(No Model.) 4 Sheets—Sheet 1.

H. HINCKLEY.

ELECTRICAL TRAIN BRAKE.

No. 344,736. Patented June 29, 1886.

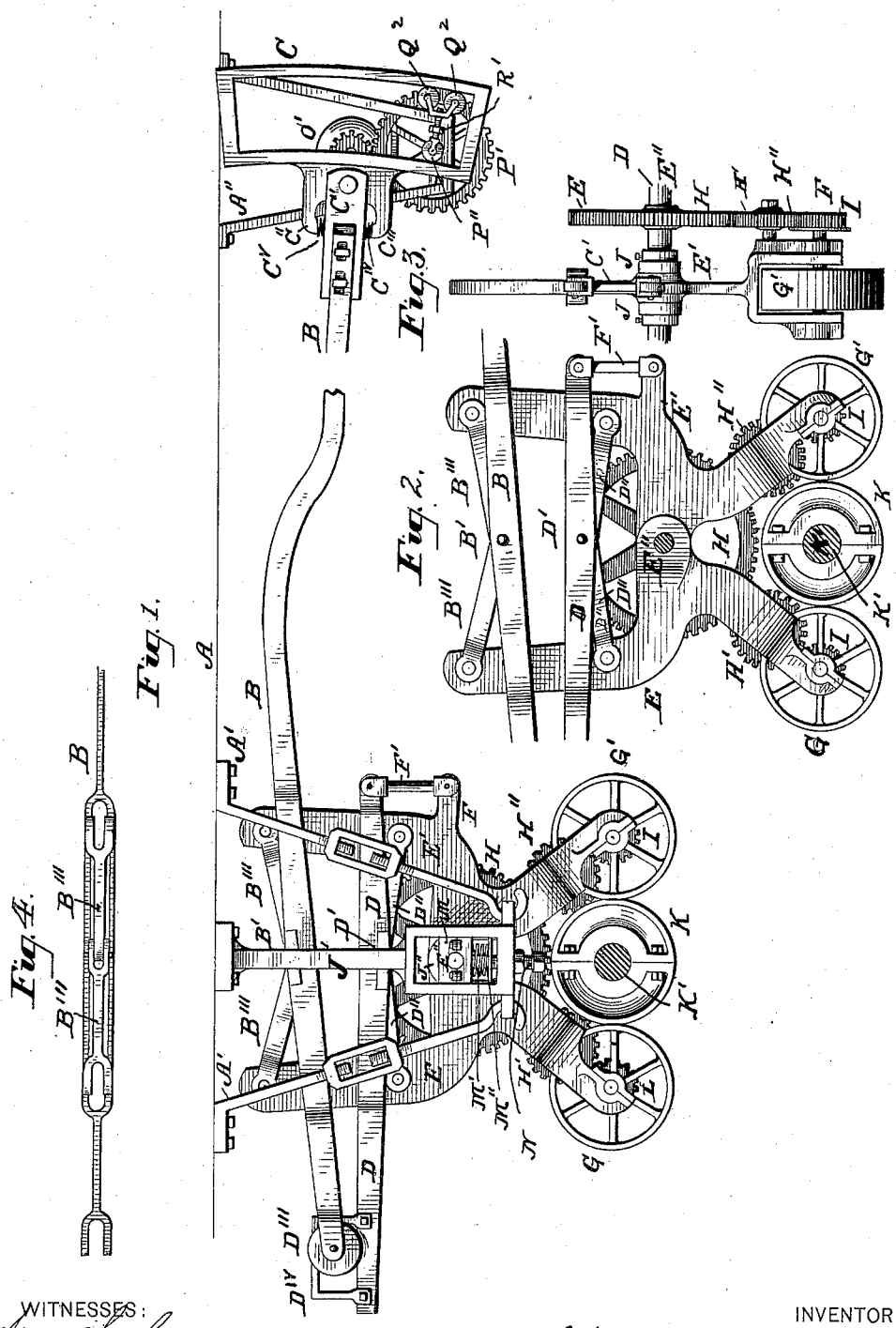

Fig. 1.

Fig. 4.

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(No Model.) 4 Sheets—Sheet 2.

