

(No Model.)

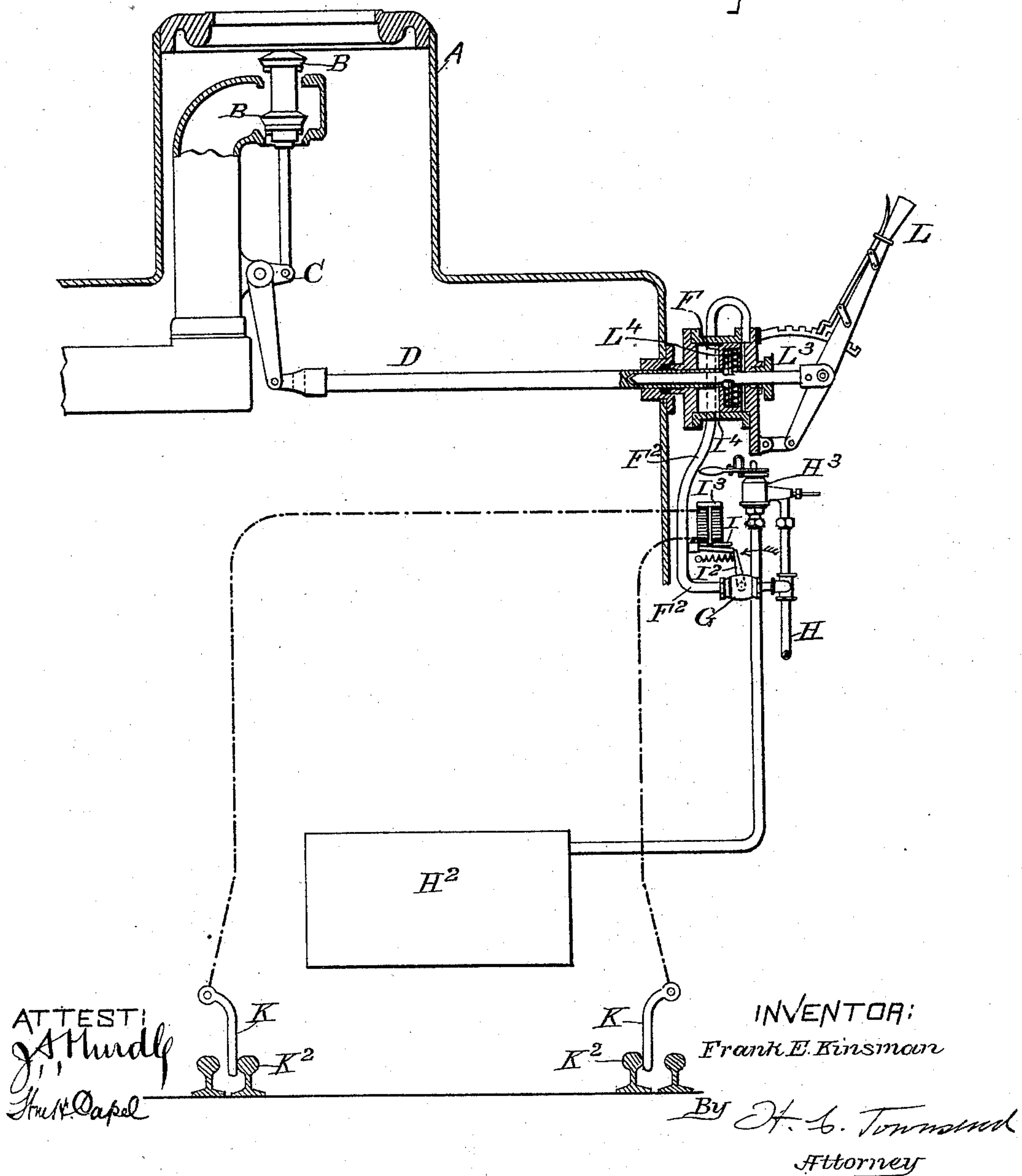
3 Sheets—Sheet 1.

F. E. KINSMAN.  
ELECTRIC TRAIN CONTROLLING APPARATUS.

No. 492,402.

Patented Feb. 28, 1893.

Fig. 1.



(No Model.)

