T. C. KERR.

MEANS FOR THE PREVENTION OF ACCIDENTS ON RAILWAYS.

APPLICATION FILED JUNE 12, 1914.

1,152,953.

Patented Sept. 7, 1915.

2 SHEETS—SHEET 1.

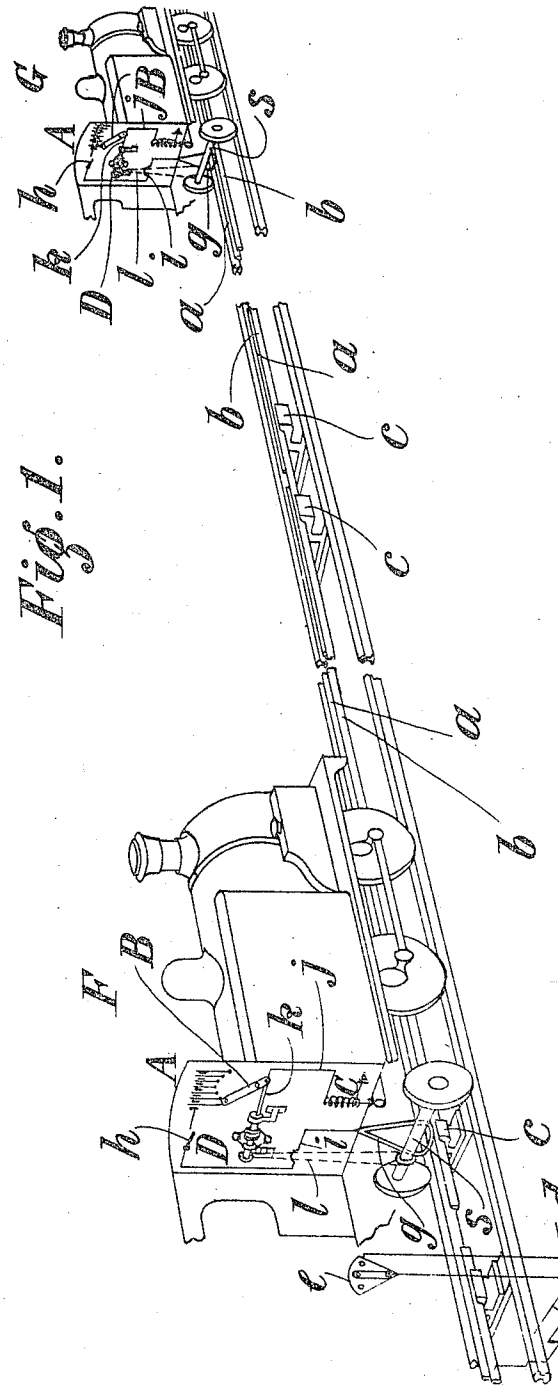


Fig. 1.

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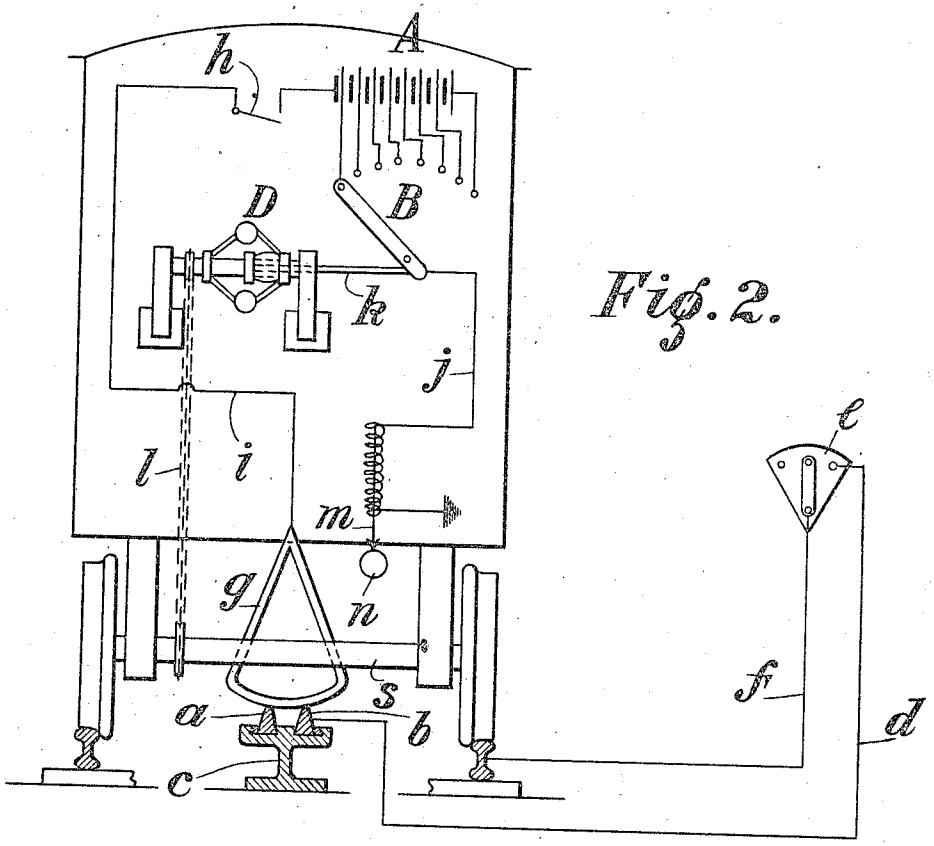


