No. 897,138. PATENTED AUG. 25, 1908.

R. PFEIL.

SIGNAL SYSTEM.

APPLICATION FILED APR. 12, 1906.

4 SHEETS—SHEET 1.

Fig. 1.

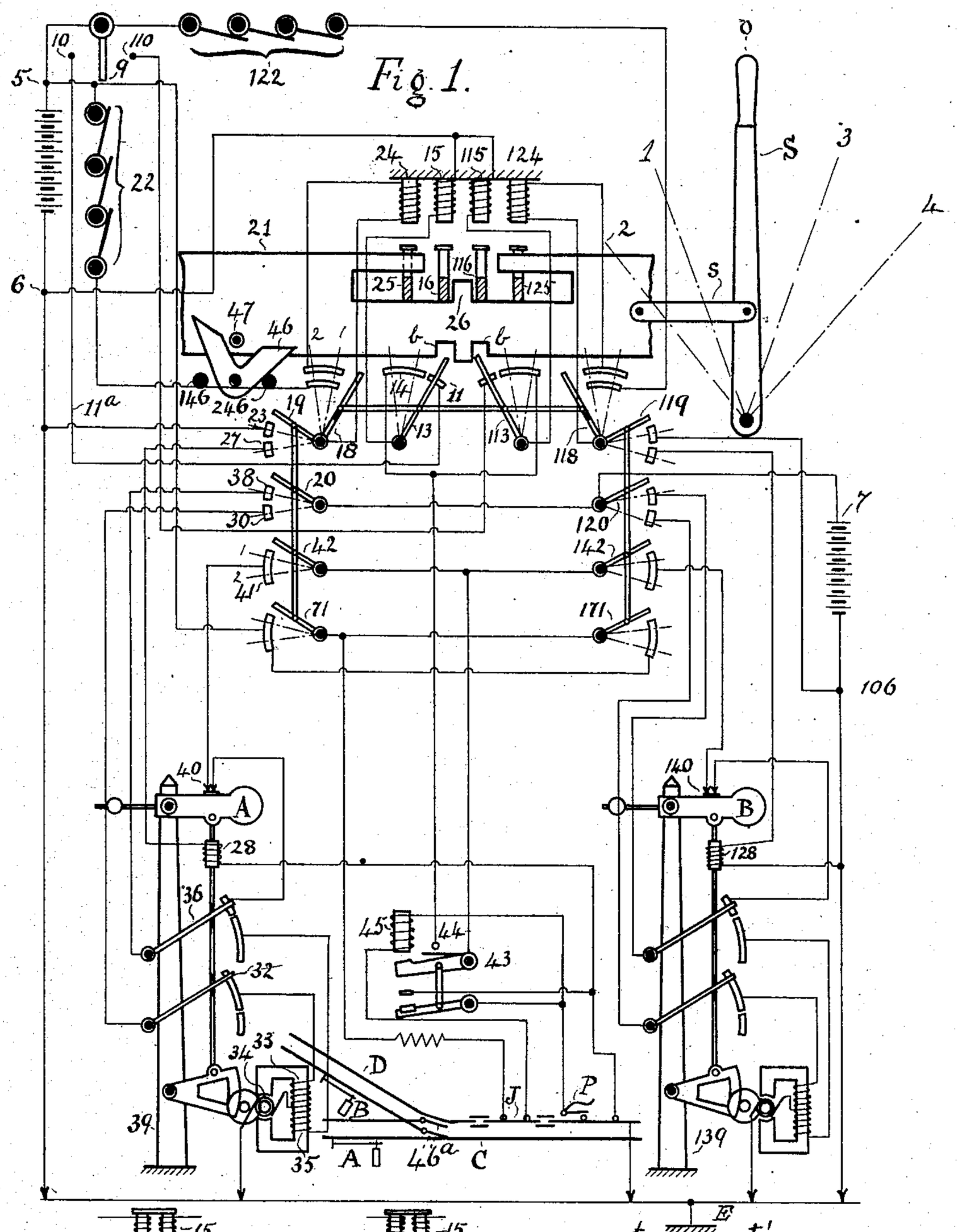

Fig. 2.

Fig. 3.

Fig. 4.