3 Sheets—Sheet 2.

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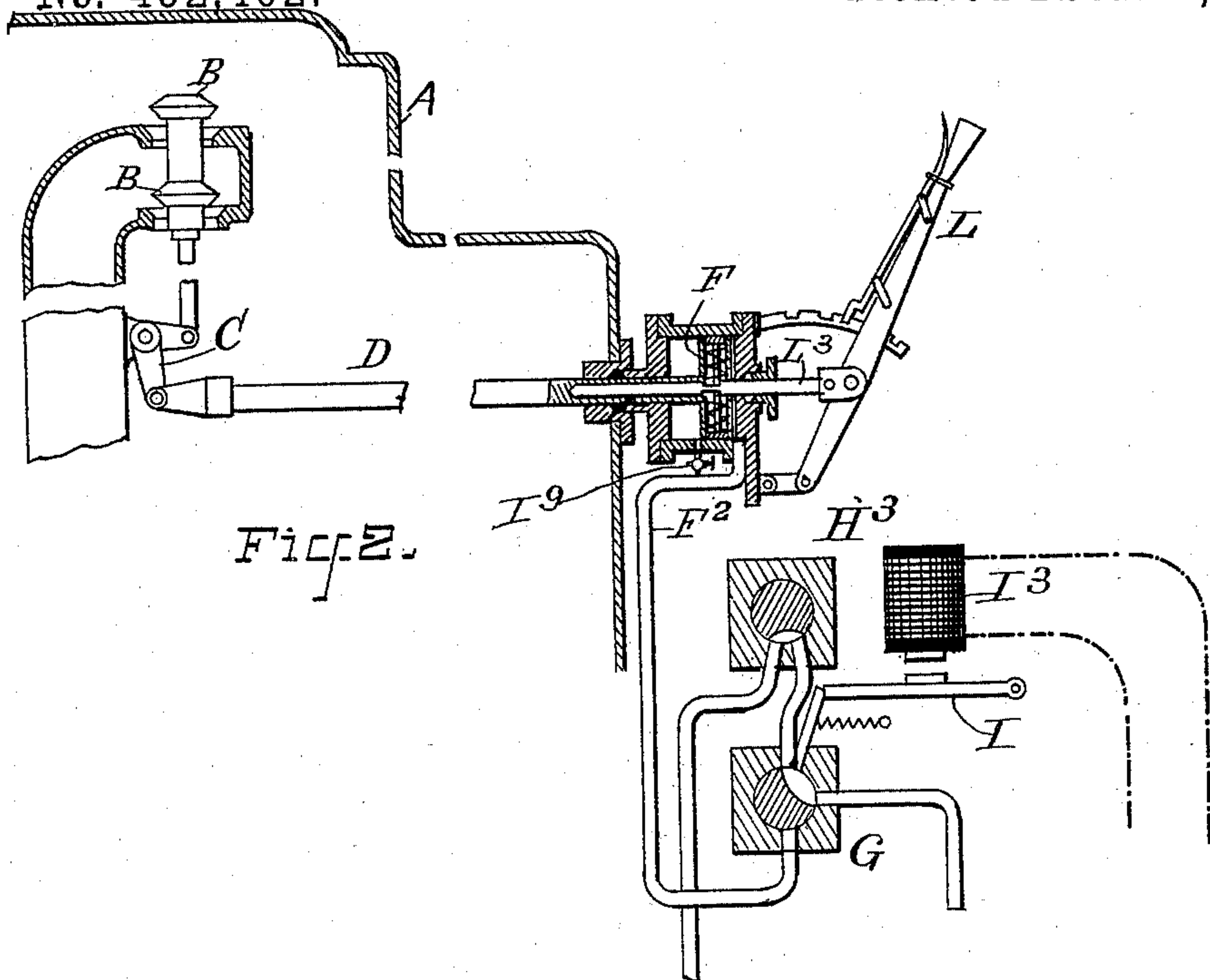


Fig. 2.

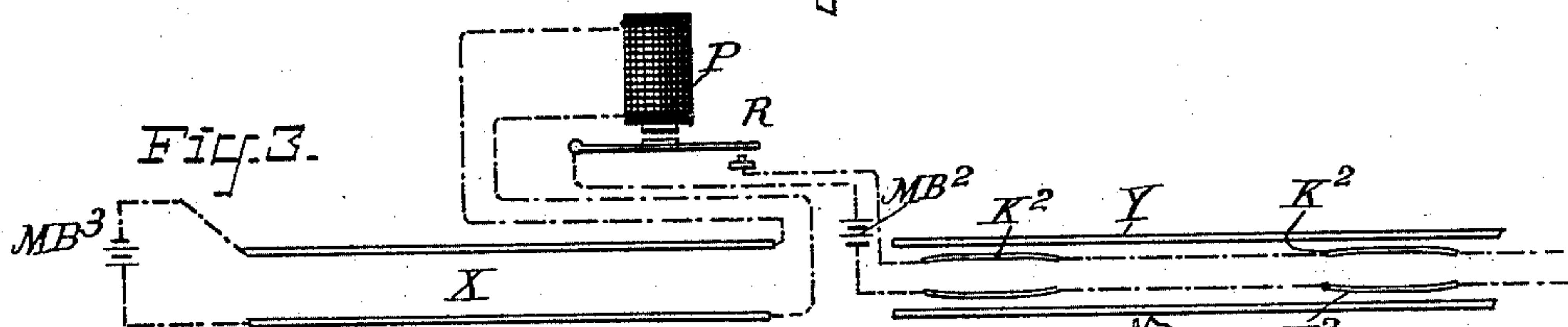


Fig. 3.

