(No Model.) 5 Sheets—Sheet 1.

T. W. BURT.

AUTOMATIC BLOCK SIGNALING APPARATUS.

No. 342,860. Patented June 1, 1886.

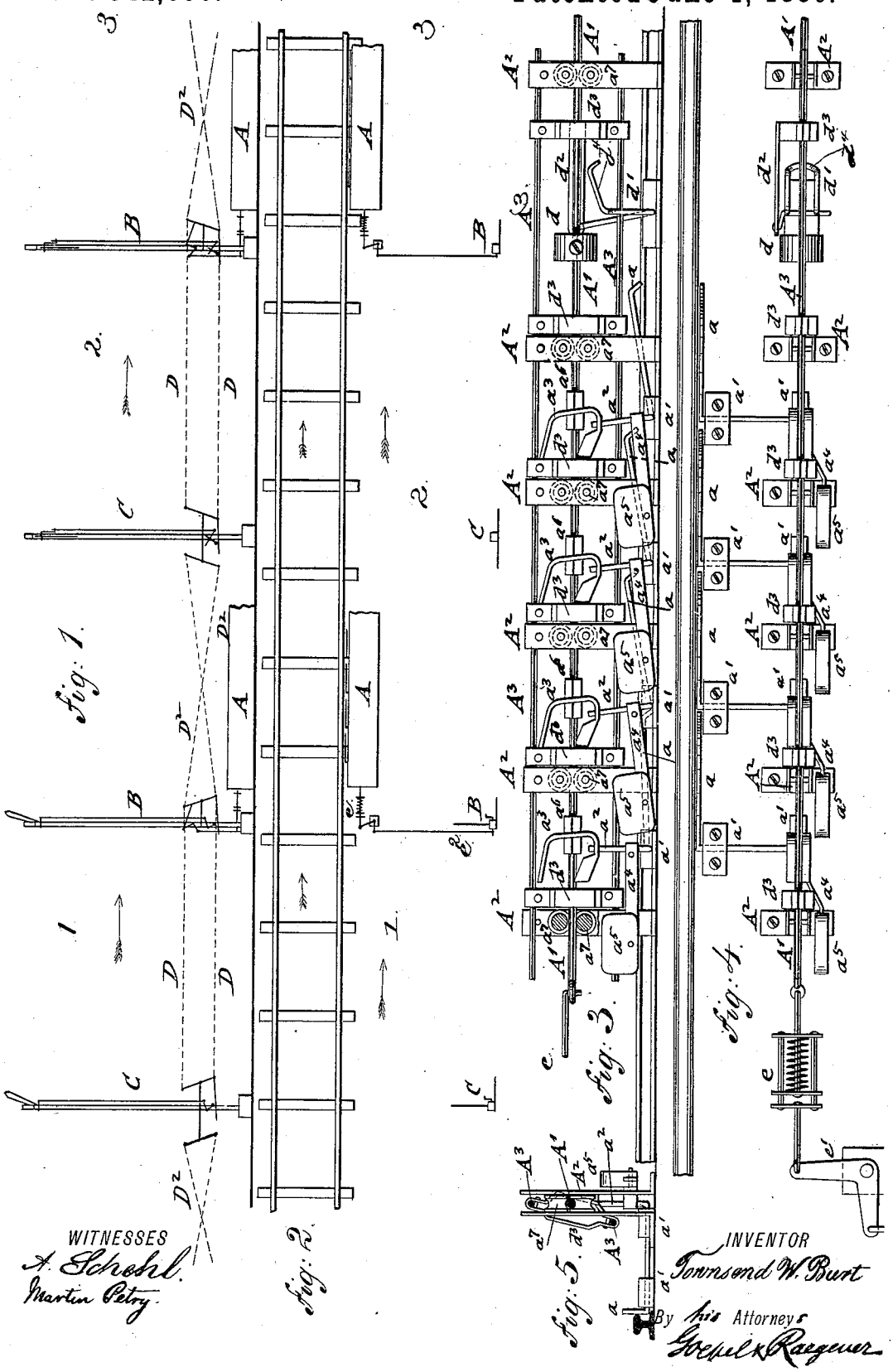

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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T. W. BURT.

AUTOMATIC BLOCK SIGNALING APPARATUS.

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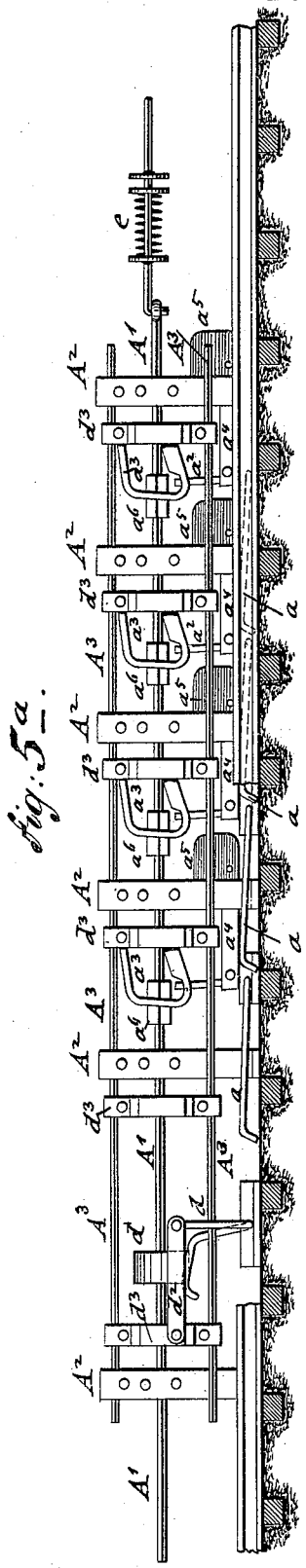

Fig. 5a.

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T. W. BURT.

AUTOMATIC BLOCK SIGNALING APPARATUS.

No. 342,860. Patented June 1, 1886.

Fig. 5b.

