(No Model.) 3 Sheets—Sheet 1.

G. F. CARD.

RAILWAY CAR BRAKE.

No. 369,918. Patented Sept. 13, 1887.

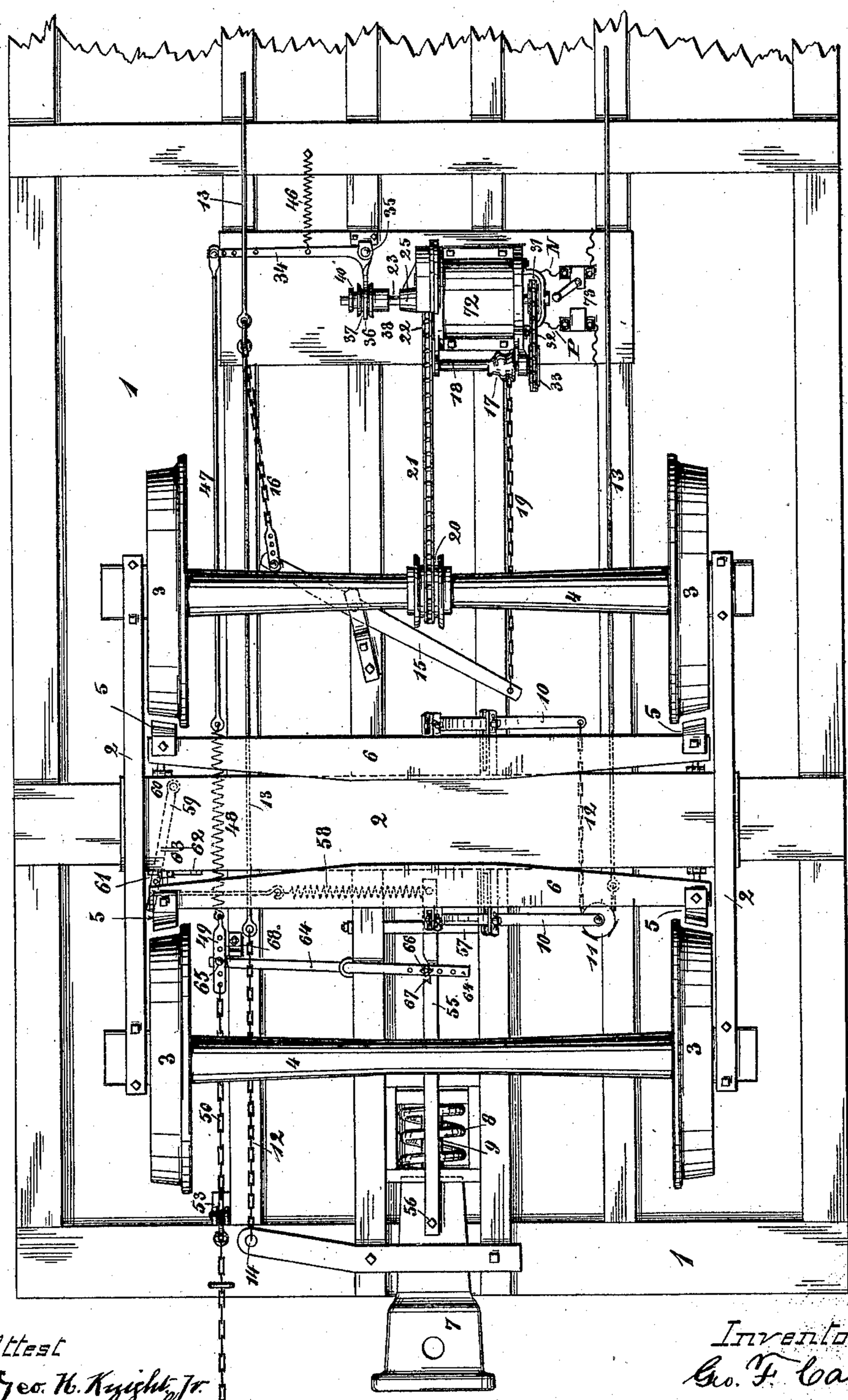

FIG. 1.

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Fig. 4.

