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F. E. CASE.

POWER OPERATED BRAKE.

APPLICATION FILED JUNE 9, 1904.

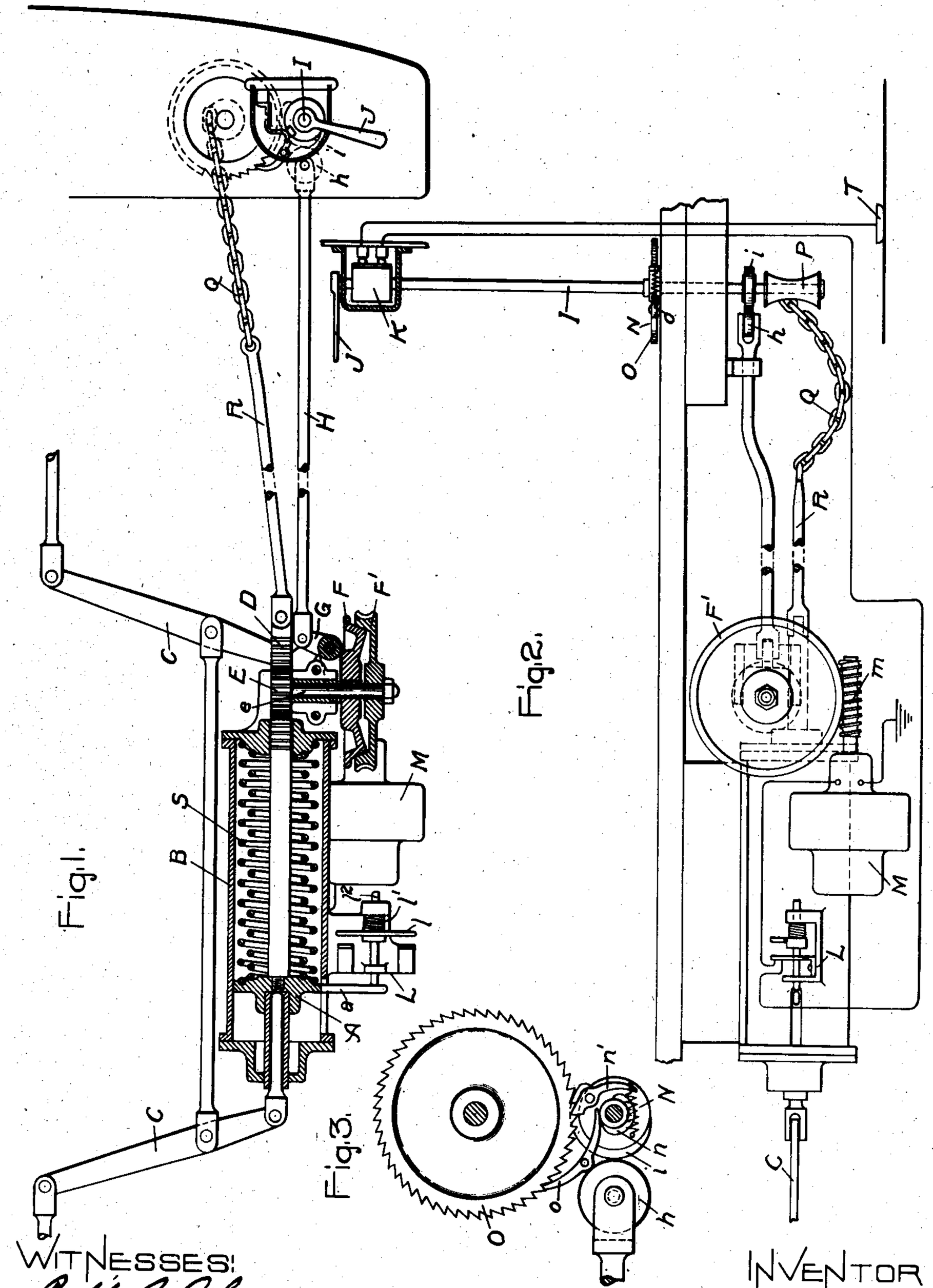

Fig. 1.

Fig. 2.

Fig. 3.

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POWER-OPERATED BRAKE.

No. 834,107. Specification of Letters Patent. Patented Oct. 23, 1906.

Application filed June 9, 1904. Serial No. 211,754.

To all whom it may concern:

Be it known that I, FRANK E. CASE, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Power-Operated Brakes, of which the following is a specification.

My invention relates to brakes for vehicles; and its object is to provide a simple, reliable, and powerful brake which is particularly applicable for use on electrically-propelled vehicles.

On high-speed electric cars in order to insure safety of operation it is necessary to employ more powerful brakes than such as can be manually applied. The use of compressed air for the braking mechanism, however, greatly increases the expense of the brakes, and in case of the failure of the air-compressor manually-operated brakes must be relied upon.

