No. 607,767. Patented July 19, 1898.

B. C. ROWELL & F. M. BRINCKERHOFF.

SPEED CONTROLLING APPARATUS FOR RAILWAYS.

(Application filed June 3, 1897.)

(No Model.) 2 Sheets—Sheet 1.

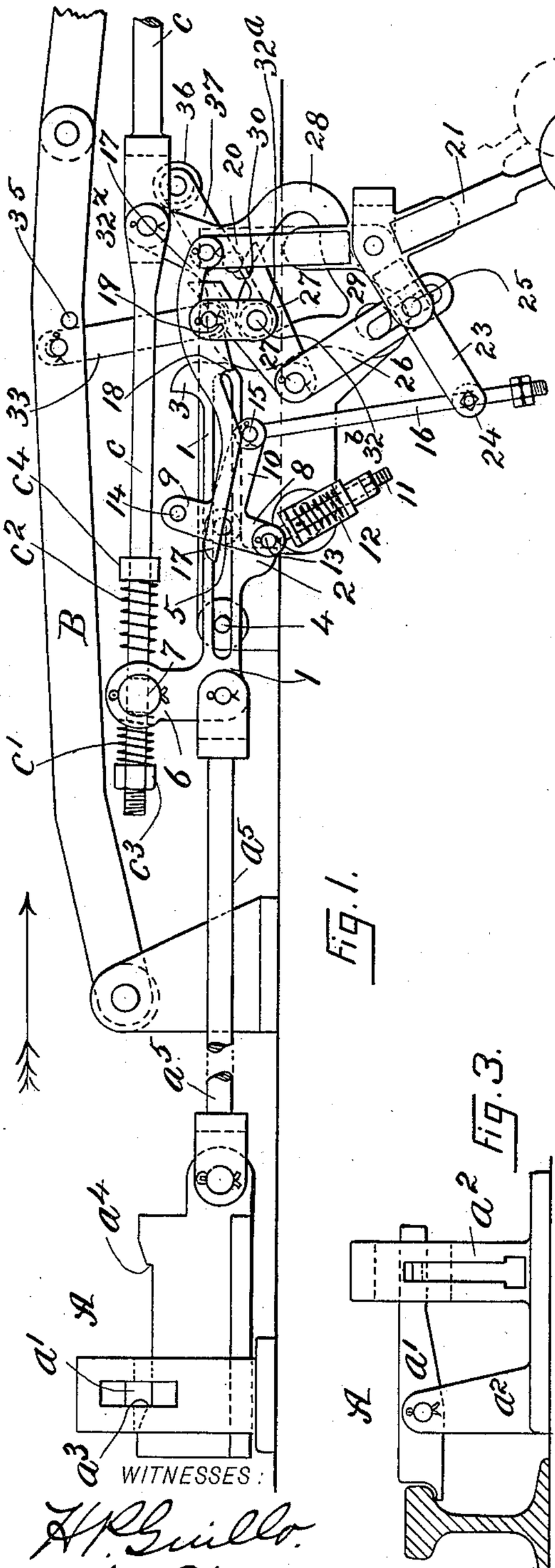

Fig. 1.

