No. 814,498. PATENTED MAR. 6, 1906.

F. E. WOODFORD.

CAR HANDLING APPARATUS.

APPLICATION FILED MAR. 2, 1905.

4 SHEETS—SHEET 1.

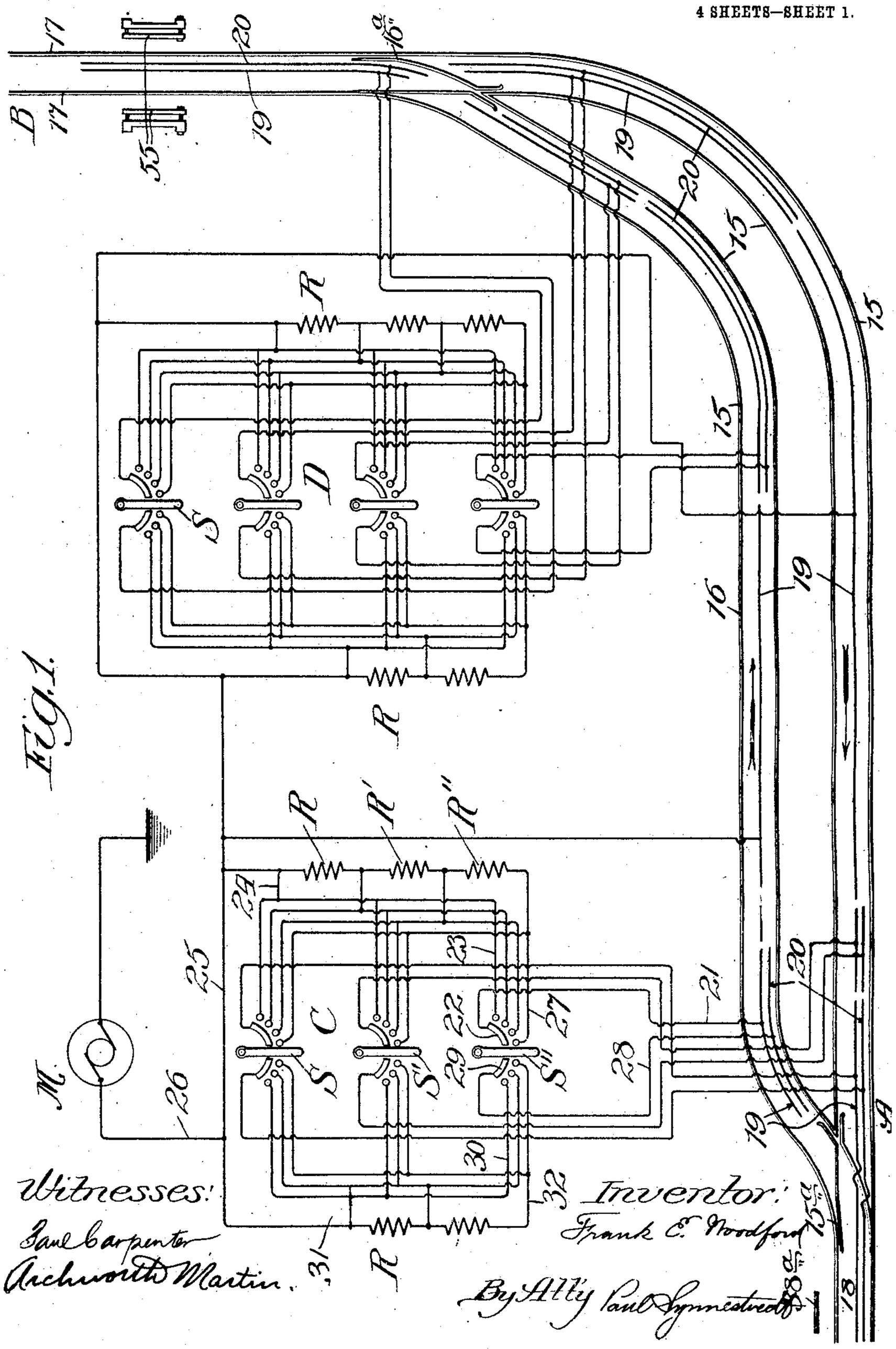

Fig. 1.

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4 SHEETS—SHEET 2.