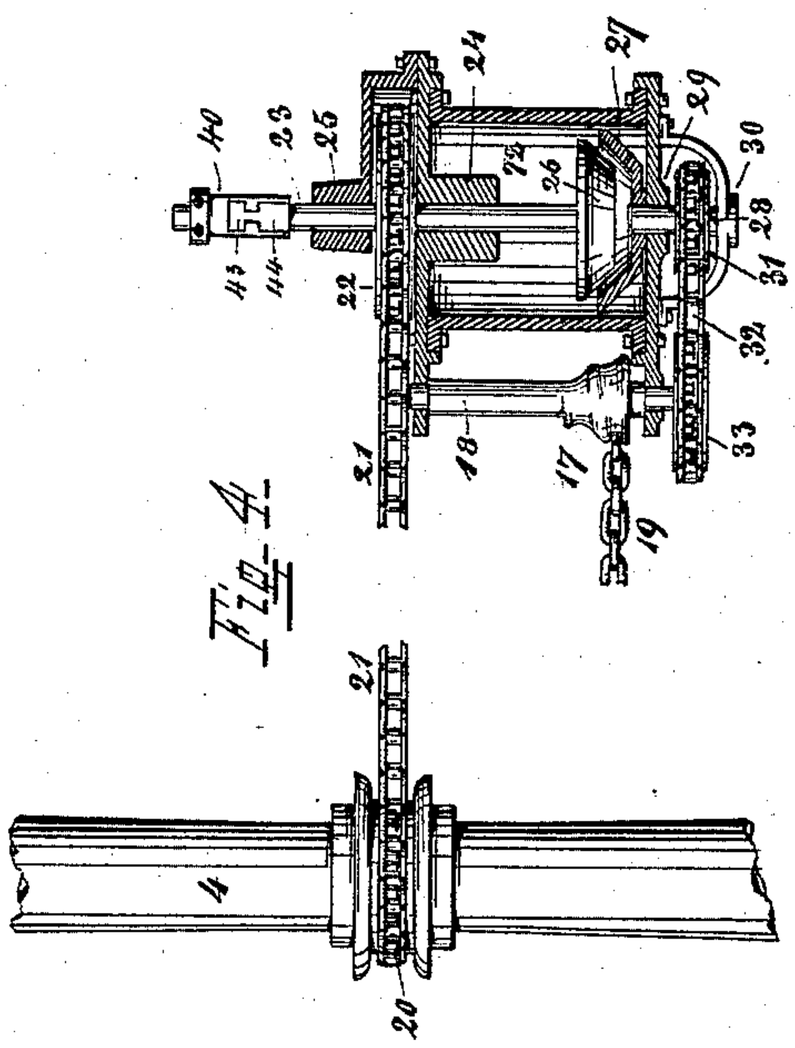


Fig. 5.

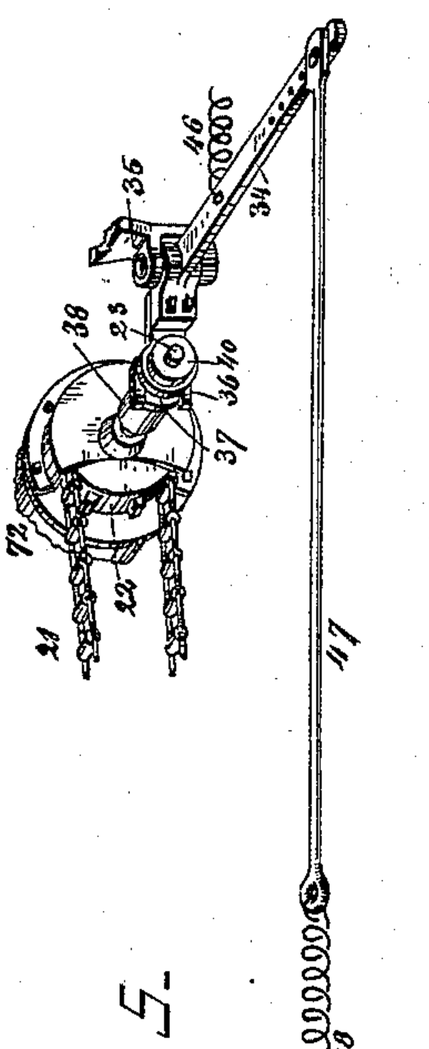


Fig. 1.

