(No Model.) 2 Sheets—Sheet 1.

J. CHANDLER.

SAFETY LOCK AND SWITCH SYSTEM FOR RAILWAYS.

No. 438,604. Patented Oct. 21, 1890.

FIG. 1.

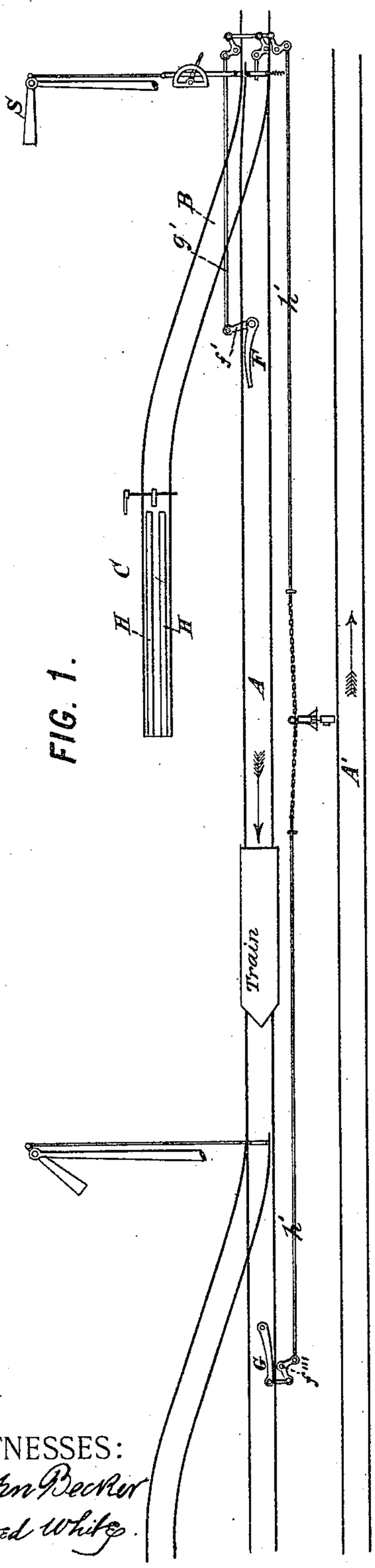

FIG. 3.

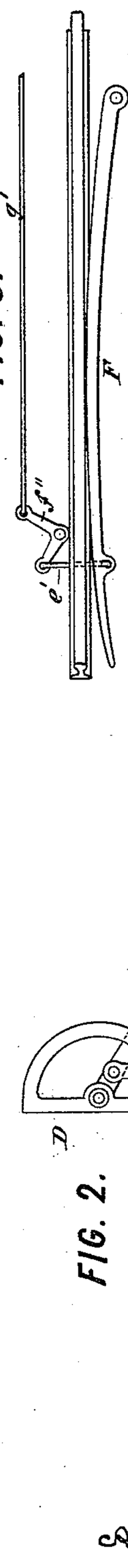

FIG. 4.

