(No Model.)

2 Sheets—Sheet 1.

T. E. THOMPSON.

Automatic Car Brake.

No. 237,143. **Patented Feb. 1, 1881.**

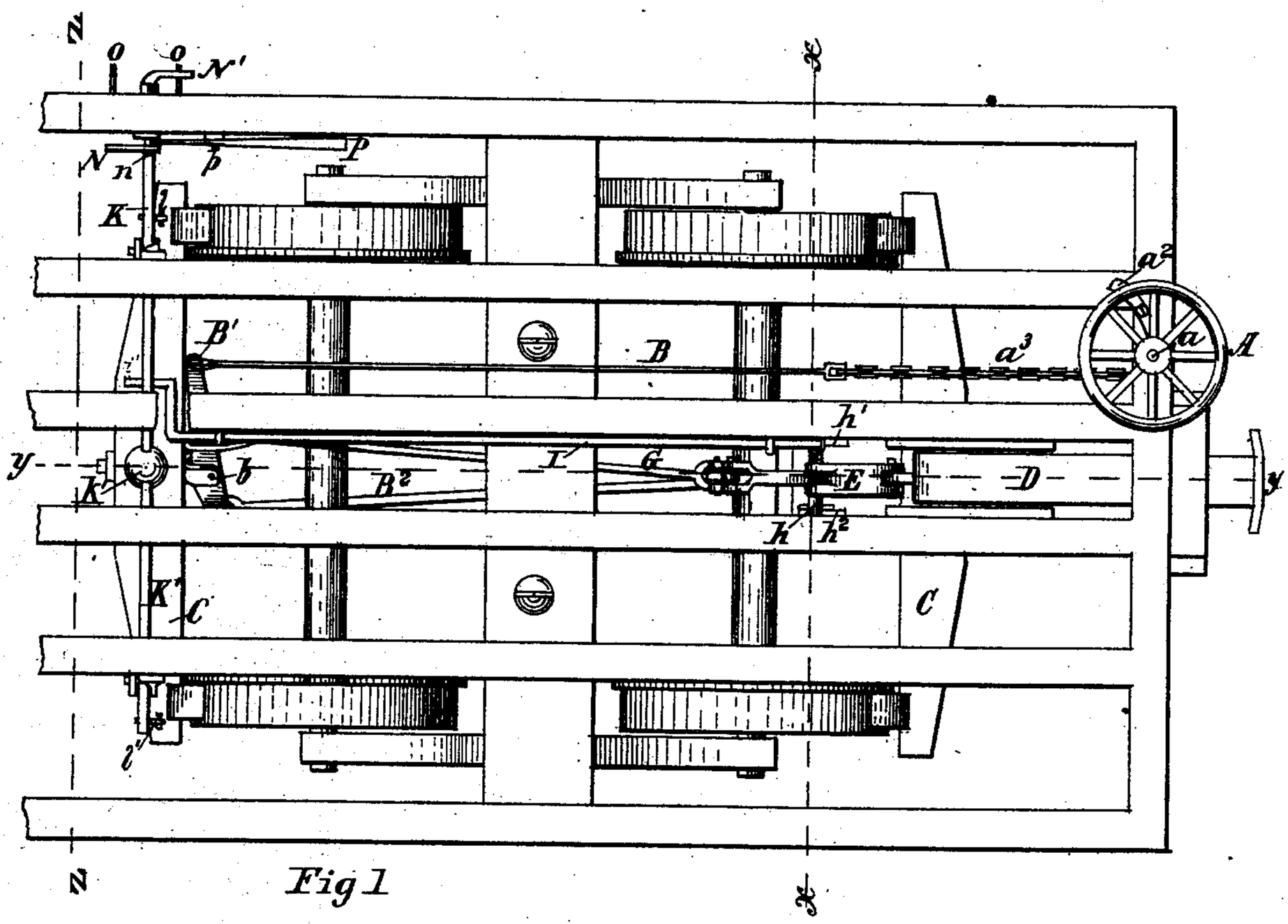

Fig 1

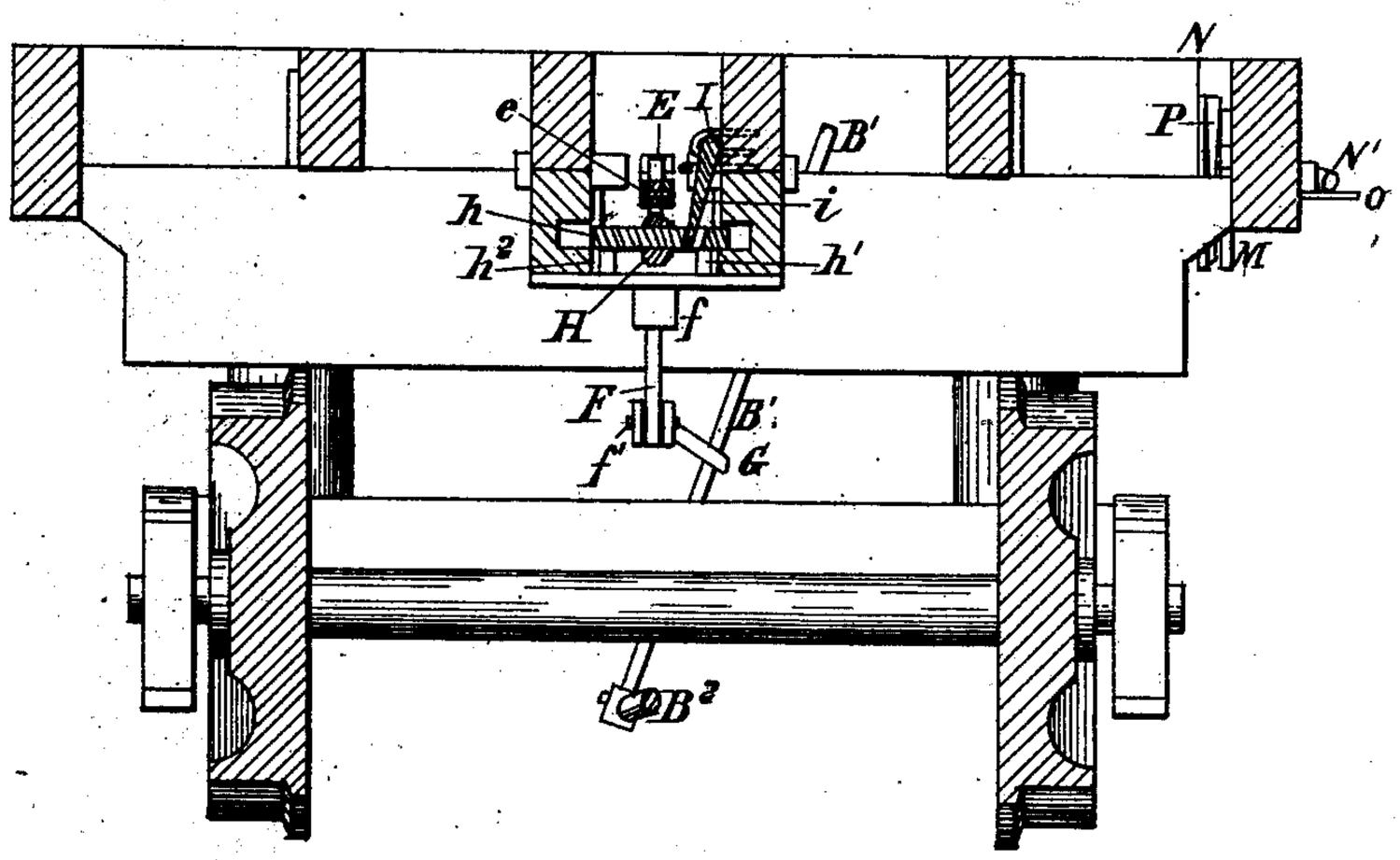

Fig 2

Witnesses:

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Inventor:

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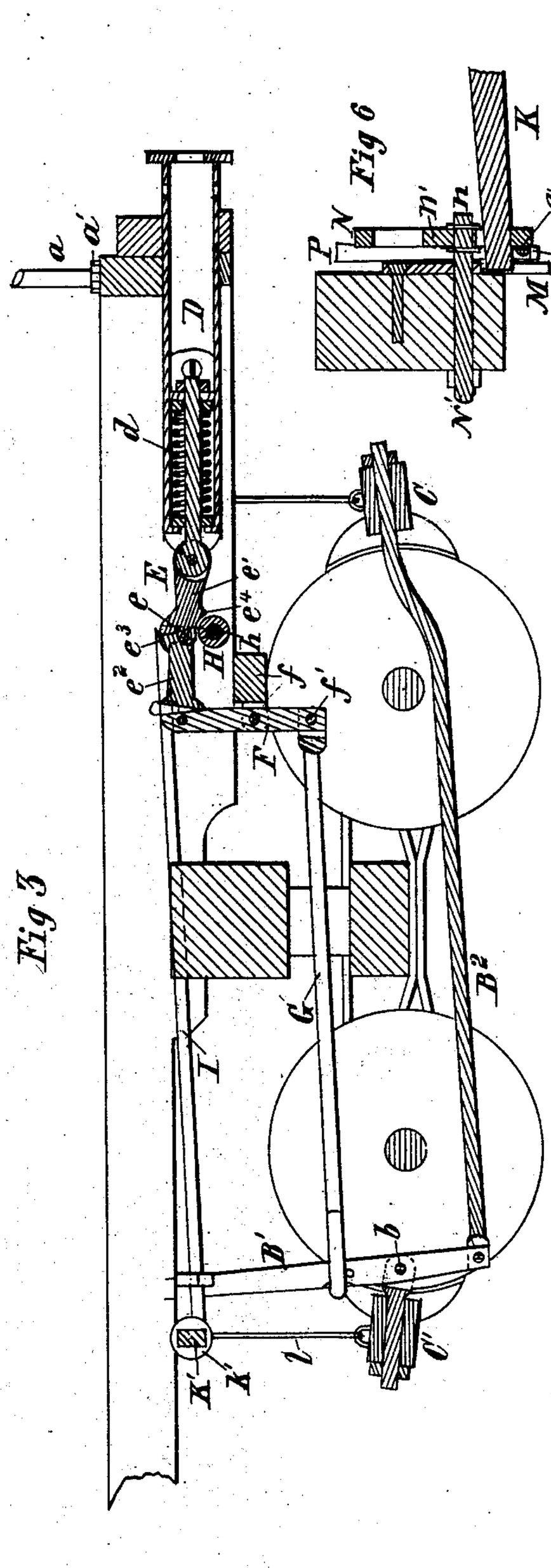

Fig 3 Fig 6 Fig 5 Fig 4

Witnesses:

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UNITED STATES PATENT OFFICE.

THOMAS E. THOMPSON, OF HYDE PARK, ASSIGNOR TO THE THOMPSON AUTOMATIC TRAIN BRAKE COMPANY, OF CHICAGO, ILLINOIS.

AUTOMATIC CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 237,143, dated February 1, 1881.

Application filed July 1, 1880. (No model.)

To all whom it may concern:

Be it known that I, THOMAS E. THOMPSON, of Hyde Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Train-Brakes; and I declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of a car-truck and part of platform having my improvements. Fig. 2 is a transverse section of the same, taken on the line *x x* in Fig. 1. Fig. 3 is a vertical longitudinal section taken on the line *y y* in Fig. 1. Fig. 4 is a transverse section taken on the line *z z* in Fig. 1. Fig. 5 is a detailed side elevation, on an enlarged scale, of the mechanism for adjusting the disconnecting device. Fig. 6 is a section of the same, taken on the line *v v* in Fig. 5.

