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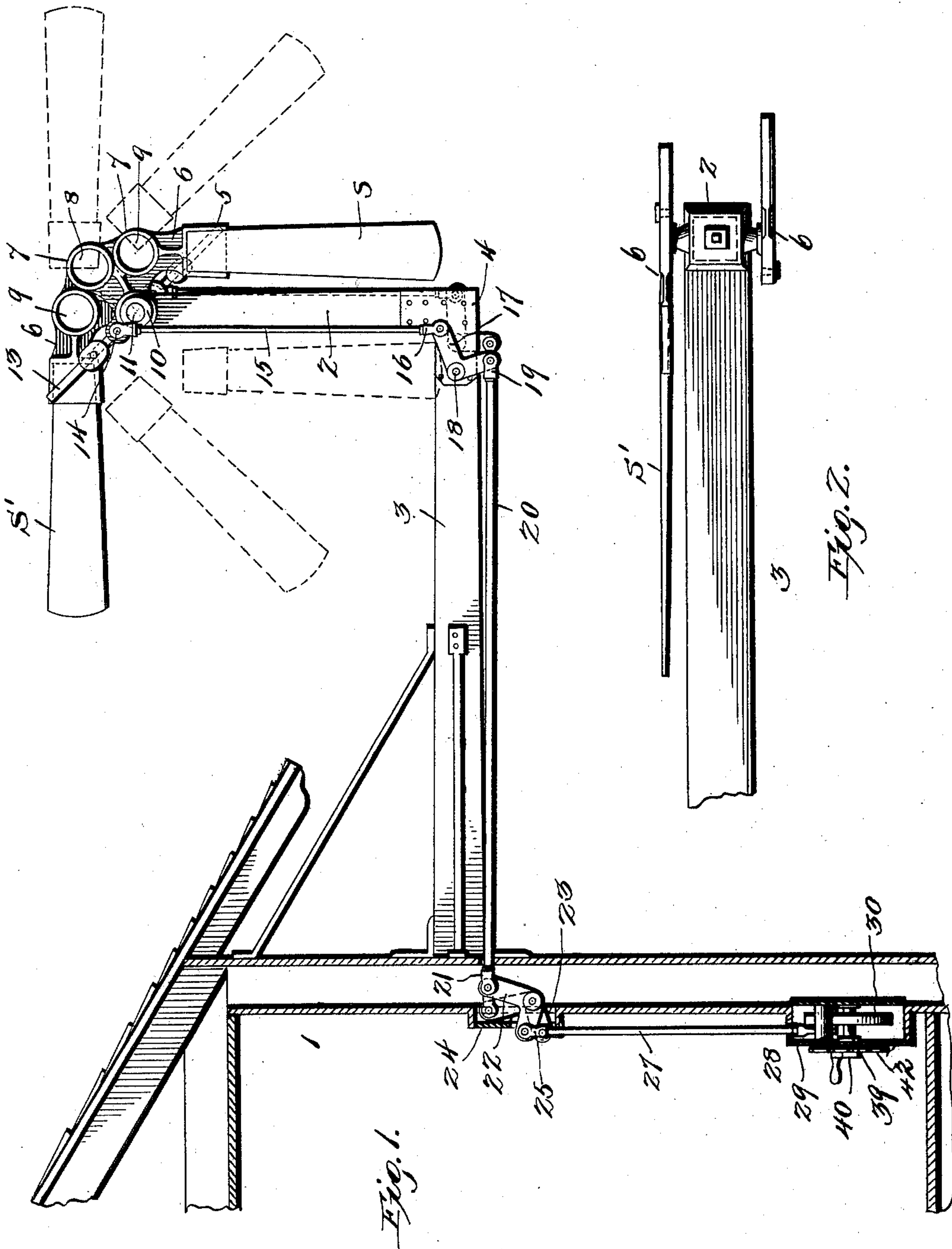
J. A. SNOW.

RAILWAY SIGNAL OPERATING APPARATUS.

(Application filed Feb. 27, 1902.)

(No Model.)

