No. 777,353. PATENTED DEC. 13, 1904.

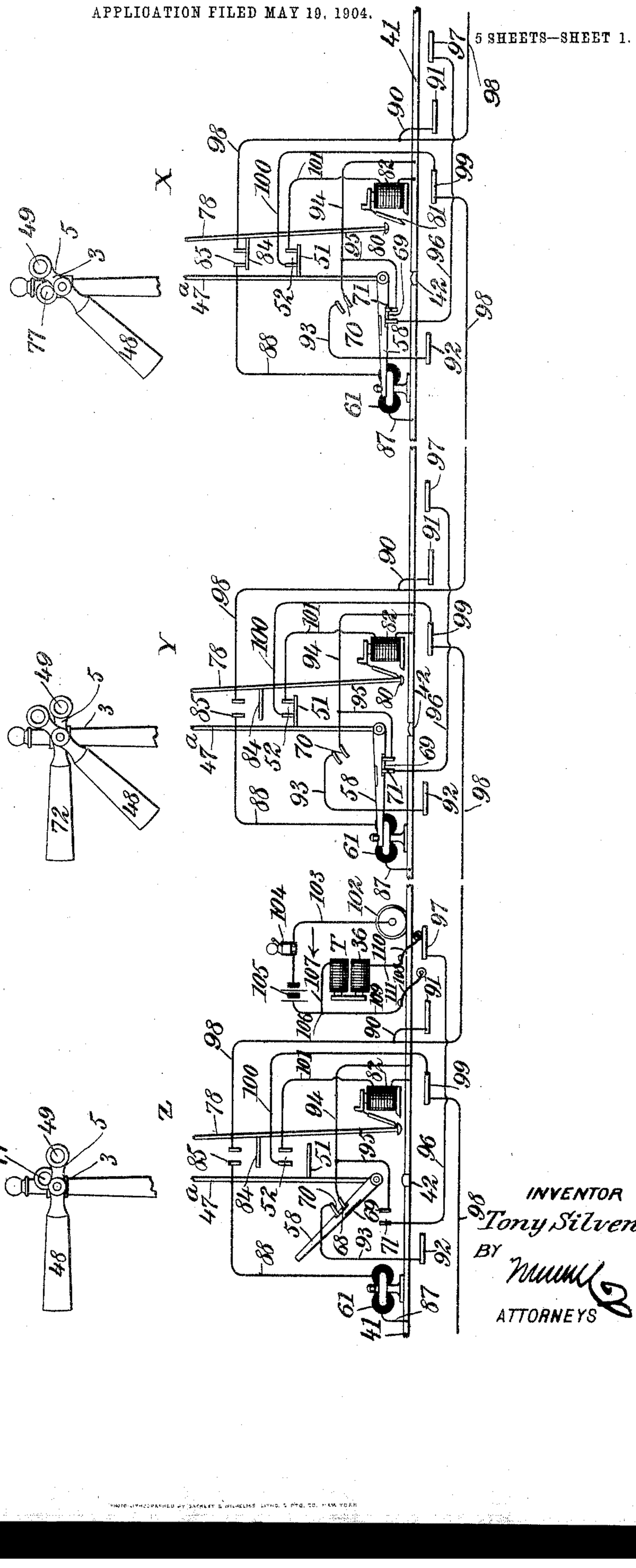
T. SILVENE.

BLOCK SIGNAL SYSTEM.

APPLICATION FILED MAY 19, 1904.

NO MODEL. 5 SHEETS—SHEET 1.

Fig. 1.



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W. Harrison.

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ATTORNEYS

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NO MODEL. 5 SHEETS—SHEET 2.

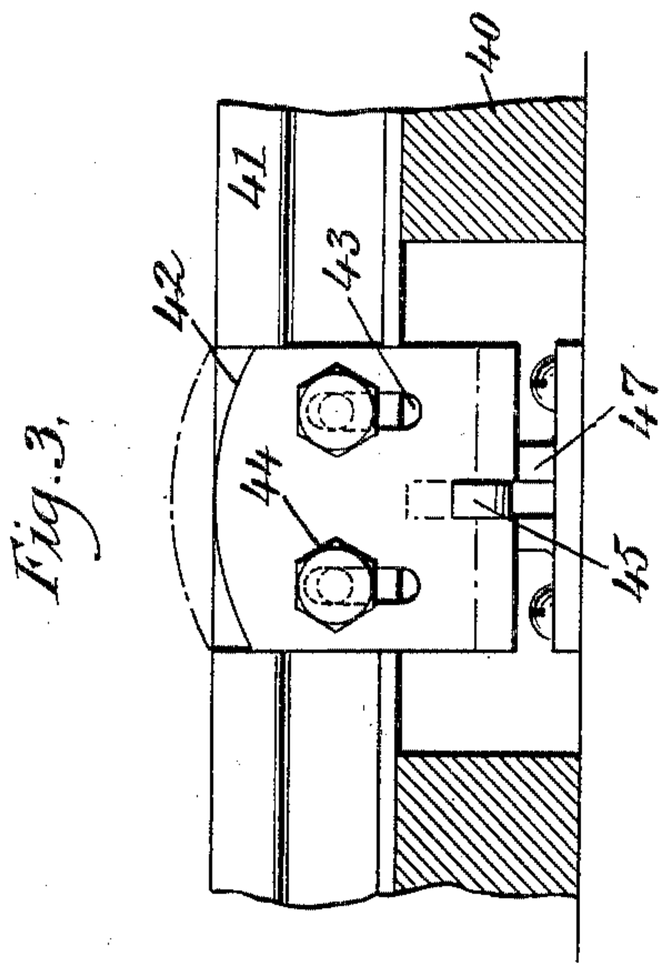

Fig. 3,

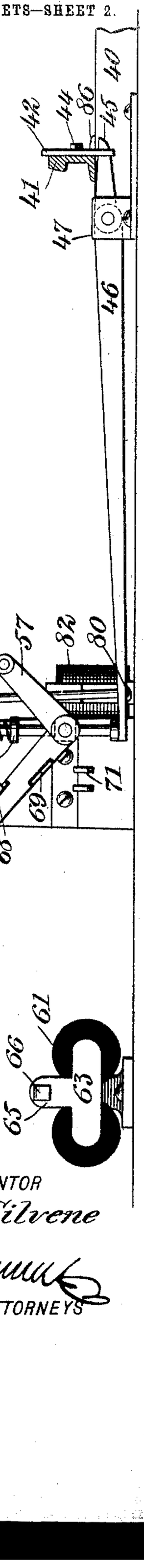

Fig. 2,

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NO MODEL. 5 SHEETS—SHEET 3.