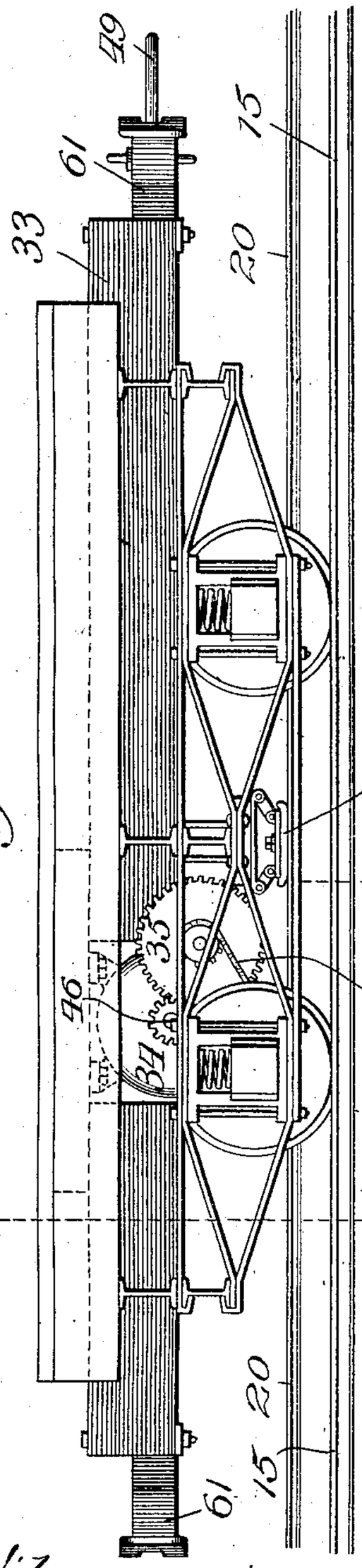

Fig. 2.

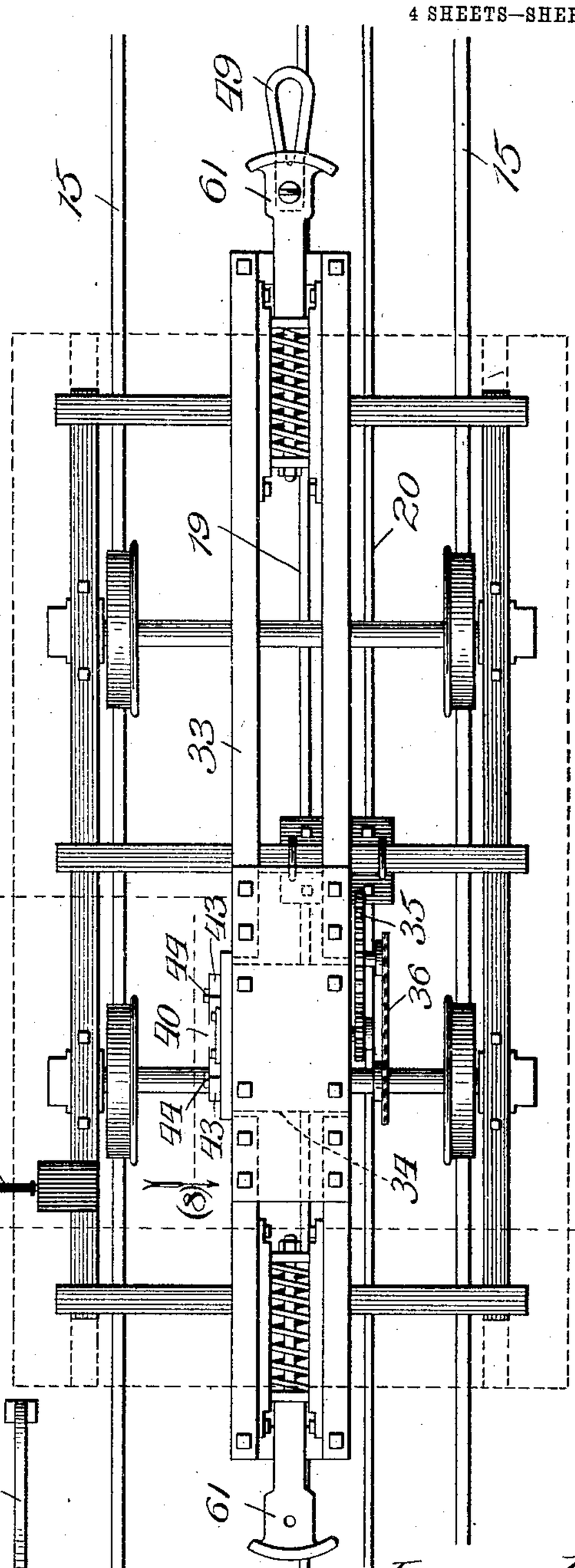

Fig. 3.