Fig. 2.

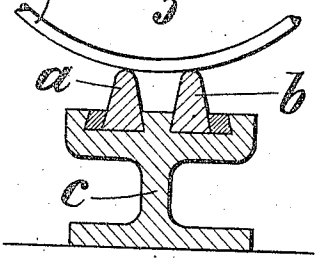


Fig. 3.

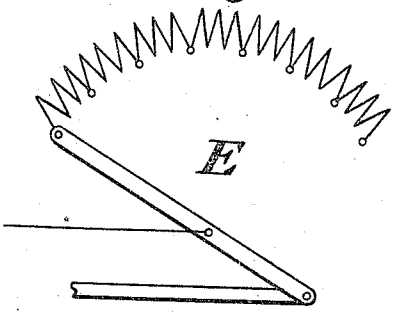


Fig. 4.

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UNITED STATES PATENT OFFICE.

THOMAS CURRIE KERR, OF STEVENSTON, SCOTLAND.

MEANS FOR THE PREVENTION OF ACCIDENTS ON RAILWAYS.

1,152,953. Specification of Letters Patent. Patented Sept. 7, 1915.

Application filed June 12, 1914. Serial No. 844,667.

To all whom it may concern:

Be it known that I, THOMAS CURRIE KERR, a subject of the King of Great Britain, residing at Stevenston, Ayrshire, Scotland, have invented certain new and useful Improved Means for the Prevention of Accidents on Railways, of which the following is a specification.

This invention relates to the prevention of collisions on railways between two or more moving bodies, by which term I mean to cover and include, a train, a part of a train, a car, or a locomotive, and the characteristic feature of the invention is that each moving body has a source of electric energy together with means whereby, as the speed of the body varies, the effective electric potential will also vary. If there are two such moving bodies on the same track and traveling at different speeds, it follows that the effective electric potential thereof will be dissimilar and this dissimilarity is taken advantage of, under this invention, to prevent possibility of a collision. The means, employed to this end are simple and effective and comprise track or other conductors, one, or more than one, electric device on each body operable from the source of electric energy and adapted to control or apply the brakes or to give visible or audible signals and means connecting the electric device or devices with said track conductors so that when the bodies approach within a predetermined distance of one another, a current will flow from the body traveling at the greater speed through the electric devices on both bodies and cause the operation of the signals and (or) the application of the brakes. In order that the invention may be clearly understood I will now describe the same with reference to the accompanying drawings which show, simply by way of example, one mode of carrying it into effect or practice.

On the drawings: Figure 1 is a perspective and diagrammatic view of a length of track having two engines thereon traveling in the same direction, said track and engines having the invention applied thereto. Fig. 2 is a diagrammatic view of the track and train circuits and Fig. 3 shows the insulated conductors *a*, *b*, enlarged and in cross section. Fig. 4 shows a modification.

