No. 676,343. Patented June 11, 1901.

J. SKOPEC.

MEANS FOR PREVENTING COLLISIONS OF RAILWAY TRAINS.

(Application filed Apr. 18, 1900.)

(No Model.) 3 Sheets—Sheet 1.

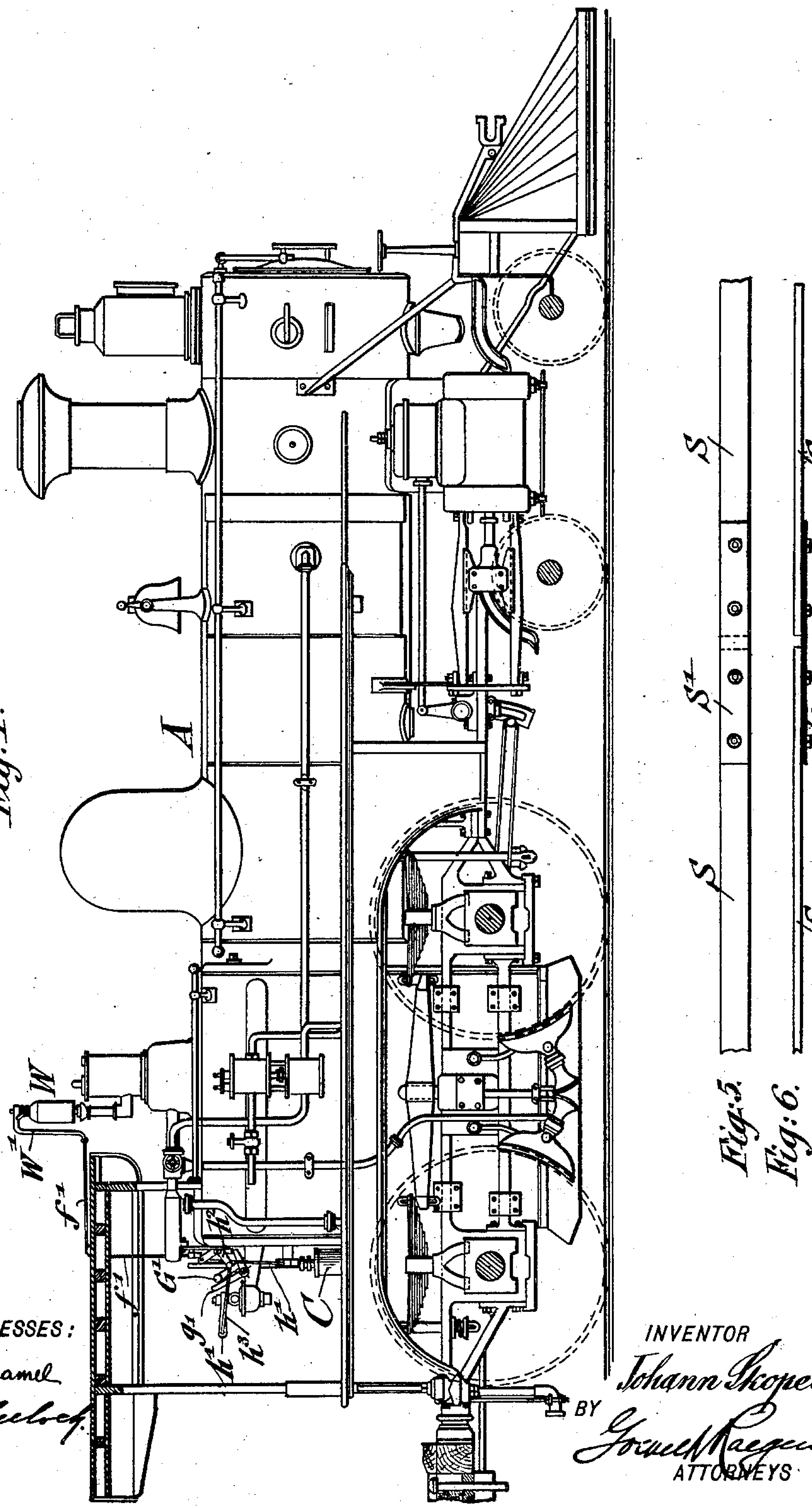

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Fig: 2.