Fig. 5,

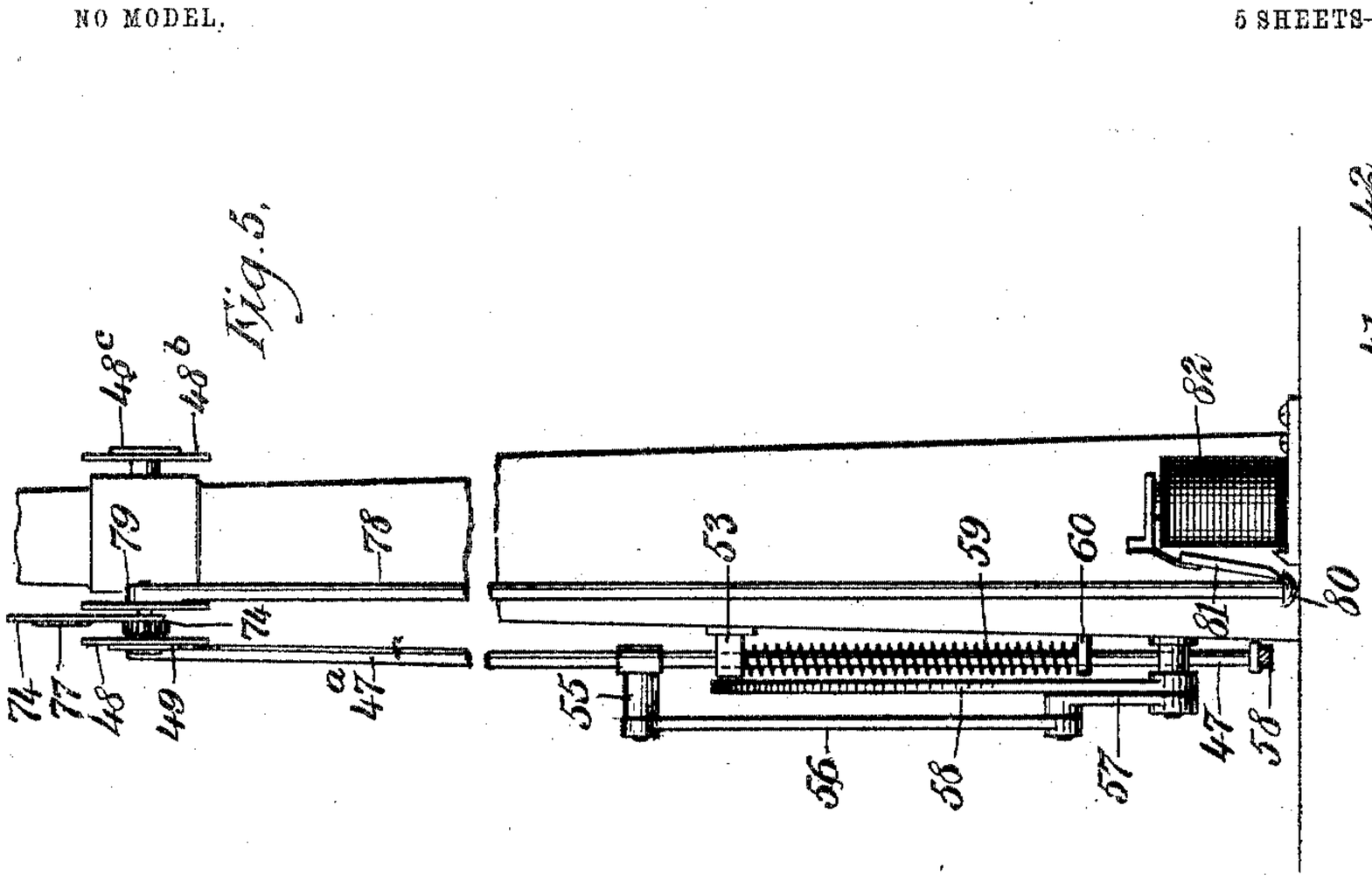


Fig. 4,

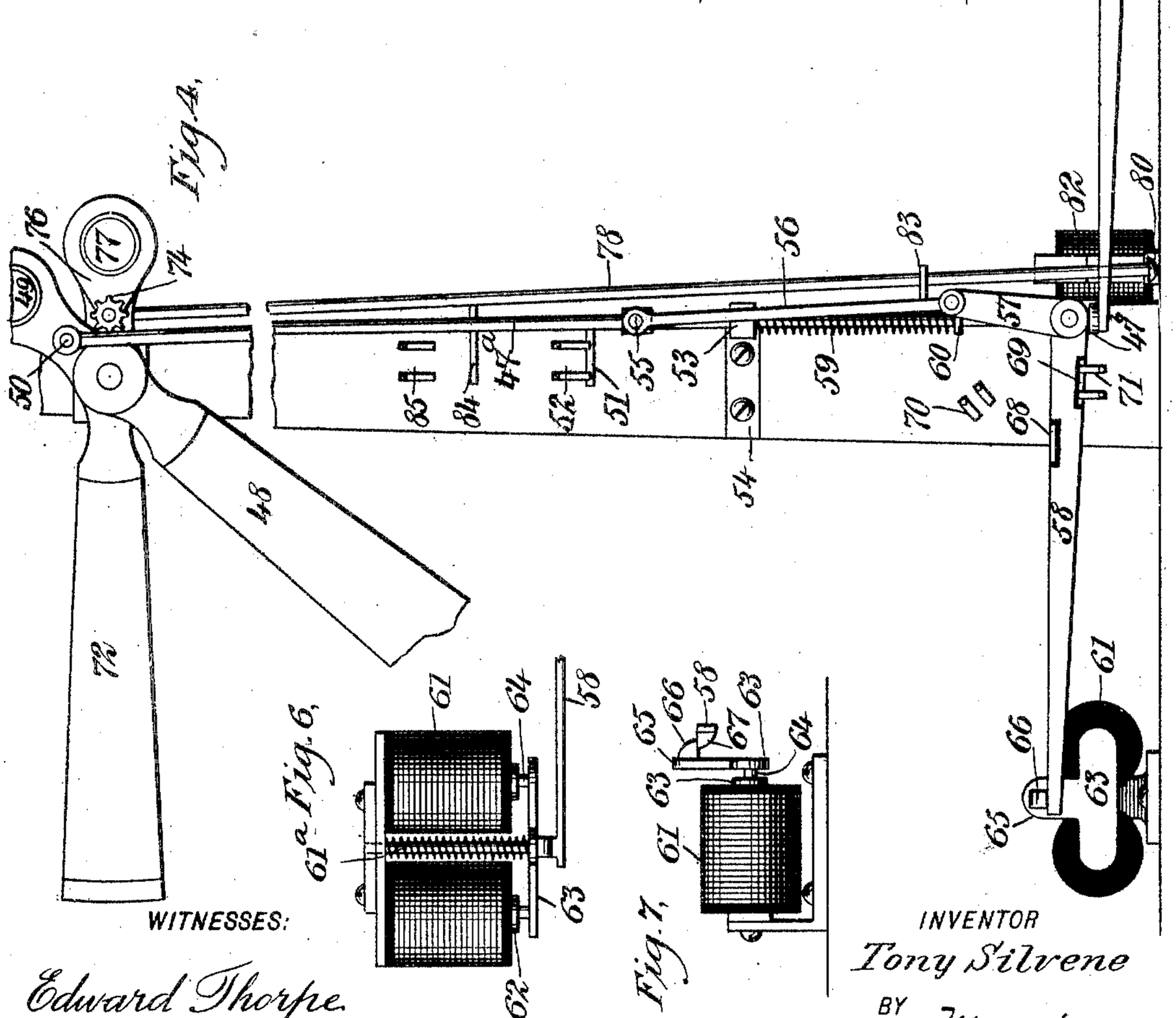
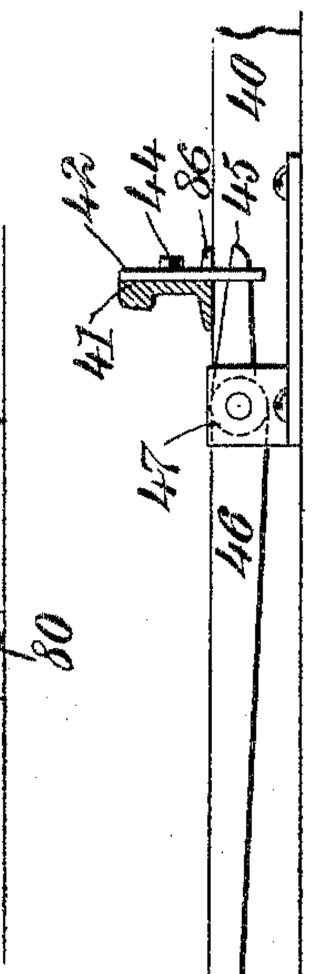