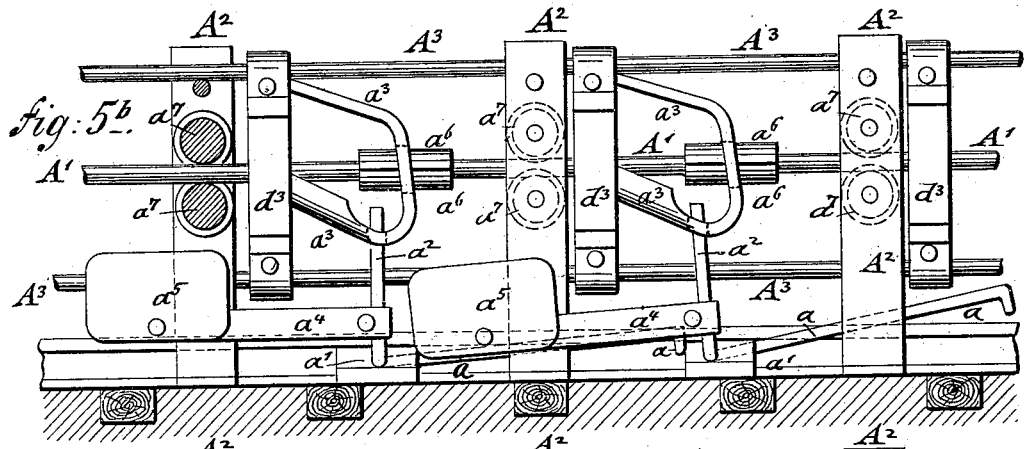


Fig. 5c.

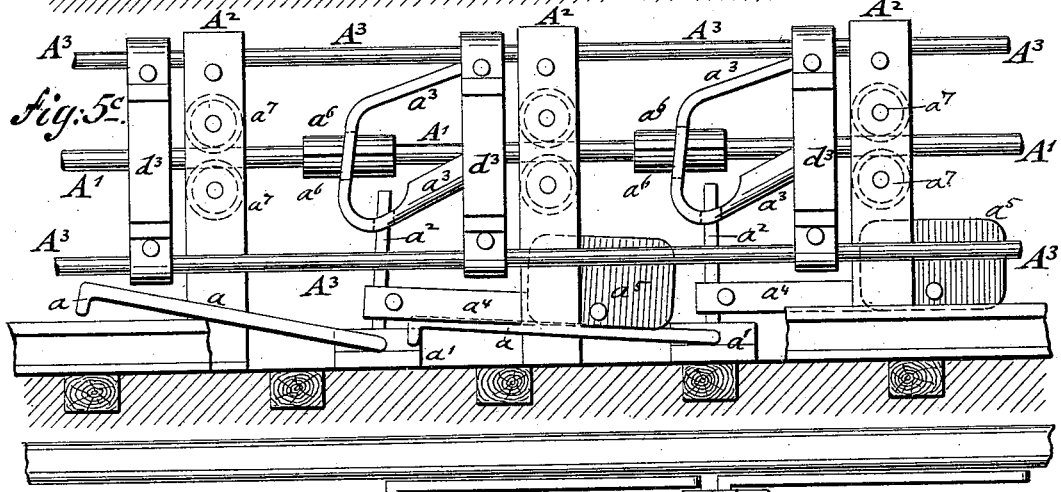


Fig. 5d.

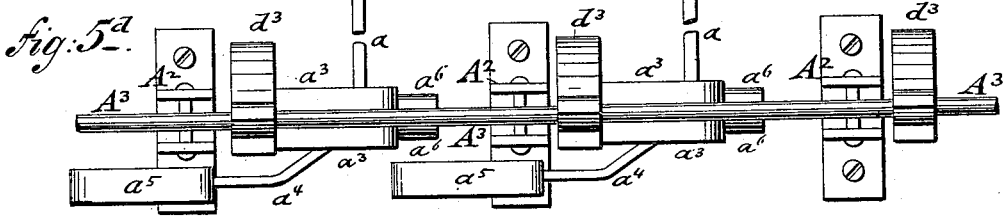
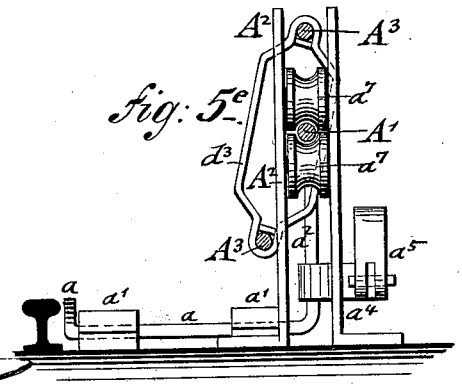


Fig. 5e.



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AUTOMATIC BLOCK SIGNALING APPARATUS.

