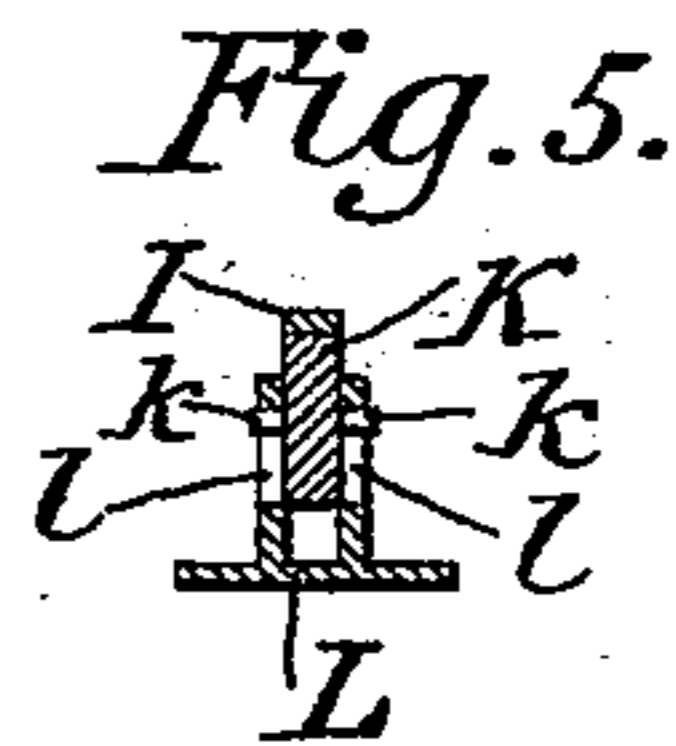