Fig. 6,

Fig. 7,



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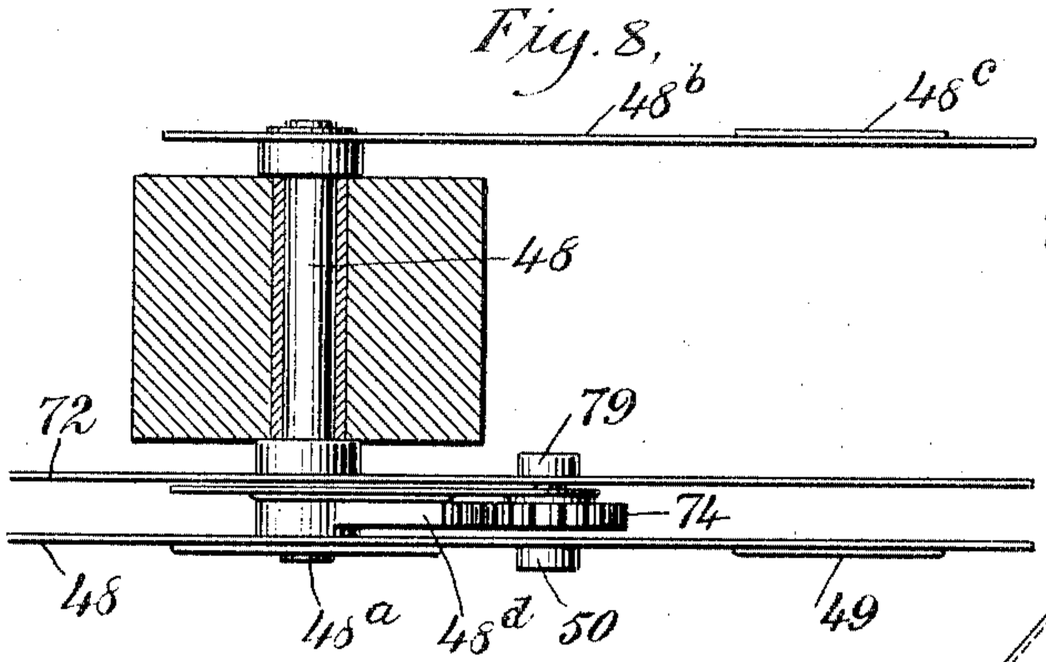
NO MODEL. 5 SHEETS—SHEET 4.

