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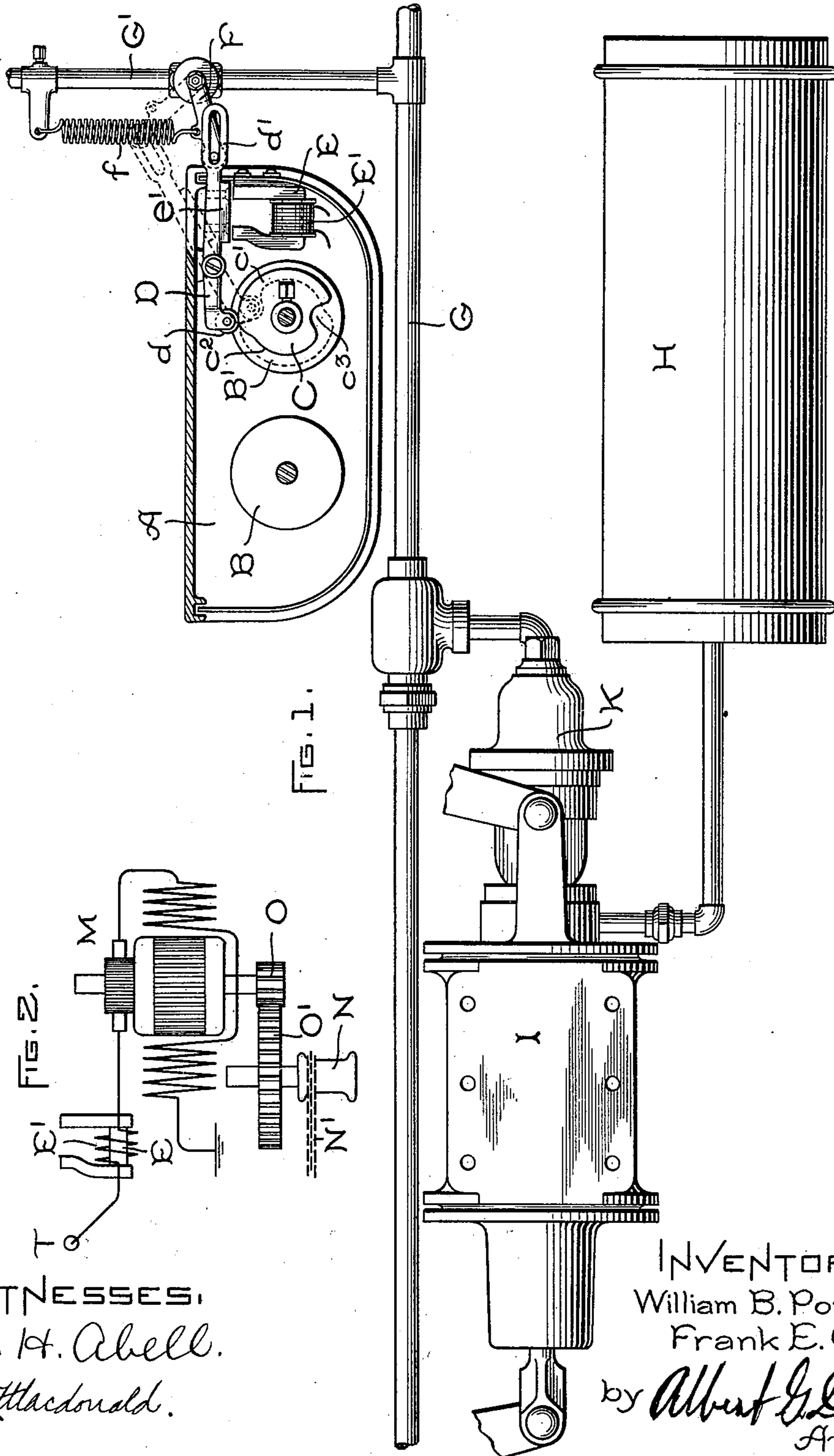
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W. B. POTTER & F. E. CASE.

MEANS FOR PREVENTING IMPROPER MANIPULATION OF AIR BRAKES.

(Application filed Aug. 29, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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MEANS FOR PREVENTING IMPROPER MANIPULATION OF AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 636,552, dated November 7, 1899.