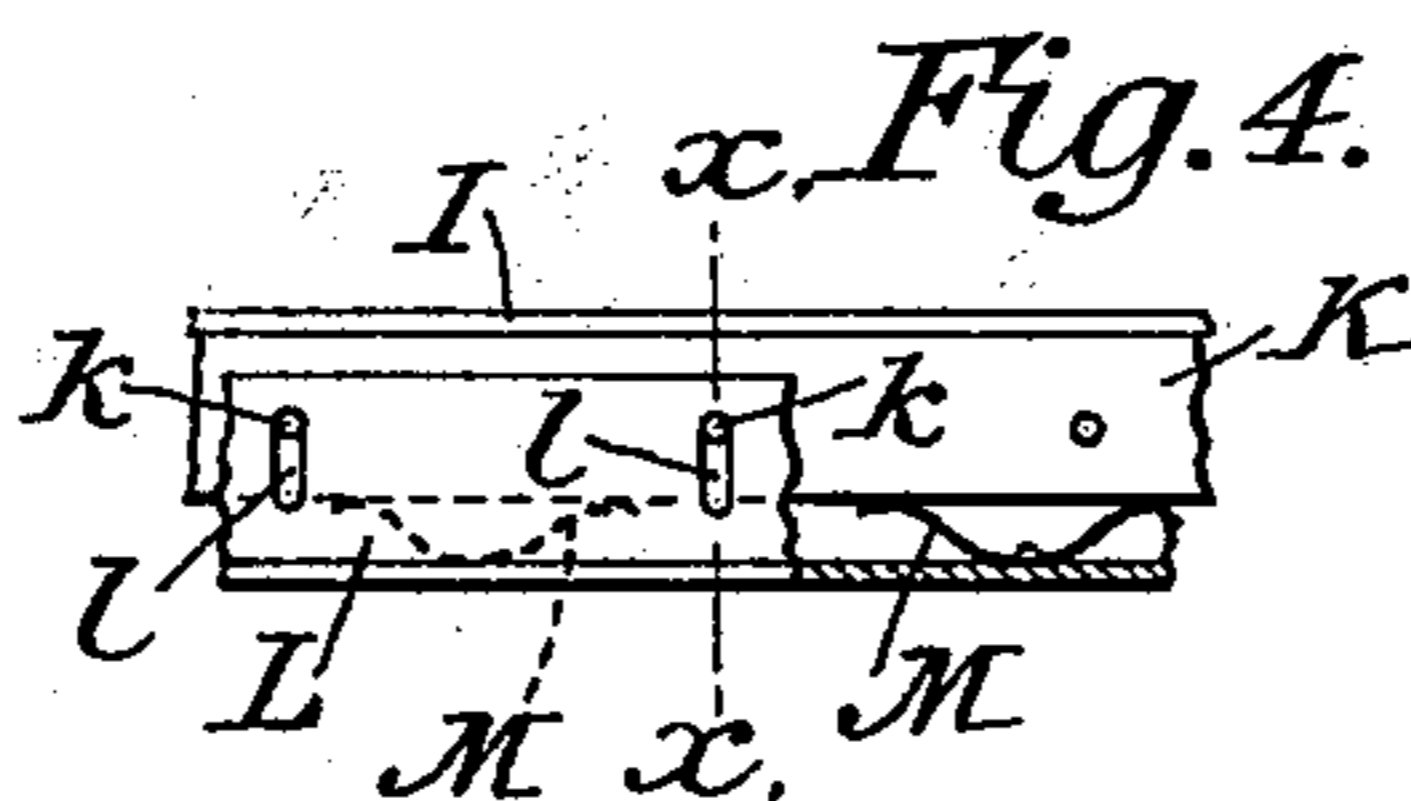
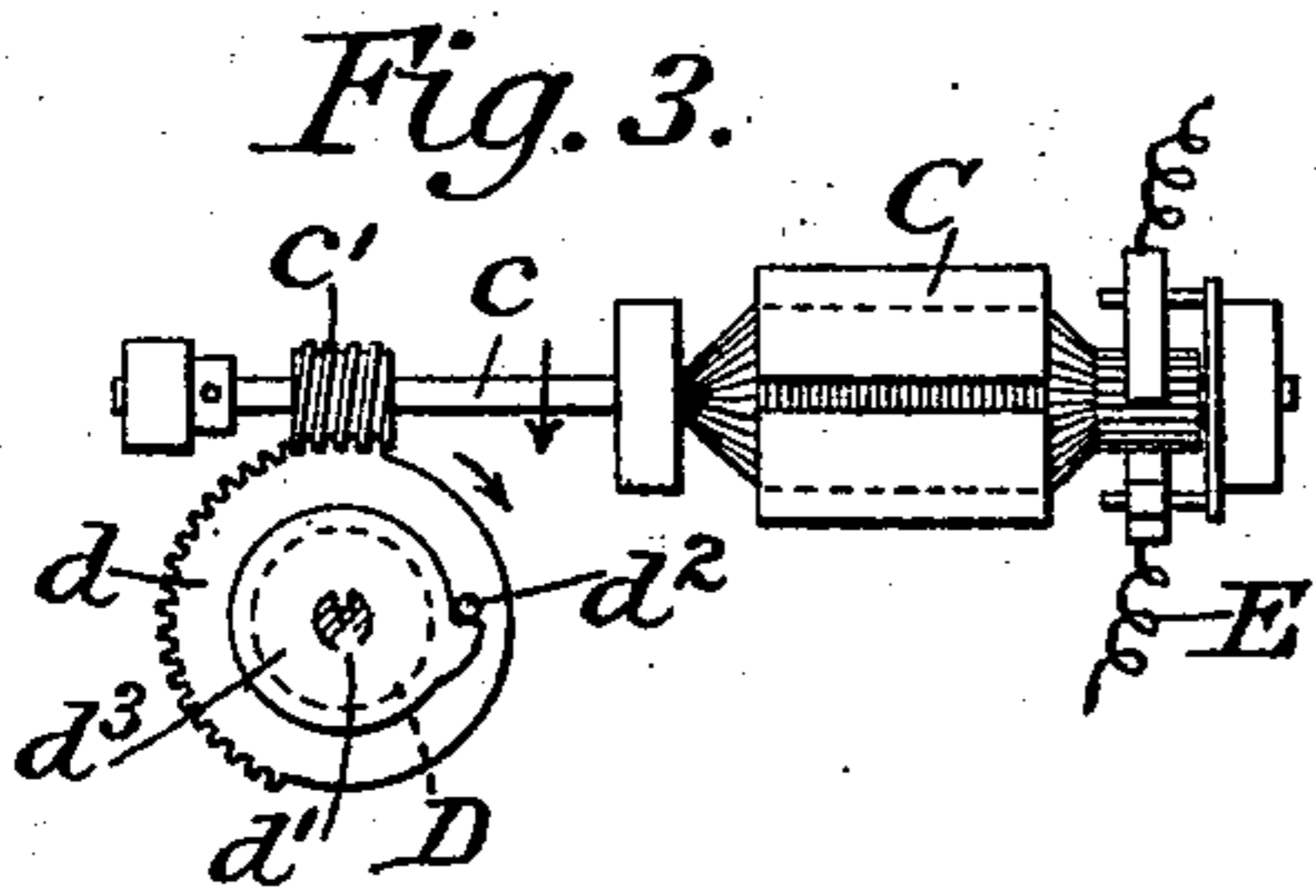