3 Sheets—Sheet 1.



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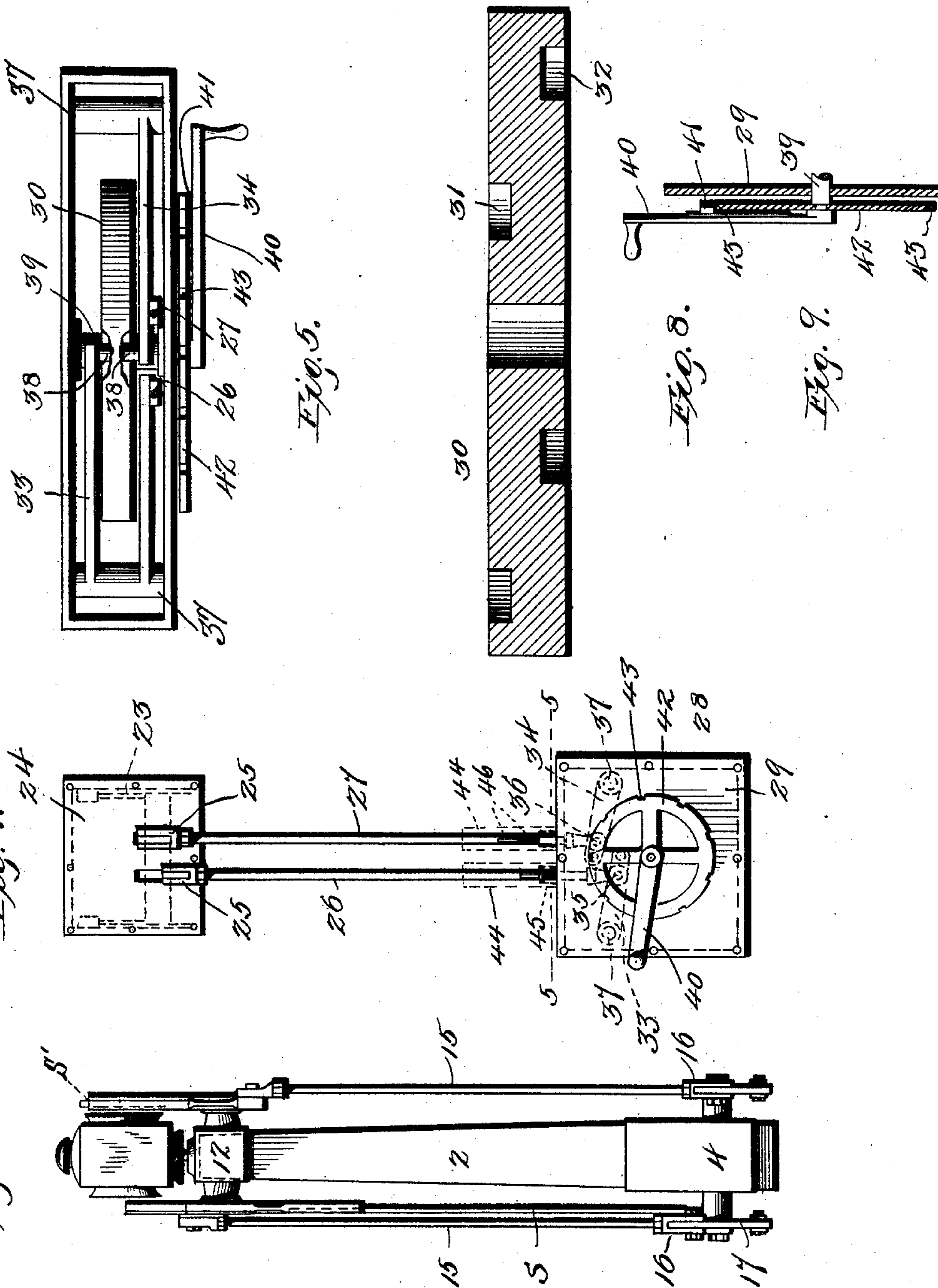
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3 Sheets—Sheet 2.



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3 Sheets—Sheet 3.

Fig. 6.