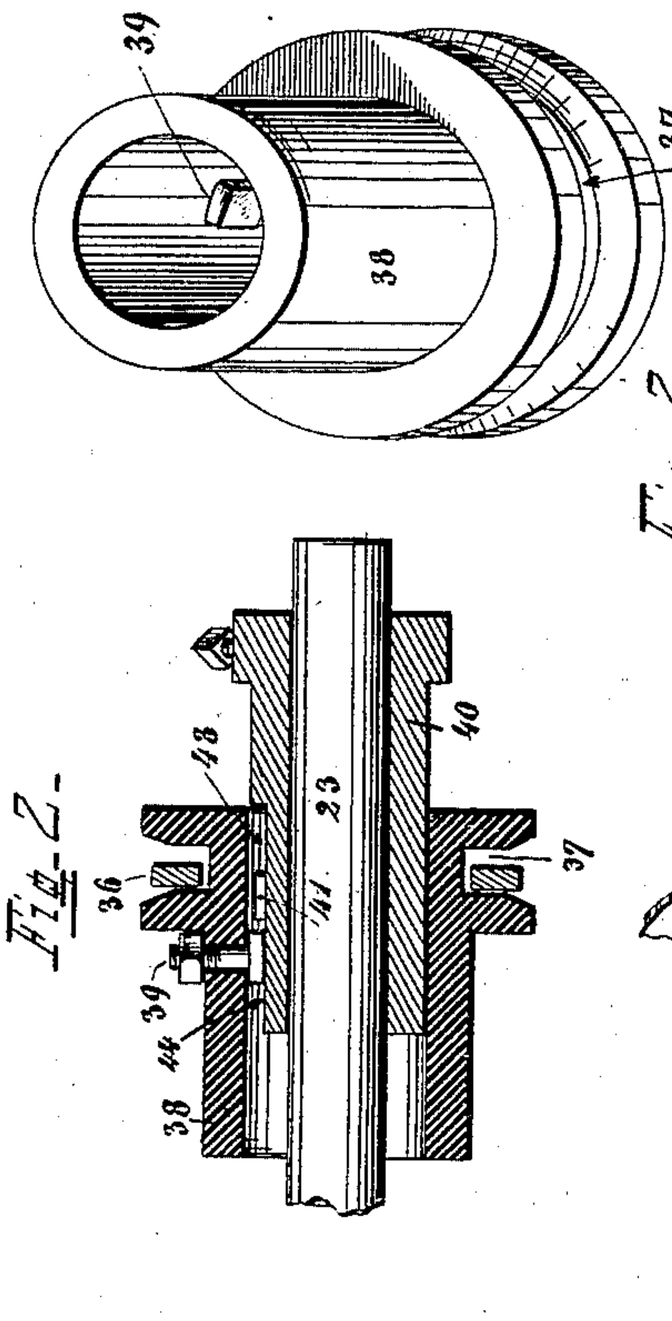
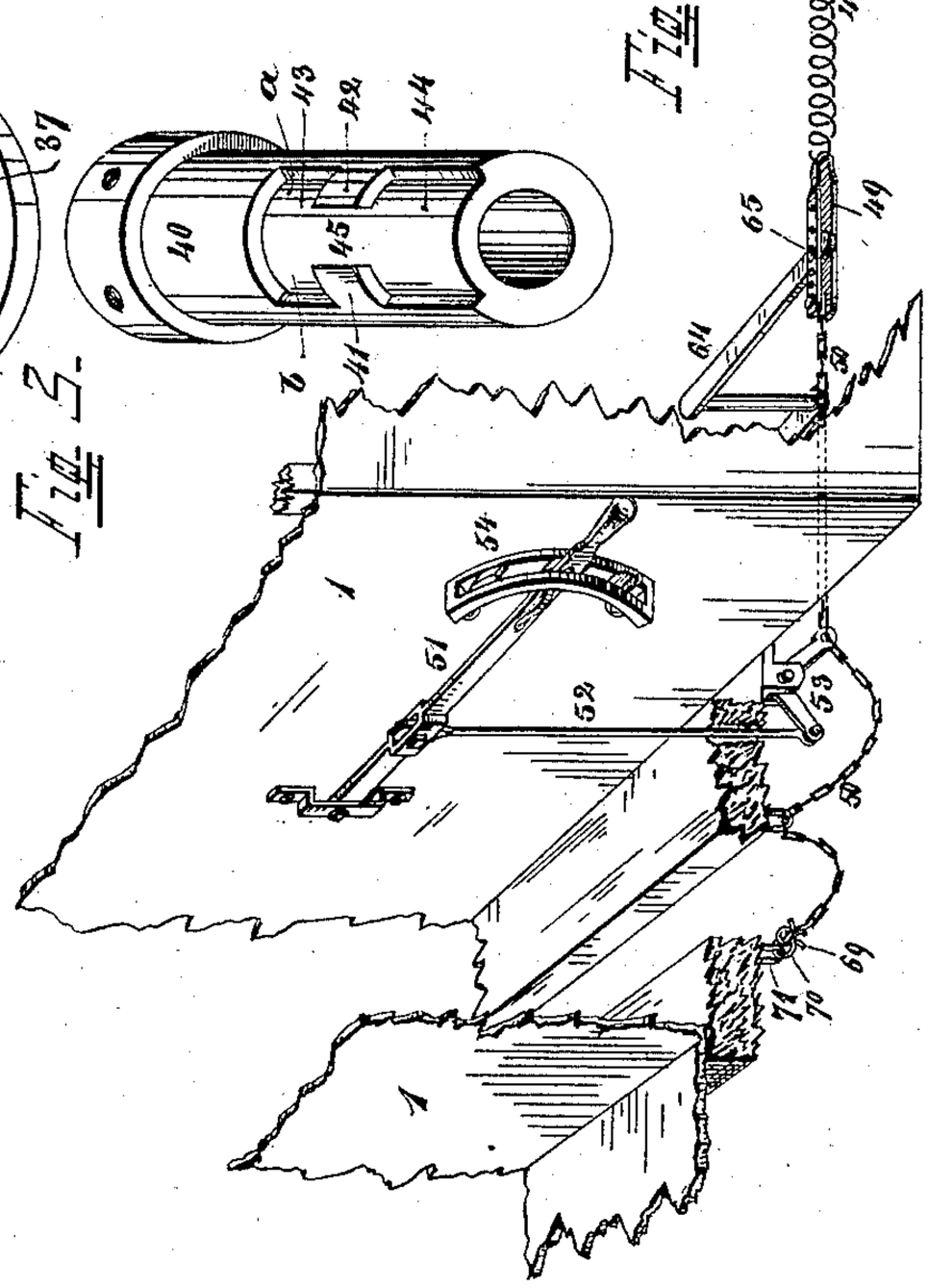