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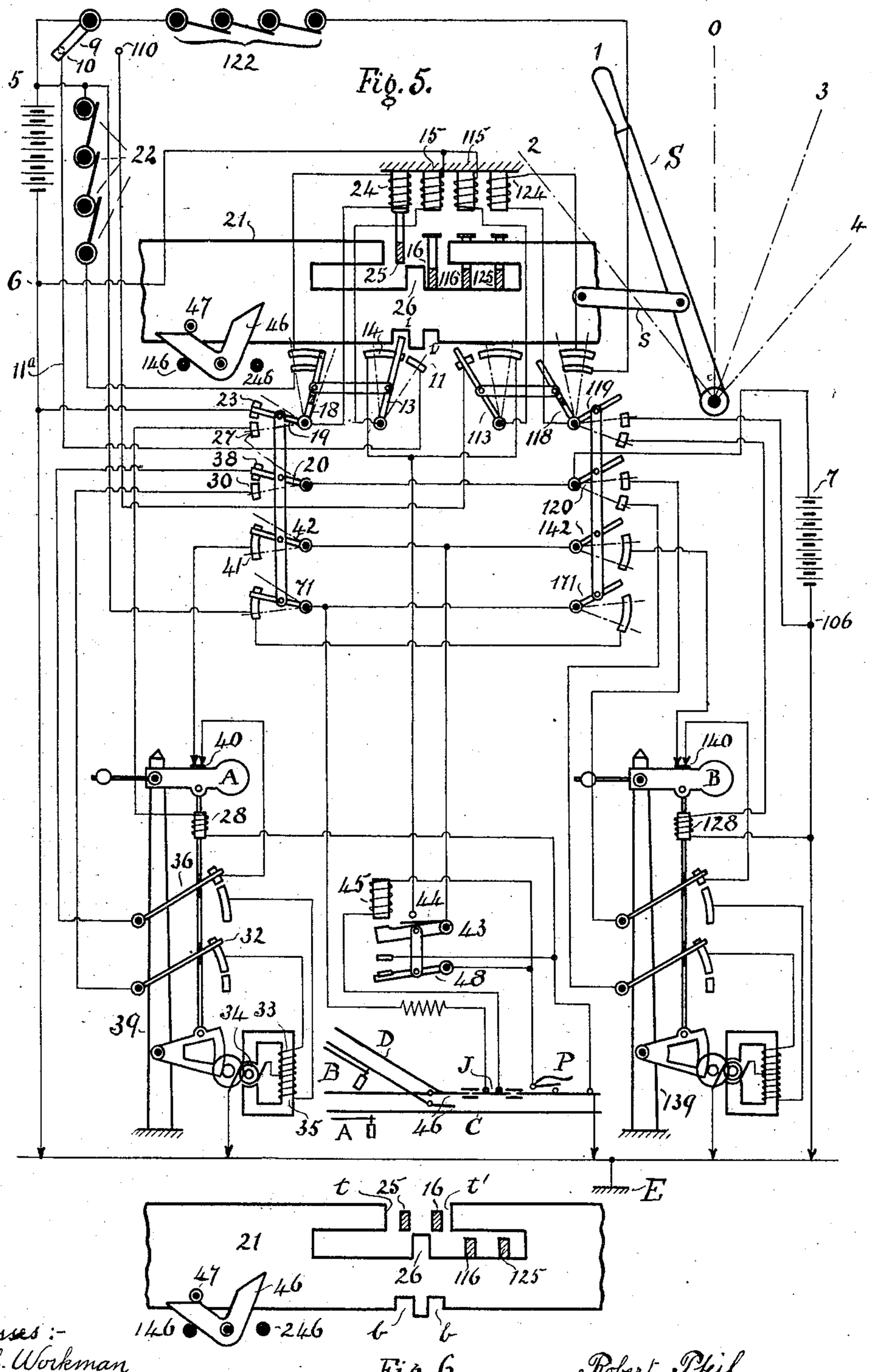
4 SHEETS—SHEET 2.

Fig. 5.



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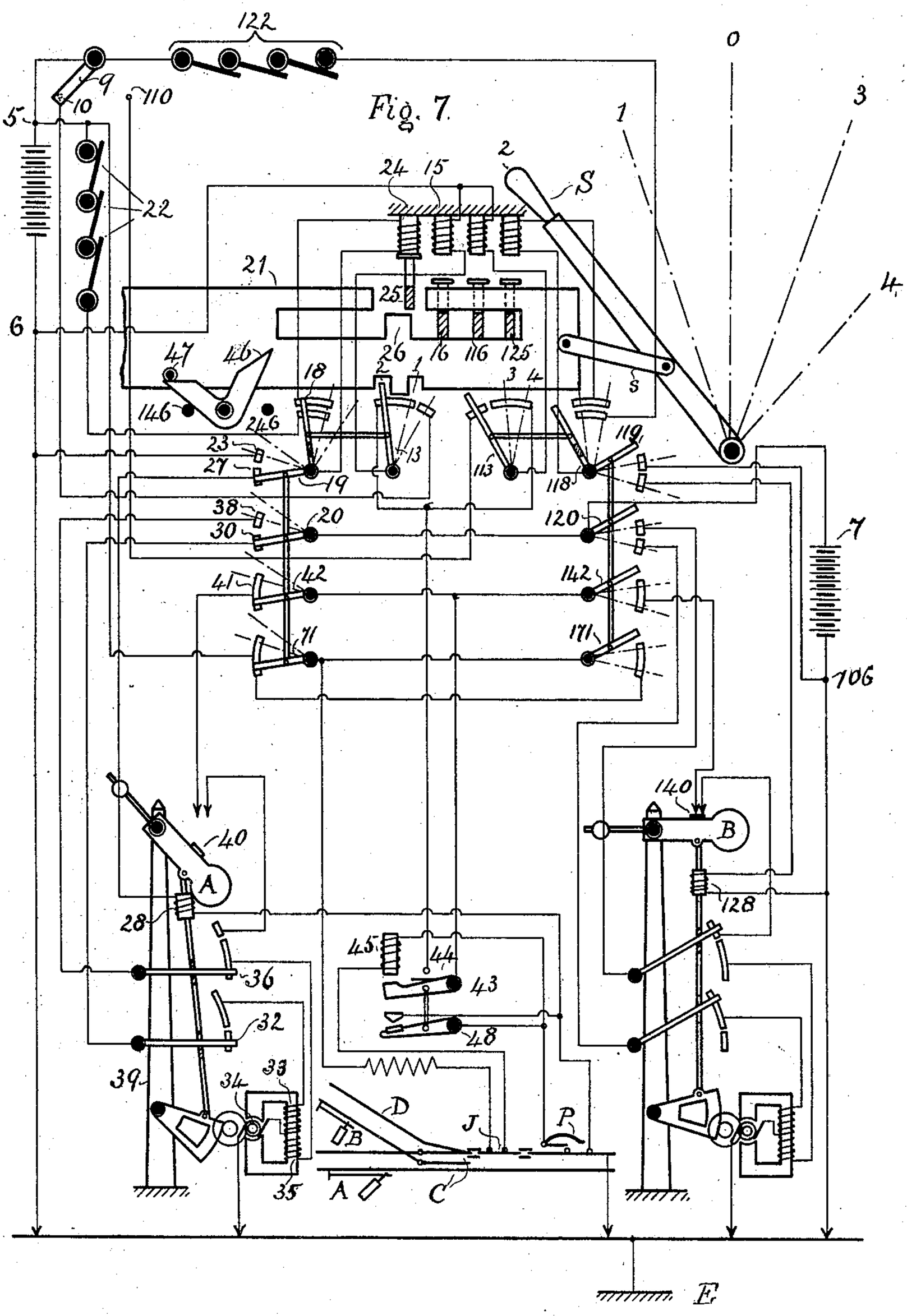
4 SHEETS—SHEET 3.