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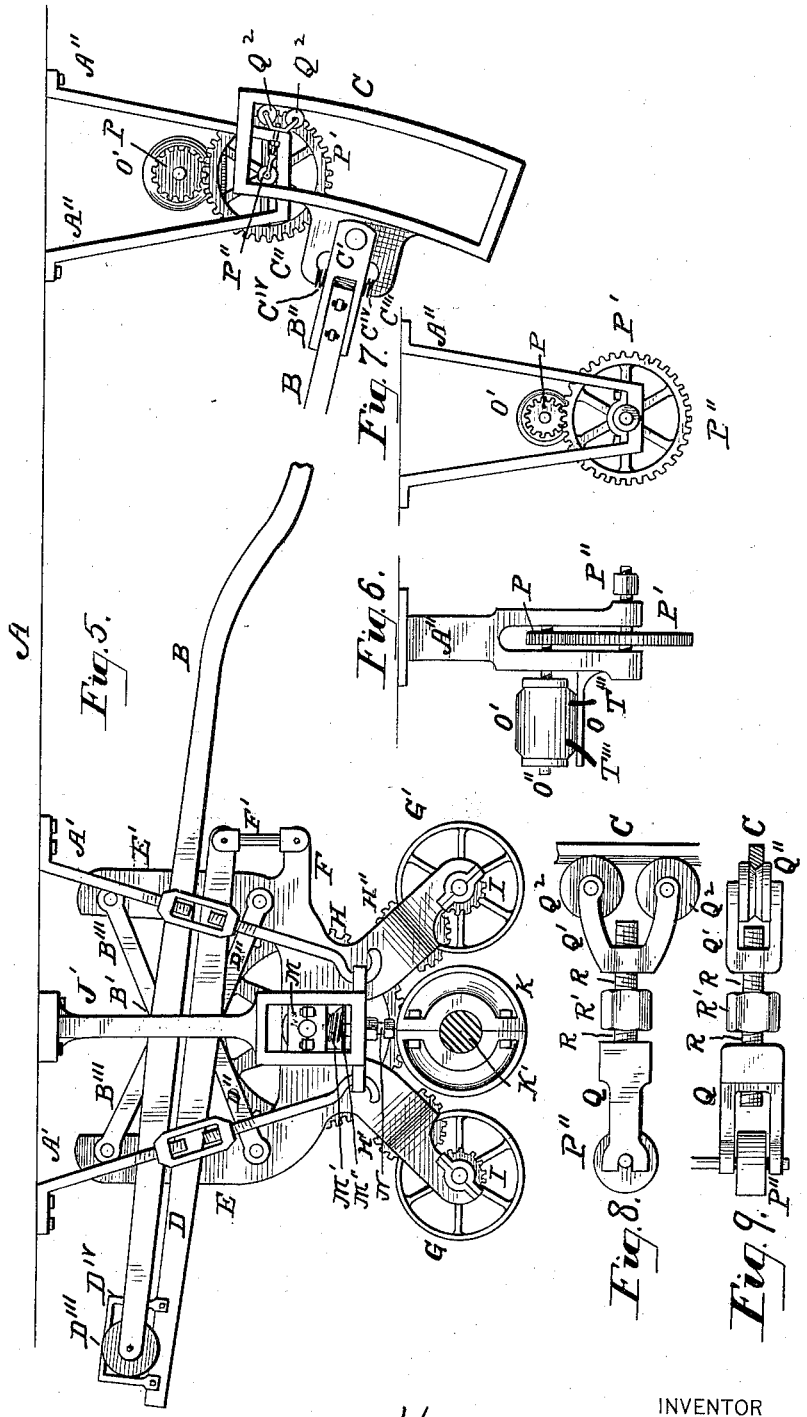

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ELECTRICAL TRAIN BRAKE.

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Fig. 11.

