

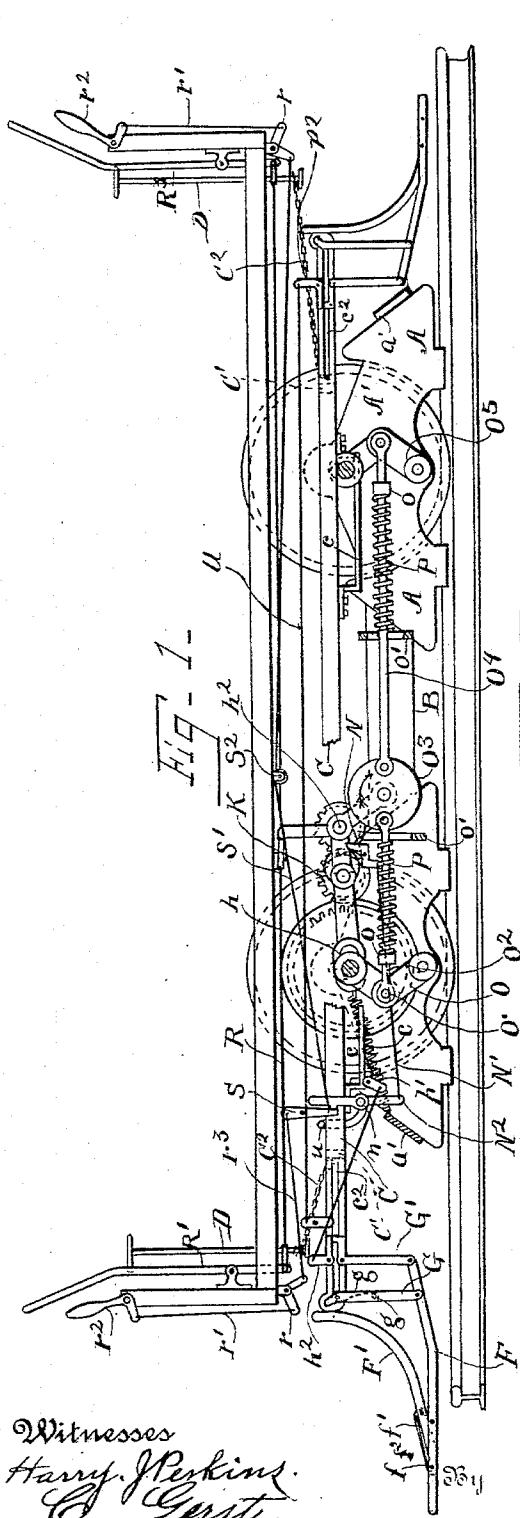
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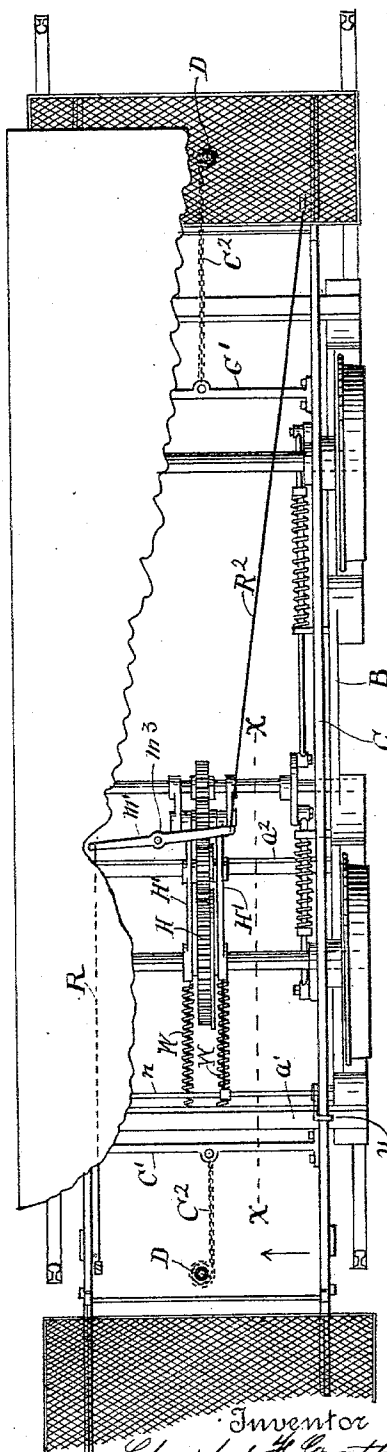
C. F. GRATHER.
CAR FENDER AND BRAKE.