Witnesses:
Paul Carpenter
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4 SHEETS—SHEET 3.

FIG. 7.

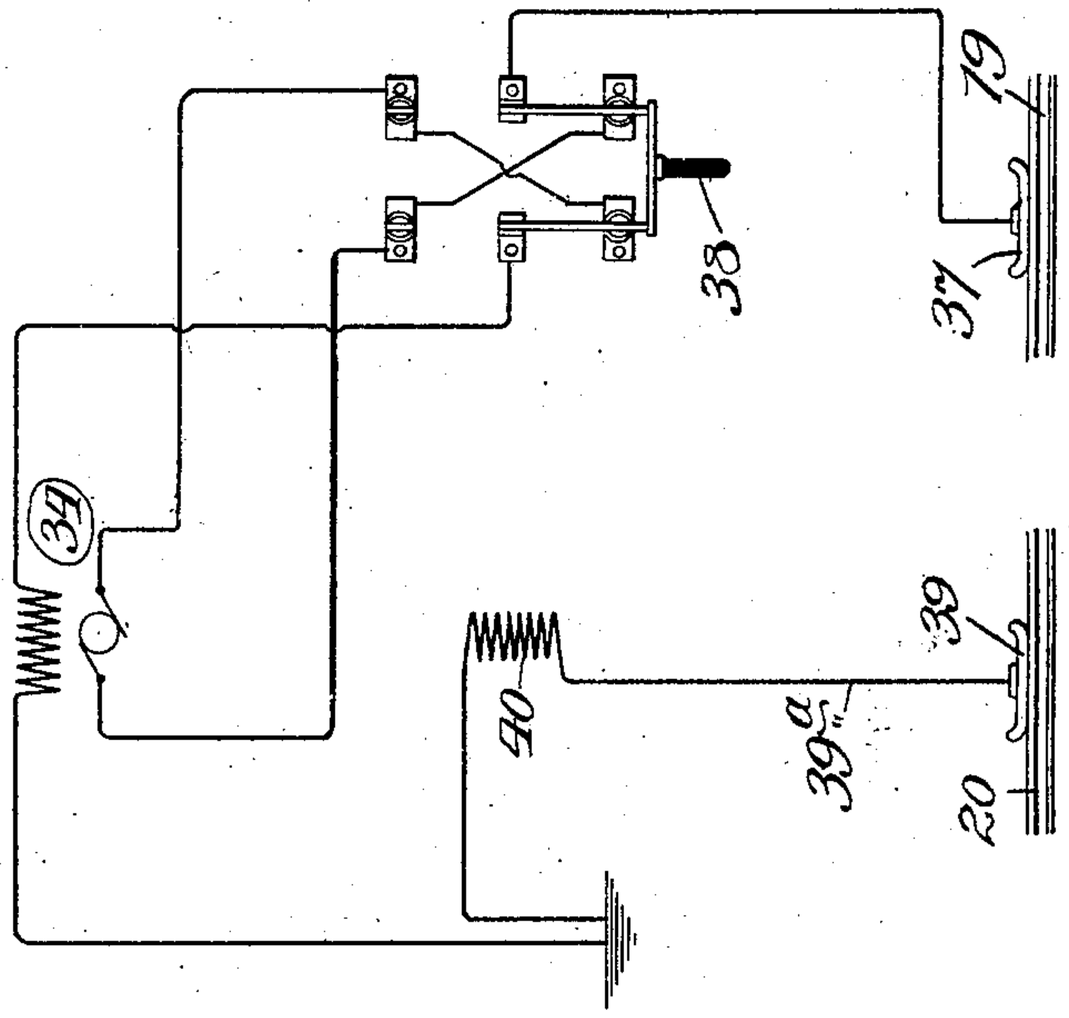


FIG. 4.