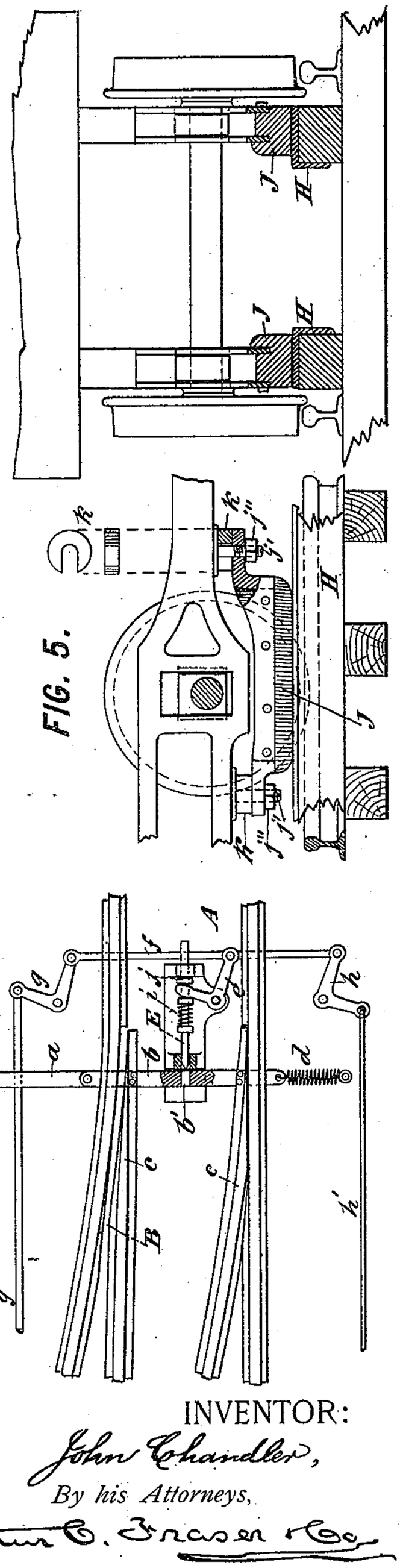

FIG. 5.

FIG. 2.

WITNESSES:
John Becker
Fred Whitop.

INVENTOR:
John Chandler,
By his Attorneys,
Arthur O. Fraser & Co.

(No Model.) 2 Sheets—Sheet 2.

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FIG. 8.

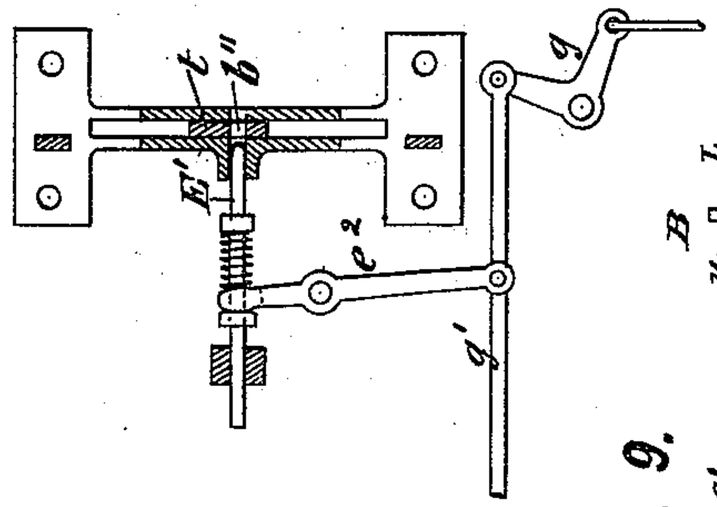


FIG. 7.

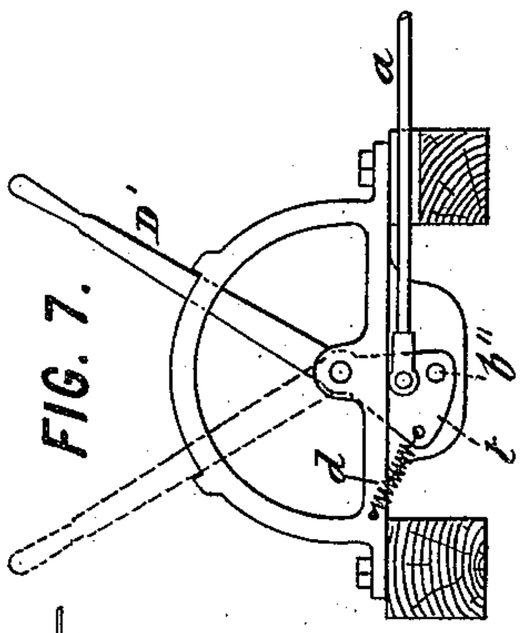


FIG. 6.