Fig. 7.



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4 SHEETS—SHEET 4.

Fig. 8.

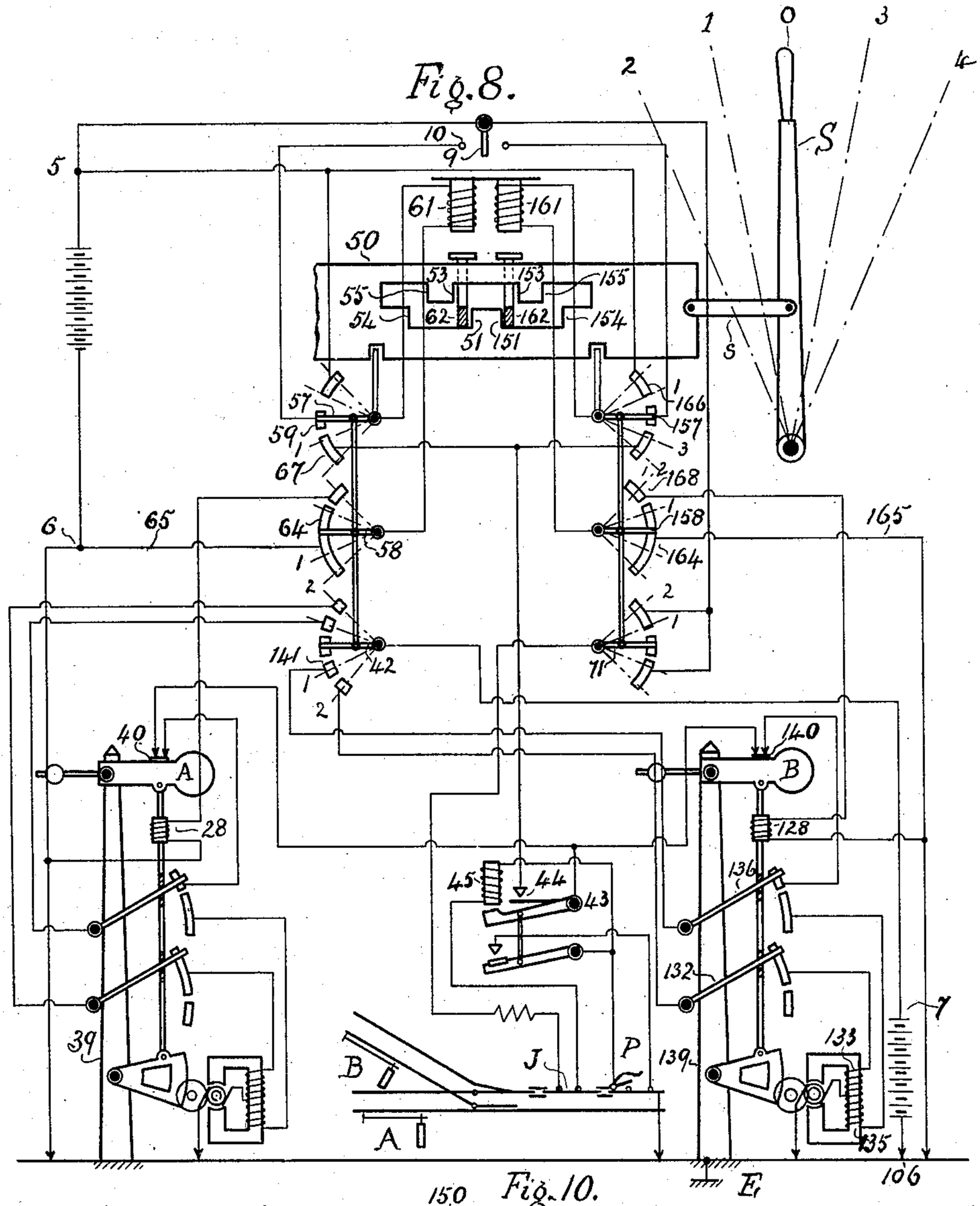


Fig. 10.