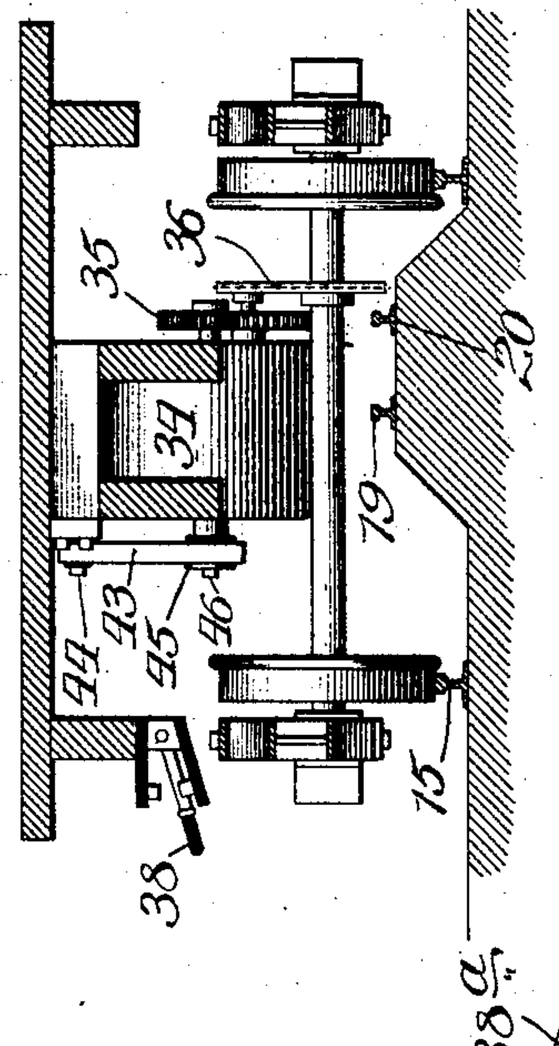


FIG. 5.

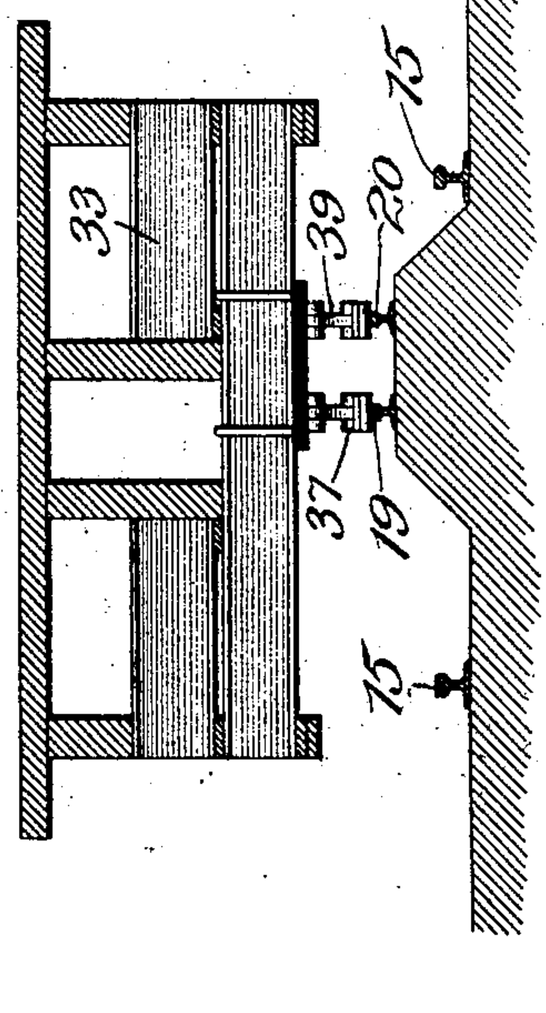
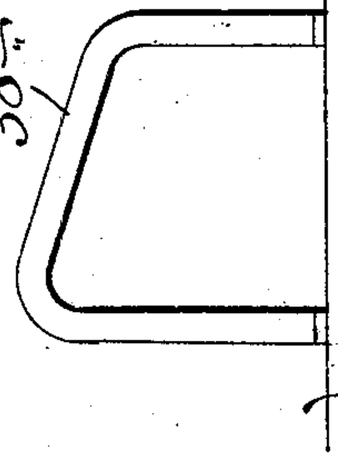


FIG. 6.



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4 SHEETS—SHEET 4.

Fig. 9.