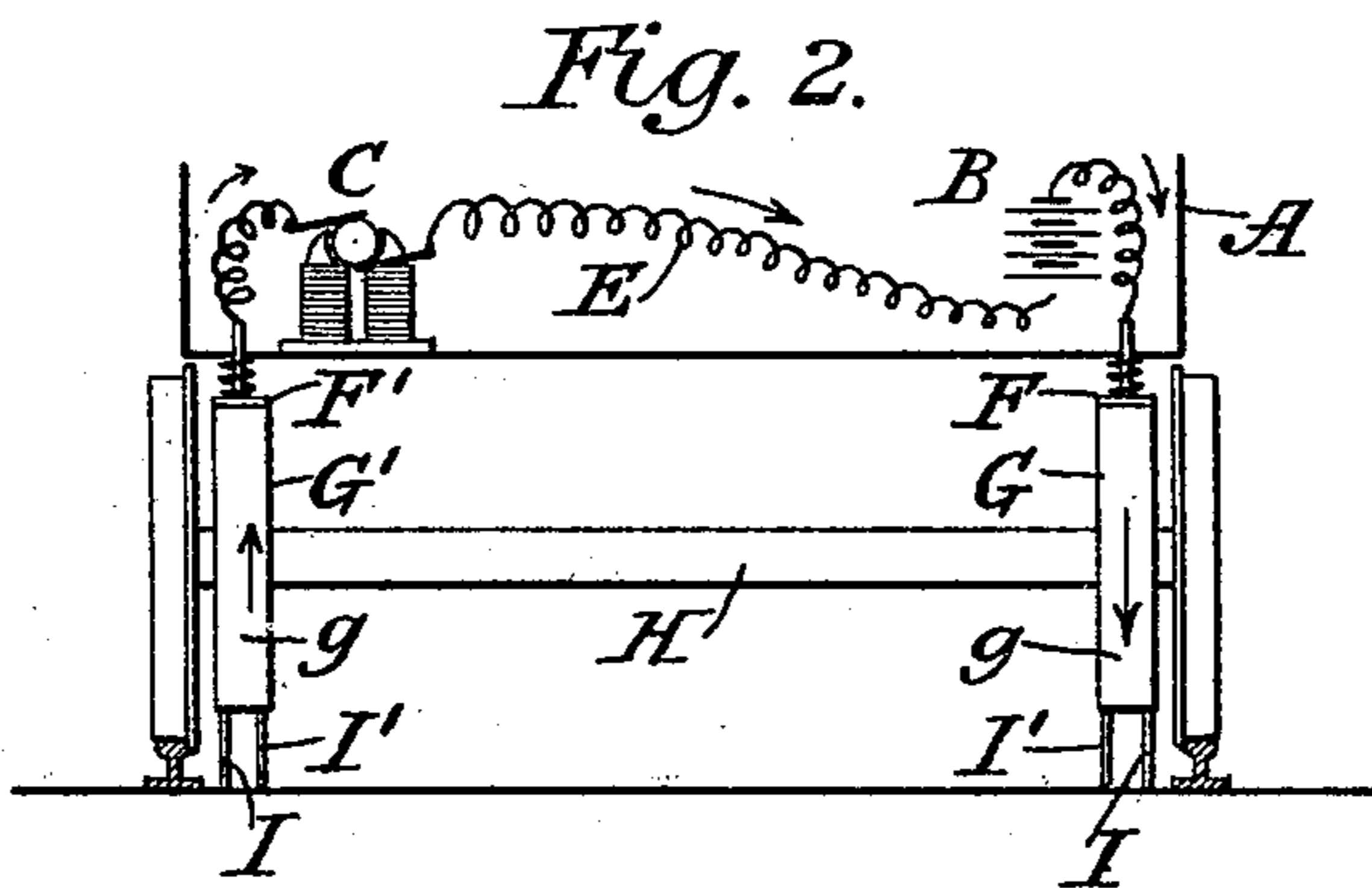
