

No. 719,566.

PATENTED FEB. 3, 1903.

F. E. CASE.
ELECTRIC BRAKE.

APPLICATION FILED JULY 31, 1899.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

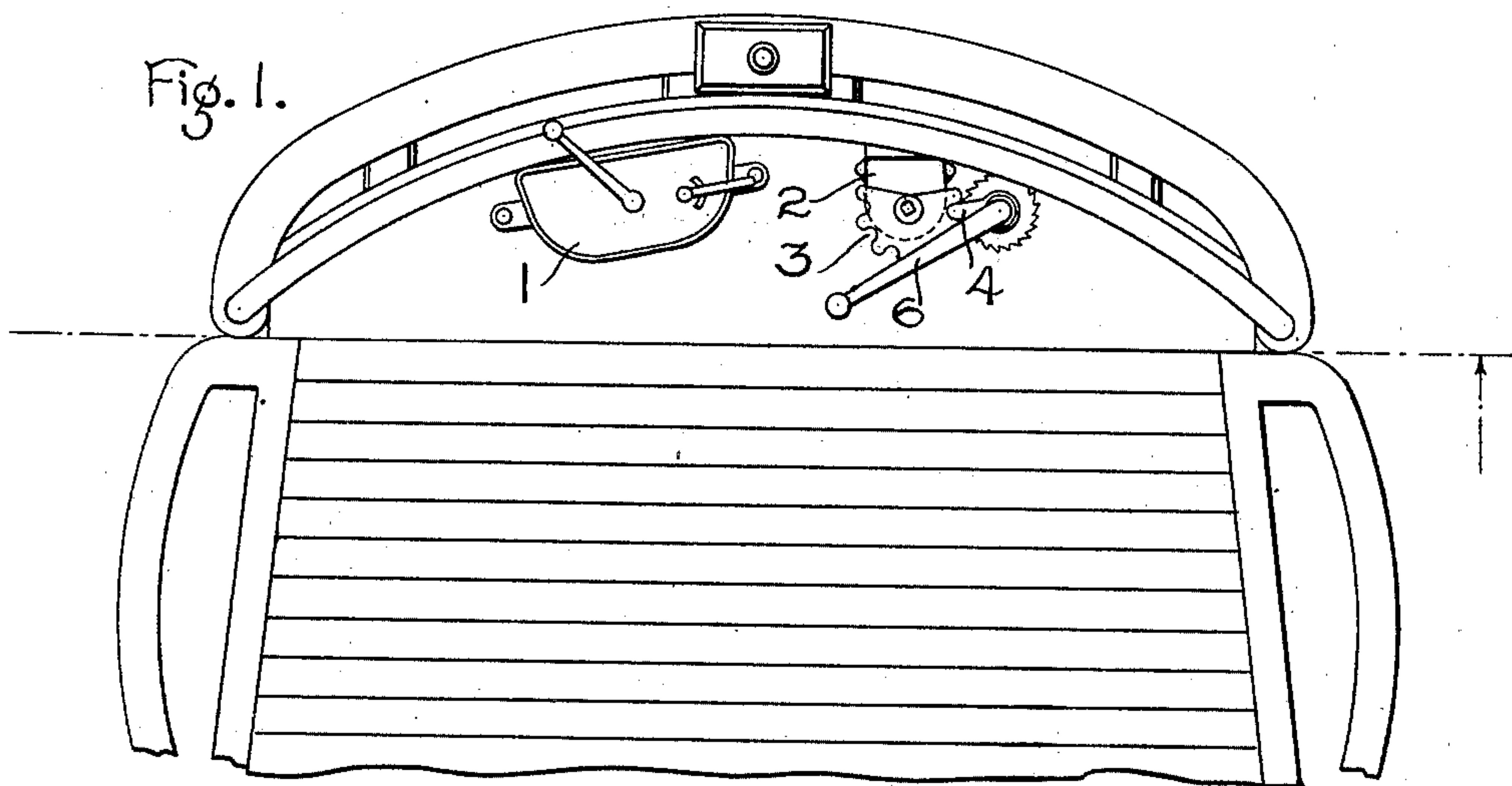
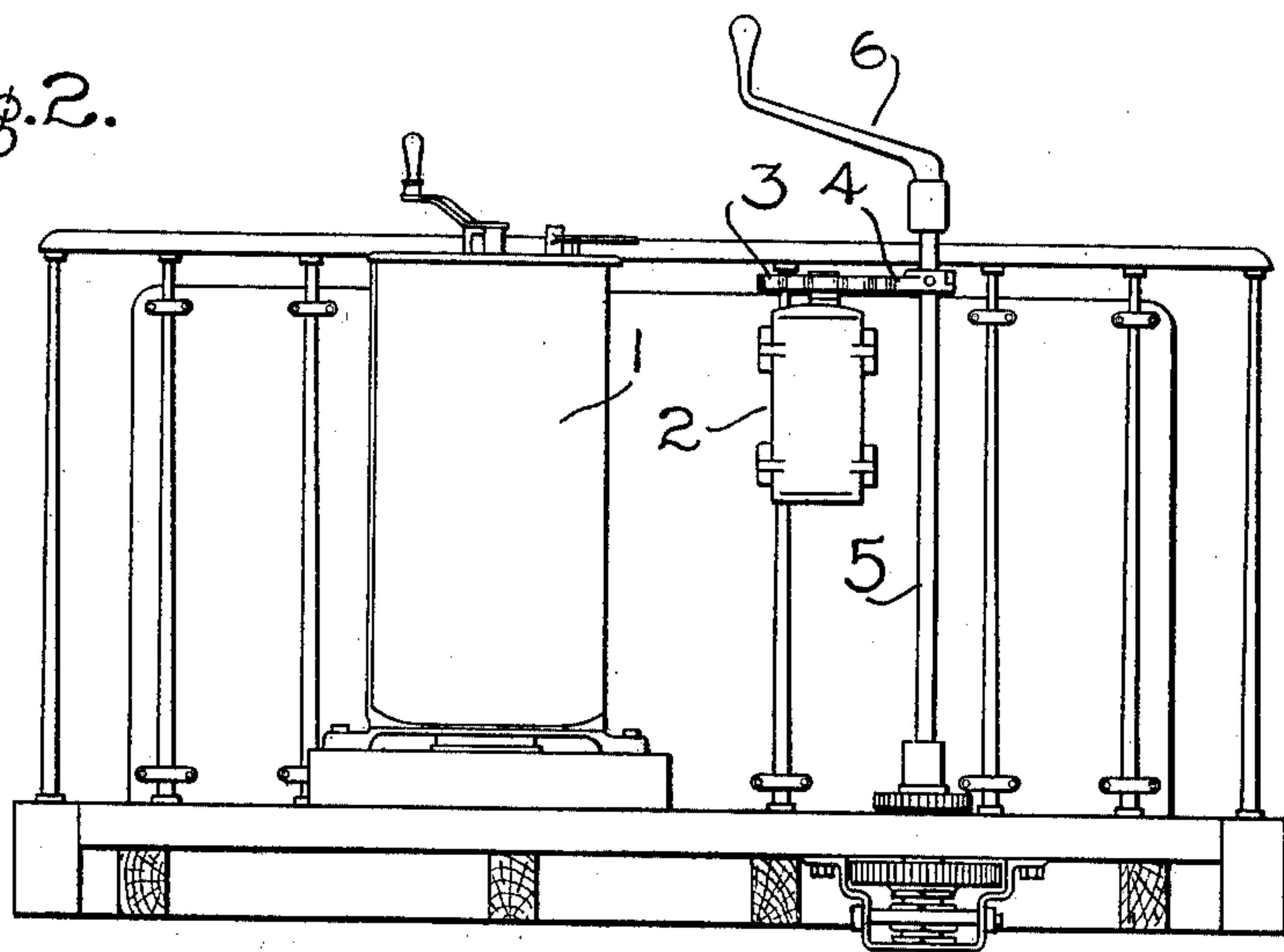