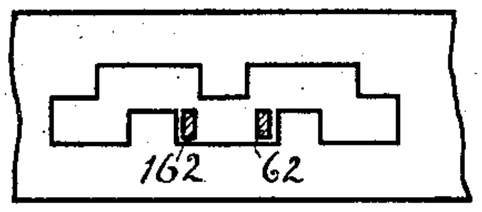
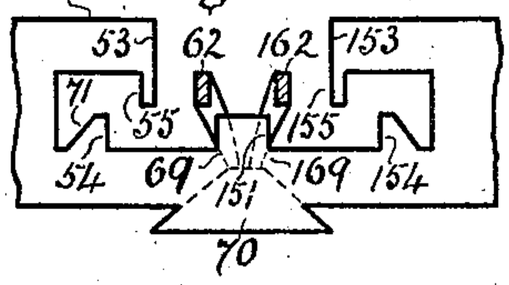


Fig. 9.



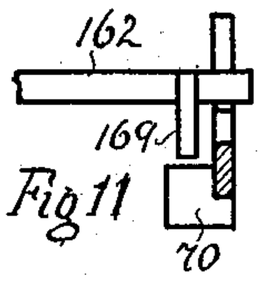


Fig 11

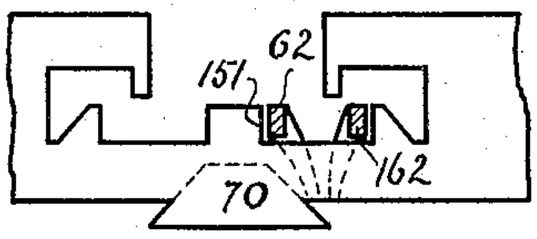


Fig. 12.

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UNITED STATES PATENT OFFICE.

ROBERT PFEIL, OF GRUNEWALD, BERLIN, GERMANY, ASSIGNOR TO SIEMENS & HALSKE, A. G., OF BERLIN, GERMANY, A CORPORATION OF GERMANY.

SIGNAL SYSTEM.

No. 897,138. Specification of Letters Patent. Patented Aug. 25, 1908.

Application filed April 12, 1906. Serial No. 311,395.

To all whom it may concern:

Be it known that I, ROBERT PFEIL, a subject of the German Emperor, and a resident of Grunewald, Berlin, Germany, have invented new and useful Improvements in Signal Systems; and in order that others skilled in the art may understand and practice my invention I give the following specification.

The invention relates to signal operating apparatus, and consists particularly of a signal operating lever having connected therewith a locking device adapted to lock the switch point levers in proper positions, switches for putting in operation the signal motor and signal-arm coupling and the necessary electro-magnetic locking apparatus and controlling or supervising apparatus.

The conditions which fulfil the object of the invention are as follows: 1. Before a signal can be set into the "clear" position, all the switch points concerned in the track over which the train will pass must be in proper position; that is, all the operating levers pertaining thereto must be locked and the controlling or supervising devices must show that the switch points themselves are properly set or locked. 2. A signal set at "clear" position must be able to be returned at any time to danger position. 3. The switch point levers must not be released from their locked condition by the mere return of the signal to danger; they must continue to remain locked until the locking is removed either automatically by the passing train, or by special, definite manual operation of a releasing apparatus at the central signal station, or train despatcher's office. 4. The locking of the switch point levers, as also the setting of the signal, is to be accomplished by the same lever. 5. The electro-magnetic and mechanical lock devices which serve for holding the switch point levers locked are so arranged that they mutually control their own operation, that is, for example, that release of a lock device for movement to the right is only possible if at the same time a locking thereof against movement toward the left takes place.

I have illustrated my invention in the accompanying sheets of drawings, in which

Figures 1, 5 and 7 are views showing the apparatus or system as a whole with the operating lever and the lock device connected therewith in three different positions, viz., the normal or rest position, intermediate position and full shifted position (to the left) respectively, with the corresponding changes in the signals and switches which result from said movements of the operating lever. Figs. 2 and 3 are detail views showing the lock device or slide in cross section and one of the electro-magnetic locks pertaining thereto. Figs. 4 and 6 are detail views showing the lock device or slide in two different positions; Fig. 4 showing the normal position of the slide as in Fig. 1, but with the first lock released and the slide freed to be moved by the operating lever. Fig. 6 shows the position of the lock device or slide corresponding to its position in Fig. 5, but before the lock lever 16 has dropped away from its magnet. Fig. 8 shows a modified form of the signal apparatus or system, with certain parts omitted for clearness. Figs. 9 to 12 inclusive are detail views showing modified forms of the lock slide and lock levers.

In Figs. 1, 5 and 7 the system or apparatus is shown in connection with two signals, A and B, which are to be operated to indicate the condition of a stretch of track indicated at C. In this track are shown switch points 46^a for a branch track D. The lock device which controls the operation of the system is indicated at 21 and consists of a slide the form of which is clearly shown in Figs. 4 and 6 of the drawing. The slide 21 is connected to the operating lever S by a link *s*, so that the slide may be shifted by the lever S longitudinally in either direction from the normal position indicated in Fig. 1 with the operating lever S in the position marked 0. Slide 21 is provided with four locking surfaces, two of which are formed by the opposite faces of a stop or lug 26, the other two being formed by the faces *t* and *t'*. These four locking surfaces coöperate with four lock levers 25, 16, 116 and 125, which are operated and controlled respectively by electro magnets 24, 15, 115 and 124. The lock slide 21 also sets and locks the switch point lever 46 by which the track switch points 46^a corresponding thereto are controlled. The lock slide 21 is also provided with means such as recesses *b b* for operating two systems of switches 13, 18, 19, 20, 42, 71 and 113, 118, 119, 120, 142, 171, each set of said switches being linked together and operated in unison and controlling electrical circuits, as hereinafter explained. In the drawing, slide 21 is

shown as operating and controlling only one switch point lever 46, but it will be understood that any desired number of such switch point levers may be operated by the slide which, in that case, is made of sufficient length to accommodate the desired number of these levers. Two fixed stops 146 and 246 are provided to limit the movements in either direction of the switch lever, and the switch lever is locked in its end positions, as shown in Figs. 5 and 7, by the stop 47 on the slide 21, this stop also serving to shift said levers.