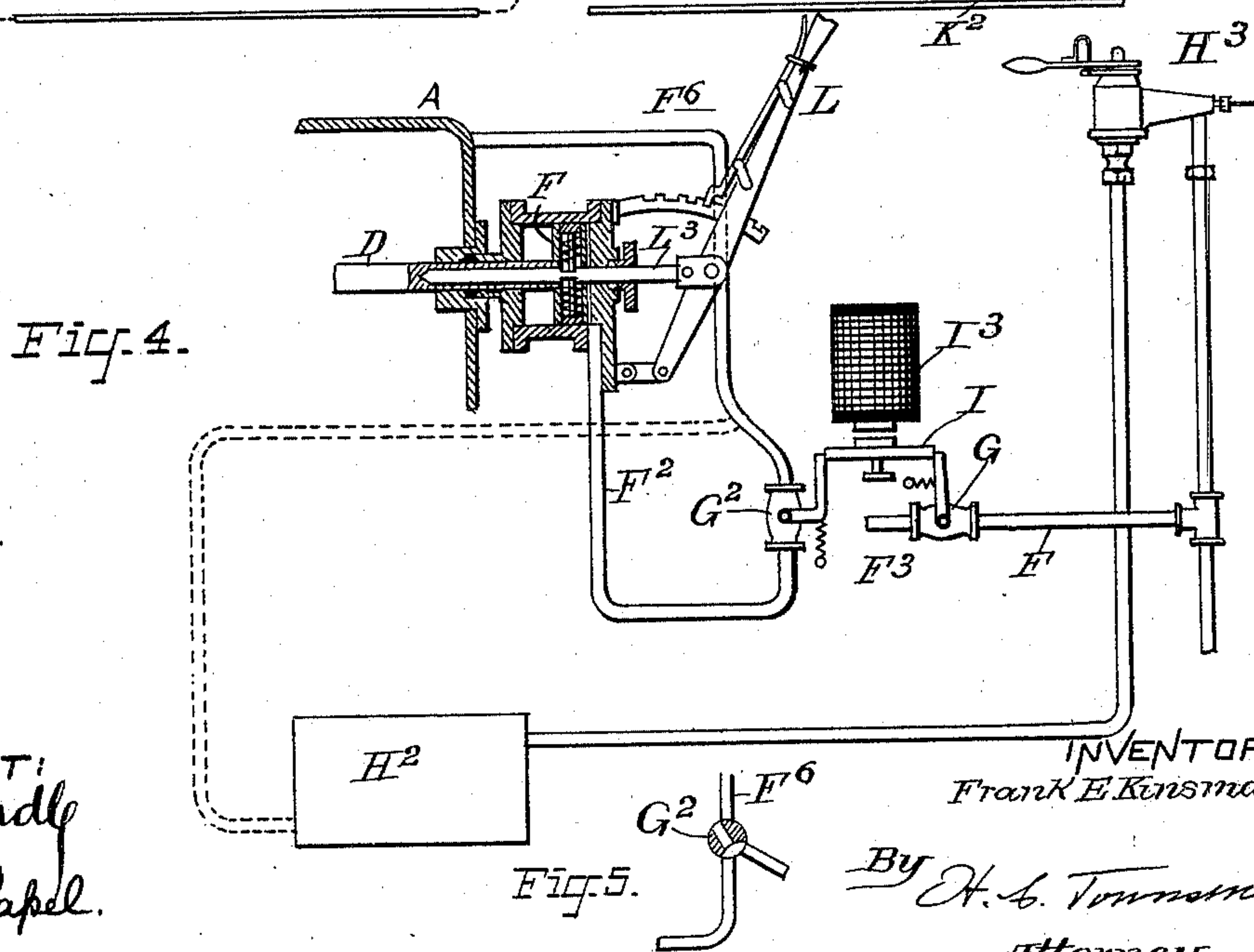


Fig. 4.

ATTEST:  
*J. A. Mudd*  
*Wm. N. Capel*

Fig. 5.

INVENTOR:  
*Frank E. Kinsman*

By *H. L. Townsend*  
Attorney

(No Model.)

3 Sheets—Sheet 3.

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Fig. 6.