Fig. 2.



Witnesses.

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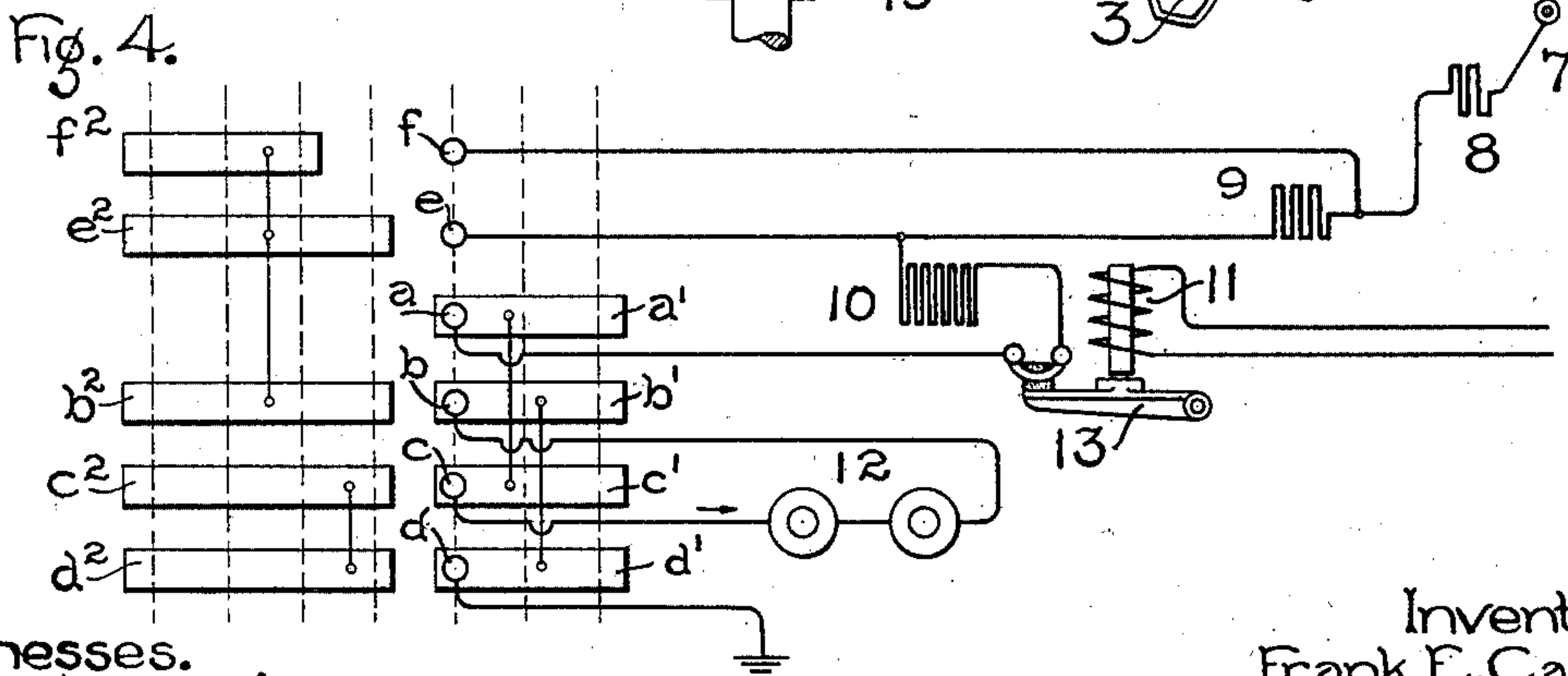