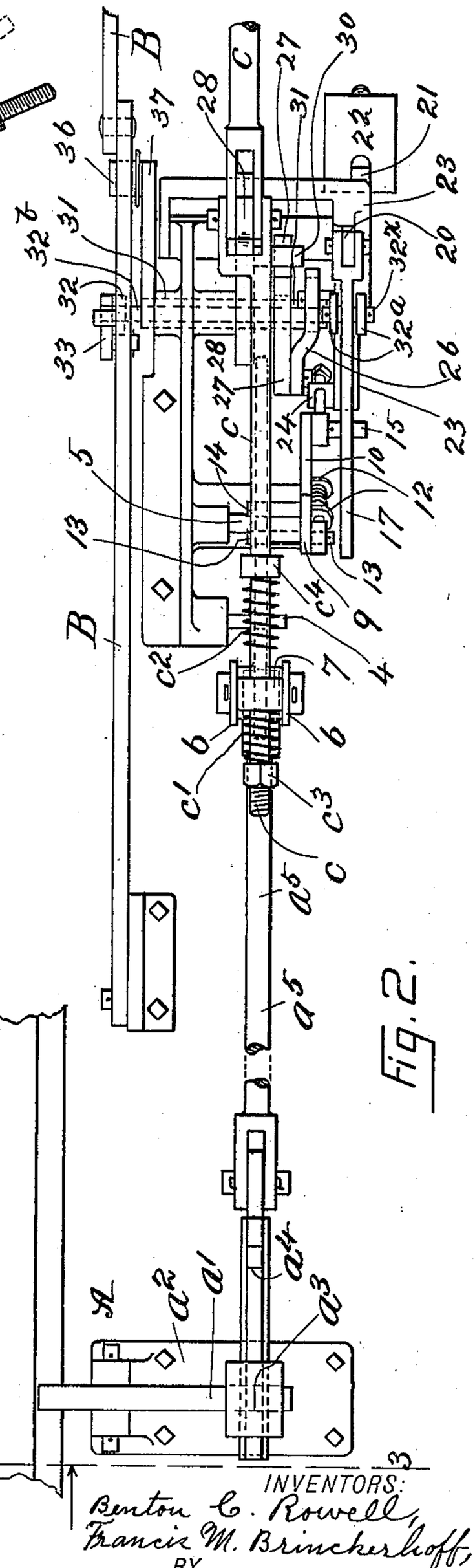

Fig. 2.

Fig. 3.

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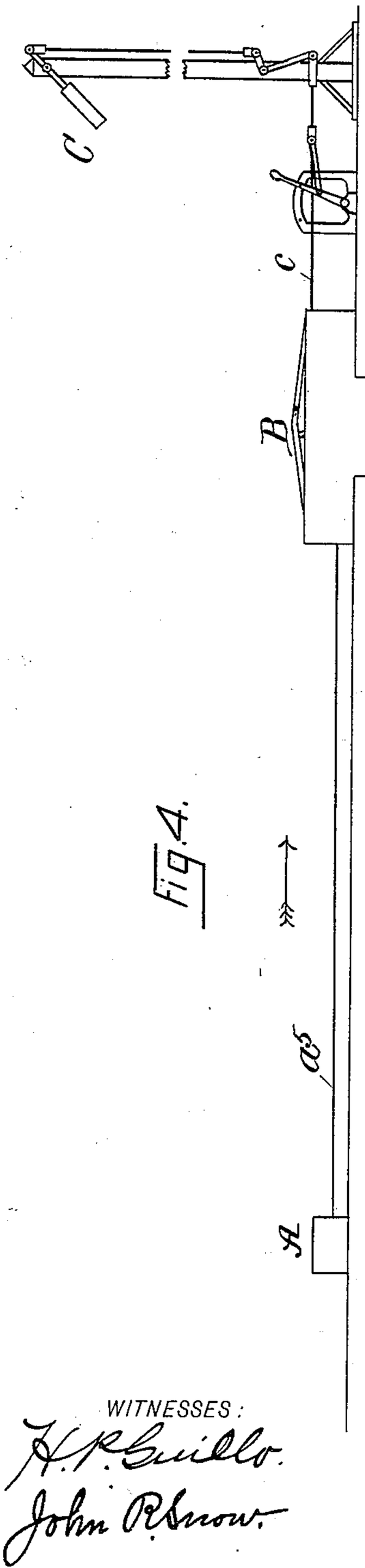

Fig. 4.