Application filed August 29, 1898. Serial No. 689,747. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM B. POTTER and FRANK E. CASE, citizens of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Means for Preventing the Improper Manipulation of Air-Brakes, (Case No. 751,) of which the following is a specification.

10 The present invention has for its object to provide a device which shall prevent improper manipulation of air-brake apparatus upon an electrically-propelled vehicle or train. It is manifest that in those instances where an

15 electric brake is ordinarily used it would lead to complication and perhaps to accident to be employing the air-brake apparatus at the same time; and it is the object of the invention to provide interlocking means between

20 the electric brake and the air-brake apparatus such that the latter can be brought into action only when no current is flowing in the electric-brake apparatus. Such an arrangement is also provided that the air-brake can be

25 operated only after an attempt has been made to stop the train by the electric braking apparatus. Where trains or cars are operated with both classes of devices, the air-brake is ordinarily used as a reserve apparatus to be operated

30 only on those occasions when for any reason the electric brake fails. This is the better arrangement, because the air-brake is a consumer of energy from the central station, while the electric brake as ordinarily operated either

35 uses less energy where trolley-current is employed or in those instances where current from the motors operated as generators is used no energy whatever is taken from the central station. The interlock is therefore

40 so arranged that where the electric brake is operative the air-brake cannot be used; but when the former apparatus fails it releases the interlocking mechanism, so that the air-brake may then be employed. To effect this,

45 a stop is provided in the controlling device for the ordinary operating-lever of the air-brake and an electromagnetic detent operated by current-flow. If the brake be operated from the trolley, then the coil of the elec-

50 tromagnet would be in the trolley-circuit;

but if it be operated from any other source of power the coil would be included in the circuit of the latter.

The accompanying drawings show an arrangement within the invention, Figure 1 55 showing an air-brake apparatus and a controller with the top removed and the interlock in position, Fig. 2 being a diagram of circuits.

In Fig. 1, A is the controller, of which B B' 60 are the switch-cylinders. The controller is one of a type well known in the art, in which the cylinder B, for instance, would be used for regulating the propelling-motors and the cylinder B' for actuating the electric brake. 65 It is of course unimportant what type of controller is used, the invention being capable of use with any preferred form. Upon the latter cylinder is fixed the cam C, having the concentric portion c' , a second concentric portion c'' , of smaller radius, and a notch c^3 , the purpose of which will be presently explained. 70 Coöperating with the cam is the lever D, carrying the cam-roller d and having a slotted link connection d' with the lever F, by which 75 the air-brake is operated. The lever F is connected to a spring f . An electromagnet E, having a coil E' , acts through its armature e' to hold the lever D in the illustrated position.

The air-brake apparatus is well understood 80 and need only be briefly referred to. The pipe G' communicates with the train-pipe G and carries a valve, to which the lever F is connected. K is the triple valve, I the cylinder, and H the auxiliary reservoir. 85

The circuits of the apparatus are shown in Fig. 2 illustrated as applied to a trolley-operated brake. Nothing in the invention limits it, however, in this regard, and any convenient source of braking-current or any class of 90 electric braking apparatus may be employed. T is the trolley or source of current. E is, as before, the electromagnet. M is the motor, which is geared by pinion and gear O O' to a drum N, winding up the brake-chain N'. As 95 long as current flows in the coil E' of the electromagnet the lever D is held in its illustrated position and the lever F, controlling the air-brake mechanism, cannot be operated. When, however, the current fails in the coil E' , the 100

spring *f* draws up the lever *F* and depresses the cam-roller *d*. It is manifest that as long as the cylinder *B'*, carrying the cam *C*, remains in its illustrated position the lever *F* cannot move; but when the attempt is made to apply the electric brake the roller will follow the surface *c*² of the cam and turn on the air-brake, exhausting the train-pipe and throwing the braking apparatus into action in the ordinary way for a service-stop. Should the occasion be urgent, however, the motorman by turning the cylinder *B* until the notch *c*³ comes under the roller would open wider the air-release valve and apply the "emergency-stop," so called, of the air-brake, the parts then standing as shown in dotted lines. Thus if the electric braking apparatus be in order the air-brake will not be applied; but should the former for any reason fail the same motion by which the engineer or motorman ordinarily operates the electric brake will turn on the air-brake either to the ordinary or emergency position, according to the urgency of the case, without special attention on the part of the engineer.