No. 559,891.

Patented May 12, 1896.



Witnesses
Harry J. Perkins
C. Gerst.

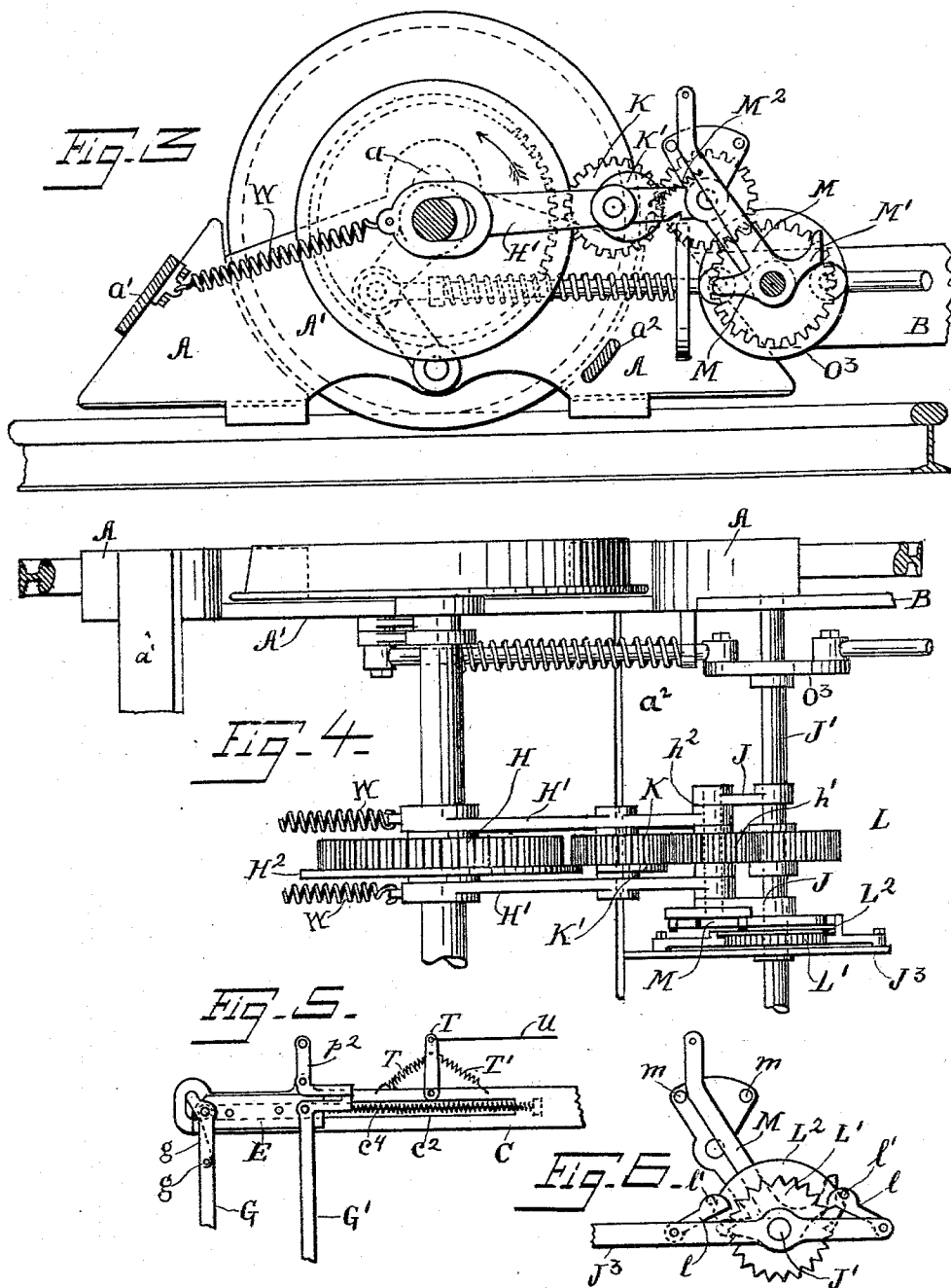


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Witnesses

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By

Attorneys

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UNITED STATES PATENT OFFICE.

