

Jan. 14, 1936.

C. S. BUSHNELL

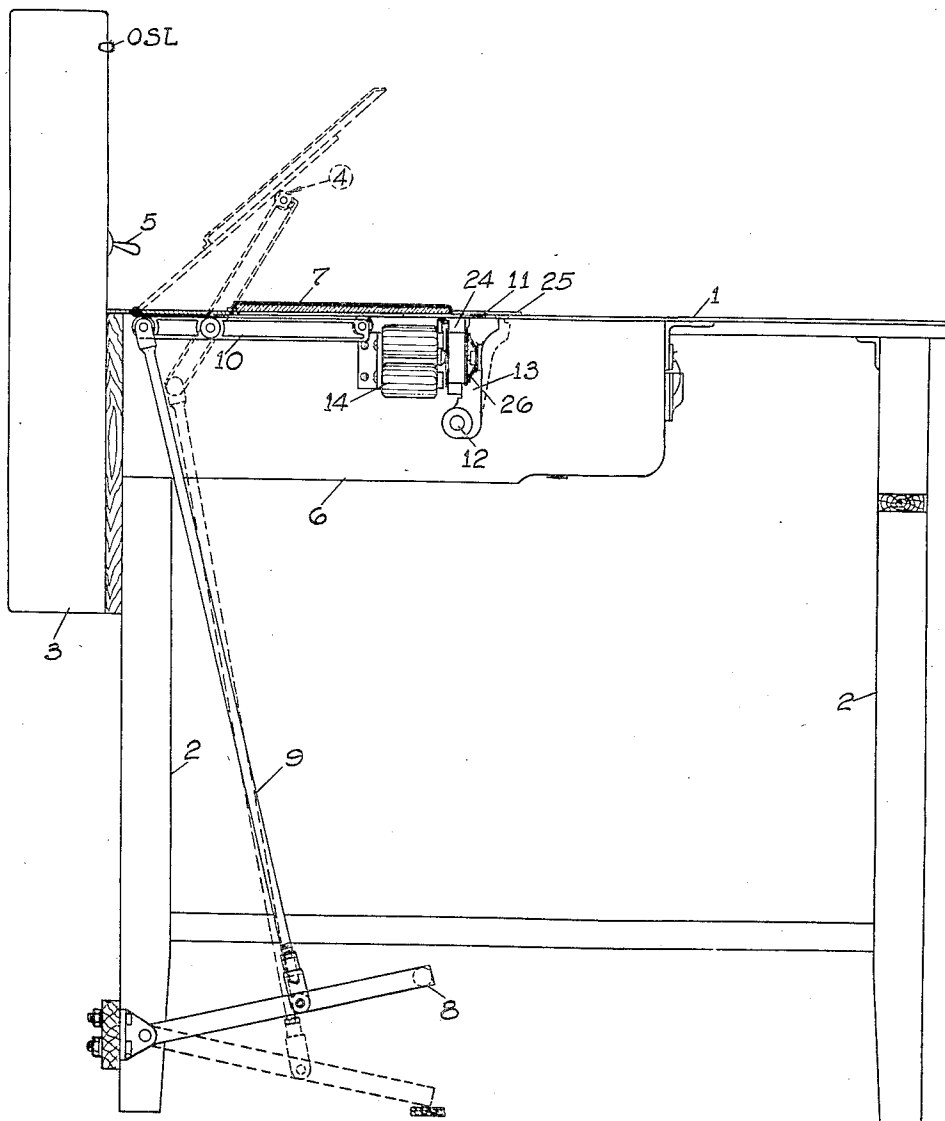
2,027,718

RECORDER FOR CENTRALIZED TRAFFIC CONTROLLING SYSTEMS

Filed Jan. 14, 1931

6 Sheets-Sheet 1

FIG. 1.