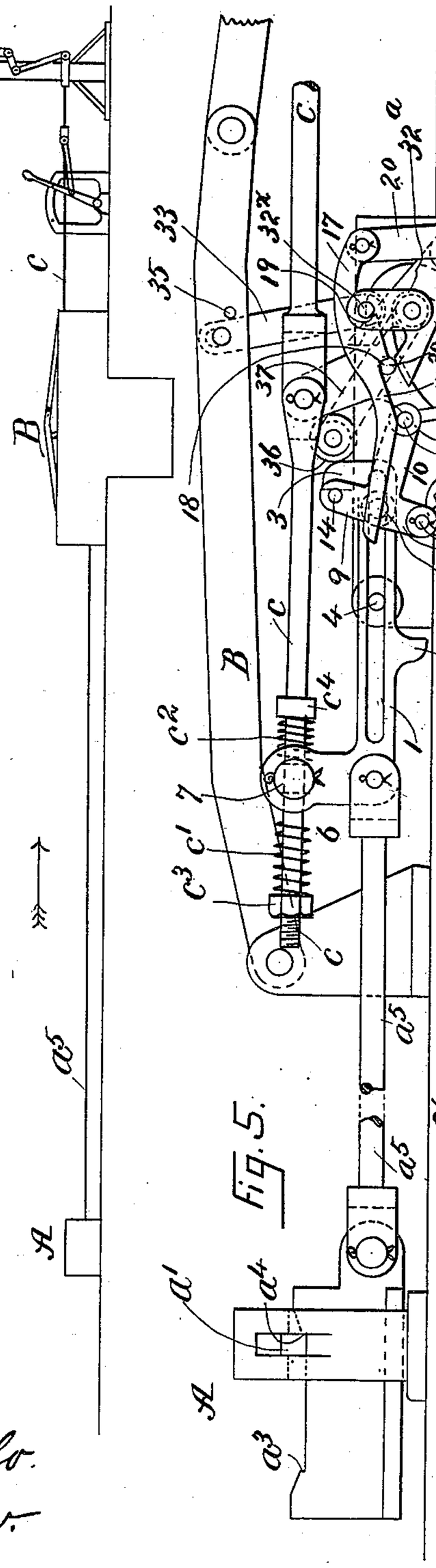

Fig. 5.