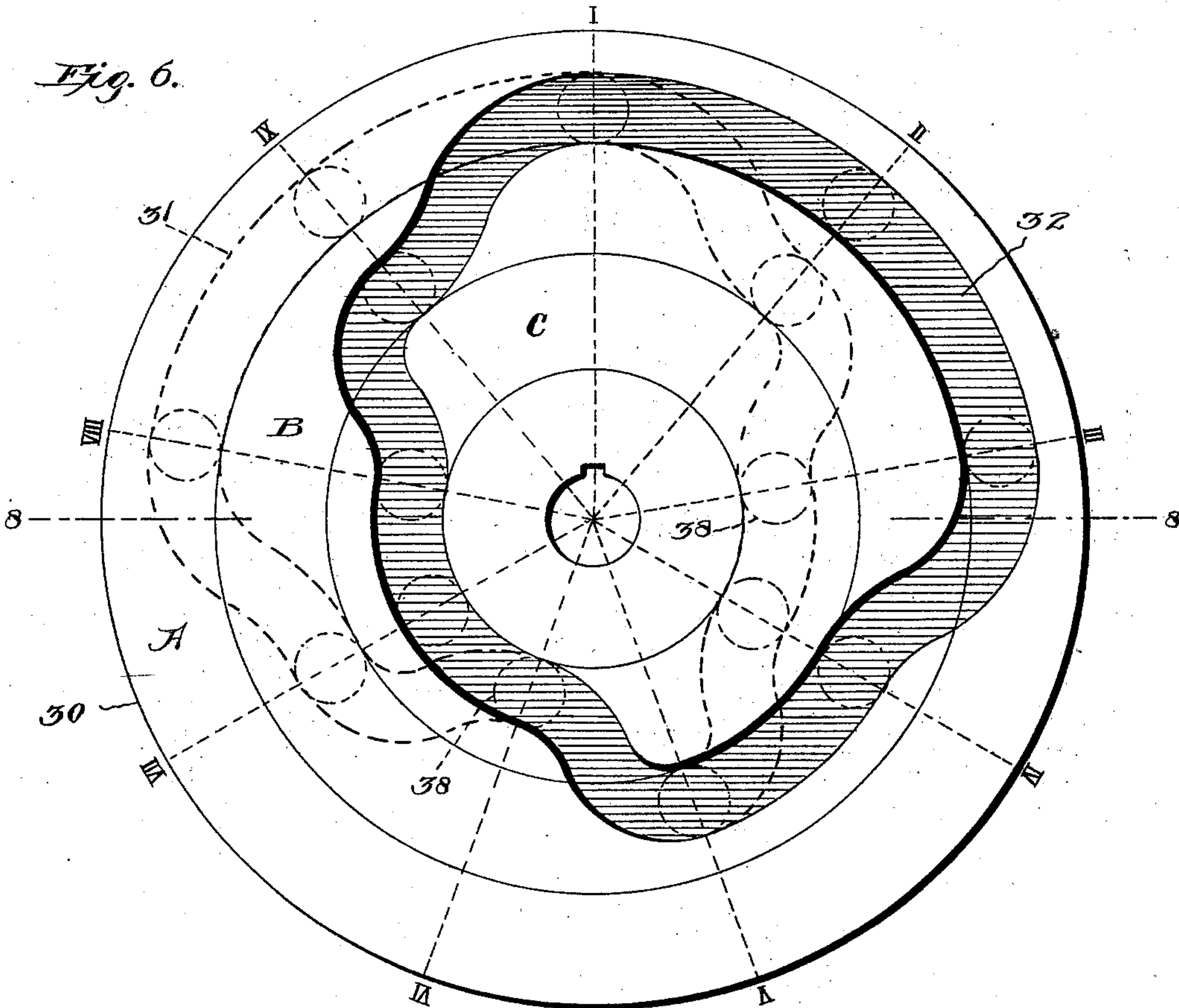