Fig. 2.

Fig. 3.



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(No Model.)

3 Sheets—Sheet 3.

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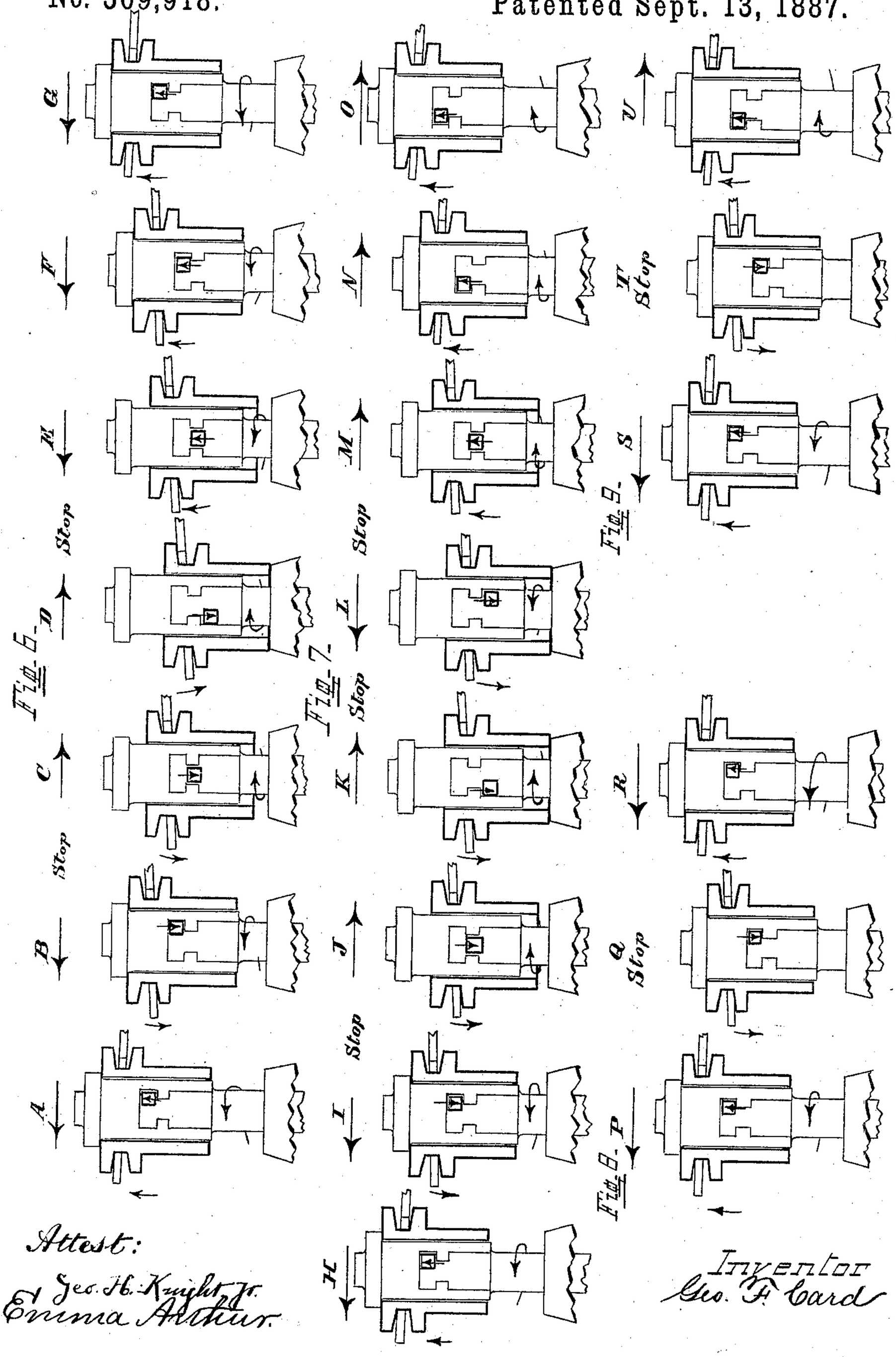