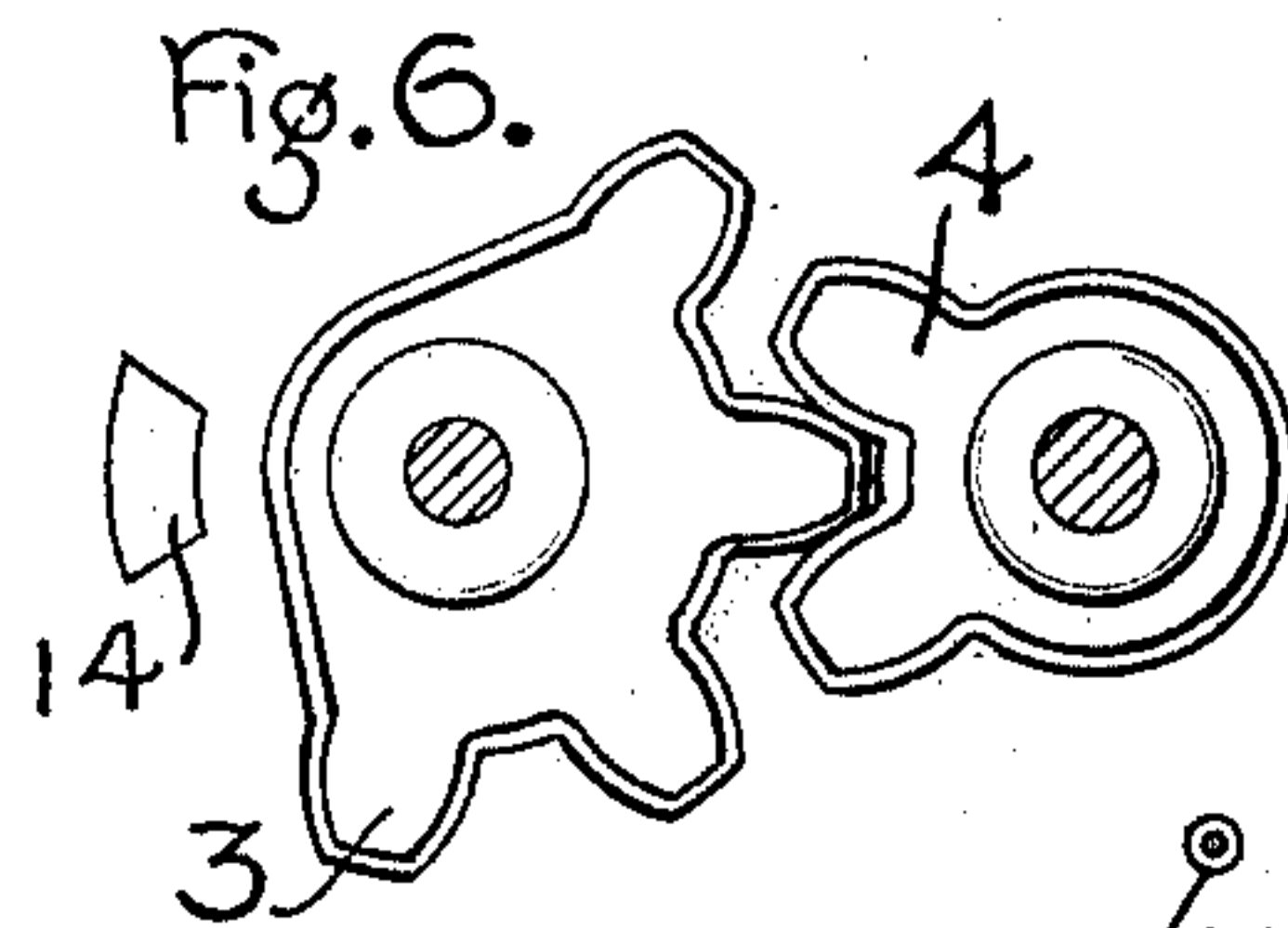
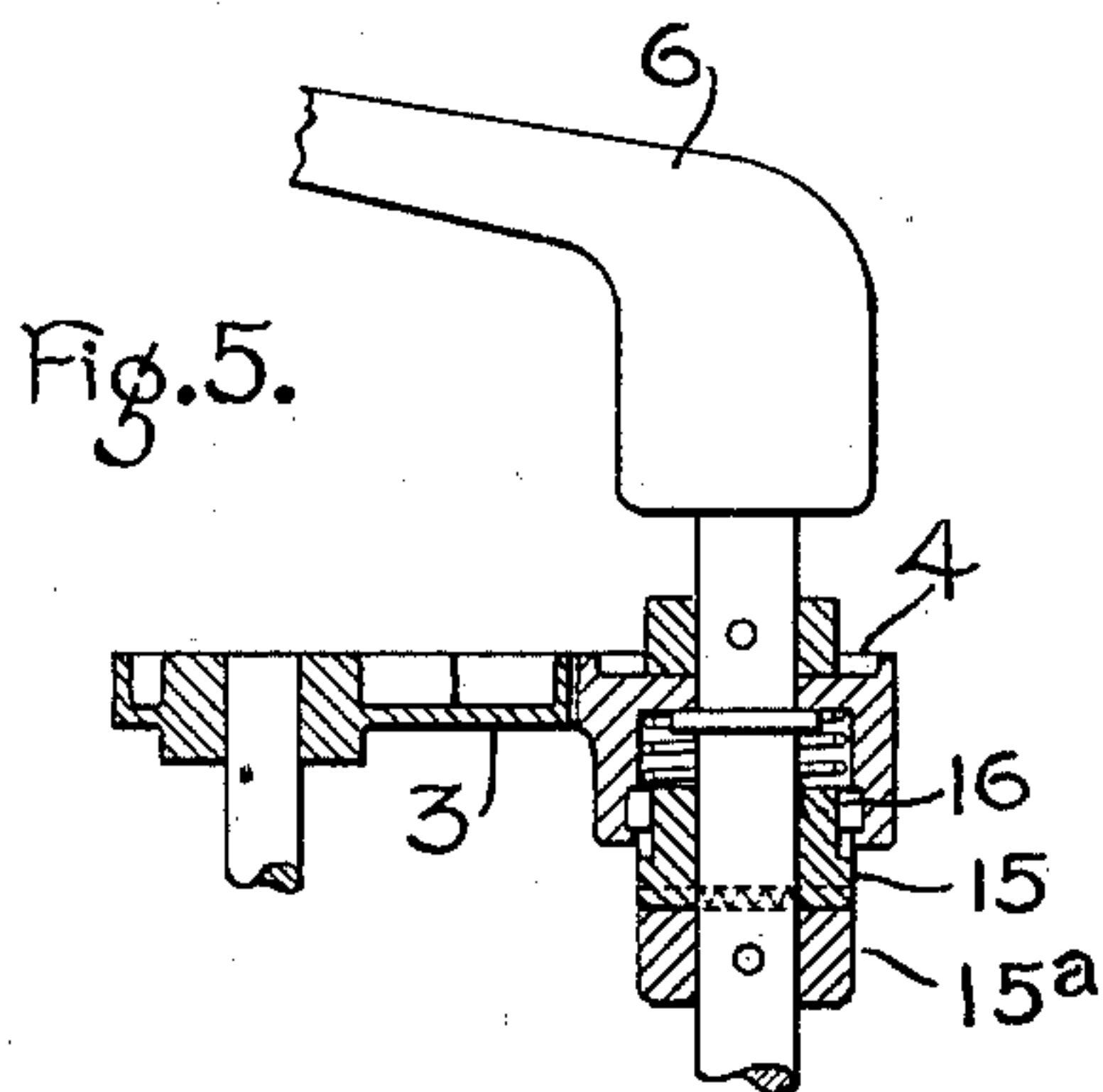
