C. B. FAIRCHILD.

CAR BRAKE.

APPLICATION FILED APR. 13, 1908.

910,805.

Patented Jan. 26, 1909.

2 SHEETS—SHEET 1.

Fig.1

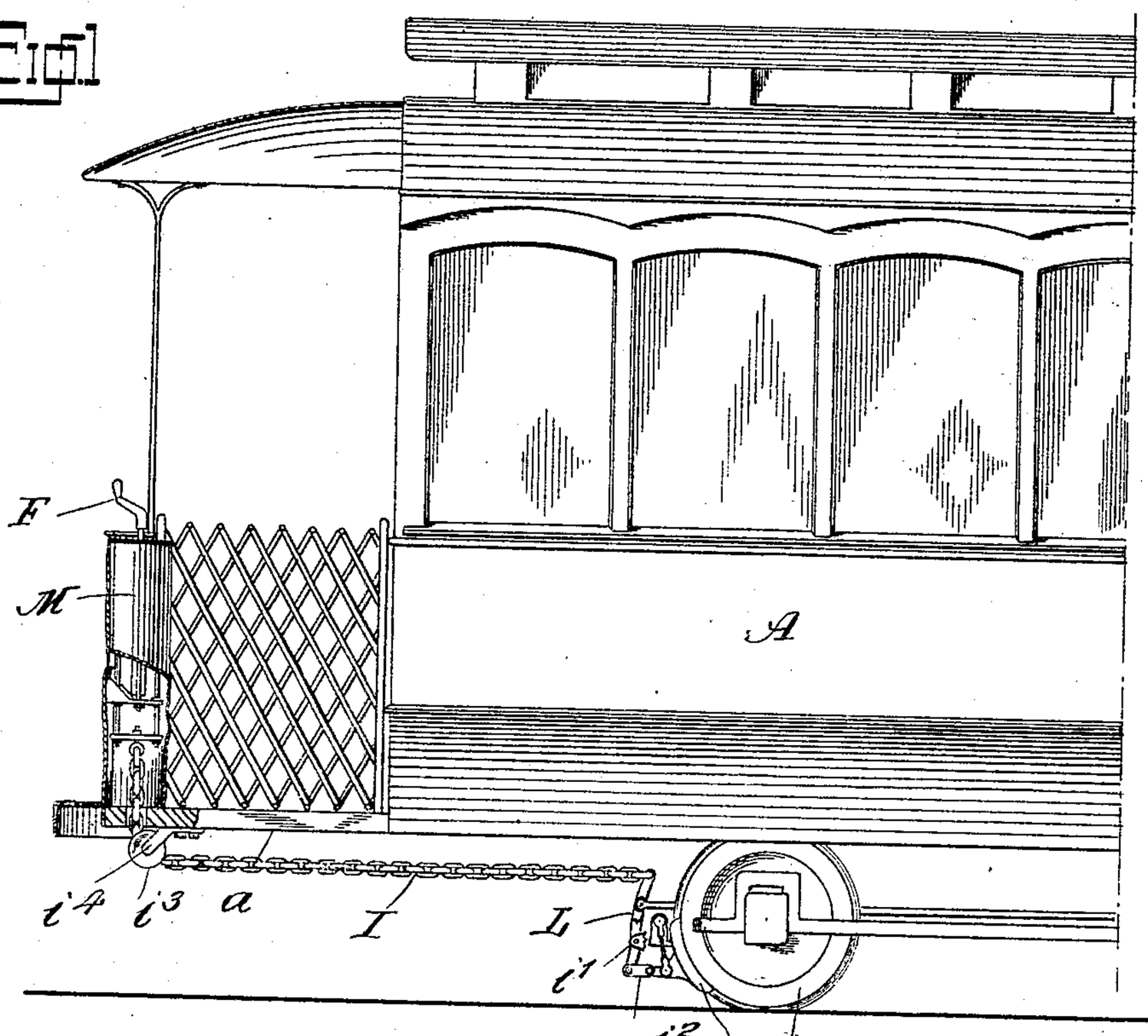


Fig.4