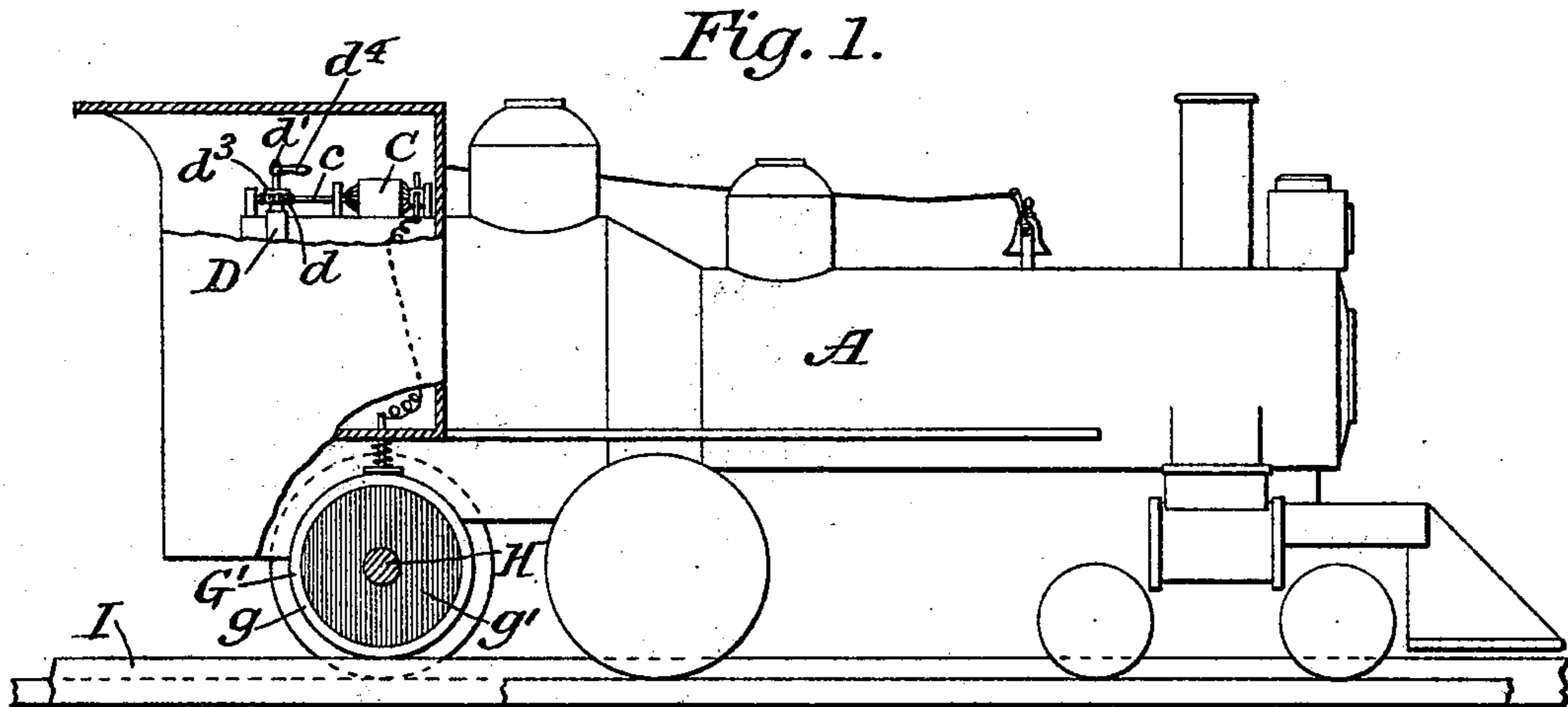