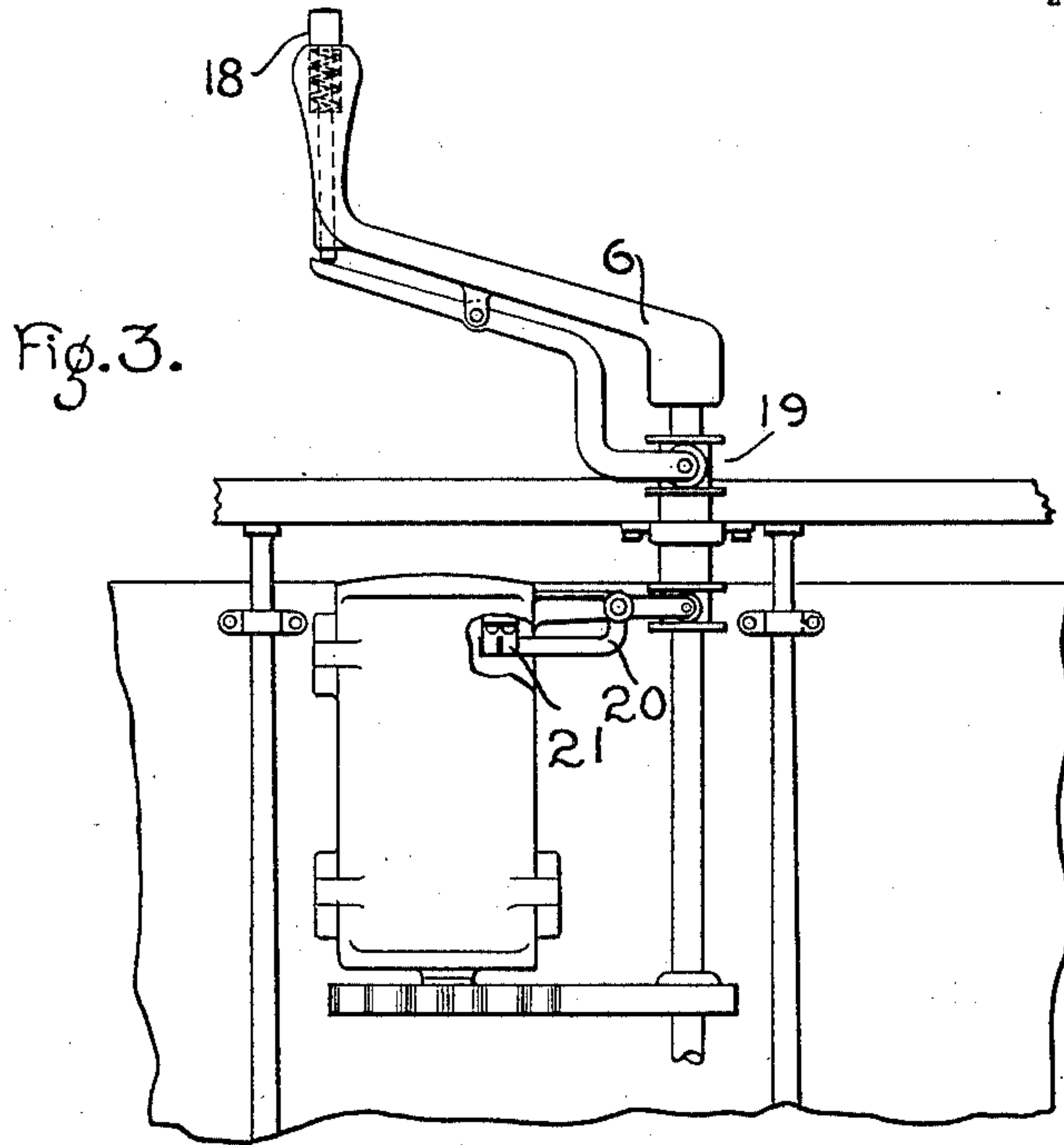
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UNITED STATES PATENT OFFICE.