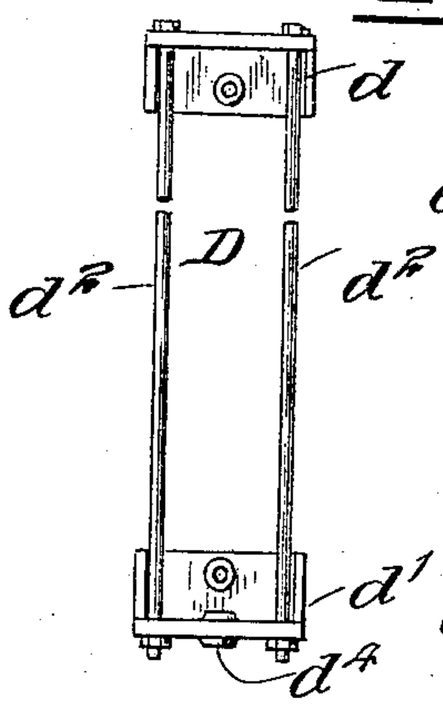


Fig.2

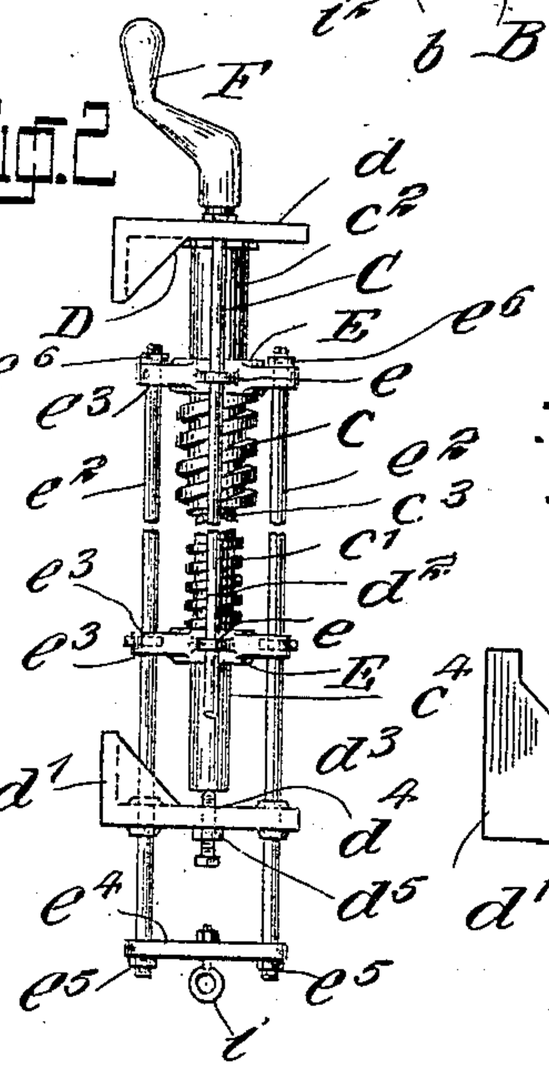
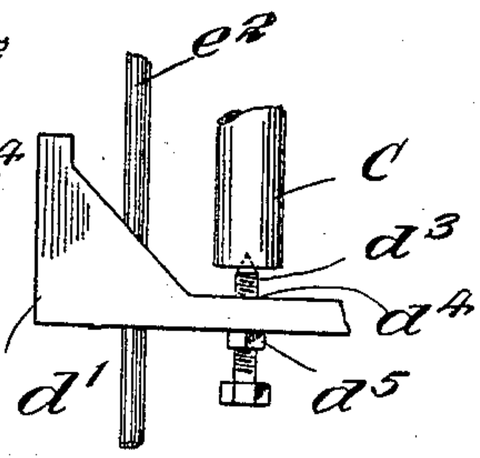


Fig.3



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2 SHEETS—SHEET 2.