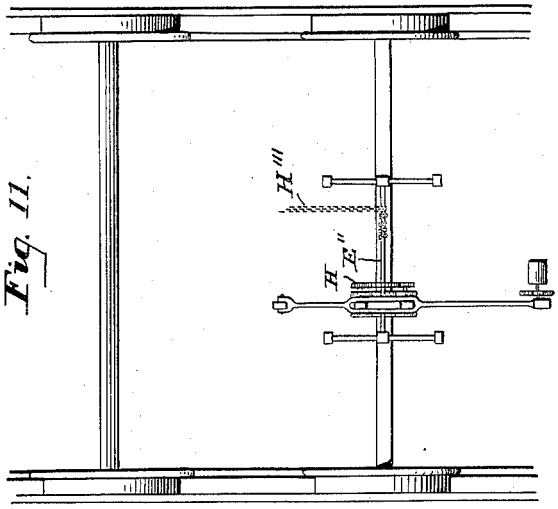
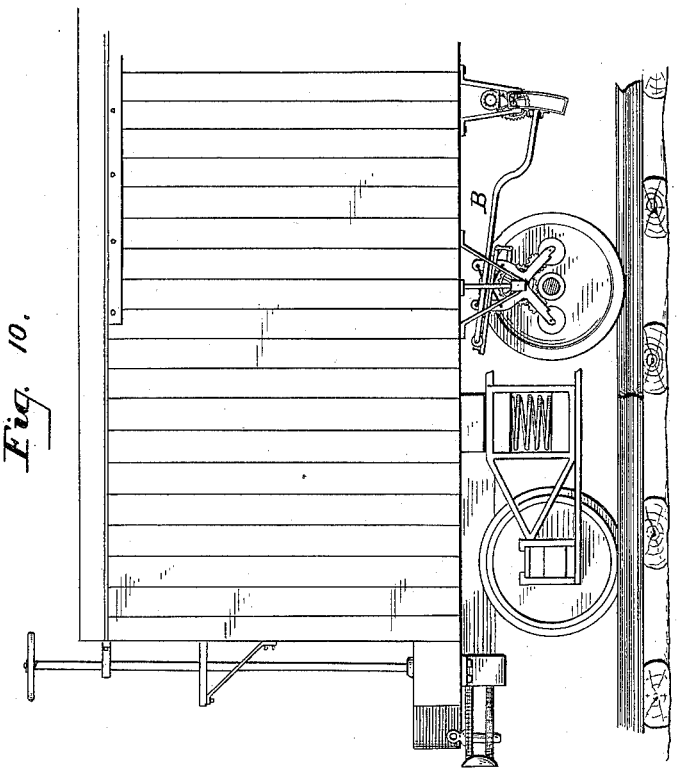


Fig. 10.



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(No Model.) 4 Sheets—Sheet 4.

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ELECTRICAL TRAIN BRAKE.

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Fig. 12.

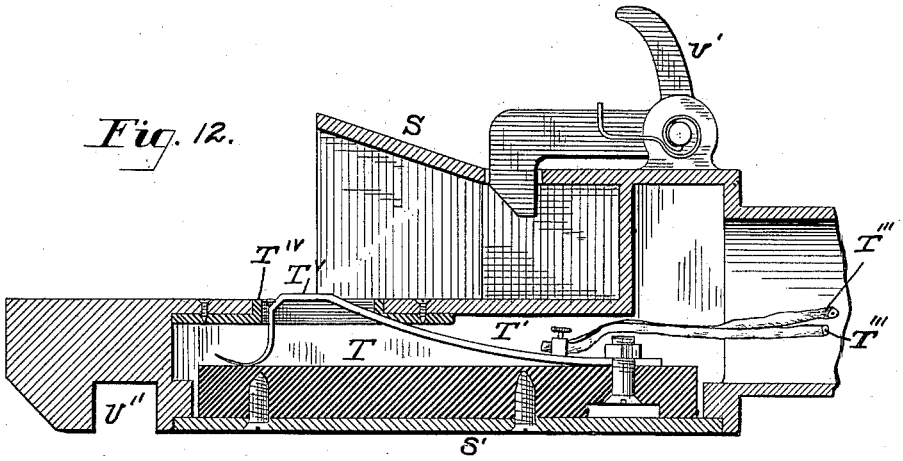


Fig. 13.