CHARLES F. GRATHER, OF NEW YORK, N. Y.

CAR FENDER AND BRAKE.

SPECIFICATION forming part of Letters Patent No. 559,891, dated May 12, 1896.

Application filed June 7, 1895. Serial No. 552,004. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. GRATHER, a citizen of the United States, and a resident of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Car Fenders and Brakes, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof, in which similar letters of reference indicate corresponding parts.

My invention relates to brakes and fenders for cars, and the object thereof is to provide a combination brake and fender which will operate automatically and jointly or which may be operated independently.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which—

Figure 1 is a side elevation with the wheels and brakes on the side from which the view is taken removed; Fig. 2, a top plan view; Fig. 3, a side elevation of the construction shown in Fig. 4 or on the line *xx* of Fig. 2; Fig. 4, a plan view of the construction shown in Fig. 3, and Figs. 5 and 6 represent details of the construction.

In the practice of my invention I mount upon the car-axles at each end and on each side brakes A, which are united on each side by a plate or bar B, formed or cast integral therewith, the brake-shoes proper, or that portion of the brakes A which acts upon the wheels and the track-rails to stop the car, being united by a wide plate A', which is of the form shown in full and dotted lines in Fig. 3, and is provided with a vertically-elongated opening or slot *a* at each end, through which the axles pass, the slots *a* being adapted to permit of the vertical movement of the brakes, as will be hereinafter described. As thus constructed and mounted, it will be seen that the brakes on each side of the car for both wheels consist of a simple piece, formed, preferably, of a single casting, and of course, as will be hereinafter seen, operates as one body, the opposite brakes at each end being also united by a cross-bar *a'*, securely bolted thereto.

In my improvement I employ a sliding fender-frame or support-frame composed of side bars C, mounted on both axles, and these bars may be provided with longitudinal slots,

through which the axles pass, or strips of angle-iron *c* may be secured thereto for the same purpose, the latter being the form of construction shown in the drawings.

The side bars C of the sliding fender-support are united by cross-bars C', (see Fig. 2,) to each of which is centrally secured a cord or chain C², each of which is connected with a vertical shaft D, which extends up through the car-platform, one at each end, by means of which the fender-support may be drawn from one end to the other and one fender be projected and in operation and the other concealed beneath the car, as may be desired. Each end of the bars C is provided with slots *c*², in which is mounted sliding blocks E, (best shown in Fig. 5,) which constitute the supports for the fenders or guards, one of which is placed at each end and each of which consists of a main frame composed of side bars F, united in the usual manner and by a body portion of wire-mesh or similar material, and of an auxiliary frame composed of curved side bars F', which are pivotally or otherwise connected with the main frame at *f*, and also provided with a body portion of wire-mesh or similar material in the usual manner, and secured at the pivoted connection of each side of the auxiliary fender-frame is a spring *f*², which extends forward and bears upon a pin or lug formed on the sides of the auxiliary frame, as shown in Fig. 1, the object of which is to press the auxiliary frame against the ends of the sliding support.

The inner end of the auxiliary fender-frame or the sides F' thereof bear upon the ends of the side bars C of the fender-frame or a cross-bar connecting the same, and the inner ends of the sides of the main fender-frame are connected with the sliding blocks E by vertical rods or bars G and G', which are pivotally connected with the fender and the blocks at each end, and a spring *g*, secured at the upper end of each of the rods G, bears upon a pin or cross-bar *g'*, the object of which is to keep the main fender-frame extended under ordinary circumstances and afford a yielding support therefor, adapted to hold the main fender-frame in the extended or projected position, and the upper end of the rods or bars G are also provided with an inwardly and upwardly directed projection, which rests in

an upwardly-directed continuation of the slots c^2 in the sides C of the fender-supporting frame.

Mounted on one of the axles of the car, and preferably centrally thereof, is a gear-wheel H, and at each side thereof is a bar or arm H', provided with longitudinal slots through which the axles pass, said bars H' being carried backwardly and mounted at their rear ends on a short shaft h^2 , on which are also mounted the upper ends of the arms or levers J, the lower ends of which are connected with a shaft J', which is revolvably mounted in the bars or plates B, which connect the brake-frames on each side, or which may be revolvably mounted in the brakes themselves.