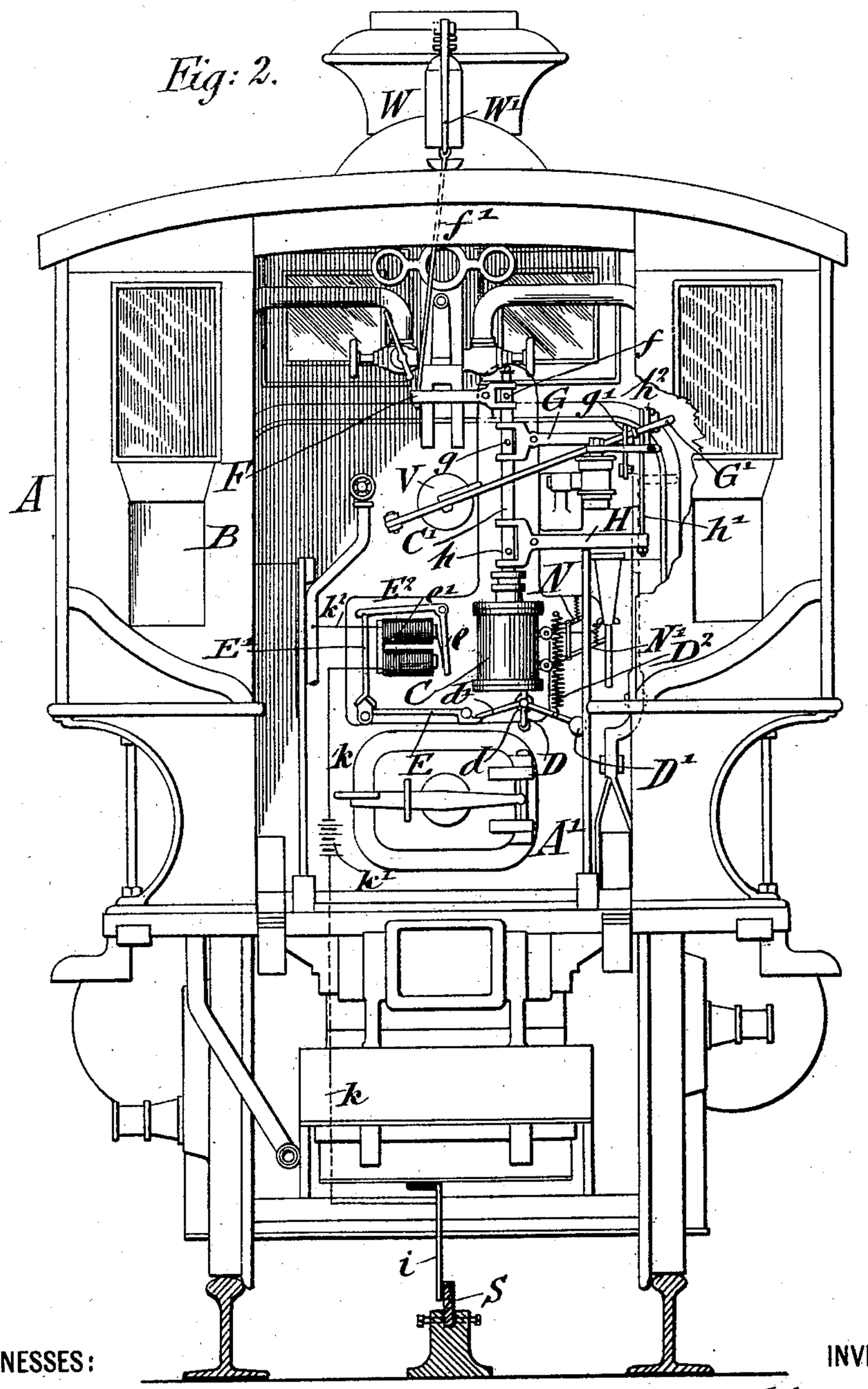

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Fig: 3.

