving as a secondary abutment against said beams when a strain is applied to the continuous draw-bar for propelling the car, a space being left between one end of the bar C'' and adjacent transom-beam B to allow the continuous draw-bar to move its requisite distance on the car. In this system I use brake bars *i i* and brake-shoes on the outside of the four truck-wheels. The bars *i i*, with their shoes *i' i'*, are suspended at both sides of the car by rods *m m* from the outer arms of bell-crank levers *o o*, pivoted on one of the stringers of the car-frame, as represented by dotted lines in the aforesaid figure of the drawings. The upright arms of the aforesaid bell-crank levers are connected with each other by a rod, *o'*, and thus the brake bars *i i* are carried movably vertically in a suspended position, and as one of said bars rises the other descends, said movement being limited by stops *o'' o''*, secured to the car-stringer in such positions as to be encountered by the bell-crank levers, and thus arrest the movement thereof at the proper time. The bell-cranks referred to are of a peculiar construction. The angle between the two arms of the bell-crank is considerably less than ninety degrees, and the connection of the bell-cranks is such that when one arm is in a vertical position the other arm has not reached a horizontal position. Therefore, when the vertical arm has moved to an inclined position, the two arms of the bell-crank give an overbalancing weight in favor of the direction of the inclination, and thus the brake bars, shoes,

&c., are held in their position by gravity of the bell-cranks. The action of the brake system in this figure is similar to that shown in Fig. 1 of the drawings; but in lieu of the gravitating pawl in the shoe attached to the continuous draw-bar I employ a push-bar, *v*, connected to the upper end of the primary brake-lever *l*, said push-bar having on its free end a toggle or pawl, *v'*, connected therewith by a knuckle-joint, and this pawl *v'* rests upon and against a lug, *v''*, attached to the block C' of the continuous draw-bar. The central portion of the push-bar *v* lies between two plates, 5 5, secured to the car-frame, and these plates are provided with triangular slots 6, into which project pins 4, secured to opposite sides of the central portion of the bar *v*. When the car is drawn ahead, the continuous draw-bar is drawn forward on the car, and the rear block C' and re-enforcing bar C'' of said draw-bar are brought to bear against the rear sides of the adjacent transom-beams B B of the car-frame, and thus the propelling-power is applied to both ends of the car and shoves the same ahead. The frictional contact of the brake-shoes with the revolving wheels draws down the front brake-beam, *i*, and brake-lever *l*, connected therewith, and at the same time raises the rear brake beam and lever until arrested by collision of the bell-crank lever *o* with the stop *o''*. The continuous draw-bar, being in its extreme forward position, allows the knuckle-jointed pawl *v'* to fall in line with the bar *v*, and is so sustained by the knuckle-joint, while the pawl *v'* at the opposite or forward end of the car has been been tripped into a vertical position by the downward movement of the primary brake-lever *l* thereat. If, then, a back-pressure is applied to the continuous draw-bar, the momentum of the car causes the lug *v''* on the rear end of the continuous draw-bar to exert a rearward pressure on the upper end of the brake-lever by the medium of the pawl *v'* abutting against the lug *v''*, and this rearward pressure on the lever *l* sets the brakes, the braking force being transmitted through the rods *k k k* to the forward brake-lever *l*, where it is resisted by the abutment of the pins 4 of the bar *v* against the inner end of the slots 6 in the plate 5. If the car should come to a stop and then be pushed back by power applied to the continuous draw-bar, the reverse movement of the wheels will draw down the primary brake-lever by the frictional hold of the brake-shoes on the wheels, and the pawl *v'* is thereby tripped to liberate the said brake-lever from the pressure of the lug *v''*, and the continuous draw-bar can then freely yield to the back-pressure and slide to its extreme rearward position on the car, so as to bring the re-enforcing bar C'' and forward block C' of the continuous draw-bar to bear against the transom-beams B B, and thereby push the car rearward.