Mounted adjacent to the gear-wheel H, between the arms or bars H', is a smaller gear K, provided on one side with a cam K', adapted to operate in connection with a flange or rim H² on the wheel H, and mounted on the shaft h , which connects the rods or arms H' and J, is a gear-wheel h' , adapted to engage with the gear-wheel K, as clearly shown in Figs. 3 and 4.

Mounted on the shaft J', between the arms or levers J, is a gear-wheel L, which engages with the wheel h' , and mounted on said shaft J', between the wheels L and one of the brakes, is a ratchet L', provided with a cam-plate L², and pivotally connected with the shaft J' is a bar or rod J³, one end of which is secured to a cross bar or brace a^2 , rigidly secured to the brakes.

Pivotally connected with the bar J³ are dogs l , having pins or lugs l' at their free ends, which normally rest on the cam-plate L², and pivotally connected with the shaft J', between the ratchet-wheel L' and one of the arms or levers J, is a crank-lever M, provided at its lower end with cranks or arms, the object of which is to disengage the dogs l from the ratchet-wheel L', as hereinafter described. The lever M is extended upward between two pins m , formed on or secured to an extension of one of the arms or levers J, and the upper end thereof is pivotally connected with a lever m' , (see Fig. 2,) which is pivotally connected centrally at m^3 with a hanger secured to the bottom of the car.

Secured to the upper end of the lever M is a spring M², one end of which is secured to one of the arms or levers H', the object of which is to keep the lever M in the position shown in Fig. 3.

Pivotally connected with the cross bar or brace a^2 is a crank-lever N, the upper end of which is adapted to engage with a notch or recess formed in the arm or lever H' adjacent to the lever M, and to the lower end of which is secured a cord or chain N', connected with the lower end of a lever N², which is connected with a shaft n , pivotally connected with the brake-shoes.

Pivotally connected with the brake-shoe frame directly below the axle is one arm of a toggle-lever O, the other arm of which is

mounted on the axle and the pivotal connection of the separate arms of the toggle-lever being directed forward, as shown at O', and mounted on the pin by which said connection is made is a rod or arm O², one end of which is connected with a wheel O³, mounted on the shaft J'. It will also be observed that a corresponding rod or arm O⁴ is connected with the opposite side of the wheel O³ and carried backward and connected with the central pivot of the toggle-lever O⁵, connected with the rear or other axle and brake on the same side and in the same manner as hereinbefore described. On each of the rods or arms O² and O⁴ is a powerful spring P, provided with bearings o , formed on said rods or arms at one end, or connected therewith, and at the other end consisting of slotted plates o' , secured to the brakes or the frame or connecting bars or plates thereof. The object of the spring P in the normal condition of the parts is to support the weight of the brakes by forcing the toggles in the direction of the ends of the car and elevating the brake-shoes by means of the vertical slot formed therein through which the axles pass.

Pivotally connected with one of the sliding bars C or the angular iron c , connected therewith, is a short lever p' , to the lower end of which is attached a cord or chain which is carried forward and connected with the vertical arm of a crank-lever p^2 , the other arm of which is carried backward and rests on a backward extension of the vertical rod or bar G of the fender-frame.

A rod R (shown in dotted lines in Fig. 2) is connected with one end of the lever m' , hereinbefore described, and the other end is carried forward and connected with the lower end of a lever R', which is carried up through the bottom of the car-platform, as shown in Fig. 1, and to the opposite end of the lever m' , as shown in Fig. 2, is connected a rod R², which is carried back to the other end of the car and connected with the lower end of a lever R³, which extends through the platform of the car, this rod R² and its connection being shown in Fig. 2, but not in Fig. 1, to avoid complicating the latter.

The forward end of the rod R is provided with a slotted extension, as shown in Fig. 1, by which the slotted connection with the lower end of the lever R' is made to admit of the proper actions of these parts in the operation of the brakes, as hereinafter described.