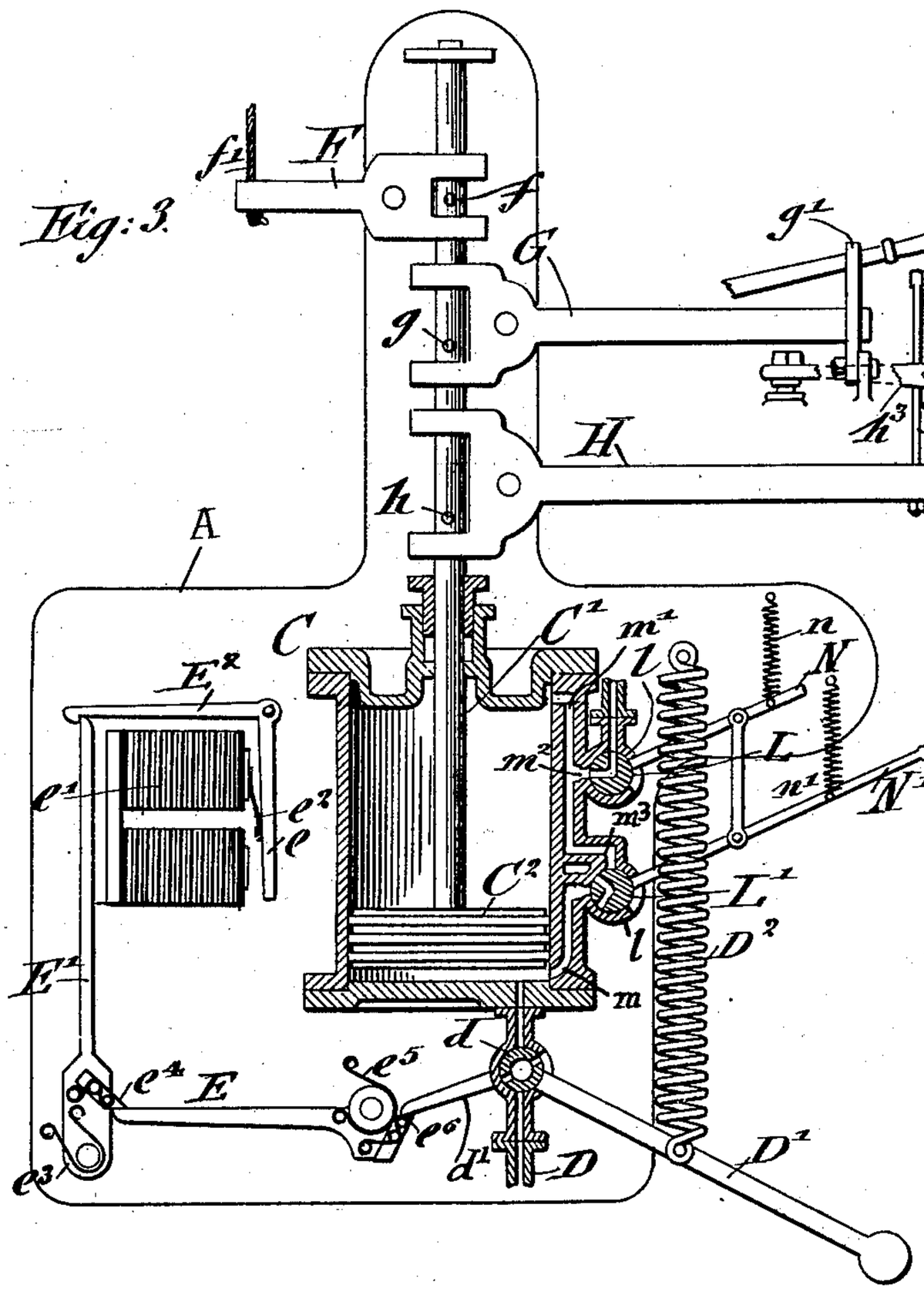
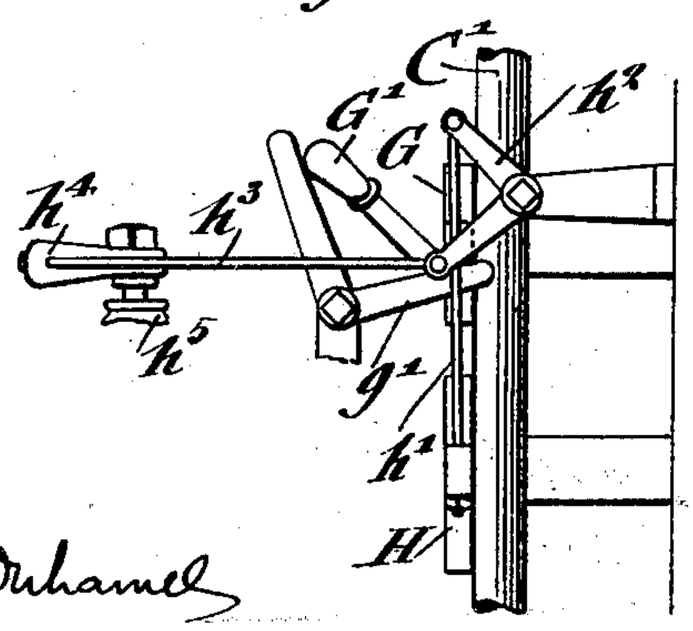