Fig. 8,



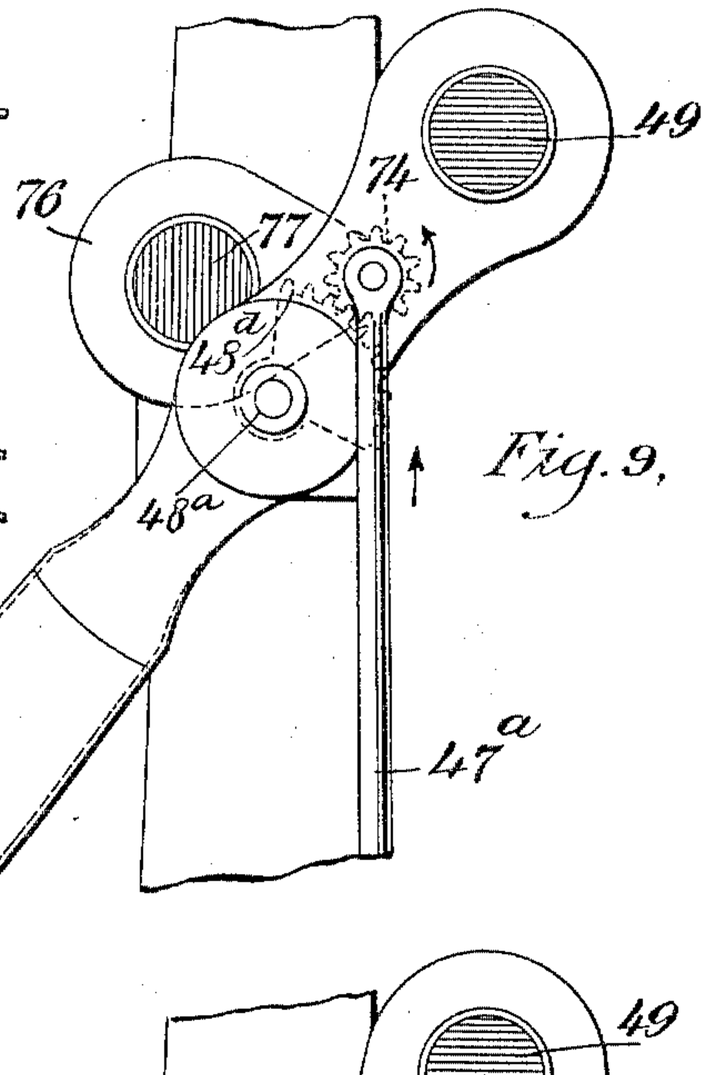


Fig. 9.

Fig. 10,