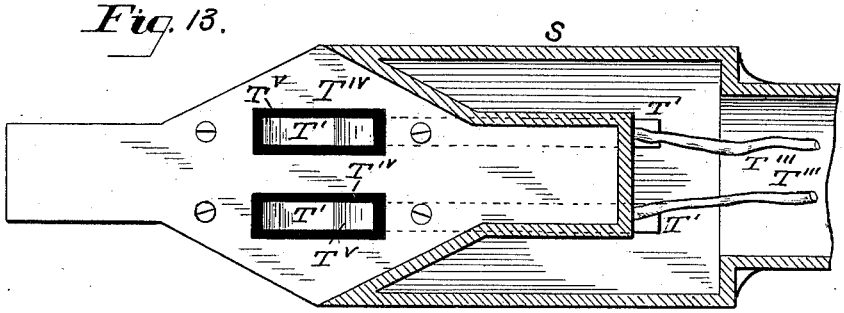
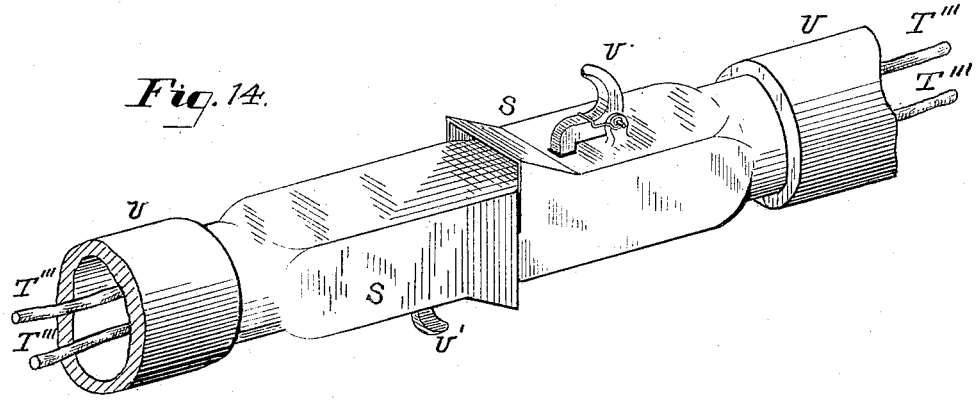


Fig. 14.



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UNITED STATES PATENT OFFICE.

HERMON HINCKLEY, OF WILLIAMSPORT, PENNSYLVANIA.

ELECTRICAL TRAIN-BRAKE.

SPECIFICATION forming part of Letters Patent No. 344,736, dated June 29, 1886.

Application filed January 12, 1886. Serial No. 188,349. (No model.)

To all whom it may concern:

Be it known that I, HERMON HINCKLEY, a citizen of the United States, and a resident of Williamsport, Lycoming county, Pennsylvania, have invented an Improvement in Electrical Train-Brakes; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making part hereof.

The nature of my invention will fully appear from the following specification and claims:

In the drawings, Figure 1 is a side elevation of my operative mechanism, the parts being in the positions which they would assume when the brakes are being applied, showing the attachments to the bottom of a car; Fig. 2, a similar detached view, with the long lever-arms broken off and the hangers or supports from the car removed, also omitting the segment and its parts, which are directly operated by the electric current; Fig. 3, an end view of the same; Fig. 4, a plan view of the main or upper lever and the upper toggle-arms, showing the split form of the lever; Sheet 2, Fig. 5, a side elevation of my apparatus, the parts being in the positions which they would assume when the brakes are open; Fig. 6, a detached end view of the electric motor with its connecting-gearing and the hanger by which it is suspended from the bottom of the car; Fig. 7, a side view of the same; Fig. 8, an enlarged side view of the adjustable rollers which operate in the segment, as will be hereinafter described; Fig. 9, an end view of the same. Sheet 3, Fig. 10, is a side view of one-half of a freight-car with my mechanism attached thereto; Fig. 11, a top view of my mechanism, showing the chain-shaft. Sheet 4, Fig. 12, is a longitudinal vertical view of my electric coupling on the line 1 2 of Fig. 13; Fig. 13, a sectional view of the same on the line 3 4 of Fig. 12; Fig. 14, a perspective view of the same.

A, Fig. 1, Sheet 1, is the bottom of a car, to which my mechanism is hung or suspended by the hangers A′ A″.

B is the main or principal lever, which has its fulcrum at B′, (see, also, Fig. 2,) the two toggle-arms B‴ B‴ being pivoted at their inner ends to this lever at B′. To the outer end of this lever B is secured an adjustable coupling, B″, the end of the lever being provided with slotted holes, through which screws or bolts pass into the coupling-bar B″. These slotted holes permit adjustment of the lever B toward or from the segment C, to which the coupling B″ is pivoted at C′. The radius of this segment is equal to one-half the diameter of a circle having its center at B, and its circumference near the outer end of the lever B—that is, the curve of the segment is that which would be described by the lever B as a radius, with its center at B′. This segment is link-shaped or open. (See Fig. 1, Sheet 1, and Fig. 5, Sheet 2.) Two lugs or lips, C″ C‴, project from the inner face of this segment on the side toward lever B, and two springs, C^{IV} C^{V}, between these lips and the pivoted coupling, hold the segment in position as yielding cushions. The short, or what I may designate the "inner" end of long lever B, rests upon the long or inner end of the lower or second lever, D, which has its fulcrum at the point D′, where it is pivoted to the overlapping ends of the levers or toggle-arms D″ D″. A grooved friction-wheel, D‴, is secured in the forked inner end of lever B. This wheel is surrounded by a rectangular looped or bent rod, D^{IV}, which is secured to the lower lever, D. When the brake is being applied, the wheel D‴ traverses on the upper edge of lever D. (See Fig. 5.) When the brakes are released, wheel D‴ impinges against the under side of the upper bar of loop D^{IV}. (See Fig. 1.) Both levers B and D are partially split or link-shaped, as shown in Fig. 4, Sheet 1, where, however, only one lever B and the upper toggle-arms, B‴ B‴, are shown. The loops or splits in the levers B and D are for the purpose of permitting these levers to be carried up and down as the brakes are released or applied.