Fig. 5

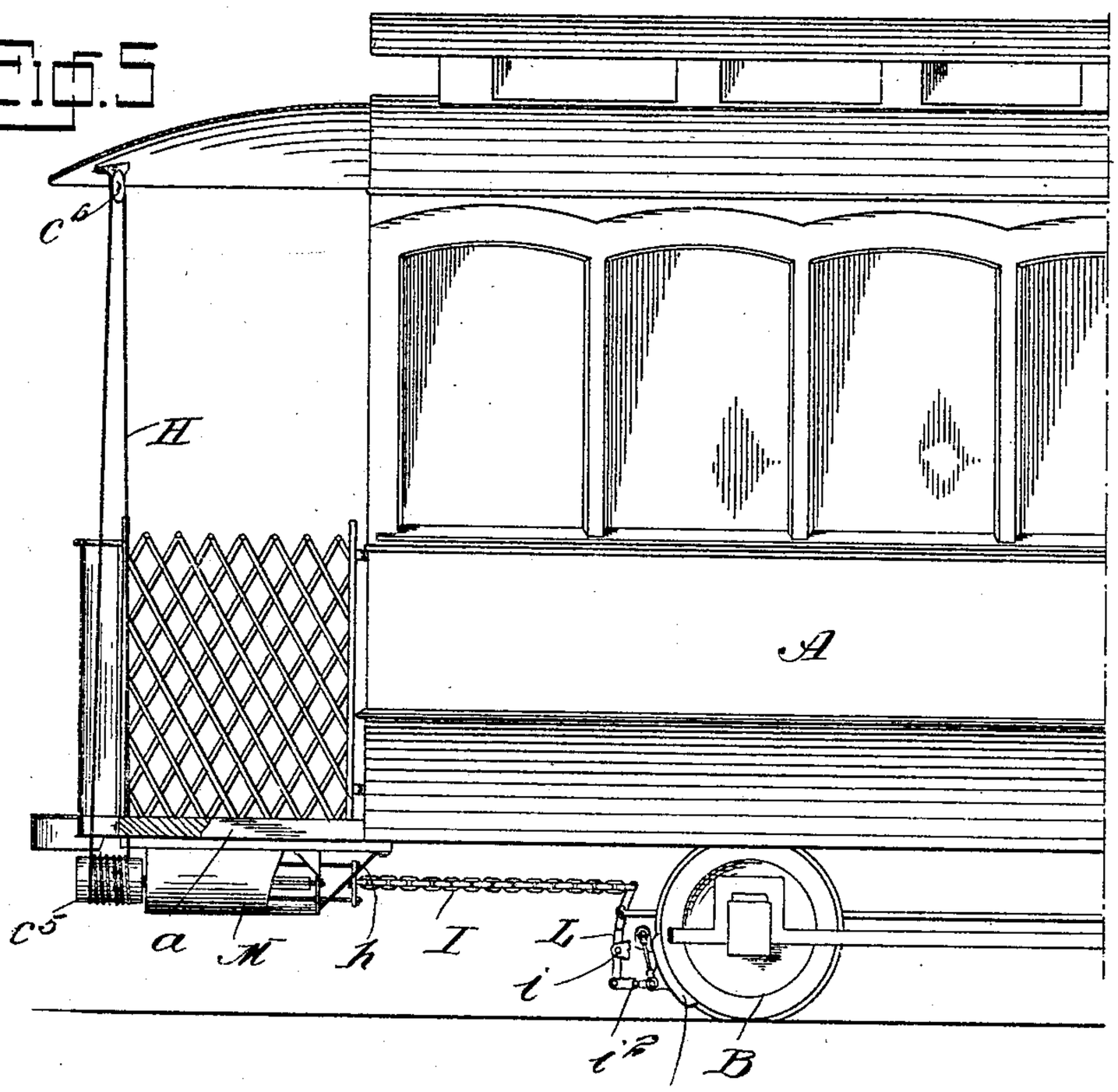


Fig. 6

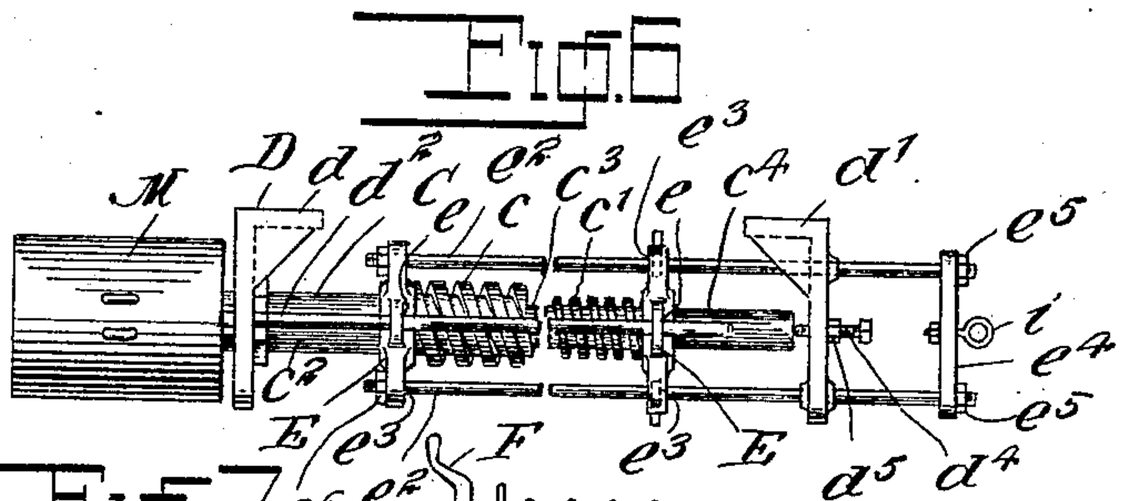
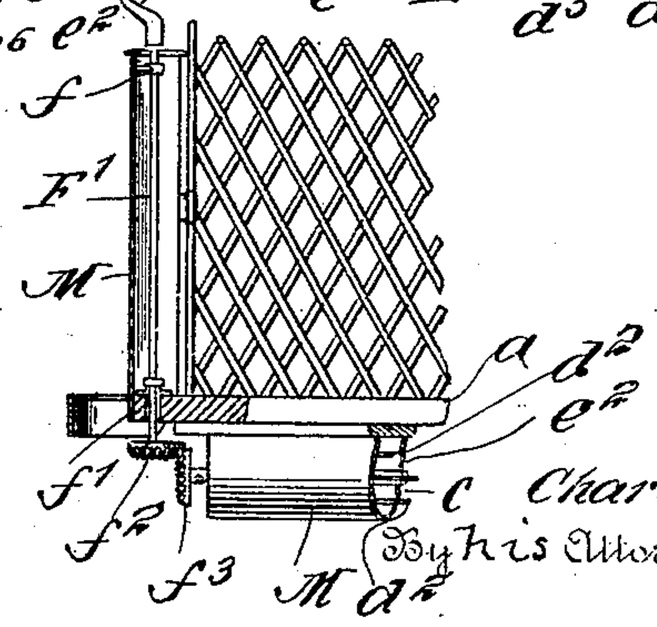


Fig. 7



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CAR-BRAKE.

No. 910,805. Specification of Letters Patent. Patented Jan. 26, 1909.

Application filed April 13, 1908. Serial No. 426,769.

To all whom it may concern:

Be it known that I, CHARLES B. FAIRCHILD, a citizen of the United States, and a resident of the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Car-Brakes, of which the following is a specification.

My invention relates to that class of car brakes in which the braking action is effected, when it is desired to arrest or control the movements of the car, by forcing the brake-shoes against the peripheries of the car wheels until the stopping or control of such movements is effected.

In Letters Patent of the United States numbered 696,901, which were granted to me April 1st, 1902, I have shown and described a car brake of this character, in which the forcing of the brake-shoes against the car wheels is accomplished by a screw, which is operated from the platform of the car through appropriate appliances, and is constructed with a uniform pitch throughout. This construction, while efficient in operation and requiring the application of but a small amount of force to arrest or control the movement of the car, has been found slow in operation when applied in practice, principally because of the fact that, in consequence of the uniformity of the pitch of the screw throughout its length, no considerable variation in the speed of movement of the parts operated from it is possible when taking up the slack or lost motion in those parts and when forcing the brake-shoes against the peripheries of their coöperating wheels.

The object of the invention is therefore to remedy this disadvantage, and to provide a screw-operated car brake in which the taking up of the slack or lost motion in the parts operated from the screw will be more rapidly accomplished, and with less power, than when such parts are pressing the brake-shoes against the peripheries of the wheels.

To these ends, my invention consists, first, in the employment of a screw, having a plurality of threads of different pitches, with the brake-shoes, whereby, when the screw is rotated to apply or set the brakes, the movements of the parts operated therefrom will be more rapid while taking up their slack or lost motion, than when forcing the brake-shoes against the wheels, but the power exerted in accomplishing the latter will be very much greater than it is in accomplishing the former; second, in the means by which the mounting and connection of the screw with the brake-shoes are effected; third, in the means by which the rotation of the screw may be accomplished, and fourth, in various other combinations and arrangements of parts, all as will hereinafter more fully appear.