The same letters denote the same parts in all the figures.

My invention relates to mechanism for operating the brakes of a railway-car automatically by the inward movement of the draw-bar caused by the pressure of the preceding vehicle, and its outward movement caused by the elasticity of the spring usually attached to it when that pressure is removed. This use of the inward and outward movement of the draw-bar has been tried and found impracticable, on account of its operating to tighten the brakes whenever an attempt is made to back the train.

The object of my invention is to obviate this difficulty without impairing the operation under other circumstances.

My invention consists in utilizing the friction of the wheels on the brake-shoes for this purpose, and it also consists in the several devices and combinations of devices which I will proceed to describe particularly.

In the drawings, A represents a brake-wheel, with its shaft *a*, toothed wheel *a'*, and pawl a^2, chain a^3, rod B, lever B', and rod B^2, connecting the lever B' with the brake-bars C and C', all of ordinary construction.

The draw-bar D has the usual spring *d* attached, by the compression of which, under the impact of the adjoining vehicle, an inward motion is given to it, usually of two inches, more or less, the spring throwing it out again when the pressure is sufficiently relaxed. With the inner end of the draw-bar is connected a nearly-horizontal toggle-joint, E, consisting of the two arms *e'* and e^2, hinged together at *e*. The end of e^2 farthest from the hinge connects with an upright lever, F, pivoted at *f* on a fixed fulcrum. This lever is pivoted, at its lower end, *f'*, to one end of the rod G, the farther end of which is bent in the form of a loop, so as to clasp the lever B' above its fulcrum *b*, which is affixed to the brake-bar C', so that when the draw-bar is pushed inward the brakes will be applied in the same manner as by means of the hand-wheel. The two arms *e'* and e^2 of the toggle-joint slope very slightly downward toward the knee, so that the latter is a little below a horizontal line, connecting their farther ends, the length of each arm being ordinarily about six inches. The knee is prevented, by the stops e^3 on the upper sides of the adjoining ends of *e'* and e^2, from moving any farther in that direction. The tendency of the pressure on their ends is therefore to hold them rigid, and not in any degree to throw them above a horizontal line. The arm *e'* of the toggle-joint has projecting from its lower side, near the knee, a spur or cam, e^4, capable of engaging with a trip-cam, H, set on a shaft, *h*, which passes horizontally under E at right angles to its length and a little behind e^4, and which is supported at either end in rests *h'* and h^2, attached to the inner sides of a pair of timbers and opening into sockets set in those timbers. As shown in the drawings, this cam is a rotating wheel. The shaft is slightly shorter than the distance between the timbers, and may have a longitudinal motion, limited by the depth of the sockets, so as to bring the trip-cam directly under E in a line to engage with the spur e^4, or a little to one side or the other, so as not to touch it.

A rod, I, parallel with the brake-rod B, is supported in staples on the inner side of one of the beams to which the rests *h'* and h^2 are affixed. It has room in these staples for a rotary motion about its cylindrical axis. At its forward end it is bent into the shape of an L,

so as to form a vertical arm, *i*, the lower end of which rests loosely in a socket in the upper surface and near the corresponding end of *h*. At its other end, near the rear end of the truck, the rod is bent sidewise at a right angle, and then again into a direction parallel to the length of its main portion, so as to form a sort of crank, *i'*, the end of which rests in a slot, *k*, in the transverse lever K. This lever reaches from one side to the middle of the car, and is hinged at *k'* to a corresponding but somewhat shorter lever, K'. Each lever is pivoted at k^2 and k^3, respectively, on a fulcrum affixed to one of the timbers, so as to have considerably the longer arm between the fulcrum and the common joint, the crank *i'* engaging with K near *k'*. The lever K' extends no farther than to a point above the end of the brake-bar C', with which it is connected by a vertical rod or hanger, *l'*. The other lever, K, is, in like manner, connected, by a hanger, *l*, with the other end of the brake-bar, but extends to the side of the car, where its end has an upward and downward motion in a guide, M, which is set on the inner side of the outermost beam. The extent of this motion is limited by a guard or stop, N, which is parallel to the guide and is eccentrically pivoted on the same side of the timber, at *n*, and which consists of a plate, *n'*, through which the pivot passes, connected on one side with a rim or frame which surrounds the end of the lever K.