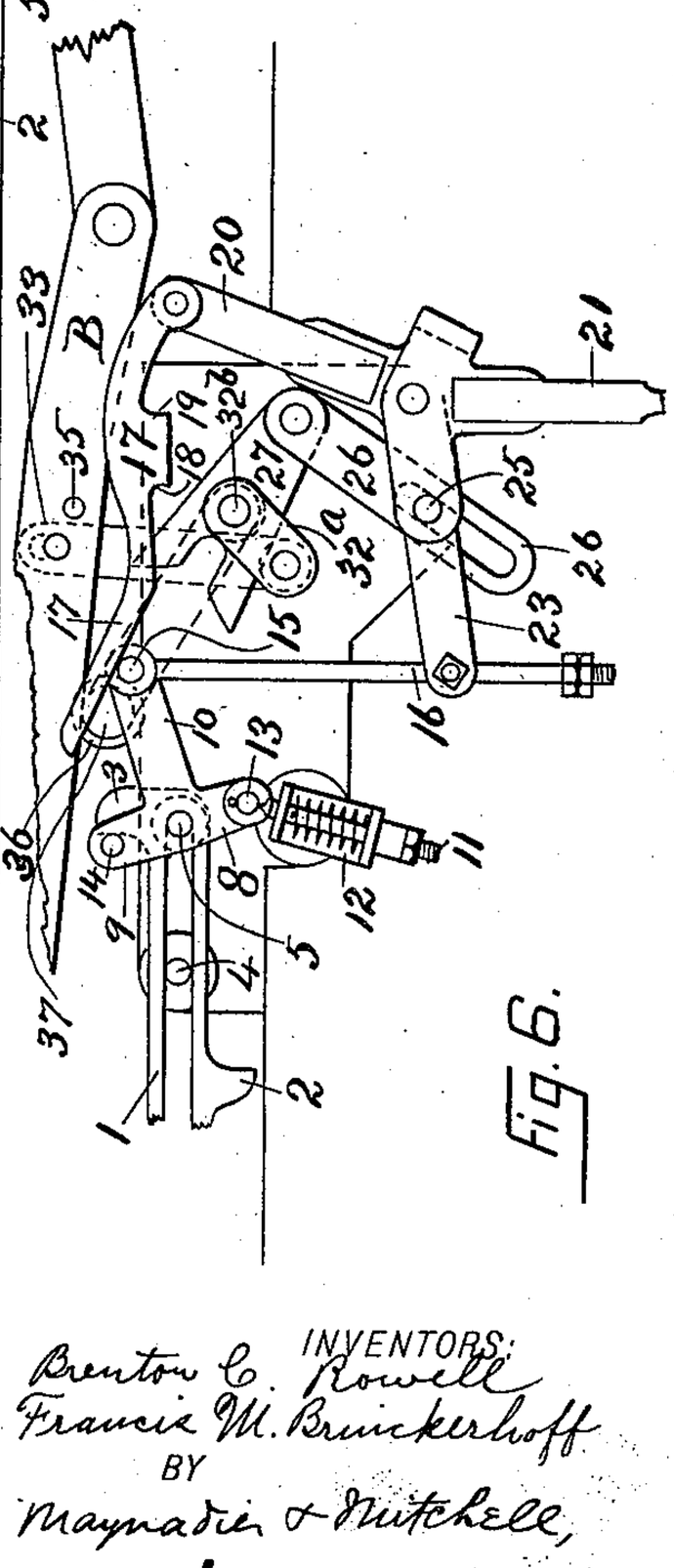

Fig. 6.

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UNITED STATES PATENT OFFICE.

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SPEED-CONTROLLING APPARATUS FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 607,767, dated July 19, 1898.

Application filed June 3, 1897. Serial No. 639,220. (No model.)

To all whom it may concern:

Be it known that we, BENTON C. ROWELL, of Boston, in the county of Suffolk and State of Massachusetts, and FRANCIS M. BRINCKERHOFF, of Chicago, Illinois, have invented an Improved Speed-Controlling Apparatus for Railways, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation of our improved apparatus. Fig. 2 is a plan of Fig. 1. Fig. 3 is an elevation on line 3 3 of Fig. 2. Fig. 4 shows the apparatus in diagrammatic form. Fig. 5 is like Fig. 1, but set in opposite position. Fig. 6 shows the apparatus when the safety-stop is lowered.

In an application filed July 6, 1896, Serial No. 598,158, is shown a speed-controlling apparatus for railways. The apparatus herein described is an improvement upon the apparatus described in the application above mentioned.

The first feature of our invention is a double-acting trip adapted to shift a safety-stop, signal, switch, or the like whenever the catch of the trip is moved clear of the detent.

A second feature of our invention is a setting mechanism adapted to set a mechanism controlling a signal or the like whichever way the setting-rod is moved.

A third feature of our invention is the combination of the improved trip and setting mechanism.

A fourth feature of our invention is a pendulum the beat of which regulates the time of operation of the apparatus and furnishes power to remove a stop and permit a signal to shift.

A fifth feature of our invention is the combination of two signals by means which will when the first signal is at "danger" allow the second signal to be moved without affecting the first signal and when the first signal is at "safety" connect the two signals, so that movement of the second signal will shift the first signal.

In the drawings, Fig. 4, we have shown our apparatus in diagrammatic form in order that the relation of the parts may be better understood. In that figure, A represents the trip at the entrance of the section of railway over which the speed of the train is to be controlled; B, the safety-stop and its governing mechanism, the said safety-stop acting on a roll which is fast to the stem of the air-release valve on the locomotive and setting the air-brakes in the usual way, and C a signal governed by the setting-rod of the apparatus. The arrow shows the direction of movement of the train.