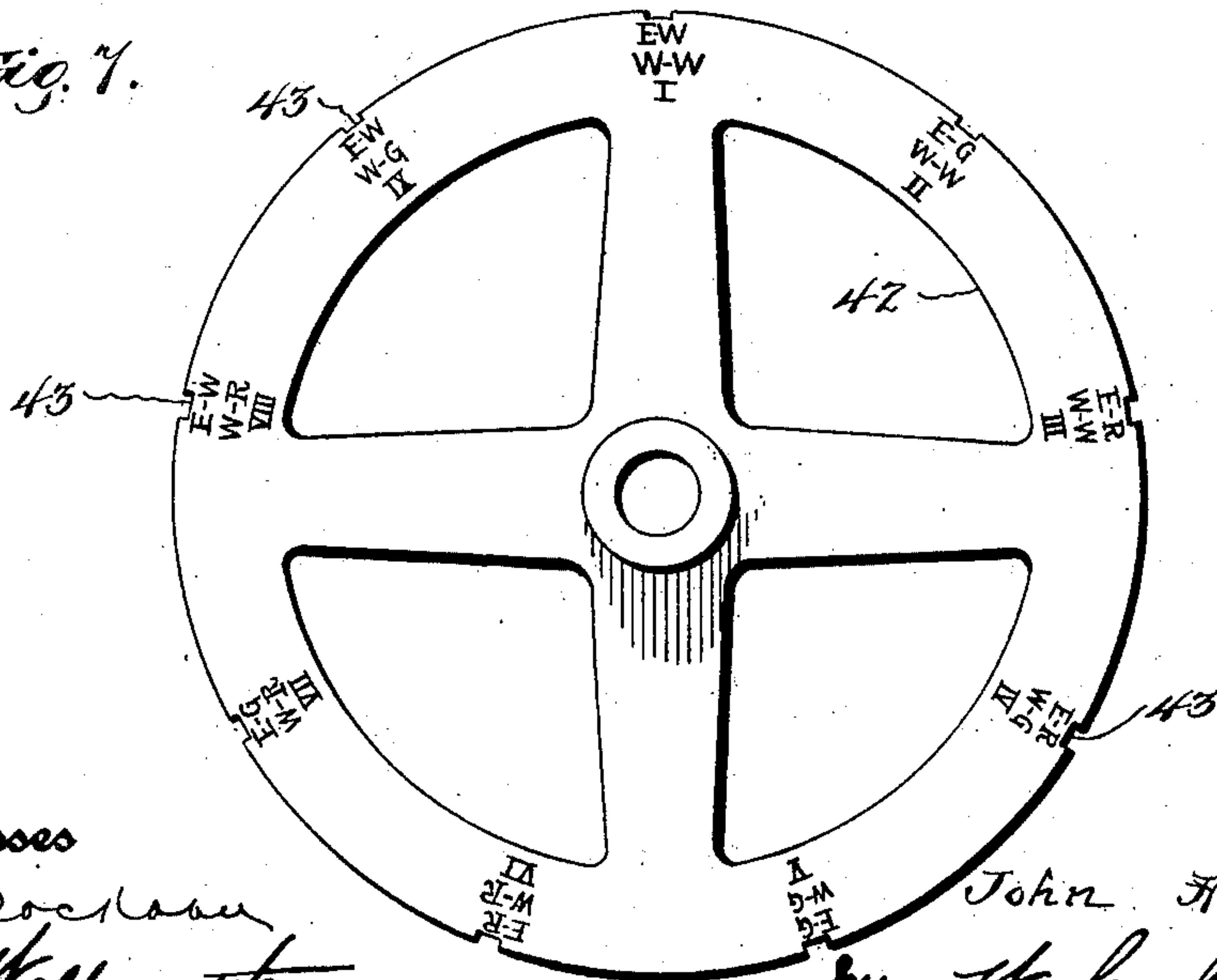


