No. 746,499. PATENTED DEC. 8, 1903.

J. A. GUERIN.

AUTOMATIC SYSTEM FOR STOPPING OR SLOWING DOWN TRAINS.

APPLICATION FILED JUNE 3, 1902.

NO MODEL.

Fig: 1.

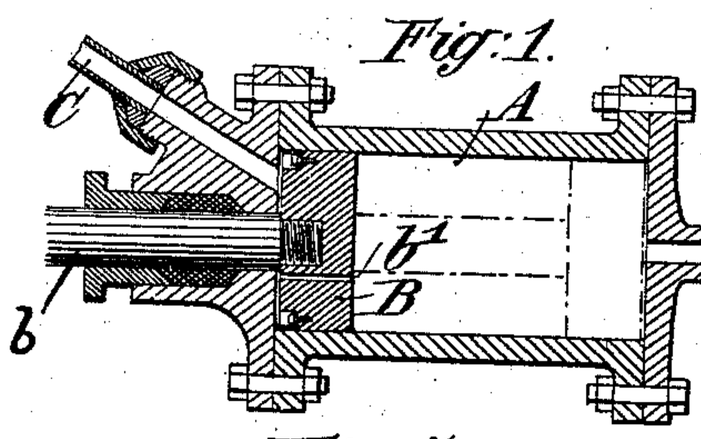


Fig: 2.

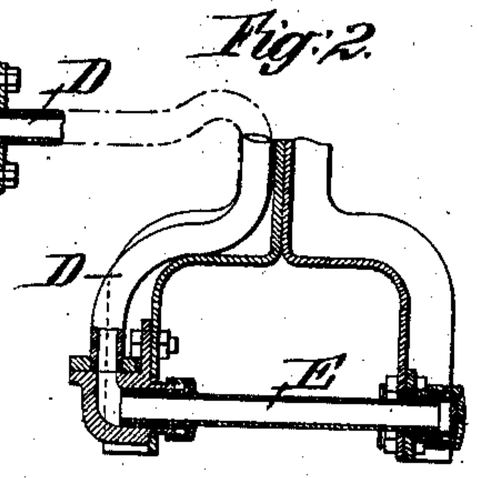


Fig: 3

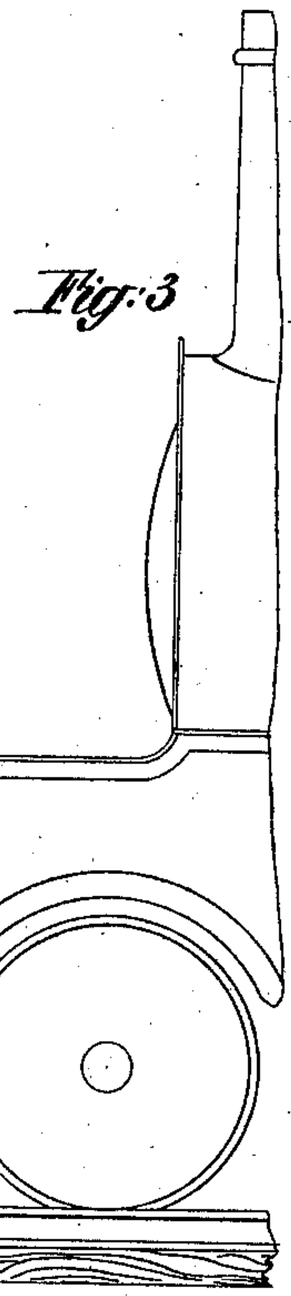


Fig: 5.

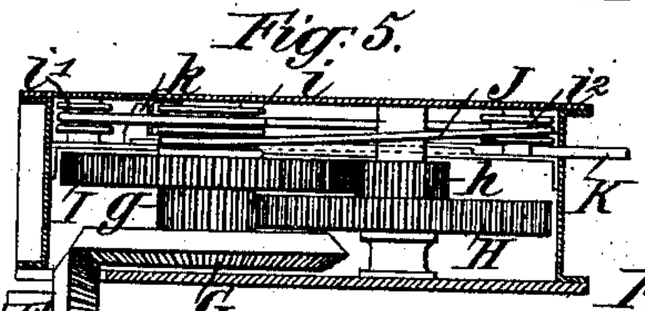


Fig: 4.