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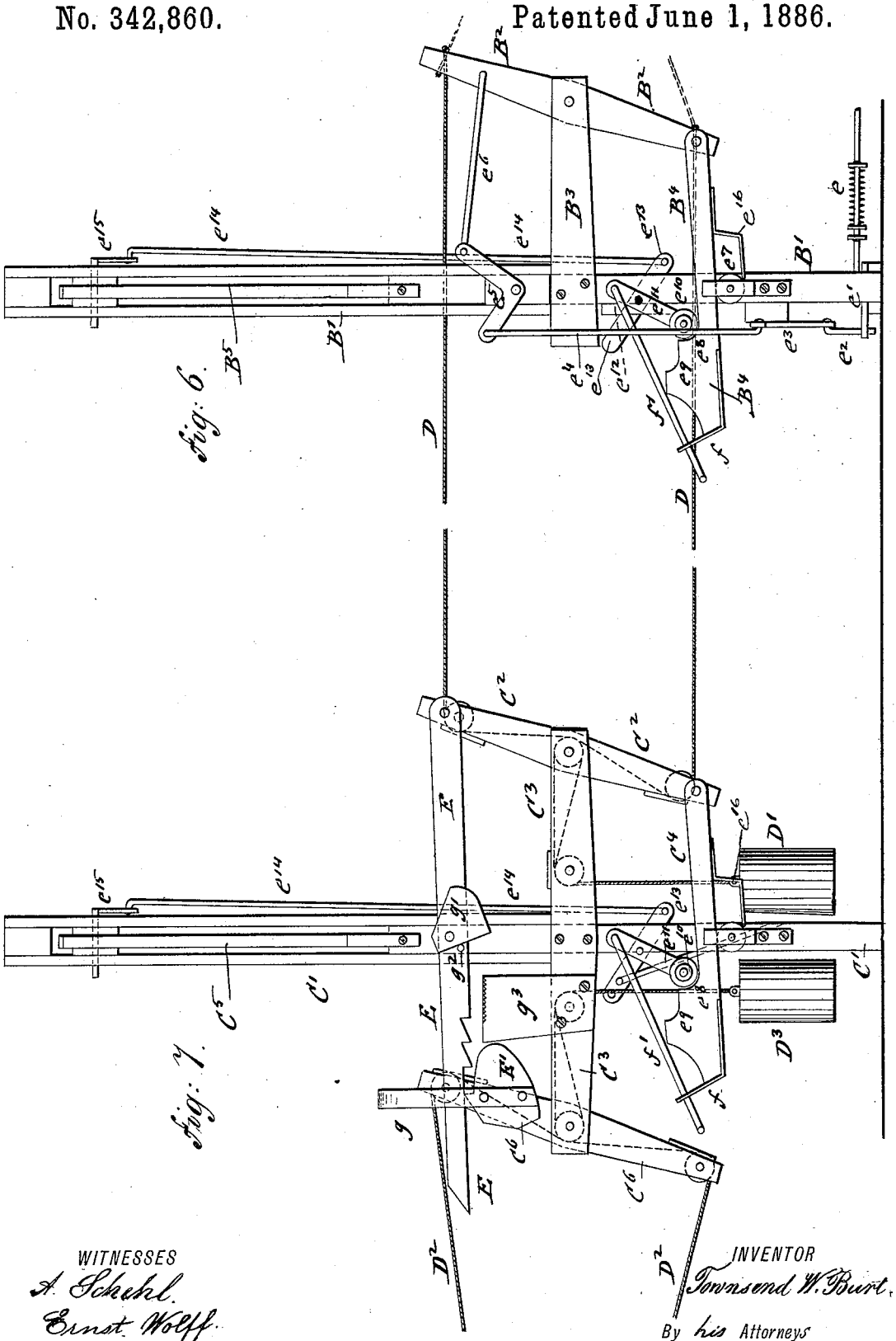

Fig. 6.

Fig. 7.

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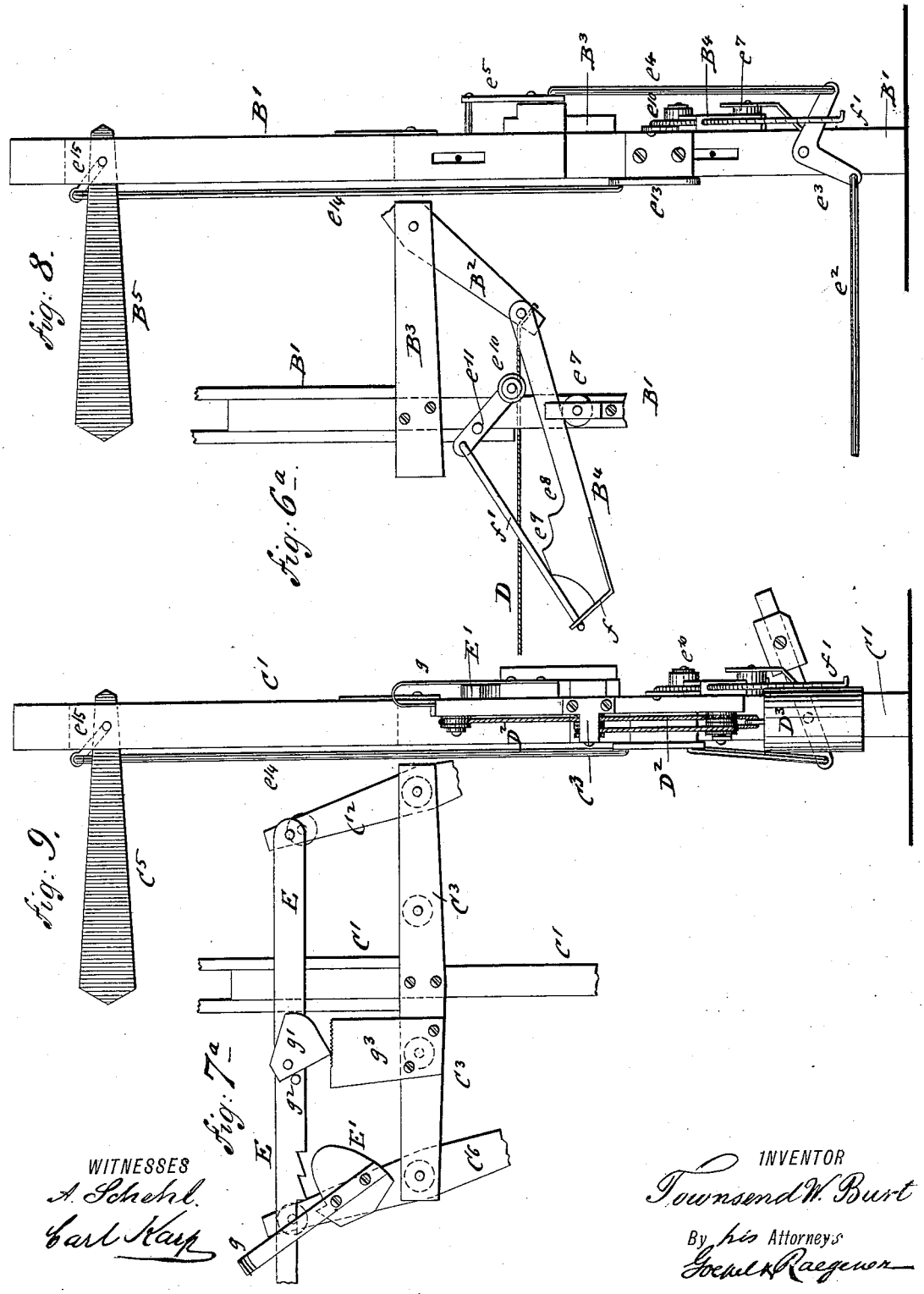

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UNITED STATES PATENT OFFICE.