A short crank-lever r is pivotally connected with the hanger secured to the outer end of each platform, and one arm of each lever is pivotally connected with a rod r' , which extends upward and is connected with one arm of the crank-handle r^2 , pivotally connected with the dashboard at each end of the car, and secured to the other arm of one of the crank-levers r , which extends downwardly at one end of the car, is a cord or chain r^3 , which is carried backwardly beneath the front platform and secured to the upper end of the

lever S, which is pivotally connected to a hanger secured beneath the platform.

The lower end of the lever S extends downwardly and has secured thereto a cord or chain 5 S', which is carried backward beneath the car over a pulley S², secured to the bottom thereof, and onto the opposite end of the car, where it is secured to one of the arms of the crank-lever r, as hereinbefore described with 10 reference to the other end. Pivotally secured at the forward end is a vertical lever T, held in position by springs T' on each side thereof, the ends of which are secured thereto and to the bar C, and connected with 15 the upper end of the lever T is a rod U, which is carried back to the opposite end and connected with the upper end of the crank-lever p², similar to that at the other end and hereinbefore described, and secured to the shaft 20 n, to which the lever N² is secured, is an upwardly-directed arm or lever u, in connection with which the lever T is adapted to operate, as will be set out in the statement of the operation of the machine.

25 Connected with the cross-bars a' are two powerful spiral springs W, one of which is connected with the ends of each of the arms H', as clearly shown in Figs. 2 and 4, the object of which springs is to throw into gear the 30 wheels K, H, h', and L, this being accomplished by pulling forward arms H' until the gear-wheel K meshes with the gear-wheel H, it being understood that in the normal position of these parts the gear-wheels K, h', and 35 L are always in gear and the gear-wheels H and K out of gear, being held out of gear by the crank-lever catch N, and the arms or levers H' and J being pivotally connected at h², as shown in Figs. 3 and 4, constituting a 40 bridge by which the wheels K and h' are supported and by means of which the gears H and K may be brought in contact or connection by the springs W, or whenever the crank-lever catch N is released. Under certain 45 conditions—for instance, when the car would be going down a steep grade and is under considerable momentum—it is necessary, or may be, that the wheels H and K should be thrown out of gear in order to prevent the 50 wheel O³ from being turned too far in the direction of the arrow shown in Fig. 1, and thus cause the toggle-lever O to be drawn too far back or the toggle-lever O³ to be drawn too far forward, thus causing the smashing 55 or breaking of the apparatus. The means provided for this purpose consist of the flange H², formed on the wheel H, and the cam K' on the wheel K, the operation of which is to prevent the above-mentioned accidents by throwing 60 said wheels out of gear, as will be readily understood, the cam-wheel being so formed as to strike the flange K² and throw the wheels out of gear when the wheel O³ has made about a quarter of a revolution. It will also be ob- 65 served that it makes no difference which way the wheel K is revolved the cam K' will operate to produce the said results in either

direction of the movement of said wheel. It must be borne in mind that this arrangement is simply for the purpose of preventing serious 70 accidents, which would result from the derangement of the toggle-levers or the breaking of other connections, and that it does not interfere with the operation of the brake in any respect.

75 When the wheels H and K are thrown into gear and the brakes operated as described, the ratchet-wheel L', which is keyed to the shaft J', is revolved by said shaft, and cam 80 L² normally operates to hold both of the dogs l out of contact with the ratchets on said wheel. The ratchet-wheel L', however, cannot make more than a quarter of a revolution, the same as the wheel O³, and a slight 85 movement of said wheel releases either of the dogs l from the cam L² and permits it to engage with the ratchet, the dog released depending upon the direction in which the ratchet-wheel is revolved. When the wheels H 90 and K are in operation or are thrown in operation, the ratchet-wheel L' will be turned in the direction of the arrow shown in Fig. 6, and the dog l on the left hand, as shown in 95 Fig. 6, will drop into engagement with the ratchet-wheel L', and the dog on the opposite side will be held out of engagement, and said last-named dog is always out of operation except when the car is going in the opposite 100 direction or to the right of the position shown in Fig. 1. When the car is going to the right of the position shown in Fig. 1 and it is necessary to apply the brakes, the ratchet-wheel 105 L' is turned in a direction opposite to that shown by the arrow in Fig. 6, and the dog on the right of said figure is thrown into engagement with the ratchet and that on the left out of engagement, as will be readily understood. In the normal position of the parts 110 when the brakes are applied neither of the dogs l is in operation, and, as before stated, the dog in operation depends upon the direction in which the car is moving, and the purpose of the dog in operation is to prevent the 115 spring P from forcing the toggle-levers apart and raising the brakes after the wheels H and K are thrown out of gear, and as long as either of the dogs l is in operation or in contact with the ratchet-wheel L' the brakes will be applied regardless of the position of the 120 wheels H and K. Whenever it is desired to throw the dog out of operation, however, and release the brakes, it is necessary to operate the lever M, which is done by operating the 125 lever R' or the lever R², which extends upward through the platform of the car, as shown in Fig. 1, and the operation of the lever M in releasing either of the dogs is made possible by the arms M' thereof, (shown in 130 Fig. 3 and in dotted lines in Fig. 6,) the purpose of which is to throw out of connection with the ratchet-wheel the dog which is in engagement therewith, at which time the springs P will operate to force the toggle-levers outward and raise the brakes.