Fig. 7.



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RAILWAY-SIGNAL-OPERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 703,218, dated June 24, 1902.

Application filed February 27, 1902. Serial No. 95,951. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. SNOW, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Railway-Signal-Operating Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings.

- 10 This invention relates to railway signaling apparatus, and has special reference to an improved signal-operating apparatus possessing special utility as a controlling means for two-way train order and block signals.
- 15 To this end the invention contemplates an operating apparatus for signals which is so constructed and arranged as to be entirely unaffected by weather conditions besides providing a positive and reliable means for
- 20 setting the signals to proper positions with a minimum amount of lost motion. In this connection the invention has in view a construction which practically eliminates the lost-motion objection to many types of railway-signal-operating apparatus, thus insur-
- 25 ing accuracy in setting the signals or semaphores and preventing the possibility of the same stopping at intermediate non-signaling positions.
- 30 A further object of the invention is to provide a simple, compact, and effective arrangement of parts comprising means whereby the operator in the office or signal-tower may through the medium of a single operating device set the signals in any of a variety of combinations, such as may be required by the
- 35 different conditions upon the separate tracks controlled by the signals.

40 With these and many other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts, which will be hereinafter more fully described, illustrated, and claimed.

45 The essential features of the invention embodying the novel construction of the signal-controller and the instrumentalities directly associated therewith to effect the setting of

50 the signals in various combinations by a single operating means are necessarily susceptible to a wide range of modification without departing from the spirit or scope of the in-

vention; but for illustrative purposes a preferred embodiment of the improvements is shown in the accompanying drawings, in which—

Figure 1 is a general view embodying a sectional elevation and showing the improved signal-operating apparatus associated with a signal-pole and the operator's office, the view indicating in dotted lines the several positions to which the semaphore-blades are placed for giving the usual signals. Fig. 2 is a detail top plan view of the pole carrying the pivotal semaphore-blades. Fig. 3 is a detail elevation of the pole and the semaphore-mountings thereon. Fig. 4 is a detail elevation of the controller mechanism and the actuating-rods coupled therewith. Fig. 5 is a detail sectional view on the line 5 5 of Fig. 4, showing the cam-wheel partly broken away. Figs. 6 and 7 are companion elevations, respectively, of the rotary signal-controller and the indicator-dial, showing the complementary relation between these elements to provide for setting the semaphore-blades to various signaling positions. Fig. 8 is a view on the line 8 8 of Fig. 6.

Like reference characters designate corresponding parts throughout the several figures of the drawings.

In carrying out the invention it is the purpose to provide an apparatus involving a single operating or controlling means, permitting of the semaphores or semaphore-blades being set to any of the various positions which are ordinarily utilized for two-way train-order and block signals. Also the invention contemplates the employment of these signals in their ordinary significance, viz: white, "safety—go ahead;" green, "caution—go cautiously;" red, "danger—stop," and the corresponding positions of the semaphore-blades being respectively perpendicular, white; diagonal, green, and horizontal, red. These signals are well understood by those familiar with railway-signaling; but at this point it may be further explained that the apparatus serves to simultaneously control the signals for both tracks—as, for instance, the tracks respectively for east-bound and west-bound trains—and consequently provides for setting the separate signals at various combinations, such as the combination of white and green, respectively, for east-

bound and west-bound trains, green and red, respectively, for east-bound and west-bound trains, red and green, respectively, for east-bound and west-bound trains, and so on throughout the series of all desired combinations, there being usually nine combinations provided for in the use of the signals for the separate tracks.

With this general explanation of the purpose of the invention and the functions carried out by the apparatus the improved and useful features of the latter will now be readily understood.

It will of course be obvious that the signals proper may be utilized in connection with any suitable support or pole such as commonly employed, and the controlling mechanism may be arranged in the office or any protected place from which the operator is to control and set the signals. For illustrative purposes there is designated by the numeral 1 in the drawings a section of a building having the usual operator's office and an exterior signal-pole 2, which may be conveniently held in a signaling position with reference to the two tracks through the medium of a supporting-bracket 3, set off from the building, adjacent to the tracks, said pole being securely braced and fastened to the outer end of the bracket 3 by joint-plates 4 or equivalent coupling or fastening means. These details of course constitute no part of the invention and may necessarily be varied to suit the conditions of the road in connection with which the signals are employed.