TOWNSEND W. BURT, OF MINEOLA, NEW YORK.

AUTOMATIC BLOCK-SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 342,860, dated June 1, 1886.

Application filed May 20, 1885. Serial No. 166,078. (No model.)

To all whom it may concern:

Be it known that I, TOWNSEND W. BURT, of Mineola, Queens county, State of New York, have invented certain new and useful Improvements in Automatic Block-Signaling Apparatus, of which the following is a specification.

My invention has reference to an automatic block-signaling apparatus; and it consists of the combination of the several elements or parts, and in the peculiar construction and arrangement of the parts of the elements, substantially as hereinafter fully set forth, and specifically pointed out in the claims.

Heretofore in this art it has been proposed to provide a single rock-lever to be acted on by a passing train to instantaneously operate the signal; but this device is objectionable, for the reason that when the lever is suddenly operated on by the train it or the parts connected to the signal are liable to become broken or strained, and consequently they soon get out of order and become useless.

In my improved apparatus I provide a setting device, which has a movable setting-rod that is fed forward with a step-by-step motion, and the signals are connected by intermediate lever mechanism with this setting-rod, and are consequently elevated slowly with a step-by-step motion, whereby sudden strain, jerks, or jars on the operative parts of the device are avoided, the apparatus rendered more durable in construction, and more reliable and effective in operation. Each block consists, essentially, of a home and distant signal, and the said signals are connected together by cables for the simultaneous operation thereof. The home signal of each block has a setting apparatus connected thereto, and the distant signal of each block is provided with a transmitting device that is connected by cables with the home signal of the block in rear thereof, whereby when a train passes a home signal of one block it will operate the setting apparatus connected thereto and display the semaphore-signals to "danger," and it will simultaneously lower the signals of the block in rear thereof when the signals of said rear block have been previously set to "danger."

The setting apparatus above referred to is so constructed that when the signals of a block have been set at "danger" by one train the said signals will not be lowered in case a train should pass the block having said danger-signals exposed, thereby signifying that a train has passed a block which had its danger-signals displayed at the time the train passed through it, one of the peculiar and important features of my invention being that the signals of one block cannot be lowered to "safety" until a train enters and operates the signals of the block ahead to "danger."

My invention is designed for use in connection with a double-track railroad exclusively—that is to say, with a railroad having two tracks, on one of which all the trains traveling in one direction pass, and on the other travel all the trains moving in the reverse or opposite direction; but in the accompanying drawings and following description I have shown and described only one of the tracks and the system of signals to be used in connection therewith, it being understood that each track is provided with my improved block-signal apparatus.

In the accompanying drawings, Figure 1 represents a diagram showing the signaling devices of two adjoining blocks in elevation. Fig. 2 is a plan of Fig. 1. Figs. 3, 4, and 5 are respectively a side elevation, a plan, and a vertical transverse section of the setting apparatus operated by the wheels of the locomotive for setting the signaling devices. Fig. 5^a is a side elevation of the setting apparatus, taken from the other side and after the shifting device has operated thereon. Figs. 5^b, 5^c, 5^d, and 5^e are respectively side elevations taken from opposite sides, a plan, and a vertical transverse section of a portion of the setting apparatus, drawn on a larger scale for more clearly illustrating the same. Figs. 6 and 7 are side elevations of two signaling devices belonging to one block, respectively, of the home and distant signaling device. Fig. 6^a shows the signaling device in position after a cable has been broken. Fig. 7^a is a side view of the distant signaling device, showing the transmitting-lever in the act of being released from the next adjoining system; and Figs. 8 and 9 are end elevations of Figs. 6 and 7, respectively.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the setting apparatus, which is arranged along-

side of the track, B the home signaling device, and C the distant signaling device, which together form the signaling apparatus for each block.

In Figs. 1 and 2 of the drawings, I have shown two adjoining blocks, 1 and 2, connected together for operation. The home and distant signals B C of each block are connected together for simultaneous operation by parallel cables D, and the distant signal of each block is connected to the home signal of the block in rear thereof by cross-cables D^2; but it is not essential that these cables shall be crossed, as they can be arranged parallel with each other. When a train enters the first block of the track and passes in the direction indicated by the arrows in Figs. 1 and 2, it can stop at a point just in rear of the setting apparatus A of said block without setting the signals of block 1, and when it passes the setting apparatus of block 1 on its way to block No. 2 it will operate to display the signals of block No. 1 to "danger" without affecting the signals of block No. 2, thus warning an approaching train in its rear that the block 2 is occupied, and obviating the danger of the trains colliding. When the train passes the setting apparatus of the home signal B of block No. 2 on its way to the block numbered 3, it will display the signals of block No. 2 to "danger," and simultaneously and automatically lower the signals of the block No. 1 to "safety" without affecting the signals of block No. 3.

The setting apparatus is placed alongside of one of the tracks of a railroad, so that it can be operated by the wheels of a passing train, which act upon the upper ends of the inclined levers *a a*, that are arranged in series alongside of the track and normally held in their proper elevated position with relation thereto, so as to be in condition for immediate action. The levers *a* are carried by shafts which rock or oscillate in suitable bearings, *a'*, and these rock-shafts are provided with upwardly-bent arms a^2, the upper ends of each of which pass through an opening in the lower arm of a vertically-disposed holder, a^3. Each of these holders is normally held in a vertical position when the apparatus is not in use, and it is approximately **U**-shaped in form. The horizontal arms thereof are arranged at an angle to a vertical arm in an inclined position, and the said horizontally-disposed inclined arms of the holders are arranged above and below a movable setting-rod, A', of the setting apparatus A. The lower arm of the holder is weighted at its outer end, which is normally held in contact with the setting-rod when the apparatus is at rest, so that when the holder is moved forward out of a vertical into an inclined position, to cause the friction-grips carried thereby to act on the rod, the weighted arm of the holder serves to draw the same backward when the clamps or grips cease to bind on the rod.