G. F. KLAFFKY & F. FALTINOWSKY.  
DEVICE FOR PREVENTING RAILWAY COLLISIONS.

No. 514,083.

Patented Feb. 6, 1894.



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(No Model.)

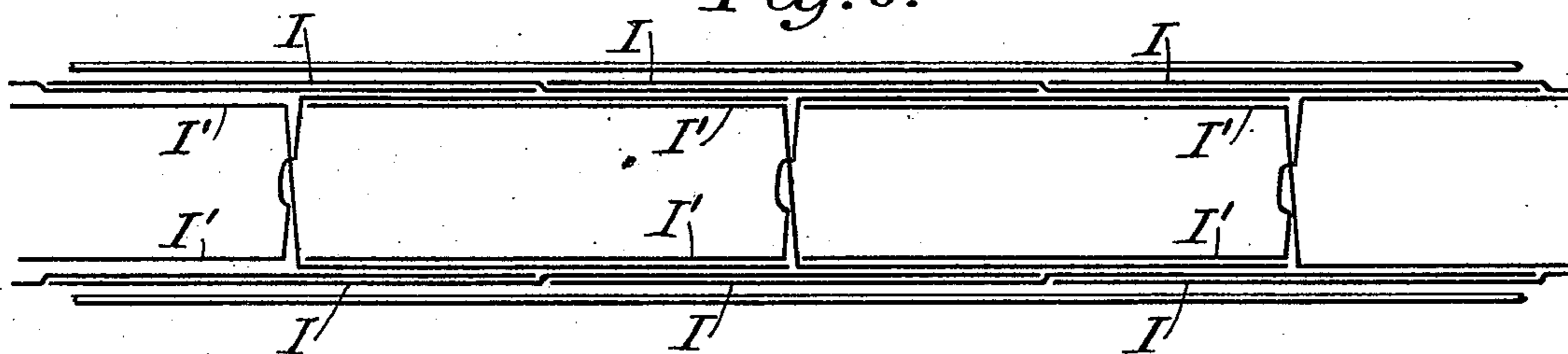