In carrying the invention into effect or practice, according to the arrangement shown on the drawings, parallel conductors *a* and *b* are carried by insulators *c* (see particularly Fig. 3) suitably located at intervals along the track, these insulators being constructed of insulating material so that the conductors are insulated from the track. The conductors are not continuous but are each divided into a number of sections insulated from one another and the opposite conductor and are so arranged, in staggered relationship, that a gap between any two sections of the same conductor shall not, under any circumstances, fall opposite a gap between two sections of the opposite conductor. The gaps fall some distance apart and the distance between a gap in the one conductor and the next gap in the other conductor represents the distance over which protection is obtained. These conductors, preferably, extend the entire length of the track but, if desired, may be arranged only in suitable lengths, at each signaling area and (or) adjacent to each station or other stopping place. At each signaling area and (or) station a partial track circuit extends from a section of the conductor *b*, by means of a wire *d* to a switch *e* and from thence, by wire *f* to a running rail or other return. The switch *e* is under the control of the signalman or other official and is, preferably, connected with the usual semaphore signaling apparatus and adapted to be closed when a danger signal is set and opened when a clear signal is set.

The train portion of the arrangement may be located on any suitable part (or on several parts) of the train but is, in the present instance, located in the engine cab and comprises a collecting bow, trolley, or equivalent *g* connected, by means of a wire *i*, with one terminal of a time switch *h*, the other terminal of which is connected with one pole of a multiple cell battery A. A pole of each cell, or group of cells, of the battery A, is connected with a stud or contact of a controlling switch B the arm of which is connected, by means of a wire *j*, with the engine framing through a suitable electric device, in this case, a solenoid C. The switch B is operable by a rod *k* connected with a centrifugal governor D which is adapted to be driven from the wheel axle *s*, or other suitable part of the train, which varies in speed in accordance with the speed of the train, by an endless chain *l* or other driving arrangement.

The core *m* of the solenoid C is suitably connected, either directly or indirectly, with

a valve located in the air or vacuum pipe *n* connected with the brake mechanism. Preferably, in all cases, the core of the solenoid would have a dash pot in connection with it to regulate its action. In some cases, if so desired, the solenoid may be arranged to actuate a trip lever or the like which, in its turn, would bring into operation spring or weight mechanism sufficiently powerful to operate the brake valve.

Instead of the multiple cell battery A a dynamo may be employed in which case the switch B would be replaced by a rheostat E (see Fig. 4). In some cases it may be found desirable to use a dynamo and drive it directly or indirectly from a wheel axle.

The *modus operandi* of the device is as follows: When a train is at a standstill the governor is at rest and the switch B includes but one cell or group of cells in the partial train circuit, or, if a dynamo is employed as a source of current, the rheostat E includes the maximum resistance in said partial circuit. If desired, the switch or rheostate may be adapted to cut all source of power out of the partial train circuit when the train is at a standstill, but, as will be hereinafter apparent, such is not a preferable arrangement. When the train is set in motion the governor D is driven from the wheel axle, or other suitable part of the train, by the chain or equivalent *l* and, as the speed of the train accelerates, the weights of the governor move outward under centrifugal action and rotates in a substantially circular path of increasing radius. This movement of the governor weights causes the switch B or rheostat E to move over a number of studs or contacts and include one or more cells of the battery B in the partial train circuit or cut out a number of resistances from said circuit. When the speed of the train ceases to accelerate, the switch or rheostat arm takes up a definite position, dependent upon the speed of the train, and maintains a number of cells of the battery A in the partial train circuit, or maintains a number of resistances out of said partial circuit and the greater the speed of the train the larger is the number of cells included, or resistances excluded, from said partial circuit, and vice versa.

Now, assume a train to have moved over a section of the conductor *b* with which a switch *e* is connected. If the switch *e* is maintained open by the setting of a clear signal there will be no effect, as no circuit can be completed from the battery A (or dynamo) and the train will be allowed to proceed. If, however, the switch *e* has been closed by the setting of a danger signal, a circuit is completed as follows (see particularly Fig. 2) from battery A (or dynamo), time switch *h*, (closed), wire *i*, bow or equivalent *g*, conductor *b*, wire *d*, switch *e*, wire *f*, through running rail and engine frame to solenoid C, and from thence through wire *j* and switch B, or rheostat E, to battery A, or dynamo. The completion of this circuit energizes the solenoid C and causes its core *m* to open the valve in the air or vacuum brake pipe *n* and apply the brakes, also, if desired, at the same time, sound an alarm.