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Emma Arthur.

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UNITED STATES PATENT OFFICE.

GEORGE F. CARD, OF COVINGTON, KENTUCKY, ASSIGNOR TO HENRY K. LINDSEY, OF CINCINNATI, OHIO.

RAILWAY-CAR BRAKE.

SPECIFICATION forming part of Letters Patent No. 369,918, dated September 13, 1887.

Application filed January 17, 1887. Serial No. 224,662. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. CARD, of Covington, Kenton county, Kentucky, have invented a new and useful System of Railway-Car Brakes, of which the following is a specification.

In the preferred and most complete form of my improvement several brake-operating instrumentalities are associated on each car. These instrumentalities include a means whereby a crowding together of the draw-heads operates automatically through a suitable friction-clutch to wind up the brake-chain windlass and set the brakes, the construction being further such that the brake-action becomes self-releasing, whether for backing or forwarding of the train by the original engine or for drawing of the train backward by an engine at the tail of the train.

With the above instrumentality I usually associate other means of bringing the same brake-setting mechanism into action. For example, a means whereby the brakes become automatically set by a violent dragging loose from a car of the portion of train in front of it; a means for discretionary operation of said friction-clutch by manipulation of a hand-lever; the ordinary brake-setting hand-wheels having the familiar chain and lever connections direct with the shoe-bars, and, lastly, a means whereby the engine-man, by operating an electro-magnetic circuit, can put the brakes of an entire train into simultaneous action.

In the accompanying drawings, Figure 1 is a under side view of a portion of a railway-car provided with the several distinct series of brake-setting instrumentalities above enumerated, all being shown in their normal or inactive condition, and consequently with the brakes off. Fig. 2 is an axial section of the boss and sleeve of the friction-clutch shaft. Fig. 3 shows the same boss and sleeve detached. Fig. 4 includes an axial section of the friction-clutch and an under side view of the following parts, to wit: the brake-chain windlass, the sprocket and sprocket-chains of the clutch, windlass and axle, and part of the axle itself. Fig. 5 is a perspective view of the hand-lever and its connection with the clutch mechanism. Figs. 6, 7, 8, and 9 are four series of diagrams to illustrate the action of the studded sleeve upon the friction-clutch shaft.

1 may represent portions of the "bodies" of two consecutive cars.

2 may represent portions of a truck-frame.

3 and 4 respectively represent truck-wheels and their axles.

5 are brake-shoes or rubbers upon customary shoe-bars, 6.

7, 8, and 9 may respectively represent a draw-head, a draw-head spring, and a draw-bar.

10, 11, 12, 13, and 14 may respectively represent the levers, sheave, chains, rods, and hand-wheel shaft of a hand-brake such as constitutes part of the usual equipment of a railway-car.

15 is a lever, one of whose extremities is coupled to one of the rods 13 by a chain, 16, its other extremity being secured to windlass I7 of windlass-shaft 18 by means of a chain, 19.

From a sprocket, 20, on one of the axles, the axle's rotary motion is transmitted by chain 21 to sprocket 22 on the shaft 23, which constitutes a member of the series of devices by which, when occasion arises, the momentum of the axle is transmitted to the windlass 17 aforesaid.