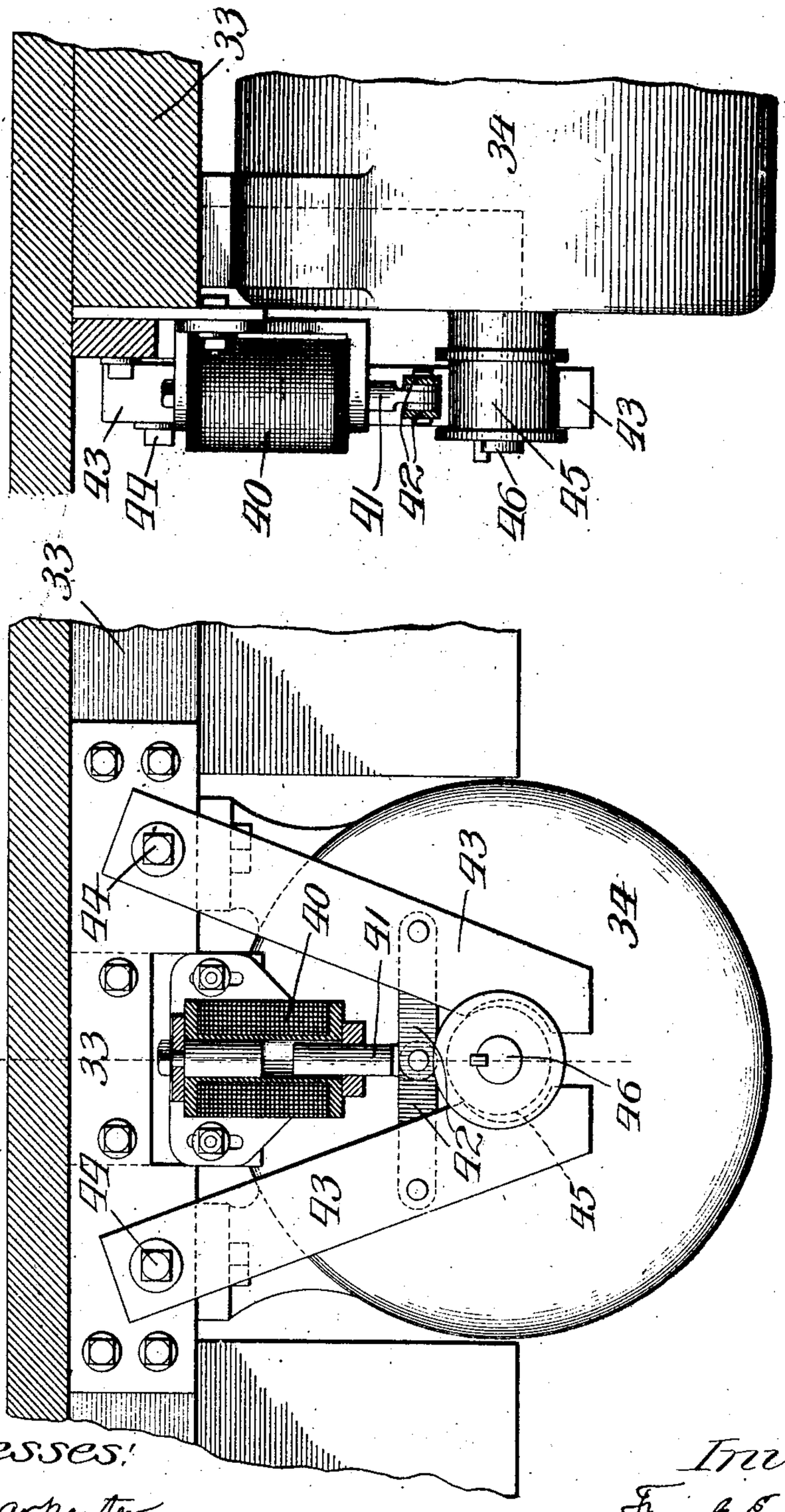

Fig. 8.

Witnesses:

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UNITED STATES PATENT OFFICE.

FRANK E. WOODFORD, OF CHICAGO, ILLINOIS, ASSIGNOR TO HAUSER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF MAINE.

CAR-HANDLING APPARATUS.

No. 814,498. Specification of Letters Patent. Patented March 6, 1906.

Application filed March 2, 1905. Serial No. 248,103.

To all whom it may concern:

Be it known that I, FRANK E. WOODFORD, a citizen of the United States, residing at Chicago, in the State of Illinois, have invented certain new and useful Car-Handling Apparatus, of which the following is a specification..