The cam *C* is so constructed and arranged that when the brake-actuating current fails the cam-lever roller will engage with the cam at such a point that the air-brake is applied at that moment in the same degree as the service-brake. If a further movement of the brake-handle occurs, the air-brake is applied to degrees of effectiveness like those resulting from the application of the service-brake at like positions of the brake-handle.

It is manifest that other arrangements might be devised which would operate in the way outlined; but any device in which upon the failure of the service-brake a reserve-brake of any kind is automatically thrown into action would be within the scope of this invention.

What we claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination with a service-brake and a reserve-brake, of means whereby the failure of the former while in operation causes the setting of the latter.

2. The combination with a service-brake and a reserve-brake, of means whereby the failure of the former at any time causes the setting of the latter with the same degree of force exerted by the former at that time.

3. The combination of a service-brake mechanism having ordinary stop and emergency-stop positions, with a reserve-brake, and means for automatically throwing on the reserve-brake to the extent to which the service-brake has been actuated, if the latter for any reason, as by failure of power, ceases to act.

4. The combination of an electric brake and an air-brake, and means whereby the failure of one causes the setting of the other.

5. The combination with an electric brake, of an air-brake a device for operating each of the brakes in service and emergency posi-

tions, and means for preventing the operation of the air-brake until the electric brake has become inoperative.

6. The combination with an air-brake, of an electric brake, an actuating device for the two brakes, and means for preventing the actuation of the air-brake until the electric brake has become inoperative.

7. The combination with an air-brake, of an electric brake, an actuator for the electric brake, an actuator for the air-brake, and interlocking mechanism between the devices, such that the air-brake will be operated when the electric brake becomes inoperative.

8. The combination of an electric brake and an air-brake in the same apparatus, and interlocking means between the brakes preventing the manipulation of the air-brake until the electric brake becomes inoperative.

9. The combination in the same apparatus, of an electric brake and an air-brake, means for operating the electric brake, and means made operative by the failure of current in the electric-brake circuit for operating the air-brake.

10. The combination with an electric-brake apparatus and a suitable controlling device, of an air-brake apparatus, and an operating-lever therefor, with an electromagnetic stop for the air-brake lever, controlled by the current in the electric-brake circuit.

11. The combination, in a braking apparatus, of an electric-brake switch, an air-release valve, and a cam on the switch determining by its position the extent to which the valve may be actuated.

12. The combination in a braking apparatus, of an electric-brake switch, an air-release lever, and a cam on the switch for determining the throw of the lever, having a "service-stop" position and a notch, *c*³, permitting a greater throw of the valve-lever, and constituting an "emergency-stop."

13. The combination with an electric service-brake, and a reserve-brake, of an actuator for said electric brake normally disconnected from said reserve-brake, and means whereby the cessation of supply-current to the electric brake effects an operative connection between said reserve-brake and the actuator.

14. The combination with an electric service-brake, of a reserve-brake, an actuator normally adapted to operate either brake, and an electromagnet in the electric-brake-supply circuit which is adapted to maintain said actuator disconnected from said reserve-brake while current flows to said electric brake.

15. The combination with an electric service-brake, of a reserve-brake, an actuator normally adapted to operate either brake, and means for preventing the operation of the reserve-brake while there is a current-supply for the electric brake.

16. The combination with a service-brake, of a reserve-brake, an actuator normally

adapted to operate either brake, and means for preventing the operation of the reserve-brake during the operation of the service-brake.

- 5 17. The combination with an electric service-brake, of a reserve-brake, an actuator for the electric brake, and means whereby the failure of current supplied to the electric brake causes said actuator to operate the re-
10 serve-brake with a degree of force corresponding to that which the electric brake exerted when the current-supply failed.

In witness whereof we have hereunto set our hands this 26th day of August, 1898.

WILLIAM B. POTTER.
FRANK E. CASE.

Witnesses as to signature of William B. Potter:

B. B. HULL,
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Witnesses as to signature of Frank E. Case:

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A. F. MACDONALD.