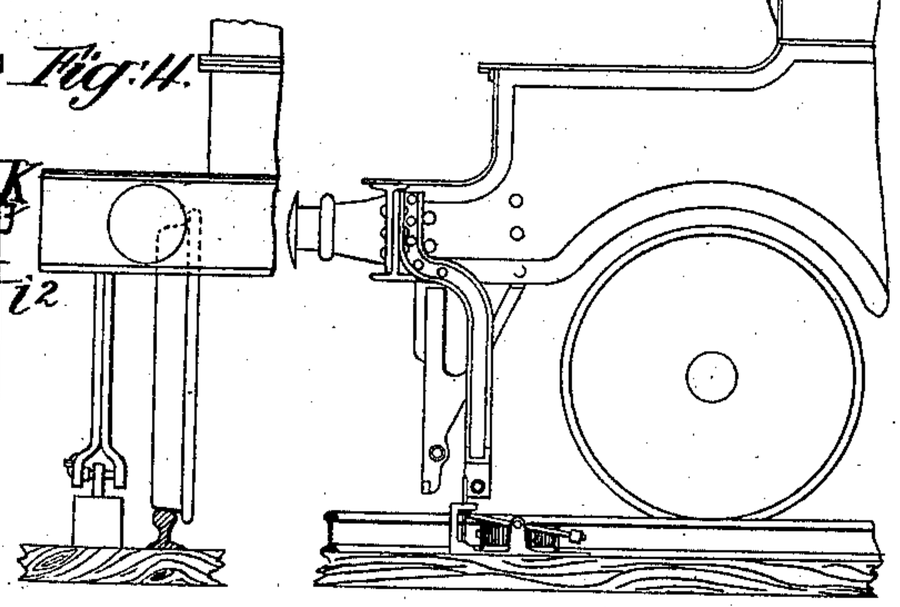


Fig: 6.

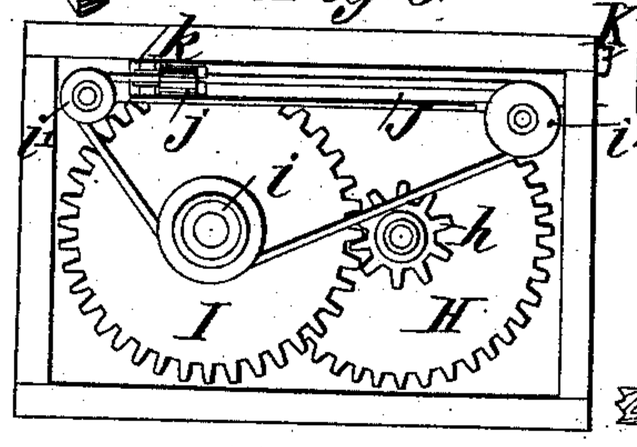


Fig: 7.

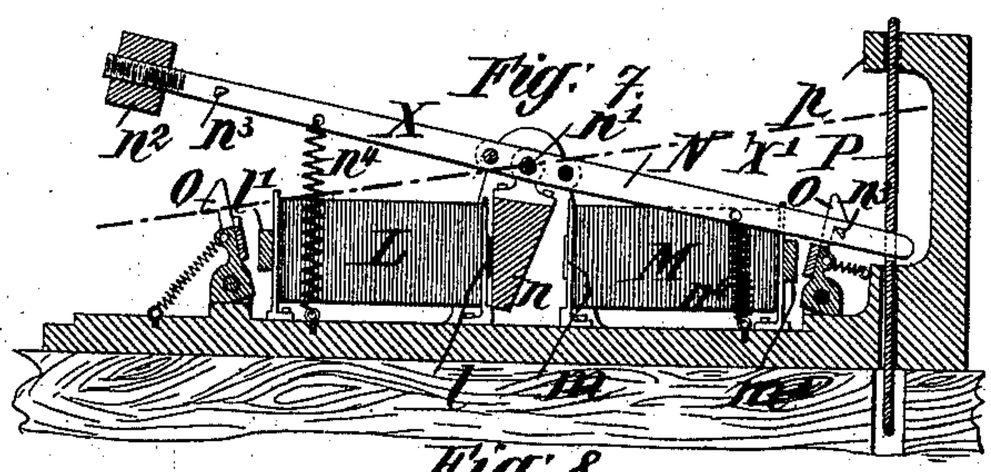
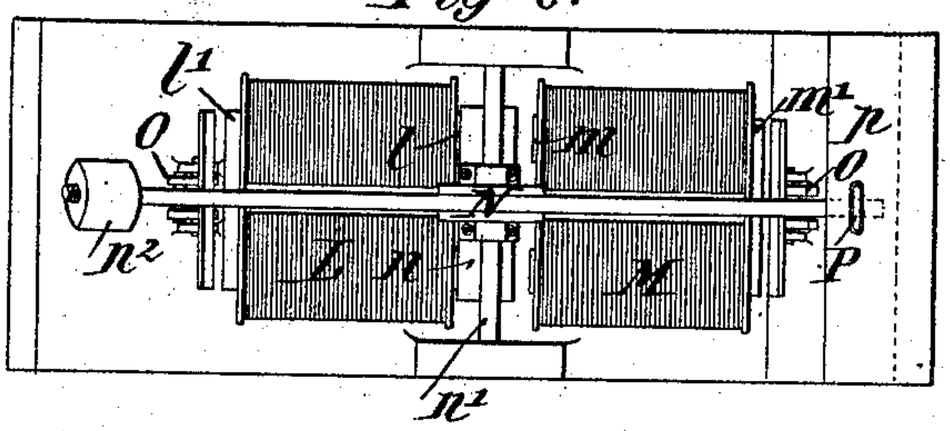


Fig: 8.