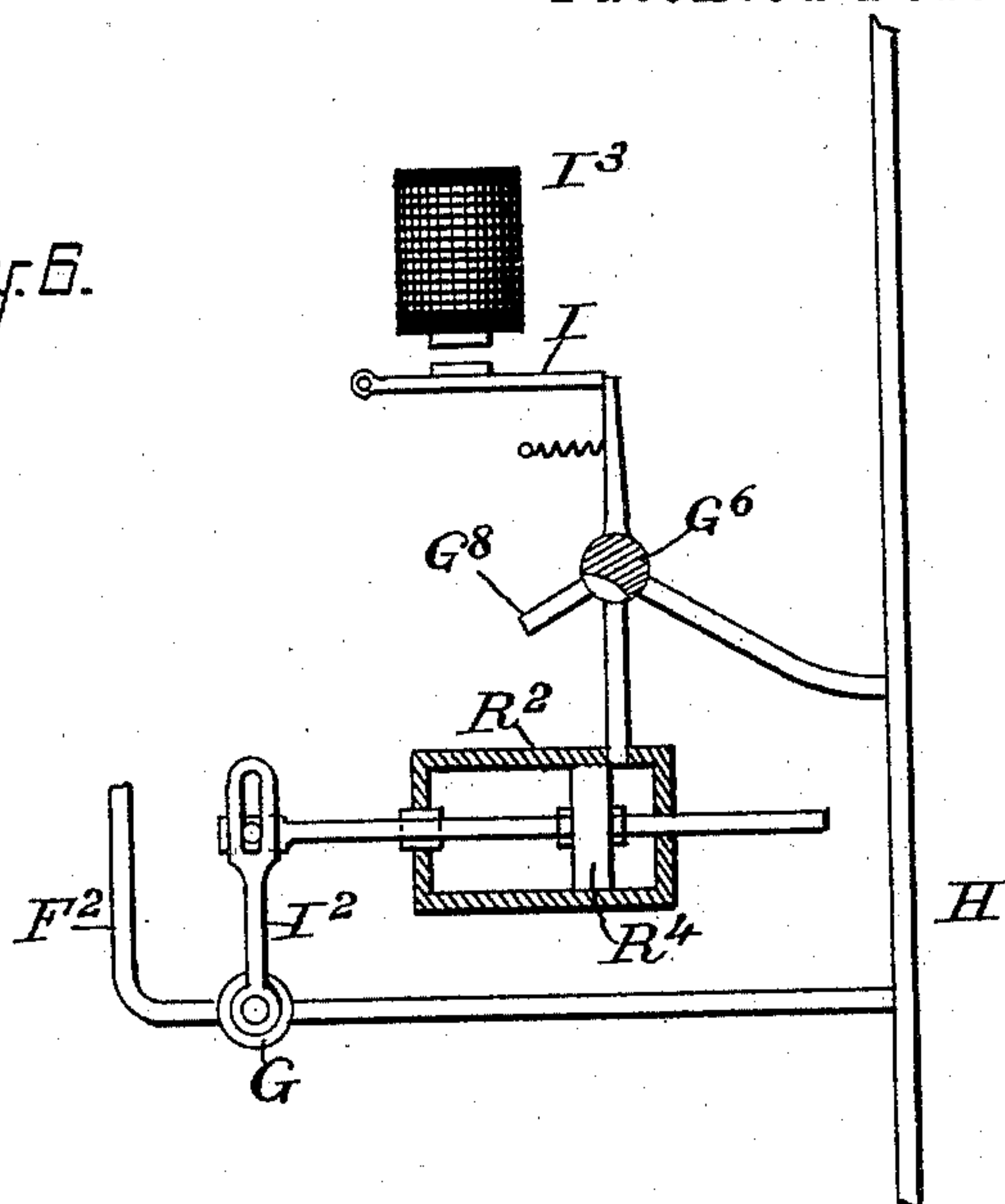
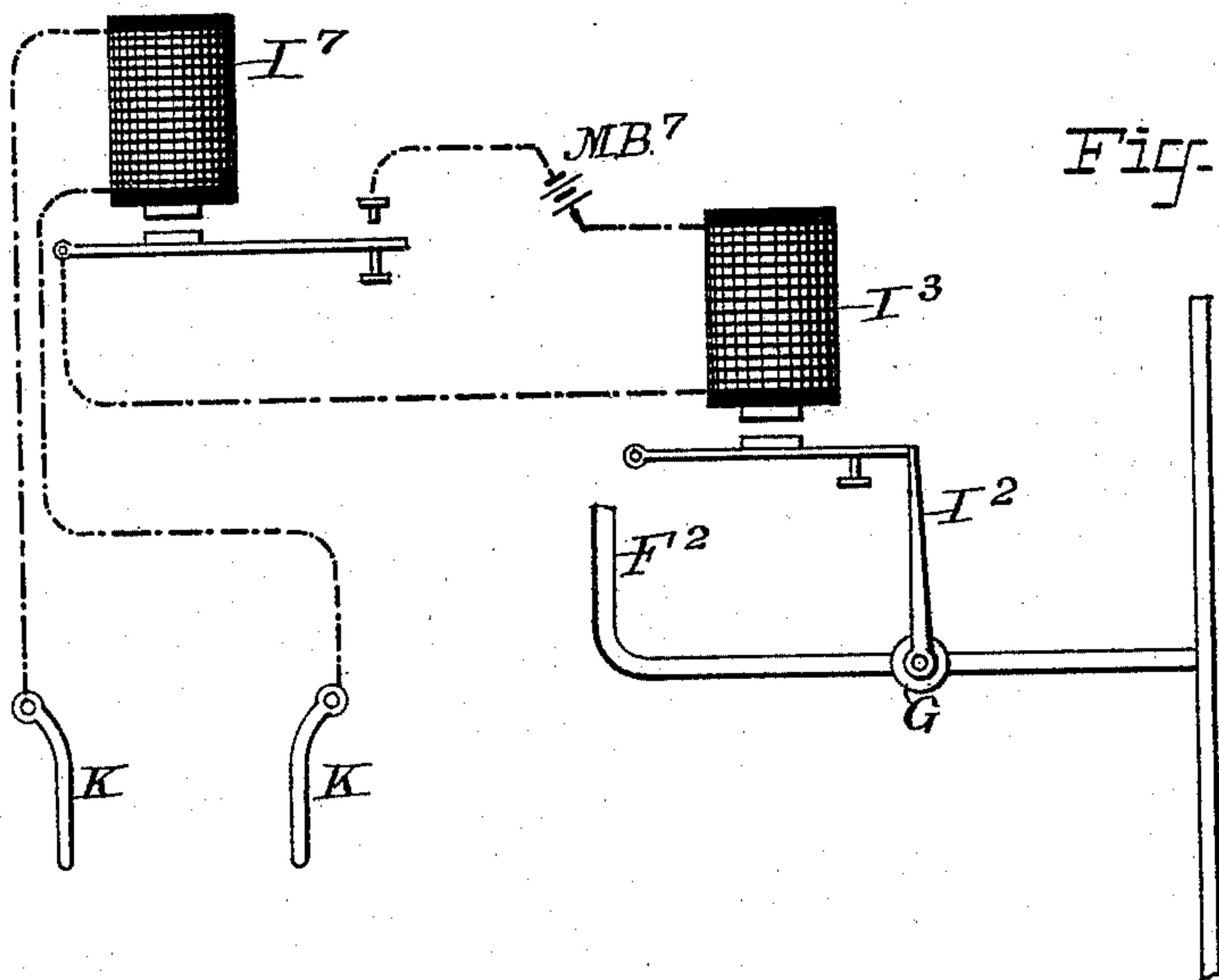


Fig. 7.



ATTEST  
J. A. Mudd  
H. N. Capel.

INVENTOR:  
Frank E. Kinsman

By J. H. Townsend  
Attorney



# UNITED STATES PATENT OFFICE.

FRANK E. KINSMAN, OF PLAINFIELD, NEW JERSEY.

## ELECTRIC TRAIN-CONTROLLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 492,402, dated February 28, 1893.

Application filed February 24, 1892. Serial No. 422,631. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK E. KINSMAN, a citizen of the United States, and a resident of Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Electric Train-Controlling Apparatus, of which the following is a specification.