The above-specified parts may be of any customary or suitable construction.

Of the above-recited five distinct means of bringing the brake mechanism into action all except the ordinary hand-wheel device operate by transmitting motion from the axle to the windlass through the instrumentality of a friction-clutch. With this object in view the shaft 23 is so constructed as to be capable of a slight endwise as well as rotary motion in its bearings 24 25, and is armed at one end with a friction-cone, 26, which, by an endwise thrust of said shaft 23, is caused to bind within and and to rotate a corresponding female cone, 27, on a shaft 28, in bearings 29 30, whose sprocket 31 having permanent connection by chain 32 with sprocket 33 on said windlass-shaft 18 it follows that whenever during motion of the car the two members 26 27 of the friction-clutch are brought into contact the said windlass 17 is caused to rotate conformably to and in the same direction with the axle.

Of the four means for applying the brakes which employ the friction-clutch 26 27 all of said means but that in which an electro-magnet is used operate by a lever, 34, connected to the car-body by a fulcrum, 35, and terminating on one side of said fulcrum in a yoke, 36, which occupies a circumferential groove, 37, in a sleeve, 38, which has an interiorly-projecting stud, 39, that occupies an oblong cavity of about thrice its width in the periphery of a boss, 40, on the clutch-shaft 23. Two projections, 41 42, partially separate said cavity into two compartments, 43 44, that communicate by a gate or passage, 45, which is a little wider than said stud 39.

The sleeve 38 is capable of both rotary and longitudinal motion, the rotary motion being with the clutch shaft 23 so long as the latter is rotating in a given direction, and again with said shaft in the reverse direction after said shaft has rotated through an arc equal to twice the width of the stud 39. The longitudinal shift of the sleeve 38 is limited in one direction by the bearing 25 and in the other direction by the limit of retraction of the yoke 36. The lever 34, of which the yoke 36 is an integral part, is normally retracted, and with it the sleeve 38, by a spring, 46, whose other extremity is made fast to the car-body. During normal condition of the apparatus the sleeve-stud 39 tends to seek and remain within the inner compartment, 43, and, while the car is in motion, to crowd into that one of the two recesses *a b* of said chamber which is rearmost with respect to the (for the time being) direction of travel. Thus in Diagram S of Fig. 9 the stud 39 is seen to occupy the (for the time being) rearmost recess, *a*, while in Diagram U, which supposes the car to be moving in the opposite direction, the stud is shown in recess *b*, which is, obviously, then the rearmost one.

From the outer extremity of the lever 34 extends a line or catenary of rod, 47, spring 48, clevis 49, and chain 50, which line reaches longitudinally of the car-body beyond the end thereof. This line is the medium by which the lever 34 is pulled forward for engagement of the brake-setting mechanism by either one of three distinct agencies, to wit: the said lever 34 may be pulled forward by the draw-head, incident to a crowding together of the train, or said lever may be similarly pulled forward by a direct drag on the chain 50, incident either to a violent rupture of the train or to the brakeman's manipulation of a hand-lever, 51, located conveniently upon the car-body and connected to the chain 50 by a stout rod, 52, and bell-crank 53, and capable of self-engagement in rack 54 on being elevated, either automatically by up-thrust of the rod 52 or manually. The lever 51, having engaged in one or other notch of the rack 54, operates, through the elastic line 47 48 49 50, to pull and hold the lever 34 forward with any force for the desired greater or less brake action, whether the forward pull of lever 34 be caused by manipulation of the hand-lever 51 or be brought about automatically by the forcing apart of the consecutive cars, and in either case the engagement of the lever 51 in the rack 54 operates to hold the apparatus to the effective braking condition until purposely liberated by disengagement of lever 51 from said rack 54.

When operating automatically, as above, the lever 51 is pushed into such engagement with the rack 54 by the up-thrust of the rod 52 as to hold the brake mechanism to its effective condition until voluntary liberation of said lever from its rack, as already intimated.

The motion of the compressed draw-head is communicated to the clevis 49 through the following mechanism:

55 is a bar whose forward end is fastened to the draw-head by a pivot, 56. Its rear end is supported on rest 57, and is normally drawn in direction of the clevis by a spring. (See dotted lines 58.) The other extremity of the spring 58 is fastened to a bar, 59, which is secured to the truck-frame by pivot 60. This lever, being secured in one or other notch 61 or 62 of rack 63, operates either to draw the lever 55 toward or to repel it from the said clevis. In the latter position the means of causing brake action by draw-head compression becomes for the time being inoperative.