Fig: 4.



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MEANS FOR PREVENTING COLLISIONS OF RAILWAY-TRAINS.

SPECIFICATION forming part of Letters Patent No. 676,343, dated June 11, 1901.

Application filed April 18, 1900. Serial No. 13,344. (No model.)

To all whom it may concern:

Be it known that I, JOHANN SKOPEC, mechanic, a subject of the Emperor of Austria-Hungary, residing at Vienna, in the Empire of Austria-Hungary, have invented Improvements in Means for Preventing Collisions of Railway-Trains, of which the following is a specification.

The present invention consists of an improved means for preventing collisions of railway-trains and other cars running on one and the same track, either in opposite directions toward each other, or one behind each other in the same direction, or crossing on the same track; and its object is to cause the whistle to sound or signal to be given to cause the brakes to be applied and the trains to be thereby stopped automatically and to cause the steam to be shut off from the cylinder, these acts being accomplished without the intervention of the engineer as soon as the trains approach near enough to each other, thereby adverting a collision.

The invention consists in providing each engine or motor-car with a suitable auxiliary motor provided with an electric starting device, the electric energy required for setting this starting device in motion being derived from a source carried by each train, or the current is derived from the station through suitable connecting-circuits. The electric circuit thus provided passes through the coils of an electromagnet which forms part of the starting device for setting the aforesaid motor in motion and passes thence over a suitable contact-shoe, which is well insulated from the metallic mass of the engine, to a contact-rail, a movable portion of said motor being provided with actuating-pins which act successively on levers that are connected with the whistle or signal, the motor proper of the car or vehicle, and the brakes. The contact-rail is arranged between the two existing line-rails, well insulated from the latter, and consequently forms an electric conductor for the operating-current, the return-current flowing along the two rails and the metallic mass of the engine. If now a metallic contact is established at any place between the two rails and the contact-rail by a second train, the circuit is thereby closed between the engines of the two trains. As the current passes through the coils of the electromagnets of the starting devices the two electromagnets of both engines will be excited and attract each armature forming part of the starting-and-stopping device of the auxiliary motor, which is thus set in motion and made to act on the mechanism to be manipulated in order to stop the train.

In the accompanying drawings, Figure 1 is a side elevation of a steam-locomotive provided with means for preventing collisions according to the principle of my invention. Fig. 2 is a rear elevation of a locomotive, showing the interior of the cab. Fig. 3 is a detail sectional side elevation of the operative parts of the apparatus proper. Fig. 4 is a detail view showing more particularly the connection between the operating-levers of the auxiliary motor and the controlling-levers of the steam-cylinder and the valve which leads from the air-compressor to the brakes. Figs. 5 and 6 are respectively detail side and plan views of contact-rails forming an electric conductor.