My invention relates to combinations of apparatus for controlling the movement of railway trains or vehicles under the conditions which arise in practice and require the automatic stoppage of the train independently of any action on the part of the engineer or driver, as well as the control of the motive power in the ordinary manner by manual operation in making service stops.

One of the prime objects of my invention is to insure the stoppage of the train automatically without any action on the part of the engineer or driver when conditions may require it as, for instance, when a neighboring section of track is occupied by another train or a vehicle, when a switch is turned to danger position, when a draw bridge is open or a bridge or section of track is destroyed, or under any other conditions where it is desirable or necessary to stop the progress of the train or vehicle.

My invention while designed primarily for application to steam locomotives, might also be applied to engines or locomotives driven by other power, since all that would be necessary would be to substitute for the special motive power controller herein shown, as used for controlling the steam, the controller adapted to the particular motive power employed. In the same way while my invention is shown as applied or carried out in connection with a brake system wherein pressure of air, steam, gas or other fluid is used, it will be obvious that by a substitution of the particular brake controller adapted to the power employed for acting on the brakes, the invention in its general combination would be employed in the same way with other brake systems and be made to operate upon the same principle as the combination of special devices illustrated.

My invention consists in the combination with the motive power controller for the vehicle, of a piston motor connected therewith which in moving from one extreme position

to the other shuts off the motive power, and in moving in the reverse direction from one extreme to the other places the motive power controller in position to put the motive power full on, a brake cock or lever, a magnet or magnets for said devices, means controlled by said magnet or magnets for causing the piston to move by pressure in one direction to shut off the motive power and to apply the brakes, devices on the road-bed for breaking and establishing the circuit of said magnet, and means upon the train independent of said magnet and its controlling devices for moving the piston of said motor to the opposite extreme position where the motive power would be on.

My invention consists also in the combination with the throttle valve, or other means for controlling the motive power of the locomotive or vehicle, of a brake system or apparatus, a brake controlling device, a plunger or piston operated by fluid pressure and connected with the throttle or other controlling device, and an electro-magnet the armature of which is mounted or supported upon the vehicle or locomotive and is in direct mechanical connection with the means for controlling the application of the brakes and simultaneously applying power to the plunger or piston so as, at the same time, to shut off the motive power.

My invention consists further in the combination with the motive power controller for the vehicle, of a plunger connected therewith, a lever or other manual device also connected with means for controlling the motive power and capable of operation independently of the plunger, a brake system or apparatus, and a governing electro-magnet governing the operation of the brake controller and of the plunger, said electro-magnet having its armature mounted upon the locomotive and in direct mechanical connection with said controlling devices and having its coils preferably connected to the energizing circuit through contact arms carried by the vehicle and adapted to engage with bars or contacts upon the road bed.

The invention consists further in the special combinations of apparatus and details of construction more particularly specified in the claims.



In the accompanying drawings:—Figure 1, is a general side elevation of an apparatus embodying my invention and shows the invention applied to a steam locomotive and to a brake system operated by steam, gas or other fluids under pressure and by plenum or vacuum might be used without departing from the invention. Fig. 2, illustrates a modification in the form of the brake controlling cock which is governed by the armature of the magnet. Fig. 3, is a diagram of electric circuits and apparatus whereby the electro-magnet may be energized automatically through the presence of a train on an adjoining section of track. Fig. 4, illustrates a modification of the invention. Fig. 5, shows a detail of one of the valves illustrated in Fig. 4. Figs. 6 and 7, illustrate modifications in the manner of operating the magnets and valve.

A, indicates the boiler of the locomotive, and B, B, the throttle valve the stem of which connects with a bell crank lever C, to which latter is joined an operating rod D, for the purpose of opening or closing said valve, thereby controlling the passage of steam to the cylinder. The rod D, is connected to the plunger or piston F, working in a suitable cylinder as shown. The plunger F, is operated by the pressure of air, gas steam or other fluid for the purpose of closing the throttle automatically and cutting off the motive power when the brakes are applied. When the plunger is operated by pressure of air, gas or steam, the cylinder of said plunger is connected by a suitable pipe F<sup>2</sup>, with a source of fluid under pressure. In the case of the operation of the plunger by plenum, the connection is made as shown on one side, while in the case of the operation by vacuum, it would be connected on the other.

G, is any valve in the connection of pipe F<sup>2</sup>, by which the application of pressure to the plunger F, may be controlled. In the simplest and preferred manner of carrying out my invention on the same ports of valve G, which controlled the application of pressure to the plunger also serve as the means for controlling the pressure in the brake system whereby the brakes may be applied. For the latter purpose the valve is placed in a connection between the pipe F<sup>2</sup>, and the pipe H, which connects directly with the usual train pipe of an air brake apparatus. The pipe H, is the pipe which leads from the usual air reservoir H<sup>2</sup>, the connection being as shown through the usual engineer's valve H<sup>3</sup>, that serves to manually control the application of the brakes, said valve in the usual system operating to take off the pressure in the pipe H, when the brakes are to be applied. In such case the valve is usually constructed to connect the pipe H, with the atmosphere direct and to at the same time cut off the connection between H<sup>2</sup>, and H.