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G. F. KLAFFKY & F. FALTINOWSKY.  
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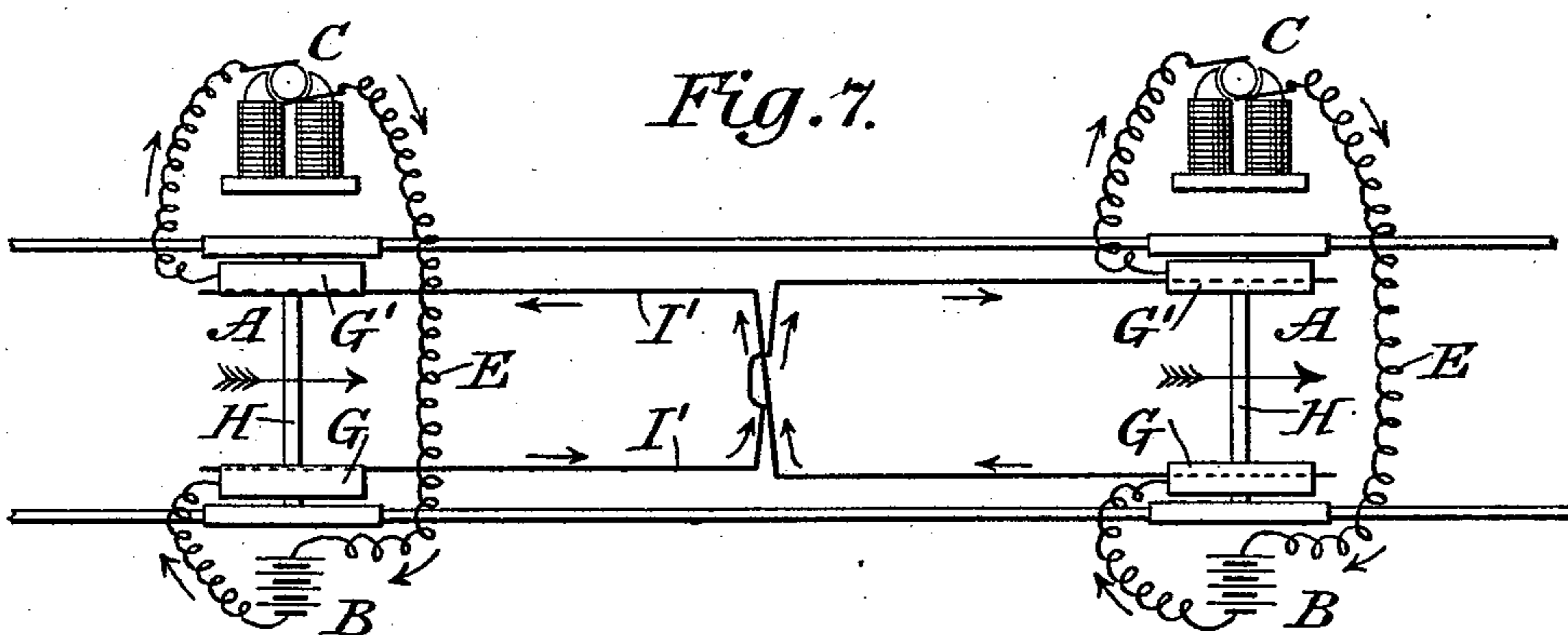
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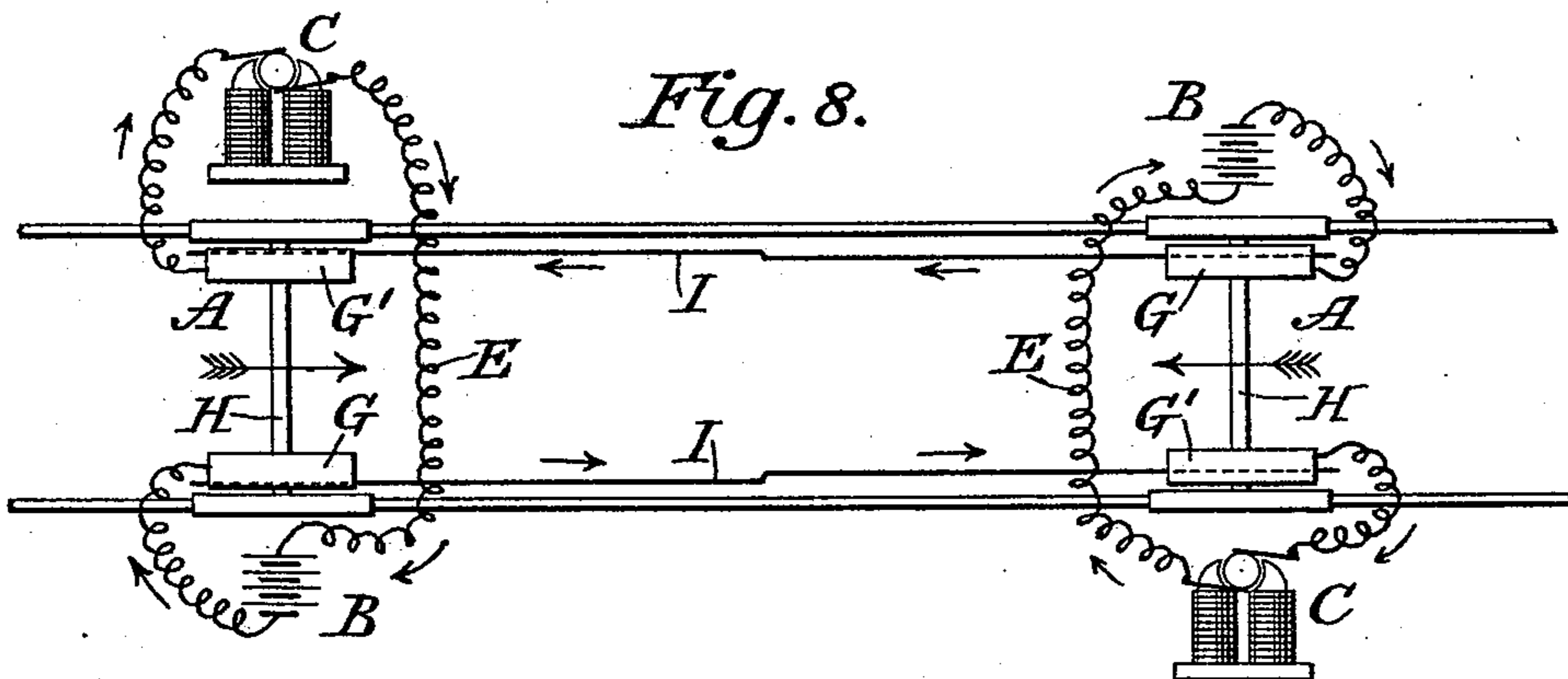
*Fig. 6.*