My invention relates to apparatus for automatically transporting freight such as coal, ore, clay in brick plants, and the like, and particularly to a certain system of tracks and electric circuits and automatic motor shifting devices for shifting cars back and forth through limited distances, the same to be handled from one or more central stations at a distance from the cars. The objects of my invention are, primarily to bring the movements of the cars under electric control from a common center, and to provide automatic apparatus for moving the same, guiding the movements, and applying the brakes, etc. Other objects are to improve and simplify the devices for these several purposes, all as will hereinafter appear. These and other objects are attained by means of the construction, arrangement and operation as illustrated in preferred form in the accompanying drawings, and as especially applied to a series of shuttle cars for the purpose of transporting material from the place of loading, to an incline to elevate and dump the load, and back.

In the accompanying drawings, Figure 1 is a general diagram of the plan of tracks and feeders for the electric car and of the electric switchboards for manipulating the driving and braking currents;

Figure 2 is a side elevation and partial section of a preferred form of the car used in the system;

Figure 3 is a plan view of the running gear, and the driving mechanism and rails;

Figure 4 is a section through the car taken on line (4) of Figure 3;

Figure 5 is another section through the car taken on line (5) of Figure 3 and showing the collector shoes in contact with the electrical feed rails;

Figure 6 is a side elevation of a switch cam used for reversing a switch on the car to change the direction of its movements at the ends of its travel;

Figure 7 is a diagram showing the electric current arrangement on the car for operating the motor and brake;

Figure 8 is a side elevation shown by a vertical section through the car on line (8) in Figure 3, illustrating the electric brake and means for operating it;

Figure 9 is a side elevation of the devices of Figure 8, being a partial section on the line (9) of Figure 8.

In the design of the apparatus as here made by way of illustration, the cars are each provided with a driving motor and with a solenoidal brake. From Figure 1 it will be seen that between a loading station A and a terminal B I have provided a pair of tracks for shifting back and forth the loaded and empty cars to and from the foot of a dumping incline, for example. The approaching track 15 and the returning track 16 are arranged with crossing frogs as usual and provided with spring switches 15^a and 16^a. Each track has along its entire length an electric collector rail 19, or conductor to provide the current for operating the driving motors, and at such points as are needed each has an auxiliary feed-rail 20 used to supply current to the car brakes hereinafter to be described. It will be understood of course that the circuit through the feed-rails and the motor and brake solenoid are completed through the car wheel to the ground in the usual manner.

Power for the entire system may be supplied by a dynamo at M and in the circuits are the switchboards C and D arranged with resistances R and with switches S′, S″, etc., for throwing the current on and off and for varying the intensity of the current. It will be seen for example, at station A, in the track 16, the feed-rail 19 is connected by wire 21 to the contact 22, and by means of the switch S″ may be connected by wires 23, 24, 25, and 26, to the dynamo and the ground; or otherwise, the switch may make contact with wire 27 which will throw the current through the resistance coils R, R′ and R″, and thence through wires 25 and 26 as before. Similarly the feeding rail 20 for the brake may be connected by wire 28 to contact 29 and through the switch S″ to wire 30 and through 31 directly to 26 and the dynamo, or through wire 32 may be sent through the resistance coils as before described. Each switch on the

board C thus operates either the power or the brake as the manipulator may desire, at each point on the track where manipulation is necessary. The switchboard D is entirely similar and operates the car at the other end of the line.

Figures 2 to 9 show the construction of the car. From Figures 2 and 3, especially it will be seen that the truck 33, which may be of any desired construction, carries a motor 34 which by gear 35 and chain 36 drives the axle of the car, receiving the current through the collector shoe 37 which slides upon the feed-rail 19, thus driving the car along the track 15. As more clearly shown in Figure 4 the car carries a switch 38 which by striking the switch cam 38ª (Figure 3) is shifted between its contact points and reverses the current through the armature. The diagram of Figure 7 shows the wiring for this purpose, and it will be understood that this may be arranged in any well known and convenient manner.

From Figure 5 it will be seen that the truck 33 is also provided with a collector shoe 39 to take current from the feed-rail 20, and from Figures 7, 8, and 9, it will be seen that by connection 39ª from this shoe a solenoid coil 40 is excited and by drawing up its core 41 it acts upon the toggle levers 42 to forcibly draw together the two brake jaws 43 pivoted at 44 to the truck 33 and operating upon a drum 45 to check the motion of the motor shaft 46. Of course this brake may be applied to the wheel axle, or any other revolving part, as desired, but I find it more effective mounted as shown. It will be understood that the switch cam 38ª is placed at whatever position is desired to reverse the direction of the car's movement.