FRANK E. CASE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC BRAKE.

SPECIFICATION forming part of Letters Patent No. 719,566, dated February 3, 1903.

Application filed July 31, 1899. Serial No. 725,590. (No model.)

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 Electric Brakes, (Case No. 853,) of which the following is a specification.

The object of my present invention is to provide a mechanical and an electrically-operated brake which will permit independent control of the movements of a car by either system of operation and by the same controlling handle or lever, thereby avoiding mistakes due to confusion of the motorman in critical emergencies and rendering the control of the car more flexible than is possible by either system used alone.

In carrying out my invention I provide a spindle or shaft on a car or vehicle platform, by turning which the electric brakes are first set with progressively-increasing power and simultaneously the slack of the hand-operating chain is taken up, and by a continued movement of the operating device through a greater angular range the mechanical brakes are set. I provide also means for interrupting the electric-brake circuit at will, thereby permitting either the mechanical or the electric brakes to be used alone when desired. This provision is of special advantage in permitting short and quickly-modulated applications of the hand-brake by the motorman when closely following another vehicle along the track or when moving through a crowded thoroughfare.

In the accompanying drawings, which illustrate my invention, Figure 1 is a top plan view of a car-platform provided with my improved brake-controlling device. Fig. 2 is a front elevation of the same. Fig. 3 is a front elevation of a modification, showing a means of discontinuing the application of the electric brake, if desired, when the hand-brake is in use. Fig. 4 is a diagram of the controlling-circuits. Fig. 5 is a sectional detail showing the operating-gearing for the brake-controller. Fig. 6 is a detail plan view of said gearing.

1 represents the power-controller, and 2 the electric-brake controller, of a system embodying my improvements. The contact-cylinder of the electric-brake controller is connected

to the shaft 5 by a gearing comprising a gear-sector 4, mounted on the shaft and intermeshing with a gear 3, connected to the contact-cylinder. In the construction shown in the drawings a stop is provided for limiting the movement of the contact-cylinder. The gear 3 may therefore be a sector merely, and I have so shown it in the drawings. The sector 4 is provided with two teeth, although evidently it may have any desired number, depending upon the desired ratio between the turns of the operating-handle and the movement of the contact-cylinder of the brake-controller. With the arrangement shown in Fig. 6 the sector 3 will be moved through two teeth, corresponding to four controller-steps, for each rotation of the operating-handle 6. The cylinder of the brake-controller is provided with contacts operating first to close the brake-circuit through a resistance and then to gradually increase the strength of the current in the brake-circuit by cutting out this resistance as the contact-cylinder is rotated. Other contacts operate in the zero position of the brake-controller to reversely connect the brake-shoes in a circuit which is automatically closed by the power-controller 1 in its first operative position.