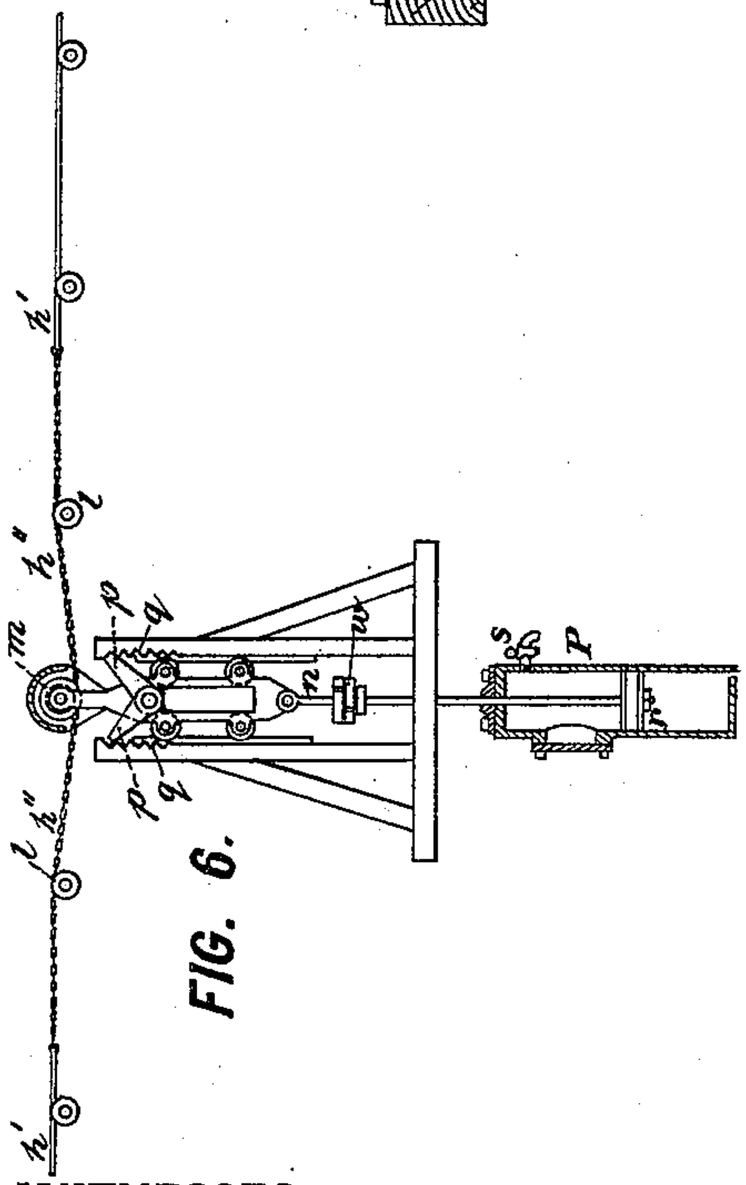


FIG. 9.

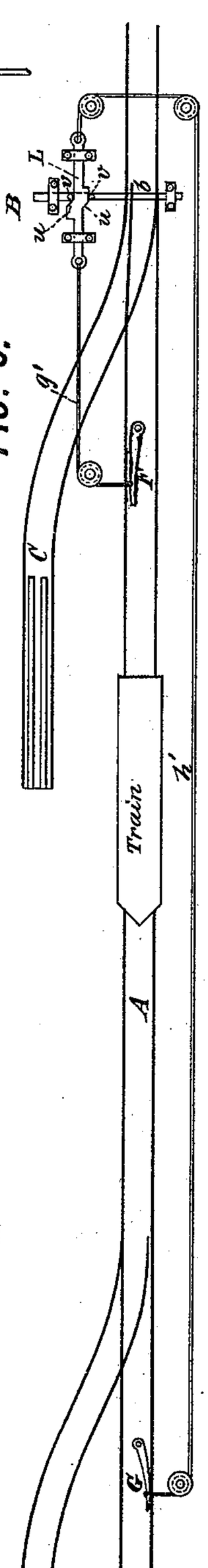


FIG. 11.