E E′ are levers approximating the X shape, but pivoted at E″. They do not cross each other, but simply overlap at their pivotal point E″. (See Fig. 2.) The toggle arms B‴ B‴ are forked at their outer ends and embrace and are pivoted by these forked ends to the upper ends of levers E E′. They decline toward their point of junction B′, whereby, as their inner ends are forced upward by the rising of lever B, they will have a tendency to straighten out and force apart the upper ends of the X-shaped levers E E′. The lower

toggle-arms, D″ D″, are pivoted together at their inner ends similarly to arms B‴ B‴, but they each incline upward, and their outer ends are also forked and embrace and are pivoted to the levers E E′ above the joint of the latter. As the lever D is depressed, these toggle-arms D″ D″ have a tendency to straighten out and force the upper ends of levers E E′ apart, thus co-operating with the toggle-arms B‴ B‴. The spreading of the upper arms of the levers E E′ above their pivotal point E″ contracts or draws together the lower prongs or branches of these levers. A lug, F, projects from the side of lever E′, and a short connecting-arm, F′, is hinged to it and to the outer or short end of lever D. Lug F has a short motion in a curve for the lever-arm E′, to which it is attached, and is pivoted at E″. The pivotal point E″ of levers E E′ is near the end of the chain-shaft for operating the brake. (See Fig. 11, Sheet 3.) The lower extremities of the levers E E′ are forked to receive the friction-wheels G G′, which are set rigidly on their shafts, the latter turning with them. (See Figs. 1, 2, 3, and 5.)

On the chain-shaft E″ is set rigidly the cog-wheel H, which engages with the cog-wheels H′ H″, located intermediately between the cog-wheel H and the cog-wheels I I, which latter are set, respectively, rigidly on the ends of the short shafts of the friction-wheels G G′. The intermediate cog-wheels, H′ H″, are supported by pins passing through their respective centers into the lower parts of levers E E′. (See H″ in Fig. 3.) The levers E E′ are sustained upon the chain-shaft E″ by collars and set-screws. (See at J, Fig. 3.)

K, Figs. 1, 2, and 5, is a friction-wheel in two halves, secured to or set rigidly upon the axle of the car, and it is designed to engage with the two friction-wheels G G′ when the two latter are brought to bear against it.

K′ is the car-axle.

J′ is a side bar of the hanger A′, and it is provided at its lower part with an opening, within which is placed the bearing J″ of the chain-shaft E″. This opening is rectangular in shape, (see Fig. 1,) and is provided with guides M, upon which move vertically the grooved ends of the bearings J″. These bearings receive and sustain the chain-shaft and rest upon a spring, M′, which in its turn rests on the plate M″. This plate is adjusted to its proper position—that is, raised or lowered by the set-screw N, which passes up through a screw-threaded hole in the bottom of the hanger. A like hanger, with bearing, spring, plate, and set-screw supports the other end of the chain-shaft E″, but is not shown in the drawings.

A″, Figs. 1, Sheet 1, 5, 6, and 7, Sheet 2, is a hanger suspended rigidly from the lower surface of the floor-timber of a car, A, having upon one side (see Fig. 6) a bracket or shelf, O.

O′ is an electric motor secured to shelf O. To the end of the shaft O″ of this motor is secured the pinion P, which engages with the large cog-wheel P′. At or near the outer end of the shaft of wheel P′ is the small friction-wheel P″. This shaft is supported in bearings in the lower part of the hanger A″. (See Figs. 6 and 7.) The hanger A″ is so located that the friction-wheel P″ will come into contact with the inner face of the smaller arc of the segment C. (See Figs. 1 and 5.)