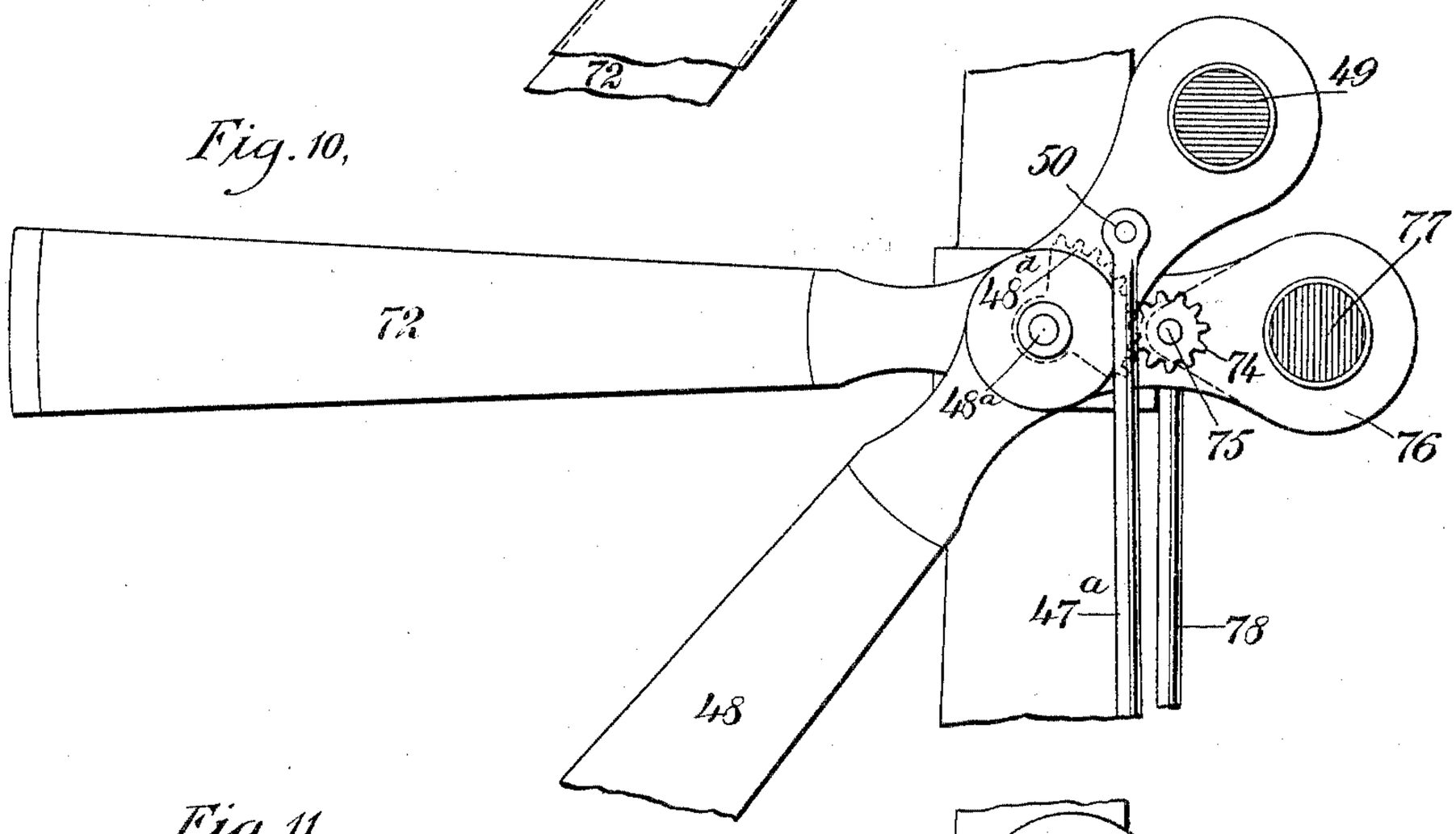
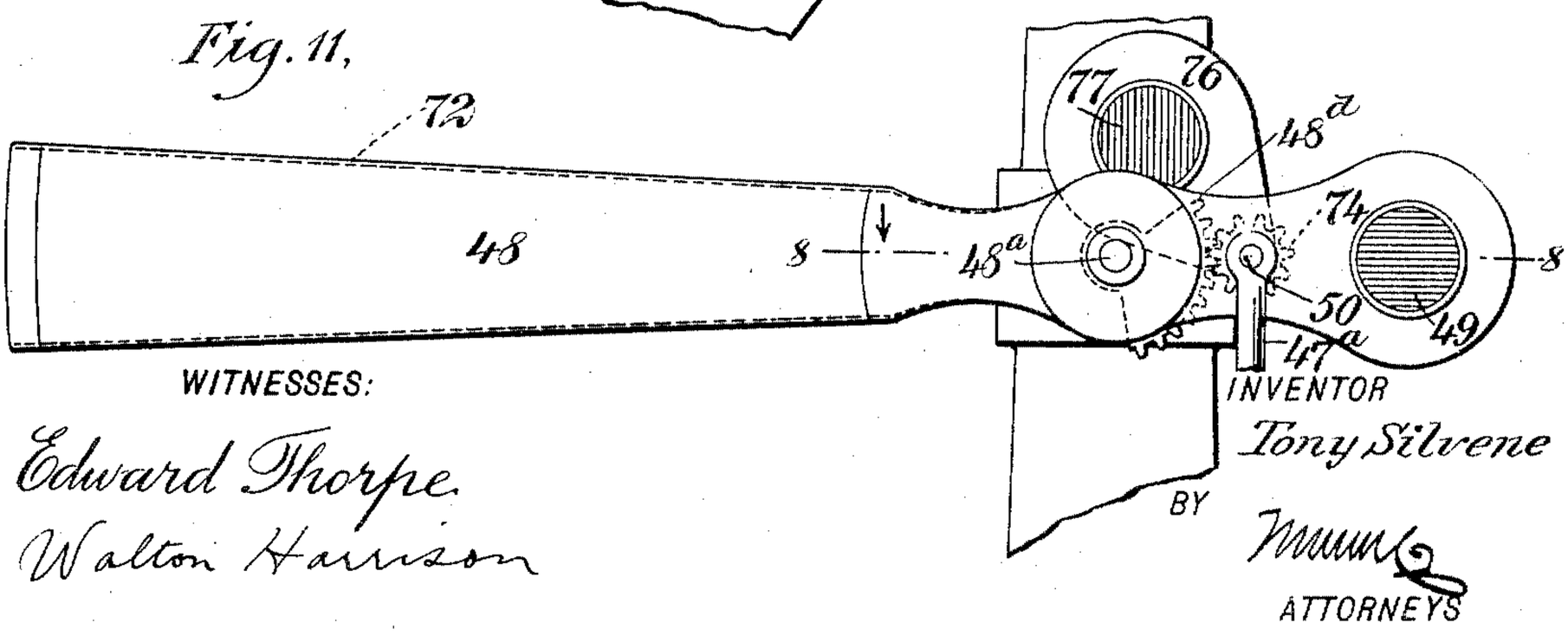