64 is a lever, one end of which is connected by a pivot, 65, with the clevis 49. A pin, 66, near the other end of the lever 64, occupies a notch, 67, in the bar 55. The forward side of this notch is so formed as to securely retain the pin 66 within it at any retrograde motion of the bar, while its rearward side is such as to allow escape of the pin by any forward motion of the bar in advance of the normal position shown in Fig. 1. A stop, 68, limits the rearward stroke of that end of the lever 64 which is attached to the clevis, and hence limits the retractile movement of said clevis itself, and consequently of the friction-clutch shaft 23. The chain 50 terminates in a hook, 69, for engagement in a gated self-closing link 70, which depends from a staple, 71, on the platform of the next car. On any excessive distension of the said chain the action is first to set and lock the brakes, as previously explained, and then the parts of the gated link 70 give way and permit the jerking loose from it of the hook 69.

With the above-enumerated four distinct means of bringing the brake mechanism into activity may be associated that of a series of electro-magnets under control of the engineman, and with this contingency in view the housing 72, which contains the friction-clutch, is made roomy enough to receive an electro-magnetic mechanism such as described in my application for patent Serial No. 207,246, said mechanism being in an appropriate electric circuit—such, for example, as described in either of my applications Serial Nos. 186,737 and 207,247—and of which the wires P N and the cut-out 73 in Fig. 1 of this application may be considered a part.

The specifications and drawings of one or

more of said applications may be referred to for specific descriptions of details appropriate to the present device.

The apparatus may be furnished without the electrical feature; but it is so constructed as to enable the addition of such feature at any moment without disarrangement of any of the parts.

The expert in train management will readily understand the action of the studded sleeve 38 upon the recessed boss 40 of the clutch-shaft 23. Instances of such action are illustrated diagrammatically in Figs. 6 to 9, inclusive. In these figures the rotating shaft is, for convenience of illustration, shown as if stationary and the sleeve-stud as revolved upon it, whereas, of course, the opposite is the fact, the sleeve really remaining at rest during each reversal of the recessed shaft, and then revolving only with said shaft. In Figs. 6 to 9, inclusive, the strong arrow at top of each respective diagram indicates the supposed direction of travel.

The word "stop," where interposed between two diagrams, indicates that between the condition of things indicated by the diagram to its left and that indicated by the diagram to its right the train had come to a standstill. The same word placed above a diagram is designed to indicate that the train was at rest during the condition of things indicated by that particular diagram. The curved arrow at the lower part of each diagram indicates rotation of the clutch-shaft and its direction. Absence of such curved arrow indicates a condition in which no rotation of the clutch-shaft occurs. The faint arrow at the left of each diagram indicates the direction of yoke-pressure at that particular juncture. The short arrow indicates the place and direction of pressure of the sleeve-stud.

Diagram A, Fig. 6, is intended to represent the relative positions of sleeve and clutch-shaft on a train which is being drawn in direction of the strong arrow by an engine in front of the train. In this condition of the parts the stud exerts no longitudinal pressure upon the clutch-shaft, and consequently no brake action takes place.

Diagram B shows the condition of these members consequent on a slowing of the engine with resultant crowding of draw-heads and a longitudinal displacement of sleeve and shaft, (see arrow on sleeve-stud,) that by closing the clutch brings the brake mechanism into operation. If, after having been thus brought to a standstill, the train is forced by the engine to travel backward, (see strong arrow in diagram C,) the yoke and stud still pressing inward, but the clutch-shaft now revolving in the retrograde direction, the stud will leave its recess *a*, and coming opposite the gate, as shown in said diagram, will be pressed therethrough, and by continued rotation of the clutch-shaft will reach the position shown in diagram D. In this position the stud obviously ceases to act on the clutch-shaft, and pressure of the clutch-cones discontinuing, and being in this condition of the parts placed out of control of the draw-head, the train may be backed any desired distance to a given destination, where it may be allowed to come to a standstill. (Indicated by the word "stop" following the diagram D.)

Diagram E shows the condition of things consequent on a resumption by the engine of its original forward motion. The first effect of this is to take off the draw-head pressure, thus permitting the yoke and sleeve to resume their normal outward retractile pressure, as indicated by the faint arrows. The next effect is to rotate the clutch-shaft in the original forward direction, as indicated by the curved arrow. These motions coact to again bring the sleeve-stud opposite the gate, through which it now returns and resumes its original position in recess *a*, as shown in diagram F. Finally, the now unopposed retractile energy of the spring 46 restores the parts, as in diagram G, to the normal position shown in diagram A.