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No. 746,499. Patented December 8, 1903.

UNITED STATES PATENT OFFICE.

JULES ALEXANDRE GUERIN, OF ST. MAURICE, FRANCE.

AUTOMATIC SYSTEM FOR STOPPING OR SLOWING DOWN TRAINS.

SPECIFICATION forming part of Letters Patent No. 746,499, dated December 8, 1903.

Application filed June 3, 1902. Serial No. 110,016. (No model.)

To all whom it may concern:

Be it known that I, JULES ALEXANDRE GUERIN, engineer, of 17 Avenue de Gravelle, St. Maurice, department of Seine, France, have invented a certain new and useful Automatic System for Stopping or Slowing Down Trains, of which the following is a full, clear, and exact description, and for which I have applied for Letters Patent in France, dated November 12, 1901.

This invention relates to an automatic system or means for controlling trains in case of necessity for completely stopping or slowing down the speed of a train and to various devices and mechanisms which it may be useful to bring into operation for this purpose, in particular the brakes and devices for effecting the stoppage and reversing the engine.

This system consists, essentially, in the use of an auxiliary motor carried by a vehicle of the train, this motor being normally always impelled to act by the provision of a force which will be afforded generally by a fluid under pressure, this force being neutralized by the existence of a predetermined counter-pressure which exists at the same time in a pipe having a breakable part placed near the track, so that if a device forming an obstacle be arranged upon the track it will be met by the said fragile portion of the pipe connected to the said auxiliary motor, which obstacle will break it, and effecting a fall in the pressure within the pipe containing the fluid, the pressure of which previously balanced the motor, will automatically cause this motor to be brought into action, and this will act upon the stopping or speed-slackening devices, which are thereby operated.

This system is capable of being carried into effect in numerous ways, and I do not limit myself to any particular one. I shall proceed to describe, by way of example, one practical method, so as to define the nature of my invention clearly.

The following description refers to the annexed drawings, upon which—

Figure 1 shows in section an auxiliary motor consisting of a cylinder and a piston. Fig. 2 shows the device forming the fragile portion of the pipe intended to be broken upon meeting an obstacle placed upon the permanent way or track. Figs. 3 and 4 show in side and in front elevation the arrangement of the fragile pipe upon a locomotive. Figs. 5 and 6 show the arrangement designed to actuate the reversing-gear of a locomotive. Figs. 7 and 8 show an arrangement for electrically controlling the obstacle device situated on a fixed piece upon the track and serving to effect the breakage of the fragile tube carried by the train.

The auxiliary motor apparatus shown on Fig. 1 consists of a cylinder in which a piston B works, the rod *b* of which is connected in any suitable manner to the different devices which it is desired to actuate in order to cause the train to be stopped or slowed down. The rod *b* is of large section, so as to afford a considerable difference between the superficial areas of the two faces of the piston. This piston is provided from one side to the other with a passage of very small diameter *b'*. The cylinder A communicates at one end by means of a pipe C with the reservoir of fluid used as the motive agent—for example, a reservoir of compressed air or a receiver of liquid carbonic acid. At its other extremity the cylinder is provided with a pipe D, communicating with the fragile tube E, which is to be broken for the purpose of effecting automatically the fall in pressure, and consequently the movement of the piston B. This tube E, which will usually be of glass, is arranged in any suitable position upon the train and is so constructed as to be easily and quickly replaceable. For this purpose it is arranged similarly to a gage-glass. Fig. 2 shows by way of example one arrangement of this breakable tube.

Figs. 3 and 4 show by way of example the arrangement of the fragile tube on the front of a steam-locomotive. The working of the arrangement is the following: The cylinder A permanently communicates, through tube C, with the reservoir of fluid under pressure. By means of the small passage *b'* the fluid passes to the other side of the piston. The fluid is thus at the same pressure in the two parts of the cylinder on each side of the piston, as also in the pipe D and fragile tube E; but since the surface of the piston where it is joined to rod *b* is by reason of the surface represented by the section thereof less than

that of the other face of the piston the force exerted on this latter is greater than upon the other, and the piston is kept back to the end of the cylinder at the tube C end and remains in this position as long as the original pressure is maintained. Now if the tube E is broken the pressure in the cylinder falls suddenly at its end toward D E, and because by reason of the very small section of the passage b' there is not time for the piston to be kept in equilibrium the pressure upon the face of the piston upon the side of the rod b forces the piston toward the other end—namely, toward the tube D. The piston by means of its rod b thus puts into action any device which it is wished to control, such as the cock upon the brake-pipe.