Similar letters of reference indicate corresponding parts in all the drawings.

Referring to the drawings, A indicates a steam-locomotive of well-known construction, or it may indicate an electric or other motor car, according to the application of my invention.

In carrying the invention into effect a base-plate B is fixed on the steam-boiler of the locomotive or in some other suitable position, on which an auxiliary motor is arranged, said motor consisting, in the case of a steam-locomotive, of an auxiliary steam-cylinder C, in which is guided a piston-rod C′ of a piston C^2, operating in the steam-cylinder. Steam is admitted into the steam-cylinder C by means of a pipe D, which communicates directly with the steam-boiler A′. The steam-pipe D is provided with a cut-off valve *d*, that may be operated by hand by means of a hand-lever D′, which is actuated in one direction by means of a spring D^2, said spring having the tendency to maintain the said valve *d* in open position. The said lever D′ is maintained in the position shown in Fig. 3 against the tendency of the spring D^2 by means of a second lever E, which is retained by the mechanism of the electric starting device by means of a second lever E′, which is under the control of a third

lever E^2, that is provided with an armature *e*, attracted by an electromagnet *e'*. Said levers are suitably pivoted to the supporting-plate B referred to. The lever E^2 is held down by a spring e^2 as long as no current is flowing through the coils of the electromagnet; but as soon as the electromagnet is excited the armature is attracted, releasing lever E' from the lever E^2, which in turn is moved in outward direction by means of an actuating-spring e^3, so as to release its toe e^4 from the lever E, said lever E being adapted to be thrown in upward position by means of a spring e^5, so as to release its toe e^6 from an arm *d'* on the cut-off valve *d*. The said arm *d'* being released, the spring D^2 acts on the lever D' and opens the valve *d*, so as to admit steam into the cylinder C. The piston-rod C' is caused by the admitted steam to rise simultaneously with the piston and to transmit its motion to a suitable intermediate mechanism acting on the parts which must be manipulated in order to stop the train.

In the present instance three appliances are required to be brought in action—*i. e.*, the alarm or steam-whistle W, the throttle-valve V of the steam-cylinder of the engine, and the brake X of the train, whether steam or air. To this end the piston-rod C' of the auxiliary motor is provided with three tappets or pins *f*, *g*, and *h*, which are adapted to successively act upon the forked ends of the actuating-levers F, G, and H, suitably pivoted to the supporting base-plate B. It will be noticed that the forks of the levers F, G, and H are successively wider apart—that is to say, the gaps between the tines or bifurcations are graduated in size, so that the pins *f*, *g*, and *h* may successively act upon the levers F, G, and H in the order named. The lever F is connected by a suitable pull-cord *f'* with the valve-lever W' of the steam-whistle W, so that the first movement is to sound the whistle. The lever G, which controls the steam only, as is shown more clearly in Figs. 3 and 4, is adapted to engage at its outer end with a suitable bell-crank lever or other equivalent device, such as *g'*, one arm of which lever is adapted to engage with the throttle-lever G' of the steam-cylinder. The third actuating-lever H is connected by means of a link *h'* with a bell-crank lever h^2, one arm of which is connected by means of a second link h^3 with the operating-arm h^4 on the spindle of the valve of the air or steam actuated brakes X.

It will be assumed that all trains which approach each other to within four hundred yards, whether in opposite direction or behind each other, are to be stopped by the automatic devices. In this case the contact-rail, which is not new in itself, but is shown in Figs. 5 and 6 for the purpose of a clear understanding of the invention, is made out of thin strips of iron of detached sections S S', which are connected by suitable insulation-strips S^2, so that the electric current cannot pass from one section to the other. Consequently, the circuit can only be made by trains approaching each other, so as to set the apparatus in action if both trains are running on the identical four hundred yards length of contact-rail.