Fig. 11,



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No. 777,353. PATENTED DEC. 13, 1904.

T. SILVENE.

BLOCK SIGNAL SYSTEM.

APPLICATION FILED MAY 19, 1904.

NO MODEL. 5 SHEETS—SHEET 5.

Fig. 12.

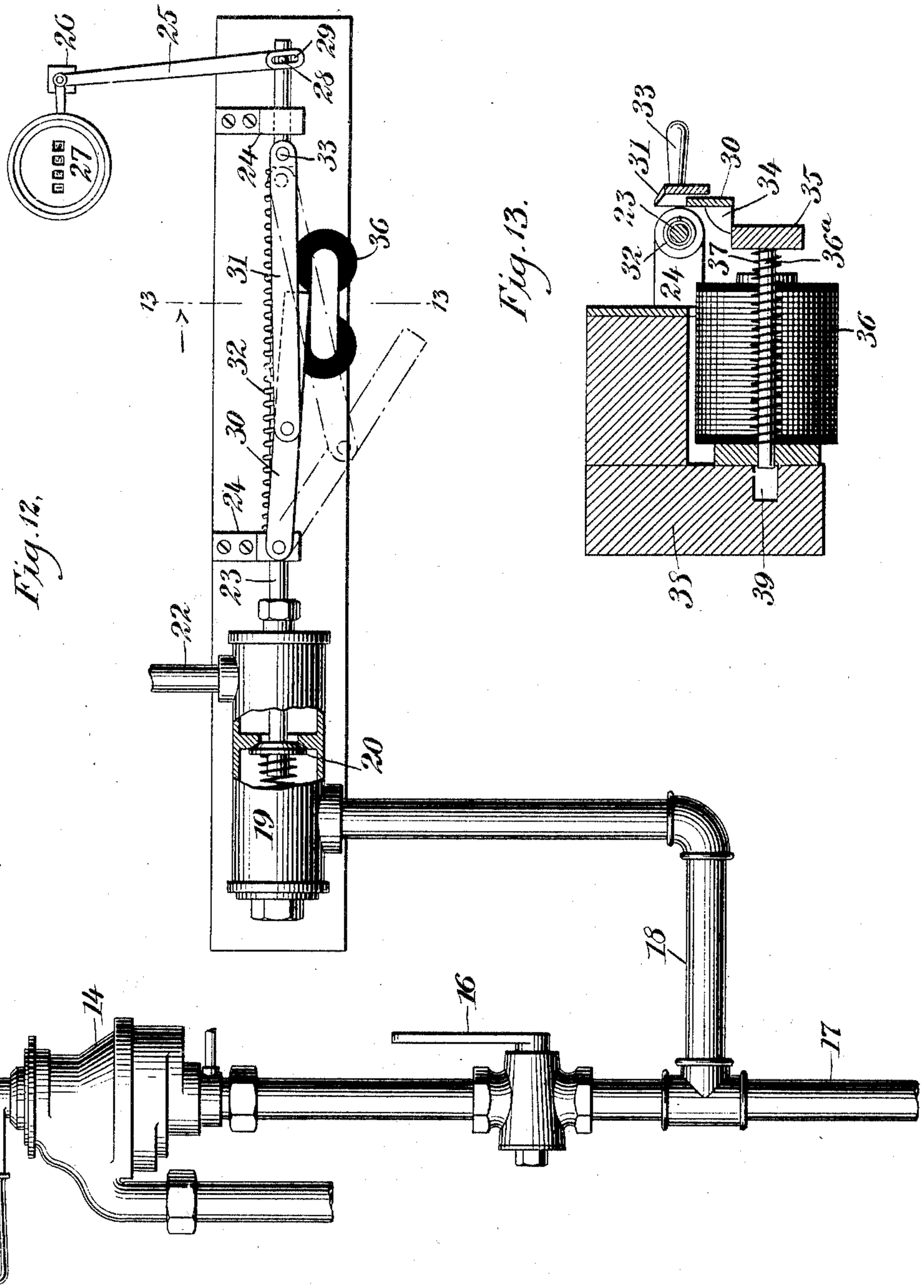

Fig. 13.

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No. 777,353. Patented December 13, 1904.

UNITED STATES PATENT OFFICE.

TONY SILVENE, OF VICTORIA, CANADA.

BLOCK-SIGNAL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 777,353, dated December 13, 1904.

Application filed May 19, 1904. Serial No. 208,707. (No model.)

To all whom it may concern:

Be it known that I, TONY SILVENE, a subject of the King of Great Britain, and a resident of Victoria, in the Province of British Columbia and Dominion of Canada, have invented a new and Improved Block-Signal System, of which the following is a full, clear, and exact description.

My invention relates to block-signals, and embodies certain improvements upon my Patent No. 760,159, dated May 17, 1904, for an electric block-signal system.

Among the several objects of my invention are the following: first, to enable trains upon the same track to warn each other with greater certainty; second, to render the action of the semaphore-arms more efficient; third, to enable the engineer of each train to know whether certain signals are made by his own train or by another train, and, fourth, to make certain improvements in the contact mechanism and connections.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a diagram showing my invention as applied to a railway. Fig. 2 is a front elevation of one of the posts provided with movable semaphore-arms. Fig. 3 is a side elevation of the trip used for setting the semaphore-arms in a predetermined position. Fig. 4 is a view somewhat similar to Fig. 1, but showing divers movable parts occupying different relative positions. Fig. 5 is a fragmentary elevation of the same viewed as from the right of Fig. 4. Fig. 6 is a plan view of the magnetic mechanism for releasing the lever 58, thereby throwing the trip. Fig. 7 is a fragmentary side elevation viewed from the left-hand side of Fig. 6. Fig. 8 is a horizontal view through one of the semaphore-posts, taken upon the line 8 8 of Fig. 11 and looking in the direction of the arrow. Fig. 9 is a fragmentary front elevation of one of the semaphore-posts, showing the semaphore-arms 48 and 72 in their normal positions, indicating "safety." Fig. 10 is an enlarged fragmentary front elevation of one of the semaphore-posts and similar to the upper portion of Fig. 4. Fig. 11 is an enlarged fragmentary elevation of the upper portion of a semaphore-post with the semaphore-arms indicating "danger." Fig. 12 is an elevation of the electrically-operated valve carried by the engine and connected with the train-pipe, and Fig. 13 is an enlarged section upon the line 13 13 of Fig. 12 looking in the direction of the arrow and showing the magnetic mechanism for opening the magnetic valve.

Referring to Figs. 12 and 13, the engineer's valve 14 is of the usual construction and is provided with a handle 15 for venting the train-pipe 17 at will. The auxiliary cut-off 16 is likewise of the usual construction. An air-pipe 18 leads from the pipe 17 to a casing 19, and in this casing is a pneumatic valve 20, capable of being opened so as to allow the air to flow through the exhaust-pipe 22, leading from the casing 19. The valve 20 is provided with a movable stem 23, encircled by a spring 32 and supported in bearing-brackets 24 and connected with a lever 25, which is pivoted upon the framework 26 and connected with a counter 27 for showing the number of movements made by the valve 20. A pin 28 is mounted upon the valve-stem 23 and slides loosely in a slot 29 in the lever 25. A lever 30 is pivoted upon one of the brackets 24, and pivotally connected with this lever is another lever 31, which is provided with a handle 33, which serves as a pivot and is connected with the valve-stem 23. The levers 30 and 31 are adapted to move into the position indicated by dotted lines in Fig. 12. The lever 30 is provided with a tooth 34, which normally rests upon an armature 35, this armature being rigidly secured upon a guide-rod 36^a, encircled by a spiral spring 37. The magnet 36 is supported upon the framework 38, which is provided with an aperture 39, into which the guide-rod 36^a may slide for the purpose of allowing a suitable play for the armature 35. Referring to Figs. 2, 3, and 4, the cross-ties are shown at 40 and a rail-section at 41. A trip-plate 42 is mounted upon the rail 41, which has a mutilation 86 to receive said trip-plate. The trip-plate is movably secured to rail 41 by means of bolts 44 entering slots 43 in the plate 42, as shown

more particularly in Fig. 3. The trip-plate 42 engages a lug 45 upon the lever 46, which is journaled upon the bracket 47 and is adapted to rock upon said bracket. The outer or free end of the lever 46 presses upward against the lower end of a rod 47^a, this rod being journaled at 50 upon the semaphore-arm 48. This semaphore-arm is provided with a colored glass 49 for indicating the position of the semaphore-arm 48 at night. The rod 47^a is provided with a contact-bridge 51, which moves into engagement with the contact members 52 whenever the rod 47^a is raised.

Mounted upon a bracket 54 is a stop 53. A pitman 56 is connected by a pivot 55 with the rod 47^a, this pitman being also connected with an arm 57, this arm in turn being rigidly connected with an arm 58, as shown more particularly in Fig. 2. A spiral spring 59 engages a collar 60, rigidly mounted upon the rod 47^a, this spring being adapted to exert tension downward upon the collar 60 and upward against the under side of the stop 53. A magnetic member 61 is provided with tubular cores 62 and with a spring-tensioned guide-rod 61^a. The armature 63 is mounted upon the guide-rods 64 and is adapted to approach and recede from the tubular cores 62. The armature 63 is provided with a boss 65, carrying a tooth 66, which is beveled, as indicated in Fig. 7, and is free to engage the tooth 67, carried by the arm 58, so as to hold this arm downward, as indicated in Fig. 4.