Each arm a^2 of the rock-shafts is provided with a rearwardly-extending arm, a^4, having a weight, a^5, that serves to normally hold the lever *a* in an inclined position above the plane of the upper surface of the track-rail to be acted on by the wheels of a passing train.

Each vertically-disposed holder a^3 has an opening or slot made or formed in its vertical arm, and in this slot of each holder is fitted two gripping or friction clamps, a^6, which are disposed one above and the other below the horizontal movable rod A' of the setting apparatus A. This setting-rod A extends through all of the friction clamps or grips of the apparatus, and it is guided between the grooved faces or peripheries of anti-friction rollers a^7, that are loosely journaled on proper shafts or pins supported upon upright standards A^2, so that the rod can be moved longitudinally by the action of the friction-clamps a^6 upon the same.

When the wheels of a locomotive depress one of the levers *a* of the setting apparatus, the vertical arm a^2 carries the holder a^3 forward with it and simultaneously forces the vertical arm of the holder out of a vertical into an inclined position, so that the friction-clamps a^6, carried by the vertical portion of the holder, are caused to bite upon the rod A' and consequently move the same forward for a limited predetermined distance. As each of the levers *a* is successively acted on by the wheels of a train the friction-clamps are likewise successively brought into engagement with the setting-rod to move the latter forward with a step-by-step motion; and when the car-wheel ceases to act on one of the levers *a* the weighted arm a^4 serves to elevate said lever to its proper position with relation to the track-rail and simultaneously actuate the vertical arm a^2 to force the vertical portion of the holder a^3 from its inclined into a vertical position, thus releasing the friction-clamps from engagement with the setting-rod, whereupon the weighted arm a^4 and the lower weighted arm of the holder will move the holder back to its normal proper position, the release of the friction-clamps being simultaneously effected with the retrograde movement of the holder to prevent the clamps from drawing the setting-rod rearwardly. When the holders are in their normal position and the apparatus out of use, the friction-clamps are free of and cannot act upon the setting-rod, and the rear ends of the horizontally-disposed arms of each of the holders a^3 are in engagement with vertically-disposed braces d^3, which are arranged in front of each of the upright standards A^2. These braces d^3 are arranged in an inclined position with relation to the standards A^2, and at their ends they are rigidly secured on horizontal shifting-rods A^3, so that they are carried by said shifting-rods. These shifting-rods extend longitudinally of the setting apparatus, the upper one of said rods being arranged within the upper ends of

standards A^2 and the lower one arranged to one side of the standards and supported by the inclined braces d^3.

To the forward brace d^3, at the front ends of the shifting-rods A^3, is pivoted one end of a link, d^2, which in turn is pivotally connected to an arm of a rock-lever, d', which is journaled in proper bearings, and has an inclined upper arm, d^4, which is normally held and arranged in the path of the movement of a stop-collar, d, rigidly secured upon the front end of the longitudinally-movable rod A′ of the setting apparatus.

It will be observed that when the friction-clamps have fed the movable setting-rod forward in the manner hereinbefore described the collar or stop on the rod will be brought into contact with the inclined arm d^4 of the rock-lever d', which will actuate the link d^2, connected to the forward brace d^3 of the shifting-rods A^3. The further longitudinal movement of the setting-rod will affect the rock-lever and also the shifting-rods A^3 and the braces d^3, so that the rods and braces of the shifting mechanism will move in unison with the setting-rod A′ of the apparatus. The braces d^3 are thus caused to act upon the rear ends of the horizontally-disposed arms of the holders a^3, to prevent the vertical portion of the latter from throwing the friction-clamps into engagement with the setting-rod, which are thus left free to slide upon the setting-rod without affecting the same, as clearly shown in Figs. 5^b and 5^c of the drawings, and when the braces d^3 act upon the holders a^3, to prevent the friction-clamps carried thereby from feeding the movable setting-rod forward the vertical arms a^2 of the rock-levers are thrown into an inclined position by reason of the forward positions of the holders a^3, and consequently the rock-shafts will be oscillated to depress the free ends of the rock-levers below and out of the plane of the track-rail, so that they cannot be acted upon by the wheels of a passing train.

The lowering of the levers a by the shifting device takes place when the signaling devices B C have been raised to their full extent by the action of the setting apparatus, and the setting-rod A′ and the levers are retained in this position and prevented from being returned to their former position by the weights a^5, owing to the locking action of the inclined arm d^4 of the lever d' on the collar d of the setting-rod A′. The weights a^5 cannot overcome this locking action until the lowering of the signaling devices, when the setting-rod is pulled back, and the collar d is released from the arm d^4 of the lever d', after which the shifting-rods and the braces d^3 carried thereby are returned to their normal position, and the weights a^5 elevate the levers a and return the holders a^3.