*Fig. 7.*



*Fig. 8.*



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# UNITED STATES PATENT OFFICE.

GOTTFRIED F. KLAFFKY AND FRANK FALTINOWSKY, OF NEW YORK, N. Y.

## DEVICE FOR PREVENTING RAILWAY COLLISIONS.

SPECIFICATION forming part of Letters Patent No. 514,083, dated February 6, 1894.

Application filed November 3, 1893. Serial No. 489,942. (No model.)

*To all whom it may concern:*

Be it known that we, GOTTFRIED F. KLAFFKY and FRANK FALTINOWSKY, citizens of the United States, and residents of the city, county, and State of New York, have invented certain new and useful Improvements in Devices for Preventing Railway Collisions; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

This invention relates to electrically actuated or controlled devices for preventing collisions on railways.

The objects which we have particularly in view are as follows: to provide means whereby the headway of a moving train or locomotive will be checked instantly and automatically if it enters a "block," that is to say, a certain definite section of the track, while another train or locomotive is on the same block; to arrange the conductors which we employ in such a way that the moving train or train shall be checked before they approach each other so closely as to make a collision inevitable; and to so construct and dispose the different parts of the apparatus employed that it shall operate with equal efficiency however the trains or locomotives may be disposed upon the track with relation to each other, that is, whether they are approaching "head on," or one is approaching in the rear of the other, or one is stationary while the other moves toward it.

Other features of the invention will be more particularly referred to hereinafter.

In the accompanying drawings: Figure 1 is a view in outline and partly in longitudinal section, representing so much of a locomotive as is necessary to enable the application of our invention to be understood. Fig. 2 is a detail view showing the track in cross section and one of the tracks of the locomotive in elevation, and representing diagrammatically the disposition of a portion of the devices carried on the locomotive or car. Fig. 3 is a detail plan view of the means which may be employed to operate the valve which controls the movement of the locomotive. Fig. 4 is a detail view partly in side elevation and partly

in section of the means for supporting the conductors. Fig. 5 is a cross section on the line  $x-x$  of Fig. 4. Fig. 6 is a diagrammatic plan view illustrating the arrangement of the conductors upon the road-bed. Fig. 7 is a diagrammatic view illustrating the mode of action of our devices when both trains, cars or locomotives are headed in the same direction; and Fig. 8 is a similar view illustrating the mode of action when the two trains, cars or locomotives are headed in opposite directions.

Upon every car or locomotive A which it is desired should be equipped with means whereby its own speed or the speed of an approaching car or train may be checked, are mounted a generator of electricity B and a motor C adapted to be operated by the current from that generator or from one or another car or locomotive. The generator may be an ordinary battery or a storage battery or a dynamo, as may be preferred or most convenient, and the motor likewise may be of any suitable form such as a powerful magnet or a solenoid or an electric motor of the type indicated at C in the drawings. The motor, of whatever form or type it may be, is adapted to operate a valve which controls the movement of the car or locomotive. This might be the throttle valve or the valve for controlling the air-brakes, as will be well understood, but for convenience of illustration, we have represented the motor as adapted to operate the valve D which controls the application of the air-brakes and as so far adapted to check the movement of the car or locomotive. The movement of the valve also constitutes a visual signal, and it will be apparent that an independent visual or audible signal might be substituted for it or used with it.

Any suitable transmitting means may be employed between the motor and the valve and we have represented the shaft  $c$  of the motor (Figs. 1 and 3), as having a worm  $c'$  which meshes with a worm-wheel  $d$  mounted on the stem  $d'$  of the valve. The wheel is not fixedly secured to the stem of the valve but is mounted loosely thereon and has a pin  $d^2$  which is adapted to engage a toothed disk  $d^3$  keyed on the stem  $d'$ . This arrangement permits the valve to be operated by the handle

$d^4$  whenever it is necessary and likewise permits the wheel  $d$  to be lifted out of engagement with the worm  $c$  and to be turned back to its normal position without requiring the motor to be rotated backward. The gear is mutilated so that the movement of the valve shall stop at the proper time although the motor continues to run.

The generator and the motor on each car or locomotive are electrically connected, as indicated at E in Figs. 2, 7 and 8, and each is adapted to be connected electrically with its respective road-bed conductor. As indicated in Figs. 1 and 2, the generator is connected to a spring-pressed contact-maker F which bears upon the periphery of a disk G fixed to an axle H of the car or locomotive and adapted to bear upon the corresponding road-bed conductor. The disks G and G' are insulated from the frame-work of the locomotive and may be composed, as indicated in the drawings, of a conducting rim  $g$  and a supporting body  $g'$  from or by which the rim is insulated. The motor is likewise connected electrically with its respective road-bed conductor by a contact-maker F', and disk G'. It will be understood that the generators and motors on all the cars or locomotives are preferably disposed in the same relative position with respect to the road-bed conductors.