F represents my improved automatic take-up for maintaining the brake-rods at a proper tension. Said take-up consists in forming the long brake-rod K of two separate rods having connected to their adjacent ends longitudinal extensions K' K', which are formed with racks 7 on their adjacent sides, and with ratchets 8 on their outer sides, as shown in Fig. 11 of the drawings, and across opposite sides of said rod-extensions K' K' are placed straps 9, between which and said extensions is a pinion, 10, pivoted on the straps and meshing in the racks 7. A coil-spring, 11, attached at one end to the axle of the pinion and at the opposite end to one of the straps 9, actuates the pinions to draw the rods K K toward each other by means of the racks 7. To the ends of the straps are pivoted serrated pawls 12, which engage the ratchets 8 8 of the rod-extensions K' K'. The spring-actuated pinion takes up the slack of the rods, and the pawls 12 retain the rods at their adjusted tension.

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

1. The combination, with a car, of a continuous draw-bar consisting of two draw-heads, respectively at opposite ends of the car and movable longitudinally on the car, an intermediate push-bar arranged movably longitudinally on the car, spring-couplings between the ends of said push-bar and draw-heads, yokes on said spring-couplings to receive the pressure thereof, and tension-rods connecting said yokes.

2. In combination with the longitudinal push-bar and draw-heads movably connected therewith, springs interposed between said parts and cup-shaped spring-seats having flanges surrounding the springs and of a depth to limit the compression of the springs by the free edges of said flanges brought to a bearing by the compression of the draw-heads, substantially as set forth.

3. The combination of the push-bar C, brackets *d d*, having longitudinal sockets *d'*, the draw-heads H, having their stale-bolts H' in said sockets, cups *e e* on the stale-bolts in front of the brackets, springs *g g* in said cups, the yokes *f f*, connected loosely with the draw-heads at the outside of the spring supporting cups, and tension-rods *h h*, connecting said yokes with each other, substantially as described and shown.

4. In combination with the car frame and trucks, a continuous draw-bar arranged movably longitudinally on said frame, springs for resisting the movement of said draw-bar toward either end of the car, levers pivoted on the car-frame, brake-bars arranged at diametrically-opposite points of the wheel-treads and suspended from the aforesaid levers at opposite sides of the fulcrums thereof, a system of co-operating brake-levers connected with the brake-bars, catches on the draw-bar, and the primary brake-levers adapted to engage the said catches, all combined to operate substantially as described and shown.

5. In combination with the brake-levers, rods connected at one end to said levers, and

provided at their adjacent opposite ends with longitudinal racks on their adjacent sides and with ratchets on their outer sides, straps across opposite sides of said ends of the rods, a pinion interposed between the racks and pivoted on the straps, a spring for actuating the pinion in one direction, and pawls pivoted on the straps and engaging the ratchets, substantially as described and shown.

6. In combination with the continuous draw-bar arranged movably longitudinally on the car, brake-bars carrying brake-shoes and arranged movably vertically, a system of co-operating brake-levers connected with the brake-bars, shoes *n n*, connected to the continuous draw-bar and provided with serrated inclined heels *n''*, the gravitating pawls *w* in said shoes and provided with corresponding serrated inclined ends engaging the heels *n''*, the primary brake-levers *l l*, having their upper ends sliding in the shoes *n n* and bearing on the pawls *w*, and the struts *u u*, provided with bearings for the levers *l l* in front and rear thereof, substantially as described and shown.

7. The combination, with the car-frame, continuous draw-bar, truck, brake-bars, and primary brake lever *l*, of the push-bar *v*, attached to the upper end of said lever, the pawl *v'*, connected with the push-bar by a knuckle-joint, and the lug *v''*, attached to the continuous draw-bar, substantially as described and shown.

In testimony whereof I have hereunto signed my name and affixed my seal, in the presence of two attesting witnesses, at Norwich, in the county of Chenango, in the State of New York, this 26th day of March, 1886.

CHARLES W. LANPHER. [L. S.]

Witnesses:
C. H. KNAPP,
H. OWEN.