Referring to the accompanying drawings, which form a part of this specification, Figure 1, is a side elevation of an end portion of a car, having one form of my invention applied in connection therewith, with certain of the parts broken away for purposes of illustration; Fig. 2, a side elevation, with parts broken away, of a portion of one form of my brake-operating mechanism, detached; Fig. 3, a detail, showing a fragment of one end of the screw and the means by which it is mounted in its supporting frame, with a portion of one of the stirrup rods by which the nuts that coöperate with the screw threads are connected with the brake-shoes, broken away; Fig. 4, a face view, with parts broken away, of the frame in which the screw is mounted, detached; Fig. 5, a side elevation of an end portion of a car, similar to that shown in Fig. 1, with the brake-operating mechanism located in a slightly different relationship with respect to the car body, and with a modified arrangement of mechanism for rotating the screw, certain parts being broken away; Fig. 6, a plan view, with parts broken away, of a screw and coöperating nuts, and of the frame and stirrup in which the screw and nuts are respectively mounted and connected with the brake-shoes, showing a further modified arrangement of mechanism by which the screw is rotated, and an inclosing case therefor, and Fig. 7, a portion of the end of a car broken away, with my invention applied in connection therewith, but showing a still further modification of the mechanism by which the screw is operated.

In all the figures, like letters of reference are employed to designate corresponding parts.

A indicates a sufficient portion of a car body to illustrate my invention, and B indicates one of the wheels upon which the car is mounted.

The car body is or may be constructed in any ordinary or preferred form, and is mounted upon any appropriate number of

car wheels as may be desired. As shown in the drawings however, the car body is provided with an outwardly extending platform *a* for the accommodation of a driver or motor-man, with each of the car supporting wheels provided with a brake-shoe *b*, which is pivoted or otherwise supported in proper relationship with respect thereto. With the brake-shoes thus supported they are, in practice, normally held backward out of contact with the peripheries of their respective wheels by gravity or otherwise, but are capable of being forced forward with more or less pressure toward and in contact with them when the movement of the car is to be arrested or controlled. For forcing these brake-shoes forward into contact with the peripheries of the wheels B when required, I make use of a screw C, which, in order to impart a more rapid movement to the brake shoes in the earlier stages of their travel toward their respective wheels, and a slower movement when they approach and are pressed against the peripheries of the latter, with a corresponding increase in the power with which the screw operates, I construct the screw with a plurality of threads *c*, c^1 etc. of different pitches, which are progressively arranged thereon in such an order that the thread *c*, having the maximum pitch, will first be operative in carrying the brake-shoes forward towards their respective wheels, to be followed by the thread having a less pitch, and so on, following this order throughout the series, from the thread having the maximum pitch to that having the minimum. As thus constructed this screw cooperates with a nut E for each of the threads *c* and c^1, to permit of which the screw C is rotatively mounted in a frame D. This frame, which may be constructed in various forms, is here shown as consisting of two end brackets *d* and d^1, which are connected and held at the proper distance apart by rods d^2, that extend between them and are disposed in parallel relationship with respect to one another. With the frame constructed as thus explained the screw is journaled near one of its ends in a suitable bearing formed in the bracket *d*, while its opposite end is supported from the bracket d^1 through a center d^3, whereby to more effectively reduce the friction and to resist the strain imparted to the screw when the brake-shoes are being forced against their respective wheels in arresting or otherwise controlling the movement of the car. To this end, the center d^3 is passed through and threaded within a suitable orifice d^4 formed in the bracket d^1, and is firmly held in adjusted position therein by a lock-nut d^5 applied in connection therewith, as shown in the drawings. The screw C being thus mounted in the frame D, the nuts E are restrained from rotation, when the screw is rotated, by the rods d^2, which, to effect such restraining action, extend through and are adapted to have suitable orifices *e* formed in or upon such nuts, slide back and forth upon them as required by the operation of the brake, and as illustrated in Figs. 2 and 6.