Q is a yoke, with its forked end setting by bearings against and partially embracing the shaft of wheel P′ on either side of the friction-wheel P″.

Q′ is another yoke, carrying at its forked extremities the wheels Q″ Q″, which latter are grooved and travel against the inner edge of the outer arc of the segment C. (See Figs. 8 and 9, Sheet 2.)

R is a double-ended bolt, having the head at the center, with right and left handed threads. Corresponding right and left handed screw threaded holes in the yokes Q and Q′ admit the adjusting of the said yokes to any desired pressure between the friction-wheel P″ and the inner arc of the segment C.

In Sheet 4, which shows views of the coupling S, is a metal casing or housing, to one side of which is secured the plate S′, which latter has secured to it the insulator T, and to the inner surface of this insulator are secured the bent springs T′ T′. Openings T^{V} T^{V} in the opposite wall of the casing allow the springs T′ T′ to project a short distance beyond the outer face of the box or case in which the spring is set. The insulator T and the insulating lining T^{IV} prevent contact between these springs and the casing.

To the springs T′ T′ are secured the ends of the flexible electrical conductors T‴ T‴.

U U represent flexible hollow connections between the coupling and the car to which it is attached, and may be of rubber hose or other suitable material to afford sufficient protection to the conductors T‴ T‴, and should be of sufficient strength and grip on the coupler to sustain the weight of the latter.

U′ is a spring-latch the lip of which engages in a notch, U″, of the other half of the coupling. When the other half of the coupling (which is a duplicate of that shown in Fig. 12) is set against and into that shown, (see Fig. 14,) the springs T′ T′ of the two halves of the coupling come into contact at that point of each spring lettered T^{V} in Fig. 12, which completes the electrical circuit between the conductors T‴ T‴ of the two cars joined or coupled. The conducting-wires connect with the motors O′ by the usual binding-posts, the wires passing from motor to motor of the various cars of the train through the tubes U U and the couplers shown on Sheet 4. These wires are positive and negative.

In Fig. 6, Sheet 2, T‴ T‴ represent the wires leading from one electric motor O′ to another. They are connected with each motor O′ in a manner well known to those skilled in the art of electricity and its mechanism, and require no further description.

The operation is as follows: The mechanism described is attached to each car in the train, and these cars are provided with wires T''' T''', coupled together between the cars substantially as set forth, in order to establish and maintain an electrical current from a dynamo machine or battery of sufficient power located on the locomotive drawing the train. When the engineer desires to apply the brakes, he moves a lever or other device, which will complete the electrical circuit between the dynamo-machine in the locomotive and the wires T''' T''', and thereby to each electric motor. This will instantly set each of said motors O' in motion. By reference to Fig. 1, Sheets 1, and Figs. 5, 8, and 9, Sheet 2, it will be seen that if the pressure between the friction-wheel P'' and the inner face of the segment C is great enough the lever B will be carried up as wheel P'' is revolved by the motor O'. By means of the adjusting-screw R', Figs. 8 and 9, the pressure between the wheel P'' and the inner face of the segment C, with which it engages, can be regulated to answer for any desired lift of the lever B. The lever B will continue to rise until the friction-wheels G and G' are brought into contact with the friction-wheel K, when it will cease its upward travel, and will be held at its highest point of ascension, with a pressure proportioned to the pressure of the friction-wheel P'' against the inner arc of the segment C. The motor O' will continue in its revolutions, but the friction-wheel P'' will slip upon the surface against which it is pressed. It will hold the lever to the pressure to which the adjusting-screw R' has been adapted or set. The motion which is imparted to the friction-wheel P'' comes from the motor O' through the small gear-wheel P, (see Figs. 5, 6, and 7,) and large gear-wheel P'. As the outer or long end of the lever B is moved upward or downward, the pivotal point B' receives a slight vertical motion—that is, the center of the circle described by the sweep of the lever B is constantly changing with the movement of the lever, and while the radius is at all times the same the arc described by the long end of the lever B is slightly flattened. The segment C being an arc of a true circle, an equal pressure between the friction-wheel P'' and the inner arc of the segment C is maintained at all points of the travel of the segment C by allowing the segment C to have a slight oscillating motion through the pivot C' and the springs C^{IV} and C^{V}. The raising of lever B throws up the toggle-arms B''' B''' at their point of junction B' at the same time the small lever D is thrown down, thus spreading the lower toggle-arms, D'' D''. The spreading of these two pairs of toggle-arms results in pushing the upper jaws of levers E E' apart, and brings their lower jaws, to which the friction-wheels G G' are attached, together. The throwing toward each other of these two friction-wheels G G' brings them into sudden contact with the friction-wheel K, which is rigidly mounted upon the revolving axle K' of the car. The motion of wheel K thus imparts motion to wheels G G', which, revolving with their axles, turn cox-wheels I, which engage and turn cog-wheels H'', which in their turn engage with and revolve the large cog-wheel H, which is mounted upon the chain-shaft. As only a certain limited amount of pressure is necessary to put on and hold the brakes, the wheels G G' are only brought to bear against the friction-wheel K sufficiently to accomplish this result. The turning of the large cog-wheel H turns the chain-shaft and winds up the chain H''', (see Fig. 11,) which puts on the brakes. The wheels G G' are brought against the friction-wheel K with force sufficient to put on the brakes, and the force of their contact with this friction-wheel is regulated by the screw-bolt R, which determines the degree or pressure to which the lever B shall be held. Of course the greater the force applied to the long end of lever B the greater the force with which the friction-wheels G G' are held in contact with friction-wheel K, and correspondingly greater will be the force with which the brakes will be applied. It is easily possible to determine what strength of such contact is necessary to operate the brakes. When the brakes are applied with great force to a car in rapid motion, the resultant sudden checking of the speed imparts to the body of the car a slight vertical vibrating motion. The friction-wheels G G', being firmly pressed against the wheel K, this vibrating motion would have a tendency to wrench the fastenings of the hanger A' from the car. This strain upon the part is overcome by resting the bearings of the chain-shaft E'' upon the spring M', thus allowing the body of the car to have a slight vertical motion, while the shaft E'' will remain stationary.