Mounted upon the arm 58 are contact-bridges 68 69, insulated therefrom, as shown, and adapted to make connection between the respective contact members 70 and 71. The rod 47^a is provided at its lower end with a knob 47^b for the purpose of presenting a good bearing-surface to the lever 46. The semaphore-arm 48 is mounted rigidly upon a stub-shaft 48^a, this shaft being rigidly connected with a short arm 48^b, provided with a colored glass 48^c. The arm 48^b and the arm 48 are practically identical, the arm 48^b being provided merely for the purpose of exhibiting the colored glass 48^c, so that the same may be visible from a direction opposite to that from which the arm 48 can be seen to the best advantage. An arm 72 is neatly fitted upon the stub-shaft 48^a. The arm 48 carries a sector 48^d, rigid therewith, and this sector meshes with a pinion 74, which is revolubly mounted upon the arm 72. As will be seen from Figs. 9, 10, and 11, when the rod 47^a is moved downward, so as to place the arm 48 in a horizontal position, the sector 48^d locks with the pinion 74, because the leaf 76 is in its extreme left-hand position, and when this takes place the movement of the rod 47^a necessarily carries the arm 72 also into a horizontal position. The pinion 74 is mounted upon a pin 75 and is rigidly connected with a leaf 76, provided with a colored glass 77. A rod 78 is connected, by means of a pivotal bearing 79, with the semaphore-arm 72. The lower end of this rod is provided with a head 80, which is free to be engaged by the armature 81 for the magnet 82, and thereby held down, as indicated by the lower end of Fig. 5. The magnet 82 is adapted to energize the armature 81, thereby releasing the rod 78 and allowing the semaphore-arm 72 to drop. A guide 83 loosely encircles the rod 78 and maintains it in proper position. The rod 78 is provided with a contact-bridge 84, which is adapted to close the contact members 85 when the rod 78 moves upward.

The rail is shown at 41 and forms a ground for the system. From the rail 41 a wire 87 in each block runs to the releasing-magnet 61. From this magnet a wire 88 runs to the contact members 85, and from the contact members 85 a wire 98 leads backward from each block to the block next preceding. Each wire 98 is connected by a wire 90 with an open-circuit contact 91. Another open-circuit contact, 92, is connected by a wire 93 with the contact members 70, these contact members being in turn connected by a wire 94 with the rail 41. Another contact member, 99, is connected by a wire 100 with the contact members 52, and from these contact members a wire 101 leads to the magnet 82 and thence to the rail 41. A wheel of the rolling-stock is shown at 102 and is connected by a wire 103 with a bell 104, located upon the rolling-stock and preferably within the cab. A battery 105 is connected with the bell 104. From a junction 106 a wire 107 leads to the magnetic member 36, above described, and from this magnetic member a wire 111 leads to a trolley-brush 110. From the junction 106 another wire, 109, leads to another trolley-brush, 108.

The magnetic member 36, the battery 105, the alarm 104, and all mechanism shown in Fig. 12 being mounted upon the locomotive are for convenience grouped together and indicated at T in Fig. 1.

In Fig. 1 are shown three blocks, each designated, respectively, by the reference-letters X, Y, and Z. The trains are supposed to be traveling from right to left. This would be the arrangement for a double-track system. For a single-track system the several parts would of course be duplicated. The contact members 92 97 are in one plane and engaged by the trolley-brush 110, whereas the contact members 91 99 are in another plane and engaged by the trolley-brush 108 only. The normal position of each semaphore-post is shown at the block X—that is to say, the several trips 42, the several arms 46, and all of the semaphore-arms normally occupy their lowermost positions. Suppose now that a train approaches from a point at the right of Fig. 1 moving toward the left hand. When this train reaches such a position that its trolley-brush 108 encounters one of the contact