Figs. 2 and 3 show clearly the manner in which the lock levers are operated by their electro magnets, the levers being pivoted at one end and having attached thereto the armatures x of said magnets. Fig. 2 shows magnet 15 deënergized and the armature and lock lever 16 fallen away. Fig. 3 shows the position of the locking lever when the magnet 15 is energized and has attracted its armature and locking lever, lifting the latter out of the path of the locking lug or stop 26. A similar position is clearly illustrated in Fig. 4. The several positions of the locking slide and operating lever S are indicated in the several Figs. 1, 5, 7 and 8, by the broken lines 0, 1, 2, 3 and 4. It will be understood that all the levers are insulated one from the other.

43, 44 and 45 indicate a relay which is connected with the track rails in a well known manner, such, for instance, as with an insulated section of rail J and the foot contact P to be operated by the passing train.

The signals A and B are shown as mounted on poles or masts 39 and 139, the signal arms of which are provided with contacts 40 and 140, which, in the danger position, as indicated in Figs. 1 and 5, are closed. The signal arms are coupled with signal operating mechanism by means of coupling magnets 28 and 128.

32 and 36 are switches which are operated by means of signal operating mechanism and control circuits, as will be hereinafter explained. The signal operating mechanism is shown as an electric motor, the armature of which is indicated at 34 and field windings indicated by the numerals 33 and 35.

Signal B is similar in construction and operation to signal A.

A description of the operation of the system and the several parts thereof with reference to the drawings will also show the construction and arrangement of the apparatus, and in order to save repetition, the system will be described by explaining its operation. In order to show in what manner the whole apparatus may be made dependent upon another operating apparatus, which may be in the same train yard or may be at any other controlling point, a dependence which is frequently employed is indicated diagrammatically in the figures and consists of a switch 9 having contacts 10 and 110, and contacts 22, and 122. This switch is situated in any suitable place best adapted for the sending or issuing of orders and for the control of the operators at the several signal towers. In yards in which the responsible traffic manager is not stationed in the switch tower, an apparatus is employed of that kind, which operates so that the operator can set a signal to clear only by special permission and on a special order.

The series of contacts of switches 22 and 122 represent special controlling or supervising contacts which serve for supervising and controlling track switches, turn tables, and in general for all those parts of a track and for all devices connected therewith which must be in a certain condition before a given train is allowed to pass. The proper condition referred to will be when these contacts are closed, as indicated in the drawings. The switches may be operated either directly by the devices referred to, switch points, turn tables and the like, or by electro magnets or other devices which are operated by the switch points, turn tables and the like. These devices do not form any part of the present invention.

The normal condition of the several features of the system is indicated in Fig. 1, the two signals A and B being at the danger position and the track connections being as indicated, with the track contact device J and P in the position shown and the switch points 46^a and the corresponding switch lever 46 having positions indicated. It will be understood that the position of the switch points 46^a always corresponds with the position of the switch lever 46 pertaining thereto. In the position 0 of the operating lever S, Fig. 1, the switch point lever 46 is not locked, but is free to move when operated by the lock slide 21. The slide, however, is locked, and both signals show the danger position. If now signal A is to be set to "clear" position, the appropriate indication or instructions will be received by the operator either from another signal tower or from the despatcher's office, or headquarters, and this will be indicated by the shifting of the switch 9 on to contact 10. When this occurs the following circuit is established: from battery terminal 5 to switch 9, contact 10, conductor 11^a, contact 11, switch 13 to magnet 15, and back to the grounded terminal 6 of the battery. Magnet 15 is now energized and lifts its armature and lock lever 16 out of the path of the lug or stop 26 on the slide 21. The lock device may now be shifted to the left by means of the operating lever S until the lug 26 abuts against the lock lever 25. Operating lever S will now be in the position 1, as indicated in Fig. 5. Switch point lever

46 in this position of the lock device will be thrown to the left (see Fig. 5), and the switch points 46[a] will be set into the position proper for a clear track to be indicated by signal A.

It is immaterial, so far as the present invention is concerned, whether this shifting of the switch points be obtained by a particular operating means for the switch point lever or by means of the stop 47 operated by the operating lever S, as shown in the form of operating lever illustrated in the drawings, or by means of a locking device connected with the operating lever.