At the entrance to the section is located a tripping-lever a', mounted at a right angle to the track upon a standard a^2 in such relation to the track that the wheel of a passing train will tip the lever. The opposite end of lever a' engages alternately detents a^3 a^4. The detents a^3 a^4 are connected by a rod a^5 with the governing mechanism of the safety-stop, which we employ as part of our apparatus, the said safety-stop being fully described in Letters Patent of the United States No. 217,144, dated July 1, 1879, and No. 444,962, dated January 20, 1891.

The connecting-rod a^5 is pinned to one end of a slotted rod 1, which moves upon studs 4 5, fast to the frame of the apparatus. Upon the upper and lower sides of rod 1 are hooks 2 3, for a purpose to be presently described. At one end of rod 1 is a forked standard 6, (see Fig. 2,) carrying a trunnion 7, through which passes one end of the setting-rod *c*. Pivoted upon stud 5 is a three-armed lever, the lower arm 8 of which is pinned to a spring-controlled rod 11 by a stud 13, which projects into the path of hook 2. The spring-controlled rod 11 is carried by trunnion 12. A stud 14 upon arm 9 projects into the path of hook 3. Arm 10 carries at its outer end a stud 15, which pins a pull-rod 16. Upon the stud 15 rests an arm 17, which is pinned at one end to an extension 20 of the pendulum-rod 21. Upon the under side of this arm 17 are two notches 18 and 19. The pendulum-rod 21 carries the weight 22, and a bell-crank arm 23 extends to one side of the pendulum-rod, the end of which arm carries a trunnion 24, in which works pull-rod 16. About midway of its length arm 23 carries a stud 25, which works in a slot in link 26, the upper end of link 26 being pinned to one end of escapement 27. A curved arm 28 is pivoted at

29 and carries a stud 30. Arm 28 is pinned at its upper end to setting-rod *c*. Escapement 27 is fast near its middle to sleeve 31. The arms 32^a 32^a are connected by shaft 32^b passing through sleeve 31. Arms 32 and 33 make up the toggle, the long arm 33 of which is pinned to one arm of the safety-stop B. The arm 32^a carries a stud $32^\times$.

A stop 35 is fast to one arm of the safety-stop and serves to prevent the toggle-arms from closing down upon that side on which the stop is secured. Two springs c' c^2 are mounted upon rod *c* and held by collars c^3 c^4, the other end of the springs abutting against the trunnion 7, the sides of which are flattened, as appears in Fig. 2.