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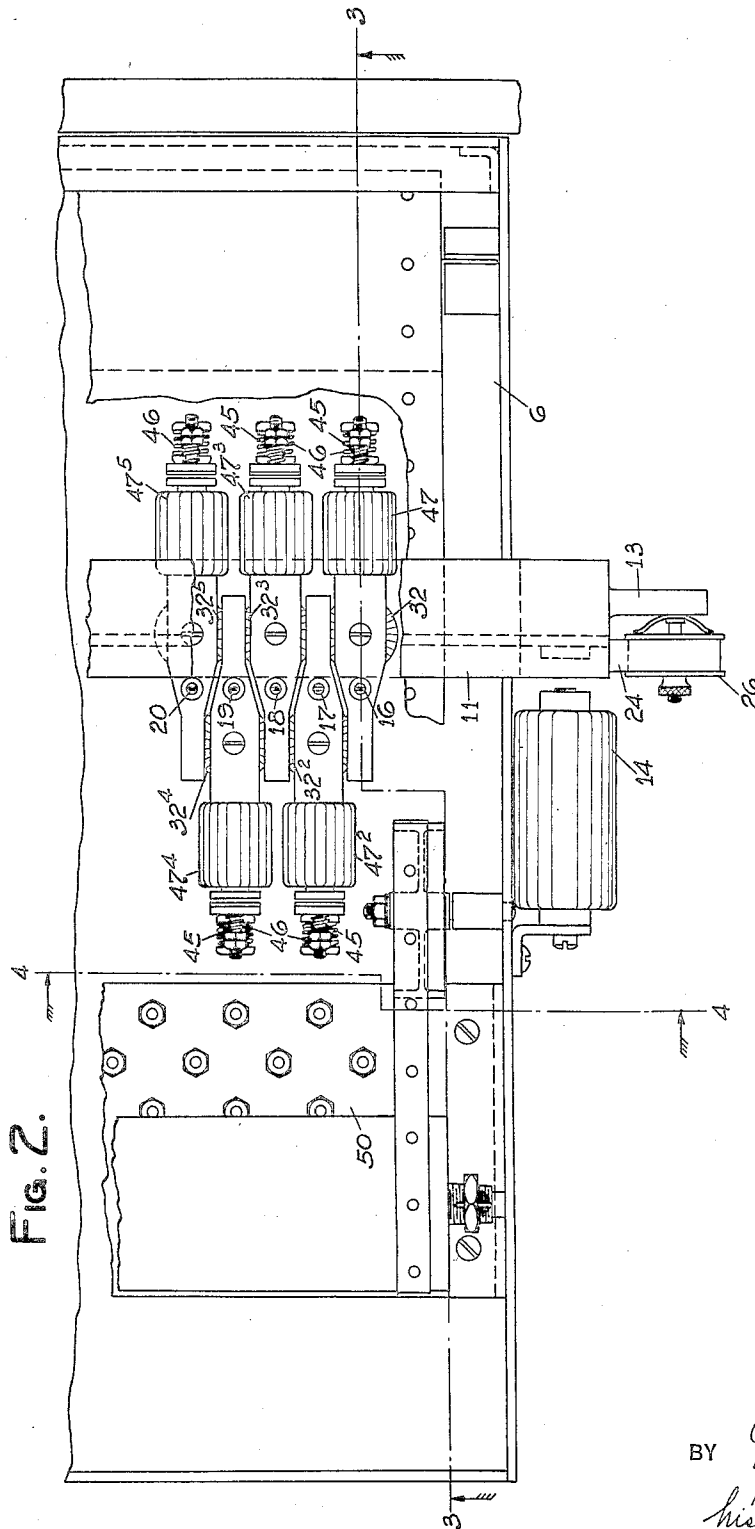
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RECORDER FOR CENTRALIZED TRAFFIC CONTROLLING SYSTEMS