If all the contacts 22 are closed (indicating the proper condition of the devices represented thereby) the following circuit will be established (see Fig. 5). From battery terminal 5 through contacts 22, switch 18 to magnet 24, switch 19, contact 23, back to the grounded terminal 6 of the battery. The shifting of the operating lever to position 1 moved switch 13 off contact 11, and thereby magnet 15 became deënergized, and lock lever 16 thereupon dropped behind drop lug 26, as clearly shown in Fig. 5, thereby locking the operating lever S from movement back to position 0. Magnet 24 being now energized, as described, lock lever 25 is raised, as shown, and the lever S and lock slide 21 may now be moved further to the left into its end position 2. This movement of the operating lever S having been made, the following circuits for operating the signal are established (see Fig. 7). From battery terminal 7 to switch 20, contact 30, switch 32 (this latter switch being, however, still in the position shown in Fig. 5) to motor field winding 33, motor armature 34, back to the grounded terminal 106 of the battery. Also, a circuit is made, by this movement of the operating lever, from battery terminal 5 through contacts 22, switch 18, magnet 24, switch 19, contact 27, to the signal coupling magnet 28, to the grounded terminal 6 of the battery. The coupling magnet being thus energized and the motor field excited, the motor is operated and shifts the signal arm into the "clear" position, as indicated in Fig. 7. The motor is thereupon stopped automatically by means of switch 32 opening the circuit of the motor, as shown in Fig. 7. It will be noted that the switch point lever 46 is locked from movement by the lock lug or bolt 47, thereby locking the switch points in proper position for the passage of a train.

In order to release the switch point lever from its lock 16, 26, automatically by the passing of the train, the relay shown in the drawing may for example be employed. The manner of operation of it may be seen from the drawing without further explanation. When the last axle of the passing train closes contact P, the circuit through the relay magnet 45 is closed, and the relay operates. At first, the only effect of the relay is to close contacts 44 and 48. After the train has passed, the operator returns the operating lever to position 1. This movement throws switch 19 off contact 27 on to contact 23 (see Fig. 5), and thereby deënergizes the coupling magnet 28 by opening its circuit. This return of the operating lever S to position 1 also closes the motor circuit as follows: from battery terminal 7, switch 20, contact 38, switch 36, which is in the position shown in Fig. 7, motor field 35, armature 34, to the grounded terminal 106 of the battery. The motor is thus reversed and the signal arm is returned to the danger position (Fig. 5). The contacts 43 and 48 having been closed as described, the following circuit is made: from battery terminal 7, switch 20, contact 38, switch 36, signal arm contact 40, switch 42, relay contact 43, 44, contact 14, switch 13, magnet 15 to the grounded terminal of the battery. Energizing of magnet 15 lifts lock lever 16 from locking position, and the operating lever S may be returned to its normal position 0. The first movement of the lever from 1 to 0 breaks the circuit at the switch 18, as will be seen in Fig. 5, thereby deënergizing magnet 24 and allowing lock lever 25 to fall behind lock lug 26. Upon operating lever S reaching its normal position as shown in Fig. 1, lock lever 16 also drops into its normal position.

The condition of the apparatus shown in Fig. 5 illustrates the subject matter of the invention. The signal is in danger position. The switch point levers are locked and the operator, owing to the electro magnetically operated lock 16, 21, cannot unlock the switch point levers prematurely. This action of the lock device is clearly illustrated in Fig. 5, which action is obtained by the provision that each lock lever locks the lock device or slide in a certain position before it frees the lock device for a further movement. For instance, lock lever 16 must assume absolutely the lock position shown in Fig. 5 in order to permit the lock slide 21 to be moved into the position shown in Fig. 7, as otherwise it would be in the path of the lock surfaces *t* of the slide. If the lock lever 16 has assumed its normal position, and the signal is moved to the "clear" position, the impossibility of the complete return of the signal lever S, except after the releasing devices (magnet 15 and relay 45) have operated, is insured. This action of the locking devices is of great importance, since it prevents the premature release of the switch point lever in case one of the locking devices fails to work. A further advantage of signal operating apparatus lies in the fact that in order to release the switch points, it is not only necessary that the signal operating lever is returned to its normal position, but also the signal motor must actually be reversed and

the arm of signal A positively returned to the danger position. These conditions are obtained by means of switches 36 and 40 inserted in the releasing circuit, which circuit is only closed in the danger position of the signal, so that magnet 15 is energized only in the danger position of the signal. For a train from B signal B is employed. For this purpose the switch 9 will be set on contact 110, and magnet 115 energized by the circuit from battery terminal 5, switch 9, contact 110 to contact 111, switch 113, magnet 115, back to the grounded terminal 6 of the battery, and the slide 21 released for movement toward the right by the raising of the lock lever 116. From this point on all the further operations at the right of Fig. 1 take place in an analogous manner, as before described, for those to the left of Fig. 1.

The twelve locking surfaces provided by the locking device (four on the lock slide and eight formed by the two sides of the four lock levers) may be divided in different ways. In Figs. 1 to 7 hereinbefore described four of such surfaces are disposed on the slide and eight on the lock levers. In Fig. 8 these twelve surfaces are shown with eight of them formed on the slide and four on the lock levers. By this modification is obtained a simplification of the signal apparatus shown in Fig. 1, inasmuch as in this case only two magnets, 61 and 161, Fig. 8, are necessary. In this Fig. 8 those parts which have the same form and apparatus as in Fig. 1 are designated by the same reference numerals. The lock slide is indicated at 50, and apart from its difference in form and the different number and arrangement of the lock surfaces (51 at the left, 151 to the right, 53, 54, 55, 153, 154 and 155) has the same functions as the lock slide 21 of Fig. 1. It is thus the locking device by means of which the switch point levers are locked (which levers, however, have been omitted from this figure for the sake of clearness). The lock levers 62 and 162 are actuated by magnets 61 and 161 in the same manner as lever 16 and magnet 15, Figs. 1, 2 and 3. It is to be explained, however, that contrary to Fig. 1, signal B on the right will be set to "clear" by the movement of the slide toward the left. This change has been made merely to avoid, as much as possible, the crossing of the conductors in the figures. Otherwise the operation is similar to that before described.