Referring now more particularly to Fig. 1, if the engines F and G, being each over the same section of the conductor *b*, are traveling at the same speed each will have the same number of cells included in, or resistances excluded from, its partial train circuit and, consequently, owing to equal voltage being in each source of supply, no current will flow from either engine and, provided their signals are clear, both will be allowed to proceed. If, however, the engine F increases in speed and tends to overtake the engine G, the governor D will cause the switch B of the former engine to include more cells in, or exclude more resistances from, the partial train circuit thereof and thus cause the electric pressure in one battery to exceed that of the other and a current will flow as follows:—from battery A, or dynamo, through time switch *h* (closed) wire *i* and collecting bow *g* of engine F, along conductor *b*, to engine G, through bow *g*, wire *i*, time switch *h* (closed), battery A, or dynamo, switch B, or rheostat E, wire *j*, solenoid C, and frame of said latter engine to the running rails by which it returns to engine F and through solenoid C, wire *j*, and switch B, or rheostat E, to battery A, or dynamo, of same. This current energizes the solenoids C of both engines and causes the brakes to be applied on both trains bringing both to a standstill and preventing possibility of a collision.

It will, of course, be obvious that a current would flow in the same manner, and have the same effect, if the engine G were stationary.

The battery or dynamo employed in connection with the present arrangement may, if desired, be the same as that used to effect the lighting of the train, or portion of the train, or may, of course, be entirely distinct from same.

The function of the time switch *h*, which is controlled by clockwork, or dash pot, or equivalent, is to enable the circuit to the solenoids to be broken, for a predetermined time only, to allow of movement for shunting, movement of train out of an area, or such like, even if the train should be over the same section of conductor as another train on the same track. This switch may be opened manually but is closed automatically at the expiration of a short and predetermined interval.

A number of simple connecting cables of

suitable length or lengths, the ends of each being provided with clips or hand clamps adapted to be detachably secured to the conductors and running rails are, preferably, provided on each train. In case it should become necessary to stop the approach of trains in either, or both directions owing to a train, or part of a train becoming derailed, or for other reasons, these connecting cables may be utilized as temporary local switches to block the approach of trains by connecting same across one or more of the conductors and its or their juxtaposed running rail, or other return.

In all cases, I prefer to arrange an installation on the engine and another similar or modified installation in the guard's van in case one installation should fail to operate from any cause.

If desired, in some cases, I may arrange for the electrical conductors to be carried on posts at the side of the track, and the bow (or trolley) would be suitably arranged to work in conjunction therewith.

In all cases where I refer to "train" or "trains" it is to be understood I intend to include portions of trains, whenever it may be deemed necessary or advisable to provide such portions with an electric installation.

Having now fully described my invention, what I claim and desire to secure by Letters Patent is:—

1. The combination, on a moving body, of a partial circuit, a multi-cell battery and means whereby as the speed of the body varies a varying number of cells of said battery will be included in said partial circuit.

2. The combination, on a train or part thereof, of a partial circuit, a multi-cell battery, a governor operable from a movable part of the train and a switch, operable from said governor, adapted to include a number of cells in said partial circuit.

3. Means for preventing collisions on railways between two moving bodies comprising electric conductors for the track, a partial circuit on each body, means connecting said partial circuits with the track conductors, an electric device in each partial circuit, a multi-cell battery on each body and means, on each body, for including a number, dependent upon the speed of the body, of cells of the battery in that body's partial circuit.

4. Means for preventing collisions on railways between two trains comprising electric conductors for the track, a partial circuit on each train, means connecting said partial circuits with the track conductors, an electric device in each partial circuit, a source of electricity connected with each partial circuit, a governor on each train operable from a movable part of the train and means, on each train, operable from said governor, for varying the potential of the electric energy transmitted from its source of electricity to its partial circuit.

5. Means for preventing collisions on railways between two moving bodies comprising electric conductors for the track, a partial circuit on each body, means connecting said partial circuits with the track conductors, an electric device in each partial circuit, a source of electricity connected with each partial circuit, a governor on each body operable from a movable part thereof, and switch means, on each body, operable from said governor, for varying the potential of the electric energy transmitted from its source of electricity to its partial circuit.

6. Means for preventing collisions on railways between two moving bodies comprising a partial circuit on each body, an electric device in each partial circuit, a source of electricity connected with each partial circuit, a governor on each body operable from a movable part thereof, means on each body, operable from said governor, for varying the potential of the electric energy transmitted from the source of electricity and means whereby, when the one body approaches within a predetermined distance of the other, the partial circuits of both will be connected to form one complete circuit.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS CURRIE KERR.

Witnesses:
FRED MIDDLETON,
LEROY WEBER.