

E. KELLER.
 DOOR CONTROLLED LOCKING MECHANISM FOR VEHICLES.
 APPLICATION FILED JUNE 13, 1919.

1,427,212.

Patented Aug. 29, 1922.
 2 SHEETS—SHEET 1.

Fig. 2.

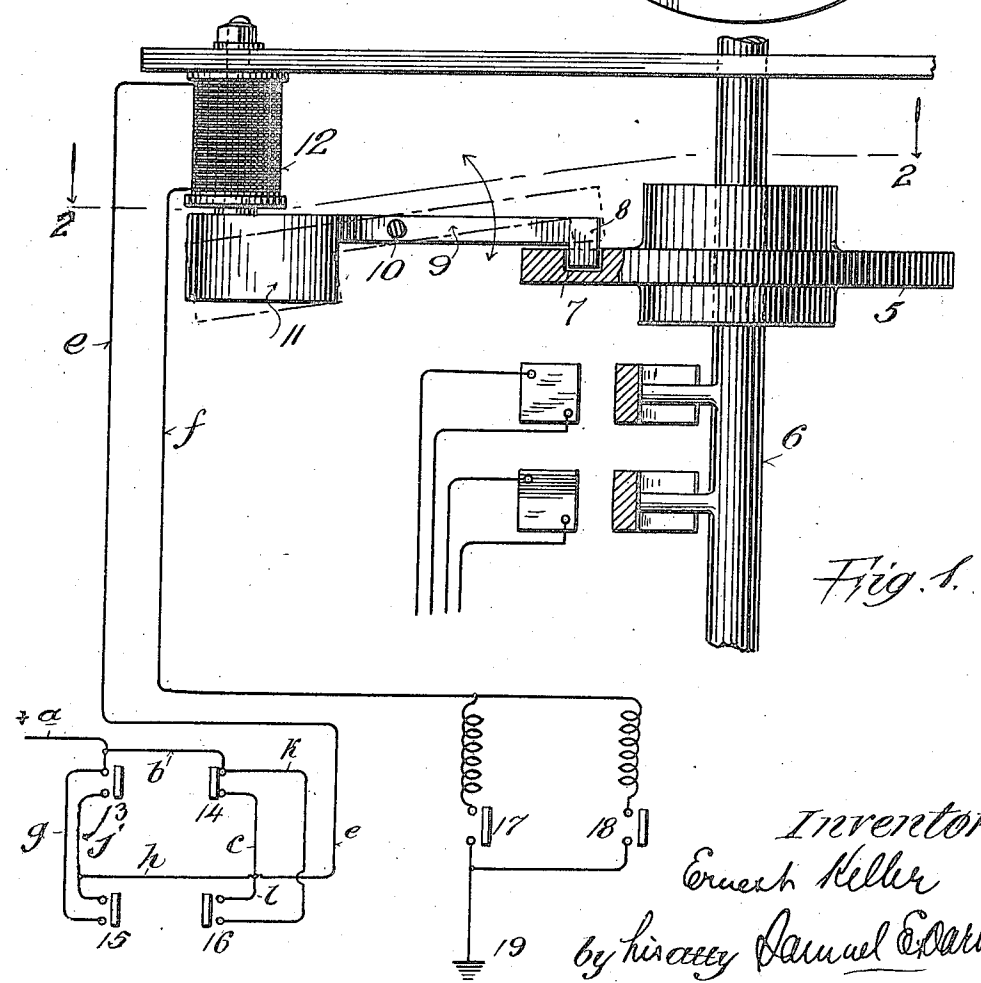
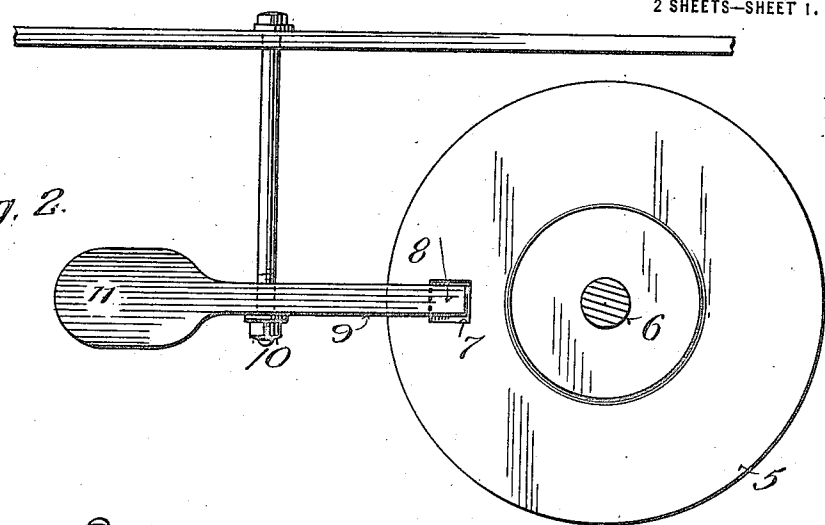


Fig. 1.