When the switch 9 is moved to contact 10 the following circuit is established: from battery terminal 5, switch 9, contact 10, contact 59, switch 57, magnet 61, switch 58, contact 64, conductor 65 to the grounded terminal 6 of the battery. Magnet 61 is thus energized, and by the lifting of lock lever 62 permits the lock device or slide 50 to be free for movement towards the left. The operating lever S is shifted by hand from position 0 to position 1, thereby also shifting the switches 57, 58, 157 and 158, 42 and 71 into the position designated by the broken lines 1, and establishing the circuit from battery terminal 5, contact 166, switch 157, magnet 161, switch 158, contact 164, conductor 165 to grounded terminal 6 of the battery. Magnet 161 lifts lock lever 162 out of the path of the lock surface 154 up to the surface 155. Simultaneously magnet 61 becomes deënergized by the interruption of the circuit at 57, 59 and lock lever 62 drops out of the path of lock face 153 to the rear of lock face 151. In these conditions, as in Fig. 5, locking of the switch point lever is produced, and the operating of the signal is now made possible. By the throwing of the operating lever S from position 1 to position 2, the circuit of the coupling magnet is closed as follows: from battery terminal 5 to contact 166, switch 157, magnet 161, switch 158, contact 168 to coupling magnet 128 to the grounded terminal of the battery 6, at the same time the signal motor is set in operation in the manner shown in Fig. 7, or in any other desired manner. The release of the lock device then takes place, in the manner as shown before, as soon as the operating lever S is returned to position 1, the signal arm set at danger and finally relay contact 43, 44 is closed; by the establishment of the following circuit: from battery terminal 7, switch 42, contact 141, contact 140, contacts 43, 44, contact 67, switch 57, magnet 61, switch 58, contact 64, conductor 65, to the grounded terminal 106 of the battery. Lock lever 62 is thus lifted in order to be removed from the path of lock surface 151. Between lock lever 162 and lock surfaces 155 is as much play allowed that in shifting back from position 1 to position 0 contact 166, 157 will be first broken before lock surface 155 engages the lock lever 162, so that lock lever 162 falls back to normal position, whereupon signal operating lever S can be moved back to position 0. In this figure also the essential features will appear—the locking of lock device 50 in position 1, the positive or compulsory locking of the parts concerned, and the dependency of the lock device in the danger position of the signal arm (contact 140).

In Fig. 9 is shown an arrangement of slide lock devices slightly different from that shown in Fig. 8, which is practically slide 50 of Fig. 8 reversed, that is, magnet 61 between the circuit joining switches 57 and 58 in Fig. 8 must operate the right locking lever and the other magnet 161 operate the left locking lever (Fig. 9).

A further modification of the previously described arrangement in the form of lock surfaces is shown in Figs. 10 and 11. This form is employed in signal operating apparatus which are not dependent on any other signal operating station or despatcher's office.

In this form the switch 9 (Figs. 1, 8) is naturally omitted. The locking of the slide in normal position must therefore be released either by the use of hand levers by means of which the lock levers 62 and 162 can be lifted, or more advantageously, by the automatic lifting thereof into the normal position. The slide in these views is indicated by the numeral 150 and carries for this purpose a wedge-shaped portion 70 which engages fingers 69 and 169 secured to the lock levers 62 and 162. If slide 150 be moved to the left, lever 162 drops slowly to its lowest position out of the path of lock surface 155, finger 169 sliding down the inclined face of wedge 70. By return of the slide to the normal or rest position, lever 162 will be lifted by the inclined face of wedge 70 in the same manner. Lever 62, on the other hand, drops uninterrupted when the slide is moved to the left, as may be seen in Fig. 12, and locks against lock surface 151, thereby locking slide against backward movement. This lock may in a known manner be released by the action of the relay Figs. 1, 5, 7 and 8.

Locking surfaces 53, 54, 55, 153, 154, 155 of Fig. 10 correspond to the similarly designated surfaces of Fig. 8. Surface 71 is inclined in order to allow the lock lever 62 to drop when the signal is moved to "clear" without locking the slide. This gives the advantage that magnet 61 may also act as a controlling or supervising magnet even in the clear position of the signal in order to notify the operator of any defects in the signal coupling circuit.

Having thus described my invention the following is what I claim as new therein and desire to secure by Letters Patent:

1. A signal-operating apparatus, comprising a signal means for causing the same to be operated, an operating or setting lever having normal, intermediate and full controlling positions, locking means for locking the lever against setting and return movements, a switch-controlling lever controlled by the operating lever in its intermediate and full positions, means for causing the signal to indicate clear when the operating lever is at full position, said means dependent upon track conditions or other predetermined conditions.

2. A signal-operating apparatus comprising a signal, means for causing the same to be operated, an operating or setting lever having normal, intermediate and full controlling positions, locking means to lock the lever in intermediate and normal positions, and means to control said locking means whereby every release of the locking means to allow movement of the lever in one direction must be preceded by a locking of the device against movement in the opposite direction.