members, 99, in the block (not shown) immediately to the right of the block marked X, a circuit is completed, as follows: wheel 102, wire 103, bell 104, battery 105, wire 109, trolley-brush 108, contact member 99 of block (not shown) to the right of the block X, thence through wire 98 to block X, bridge 84 (now closed) at X, wire 88, magnetic member 61, wire 87, rail 41, back to wheel 102. This energizes the magnetic member 61 and releases the arm 58, causing the several movable parts of the block X to assume certain relative positions indicated in Fig. 1 at block Z. This movement lowers the bridge 84 at block X. The train next runs into the block designated X. The trolley-brush 110 first encounters the contact member 97, producing no effect whatever, for the reason that the contact-bridge 69 of block X has just been raised off the contact members 71 by the upward movement of the arm 58. Nothing occurs, therefore, to warn the engineer or to interfere with the running of his train. The trolley-brush 108 next engages the contact 91, which is out of reach of the trolley-brush 110. No current can now flow through the magnet 61 of block X, the bridge 84 being lowered, so as to open the circuit. The current, however, flows backward through the wire 98 to the block to the right of X, where it passes upward through the wire 100, thence through the bridge 51, thence downward through the wire 101 and the magnet 82 to the rail. It thus energizes the magnet 82 in that block and releases the rod 78, allowing the semaphore-arm 72 to drop into a position indicating "safety." The trolley-brush 108 next encounters the contact member 99. The bridge 51 in block X being now out of engagement with the contact members 52, no current can flow through the magnet 82 in this block and no current can flow forward through the wire 98 to the block Y, for the reason that the bridge 84 in the block Y keeps the circuit open. The trolley-brush 108 therefore has no effect in engaging the contact member 99 in block X. The fact that the bridge 84 in block Y occupies its lowest position is due to the pressure of the train T between the blocks Y and Z, because in order to occupy its present position the train T has necessarily depressed the trip 42 in block Y, thereby lowering the bridge 84 in that block. The result is that the rear train being unable to energize the magnet 61 in block Y, and consequently unable to raise the semaphore-arm 48 in this block, is powerless to make the semaphore in block Y indicate anything but "danger," and the engineer of the rear train if watching for signals ahead has adequate notice that the track ahead is blocked. The contact member 99 having been passed, the wheel next depresses the trip 42 of block X. This lowers the arm 58 of block X, raises the rod 47[a], and lowers the semaphore-arm 48, but does not release the rod 78, for the reason that this rod is held down mechanically by the armature 81 engaging the head 80. The semaphore-arm 72 in block X therefore remains horizontal. In passing out of the block X the contact-brush 110 engages the contact member 92 without producing any effect, for the reason that the contact members 70 in block X are now open. The engineer looking ahead to block Y sees the semaphore-arm 48 in the position indicated in Fig. 1 and is thus apprised of the presence of the train and should stop accordingly. Should he disregard the warning thus given, his train will be stopped automatically. As the forward train T is standing between the blocks Y and Z and as the rear train is approaching the block Y from the right, the trolley-brush 110 of our train upon engaging the contact member 97 of the block Y completes the following circuit: wheel 102, wire 103, battery 105, wire 107, magnet 36, brush 110, contact member 97, wire 96, bridge 69, wire 95, wire 94, rail 41, back to wheel 102. This rings the bell 104 of the engine approaching the block Y and by energizing the magnet 36 applies the brakes and stops the trespassing train. The counter 27 upon the locomotive records the movement of the rod 23 and serves afterward as a telltale of the engineer's negligence. Suppose, however, that before our train arrived at block X the train T had pulled out, moving, of course, to the left. In clearing the block Z the contact-brush 108 upon engaging the contact member 91 would have completed the following circuit, to wit: wheel 102, wire 103, bell 104, battery 105, wire 109, contact-brush 108, contact member 91 of block Z, wire 90, wire 98, contact member 99 of block Y, wire 100, bridge 51 of block Y, (now closed,) wire 101, magnet 82, rail 41, back to wheel 102. This energizes the magnet 82 and releases the rod 78, whereupon the semaphore-arm of block Y swings downward into a normal position, indicating "safety." This movement of the train T would have raised the bridge 84 in block Y so that our rear train approaching the block X from the right upon engaging the contact member of block X would have found a complete circuit through the magnetic member 61 of block Y and would therefore have been enabled to release the arm 58 in block Y. The inevitable result of this arrangement is that when one train approaches another from the rear the rear train is always stopped either by the engineer heeding the warning presented by the position of the semaphore-arm 48 or if he fails to do so by the brakes being automatically applied. It is also clear that no false alarms can be given. Suppose now that the road is of the so-called "single-track" type and that a train at the left of the block Z is approaching this block. Owing to the presence of the train T between the blocks Y and Z, the arm 58 is raised to its highest position, as above de-

scribed. This being so, the bridge 68 is temporarily in engagement with the contact members 70 and will remain thus until the train T moves to the left, depressing the trip-plate 42 of the block Z, and the arm 58 in block Z has been raised into its elevated position by the brush 108 of the train T encountering the contact member 99 in the block Y before approaching the block Z. If now, as above stated, a train to the left of the block Z enters this block, the instant the brush 110 encounters the contact member 92 the current flows from the battery 105, carried by the train, through contact member 92, wire 93, bridge 68, wire 94, and rail 41 back to the wheels and battery of the approaching train. This rings the bell 104 upon the approaching train and also applies the air-brakes thereof, as above described, so as to bring the train to a full stop. It follows, therefore, that the train T not only protects a block upon each side of it, but that this protection affects trains moving in either or both directions. As soon as the train T in moving to the left depresses the trip 42 the block Z is left in its normal condition, except that the rod 78 is held down and the semaphore-arm 72 remains elevated, and as soon as the train moves into the next consecutive block to the left the semaphore-arm 72 in block Z is dropped to its lowermost position. It is clear, therefore, that a train in approaching a semaphore normally causes both arms of the same to move into their uppermost respective positions and that the semaphore immediately to the rear of the train normally displays two arms, one in its uppermost position and the other in its lowermost position, whereas in the semaphore in the next block to the rear both arms are in their lowermost positions. If the engineer in looking ahead sees both arms elevated to their uppermost or horizontal positions, he knows that the track immediately ahead is safe; but if the semaphore shows two arms, one elevated and the other depressed, as indicated at the center of Fig. 1, he knows that some other train is in the block immediately ahead. He is enabled to ascertain by a glance at the semaphore immediately in front whether there is a train ahead or not.

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

1. In a block-signal system, the combination of a pair of movable arms, means controllable automatically by movements of the rolling-stock for raising one of said arms, locking mechanism for temporarily securing said arms together and causing the same to act as a unit, an indicating member connected with said locking mechanism for showing the position thereof, and means controllable automatically by movements of the rolling-stock for lowering said arms separately.

2. In a block-signal system, a pair of movable arms, means controllable automatically by movements of the rolling-stock for raising one of said arms, locking mechanism for temporarily connecting said arms together so as to act as a unit, and means controllable by movements of rolling-stock for lowering said arms separately.

3. In a block-signal system, a pair of movable arms, mechanism actuated automatically by movements of the rolling-stock for raising one of said arms, gearing connected with said last-mentioned arm and actuated thereby for raising the other arm, and separate mechanisms controllable separately by movements of the rolling-stock for lowering said arm separately.

4. In a block-signal system, a pair of movable semaphore-arms normally depressed by their own weight, gearing for connecting the same together so as to act as a unit when one of said arms is raised, mechanism controllable automatically by movements of the rolling-stock for raising said arm last mentioned, means for temporarily securing said arms in elevated positions, and devices, controllable separately by movements of the rolling-stock for separately releasing said arms.

5. In a block-signal system, a movable signaling member mounted alongside of a track and adapted to be observed from a distance, mechanism connected therewith for shifting the same into different predetermined positions, separate contacts connected with said mechanism and opened and closed by movements thereof, one of said contacts being closed when said movable signaling member is in one of said predetermined positions, the other of said contacts being closed when said movable signaling member is in the other of said predetermined positions, separate wires connected with said contacts, and other contacts connected with said wires and disposed upon different parts of said track, the arrangement being such that only one of said last-mentioned contacts can be energized at a time.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

TONY SILVENE.

Witnesses:
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