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H. BIERMANN.

MEANS FOR CONTROLLING RAILWAY TRAINS.

(Application filed Mar. 9, 1897.)

(No Model.)

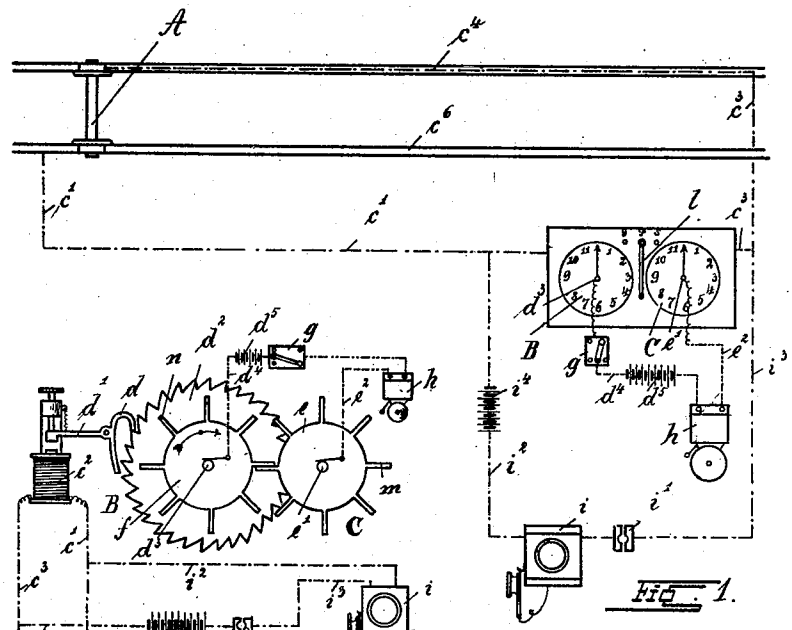

Fig. 1.

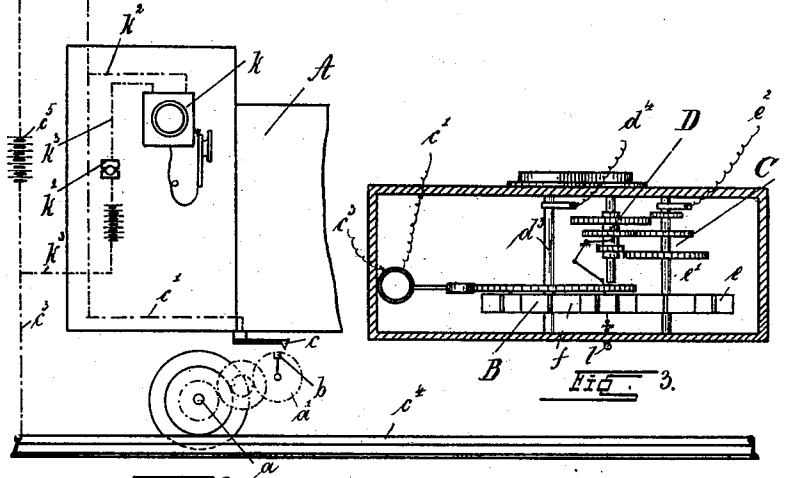

Fig. 3.

Fig. 2.

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HERMANN BIERMANN, OF BRESLAU, GERMANY.

MEANS FOR CONTROLLING RAILWAY-TRAINS.

SPECIFICATION forming part of Letters Patent No. 636,313, dated November 7, 1899.

Application filed March 9, 1897. Serial No. 626,670. (No model.)

To all whom it may concern:

Be it known that I, HERMANN BIERMANN, merchant, of Breslau, in the Province of Silesia, Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Contrivances for Keeping Check of Trains Along the Line and for Effecting a Telephonic Communication from the Station; and I do hereby declare that the following is a full, clear, and exact description of the same.

The invention relates to a contrivance for railway-lines by which one is able to control the movements of a train from the nearest station and to effect a telephonic communication with it. For this purpose a control apparatus, with two sets of clockwork, is connected with the station-telephone. One set of clockwork acts independently of the train. The other is so controlled by the train electrically that a definite number of revolutions of the locomotive-axle suffice to advance the hand of the clockwork to the next division of the dial. Thus one clockwork checks off the time and the other the distance covered. The two sets are regulated so that the time and distance gages work evenly when the speed is normal. Each of the two sets has a cog-wheel the teeth of which are so geared as to come into contact with one another directly when the two sets of clockwork move unevenly, thus closing an electric circuit connected with an alarm. The ringing of the bell is a proof that the train is not maintaining the prescribed speed. The action of the distance-gage (the set connected with the train) further shows whether the speed is too great or too slow or whether the train has stopped and at what part of the line the train is for the time being. A telephone can then be connected at the station with the wires leading to the train.

The accompanying drawings show a schematic arrangement of the contrivance.

Figure 1 shows the whole arrangement; Fig. 2, the arrangement of the two sets of clockwork and the connection of the distance-gage with the train. Fig. 3 is a section through the control apparatus.

The disk a', of non-conducting material, is so moved by axle a of the locomotive A by means of a suitable transmission that it makes one revolution after a certain distance has been covered—say one kilometer. Bearing on the periphery of a' is the spring c, which comes in contact with the pin b, attached to the disk, at every revolution of the latter. The pin b is connected with axle a, and through it with the rail c^4. The wire c', fed by the current source c^5, attached to the train, passes from the contact-spring c to the electromagnets c^2 of the clockwork B (distance-gage) of the station.