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 Ernest Keller
 by his attorney Samuel Early

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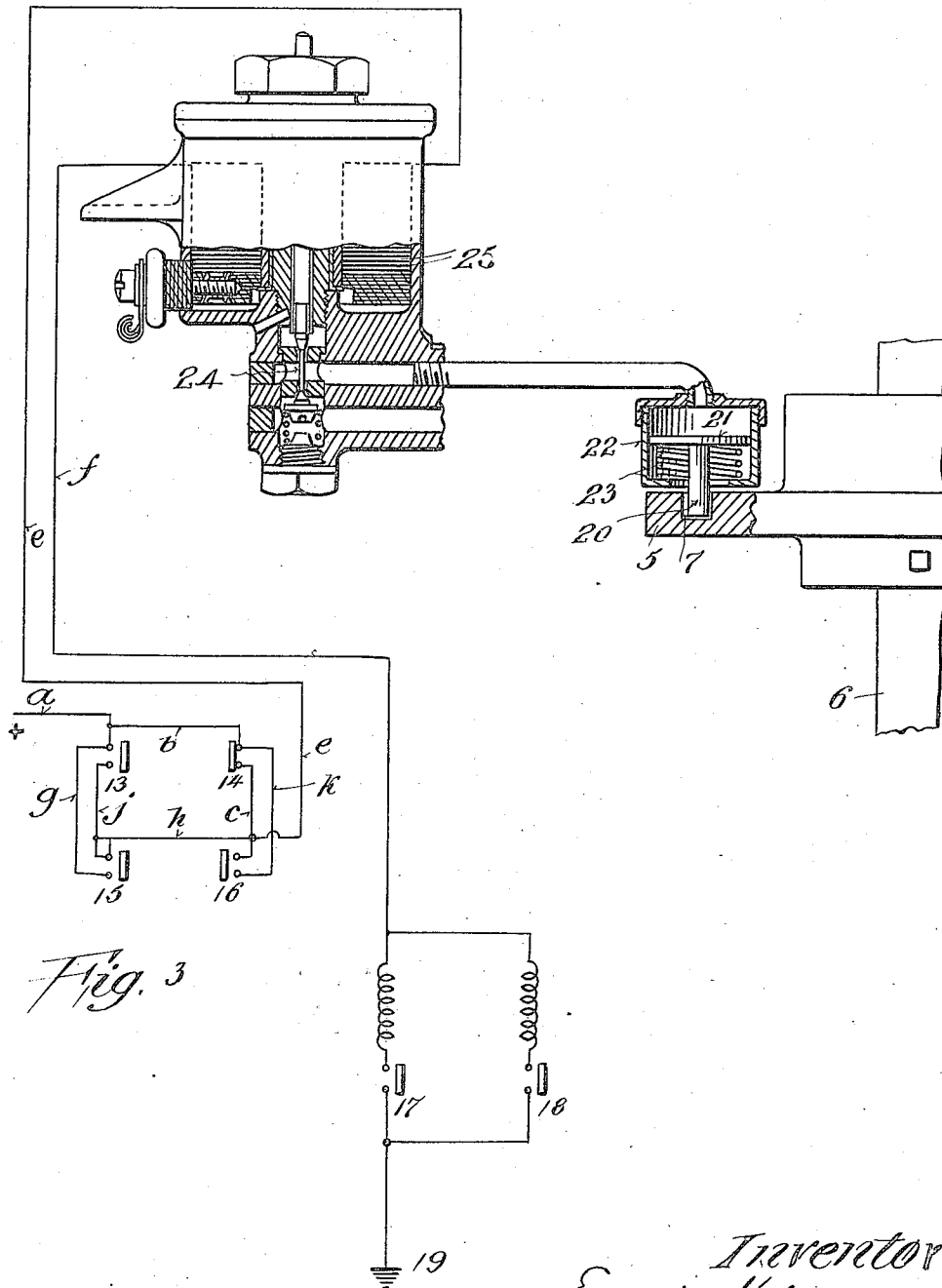


Fig. 3

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UNITED STATES PATENT OFFICE.