The signal-pole 2 sustains thereon the separate swinging semaphore-blades S and S', which work, respectively, at opposite sides of the pole to provide for giving the proper signals to the tracks guarded thereby, said semaphore-blades being designed to move to either of the three signaling positions—viz., perpendicular, diagonal, or horizontal. Each of the swinging semaphore-blades is secured fast at one end, as at 5, to a pivotal signal-bracket 6, provided contiguous to the heel end of the semaphore-blade with lens-frames 7, respectively carrying the green and red lenses 8 and 9.

The separate lenses 8 and 9 are arranged in the same circular plane concentric to the axis or pivot of the bracket 6, so that either of the same may be brought into a signaling position at one side of the signal-lamp, which is placed upon the pole 2 at night in order that the proper signals may be given through the lenses at night, while in the day-time the same signals are given by the semaphore-blades.

The swinging signal-bracket 6 for each semaphore-blade is provided with a laterally-offset pivot-collar 10, receiving the pivot 11, carried by the bearing cap or fitting 12, arranged upon the signal-pole 2, and preferably at the side of the pivot opposite the semaphore-blade each signal-bracket 6 is provided with an offstanding weighted counter-

balance-arm 13. Also preferably at the side of the pivot opposite the semaphore-blade each signal-bracket 6 has pivotally connected thereto, as at 14, the upper end of a setting-rod 15, which may be conveniently formed of gas-pipe and pivotally coupled at its lower end, as at 16, to one arm of a bell-crank lever 17. This bell-crank lever 17 is pivotally mounted at its angle, as at 18, upon the signal-pole or the support therefor, and has pivotally coupled, as at 19, to the arm thereof opposite the connection 16 for the rod 15 an intermediate connecting-rod 20. This intermediate connecting-rod 20 may likewise be formed of gas-pipe and extending along the supporting-bracket 3 is pivotally united at its inner end, as at 21, to one arm of a bell-crank lever 22, which is pivotally mounted, as at 23, upon a hanger or hanger-plate 24, secured within the operator's office or building 1.

The connections just described are in duplicate, respectively, for the separate semaphore-blades S and S', but are necessarily arranged upon opposite sides of the signal-pole and the support 3 therefor, so that each semaphore-blade will have its individual operating or adjusting connections. The bell-cranks carried by the hanger or hanger-plate 24 have respectively coupled thereto by means of pivotal connections 25 the actuating-rods 26 and 27, which are respectively for operating the signals for the separate tracks. Both of said actuating-rods are operated through the medium of a signal-controlling mechanism arranged entirely within the operator's office or building and operated through the instrumentality of a single device.

The controlling mechanism is designated in its entirety by the reference-number 28 and includes in its general organization a controller casing or box 29, which may be of a skeleton or entirely-closed formation and may be mounted in any convenient position readily accessible to the operator. The controlling mechanism in addition to the casing or box 29 includes as a principal element thereof a rotary signal-controller 30. This signal-controller is preferably in the form of a single wheel or disk which may be properly termed a "cam," inasmuch as the same is provided upon opposite faces thereof with continuous and sinuous cam-guides 31 and 32, respectively. These cam-guides 31 and 32 upon opposite sides or faces of the wheel or disk 30 may be provided in any suitable manner. Preferably these guides are in the form of sinuous grooves provided directly in the opposite faces of the disk-body, inasmuch as the grooves secure a positive action in both directions for the adjusting-levers 33 and 34, associated, respectively, with the actuating-rods 26 and 27. The adjusting-levers 33 and 34 cooperate, respectively, with the cam guides or grooves 31 and 32 upon opposite sides of the cam wheel or disk 30 and likewise have pivotally coupled thereto, as at 35 and 36, the

lower ends of the actuating-rods 26 and 27, respectively.

Both of the adjusting-levers are pivotally supported at one end, as at 37, upon pivotal mountings within or on the controller casing or box 29, and at their free swinging ends the said adjusting-levers are provided with engaging points 38, preferably in the form of antifriction-rollers working within the guides or grooves 31 and 32, respectively, of the cam wheel or disk 30. These connections provide means whereby the rotation of the cam wheel or disk 30 imparts a positive action or motion simultaneously to both adjusting-levers 33 and 34, with the consequence of moving the actuating-rods 26 and 27, from which motion is transmitted through the intermediate connections described to the semaphores operated from the said rods.