As shown in the drawings, N is in form somewhat like a semicircle, having its pivoted point near the straight side which corresponds to the diameter and its plate *n'* adjoining that side, the pivoted point being nearer to one end of the straight side than to the other.

The levers K and K' are hinged in a ball, which is made of a weight not quite sufficient to balance the tendency of the brake-bar C', to draw down, by its weight, the outer ends of the levers, and thus force up the jointed ends. The weight at *k'* moderates this tendency, so that the outer ends of the levers will be drawn down, but not with that violence which would otherwise characterize the motion.

The upward motion of the inner end of K, caused by the downward motion of its outer end, necessarily raises the end of the crank *i'*, and thus imparts a rocking motion to the rod I and its vertical arm *i*, which motion, in the particular arrangement of parts shown in the drawings, will be for all the radii below a horizontal line, and so forces the arm *i* to the left. This motion, if not arrested, will bring the left end of the shaft *h* into the socket at h^2, and thus put the trip-cam H clear to the left of the toggle-joint E, so that it cannot engage with the spur e^4. If we suppose the shaft *h* to be as far as possible to the right at the beginning of this motion, so that the trip-cam will be on the right of the toggle-joint, it is evident that at a certain point in the downward motion of the outer end of K the trip-cam will be directly under the toggle-joint, so that if, at that moment, the impact of the preceding vehicle should force the draw-bar far enough in, the spur e^4 would engage with the wheel and the knee of the toggle-joint be thrown up above a horizontal line, thus crippling the connection between the draw-bar and the brakes, so that the latter would be thenceforth entirely unaffected by the inward motion of the former. Now, the guard N is so proportioned that when its shorter radius or the shorter arm of its straight side is perpendicular below the pivot *n*, the corner or concavity n^2 of the rim will hold the outer end of the lever K at exactly the requisite height to hold the trip-cam directly under the toggle-joint E, so that without the application of some additional force the draw-bar will not operate the brakes. That additional force I find in the friction of the brake-shoes against the wheels. When the car moves forward the hinder semi-circumference of each wheel has evidently an upward motion, which motion, in the case of the rear wheels of the truck, will be communicated to the brake-shoes with great force when the latter are pressed against them, even though the pressure be far from sufficient to stop the train. Now, the shaft *h* passes under the toggle-joint E so far back of the spur e^4 that, before e^4 can come far enough back to engage with the trip-cam, the draw-bar must have been pushed far enough in to bring the brake-shoes against the rear wheels with pressure not sufficient to stop the car, but abundantly sufficient to throw up the brake-shoes and the brake-bar C' with great force. This upward motion is communicated, by the hanger *l*, to the lever K, the length of the shorter radius of N being sufficient to allow the outer end of K to move so far up before striking the pivot *n* that, by the downward movement of the inner end, the crank *i'* will, in the particular arrangement shown in the drawings, be turned downward and to the right, imparting the same motion to the rod I and its vertical arm *i*, and thus pushing the shaft H so far to the right that the trip-cam will be clear to the right of the toggle-joint E, and the connection of the draw-bar with the brakes unimpaired. It is evident, then, that when the train is moving forward, the guard N being set in the position described, any pressure on the draw-bar caused by a slackening of the speed of the preceding vehicle will operate first to put the trip-cam out of the way of the toggle-joint, and next to tighten the brakes sufficiently to stop the car. If, now, it be attempted to back the train, the motion of the hinder semi-circumference of each wheel will evidently be downward instead of upward, and when, by the backward motion of the next preceding vehicle and the consequent pushing in of the draw-bar and incipient tightening of the brake-shoes this motion is communicated to the brake-bar C', instead of pushing up the outer end of the lever K it will draw it down into

the corner or concavity n^2—that is, exactly into the position where it will operate to hold the trip-cam directly under the toggle-joint E—and so cripple the connection of the draw-bar with the brakes while the pressure on the latter is still slight. In this way, it will be seen, I contrive to use the inward pressure of the draw-bar to put on the brakes automatically, for the purpose of arresting the forward motion of the train, while preventing that pressure from interfering in any degree with backing the train.