The raising of the signals B C is accomplished by the setting-rod A′, which is connected by an intermediate spring coupling device, e, with a bell-crank lever, e', which latter operates by a connecting-rod, e^2, a vertical bell-crank lever, e^3, at the lower part of the upright post B′ of the first or home signaling device B. This spring coupling device e preferably consists of two side bars connected at their ends by rigid cross-bars, and a slide-bar is free to move back and forth on the side bars, and is held under the tension of a spring that is coiled around a link connected to the movable setting-rod A′ of the apparatus A; but I do not desire to limit myself to this described form of spring-coupling. The bell-crank lever e^3 is connected by a pivot-rod, e^4, with a second bell-crank lever, e^5, that is connected by a pivot-rod, e^6, with an oscillating lever, B^2, that is fulcrumed to a fixed bracket-arm, B^3, of the signaling device B. To the lower end of the oscillating arm B^2 is pivoted a horizontal slide-piece, B^4, that is guided on an anti-friction roller, e^7, said slide-piece being provided with a shoulder, e^8, and a rest, e^9, back of said shoulder, as shown in Fig. 6. The shoulder e^8 engages an anti-friction roller, e^{10}, at the outer end of a crank-arm, e^{11}, the shaft of which turns in bearings e^{12} on the upright post, B′, and carries a second crank-arm, e^{13}, that is connected by a pivot-rod, e^{14}, with a crank-arm, e^{15}, applied to the semaphore-arm B^5 or other signaling device, as shown in Fig. 6. A downwardly-inclined bracket-arm, e^{16}, is rigidly secured on the lower face of the slide-bar B^4, and this arm fits under the roller e^7, to hold the free end of the said bar from upward movement and in contact with the friction-roller, as will be readily understood. When the setting-rod A′ is successively moved forward by the levers a a, the intermediate bell-crank levers and connecting-rods are also operated, and thereby the lever B^2 oscillated on its fulcrum. This causes, also, the lateral movement of the slide-piece B^4, so that the roller of the crank-arm e^{11} passes over the shoulder e^8 onto the rest e^9. The step-by-step motion of the slide-piece raises the signaling-arm by the intermediate connecting-rod, e^{14}, and holds it in this position by the rest e^9 until dropped again by the releasing action of the signaling device of the next block ahead. The oscillating lever B^2 of the first or home signaling device B is connected by two wire cables, D D, attached to its upper and lower ends with an oscillating lever, C^2, of the distant signaling device C, said cables passing over guide-pulleys at the outer ends and center of the lever C^2 and of the supporting bracket-arm C^3, to a tension-weight, D′, that is suspended alongside of the upright post C′ of the signaling device C. The weight D′ serves to keep the cables D taut, and compensates for the expansion or contraction of the same by changes of temperature. In case any one of the cables should break, the weight D′ serves to set both signaling devices to "danger" by moving the oscillating levers B^2 and C^2 into a position converging toward each other, so that the slide-pieces C^4 and B^4 are moved in opposite direction to

each other and both signaling devices thereby set to "danger." When the upper cable D breaks, the slide-piece B^4 is moved into the position shown in Fig. 6ª until a slotted guard-piece, *f*, at its end engages the enlarged end of a connecting-rod, *f'*, that is pivoted to the opposite end of the crank-arm e^{11}, and oscillates the same, so as to raise the signaling-arm to an upwardly-inclined position above the usual position at right angles to the post B'. The slide-piece C^4 of the signaling device C is moved in opposite direction to the slide-piece B^4, and thereby the signaling-arm C^5, also set to an upwardly-inclined position, as the arm e^{11} rides beyond the rest e^9 on the highest point of the slide-piece C^4. In case the lower cable D breaks, the slide-piece C^4 is moved into the position shown in Fix. 6ª, and the slide-piece B^4 in opposite direction thereto, so that the signaling-arms of both signaling apparatus B and C are set into upwardly-inclined position in the same manner as before described. As the signaling-arms are thrown up higher than at right angles in this case, the engineer will know directly that the cable-connection is out of order, and will move on slowly to the signaling devices of the next block.

The distant signaling device C of each block is provided, besides the oscillating lever C^2, with a transmitting-lever, E, which is pivoted to the upper end of the oscillating lever C^2. The transmitting-lever E is toothed along a part of its under side, and the outer end thereof is fitted and free to slide in a bent arm of a vertically-disposed guide, *g*, (shown in Figs. 7ª and 9) that is attached to the upper end of a second oscillating lever, C^6, fulcrumed to the opposite end of the bracket-arm C^3. The lever C^6 is connected by cross-cables D^2 D^2 with the lever B^2 of the home signaling device B of the next adjoining block behind. When the lever C^2 is oscillated by the cables D D, the teeth of the transmitting-lever E engage a toothed cam, E', attached to the guide-piece *g*, and move the lever C^6 into the position shown in Fig. 7ª, so that it operates the cross-cables D^2 D^2 and lowers thereby the signaling-arms of the next block behind. When the levers B^2 and C^2 are returned into the position shown in Figs. 6 and 7 by the action of the cross-cables of the next block ahead, the transmitting-lever E is moved with the lever C^2 without engaging the lever C^6 as the lever E is raised clear of the cam E' by means of a second cam, *g'*, pivoted to the side of the transmitting-lever E. This cam abuts against a fixed pin, g^2, and engages the minutely-toothed surface of a fixed support, g^3, attached to the horizontal bracket-arm C^3, as shown in Figs. 7 and 7ª. The lever C^6 remains in the position shown in Fig. 7ª until the home signal of the block in rear is displayed to "danger" by a passing train, the home signal of said rear block being connected to the lever C^6 by the cross-cables B^2, and when the signals of the rear block are set to "danger" the cables D^2 move the lever C^6 into the position shown in Fig. 7, so as to be ready to be moved again by the lever E. When the lever occupies the position shown in Fig. 7ª, and the cables D^2 serve to move the lever C^6 into the position shown in Fig. 7, the said lever C^6 does not carry with it the transmitting-lever E, as the pawl *g'* bears on the fixed support g^3 and elevates the toothed end of the lever E from engagement with the fixed cam E'. By the transmitting-lever E the signaling devices of one block are either connected with or disconnected from the signaling devices of the next adjoining block ahead, so that the signaling devices of one block are lowered while the signaling devices of the block next ahead are raised in the manner just described. The tension-weight D^3 of the cross-cables D^2 is arranged at the second or distant signaling device C, so that in case any one of the cross-cables should break the signaling devices of the next following block are set to "danger" in the manner before described. As the train passes over the track from one block to the other it lowers the signaling devices of the block in rear, while raising the signaling devices of the block just passed. Simultaneously with the lowering the signaling devices of the block in rear by the action of the setting apparatus and cables of the first block and cross-cables of the block in rear the setting-rod of the rear block is returned to its normal position, together with its shifting-rod, so as to be ready to be acted upon by the next train. The train sets thus automatically the signaling device of the different blocks, so that the track back of the same is kept clear from block to block and the trains protected from collision with trains moving behind on the same track.