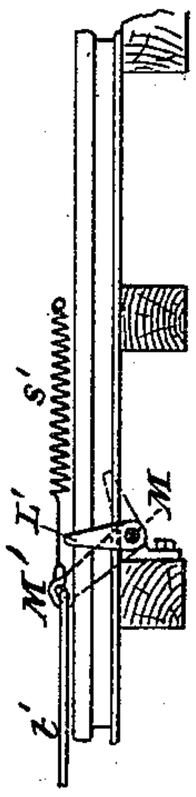
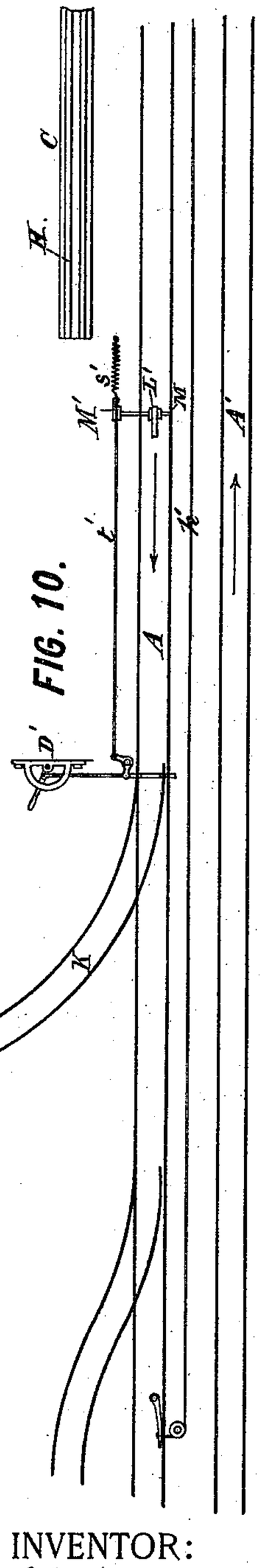


FIG. 10.



WITNESSES:
John Becker
Fred Whitey

INVENTOR:
John Chandler,
By his Attorneys,
Arthur G. Brazer & Co.

UNITED STATES PATENT OFFICE.

JOHN CHANDLER, OF BROOKLYN, NEW YORK.

SAFETY-LOCK AND SWITCH SYSTEM FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 438,604, dated October 21, 1890.

Application filed January 10, 1890. Serial No. 336,571. (No model.)

To all whom it may concern:

Be it known that I, JOHN CHANDLER, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Safety-Lock and Switch System for Railways, of which the following is a specification.

The principal object of this invention is to prevent collisions between trains following one another on the same track. To this end the track is divided into blocks or sections at the beginning of which is arranged a switch or side-track called a "safety-siding." The arrangement is such that if a train follows too closely after another it will upon entering a block from which the preceding train has not yet passed off be shunted off from the main line onto the safety-siding, where it will be stopped.

The invention relates, also, to means for stopping the train after it has been guided onto the safety-siding.

It also relates to the details for locking and unlocking the switches leading to the safety-sidings and to means for automatically taking up slack in the connecting rods, wires, or chains by which the switches, signals, or other apparatus are operated from distant points along the track.

Figure 1 of the accompanying drawings is a plan, on a small scale, of a section of double-track railway, to one track of which my invention is applied. Fig. 2 is a plan, on a larger scale, of the switch-locking mechanism. Fig. 3 is a plan, on a larger scale, of one form of track-treadle for operating the switch-locks and signals. Fig. 4 is a transverse section of the safety-siding with a fragment of an engine thereon. Fig. 5 is a fragmentary longitudinal section of the safety side-track and locomotive, showing one method of equipping the latter. Fig. 6 is a vertical side elevation, partly in mid-section, of the device for taking up the slack in the connecting wires or chains. Fig. 7 is a side elevation, and Fig. 8 a horizontal section, of a modified construction of the switch-lock. Figs. 9 and 10 are plan views showing modifications, and Fig. 11 is an enlarged fragmentary longitudinal section of the track shown in Fig. 10.

In Fig. 1, A designates, for example, the up-track, and A′ the down-track, of a double-track railway. The track A is shown provided with my invention, it being understood that in practice the track A′ will be equipped in like manner. The track A is divided into blocks or sections of any suitable length—as, for example, one or two miles. At the beginning of each section is constructed a switch B, opening into a safety-siding C, arranged to extend along the main track or in any other direction. The switch B is of any usual construction, being, however, preferably provided with a spring or weight arranged to cause it to stand normally open from the main track to the siding, so that a train moving along the track A in the direction of the arrow will be shunted onto the siding C unless the switchman stands at the switch and holds it open to the main line until the train has passed. It is designed that there should be a switchman at each block, who shall thus manually hold the switch open at the passage of each train. As soon as the train has passed the switch and the switchman has released it, it becomes automatically locked in position until the train enters upon the next block beyond, whereupon the switch is automatically unlocked, so that it may be opened again to the main line for the passage of the next succeeding train.