In applying this device to a car it may be found that there is a difference in the distance between the center of the axle and the lower line of the car-body in different cars, to allow for any difference in measurement by the adjustment of the set-screw N. The center of the wheels G G' may be brought in line with the center of the car-axle. When the engineer desires to open the brakes, he simply reverses the motion of the lever alluded to above, and thus breaks the electrical circuit between the dynamo and the electric wires T''' T'''. The result of this will be that the motors O' will cease to operate. Segment C will drop, carrying down with it the lever B. The upper jaws of levers E E' will be brought thereby closer together. The lower jaws of these two levers will spread, relieving the friction-wheels G G' from contact with wheel K, thus relieving the brakes from the pressure which has been employed to apply them. The chain-shaft E'' (see Figs. 1, 2, and 11) is the shaft of the large cog-wheel H, and near its end (see Fig. 2) is the pivot upon which the levers or arms E E' are hung or swung. The cog-wheels I I are set upon the short shafts of friction-wheels G G', respectively. It will be observed that

the toggle-arms B''' B''' are set at an angle, being depressed at their pivotal point B, so that by raising them at their pivotal point they will spread the levers E E'. The toggle-arms D'' D'' are hinged together at their ends, and are elevated at this their point of junction D', so that their action is to spread levers E E' when they are depressed. The double-ended bolt R (see Figs. 8 and 9, Sheet 2) has right and left hand thread engaging the yokes Q and Q'. By turning this bolt the two yokes are forced apart or drawn together, so as to shorten or lengthen the distance between the friction-wheel P'' and the other friction-wheels, Q'' Q'', whereby the pressure of these wheels upon the interior of the two bars of the double segment C may be increased or diminished. The electric wires T''' T''' are covered with any desired insulating material.

What I claim as new is—

1. A brake mechanism consisting of the combination of the friction-wheel G, set upon a swinging lever, and a friction-wheel, K, upon the axle of the car, the two adapted, as shown, to be brought into contact, cog-gearing I H' H, for transmitting power from the friction-wheel G to the shaft E'' of cog-wheel H, which shaft E'' bears the brake-chain, whereby when the friction-wheel G is pressed against the wheel K, which is set rigidly upon the car-axle, the shaft E'' will be turned and the brake-chain H''' tightened, to apply the brakes, substantially as described.

2. A brake mechanism consisting of the combination of the friction-wheel K, set rigidly upon the car-axle, two friction-wheels, G G', hung upon swinging levers E E', which levers are capable of being swung toward each other, so as to bring said friction-wheels G G' into contact with the friction-wheel K upon the axle, gear-wheels I I H' H'' H, brake-shaft E'' of cog-wheel H, provided with a brake-chain, H''', all combined and operating substantially as described.