Fig. 7 is designed to illustrate a series of events which in diagrams H to K, inclusive, are supposed identical with those referred to in diagrams A to D, inclusive. The train at this juncture having come to a standstill, as indicated by the word "stop" following diagram K, the original engine is supposed to leave the train and an engine to be attached at the rear of the train. It is further supposed to be desired that this engine shall drag the train tail foremost in the same direction that the original engine had been backing it. It is further supposed that it is desired that the draw-heads resume their capacity for automatic brake action. If the train dragged by this (tail) engine were to start at once forward with the parts in the condition shown in diagram K, no draw-bar brake action could take place by subsequent slowing of the engine, because the sleeve-stud is imprisoned in the non-effective compartment of the shaft-cavity. To overcome this defect, the engine is first backed so as to bring the sleeve-stud into the position shown in diagram L. The engine being now reversed, motion of the train to the right causes the parts to pass through the successive stages shown in diagrams M and N, and finally to reach the condition shown in diagram O, which differs from the condition shown in diagram H only in being adapted for the changed direction of travel.

Diagram P of Fig. 8 represents the normal condition of the parts on a train which is being drawn in direction of the strong arrow. Diagram Q shows their condition on the train being brought to a standstill by the slowing down of the engine. Diagram R shows like condition of the parts on resumption of the original direction of travel.

Diagrams S and T of Fig. 9 represent, respectively, precisely the same actions and conditions as diagrams P and Q; but diagram V differs from diagram R in representing the condition produced by a dragging of the train

in the opposite direction by an engine placed at the tail (which thus becomes the head) of the train.

Should the engine-man in starting desire to make sure that his draw-heads are in condition for effective brake action, he has merely to temporarily back the train. If the sleeve-stud has by previous movements been left in the wrong position, such as the position in diagram K would be for a train about to "pull out," to the right, a brief backing of the engine brings the stud to position shown in diagram L, after which a forward movement brings the stud to the proper normal position shown in diagram O. If, on the contrary, the stud was already in the position shown in diagram O, the backing action referred to merely shifts the stud for the moment to position shown in diagram H, to return immediately to position O on resumption of the onward travel.

I claim as new and of my invention in railway-car-brake mechanism—

1. The combination, with a friction-clutch member, 27, which is connected with the brake-chain windlass, of a windlass-shaft, 23, rotated from one of the car-axles and being shiftable endwise, said shaft having at one extremity the other member of the friction-clutch and near its other extremity the cavity 43 44 45 for stud 39 of sleeve 38, whose groove 37 receives the yoke 36 of a lever, 34, held by spring 46 normally in position for preventing clutch-contact, and being provided with means 47 for enabling it to be pulled forward for clutch-contact, substantially as and for the purposes set forth.

2. The combination, with a means, 47, of bringing into effective position the clutch through which motion of the car-axle is transmitted to the brake-operating windlass, of the lever 64, whose stud 66 occupies the notch 67 in bar 55, which extends rearwardly from the draw-head, to which its forward end is pivoted, the rear end of said bar being normally drawn toward the said stud 66 by means of a spring, 58, substantially as and for the purposes set forth.

3. The combination, with a means, 47, of bringing into effective position the clutch through which motion of the car-axle is transmitted to the brake-operating windlass, of the chain 50 and the self-closing link 70 on the contiguous car, substantially as and for the purposes set forth.

4. The combination, with the clutch-controlling devices 47 and 50, of the bell-crank 53, the rigid rod 52, the self-engaging lever 51, and the rack 54, substantially as and for the purposes set forth.

5. The combination, with means 47, for bringing into effective position the clutch through which motion of the car-axle is transmitted to the brake-operating windlass, of the severally-connected instrumentalities whereby such windlass is brought into operation either from a crowding together of the draw-heads or from a pulling apart of two consecutive cars, or by manipulation of a hand-lever, the same operating through the instrumentality of the following devices, namely: the lever 64, whose stud 66 occupies notch 67 in projection 55 from the draw-head, the chain 50, the self-closing link 70, the bell-crank 53, the rigid rod 52, the self-engaging lever 51, and the rack 54, substantially as set forth.

In testimony of which invention I hereunto set my hand.

GEORGE F. CARD.

Attest:
GEO. H. KNIGHT,
E. M. WILLIAMS.