One suitable construction of switch and locking device is shown in Fig. 2. D is the switch-stand, having a hand-lever or other means for operating the switch connected by a rod *a* to the tie-bar *b*, connecting the movable rails or tongues *c c*. The switch is normally held open to the siding by a spring *d*, applied either to the bar *b*, as shown, or to any other convenient part of the apparatus. When the switch is in this position, a hole *b′* in the bar *b* stands in coincidence with a sliding bolt E, so that this bolt may enter it. The bolt is operated by an elbow-lever *e*, one arm of which engages the bolt and the other arm of which connects through a rod *f* with two elbow-levers *g* and *h*. The lever *g* connects by a rod *g′* to a track lever or treadle device F, arranged on the main track A sufficiently far beyond the switch B to be encountered by the locomotive after the last car of the train shall have passed over the switch.

This track-lever is preferably a bar pivoted alongside the track and normally standing close against the rail in such position that upon the passage of the flanges of the wheels between it and the rail it will be pressed back away from the rail, and in so doing will pull the rod g'. To this end it may be formed with an arm f', as shown in Fig. 1, or it may be connected by a rod e' to an elbow-lever f'', as shown in Fig. 3, or any other construction of lever or track-treadle or any other known mechanism arranged along or upon a railway-track and constructed to be displaced upon the passage of a train may be substituted for the construction shown as the mechanical equivalent thereof.

The elbow-lever h connects by a rod h' to a track treadle, lever, or other equivalent device G, as shown in Fig. 1. This device is located at or near, or preferably just beyond, the beginning of the next succeeding block or section.

When the train, having passed over the switch B, acts upon the treadle F, it communicates motion by pulling through the rod g', elbow-lever g, and rod f, and thereby tilting the lever e and shooting the bolt E into engagement with the rod b, whereby the switch is locked. If the train be unusually long, so that the last car has not yet passed the switch, or if for any other reason the switchman is still holding the switch open to the main line, the bolt E will not be shot, because the hole b is not in coincidence with it, but the lever e will act to compress a spring i, through which its action is transmitted to the bolt, and immediately upon the return of the switch to its normal position the bolt will be shot by the tension of this spring. The spring i is not strong enough to overcome the friction and inertia of the parts between the treadle F and the bolt E. When the train passes out of this block and onto the next succeeding block, it acts upon the treadle G and by displacing it pulls through elbow-lever f''' the rod h', elbow-lever h, and rod f upon the lever e, tilting the latter in the opposite direction and causing it to act upon a projection j on the bolt to retract the latter and unlock the switch. The switch may then be opened whenever the following train approaches.

In case the following train arrives at the switch before it is unlocked the switchman is unable to open the switch to let the train proceed on the main track, and the train being warned by some suitable signal that the switch is set to the siding will ordinarily come to a stop. This signal will ordinarily consist of a semaphore S, Fig. 1, connected to and operated by the switch-lever in any manner known in the art. In case the train does not stop by reason of negligence on the part of the engineer, or because the train is beyond his control, or for any other reason, it will be shunted onto the side track C. This track may be made long enough to enable the train to be stopped in the ordinary way, or it may be constructed with an upgrade sufficient to insure the stopping of the train. This is shown in my patent, No. 254,863, dated March 14, 1882. I prefer, however, that it shall be provided with special means for stopping the train, which means constitute part of my present invention. These means consist of rails or stringers H H laid along the track, either alongside the track-rails, as shown in Figs. 1 and 4, or in any suitable position which can lift the wheels of the locomotive or of the cars more or less from the rails, and transfer, consequently, a greater or less proportion of the weight of the locomotive or cars from the wheels to these rails or stringers, along which the locomotive or cars will slide until by friction thereagainst they are brought to rest. The locomotive or the cars are provided with runners constructed, for example, as shown in Fig. 5, where a runner J is shown applied to the locomotive adjacent to one of the driving-wheels. These runners J are arranged to encounter the rails H H and slide upon them. They are fastened to the frame of the locomotive or car by screws or bolts j' j', having nuts j'' j'', which clamp them against blocks k k. When the train has been stopped by sliding on these runners, it is necessary to release it therefrom and lower its wheels onto the rails again, which is done by jacking up the frame of the engine or cars, releasing the nuts j' and taking out the blocks k, so that when the engine or car is let down onto its wheels again its weight will be borne by its wheels and not by the runners J, after which it may be backed off from the side track. This feature of my invention will come into play only in case of a runaway locomotive or of a train running at an unusual speed, or when the breaks fail to operate, or in case of the death or disability of the engineer, and, in short, under only those circumstances which would ordinarily result in disaster unless the train were thus stopped.