I do not describe a mechanical arrangement for this purpose, for I do not restrict myself to any special arrangement, and it will be understood that a workman having at his disposal the motor formed by the aforesaid cylinder can effect the connection of this motor with the parts to be controlled in a variety of ways, which will depend upon the special conditions of application. These parts, in fact, may differ according to the nature of the method of traction and the type of locomotive employed. They may be, for instance, a compressed-air brake, a vacuum-brake, the reversing-gear or throttle-valve of a steam-engine, controller of an electric locomotive or self-propelling vehicle.

Two fragile tubes might be placed at different positions and two obstacle devices be placed upon the track at a certain distance one from the other, these corresponding with the two fragile tubes, so as to effect, first, a slowing down and then a stop.

I wish to point out that I do not limit myself strictly to this motor, for various arrangements fulfilling the same purpose may be included under the principle of my invention. Thus, for instance, I might make use of a piston without the passage b', the piston being acted upon not by a fluid but by a powerful spring, the pressure of the fluid acting upon only the other face of the piston to counterbalance the action of the aforesaid spring.

Figs. 5 and 6 show by way of example a mechanical arrangement upon a steam or a compressed-air locomotive which allows of an automatic manipulation of the reversing-gear by the control of the aforesaid auxiliary motor, while at the same time freely permitting manipulation by hand, as usual. According to this arrangement the shaft F of the screw controlling the slide of the reversing-gear is fitted with a bevel-pinion f, gearing with a bevel-wheel G, which by means of a pinion g and a double intermediate gear-wheel h H is connected to a spur-wheel I, fast to a drum or pulley i. Around this latter passes a small endless cord J, also passing over two pulleys $i' i^2$. (See Fig. 6.) To this cord is fixed upon one of its straight lengths a block j, which is over the stroke of a fork k, fast to a rod K, connected, by means of any suitable intermediate connections, to the rod b of piston B of the motor. By means of this arrangement the reversing-gear can be manipulated by hand in the ordinary manner—that is, in a steam-locomotive the mechanism for changing the direction is controlled automatically by the system which forms the subject of the present invention in case of rupture of the fragile stem; but under other and ordinary conditions it is operated in the usual manner. When the auxiliary motor makes its stroke, the rod K draws along, by means of the fork k, the block j, and thereby the cord J, which arrangement effects the rotation of the pulley i and of the various gear-wheels leading up to the shaft F. This working can take place whatever be the position of the block j—that is to say, whatever be the position in which the reversing-gear may be.

As regards the device which acts as an obstacle upon the track for the purpose of breaking the fragile tube E its arrangement and operation are variable. This device may be controlled either mechanically or electrically.

Figs. 7 and 8 show by way of example an electrical controlling arrangement. This comprises two electromagnets L and M, placed opposite one another. In the space between the poles of these l m is an armature n, fast to a lever N, pivoted upon a horizontal axis n'. This lever at one of its ends engages in an opening in a vertical plate or strip P, of suitable strength, guided in a support p. At its other end the lever is furnished with an adjustable counterweight n^2. This upstanding projection P forms the obstacle device. At its two ends the lever N is provided with two projections n^3 n^3, by means of which it can be latched to hooks O O, forming armatures arranged to face the poles l' m' of the electromagnets.

It is to be understood that when the current is sent into either the electromagnet L or M the armature n is attracted by the one or other of these and the lever N assumes the position of X or X', raising or lowering the projection P, which is to form the obstacle in the path of the fragile tube carried by the train. In one or the other of these positions the lever is latched by the corresponding hook O, and when the lever passes to the other position the electromagnet L or M, which effects this movement, attracts its hook O, which is consequently unlatched from the lever, and thus enables the latter to rise at that end.

The lever N is connected to two springs of equal strength n^4 n^4, by means of which it tends to be brought back into equilibrium between the two electromagnets, so as not to be indifferent, too movable, and sensitive to vibrations resulting from the passing of trains.

In Figs. 3 and 4 I have shown by way of example an engine furnished with a fragile tube just reaching the obstacle formed by the projection P. Such an electrical arrangement can be controlled by the ordinary signal-sta-

tions and may also be used to form an automatic protective or block system, the track being divided into sections and the train effecting by its travel both the openings and the closings of circuit necessary to protect itself.

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

Means for automatically stopping or slowing down trains comprising a cylinder, a reservoir of fluid under pressure communicating with one end thereof, a piston having a contracted passage therethrough, a piston-rod connected to the piston of a size sufficient to cause a considerable difference in the superficial area of the two faces of said piston and a hollow breakable device in communication with the opposite end of said cylinder, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JULES ALEXANDRE GUERIN.

Witnesses:
GUSTAVE DUMONT,
EDWARD P. MACLEAN.