The cam guides or grooves 31 and 32, respectively, upon opposite sides of the wheel or disk 30 are of a sinuous and irregular formation to provide for nine possible combination positions of the adjusting-levers, and consequently of the semaphores associated therewith. From Fig. 6 of the drawings it will be observed that the separate cam guides or grooves upon opposite sides of the cam wheel or disk are usually in reversed relation with reference to each other, although at certain points within the same circular plane corresponding portions of the separate grooves 31 and 32 are in coincident relation, as is necessary to provide for giving the same signal from both blades S and S'.

In order that the action of the controller or cam may be easily understood, there is indicated in Fig. 6 of the drawings diagrammatically a series of concentric circular zones, (designated A, B, and C, respectively.) The cam-grooves 31 and 32 wind sinuously through various portions of the said circular zones A, B, and C and there is also indicated diagrammatically the possible positions of the engaging points 38 of the separate adjusting-levers 33 and 34 to provide for giving different combinations of signals from the semaphores or semaphore-blades. The different positions or combinations are indicated diagrammatically upon Fig. 6, as I, II, III, IV, V, VI, VII, VIII, and IX.

Referring to the mounting of the controller or cam 30 and the instrumentalities directly coöperating therewith, it will be observed from the drawings that the said controller of cam is mounted upon a short axle or arbor 39, journaled in suitable bearings provided on the casing or box 29 and having mounted upon one end thereof a single operator's lever or handle 40, which constitutes the single operating device of the entire apparatus. This lever or handle 40 is secured fast upon the axle or arbor 39, so as to turn the controller or cam 30 in either direction desired, and the said lever or handle 40 is also equipped with a spring-latch 41, adapted to ride over the face of an indicator-dial 42, and become automati-

cally engaged with any of a series of locking-notches 43 provided in the periphery of the said dial.

The indicator-dial 42 is secured fast upon the exposed face of the controller casing or box 29, and the peripheral locking-notches 43 thereof are arranged in regularly-spaced order and corresponding in spacing to that of the different portions of the cam guides or grooves 31 and 32 representing the different active points where various combinations of signals are provided for. To render it perfectly convenient for the operator to accurately set the signal to proper positions, the indicator-dial 42 may preferably have arranged thereon indications denoting the various signaling combinations.

For illustrative purposes a suggested arrangement of indications is shown in Fig. 7 of the drawings and comprehends the thought of marking the locking-notches to correspond with the combinations provided for by the rotary controller or cam 30—that is, the several notches of the indicator-dial would be marked, respectively, I, II, III, IV, V, VI, VII, VIII, and IX. Also assuming that the tracks are used in connection with east and west bound trains, respectively, the indicator-dial may also have placed thereon the letters "E" and "W" in connection with each notch to designate the east and west bound tracks, and also in connection with each notch on the dial may be placed the letters corresponding to the combinations of signals which are provided for when the operator's lever or handle is engaged in such notch. This manner of placing indications upon the indicator-dial will be obvious by reference to Fig. 7. For instance, assuming that the groove 31 (indicated by dotted lines on Fig. 6 of the drawings) is for the signal controlling east-bound trains and the groove 32 for the signal controlling west-bound trains, should it be desired to show a white signal for east-bound and a green signal for west-bound trains the operator's lever or handle is moved to position "IX" upon the dial; or if it is desired to show green for east-bound and red for west-bound trains the operator's handle or lever would be turned to position "VII," which would provide the desired combination. The various other combinations possible will be readily understood by noting the fact that the circular zone A comprehends those portions of the cam-grooves providing for white signals, the zone B for those portions providing for green signals, and the zone C those portions providing for red signals.