In Fig. 2 the circuit is shown in which the electromagnet *e* is arranged. The circuit comprises a wire *k*, which includes the battery *k'* and is connected with the coil of the electromagnet *e*, while another wire k^2 is connected with the other coil of the said electromagnet and also at a suitable point with the metallic mass of the engine. The wire *k* leads in a suitable manner to a metallic and well-insulated contact-shoe *i*, which is suitably fixed on the under part of the locomotive, so as to contact with the conducting-rail S. The circuit having been closed by the contact-shoes of two cars or locomotives the steam will be admitted into the auxiliary motor-cylinder C, as previously described, thereby in turn sounding the steam-whistle through the medium of the lever F, shutting off the steam from the steam-cylinder through the medium of the lever G, and applying the brakes through the medium of the lever H.

The time or the distance within which the train must be pulled up will be determined by the size of the orifice through which the steam passes through the valve *d* to the cylinder C. Trains traveling at a low rate of speed may have a small orifice, while fast trains should have a larger orifice in order to be pulled up within actually the same distance as the slow trains. The action of the automatic stopping arrangement may be arrested at any time by the engineer, so that the train need not be stopped. This is effected by depressing the lever D', whereby it is made to again enter the toe e^6 of the spring-actuated lever E, so as to be retained thereby in the position shown in Fig. 3, so that the steam will again be cut off from the steam-cylinder C.

After the train or car has stopped and it is desired to return the parts to their normal position the steam is exhausted from the cylinder C by the following devices: L L' indicate suitable rotary valves provided with L-shaped or angular passages and journaled in suitable valve-casings *l l'* on the exhaust side of the cylinder C. A steam-passage *m* leads from the lower end of the steam-cylinder C to the valve L', and still another passage *m'* communicates both with the valve L by means of a duct m^2 and with the valve L' by means of a duct m^3. The valves are retained normally in the position shown in Fig. 3 by means of springs *n n'*, acting respectively on the levers N N' of the valves L L'. If now it be desired to exhaust the steam from the cylinder C, the lever N' is lowered, thereby opening the valve L' and connecting the passage *m* with the passage m^2, so that the weight of the piston and its rod will cause the piston to force the steam under the same through the passage *m*, the passage of the valve L', the

duct m^8, and the passage m^2 into the upper part of the cylinder C, so that the steam is transferred from one to the other side of the piston. This having been accomplished the engineer releases the lever N′, and the springs n n' automatically move the valves L L′ into the position shown, thereby opening the exhaust-pipe m^4 to the exhaust-passage m' and permitting the steam in the upper part of the chamber to escape. In the case of trains which are not run by steam, but by electric or other motive power, this power may be utilized for working the mechanism to be manipulated in order to stop the train. If the trains are worked by electricity, the auxiliary motor is set in motion as soon as the electric starting device releases a suitable switch, which is turned by mechanical means in a similar way to the valve-lever D′, whereby the circuit leading to the motor driving the car is broken and part of the current feeding the latter is conducted to the auxiliary motor, which on being set in motion will act on the appliances to be manipulated to bring into action a signaling device or alarm and to actuate the automatic brake. It is evident that the apparatus may be provided with a recording device of any suitable construction affording means to ascertain whether the apparatus has been in action or not during the journey.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In means for preventing collisions of railway-trains, the combination of a suitable auxiliary motor, provided with a slide-rod carrying a suitable number of tappets, means for actuating said motor automatically, and a set of levers connected respectively with the signaling device and the brake mechanism, said actuating-tappets being located at gradually-increasing distances from the set of levers, so as to engage the levers in succession, substantially as set forth.

2. In means for preventing collisions in railway-trains, the combination of a motor provided with a slide-rod, equipped with a number of tappets, means for actuating the motor automatically, and a set of three levers controlling respectively the signaling device, steam-cylinder and brakes, said levers having forks of gradually-increasing size, so as to be successively engaged by the tappets on the slide-rod, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

JOHANN SKOPEC.

Witnesses:
ALVESTO S. HOGUE,
ALBERT BENCKE.