In place of the rods g' h', wires, chains, or or any other suitable connections may be substituted.

In practice it is found in the case of all such connections as rods or chains g' h', extending for long distances along a railway-track that there is more or less difficulty experienced from the elongation or slackening of the connection. This difficulty is found in the operation of switches at long distances from a switch-house through the intervention of rods or wires and in the operation of signals at a distance through wires or other connections. To automatically take up the slack or elongation in such connections, I have devised the construction shown in Fig. 6. The rod or other connection is here lettered h'. A portion of the connection is made flexible, preferably, by constructing it as a chain h'', which passes over sheaves l l and under a roller or sheave m, which latter roller is movable up and down. A weight w is so hung as to pull

downwardly upon the roller m, and thereby draw the chain h'' out of line, its deflection being sufficient to take up the slack. The weight w is hung to the pulley by a rod n, to which are connected two pawls $p\ p$, which are pressed outwardly by springs into engagement with the teeth of racks $q\ q$. The weight w is so adjusted that it will afford sufficient tension to take up the slack in the connector h' without exerting sufficient force to move either the switch-lock E or the track-treadle or other device G, or any other device that may be at opposite ends of the connector h'. When the weight has drawn the pulley m down sufficiently to take up the slack, the reascent of the pulley when the connector h' is pulled is prevented by the pawls $p\ p$, one or other or both of which will be in engagement with their racks. In order to prevent too quick a descent of the weight, which would cause it to take up any relaxing movement of the connector h' due to other causes than the elongation or slackness thereof, and which would result in a failure to transmit such relaxing movement to the opposite end of the connector, I provide the device with a dash-pot P, consisting of a fixed cylinder, which may be open or vented at its lower end, in which a suitably-packed piston r works, its piston-rod being a prolongation of the rod n, passing through a stuffing-box in the upper end of the cylinder, and the rapidity of the flow of air into the latter being determined by a stop-cock s, applied to an inlet-pipe. The dash-pot is so adjusted that the descent of the weights and pulley m is necessarily too slow to respond to any movement except that due to the gradual elongation or slackening of the connector h'.

Figs. 7 and 8 show a construction wherein instead of locking the switch-rod b the operating-lever of the switch is locked. The bolt E′ is operated by a lever e^2, which is connected to the rod or connection g', and which will also be connected, as shown in Fig. 2, through elbow-levers $g\ h$ to the connector h'. The hand-lever D′, which is connected by the rod a to the switch and is normally retracted by a spring d, as shown in Fig. 7, is formed with a web t, in which is formed a hole b'', to be entered by the bolt E′, as shown in Fig. 8. The result of this construction is the same as that of the construction first described.

Fig. 9 shows a modification of my invention, wherein the switch is both shifted and locked automatically by the displacement of the treadles F G by the moving train. When the train reaches the treadle F and displaces it, the consequent pull on the connector g' slides a bar L to the position shown, so that its cam-surfaces $u\ u$, acting on pins $v\ v$ on the switch-bar b, shift the switch-bar, and thereby open the switch to the siding C, where it remains locked until the train passes onto the block ahead, and in so doing displaces the treadle G, which pulls the connector h', and thereby draws the bar L back to its original position, so that its cams act upon the pins v and slide the bar b back to open the switch to the main line ready for the next following train.