As an extra precaution to insure perfect accuracy in setting the signals into the various combinations, telltale devices 44 may be conveniently associated with the actuating-rods 26 and 27. Each of the telltale devices 44 may consist of simply a short sleeve receiving the actuating-rod and having formed therein a sight-opening 45, through which will be exposed color portions 46 upon the actuating-

rod, which color portions are respectively white, green, and red. According to the position in which the blade is set the corresponding signal color will be exposed through the sight-opening 45, and thus additionally indicate to the operator that the signal is "O K" and the apparatus working right.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described signal-operating apparatus will be readily apparent to those skilled in the art without further description, and it will also be understood that various changes be the form, proportion, and minor details of construction may be made within the scope of the invention without departing from the spirit or sacrificing any of the advantages thereof. It will also be understood that while the operating apparatus set forth has been described in connection with signals of the semaphore type, yet, as is obvious, the construction might well be adapted for association with railway-switches, inasmuch as the separate operating-rods 26 and 27 may obviously be utilized to transmit motion to either signal or switch operating connections.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In an apparatus of the class described, the combination with the signals, of a rotary disk having separate operating elements at opposite sides thereof, swinging levers oscillated from the said operating elements of the disk, and reciprocatory signal-actuating connections with the levers.

2. In an apparatus of the class described, the combination with the signals, of a single rotary disk having cam-guides upon opposite sides thereof, swinging levers having engaging elements coöperating with said cam-guides, and reciprocatory signal-actuating connections with the levers.

3. In an apparatus of the class described, the combination with the signals, of a rotary disk having separate operating elements at opposite sides thereof, swinging levers oscillated from the said operating elements of the disk and pivotally mounted upon axes disposed in parallelism to the axle of the disk, and reciprocatory signal-actuating connections with the levers.

4. In an apparatus of the class described, the combination with the signals, of a single rotary disk having separate operating elements at opposite sides thereof, and arranged upright upon a horizontal axis, vertically-swinging levers oscillated from the said operating elements of the disk, and reciprocatory signal-actuating connections with the levers.

5. In an apparatus of the class described, the combination with the signals, of a rotary disk having separate operating elements at opposite sides thereof, levers moved from said operating elements of the disk, signal-actuating connections with the levers, and

an operating device for the disk arranged directly on the axle of the latter, said operating device including means for indicating the various combinations provided for by the separate cam-guides.

6. In an apparatus of the class described, the combination with the signals, of a rotary disk having at opposite sides thereof continuous and sinuous cam-guides, the separate cam-guides being reversely related, but having portions in concentric circles, a pair of swinging adjusting-levers pivotally supported at one end and carrying at their other ends elements engaging the said cam-guides, reciprocatory signal-actuating connections with the levers, and a signal-operating device for the disk arranged directly on the axle thereof, said operating device including indicating means having points corresponding to the various combinations provided for by the said cam-guides.

7. In an apparatus of the class described, the combination with the signals, of a rotary disk having separate cam-guides upon opposite sides thereof, said cam-guides having portions thereof disposed in coincident relation, separate adjusting-levers respectively engaging the separate guides, actuating connections between the levers and the signals, an operating device including a lever or handle directly upon the axle of the disk for turning the latter, and a stationary dial coöperating with the lever or handle and having indications corresponding to the related portions of the separate guides.

8. In an apparatus of the class described, the combination with the signals, of a controlling mechanism comprising a rotary wheel or disk provided upon opposite sides thereof with continuous and sinuous cam-guides, portions of which are in coincident relation, an axle for said wheel or disk, separate levers engaging respectively with the separate cam-guides, actuating connections between said levers and the signals, a stationary indicator-dial having a plurality of locking-points arranged in spaced relation corresponding to the related portions of the separate cam-guides, and an operator's lever or handle secured to the axle of the wheel or disk and carrying a latch coöperating with the locking-points of said dial.

9. In an apparatus of the class described, the combination with the signal, of controlling mechanism having an actuating-rod for the signal, said actuating-rod being provided with colored portions, and a telltale device consisting of a sleeve receiving the rod and having a sight-opening exposing the colored portions thereof.

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

JOHN A. SNOW.

Witnesses:

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