The wheels H and K may be thrown out of gear, as described, by the cam K' and the flange H² under certain conditions—as, for instance, when the car is on a steep grade and it is necessary to prevent the toggle-levers from being drawn too far toward the center; but it will be understood that said wheels K and H may be thrown out of gear by the operation of the lever M, which is done by operating either of the vertical levers R' or R³ from the platform of the car and forcing the lever M to the right, as shown in Fig. 6, when said lever will release the dog and strike the pin *m* to the right in Fig. 6, and thus draw toward the center of the car the upper end of the arm or lever J, to which it is attached or of which it forms a part, thus pulling out of gear the wheels H and K, when the crank-lever catch N will drop into the notch or recess formed in one of the arms or levers H' and hold said wheels out of gear.

Whenever it is necessary to throw the brakes into operation from either platform of the car, it is only necessary to pull either of the crank-levers *r*², when the lever S will be operated to force backward the upper end of the lever N², which will release the crank-lever catch N, which will result in the operation of the brakes, as hereinbefore described.

It will be observed that the fender-support, consisting of the sliding-frame, composed of the side bars C and the cross-bars C', may be drawn in either direction by the chains or cords C², as hereinbefore described, and the direction in which said frame is drawn will depend upon the direction in which the car is moving. For instance, if the car is moving to the left in the position shown in Fig. 1, the frame at that end would be drawn out, when the fender or guard will be projected in front of the car, as shown, and the fender or guard at the opposite end withdrawn beneath the platform, as is also shown.

The fender or guard, as will be understood, is held in the forward or projected position principally by the springs *g*, and the auxiliary fender and frame F' is held in the position shown by the spring *f*'. If now a person or object should be struck by the main fender-frame, the latter would be borne downwardly and backwardly against the pressure of the springs *g* in contact with the track, which movement would operate the lever *p*² and throw it forward, when the lever *p*' would be thrown against the lower end of the lever N², which would release the crank catch-lever N and operate the brake, as hereinbefore described. If when the main fender-frame is depressed, as hereinbefore described, a stationary obstruction should be struck, as may happen under certain conditions, the entire fender-frame, including the sliding block E, would be forced backward against the operation of the spring *c*⁴, one of which is placed in each of the slots *c*² and mounted on a rod located in said slot *c*², when the entire fender-frame and blocks E would be forced back-

ward, thus preventing the breaking of the fender or its connections. In this movement of the main fender-frame the auxiliary fender F' would, as will be understood, slide upward on its bearings on the end of the sliding frame and close the space between said frame and the platform of the car, said auxiliary frame being raised against the pressure of the spring *f*' and again assuming its normal position when the main fender-frame and the sliding blocks E are slid outward or forward to the operative position thereof.

It will be understood that the main and auxiliary fender-frames and the sliding blocks E are applied to both ends of the sliding frame, but in the foregoing description the letter of reference having been applied to but one end but one of the sliding blocks is shown, and this in detail view in Fig. 6.

When constructed and applied as hereinbefore shown and described, my invention constitutes a perfect apparatus for accomplishing the results for which it is intended, and the operation of the various parts thereof, as set out in the foregoing specification, is positive and effectual under all conditions, and when properly constructed and applied failure in the operation is practically impossible.