The valve G, may be a balanced valve, or any other desired construction of valve which

shall normally stand in position to cut off the connection between H, and F<sup>2</sup>. The position of valve G, is controlled by the armature I, of an electro-magnet I<sup>3</sup>. Preferably the direct mechanical connection of said armature and the brake controlling valve or other brake controlling mechanism, is by means of a catch or detent formed through the engagement of an arm I<sup>2</sup>, extending from the valve stem and normally locked by the armature I, but as will be obvious the valve and armature might be otherwise connected so that, when the armature is operated, the valve or other brake controlling device, will be caused to move for the purpose of applying the brakes. Normally, the valve is held in position shown by the armature of the magnet so that the ordinary brake controller H<sup>3</sup>, may be operated in the usual way for the purpose of putting on and taking off the brakes in making the usual service stops. When, however, the armature I, is operated by the electro-magnet I<sup>3</sup>, the spring or weight applied to the arm I<sup>2</sup>, and tending to turn the same in the direction of the arrow, will throw the valve over and open the connection between H and F<sup>2</sup>. The pressure of the air will thereupon be applied to the plunger F, and will cause the steam or other motive power to be at the same time, or approximately the same time, cut off.

In practice the relief of pressure in H, to the extent necessary for the application of the brakes may be made through any port or opening controlled by the plunger F, in its movement so that the motive power shall be cut off at or before the time the brakes are applied. I do not limit myself, however, to any particular order or relative time in the application of the brakes and the cutting off of the motive power. The preferred construction is, however, one in which the plunger F, shall open or uncover a port I<sup>4</sup>, opening to the atmosphere and through which port the pressure in H, may diminish when the plunger F, moves forward to close the throttle.

In order to govern the rapidity of application of the brake, when the brake controlling mechanism is operated, I place in some part of the exhaust connections a regulating cock or valve I<sup>5</sup>. This is preferably applied as shown, in the connection from the exhaust port I<sup>4</sup>, and may be set to determine the rapidity with which the air shall escape from said exhaust. This valve or cock I<sup>5</sup>, might be set so that there would be a pressure maintained at all times behind the piston F, although allowing sufficient relief of pressure in the connections to the brake system to permit the brakes to be applied. By maintaining the pressure at all times of some amount behind the piston, I insure the closing of the throttle in case it should become unbalanced in a way to tend to open it. Thus, for instance, when the plunger F, is thrown by the pressure of air or gas to close the throttle and the throttle should be unbalanced and steam pressure should act di-



rectly on the same in a manner to open it, it would be obvious that if the pressure behind the piston F, should be entirely relieved, the throttle would tend to open of itself; but by maintaining some pressure behind the piston F, sufficient to allow for any such want of balance of the throttle itself, the closing of the throttle and the maintenance of the same in closed position is insured until the plunger may be moved back by the superior force applied through the hand gear and clutch.

The armature I, carried by the locomotive or other vehicle of the train, is operated upon by the electro-magnet I<sup>3</sup>, which is also preferably mounted upon the vehicle, though it would be within my invention to mount the same upon the road bed as in my patent No. 347,700, dated July 20, 1886, and to carry or support the armature in proper proximity to be actuated by the magnet as the armature passes over it, or to otherwise cause the armature on the locomotive or car to act. The preferred arrangement, however, is one in which the electro-magnet I<sup>3</sup>, is also mounted upon and carried by the vehicle and has the terminals of its coils connected to the contact arms or bars K, which move with the vehicle being mounted upon the truck or other proper support. These arms are adapted to make contact or connection with the contact bars or rails K<sup>2</sup>, carried by the road bed and in any usual or proper manner whereby the circuit of the electro-magnet, will be closed through a battery or other generator of electricity. One of the ways of completing said circuit is illustrated in Fig. 3, and will be presently described, but as will be readily understood, the invention is not limited to any particular way of completing the circuit or connection of the rails K<sup>2</sup>, K<sup>2</sup>.

It is obvious that if the valve G, be an ordinary one way valve it will, if the valve H<sup>3</sup>, be opened, exhaust the air from not only the pipe H, but the reservoir H<sup>2</sup>. This action is in fact a desirable one under some conditions as the engineer may not, when a danger stop is made, immediately take off the brakes and start ahead. The valve G, might, however, be a three way valve as illustrated in Fig. 2, and so arranged as to cut off the connection from the reservoir to H<sup>3</sup>, whenever said valve is turned for the purpose of connecting the train pipe H, with the pipe F<sup>2</sup>.

L, indicates any hand lever or other hand gear for operating the throttle valve or other means controlling the motive power of the vehicle. Such hand gear or lever is so connected and combined with the other devices as to be capable of operation independently of them while, moreover, the devices employed in cutting off the motive power under danger conditions must be also capable of operation independently of the hand lever.

In Fig. 1, I have shown the hand gear or lever L, connected with the plunger and rod D, by a friction clutch normally engaging and connecting the two with sufficient power to

permit the lever to actuate the throttle, but at the same time adapted to allow the plunger to move independently of the lever in making a danger stop, when the lever is locked. The lever L, is connected with a rod L<sup>3</sup>, which works in a hollow rod D, and has a groove which is engaged by the spring dogs L<sup>4</sup>, which work in the plunger F. These spring dogs are so adjusted as to give sufficient bite or grip to permit the lever L, to move the rod D, but they will give and allow the plunger F, to be worked independently of L, when the pressure upon the plunger comes into action to bring about the danger stop.

As will be obvious the hand gear or lever might be connected with a second throttle or motive power controller instead of with the plunger, each throttle or motive power controller being adapted to cut off the motive power, that controlled by F, standing normally open, while that controlled by L, would be operated in the usual manner.

When the apparatus stands in the position shown in the drawings, it will be obvious that the motive power may be controlled and the brakes applied by hand in the usual manner. Should, however, the armature of the electro-magnet be actuated the brake valve G will be operated thereby opening connection between H and F<sup>2</sup>, and the pressure of air or gas passing through F<sup>2</sup>, will operate upon a plunger F, and shut off the motive power. As the plunger moves forward it will uncover the port I<sup>4</sup>, and the air may then completely escape from H, so as to cause the brakes to be applied.