At the station B an incline connected with the terminal 17 is preferably used to elevate the cars for dumping, and it will be seen that the feed-rails 19 and 20 end at this point. Proper apparatus is here used to attach and carry up the cars.

From the above description it will be evident that in operation a car being at the station A for loading will by throwing on the switch S to excite its motor, be driven back toward the terminal 18 until the switch 38 strikes the switch cam 38ª, reversing the current through the armature. Thereupon the loaded car will move toward the right, passing in the switch 15ª and along the track 16 to the terminal B, receiving current from the feed-rail 19 and moving at a speed under control of the operator by means of the switchboards C and D, as heretofore described. Arriving at the terminal 17 of the track, the car will be stopped in the proper place and gradually, by the operator manipulating switchboard D, moving the switch S over to the left to throw the current off from rail 19 operating the motor and throwing it on rail 20 to apply the brake. It will be observed that each section of the track is controlled by a separate switch S so that within certain limits one car can be operated without affecting the others.

It will thus be seen that a single operator stationed at the electric switchboards can manipulate any one of the cars to start or stop it at any desired point on the track, and that each car when it reaches either of the terminals of the track automatically reverses its direction to return, or attaches itself to the cable truck. This control is rendered perfect and easy by reason of the means for varying the current on any one of the several sections of track or upon all of them; so that the individual cars can be driven at any desired speed or stopped as quickly as necessary, at any part of the track where such operation may be desired. By the arrangement of the switches to control both the driving current and the braking current I make it impossible to rack or injure the mechanism by accidentally throwing both currents on at once, and when desired it will be evident that the track may be in as many sections as desired and the feed-rail for the brake may everywhere parallel the feed-rail for the motor. Thus the operator has complete control over the relative positions of all the cars, and the speed of them collectively and individually at all parts of the track.

Having thus described my invention and illustrated its use, what I claim as new, and desire to secure by Letters Patent, is the following:

1. The combination with a railway track, of two electric feed conductors independent of the track and of each other, a central switchboard having differential resistance coils and a single switch to vary the current in either of said conductors; and a series of independent cars on the track provided with motors and brakes, and motor and brake circuits having operative contact with said conductors, substantially as described.

2. The combination with a circuit of track, a series of cars thereon, electric motors and brakes on each car, and conductors for supplying current to the same, and a central switchboard having means to differentially vary the current in different sections in said track and conductors in alternation.

3. The combination with a car having an electric motor and an electric brake, of a track and separate conductors for feeding the motor and brake, and a single central switch differentially controlling the current for both the motor and the brake conductors from a distant central station, substantially as described.

4. The combination with a motor-driven car having thereon an electrical brake, of a distant switch controlling station and independent feed conductors therefrom to the motor and brake, and a single switch adapted

to alternately energize the motor and brake conductors, and means attached thereto to vary the current in each of said conductors.

5. The combination with a track and a motor car thereon, of means for supplying current to said motor comprising separate connections to various portions of the supply conductor, and a set of resistance coils located at a central station and arranged for varying the current in said several portions and to energize the motor and brake circuits in alternation.

6. The combination with a track and a motor car having an electric brake, of separate conductors independent of each other and of the track for feeding the motor and the brake of the car and means located at a central station to energize them at will from a distant point independently of each other and only in alternation.

7. The combination with several motor cars each having an electric brake and a separate feed conductor for the motor and brake, and a distant central switchboard having means to vary the current in both the motor and brake conductors, including a single switch to operate both the motor and the brake connection.

8. In car handling apparatus the combination with a source of current, and suitable electric connections for supplying current to a moving motor car, of a brake for the car comprising a pair of pivoted jaws embracing a revolving portion of the car driving mechanism a toggle link for closing said jaws operated by a solenoid, and means for energizing the solenoid by current from a point external to the car substantially as described.

9. The combination with a motor-driven-car having an electric brake, feed conductors for the motor and brake, and a single switch to operate the motor and brake in alternation from a distant point.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

FRANK E. WOODFORD.

Witnesses:

PAUL CARPENTER,

F. W. H. CLAY.