It is evident that many changes in and modifications of the form, construction, and combination of the parts herein shown and described may be made without departing from the spirit of my invention, and I therefore reserve the right to include therein all such changes, alterations, and modifications as relate to the form, construction, combination, location, and arrangement of the parts as fairly come within the scope thereof.

Having fully described my invention, I claim and desire to secure by Letters Patent—

1. The combination with a car, of a brake apparatus consisting of a frame or frames mounted on the axles at each side of the car, and connected by cross-bars or otherwise, said frame or frames being provided at each end with brake-shoes adapted to act in connection with the wheels of the car and the rails of the track, and the frames being also provided with vertical elongated openings or slots through which the axles pass, toggle-levers one arm of which is connected with the end of the axles at each side and the other with the frame of the brake directly below the axle, and a rod or arm connected with a wheel mounted on a shaft between the trucks arranged transversely of the frame or frames and means for revolving said wheel and applying or releasing the brakes, substantially as shown and described.

2. The combination with a car, of a brake apparatus consisting of a frame or frames mounted on the axles at each side of the car, and connected by cross-bars or otherwise, said frame or frames being provided at each end with brake-shoes adapted to act in con-

nection with the wheels of the car and the rails of the track, and the frames being also provided with vertical elongated openings or slots through which the axles pass, toggle-levers one arm of which is connected with the end of the axles at each side and the other with the frame of the brake directly below the axle, and a rod or arm connected with a wheel mounted on a shaft between the trucks arranged transversely of the frame or frames and means for revolving said wheel and applying or releasing the brakes, consisting of a gear-wheel mounted on one of the car-axles a gear-wheel mounted on said shaft and intermediate gearing and means for throwing the same into and out of operation, substantially as shown and described.

3. The combination with a car, of brake-frames mounted on each axle at each side and provided with cross-bars or other means of connection, said arms being also provided with brake-shoes adapted to operate in connection with each of the wheels and with the rails of the track and said frames being mounted on the axles by means of vertical elongated slots or openings, toggle-levers, one arm of which is connected with each axle on each side, and the other arm of which is connected with the frame of the brake-shoes directly below the axle, rods or arms connected with the pivotal points of said toggle-levers and eccentrically with a wheel secured to a shaft mounted transversely of the brake-frame and between the trucks of the car, a gear-wheel mounted centrally of said shaft and adapted to be placed in connection with a gear-wheel mounted centrally of one of the axles of the car by means of intermediate gearing, a ratchet-wheel also mounted on said shaft, pawls or dogs pivotally supported adjacent to said ratchet-wheel and adapted to operate in connection therewith, a lever also mounted on said shaft and provided with arms by which the dogs are operated and means for placing said lever into or out of connection with said ratchet, and for placing the gear-wheels on the car-axle and on said shaft in or out of connection, substantially as shown and described.

4. The combination with a car, of a brake device, consisting of a frame provided with brake-shoes adjacent to each wheel of the car, said frame being provided with vertical slots through which the axles of the car pass and by means of which the frame is mounted, and a fender frame or support also mounted upon the axle of the car and adapted to slide in either direction thereon, said fender frame or support being provided with a fender or guard at each end thereof, said braking device and sliding frame or support for the fenders or guards being adapted to operate automatically, substantially as shown and described.

5. The combination with a car, of a brake device consisting of a frame having brake-shoes adjacent to each wheel, said frame being provided with vertical slots or openings

through which the axles pass and by means of which the brake-frame is mounted thereon, a shaft mounted in said frame parallel with one of the car-axles, a gear-wheel mounted on said axle and a corresponding gear-wheel mounted on said shaft, a bridge or frame the ends of which are mounted on and supported by said axle and by said shaft, gear-wheels mounted in said bridge or frame and adapted to be placed in gear with said wheels on said axle and shaft, a ratchet-wheel also mounted on said shaft, pivoted dogs supported adjacent to said ratchet-wheel and adapted to operate in connection with said ratchet-wheel, a lever for operating said dogs and placing either of them in or out of connection with the ratchet-wheel, toggle-levers one arm of which is mounted on the end of each axle and the other arm of which is pivotally connected with the brake-frame directly below the axles, rods or arms connected with each of said toggle-levers and eccentrically with a wheel mounted on said shaft, and means for operating the ratchet, lever and parts connected therewith, to apply or release the brakes, substantially as shown and described.