The current is conveyed from the contact-spring c to the station by one of the rails c^6. For the purpose of clearness and distinctness the drawings show the current conducted along a special line c'. In order to use c^6 as conductor, the second rail c^4 must naturally be insulated from the first. The current flows from the electromagnets c^2 through the wire c^3 to the rail c^4 and thence back again to the contact-pin b. On the shaft d^3 of the distance-gage B is the ratchet-wheel d^2, the teeth of which gear into the armature d, connected with the lever d', which on completion of the circuit $c\ c'\ c^2\ c^3$ is attracted by the electromagnet c^2. A cog-wheel f is attached to the distance-gage B and a cog-wheel e to the time-gage C in such a way that when the action is even their cogs $m\ n$ do not touch, but come into instant contact the moment as uneven action is set up. The gage C is so regulated that where the speed of the train is normal the cog-wheel e has the same speed in its revolutions as the cog-wheel f of the distance-gage B. The time-gage C is regulated by the adjusting-lever l and has a different motion for goods, passenger, and express trains, answering to the speed at which the trains in question travel. The wheels e and f being electrically connected with the wires d^4 and e^2, the contact of the cogs m and n closes a circuit leading to an alarm-bell h, with switch for breaking contact g. The station-telephone i, having the battery i^4, is connected by means of the wires i^2 and i^3 with the wires c' and c^3, leading to the train, and can be put in circuit by the plug-socket i'. The train is also provided with a telephone k, which by means of the plug-socket k' and the wires k^2 k^3 can be connected with the wires c' and c^3, leading to the station.

The action of the arrangement is as follows: When a train leaves a station, the fact is tele-

graphed to the next station, where the time-gage C is set in motion and regulated for the speed of the train in question. Each revolution of the disk a', connected with the axle of the locomotive A, causes the circuit $c\ c'\ c^2\ c^3\ c^4$ to be closed and the electromagnet c^2 to be charged, as the result of the contact of the pin b with the spring c. The lever d' of the armature d is thus attracted by the electromagnet. The further progress of the train causes the circuit $c\ c'\ c^2\ c^3\ c^4$ to be broken again immediately the pin b has passed over the spring c, the lever d' of the armature d being also released. The result of the attraction of the lever d' by the electromagnet c^2 is that the ratchet d^2 is advanced the distance of half a cog in the direction of the arrow, Fig. 2, by means of a spring attached to the axle of the ratchet. The lever being released, the ratchet d^2 again moves the distance of half a cog. In other words, the hand of the distance-gage B advances one division of the dial at every revolution of the disk a'. At the same time the hand of the time-gage C has also moved the same distance, so that the distance between the cogs $m\ n$ remains constantly the same. Should the train come to a standstill or not keep up its proper speed, the circuit $c\ c'\ c^2\ c^3\ c^4$ either remains without current or closed for longer or shorter intervals, just as when the regular speed is maintained. The distance-gage B therefore does not act when the train has stopped. On the other hand, an abnormal speed causes the hand to move slower or quicker than the time-gage C. In consequence of the uneven action of both sets of clockwork the cogs m of the cog-wheel e after a longer or shorter time will come into contact with the cogs n of the cog-wheel f, Fig. 2, where the number of the cogs has been rightly chosen. This contact closes the circuit $d^3\ d^4\ d^5\ g\ h\ e^2\ e'$ and rings the bell h, which is an evidence that the train is not keeping to its time or has stopped. The immediate circumstances are apparent from position of the hands of the gages B and C, Fig. 1. The station official can thereupon put the bell h out of circuit with the switch g and switch on the telephone i by means of the plug-socket i'. The train-telephone k has previously switched on by plugging at k', thus rendering a communication possible between train and station.

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

1. A means for controlling the speed of trains, comprising a time-clockwork, a coöperating clockwork, means controlled by the train for moving the coöperating clockwork in synchronism with the time-clockwork, and means for giving an alarm when the two clockworks are out of synchronism.

2. A means for controlling the speed of trains, comprising a time-clockwork, a coöperating clockwork, both located at a station, a line-circuit controlled by a moving train and comprising conductors and a magnet for moving the coöperating clockwork in synchronism with the time-clockwork, means for giving an alarm when the two clockworks are out of synchronism, a cab-telephone, a station-telephone, and means for connecting said telephones with the line-circuit, whereby conversation may be carried on.

3. A means for controlling the speed of trains, comprising a time-clockwork, a coöperating clockwork, both located at a station, a line-circuit controlled by a moving train and comprising conductors and an electromagnet for moving the coöperating clockwork in synchronism with the time-clockwork, means for closing the magnetic circuit and means for giving an alarm when the two clockworks are out of synchronism.

4. A means for controlling the speed of trains, comprising a time-clockwork, an additional clockwork, both of said clockworks being provided with cog-wheels, the teeth or pins of one cog-wheel being adapted to interfere with the other, means controlled by the train for moving the coöperating clockwork in synchronism with the time-clockwork, and means for giving an alarm when the two clockworks are out of synchronism.

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

HERMANN BIERMANN.

Witnesses:
BRUM NORDWAY,
ERNST KATY.