While I have so far described the plunger as being operated through connection with the air brake system and by means of the cock which controls the application of the brakes, I do not limit myself in this respect since pressure might be obtained through connection with the steam dome or with the air reservoir direct or with other source of pressure and controlled by means of an independent valve.

Thus, as indicated in Fig. 4, the armature of the magnet controls the movement of a cock G<sup>2</sup>, by normally holding an arm extending from the cock out of action. When the armature is raised the arm is released and the cock G<sup>2</sup>, is turned to establish connection from pipe F<sup>6</sup>, connected with the steam dome to the pipe F<sup>2</sup>, leading to the cylinder of the plunger.

The cock G<sup>2</sup>, is preferably a three way cock as illustrated in Fig. 5 adapted when placed in normal position to open connection between F<sup>2</sup>, and the atmosphere to allow exhaust of the steam behind the plunger after a danger stop. The cock G, has a vent F<sup>3</sup>, connecting directly with the atmosphere so that when the valve G, turns the pressure on the train pipe or pipe connection with the brake apparatus will be relieved. Pipe F<sup>6</sup>, might be obviously connected direct with the air receiver H<sup>2</sup>, as indicated by the dotted lines. The arrange-



ment shown in Fig. 4, is, however, not so simple requiring as it does the use of an extra valve, and the devices before described are preferable for simplicity and certainty of action on vehicles using air brakes or air pressure for controlling the movement thereof.

As illustrated in Fig. 6, the brake controlling valve might be a valve which would control the pressure of the air or steam upon a plunger or piston connected directly with the valve G. In this case the armature of electro-magnet I<sup>3</sup>, would be used to control the position of a valve such as G<sup>6</sup>, the stem of which would have an arm normally detained by the armature. The valve G<sup>6</sup>, would control the passages or connections between the cylinder R<sup>2</sup>, and any source of air or gas under pressure, as pipe H. The plunger R<sup>4</sup>, in the piston, will be connected through suitable links with the arm of the valve G, so that when pressure is admitted to the piston R<sup>4</sup>, the latter will be operated to turn the valve G, and open communication between H and F<sup>2</sup>. Valve G<sup>6</sup>, should be as typified, a three way valve adapted when turned to normal position to open connection between cylinder R<sup>2</sup>, and the exhaust G<sup>8</sup>, but when released to close the exhaust connection and establish communication between the pipe leading from R<sup>2</sup>, to the valve G<sup>6</sup>, and the pipe leading from said valve to the pipe H. In a similar way the electro-magnet I<sup>3</sup>, might be used to let off or actuate any brake controlling cock or mechanism adapted directly or indirectly to cause the brake to be applied.

As will be obvious the circuit of the electro-magnet I<sup>3</sup>, might be through the direct or relayed circuit of that connected to the pressure or contact arm. Thus, as shown in Fig. 7, the electro-magnet I<sup>3</sup>, might be energized by the current from battery M, B<sup>7</sup>, controlled in turn by an electro-magnet I<sup>7</sup>, that is connected directly to the contact arms K. The battery circuit M, B<sup>7</sup>, would stand normally open, but when the magnet I<sup>7</sup>, is normally excited, the armature of the latter would be drawn up and close the circuit of M, B<sup>7</sup>, after the manner of any relay, thus causing the magnet I<sup>3</sup>, to be energized. Whether such magnet be in the direct or relayed circuit, the current for energizing the same could be derived from any source either upon the road bed or upon the vehicle or train. In the latter case it is obvious that the source of current might be a dynamo engine run on the train for any purpose or even might be a storage battery circuit. In some cases where an electric lighting plant is established on a train or vehicle, current might be taken from the mains of such plant for the purpose of operating the magnet.

One of the ways of controlling the circuits or connections of the rails K<sup>2</sup>, is indicated in Fig. 3. The diagram illustrates the usual electric block system wherein a section of rails X, joining the section Y, whereon a train is to be stopped automatically has an electro-

magnet P, connected to the rails at one end of the section and the battery M, B<sup>3</sup>, connected to the same section at the opposite end. The armature of the electro-magnet normally holds a circuit closer and breaker R, open, but when the rails X, are connected by the wheels of a vehicle the battery current is short circuited from the magnet P, and the armature drops away closing the circuit to the contact rails Y. In this circuit is included another generator of electricity M, B<sup>2</sup>, which serves to energize the magnet I<sup>3</sup>, whenever the vehicle carrying the same passes onto the section Y, and the contact arms K, carried thereby engage with the contact rails K<sup>2</sup>. The circuit of K<sup>2</sup>, might be controlled by a railroad switch, draw-bridge, or by other means as well understood by those skilled in the art of electric railway signaling.

What I claim as my invention is—

1. The combination with means controlling the motive power of the vehicle, of a brake system, a brake controlling device, a plunger operated by fluid pressure and connected with the motive power controlling device, and an electro-magnet the armature of which is mounted upon the vehicle in direct mechanical connection with means for controlling the application of the brakes and for simultaneously applying power to the plunger or piston, so as, at the same time, to shut off the motive power.

2. The combination, substantially as described, with a railway vehicle, of a hand lever and a motor device both having connection with a motive power controller and capable of operation independently of one another, a brake controlling device, and a governing electro-magnet the armature of which is carried by the vehicle and governs the action of said motor device and brake controlling device while the circuit of the magnet is formed over the contact bars or rails upon the road bed.