3. A signal operating apparatus comprising a signal means for causing the same to be operated, an operating or setting lever having normal, intermediate and full controlling positions, locking means for locking the lever in the intermediate and normal positions, said lever permitting the signal to be at clear in its full position and at danger in its intermediate and normal positions, and means whereby the return of the lever to normal position is dependent upon the danger position of the signal.

4. In a signal controlling apparatus, the combination with a signal operating mechanism and switch point operating devices, of an operating lever, said lever having normal, intermediate and full set positions, operative connections between said lever, the switch point devices and the signal operating mechanism whereby movement of the lever to the intermediate position operates the switch point devices, and further movement of the same to full set position sets the signal, locking means for locking the said lever in the intermediate position and locking the switch point devices, and means dependent upon predetermined conditions for automatically releasing said lock to permit the full setting of the operating lever, whereby setting and locking of the switch point devices is compulsory before the signal can be set.

5. In signal controlling apparatus, the combination with a signal, operating mechanism therefor and switch point operating devices, of an operating lever, said lever having normal, intermediate and full set positions, operative connections between said lever and the switch point devices whereby movement of the lever to intermediate position sets the switch points, a lock device for locking the lever in the intermediate position and for locking the switch points, circuits for controlling said lock devices, signal operating circuit, and connections between the operating lever and said circuits whereby movement of the said lever to intermediate position releases said lock device, and movement of said lever to full position sets the signal.

6. In signal controlling apparatus, the combination with a signal, operating mechanism therefor and a switch point lever, of an operating lever for the apparatus, operative connection between the operating lever and the switch point lever, locks for the operating lever, circuits for the signal operating mechanism and for said locks, and operative connections between said circuits and said lever so arranged that the first movement of the lever sets and locks the switch points and controls the lock circuit to release the operating lever and thereby permits further movement of said lever, and the further movement of said lever controls the signal operating mechanism to set the signal.

7. In signal controlling apparatus, the

combination with a signal, operating mechanism therefor, and a switch point lever, of an operating lever, a lock slide connected therewith, a lock for locking said slide and lever in an intermediate position, connections between said slide and the switch point lever whereby movement of the slide to intermediate position sets and locks said lever, circuits controlled by said slide for controlling said lock and the signal operating mechanism, the arrangement being such that in the intermediate position of the slide the lock circuit is closed and its lock released, and further movement of the slide to full position closes the circuit of the signal operating mechanism and sets the signal, thereby compelling the setting and locking of switch points before the signal can be operated.

8. In signal controlling apparatus, the combination of an operating lever, automatically operated locking devices for the same, means for causing the release of said lever for movement in one direction to lock the same against return movement.

9. In signal controlling apparatus, the combination of an operating lever, switch point levers operatively connected therewith, a lock device for locking both said levers in intermediate position, a signal and signal operating mechanism, circuits for controlling said lock device, circuits for controlling the signal operating mechanism, said circuits controlled by the operating lever and so arranged that movement of said lever to intermediate position closes the lock circuit, releases the lock of the operating lever for further movement thereof in the same direction and locks the same against return movement, and said further movement of the lever to full position closes the signal operating circuit and sets the signal.

10. In signal controlling apparatus, the combination of an operating lever, switch point operating devices operatively connected therewith, lock devices for locking said lever in an intermediate position, said switch point devices set and locked in said intermediate position of the lever, signal operating mechanism rendered operative in the full set position of said lever, means controlled by the lever for releasing said lock devices to permit movement of said lever to full position and simultaneously locking the same against return movement, and means dependent upon the return of the signal to normal position to release said lock against the return movement.

11. In signal controlling apparatus, the combination of an operating lever, a lock slide operatively connected therewith, electro magnetic locks for controlling the operation of said slide and lever, said locks coöperating with said slide to lock the same and the lever in normal and intermediate position, circuits controlling said locks, one of said circuits dependent upon a distant station and operating to release the slide from normal locked position, another of said circuits dependent upon predetermined track conditions and the movement of the slide to intermediate position to release the same from intermediate position, other of said circuits dependent upon said predetermined conditions and the full set position of the slide for operating the signal, and switch point levers operated by the slide in its movement to and from its intermediate and normal positions and locked thereby in the intermediate and full set positions.

12. In a signal controlling apparatus, a lock slide, an operating lever controlled thereby, said slide having locking faces, lock levers for engaging said faces and locking and releasing said slide, a switch point lever operatively engaged by said slide and locked thereby in set position when said slide is in intermediate and full set positions, said locking faces and levers arranged to lock the slide in an intermediate position, means for operating said lock levers, said means interlocking one with the other whereby the release of a lock to permit movement of the slide in one direction is dependent upon a locking of the slide against movement in the other direction, and signal operating mechanism dependent upon the movement of the slide to full set position.

13. In a signal controlling apparatus, a lock slide, an operating lever connected therewith, locks engaging said slide to lock and release the same and permit said slide to be moved by the lever into normal, intermediate and full set positions, a switch point lever operated by said slide by its movement from normal to intermediate positions and vice versa, means for locking the switch point lever in intermediate and full set positions, electrical circuits for operating said locks, and for setting and clearing the signal, switches controlling said circuits, said switches operated by said slide, one of said circuits controlling the intermediate lock and operating to release said lock when the slide reaches intermediate position, contacts and switches in the signal setting circuit arranged to be closed when the slide is in full set position, a lock for preventing return of the slide and operating lever to normal position, said lock operated by the slide in its intermediate position, and means dependent upon the return of the signal to normal position for releasing said lock.

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Witnesses:
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