3. A brake mechanism consisting of the two bent levers E E', pivoted as shown, and connected above their pivotal points by toggle-arms B''' B''', which are pivoted at their ends at B', lever B, attached to these toggle-arms at their pivotal point B', whereby by the raising or lowering of this lever the toggle-arms are raised or lowered at their pivotal point, and the upper ends of levers E E' are forced apart or drawn toward each other, and the lower part of these levers E E' are coincidently drawn toward each other or forced apart, friction-wheels G G', mounted upon the lower ends of levers E E', respectively, friction-wheel K, mounted rigidly upon the car-axle, gear-wheels I I H' H'' H, and brake-chain shaft E'', all arranged and operating substantially in the manner set forth.

4. A brake mechanism consisting of the two bent levers E E', pivoted as shown, and connected above their pivotal point by toggle-arms B''' B''', which are pivoted at their ends B', and toggle-arms D'' D'', which are pivoted at their ends D', said toggle-arms being elevated and depressed substantially in the manner shown, long lever B, attached to the upper toggle-arms at their pivotal point B', and short lever D, attached to the lower toggle-arms at their pivotal point D', said long lever B being connected by a sliding joint, D''' D^{IV}, at one of its ends to the outer extremity of the short lever D, whereby by the raising of the upper long lever, B, the lower lever will be depressed and the movement of the upper and lower toggle-arms will operate to spread the upper jaws of levers E E' above their pivotal point E'' and contract their lower jaws below this point, friction-wheels G G', mounted upon the lower ends of levers E E', respectively, friction-wheel K, mounted rigidly upon the car-axle, gear-wheels I I H' H'' H, and brake-chain shaft E'', all arranged and operating substantially as described.

5. A brake mechanism consisting of the combination of positive and negative electric wires T''' T''', adapted to be connected with a dynamo machine or battery, motor O', with its gear-wheels P P', and friction-wheel P'', segment C, with which said friction-wheel engages, attached to the end of long lever B, whereby by the movement of the segment actuated by the friction-wheel P'' this lever may be raised, toggle-arm B''', pivoted or hinged to said lever B and to lever E, lever E, pivoted at E'', and adapted to be reciprocated by the raising and lowering of toggle B''', friction-wheel G, set upon the lower end of lever E, adapted to engage with friction wheel K, set rigidly upon the axle of the car, gear-wheels I, H', and H, and brake-chain shaft E'', all combined and operating substantially as described.

6. A brake mechanism consisting of the combination of a positive and negative electric wire, T''' T''', adapted to be connected by a dynamo machine or battery, motor O', with its gear-wheels P P', and friction-wheel P'', segment C, with which said friction-wheel engages, attached to the end of the long lever B, whereby by the movement of the segment actuated by the friction-wheel P'' this lever may be raised, toggle-arms B''' B''', pivoted at their inner ends to lever B and at their outer ends to levers E E', levers E E', hinged or pivoted at E'', with lower jaws to which are suspended or hung the friction-wheels G G', friction-wheel K, set rigidly upon the axle of the car, gear-wheels I, I, H', H'', and H, and brake-chain shaft E'', all combined and operating, substantially as described.

7. The combination of the lever B, of the segment C, lug C'' upon said segment, pivot C, and springs C^{IV} C^{V}, to cushion the joint between the lever and the segment, substantially as described.

8. The combination of the double-barred segment C, the friction-wheels P'' Q'' Q'', adapted to traverse between the bars of said segment, the yokes Q and Q', with the adjusting double-ended bolt R, with right and left hand

thread, whereby by the turning of bolt R the distance between the friction-wheel P″ and the friction-wheels Q″ Q″ may be lengthened or shortened to increase or diminish the pressure of these wheels upon the interior of the two bars of the segment C, substantially as described.

9. In an electric car-brake mechanism, a coupler for joining the wires which carry the current of electricity between the cars, consisting of two duplicate shells or boxes, S S, internal springs, T′ T′, with insulating material T T^{IV} to prevent them from coming into contact with the shell of the coupler, said springs being in electrical junction with the wires T‴ T‴, and projecting through openings T^{V} T^{V}, whereby when the two halves of the coupler are brought together the springs T′ T′ of one half will come into contact through openings T^{V} T^{V} with the springs T′ T′ of the other half, and a continuous insulated connection will be made between the wires of the different cars, substantially as described.

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WM. H. CARSON.