The operation is as follows: Commencing with the mechanism as shown in Figs. 1 and 2, upon the entry of a train into the section lever a' will be tripped and spring c' will throw standard 6 and slotted rod 1 to the right, the end of lever a' resting upon the left end of detent-block a^3 a^4. Hook 2 will, through stud 13, tip the three-armed lever, in doing so compressing the spring-controlled rod 11 until the trunnion 12, upon which rod 11 is mounted, is sufficiently turned, when the spring will aid in tipping the three-armed lever. The stud 14 on arm 10 will by this action lift the arm 17 until the notch 19 is disengaged from stud $32^\times$. The pendulum is now at liberty to swing and swings to the left, and arm 17 is carried to the right past notch 18. As the pendulum swings back upon its return stroke arm 17 is pushed to the right until notch 18 strikes stud $32^\times$, turning shaft 32^b, to the other end of which toggle-arm 32 is fast, straightening the toggle-arms 32 33, and finally pushing the toggle-arms to the left until the safety-stop B falls and in so doing carries the stud $32^\times$ out of engagement with notch 18, when the end of arm 17 falls again upon stud 15, upon which it will ride until the pendulum has ceased to swing, while the safety-stop itself falls upon roll 36 upon arm 37, which is fast to sleeve 31. (See Fig. 6.) To reset the apparatus, setting-rod *c* is now pushed to the left, for the slotted rod 1 has been already thrown to the right so far that stud 4 now rests at the left end of the slot in rod 1. The two springs c' c^2 are after the operation of the apparatus uncompressed or balancing each other. The first effect of moving rod *c* to the left is to compress spring c^2 and then to push standard 6, slotted rod 1, connecting-rod a^5, and detent-block a^3 a^4 to the left until detent a^4 brings up against lever a', and further movement of rod *c* to the left fully compresses spring c^2. Rod *c* is held in its position at either end of its stroke by the shifting-lever and pin shown at the right of Fig. 4 or in any suitable way. In its movement to the left, above described, setting-rod *c* pushes curved arm 28 to the left, carrying stud 30 into the slot of escapement 27 and turning the escapement and the sleeve 31, to which it is fast, thus raising the roll 36 through arm 37, pushing the arms of safety-stop B into the raised or danger position, and drawing the toggle-arms 32 33 straight. The continued movement of rod *c* to the left carries roll 36 from under safety-stop B, and also carries stud 30 out of escapement 27, leaving roll 36 and arm 37 to the left instead of to the right. (See Fig. 5.) The turning of escapement 27 forces link 26 down and through stud 25 on bell-crank arm 23 forces the pendulum to the right and through pendulum extension 20 forces arm 17 to the left, arm 17 riding upon stud 15, which at the beginning of this action is in its most elevated position, the three-armed lever having been tipped at the beginning of the cycle of operations described; but the bell-crank arm 23 is connected at its outer end to pull-rod 16, and as the pendulum is set the three-armed lever is pulled back, the spring-controlled rod 11 finally setting and holding the three-armed lever in its original position. Just before escapement 27 becomes vertical, as it is pushed over by stud 30, the pendulum has been pushed to the point indicated in Fig. 1 in dotted lines. The movement of escapement 27 past the center serves to retract link 26, and the pendulum is lowered until notch 18 catches on stud $32^\times$, and the pendulum will now pull the toggle-arms over to the right until checked by stop 35, as shown. Continued movement of escapement 27 still further retracts link 26 until play is left for the movement of stud 25 in the slot of link 26 to allow the pendulum to swing. The pushing over to the left of slotted rod 1, which takes place when rod *c* is pushed to the left, as described, at the beginning of the setting operation, will carry hook 3 to the left in position to be in contact with stud 14 on arm 9 of the three-armed lever as soon as the three-armed lever is returned to its normal position, as shown in Fig. 1, by pull-rod 16 and spring-controlled rod 11. The apparatus is now again set as shown in Fig. 5. Upon the entrance of a train into the section the tripping of lever a' will release detent a^4, and spring c^2, which is now the operating-spring, will throw standard 6 and everything connected therewith to the left. The hook 3 on slotted rod 1 will in this operation tip the three-armed lever, releasing the pendulum as before. The resetting is the same as before, but the parts are moved in the opposite direction (see Fig. 6)—that is, rod *c* is moved to the right and stud 30 turns escapement 27 to the right, lifting safety-stop B by means of arm 37, fast to sleeve 31, to which the escapement is fast. The other parts operate as before.

We have shown in Fig. 4 a signal attached to the setting-rod of our apparatus. It will be clear from the foregoing that after the apparatus is set the setting-rod may be moved in either direction to shift the signal without in any way affecting the operation of the apparatus, which will remain set until released by the tripping of the lever a'. The only

effect of moving the rod *c* from left to right, or vice versa, is to make spring *c'* or spring c^2 operative, as the case may be, and to shift detent-block a^3 a^4 and the connected parts, with the result that hook b^2 will operate to tip the three-armed lever if the rod *c* is carried to the right and hook 3 will operate to tip the three-armed lever if rod *c* is carried to the left. One advantage of this is that where our speed-controller is used to control the approach to a railway-station trains starting from that station may back into the station from the other direction and the signal connected with the apparatus be set to protect the rear of the train without disturbing the apparatus, while if a train passes over the trip the signal cannot be moved to "danger" behind the train as the train passes without again setting the apparatus. In short, the apparatus is so devised that when it is unset the movement of the setting-rod, in either direction will reset it, while when it is set no movement of the setting-rod will affect it.