ERNEST KELLER, OF WOODHAVEN, NEW YORK, ASSIGNOR TO NATIONAL PNEUMATIC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF WEST VIRGINIA.

DOOR-CONTROLLED LOCKING MECHANISM FOR VEHICLES.

1,427,212.

Specification of Letters Patent. Patented Aug. 29, 1922.

Application filed June 13, 1919. Serial No. 304,031.

To all whom it may concern:

Be it known that I, ERNEST KELLER, a citizen of the United States, residing at Woodhaven, county of Queens, State of New York, have made a certain new and useful invention in Door-Controlled Locking Mechanism for Vehicles, of which the following is a specification.

This invention relates to door controlled locking mechanism for vehicles.

The object of the invention is to provide a locking mechanism which is simple in construction, efficient in operation for preventing a vehicle such as a car, bus, or the like, from being started until all the doors or exits are closed.

A further object of the invention is to provide means of the character referred to for locking the car controller in its off position when a door or exit on the car is open and maintaining the controller locked as long as the door or exit remains open, thereby preventing injury or accident to passengers due to premature starting of the car.

A further object of the invention is to provide a door controlled locking mechanism of the character referred to in which power consumption in the control circuits continues only so long as one or more of the doors of a car or train of cars remains open, and is cut off during the time the motor circuit is in operation.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location, and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawing, and finally pointed out in the appended claims.

In the accompanying drawing:—

Fig. 1 is a view in elevation, and partly diagrammatic, showing a door controller lock mechanism embodying the principles of my invention.

Fig. 2 is a view in section on the line 2, 2, Fig. 1, looking in the direction of the arrows.

Fig. 3 is a view similar to Fig. 1 showing a modified locking structure embodying the principles of my invention.

In the practical and safe operation of elevated and subway trains, surface cars, buses, and other passenger vehicles, and in order to avoid danger of accident to board-

ing and alighting passengers through the premature starting of the car or train, it has been found desirable to insure that all the doors on the car or throughout the train of cars are closed before the car or train is started. The structures and arrangements at present employed for accomplishing this purpose are not only complicated and expensive to construct and install but they are also expensive to maintain in that, generally, there is a large amount of power consumption in the control system due, largely, to the series circuit arrangement employed in connection with such systems.

It is among the special purposes of my present invention to provide a control system which is exceedingly simple in structure, capable of being economically manufactured and quickly and easily applied or installed, and which is inexpensive to maintain, and wherein the operating power consumption required in the system is reduced to a minimum.

In carrying out my invention in its broad scope I propose to provide a lock constructed and arranged when in operative position to lock the propelling motor or motors of the car or train against operation, and to control such lock either electrically, pneumatically, electro-pneumatically or otherwise, by the opening and closing movements of the door or doors of the car or train. In practice, and in one form of embodiment of my invention, to which, however, I do not desire to be limited or restricted, I propose to apply the lock to the propelling motor controller, and so relatively position the parts that the controller is locked when in its off position, the lock becoming operative to restrain the controller from operation from its off position only so long as any door or exit on the car or train remains open.

In Figs. 1 and 2 I have shown an electrically operating control system wherein 5 designates the plate or disk carried by the shaft 6 of the usual ordinary propelling motor controller. The plate 5 is formed with a socket or seat 7 with which cooperates a dog 8 of a rock lever 9 pivoted at 10, its opposite end being suitably weighted as indicated at 11, the weight either constituting the armature of an electromagnet 12 or adapted to be attracted by the core of said magnet when said magnet is energized, so as to carry the locking nose or dog 8 into

engagement with the seat 7 to lock the plate 5 and hence the controller against operation. When the electromagnet becomes de-energized the weighted end of the lever 9 rocks said lever and retracts the locking dog or nose 8 thereby releasing the controller and permitting the same to be manipulated in its normal manner.

The circuit of the electromagnet 12 includes switches 13, 14, 15, 16, which I will refer to as door switches, there being as many of such switches as there are doors on the car or throughout a train of cars, said switches operating to be opened when the doors are closed, it being understood, of course, that a switch is associated with each door. In the illustrative example shown the switches 13, 15, 16, are shown open, indicating that the doors associated therewith are closed, while the switch 14 is shown closed, thereby indicating that the door associated therewith is open. In practice I also propose to include switch 17, 18, in the circuit of the lock controlling magnet 12, said switch 17, 18, preferably being controlled by the reversing controller in such manner as to be closed when the reversing controller occupies its normal position. The two switches 17, 18, represent respectively the reversing controller switches at opposite ends of the same car. Under normal operating conditions the reversing controller is set into a fixed position from which it is not disturbed except in case of emergency. This affords a convenient arrangement for normally maintaining the circuit of the lock control magnet 12 closed to ground or return, at least so far as the switch 17, 18, is concerned, it being understood that said switch 17, 18, is normally closed when the reversing controller is in its normal position.