The operation of my invention is as follows: When a train enters the first block, 1, of my automatic signaling apparatus and moves in the direction indicated by the arrows in Figs. 1 and 2, it can pass the distant signal of block No. 1 and stop at a point in rear of the setting apparatus A of the home signal B without displaying the semaphore-signals to "danger." If the train passes from block 1 to block 2 and over the setting apparatus of block 1, the said apparatus will oscillate the levers B^2 C^2 of the block 1, which will elevate the signals B^5 C^5 to "danger," thus warning an approaching train in its rear that the block No. 2 is occupied when the signals of block No. 1 are displayed, and when the train passes over the setting apparatus of block No. 2, to pass to the block ahead, No. 3, it will display the signals of block No. 2 to "danger," and simultaneously and automatically lower the signals of block No. 1 to "safety." The transmitting-bar of block No. 2 is adapted to operate the lever C^6 of the distant signal C when the signals of block No. 2 are displayed to "danger" to move the cables D^2 and the levers B^2 C^2 of block No. 1 to instantaneously lower the signal of block No. 1 to "safety." Thus it will be seen that when a train passes the home signals of one block it will dis-

play the signals of that block to "danger" and instantaneously lower the signals of the block in rear to "safety" without affecting the signals of the blocks in front or ahead. If an engineer through negligence or accident should run his train past a block which has its signals displayed at "danger," the setting apparatus will not lower or affect the position of the signals in any way, the shifting mechanism of the apparatus being thrown into engagement with the clamp-holders to prevent the clamps from acting on the movable setting-rod when the signals of the block to which the setting apparatus is applied are set at "danger." Consequently the apparatus cannot affect the signals when they are displayed. The home and distant signals of each block are placed at suitable intervals apart, at long or short distances, and when the signals are placed considerable distance apart it is desirable that the slide-bars and oscillating levers C^2 B^2 shall have a limited amount of play without affecting the signals when they are elevated and displayed at "danger." To provide for this limited movement of the parts, the shoulder e^8 of the slide-bar is made a little longer than it would otherwise be, so as to allow the friction-roller of the crank arm *e* to slide thereon without moving the signal from its extended position. When a train passes block 1, it sets the signal thereof to "danger." If it should accidentally pass block 2, and the signals thereof have been previously set at "danger," the train will not lower or affect the signals of either blocks number 1 and 2, and when the train passes block 3 it lowers the signals of block 2 to "safety" without affecting or lowering the signals of block 1, thus indicating that a train has run by a block which has its danger-signals exposed at the time when the train passed by it.

I do not desire to limit myself to the precise construction and arrangement of parts herein shown and described as an embodiment of my invention, as I am aware that many changes therein can be made without departing from the principle or sacrificing the advantages thereof.

It will be observed from the foregoing description, taken in connection with the drawings, that the signals are elevated by a series of successive movements imparted thereto by the setting apparatus, and that they are elevated with a step-by-step motion, which obviates the danger of breakage and strain on the various parts, and it will be further observed that they are instantaneously lowered when the signals of the block ahead are displayed, the whole operation being accomplished automatically and effectively.

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

1. In an automatic block-signaling apparatus, the combination of a setting apparatus having a step-by-step movement, the home and distant signals, and intermediate connecting mechanism between the setting apparatus and the signals for elevating the latter to danger position with a step-by-step motion, substantially as described.

2. In a block-signaling apparatus, the combination of a setting apparatus having a step-by-step motion and adapted to be operated by a passing train, the home and distant signals connected for simultaneous operation, and lever mechanism connecting the signals and setting apparatus, substantially as described.

3. In a block-signaling apparatus, the combination of a setting apparatus having a step-by-step motion, a home signal connected thereto and operated thereby, and a distant signal connected with the home signal for simultaneous operation, substantially as described.

4. In an automatic block-signaling apparatus, the combination of a setting apparatus having a successively-fed setting-rod, a home signal, intermediate mechanism connecting the setting-rod and home signal, a distant signal, and cables connecting the home and distant signals, substantially as described.

5. In an automatic block-signaling apparatus, the combination of a setting apparatus having a successively-operated movable rod, a home signal, lever mechanism between the home signal and setting-rod, and having an intermediate spring coupling device, a distant signal, and cables connecting the home and distant signals for simultaneous operation thereof, substantially as described.

6. In an automatic block-signaling apparatus, the combination of a setting apparatus adapted to be operated by a passing train and having a movable rod fed with a step-by-step motion, a home signal, a distant signal, oscillating levers connected to the signals, cables connecting the levers, and intermediate lever mechanism connecting the movable rod and the lever of the home signal, substantially as described.

7. In an automatic block-signaling apparatus, a series of blocks each having a setting apparatus provided with a longitudinally-movable setting-rod having a step-by-step movement, a home signal connected to the setting apparatus, and a distant signal connected to the home signal, the distant signal of one block being connected to the home signal of the block in rear thereof, whereby when the signals of one block are displayed at "danger" the signals of the block in rear are instantaneously lowered to "safety," substantially as described.

8. In an automatic block-signaling apparatus, a series of blocks each having a setting apparatus provided with a longitudinally-movable setting-rod having a step-by-step movement, a home signal, a distant signal, and cables connecting the home and distant signals, the distant signal of each block being provided with a transmitting device connected to the home signal of the block in rear thereof, substantially as described.

9. In an automatic block-signaling apparatus, a series of blocks each having a setting

apparatus, a home signal, and a distant signal, the distant signal of each block having a transmitting-bar, and an oscillating lever adapted to be operated by the transmitting-bar, substantially as described.

10. The combination of an oscillating lever operated by cables, a toothed transmitting-bar connected thereto and having a pivoted elevating-dog, and an oscillating lever having a fixed cam adapted to be operated by the toothed transmitting-bar, substantially as described.