3. The combination of a hand lever or other manual device and a plunger, both connected with the throttle or other means for controlling the motive power and capable of manipulation independently of one another, as described, of a brake system or apparatus having a controlling device which controls also the passage to said plunger, and a governing electro-magnet whose armature is carried by the vehicle in direct mechanical connection with said brake controller.

4. The combination, substantially as described, in an apparatus for controlling the movement of railway vehicles, of a motive power controller, a piston motor connected therewith which in moving from one extreme position to the other shuts off the motive power, and in moving in the reverse direction from one extreme to the other places the motive power controller in position to put the motive power full on, a brake cock or lever, a magnet or magnets for said devices, means controlled by said magnet or magnets for



causing the piston to move by pressure in one direction to shut off the motive power and to apply the brakes, devices on the road-bed for breaking and establishing the circuit of said magnet, and means upon the train independent of said magnet and its controlling devices for moving the piston of said motor to the opposite extreme position where the motive power would be on.

5. In an apparatus for controlling the movement of railway trains, the combination with the throttle valve on the locomotive, of a manual air brake controller, an independent automatic air brake controller mechanism adapted to apply the brakes independently of the manual brake controller, a fluid motor connected to the throttle valve, an electro-magnet or magnets on the locomotive for bringing said automatic air brake mechanism and fluid motor into operation at the same time, and means upon the road bed for controlling the action of said magnets, as and for the purpose described.

6. The combination, in an apparatus for controlling the movement of railway trains, of a throttle valve, a fluid piston motor therefor and brake controlling mechanism upon the locomotive, an electro-magnet or magnets in a circuit upon the locomotive for simultaneously bringing said brake mechanism into operation, and opening a valve connected to the piston motor, devices upon the road bed for energizing said magnets, a relay magnet controlling the circuit to said devices and connected to the rails of a section of track, and a charging battery or other generator of electricity connected to said section, as and for the purpose described.

7. The combination in an apparatus for controlling the movement of railway vehicles, of a vehicle having a brake controlling device and a device controlling the motive power and capable of operation independently of the hand lever or other manual device, an electro-magnet or magnets for bringing the same into operation together, a circuit for said magnets on the vehicle, devices on the road bed of a section of track, an electro-magnet connected to or with the rails of another section of track, and relay devices governed by said magnet for controlling the connections to the devices on the road bed of the first named section.

8. The combination, substantially as described, of a throttle valve or other power controller, a brake system having a controlling cock, a plunger operating upon the throttle, an electro-magnet governing said controlling cock, and a connection between the piston of the plunger and a source of air, gas, or other pressure, passing through said cock.

9. The combination with a hand lever or other manual controlling device and a plunger both operating upon motive power controlling mechanism and adapted to be operated independently of one another, of a brake system or apparatus having a manual controller, and

an independent brake controlling mechanism, and an electro-magnet the armature of which controls the brake mechanism.

10. The combination, substantially as described, with the throttle valve having a manual controlling device, of a plunger operating upon the motive power controller independent of the manual device, a brake system or apparatus having a manually operated valve, and an automatic valve adapted to be operated independently of one another, and an electro-magnet for controlling the action of the automatic valve and the passages connected to the cylinder of the plunger with a source of air, gas steam or other fluid under pressure.

11. The combination with a hand lever or other manual controlling device and a plunger both operating upon the motive power controlling mechanism and adapted to be operated independently of one another, of a brake system or apparatus having a manual controller, and an independent brake controlling mechanism, and an electro-magnet the armature of which controls the brake mechanism and the plunger operating on the motive power controller, as and for the purpose described.

12. The combination, substantially as described, with a throttle valve or other motive power controller, of a plunger or piston, a connection therefrom to the brake system or apparatus, and a port or valve controlled by the movement of said plunger for the purpose of putting on the brakes when the plunger or piston has moved to a predetermined extent to shut off the motive power.

13. The combination, substantially as described, with the plunger or piston  $L^4$ , operating on the motive power controller, of the connection  $F^2$ , from the cylinder of said piston to the brake system, a valve in said connection, and a port  $I^4$ , controlled by the piston and opened by said piston when it moves to throw off the motive power.

14. The combination, substantially as described, with the train brake pipe  $H$ , and the air reservoir  $H^2$ , of a manual valve  $H^3$ , and a magnetically controlled valve  $G$ , both connected to the train pipe, a plunger or piston  $L^4$ , also connected with the train pipe through said valve  $G$ , and a motive power controller actuated by said plunger or piston.

15. The combination, substantially as described, with an air brake apparatus and an automatic valve for applying the brakes in case of emergency, of a regulable vent or exhaust opening under the control of the engineer and adapted to be set or adjusted to determine the power or suddenness with which the brakes should be applied throughout the brake system.

16. The combination, substantially as described, with the plunger  $F$ , connected to a motive power controller, of a port or valve controlled by said plunger and governing the pressure in the brake system, and a regulable



cock or valve in said connections for determining the rapidity with which the brakes shall be applied.

17. The combination, substantially as described, with a railway vehicle, of means for controlling the motive power driving the same, a brake system, a manual brake controller, an independent automatic brake controller adapted to apply the brakes independently of the manual brake controller, and a governing electro-magnet or magnets controlled from the road bed for governing the

said motive power controller and the automatic brake controller in the manner described to bring them both into operation at the same time.

Signed at New York, in the county of New York and State of New York, this 20th day of February, A. D. 1892.

FRANK E. KINSMAN.

Witnesses:

WM. H. CAPEL,  
THOS. F. CONREY.