When it is desired to reverse the principal motion of the car, so that the end which I have thus far called the "front" will become the rear, the mechanism which I have described will serve the same purpose, with the addition of the lever P, which is pivoted at p on the inner side of the same timber to which the guard N is affixed a little in front of N—that is, toward the toggle-joint. This lever is so pivoted that its shorter arm p' swings parallel to the guide N and so far to the right of it as just to clear it, except that a flange, q, projecting laterally from that portion of the curved periphery of N which is opposite the shorter radius, engages the end of the lever when the shorter radius of N is below the pivot. When the car is to be used end for end in the way which we are now providing for the guide is to be reversed, so that its longer radius will be perpendicularly below the pivot n, as shown by dotted lines in Fig. 5 of the drawings. The flange q will then be above n, and the arm p' will be free to swing up in a plane parallel with N until it comes in contact with the lever K, just within the point where K would otherwise rest in the corner or concavity n^3 of N. The longer arm p^2 of the lever P is so adjusted as, by its superior length and weight, in combination with the weight at k', to overcome the tendency of the weight of the brake-bar C′ with its brake-shoes to draw down the outer end of K, so that, unless some force additional to the weight of C′ opposes, the outer end of K will be held up as high as the guard N will permit. The construction of N is such that its central plate, n', through which the pivot n passes, is nearly all on the same side of n as the longer radius, so that the distance from the pivoted point to the farther side of n' is about equal to the distance from the other side of n' to the corner or concavity n^2, or the point where the shorter arm of the straight side touches the inner edge of the curved periphery, less the thickness or perpendicular dimension of the lever K, so that when the longer radius of N is perpendicular below the pivot, K will be held between the arm p' and the plate n' at the same height as if it rested in the corner n^2 formed by the curved periphery and the shorter radius—that is, at the requisite height to hold the trip-cam directly under the toggle-joint E—so that the connection of the draw-bar with the brakes will be crippled before anything more than a slight pressure can be transmitted to the wheels. When the motion is backward—that is, in the same direction which in the former part of this specification is called "forward"—there will be nothing to interfere with this operation of the lever P, the friction of the wheels tending to force the brake-bar C′ upward, and thus hold the outer end of K still more firmly in its position under the plate n', so that the operation of the draw-bar will not interfere with the backing of the train. When, however, the motion is forward—the same direction called "backward" in the former part of the specification—the downward momentum of the forward semi-circumferences of the wheels, communicated by friction to the brake-bar C′, will be abundantly sufficient to overcome the weight of the longer arm p^2 of the lever P, and to draw down the outer end of K until it rests in the corner or concavity n^3 formed by the junction of the longer radius of N with its curved periphery, and thus to lift up the inner end of K far enough to draw the trip-cam H clear aside from the toggle-joint, so that the connection of the draw-bar with the brakes will remain unimpaired.

The position of N may be adjusted by means of a crank, N′, formed by continuing the pivot n through the beam, and bending it on the outer side at a right angle. When adjusted it is held in position by the stops o, on one or the other of which the crank rests. The crank and guard are both so set as to be on the side of their pivot toward the locomotive when in the right position.

The lever P might be dispensed with by using a spring attached at one end to the lever K or K′ and at the other to one of the timbers, and so adjusted as, by its elasticity, to hold K in the right position to keep the trip-cam under the toggle-joint; but I find the lever preferable in practice.