6. The combination with a car, of a brake-frame mounted on the axles thereof, and vertically movable thereon, said frame being provided with brake-shoes adjacent to the wheel and to the rails of the track, said frame being adapted to be depressed so that said shoes will come in contact with said rails, and depressing mechanism therefor, consisting of toggle-levers connected with each end of each of the axles and with the brake-frame immediately below said axles, said toggle-levers being connected with a wheel mounted on a shaft arranged transversely of the car, by means of rods or arms connected eccentrically therewith, levers at each end of the car and connecting devices between said levers and said shaft by means of which said toggle-levers are operated to apply or release the brake, substantially as shown and described.

7. The combination with a car, of a brake-frame mounted on the axles thereof, and provided with shoes adjacent to each wheel, adapted to be depressed in contact with the rails of the track, toggle-levers connected with the end of each axle and with the frame directly below the axle, spring-operated rods or arms connecting said toggle-levers with a wheel mounted on a shaft arranged transversely of the brake-frame, a gear-wheel mounted centrally of one of the axles, a movable spring-operated bridge or frame connected with said shaft, and said axle, and supporting gear-wheels adapted to be placed in connection with said gear-wheels on the axles and the shaft, a catch-lever adapted to operate in connection with said bridge or frame and provided with connections by which it may be operated from the platform of the car, substantially as shown and described.

8. The combination with a car, of a brake-

frame mounted on the axles thereof, and provided with shoes adjacent to each wheel, adapted to be depressed in contact with the rails of the track, toggle-levers connected with the end of each axle and with the frame directly below the axle, spring-operated rods or arms connecting said toggle-levers with a wheel mounted on a shaft transversely of the brake-frame, a gear-wheel mounted centrally of one of the axles, a movable spring-operated bridge or frame connected with said shaft, and said axle, and supporting gear-wheels adapted to be placed in connection with said gear-wheels on the axles and the shaft, a catch-lever adapted to operate in connection with said bridge or frame and provided with connections by which it may be operated from the platform of the car, and a sliding fender frame or support also mounted on the axles of the car and in operative connection with the operating mechanism of the brake-frame, substantially as shown and described.

9. The combination with a car, of a brake-frame, mounted on the axles thereof, and provided with shafts adjacent to each wheel, adapted to be depressed in contact with the rails of the track, toggle-levers connected with the end of each axle and with the frame directly below the axle, spring-operated rods or arms connecting said toggle-levers with a wheel mounted on a shaft arranged transversely of the brake-frame, a gear-wheel mounted centrally of said shaft, a corresponding gear-wheel mounted centrally of one of the axles, a movable spring-operated bridge or frame connected with said shaft and said axles, and supporting gear-wheels adapted to be placed in connection with said gear-wheels on the axles and the shaft, a catch-lever adapted to operate in connection with said bridge or frame and provided with connections by which it may be operated from the platform of the car, and a sliding fender frame or support also mounted on the axles

of the car and in operative connection with the operating mechanism of the brake-frame, said shaft being also provided with a lever, a ratchet-wheel mounted thereon, the operation of which is controlled by pivoted dogs which are controlled by said lever, said lever being in connection with and adapted to be operated by levers at either end of the car, substantially as shown and described.

10. The combination with a car, of a brake-frame mounted on the axles thereof and vertically movable thereon, a sliding fender frame or support also mounted on said axles and in operative connection with the operating mechanism of the brake-frame, and pivotally-supported fenders or guards at each end of said brake-frame, said fenders or guards being adapted to operate the brake mechanism, substantially as shown and described.

11. The combination with a car, of a sliding fender frame or support mounted on the axles thereof, and provided at each end with a pivotally-supported fender consisting of a main and auxiliary frame, the first of which is connected with the sliding frame or support and the second of which is pivotally connected with the first, the main frame being adapted to be borne or pressed backward on the sliding support and the auxiliary frame being provided with a bearing on the end of said support and by means of which when the main frame is pressed backward the auxiliary frame would be forced upward in front of the platform of the car, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of the subscribing witnesses, this 29th day of May, 1895.

CHARLES F. GRATHER.

Witnesses:

I. M. MULLER,
C. GERST.