Fig. 10 shows the arrangement that I prefer to use in connection with a switch or siding on which trains are to be run to be loaded or unloaded, such as those at stations in freight-yards and coal-yards. K is this switch branching off from the track A. In the use of such a switch if the train is to be run onto it for a short time only and be backed onto the main track before another train is due it will not interfere with the block-signaling; but if a train is to stand for some time on the switch it is necessary then to operate the block-signals by hand, in order to clear the line for the next following train. If, then, the train on the switch were to back onto the main track at a time when another train was approaching a collision might ensue. To avoid this I provide a means for stopping the train running on the main line in case the switch K is open. To this end a lever L′, mounted on a shaft M, as best shown in Fig. 11, is arranged transversely beneath the track at any suitable distance from the switch, so that when turned up the lever L will project high enough to operate any suitable sort of train-stopping devices on the locomotive or cars—such, for example, as by shutting off the steam or operating the air-brakes—and when turned down it shall be so low as to be out of engagement with such devices. Such train-stopping devices are already known in the art, being illustrated in my patents, Nos. 273,465, of March 6, 1883, and 283,754, of August 28, 1883. The lever is turned up or down by means of a rod or chain t', connecting the crank M′ on the shaft M with the switch-stand D′ or other moving part of the switch K in such manner that when the switch is open the lever L shall be thrown up and when the switch is closed it shall be turned down. The lever may be moved in one direction by the pull of the rod or chain t' and in the opposite direction by the spring s'. So long as the switch K is closed the main line is complete and the operation is the same as though there were no switch, but when the switch is open the lever-arm L′ projects upwardly in position to arrest any train that may attempt to pass.

I claim as my invention the following defined novel features and improvements, substantially as hereinbefore specified, namely:

1. The combination, with a main track and a switch leading from it, of a track-treadle on the main track beyond the switch, connected to the latter and adapted on being displaced by the passage of a train that has traversed the switch to actuate parts of the latter to prevent its being opened to the main track, so that a following train unless stopped would be shunted from the main track, and a second treadle on the main track at a distance beyond the first, connected to said switch and con-

structed on being displaced by the passage of a train to replace the parts of the switch, so that a following train subsequently passing the switch may continue on the main track.

2. The combination, with a main track and a switch leading from it, of a lock for fastening said switch in position to shunt a train from the main track, a track-treadle on the main track beyond the switch, connected to said lock to operate the latter and lock the switch on the treadle being displaced, and a second treadle on the main track at a distance beyond the first, connected to said lock and constructed on being displaced by the passage of a train to unlock the switch.

3. The combination, with a main track, a switch leading from it, and a safety-siding with which said switch communicates, of means applied to said siding for stopping the train shunted thereonto, a lock for fastening said switch in a position to direct a train onto said siding, a track-treadle on the main track beyond the switch, connected to said lock and adapted on being displaced to operate said lock and lock the switch, and a second treadle on the main track beyond the first, connected to said lock and constructed on being displaced to unlock the switch.

4. The combination, with a main track, a switch leading from it, and a safety-siding with which said switch communicates, of means tending normally to set said switch to said siding, a lock for locking it in said position, a treadle on the main track for applying said lock, and a second treadle beyond the first for withdrawing said lock.

5. The combination, with a main track, a switch leading from it, and a safety-siding, of means for stopping a train shunted onto said siding, said means consisting of lifting rails or stringers H H and runners J J, applied to the locomotive or cars and constructed relatively so that when the runners encounter the rails H H they shall be lifted thereby and the weight of the locomotive or car be transferred wholly or in part from the wheels to said runners, the frictional contact of which with the rails H H will stop the train.

6. The combination, with a safety-siding having rails or stringers H H, of a locomotive or car having runners J J adapted to ride on said rails H H and a connector between said runners and the frame of the locomotive or car, constructed to admit of the raising of the runners to retransfer the weight of the locomotive or car to its wheels, and thereby to enable it to be run off from the safety-siding.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN CHANDLER.

Witnesses:
GEORGE H. FRASER,
FRED WHITE.