To permit of the nuts E coöperating with their respective threads *c*, c^1, etc., these nuts are arranged at the proper distance apart to insure of the one passing out of engagement with its respective thread, as the other is brought into engagement with its thread, being fixedly held in these positions by rods e^2, which are passed through and firmly held in suitable orifices e^3 formed in nuts E, and which, extending outward through suitable orifices formed in the bracket d^1, are connected at their outer free ends by a bar e^4, whereby, with such rods, to form a stirrup, with the rods e^2 provided at their opposite ends with nuts e^5 and e^6, which are respectively engaged with the outer side of the bar e^4, and with the outer surface of the inner nut E. The nuts E being thus connected and rigidly held at the proper distance apart, will, when the screw C is operated, successively engage one after the other with their respective threads, with one passing out of engagement with its thread, as another is brought into engagement with its thread. To permit of this being accomplished, the portion of the screw containing the thread of the maximum pitch *c* is preferably constructed somewhat larger in diameter than that containing the thread of lesser pitch, which, if the series is continued, will be somewhat larger than that containing the minimum pitch, whereby as the nuts are successively passed over and off their respective threads, one after another will pass outward over the portion of the screw that extends beyond, and which, unprovided with a thread, is preferably constructed of a diameter slightly less than that of the interior of the nut that coöperates with it, as shown more particularly at c^2, c^3, and c^4 in Figs. 2 and 6. With the screw and nuts thus organized and operating, they may be applied to the car in various ways. In Fig. 1 I have shown them as applied to the frame of the dash-board and occupying a vertical position, while in Figs. 5 and 7 they are located beneath the platform of the car and occupy a horizontal relationship. When applied to the frame of the dash-board they are or may be secured thereto by suitable bolts passing through the brackets *d* and d^1 and engaging with it, and when thus applied the screw C is preferably operated by a crank F. On the other hand, when applied to the under side of the platform *a* they will be secured thereto by bolts or screws, similarly passing through orifices in the brackets *d* and d^1 and entering or engaging with the floor or sills thereof, and in this case the screw will be rotated,

either by an endless cord or rope H, which, passing around a suitable drum c^5 upon the end of the screw and extending upward and over a pulley c^6 secured to the roof of the car within easy reach of the driver or motorman, or by a crank F through the intermediary of a vertical shaft F^1, which, rotatively mounted in suitable bearings f and f^1 respectively secured to the dash-board and formed in the platform, is operatively connected at its lower end with the screw through the intervention of bevel gears f^2 and f^3. As thus mounted and operated in either of the ways specified, the nuts E may be connected with the brake-shoes in various ways. I prefer however to effect this connection through the intermediary of a chain I, which, fixedly attached at one end to an eye-bolt i secured in the bar e^4, is connected at its other end to the upper extremity of a lever L, which is fulcrumed intermediate its length upon a pin i^1, and is jointed at its lower end to the brake-shoes through the intervention of appropriate links i^2.

When the screw and nuts are arranged beneath the platform of the car, in a horizontal position, the chain I will extend directly from the eye-bolt i in the bar e^4 of the stirrup to the upper end of the lever L in a straight line. When however these parts are arranged in a vertical position, as shown, for instance, in Fig. 1, then the chain, in extending from the eye-bolt to the upper end of such lever, will pass around an idler-pulley i^3, journaled beneath the platform a in a suitable hanger i^4.

As thus arranged and connected, the operation of the parts will be as follows: With the brake-shoes held backward away from the peripheries of their respective wheels, and in their normal position, whenever it is desired to arrest or control the movement of the car the screw C will be rotated in the proper direction through the crank F or endless cord H, when the nut E will be engaged with the thread c, having the maximum pitch, and the parts thereby moved to take up the slack or lost motion in them, with the maximum speed. With the slack or lost motion in the parts thus taken up, and the brake-shoes carried into close relationship to the peripheries of their respective wheels, the nut E will be carried off its respective thread c and the nut E appropriate to the thread c^1 brought into engagement with that thread, when the further movement of the parts will be continued and the brake-shoes forced into contact with the peripheries of their appropriate wheels at a slower rate of speed, but with a greatly increased power. The arrest or control of the movement of the car having been thus accomplished, and it be desired to start the car either forward or backward, the screw C will be rotated in an opposite direction by its crank or operating endless cord, when the reverse of the movements above specified will result, and the nut appropriate to the thread c^1 will travel along the screw until the nut appropriate to the thread c is engaged with that thread, when a more rapid movement of the parts will be occasioned, with the consequent effect that the brake-shoes in moving backward away from the peripheries of their respective wheels will start at a slow rate of speed and be thereafter accelerated in their movement in their farther backward travel.