The hangers l and l' are so attached to the brake-bar and to the levers K and K′, by hooked ends catching in staples or ring-bolts on the brake-bar and levers, respectively, as to allow of considerable lateral motion, so as to accommodate themselves to the motion of the car in rounding curves and otherwise swaying from side to side, without disturbing the perpendicularity of their push and pull on the levers K and K′, and thus impairing the accuracy of operation of the devices which I have described.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a system of car-brakes operated by the inward pressure of the draw-bar, a brake-bar receiving an upward or downward impulse from its friction against the wheels, in combination with mechanism operated by this impulse to control the mechanism for applying the brakes, whereby the inward reciprocation of the draw-bar is made effective to apply the brakes in a retarded forward movement of the car, but ineffective in any backward movement thereof.

2. In a system of car-brakes operated by the inward pressure of the draw-bar, a toggle-joint in the chain of mechanism between the draw-bar and the brake-bar, so adjusted as to be held rigid by that pressure, in combination with mechanism for automatically tripping it, substantially as and for the purpose described

3. In a system of car-brakes operated by pressure on the draw-bar, a toggle-joint in the chain of mechanism between the draw-bar and the brake-bar, so adjusted as to be held rigid by that pressure, in combination with mechanism for automatically tripping it, and with mechanism operated by the friction of the brakes on the wheels for regulating the contact of the tripping mechanism with the toggle-joint, substantially as and for the purpose described.

4. In a system of car-brakes operated by pressure on the draw-bar, a toggle-joint between the draw-bar and the brake-bar, so adjusted as to be held rigid by that pressure, in combination with mechanism for automatically tripping it, mechanism operated by the friction of the brake-shoes on the wheels for regulating the contact of the tripping mechanism with the toggle-joint, and a guard or stop to hold the regulating mechanism rigid against the force communicated from the friction or leave it free to obey that force, substantially as and for the purpose described.

5. In a system of car-brakes operated by pressure on the draw-bar, mechanism for automatically crippling the connection of the draw-bar with the brakes, in combination with mechanism operated by the friction of the brake-shoes on the wheels for regulating the crippling mechanism, and a guard capable of adjustment to hold the regulating mechanism immovable against the impulse communicated by the friction or leave it free to obey that impulse, substantially as and for the purpose described.

6. The draw-bar D, toggle-joint E, with the spur e^4, and mechanism for connecting the toggle-joint with the brakes, trip-cam H, shaft h, rod I, with its vertical arm i and crank end i', in combination with mechanism for operating the crank by the friction of the brake-shoes on the wheels, substantially as and for the purpose described.

7. The draw-bar D, toggle-joint E, with the spur e^4, and mechanism for connecting the toggle-joint with the brakes, trip-cam H, shaft h, rod I, with its vertical arm i and crank end i', hinged levers K and K′, connected with the brake-bar C′, so as to receive from it an upward or downward impulse, eccentric guard N, with lever P and flange q, all in combination, substantially as and for the purpose described.

8. The lever K, in combination with the lever K′ hinged thereto, the brake-bar C′, so connected with one of the arms of K as to communicate its upward or downward impulse thereto, and mechanism for regulating the operation of the brakes, said mechanism being connected with the other arm of K, all substantially as and for the purpose described.

9. The draw-bar D, toggle-joint E, with the spur e^4, and mechanism for connecting the toggle-joint with the brakes, hinged levers K and K′, with mechanism for automatically vibrating them, rod I, with its crank end i' and vertical arm i, shaft h, and trip-cam H, all in combination, substantially as and for the purpose described.

10. The eccentric guard N, having the plate n', on the same side of the center with the longer radius, in combination with the lever K, substantially as and for the purpose described.

11. The eccentric guard N, in combination with the crank N′ and stops o and lever K, substantially as and for the purposes described.

12. The guard N, eccentrically pivoted, and provided with the plate n', on the same side of the pivotal joint as the larger portion of the guard, and with the flange q, on the curved periphery of the smaller portion, in combination with the lever P and the lever K, all constructed, arranged, and operating substantially as described.

THOMAS E. THOMPSON.

Witnesses:

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