The road-bed conductors are preferably wholly independent of the rails upon which the cars and locomotives run on account of the difficulty or impracticability of perfectly insulating the wheels on opposite sides from each other. We prefer to dispose each conductor or set of conductors on the inner side of the corresponding rail but insulated therefrom, the corresponding contact disk G or G' being so placed upon the locomotive or car as to bear on the conductor. Each conductor may be supported in any desirable way; but we prefer to fasten each conducting strip or wire I upon the upper edge of a plate K of any suitable material which is held between fixed supports L, L, and rests upon springs M, M, so that the conductors may yield more or less and may be always in contact with the conducting rim of the disk above it. The supports L, L, may have vertical slots  $l, l$ , at intervals to receive pins  $k, k$ , fixed to the plate K and thereby to permit the proper degree of movement of the plate. It will be understood that each conductor extends along the road-bed without a break for the whole length of the block or section which is to be guarded. If it were necessary only to guard against "head on" collisions, a single conductor for each side of the track would be sufficient, as indicated in Fig. 8, and it will be readily understood that the rails and the frame-work of the locomotive or car might be brought into the circuit to complete it in the place of one of the conductors. As shown clearly in Fig. 8, as soon as two cars or locomotives enter upon the same block or section,

moving in opposite directions, the circuit is completed from the generator on each car or locomotive to and through the motor on the other car or locomotive and thence to the other generator, the two generators reinforcing each other upon the same circuit. The result is that the motor of each car or locomotive will be operated to actuate the means which control the movement of the car or locomotive and that if both are moving toward each other the speed of both will be checked, while if one is stationary and the other is moving toward it the speed of the moving car or locomotive will be checked. The arrangement of the conductors just referred to will not produce the proper action of the apparatus if the two cars or locomotives are headed in the same direction, whether the two are moving toward each other or one of them is stationary. This latter condition requires the use of additional conductors I', I', disposed in the manner represented in Fig. 7, in which the two conductors I', I', are transposed at a point preferably about the middle of the block so that the current may be permitted to flow in the proper direction to energize each motor. Thus, as indicated by the arrows in Fig. 7, the current from the leading generator passes by the conductor I' to the motor of the following car or locomotive through the disk G' on the opposite side of that car, thence to the generator of that car, thence to and through the disk G, thence by the other conductor I' to the disk G' on the opposite side of the leading car and thence to and through the motor of that car back to the generator, the two generators acting together as before. The conductors I, I, are also in contact with the corresponding contact disks; but, as will be readily understood, the electrical condition of each conductor I will be one of equilibrium, since its ends are connected to like poles of the two generators. The same condition of things obtains with respect to the conductors I, I, in the case illustrated in Fig. 7.

The conductors I, I, and I', I', have been illustrated separately in Figs. 7 and 8 for the sake of clearness, but it will be understood that they are used together, as represented in Fig. 6. If the conductors of each block terminated at the end of the block it might happen that a collision would take place if the two cars or locomotives were approaching the adjacent ends of two consecutive blocks at equal distances or nearly equal distances from the break between the two blocks, or if one car or locomotive should be standing near the end of one block and the other should move toward it on the next block. To guard against collisions under these circumstances we make each conductor or set of conductors overlap the conductor or set of conductors of the next block for a considerable distance, preferably for half the length of the block, as indicated in Fig. 6. With this added pre-

caution it becomes practically impossible for a collision to take place on a railway equipped with our devices.

It will be understood that although the mechanical features which we have shown are excellent for the purposes intended and although we desire to be protected in the use of such mechanical features, the particular form and arrangement thereof which we have illustrated are not essential to the practice of our invention and various other devices might be substituted therefor. Accordingly, in the claims which follow, we do not intend to limit our invention with respect to the mechanical features except so far as such features are particularly specified.

We claim as our invention—

1. In a device for preventing railway collisions, the combination of a motor mounted upon each car or locomotive and adapted to check the movement thereof when operated, a generator mounted upon each car or locomotive and electrically connected with the motor thereon, a set of independent conductors for each block or section of the road-bed parallel throughout their length, a separate set of independent conductors for each block or section of the road-bed crossed or transposed

at a point about midway of their length and means to establish electrical connection between each motor and each generator and its respective conductors, whereby when two cars or locomotives, regardless of their relative position, are upon the same block or section, the circuit will be completed through each motor and it will be caused to check the movement of the locomotive or car on which it is mounted, substantially as shown and described.

2. The combination with a locomotive or car and a valve to control the movement thereof, of a mutilated worm-wheel mounted loosely upon the stem of said valve, a disk fixed on said valve-stem to turn therewith, a pin and stop connection between said disk and gear, a worm adapted to engage and drive said gear, and a motor to operate said worm, substantially as shown and described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GOTTFRIED F. KLAFFKY.  
FRANK FALTINOWSKY.

Witnesses:

RICHARD F. OTTO,  
A. N. JESBERA.