Power for the circuit of the lock control magnet 12 may be derived from the overhead or underground trolley, contact rails, or other source, or from a storage battery.

In accordance with my invention various door control switches 13, 14, 15, 16, are coupled up in parallel and this constitutes an important and valuable feature of my invention, as I thereby avoid the disadvantages and objections attending the employment of series circuits for the control lock 12.

Referring to the circuit diagram illustration of Fig. 1 the current for the circuit control magnet 12, derived from any source as above indicated, is delivered through the following circuit, assuming, as shown, that the switch 14 is closed and all of the other door switches of the system are open, thereby indicating that all the doors of the car or train are closed except the door controlling the contacts 14:—from conductor *a*, conductor *b*, through switch 14, conductor *c*, conductor *e*, magnet 12, conductor *f*, switch

17 (or 18), which are supposed to be closed, to ground at 19. The completion of this circuit causes the magnet 12 to be energized, its armature 11 to be attracted, and the locking dog 8 to engage in the socket 7 when the controller is in its "off" position, thereby locking the controller against operation. When the door which controls switch 14 is closed said switch is opened and the above circuit is opened, the magnet 12 deenergized and the controller lock is released, thereby permitting the normal manipulation and operation of the controller. Suppose, however, instead of the door which controls switch 14 being open, that the door controlling switch 15, for example, is open, thereby closing switch 15, thereupon the circuit of magnet 12 is completed as follows: through conductor *a*, conductor *g*, switch 15, conductor *h*, conductor *e*, and on through the magnet 12 to ground at 19 as before. If, for example, switch 13 is closed the circuit of magnet 12 will be completed as follows:—from supply conductor *a*, through switch 13, conductor *j*, conductor *h*, conductor *e*, and on through magnet 12 to ground at 19 as before. If the door switch 16 is closed then the circuit of magnet 12 is completed as follows:—from current source, through conductor *a*, conductor *b*, conductor *k*, switch 16, conductor *l*, conductor *e*, and on through magnet 12 to ground at 19 as before. Thus it will be seen that when any door of the car or throughout the train is open the circuit of magnet 12 is closed and the locking device is effective to lock the controller in its off position. This lock is maintained as long as any door switch throughout the system is closed, that is, so long as any door remains open. When, however, all of the door switches are opened, that is, when all of the doors are closed, the circuit of the magnet is opened and the lock is released.

While I have shown in Fig. 1, and have above described a particular construction of magnet controlled locking device for the propelling motor controller, it is obvious that other forms of locks may be employed, for example, a locking dog 20 is shown in Fig. 3 which is connected to a piston 21 operating in a cylinder 22 and normally held raised out of engagement with the disk 5 or other part of the controller to be locked by means of a spring 23. When a pressure medium is admitted to the cylinder 22 the piston 21 is shifted in the cylinder against the action of spring 23 and in a direction to cause the dog 20 to engage controller member 5. This is the arrangement of parts shown in Fig. 3. The supply or exhaust of pressure medium to and from the cylinder 4 is controlled by the valve device 24 which in turn is connected to the core of a solenoid, the coil of which is indicated at 25. The circuit of this coil corresponds

exactly with the circuit of magnet 12 in the arrangement shown in Fig. 1. The operation is identically the same so far as the circuit arrangement is concerned, the magnet 25 operating to control the supply and exhaust of pressure medium to the lock cylinder 22, thereby controlling the locking dog 20. It is obvious that other forms of locking mechanism may be substituted for that shown in Figs. 1 and 3. When a pressure operated locking dog is employed the supply of pressure medium may be obtained from the brake system or from any other suitable or convenient source.

By including the reverse controller switches 17, 18, in the circuit of the electric device which controls the lock it will be observed that while these switches are normally closed, still should an emergency arise requiring the operator to reverse the propelling motor the reverse controller is operated which immediately opens the circuit at switches 17, 18, and hence insuring a release of the lock should the lock at the moment of the emergency be in locking position by opening the circuit of the lock controlling electrical device, thereby permitting the operator or motorman to manipulate a controller in reverse operations.