11. The combination of an upright, an oscillating lever, a signal, and a movable bar connected to the lever and having a lengthened shoulder, e^8, and a rock-shaft connected to the signal and having a roller acted on by the movable bar, whereby the movable bar can move a limited distance without affecting the signal, substantially as described.

12. In an automatic block-signaling apparatus, a series of blocks each having a setting apparatus provided with shifting mechanism and a movable rod with which the shifting mechanism moves in unison when the rod has been moved a predetermined distance, a home signal, a distant signal, and intermediate connections between the signals and setting apparatus, whereby when a train passes a block having its signals set at "danger" the signals will not be affected by the train, substantially as described.

13. In an automatic block-signaling apparatus, a series of blocks each consisting of a setting apparatus having shifting mechanism, a home signal connected to the setting apparatus, a distant signal, and cables connecting the home and distant signals, the distant signal of each block having a transmitting device connected with the home signal of the block in rear thereof, whereby when a train passes a block having its signals set at "danger" the signals of the block just passed will not be affected nor will the positions of the signals of the blocks in front and rear be changed, substantially as described.

14. In an automatic block-signaling apparatus, the combination of a setting apparatus operated by the wheels of the locomotive, said setting apparatus consisting of a series of weighted levers, friction-clamps, a shifting device, and a locking-lever for said shifting device with a home signaling device, a lever mechanism connecting said setting apparatus with the home signaling device, a distant-signaling device, and cables connecting the home signaling device with the distant signaling device, substantially as set forth.

15. In an automatic block-signaling apparatus, the combination of a setting apparatus operated by the wheels of the locomotive, a home signaling device, a lever mechanism connecting the setting apparatus with the home signaling device, a distant signaling device, cables connecting the home and distant signaling devices, cross-cables connecting the distant signaling device of one block with the home signaling device of the next adjoining block, and a transmitting device for operating the cross-cables and signaling devices of the next block behind by the cables of the first block, substantially as set forth.

16. In a signaling apparatus, the combination of a setting apparatus, a home signal having an oscillated pivoted lever, mechanism intermediate of the setting apparatus, and lever for operating the latter, a slide-bar pivoted to the lever, a signal device operated by the slide-bar, a distant signal, and connections intermediate of the home and distant signals for simultaneously actuating the same, substantially as described.

17. In a signaling device, the combination of an upright post, a centrally-pivoted lever, a slide-bar pivoted to one end of the lever and having a shoulder, a pivoted signal on the post, a rock-shaft having an arm carrying a roller that normally bears on the shoulder of the slide-bar, and connections intermediate of the rock-shaft and signal, substantially as described.

18. A signaling device consisting of a supporting-post, an oscillating lever, a slide-piece pivoted to said lever, a signaling-arm, a transmitting mechanism connecting the slide-piece with said arm, and a guard device connected to said transmitting mechanism, substantially as set forth.

19. The combination of a home signal, a distant signal, both having oscillating levers, cables connecting the oscillating levers of the home and distant signals, and a tension-weight suspended directly from the free ends of the cables for keeping them taut, substantially as described.

20. The combination of a home signaling device, a distant signaling device, both having oscillating levers, guide-pulleys at the ends and center of one of said levers, cables connecting said levers and passing over said pulleys, a tension-weight attached to the end of the cables nearest to said pulleys, and slide-pieces pivoted to the lower ends of the oscillating levers and connected to the arms of the signaling devices, substantially as set forth.

21. The combination of a home signaling device, a distant signaling device, both having oscillating levers, cables connecting said levers, a tension-weight attached to the cables, slide-pieces pivoted to the oscillating levers, and guard devices for retaining said levers and setting the signaling devices to "danger" in case of breakage of one of the cables, substantially as set forth.

22. The combination of a home signaling device, a distant signaling device, both having oscillating levers, guide-pulleys at the ends and center of one of said levers, cables connecting said levers and passing over said pulleys, a tension-weight attached to the ends of the cables next to said pulleys, slide-pieces pivoted to the lower ends of the oscillating levers, and guard devices for setting the signaling devices to "danger" in case one of

the cables should break, substantially as set forth.

23. The combination of a home signaling device, a distant signaling device, both having oscillating levers, cables connecting said levers, a transmitting-lever pivoted to the oscillating lever of the distant signaling device, a second oscillating lever operated by said transmitting-lever, and cross-cables connecting said oscillating lever with the oscillating lever of the home signaling device of the next adjoining block, substantially as set forth.

24. The combination of a home signaling device, a distant signaling device, both having oscillating levers, cables connecting said levers, a toothed transmitting-lever pivoted to the oscillating lever of the distant signaling device, a second oscillating lever having a guide-piece and toothed cam, a cam pivoted sidewise to the toothed lever, a stop-pin for arresting said cam, and a fixed support for engaging the pivoted cam and lifting the transmitting-lever clear of the toothed cam, substantially as set forth.

25. The combination of an oscillating lever, cables connected thereto, a signal, a rock-shaft connected to the signal, a slide-bar, and an arm or rod connected to one end of the slide-bar, and the rock-shaft, substantially as described.

26. The combination of an oscillating lever, cables connected thereto, a signal, a rock-shaft having an arm connected to the signal, a slide-bar pivoted to the oscillating lever and having a slotted plate, and an arm or rod connected to the slotted plate and to the rock-shaft, substantially as described.

27. In an automatic block-signaling system comprising a series of blocks each having a setting apparatus actuated by a passing train with a step-by-step movement, a home signal, a distance signal, and connections intermediate of the signals, and setting apparatus for simultaneously actuating the same, the distant signal of each block having transmitting mechanism, substantially such as described, connected to the home signal of the block in rear thereof, whereby when a train passes through one block it will display the signals thereof to "danger" with a step-by-step movement, and simultaneously and instantaneously conceal the signals of the block in rear to "safety," substantially as described.

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

TOWNSEND W. BURT.

Witnesses:
PAUL GOEPEL,
SIDNEY MANN.