By my invention I provide a power-operated brake comprising a powerful spring tending to apply the brakes and power-operated means for compressing the spring to release the brake. I furthermore provide manually-controlled means for releasing the brakes in case of the failure of the power-operating means. The application of the brakes, however, is at all times controlled by the spring and is in no way dependent for its effectiveness upon the operative condition of the power-operated means.

My invention will best be understood by reference to the accompanying drawings, in which—

Figure 1 shows a plan view of a braking mechanism arranged in accordance with my invention. Fig. 2 shows an elevation of the same, and Fig. 3 shows a detail view of the auxiliary manually-operated releasing means.

In the drawings, A represents a cross-head or piston arranged to reciprocate within the guides or cylinder B.

S is a powerful compression-spring which tends to move the cross-head A toward the left, so as to move the levers C C to apply the brakes. The cross-head or piston A is provided with a piston-rod D, which is formed with gear-teeth at its end which are engaged by the pinion E, mounted on the shaft *e*. The shaft *e* has keyed to it one member F of a friction-clutch. The other member F′ of the clutch is loosely journaled on the shaft *e*. The member F′ is provided with gear-teeth on its periphery which are engaged by a worm *m* on the shaft of the electric motor M. Thus when the two members F F′ of the friction-clutch are in engagement and the motor M is energized the piston A will be moved toward the right, compressing spring S and releasing the brakes. The member F of the friction-clutch is arranged to be axially moved on the shaft *e* by the bell-crank lever G, controlled by the rod H. The rod H carries at its other end a roller *h*, which bears against a cam *i* on the shaft I, which is provided with a handle J. By reciprocating handle J rod H may be pushed longitudinally to bring the two members of the friction-clutch into engagement or may be allowed to move in the opposite direction to release the clutch. The shaft I also carries a controller K, which in the position shown completes a circuit from the trolley T or other source of current to the switch L, which controls the circuit of motor M. The switch L comprises two stationary contacts and the movable contact *l*, which is provided with the compression-spring *l′*, tending to move it into engagement with the stationary contact, and is also provided with a rod or spindle l^2, arranged to be engaged by an arm *a*, projecting from the piston A through a slot in the cylinder B. When controller K is in the position shown and the movable contact *l* is in engagement with its stationary contacts, the motor-circuit is closed from trolley T to earth, and the motor is thereby energized to release the brakes. The shaft I also carries a plate N, provided with a cam *n* and a spring-pressed pawl *n′*. The spring-pressed pawl *n′* engages a toothed wheel O when the controller is in the position shown. The cam *n* is arranged to engage a second pawl *o* when the shaft I is reciprocated and to force the pawl *o* out of engagement with the toothed wheel O. The toothed wheel O carries on its shaft a drum P, which is connected by a chain Q to a rod R, which engages the piston-rod D. During normal operation of the brakes the chain Q is left hanging loosely, as shown in Fig. 2, and performs no part in the operation of the brakes. It comes into operation only when the power fails and the brakes must be manually released, as will be hereinafter explained.

The operation is as follows: With the controller in the position shown the motor-circuit has been closed to move piston A toward the right, compressing spring S until the point was reached at which the arm *a*, carried by piston A, engaged spindle l^2 and opened the circuit of motor M at the switch L. This represents the normal running position of the several parts. The two members F F′ of the friction-clutch are held in engagement with the handle J in this position by cam *i* and roller *h*. Now if it is desired to apply the brakes the handle J is rotated in a clockwise direction, as viewed in Fig. 1. The rod H is thus allowed to move forward to release member F from member F′. The shaft *e* and its pinion E are consequently free to revolve, and piston A is moved quickly toward the left by spring S, giving a powerful application of the brakes. At the same time movable contact *l* is pressed into engagement with the stationary contacts by the spring *l*′. When it is desired to release the brakes, handle J is returned to the position shown. The circuit of motor M is then closed, since switch L is in its closed position. The two members of the friction-clutch are also restored to engagement with each other. The motor M consequently starts, driving the pinion E through the friction-clutch and moving piston A to the right, compressing spring S. This continues until switch L is opened by the arm *a* engaging the spindle l^2.

Should it be found that the power has failed after an application of the brakes, the brakes may be released manually, as follows: By pushing handle J in a counter-clockwise direction, as viewed in Fig. 1, the spring-pressed pawl *n*′ (shown in Fig. 3) rotates toothed wheel O, thereby rotating drum P and tightening chain Q. The pawl *o* prevents a backward movement of the toothed wheel, while handle J is moved back to repeat the operation. Thus the toothed wheel may be rotated step by step, drawing rod R forward and compressing spring S and releasing the brakes. After the brakes have thus been released manually if it is desired to again apply them the application is accomplished in the same manner as has been heretofore described. By moving the handle J in a clockwise direction the cam *n* is brought into engagement with the pawl *o*, rocking it out of engagement with the toothed wheel O. The pawl *n*′ is rotated out of engagement with the toothed wheel O by the rotation of the plate N. The drum P is thus released and the piston is free to move under the influence of the spring. Thus with this arrangement a quick and powerful application of the brakes may be at all times obtained and failure of the power-operated means has no effect upon the efficiency of the application.