The circuit connections will be understood from an examination of the diagram Fig. 4, in which 7 represents the trolley or current-collector, 8 a permanent current-reducing resistance, and 9 and 10 resistances progressively cut out of circuit to intensify the force of application of the electric brakes as the brake-controller is operated. The diagram shows the contacts of the brake-controller cylinder developed on a plane surface, as is customary in diagrammatically illustrating such structures. The controller-contacts are shown in the position corresponding to the gear position illustrated in Fig. 6, the brake-shaft having been moved forward far enough to take up a part of the slack in the brake-chain, but not far enough to bring the electric brake into action. As the brake-shaft is moved still farther in right-handed rotation the fixed contacts b to f , inclusive, pass out of engagement with the contacts a' to b' and into engagement with the contacts b^2 to f^2 , thereby closing the electric-brake circuit

as follows: from trolley 7 through resistance 8 and resistance 9 to fixed contact *e*, thence by way of cross-connected movable contacts *e*² and *b*² to contact *b*, through the brake-shoes 12 to contact *c*, and thence by way of cross-connected contacts *c*² *d*² and fixed contact *d* to ground. A further movement of the brake-controller cylinder operates to bring the fixed contact *f* into engagement with the contact *f*², thereby short-circuiting the resistance 9, the other circuit connections remaining the same as before. After this point in the movement of the brake-controller cylinder has been reached a further movement of the brake-handle operates only to tighten the brake-chain and apply the mechanical brakes, the contacts of the brake-controller moving with the brake-handle, but without changing the circuit connections, until the sector 3 is brought into engagement with a stop 14. This stop limits the movement of the brake-controller cylinder; but the operating-handle may still be turned, a slip connection being provided between the shaft and the sector 4, as shown in detail in Fig. 5.

The slip connection may be of any convenient form, that shown comprising two clutch-sleeves 15 15^a, provided with serrated edges, as indicated in dotted lines, one fixed to the shaft and the other movable thereon, but held by a spring 16 in engagement with the fixed sleeve 15^a and being secured by a spline or feather to the gear-sector 4. Thus when the gear-sector 3 is brought into engagement with the stop 14 in either direction of movement of the brake-controller the movement of the sector is arrested, and thereafter the movable sleeve 15 is forced to ride over the correspondingly-serrated sleeve 15^a. As the brake-handle is moved in the reverse direction to release the brakes the controller-contacts are immediately operated in the reverse order, and when the position shown in the drawings is reached the brake-shoes are reversely connected in a circuit which at the proper time is connected with the source through an electromagnetically-actuated contact. This latter contact is closed by the power-controller as the latter is operated, thus demagnetizing the brake-shoes. The operation of the electromagnetically-actuated contact in the demagnetizing-circuit is accomplished by contacts on the power-controller, which operate to close the circuit through the coil 11, which operates a circuit-breaker 13 when current is first thrown into the motor-circuits. The circuit-breaker is of course provided with the usual arc-rupturing devices for insuring the safety of the contact.

The demagnetizing-circuit may be traced as follows: from the trolley 7 through the resistances 8, 9, and 10 in series, through the bridging contact of the circuit-breaker 13 to the fixed contact *a* of the brake-controller, thence by way of cross-connected contacts *a*' and *c*' and fixed contact *c* through the brake-

controlling coils in the direction indicated by the arrow to fixed contact *b*, thence by way of cross-connected contacts *b*' and *d*' and fixed contact *d* to ground. As the brake-handle is turned backward to release the brakes the electric-brake controller is immediately actuated to open the brake-circuit; but in order to permit the electric brake to be released before the tension on the brake-chain is reduced or to be thrown out of action at any time when the motorman desires to use the hand-brake only I provide a device on or near the handle for opening the brake-circuit independently of the position of the handle or of the brake-controller. A convenient construction comprises a push-pin 18, passing through the handle and normally supported by a coil-spring capable of engaging a lever when depressed and raising a sleeve 19 in sliding relation to the brake-staff, which connects with a switch or cut-out 20 in circuit making and breaking relation to a terminal 21 in circuit with the brake-coils.

It will thus be seen that a hand-operated emergency system is provided controlled by the same direction of hand movement and independently or simultaneously with the electric brake, rendering the contingency very remote when accidental conditions will disable a car from brake control. The safety factor is greatly increased by this combination, as no confusion can result to the motorman from independent and separately-controlled devices, and he does not have to stop to think what lever ought to be operated.