In the construction of the screw C the difference between the pitch of the various threads may be varied within wide limits. In practice I have found that with a maximum pitch of two inches and a minimum pitch of five eighths of an inch excellent results have been obtained, but this variation may be departed from and the difference between the pitches of the different threads may be otherwise varied as the judgment of the constructor or the exigencies of the use of the screw may dictate.

With the parts constructed and organized as above set forth I provide, as will be seen, a brake for cars, which, in its operation to arrest or control the movements of the cars, acts with great rapidity during the major portion of the travel of its parts, but with a very much reduced speed and greatly increased power, when forcing the brake-shoes against the peripheries of the wheels, which said operation and results are reversed when the brake-shoes are being withdrawn from the periphery of such wheels.

Along with the parts above described may be employed a suitable casing M in which various of the parts of the mechanism may be inclosed, as well as appropriate braces h to aid in resisting the strain imparted to the frame D when the brake-shoes are being forced against the peripheriesof their wheels, as shown, for instance, in Fig. 5.

Having thus described my invention, and specified certain of the ways in which it is or may be carried into effect, I claim and desire to secure by Letters Patent of the United States,—

1. The combination, with a screw constructed with a plurality of threads of different pitches, and a nut for coöperating with each of such threads, of means by which a relative rotary motion between such parts may be effected to successively bring one after another of such nuts into, or to carry them successively out of, operation, substantially as described.

2. The combination, with a car wheel, and a brake-shoe for coöperating therewith, of a screw constructed with a plurality of threads of different pitches, nuts for coöperating with such threads, means for rotating said screw, and connecting devices intermediate the nuts and the brake-shoe, whereby a progressively

decreasing speed of movement with a correspondingly increasing power is imparted to the brake-shoe as it is carried forward toward and against the car wheel, substantially as described.

3. The combination, with a car wheel, a brake-shoe for coöperating therewith, and a frame, of a screw constructed with a plurality of threads having the pitch of each succeeding thread decreased rotatively mounted in such frame, a nut for coöperating with each of the threads, and means for connecting these nuts with the brake-shoe, whereby the brake-shoe in moving forward and against the car wheel travels at different rates of speed and with an increasing power in different parts of its traverse, substantially as described.

4. The combination, with a car wheel, a brake-shoe for coöperating therewith, a frame adapted for securement to a car, and a screw provided with a plurality of threads, the succeeding threads of which decrease in pitch from one end of the series to the other rotatively mounted in such frame and constructed with portions at the ends of the several threads reduced in diameter, and means for rotating such screw, of a nut for coöperating with each of the threads, rods by which these nuts are fixedly secured together and held at the proper distance apart, and means for connecting these rods with the brake-shoe, substantially as described.

5. The combination, with a car body, a supporting wheel, a brake-shoe for coöperating with such wheel, and a frame secured to such car body, of a screw equipped with a plurality of threads each succeeding thread of which is of less diameter and pitch than the preceding thread, a nut for each of these threads, a stirrup by which these threads are secured together and fixedly held at the proper distance apart, means for rotating said screw, and devices for connecting the stirrup with the brake-shoe, substantially as described.

6. The combination, with a car body, a supporting wheel, a brake-shoe for coöperating with such wheel, and a frame secured upon such car body, of a screw equipped with a plurality of threads, each succeeding thread of which is of less diameter and pitch than the preceding thread, a nut for each of these threads, a stirrup by which these threads are secured together and fixedly held at the proper distance apart, a vertical shaft, bevel gears by which this vertical shaft is connected with the screw, a crank on such vertical shaft, and means for connecting the stirrup with the brake-shoe, substantially as described.

7. The combination, with a frame adapted to be secured to a car body, and a screw equipped with a plurality of threads, each succeeding thread of which is decreased in pitch rotatively mounted at one end in a bearing formed in such frame and supported at its other end upon a center, of a nut for each of the threads, rods by which such nuts are connected and fixedly held at the proper distance apart, a car wheel, a brake-shoe for coöperating therewith, connecting devices between said rods and the brake-shoe, and means for rotating such screw, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two witnesses this 9th day of April, 1908.

CHARLES B. FAIRCHILD.

Witnesses:

WM. H. APPLETON,

WM. A. KNAPP.