A door control locking mechanism of the character above described prevents the motorman from advancing the controller from its off position until all the doors or exits of the car or throughout a train of cars are closed, therefore the car is not permitted to move so long as a door remains open, thereby preventing accidents through premature starting of the car or train. It will also be seen that the locking structure is exceedingly simple. The member 5 of the controller with which the locking device cooperates may be any suitable or desired part of the controller connected to move with the controller handle or controller shaft and the ordinary star wheel employed in connection with controllers may well answer the purpose. The cost of manufacture of the locking apparatus is therefore very small as compared with structures at present in use for accomplishing the same purpose. Moreover, the consumption of current for operating the lock device is reduced to a minimum. Current flows in the circuit of the control device only so long as a door remains open. Since for the greater part of the travel of a car or a train of cars, that is, during the time of travel between stations or stopping points, the doors remain closed and consequently there is no current consumption in the circuit of the locking device. Since the structure is exceedingly simple and only a few parts are required which may be of rugged structure and capable of easily withstanding the usage to which the locking devices

are subjected the cost of maintenance of the equipment is reduced to a minimum. Likewise the cost of installation is exceedingly small. The parts of the locking mechanism in no way interfere with the operation of the car nor of the door or doors. Moreover, in the ordinary series system of control for locking devices the troubles arising from the resistance of contacts on low voltage systems are multiplied because of the large number of contacts employed in the series circuit. This trouble is reduced and practically eliminated by the system of coupling up the door switches in parallel relation to each other so that even if all of the doors are open and their corresponding switches are closed the resistance offered by one pair of contacts is not objectionable since the current path for completing the circuit of the door lock magnet is completed through some other pair of contacts. Consequently greater reliability is secured in service. Again, with present locking systems it is the custom to provide a switch in the propelling motor circuit which shunts the lock controlling system. In this case when an open circuit in the lock system occurs at the door switches in the contactor, slip rings, or other portions of the present devices, the danger is incurred of a premature starting of the car or train with a door remaining open, current supply to the motor being obtained through the shunt circuit. Such a possibility is eliminated in the system above described because it is unnecessary to employ such a shunt switch.

Having now set forth the objects and nature of my invention and a construction embodying the principles thereof what I claim as new and useful and of my own invention and desire to secure by Letters Patent is,—

1. In a locking mechanism for vehicles, a controller for the propelling power thereof, a lock for said controller operating when in action to lock said controller in off position, electrical devices for controlling said lock, and switches controlled by the doors on the vehicle, said switches being arranged in parallel and associated in the circuit of said electrical devices for independently operating the same.

2. In a locking mechanism for vehicles, a controller for the propelling power of the vehicle, a lock therefor, electrical devices for operating a lock to maintain the controller in its off position, a plurality of switches, each switch associated with a door on the vehicle, said switches being connected up in parallel relation to each other in the circuit of said electrical devices.

3. In a locking mechanism for vehicles, a controller for the propelling power of the vehicle, a lock therefor, electrical devices controlling said lock, a circuit for said elec-

trical devices, a switch associated with each door of the vehicle, said door switches being connected up in parallel relation with each other in said circuit whereby when any switch is closed by a door being opened said lock is applied to retain the controller in its off position.

4. In a locking mechanism for vehicles, a controller for the motive power of the vehicle, a lock therefor, electrical devices for controlling said lock, a circuit for said electrical devices, a series of door controlled switches arranged in said circuit, said door switches arranged in parallel circuit relation with respect to each other and operating when any door is open to close said circuit to apply the lock.

5. In a locking mechanism for vehicles, a controller for the motive power thereof, a locking member carried by said controller, a cooperating lock to engage said locking member to lock the controller in its off position, a magnet for controlling said lock, a circuit for said magnet, and door controlled switches arranged in parallel for controlling the circuit of said magnet.

6. In a system of locking mechanism for vehicles, a controller, a lock operating to

retain the controller in its off position, an electrical device to control said lock, and means controlled by all the doors of the system for controlling the circuit of said electrical device and operating when any door is open to complete said circuit to apply said lock.

7. In a system of lock control mechanism for vehicles, a controller for the propelling power of the vehicle, a locking device for locking said controller, means for operating said locking device, and a plurality of door operated switches arranged in parallel for rendering effective said lock operating means whenever any one of said switches is closed by its door being open.

8. In a door controlled locking mechanism for vehicles, a plurality of control switches arranged in parallel, a controller, means for locking said controller in off position, and means for rendering effective said locking mechanism through the agency of any one of said switches being closed.

In testimony whereof I have hereunto set my hand on this 10th day of June A. D., 1919.

ERNEST KELLER.