While I have described in the foregoing specification a certain specific embodiment of my invention, it will be evident that many modifications may be made without departing from the spirit and scope of my invention. Also it will be understood that certain of the features of my invention may be used in any brake system employing both electrical and mechanical brakes whatever may be the construction and arrangement of the apparatus employed.

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

1. In combination, an electric brake, a mechanical brake, a common handle for actuating them, and means for releasing the electric brake irrespective of the position of said handle.

2. In combination, an electric brake, a mechanical brake, a common handle for actuating them, and means controlled from said handle for releasing the electric brake without releasing the mechanical brake.

3. In combination, an electric brake, a mechanical brake, a common handle for actuating them, and means controlled from said handle for throwing the electric brake out of action without releasing the mechanical brake.

4. In combination, an electric brake, a mechanical brake, a common handle for actuating them, and means controlled from said

handle for opening the electric-brake circuit without releasing the mechanical brake.

5. In combination, an electric brake, a mechanical brake, a common handle for actuating them, and means controlled from the handle but independent of the position of the same for releasing the electric brake.

6. In combination, an electric brake, a mechanical brake, a common handle for actuating them, and means controlled from the handle but independent of the position of the same for opening the electric-brake circuit.

7. In combination, an electric brake, a mechanical brake, a common handle for actuating them, a switch in the electric-brake circuit, and means carried by the actuating-handle for operating said switch.

8. In combination, an electric brake, a mechanical brake, a shaft operatively connected to the mechanical brake, a brake-controller geared to said shaft, a stop for limiting the movement of said controller, and a slip connection for said gearing.

9. In combination, an electric brake, a mechanical brake, a shaft operatively connected to the mechanical brake, a handle therefor, a brake-controller geared to said shaft, a stop for limiting the movement of said controller, and a slip connection between said shaft and the gearing.

10. In combination, an electric brake, a mechanical brake, a shaft operatively connected to the mechanical brake, a controller for the electric brake, and a connecting-gearing comprising a gear-wheel connected to the controller and a cooperating gear-wheel connected to the shaft.

11. In combination, an electric brake, a mechanical brake, a shaft operatively connected to the mechanical brake, a controller for the electric brake, a connecting-gearing comprising a gear-wheel connected to the controller and a cooperating gear-wheel connected to the shaft, a stop for limiting the movement of said controller, and a slip connection for said gearing.

12. In combination, an electric brake, a mechanical brake, a shaft operatively connected to the mechanical brake, a controller for the electric brake, and a connecting-gearing comprising a gear or portion of a gear connected to the controller and a cooperating gear-sector connected to the shaft.

13. In combination, an electric brake, a me-

chanical brake, a shaft operatively connected to the mechanical brake, a controller for the electric brake, a gearing between said controller and said shaft, and means independent of the controller for releasing the electric brake.

14. In combination, an electric brake, a mechanical brake, a shaft operatively connected to the mechanical brake, a controller for the electric brake, a gearing between said controller and said shaft, and means independent of the controller for opening the electric-brake circuit.

15. In combination, an electric brake, a mechanical brake, a shaft operatively connected to the mechanical brake, a handle thereon, a controller for the electric brake, a gearing between the said controller and said shaft, and means controlled from the handle for releasing the electric brake.

16. In combination, an electric brake, a mechanical brake, a shaft operatively connected to the mechanical brake, a handle thereon, a controller for the electric brake, a gearing between the said controller and said shaft, and means controlled from the handle for opening the electric-brake circuit.

17. In combination, an electric brake, a mechanical brake, a shaft operatively connected to the mechanical brake, a handle thereon provided with a movable member, a controller for the electric brake, a gearing between the controller and the shaft, a switch in the electric-brake circuit, and mechanism operatively connecting said switch to the movable member on the said handle.

18. A vehicle - brake provided with two brake-applying devices, one electric and the other mechanical, both controlled by the same operating-handle, and means for applying them independently or together.

19. A vehicle - brake provided with two brake-applying devices, one electric and the other mechanical, both controlled by the same operating-handle, means for applying them in the order stated, and a cut-out for releasing the electric brake independently of the mechanical brake.

In witness whereof I have hereunto set my hand this 18th day of July, 1899.

FRANK E. CASE.

Witnesses:

A. NUTTING,

H. D. JAMESON.