It will be obvious that the pendulum employed in our apparatus performs a double function—namely, that of regulating the operating time of the apparatus by its beats and as a weight hung up to develop power in falling, the power being employed to knock the toggle-arms from under the safety-stop by notch 18 on arm 17 as the pendulum swings.

It will now be clear that the controlling-rod of our apparatus is under spring tension tending to move it endwise, but held by the catch and the opposed detents, so that the spring tension tending to move the controlling-rod to the right may be released and the spring tension tending to move it to the left may be applied, and vice versa, without lifting the catch, and this is one feature of our invention, its advantage being that the controlling-rod is always free to be moved in either direction endwise so far as the opposed detents will allow, and yet when the catch is lifted the spring tension will move the controlling-rod and cause it to do its work, which may be shifting a safety-stop, as shown, or shifting a switch or other work, as is obvious. After the catch is lifted the controlling-rod must be again brought under the control of the opposed detents, the catch, and the opposed springs, and this is done by simply restoring the spring tension; but as lifting the catch causes the controlling-rod to start an appropriate mechanism it is necessary that that mechanism be reset in order that it may be again started when the catch is again released. The resetting of that mechanism is accomplished by the endwise motion of the setting-rod in either direction, and yet after that mechanism is once set the setting-rod can be moved endwise in either direction without affecting that mechanism, and this is a second feature of our invention, its advantage being that the setting-rod may be used to control a second signal, switch, or for other work, and also that the mechanism for controlling the safety-stop or the like is always sure to be reset.

In order that the desired time may elapse between the lifting of the catch and the shifting of the safety-stop, we have devised a pendulum mechanism in which the pendulum, when released, first swings and on its return swing knocks a stop or prop out of the way, and thereby causes the safety-stop to shift. The distinguishing characteristic of this feature of our invention is that the pendulum not only acts as a falling weight to drive a mechanism, but also acts as a true pendulum.

The main purpose of our apparatus is to connect a safety-stop and a second signal or a switch and signal or two signals of any kind, so that shifting one shall put the other under control of an automatic trip and so long as one is controlled by the automatic trip leave the other free to be moved without affecting the signal controlled by the automatic trip. In the apparatus as shown the safety-stop is under control of the automatic trip; but whenever it is released from that control is brought again under that control by shifting the semaphore-signal, which is under control of the setting-rod. The advantages of this construction have been fully explained above.

What we claim is—

1. The tripping mechanism consisting of an operating-rod; opposed springs controlling said rod; opposed detents upon said rod; a catch between said detents; opposed hooks upon said rod; and arms, each in the path of one of the hooks, all organized so that one of the hooks will engage one of the arms when the catch is released, substantially as described.

2. The setting mechanism consisting of a setting-rod; an arm pinned to that rod; an escapement; a pin upon the arm adapted to turn the escapement when the arm is moved by the setting-rod; a second arm connected to the escapement and adapted to move the signal, all organized and operating substantially as described.

3. The time-weight mechanism consisting of a setting-rod; an arm pinned to that rod; an escapement; a pin upon the arm adapted to turn the escapement when the arm is moved by the setting-rod; a link pinned to the escapement; a bell-crank lever fast to the pendulum; a pin connecting the bell-crank lever and the link; the pendulum; the pendulum-rod extension; an arm pinned to the top of that extension and having opposed notches and a stop with which one of the notches normally engages to hold the pendulum set and which is knocked out of stopping position by the other notch as the pendulum swings when released, to permit a signal, controlled by the stop, to shift, substantially as described.

4. The speed-controlling apparatus above described consisting of a catch operated by a passing train and at the entrance of the sec-

tion over which the speed is to be controlled; an operating-rod carrying opposed detents controlled by the catch; those detents; a setting-rod carrying opposed springs controlling the operating-rod; those springs; an escapement; a safety-stop; a pendulum; means whereby motion of the setting-rod will actuate the escapement and lift the safety-stop and set the pendulum.

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