Many modifications in the construction and arrangement of parts will be obvious to those skilled in the art, and I aim in the appended claims to cover all such modifications which are within the scope of my invention.

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

1. In a vehicle, in combination with the brakes, a spring for applying the brakes, a motor for releasing the brakes, a clutch between said motor and said spring, a motor-controller, and a single handle for governing the operation of said clutch and said controller.

2. In a vehicle, in combination with the brakes, a spring for applying the brakes, a power-operated motor for releasing the brakes, a clutch between said motor and said spring, and manually-controlled means for disengaging said clutch to allow the spring to apply the brakes and for engaging said clutch and energizing said motor to release the brakes.

3. In a vehicle, in combination with the brakes, a spring for applying the brakes, a power-operated motor for releasing the brakes, a clutch between said motor and said spring, manually-controlled means for disengaging said clutch to allow the spring to apply the brakes and for engaging said clutch and energizing said motor to release the brakes, and automatic means for deënergizing said motor when the brakes are released.

4. In a vehicle, in combination with the brakes, a spring for applying the brakes, an electric motor for releasing the brakes, a clutch between said motor and said spring, a manually-controlled switch for energizing said motor, and an automatic switch for breaking the motor-circuit when the brakes are released.

5. In a vehicle, in combination with the brakes, a spring for applying the brakes, a power-operated motor for releasing the brakes, a clutch between said motor and said spring, and auxiliary manually-operated means for releasing the brakes.

6. In a vehicle, in combination with the brakes, a spring for applying the brakes, a power-operated motor geared to said spring and adapted to strain said spring to release the brakes, auxiliary manually-operated means for straining said spring to release the brakes, and means for releasing said spring to apply the brakes.

7. In a vehicle, in combination with the brakes, a spring for applying the brakes, a power-operated motor geared to said spring and adapted to strain said spring to release the brakes, auxiliary manually-operated means for straining said spring to release the brakes, and means controlled by a single handle for releasing said spring from both the power-operated and manually-operated straining means to apply the brakes.

8. In a vehicle, in combination with the

brakes, a spring for applying the brakes, a power-operated motor for releasing the brakes, auxiliary manually-operated means for releasing the brakes, a manually-controlled shaft, and two cams carried thereby and arranged to release said spring from the power-operated and the manually-operated brake-releasing means respectively.

9. In a vehicle, in combination with the brakes, a spring tending to apply the brakes, a power-operated motor for releasing the brakes, auxiliary manually-operated means for releasing the brakes, and a manually-controlled shaft arranged in one position to release said spring to apply the brakes, in another position to energize said motor to release the brakes, and by successive movements to a third position to operate said auxiliary brake-releasing means.

10. In a vehicle, in combination with the brakes, a spring tending to apply the brakes, means for restraining the brakes in release position, means for disengaging the brakes from the restraining means, a power-operated motor geared to the brakes and adapted when energized to restore them to release position, and automatic means for deënergizing said motor when the brakes are in release position.

11. In a vehicle, in combination with the brakes, a spring tending to apply the brakes, means for restraining the brakes in release position, means for disengaging the brakes from the restraining means, a power-operated motor geared to the brakes and adapted when energized to restore them to release position, and auxiliary manually-operated means for moving the brakes to release position.

12. A braking mechanism for vehicles comprising a braking-spring, a reciprocating bar for compressing the same and a motor having a rotating armature for reciprocating the said bar.

13. A braking apparatus for vehicles comprising a tension-spring, a reciprocating rod for compressing the same, a rack carried by the said rod, a pinion engaging the rack and a motor for rotating the pinion and reciprocating the rack in compressing the spring.

14. A braking mechanism for vehicles comprising a brake-rigging, a braking-spring, a reciprocating compressing member interposed between the said rigging and the said spring and electrically-rotated member for reciprocating the said rod.

15. A braking mechanism comprising a brake-rigging, a braking-spring, an abutment engaging one end of the spring, a reciprocating member engaging the other end of the spring, levers connecting said reciprocating member with the brake-rigging an electric motor and a rotating member actuated by the said motor for actuating the reciprocating member.

16. A braking mechanism for vehicles comprising a brake-applying spring, brake-rigging connected with the same, a reciprocating member connecting with the brake-rigging and capable of compressing said spring, a motor having a rotating armature for actuating the spring-compressing member and hand-operated mechanism also connected with the compressing member for compressing the spring or preventing the release of the brakes.

In witness whereof I hereunto set my hand this 8th day of June, 1904.

FRANK E. CASE.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.