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6 Sheets-Sheet 2



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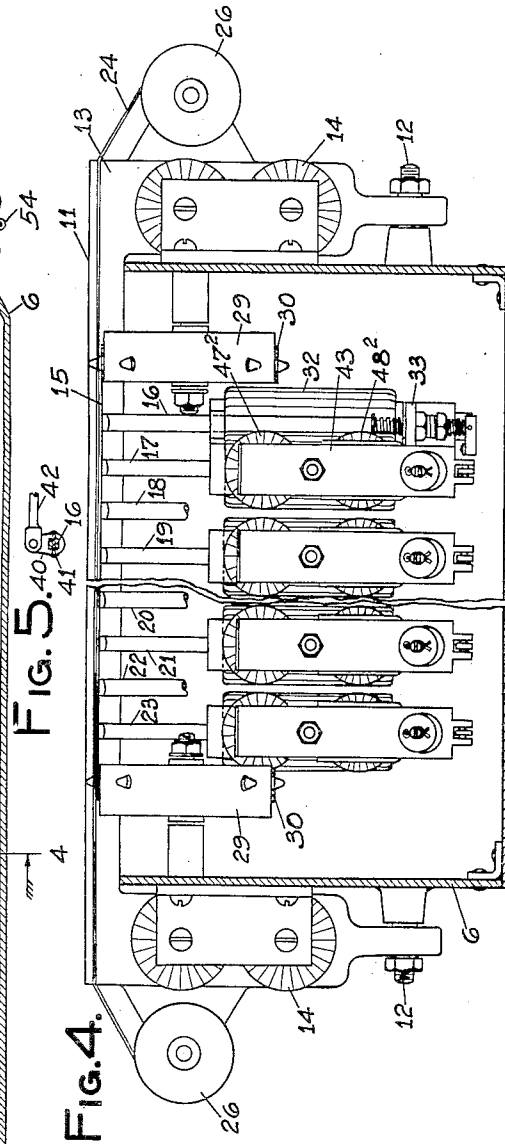
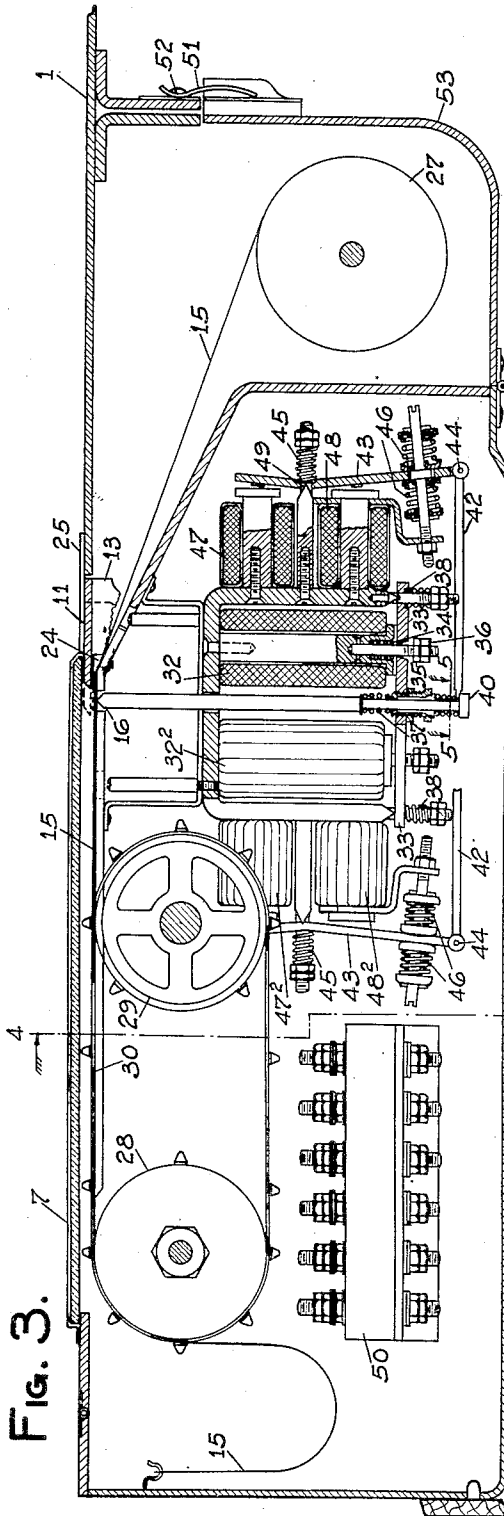
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RECORDER FOR CENTRALIZED TRAFFIC CONTROLLING SYSTEMS

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6 Sheets-Sheet 3



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2,027,718

RECORDER FOR CENTRALIZED TRAFFIC CONTROLLING SYSTEMS

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6 Sheets-Sheet 4

FIG. 6.

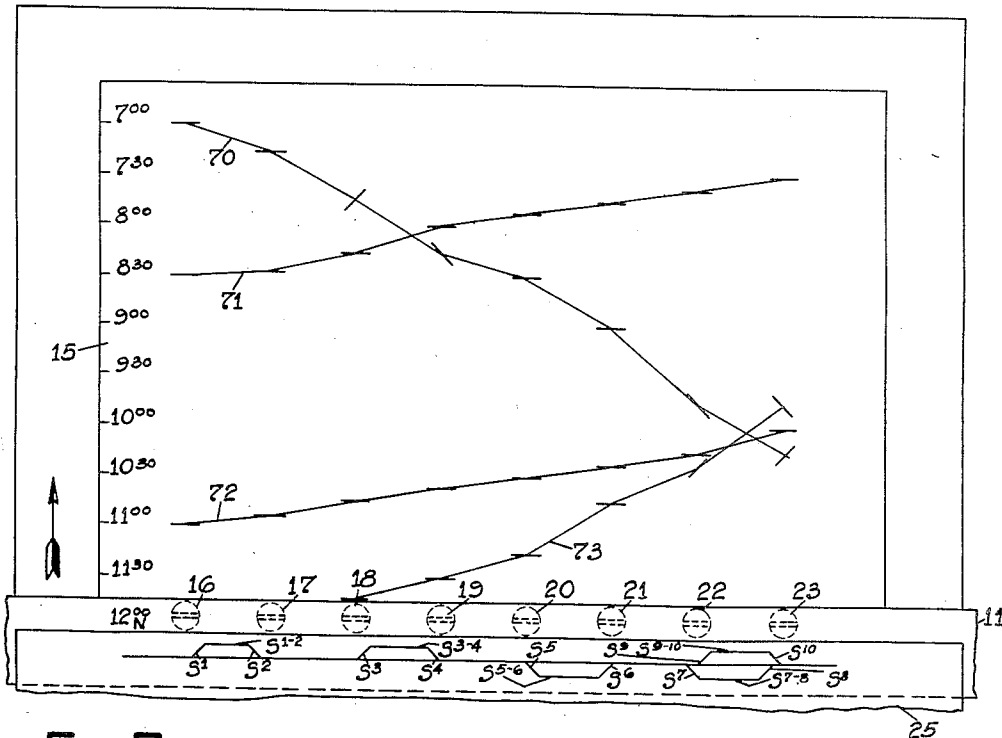
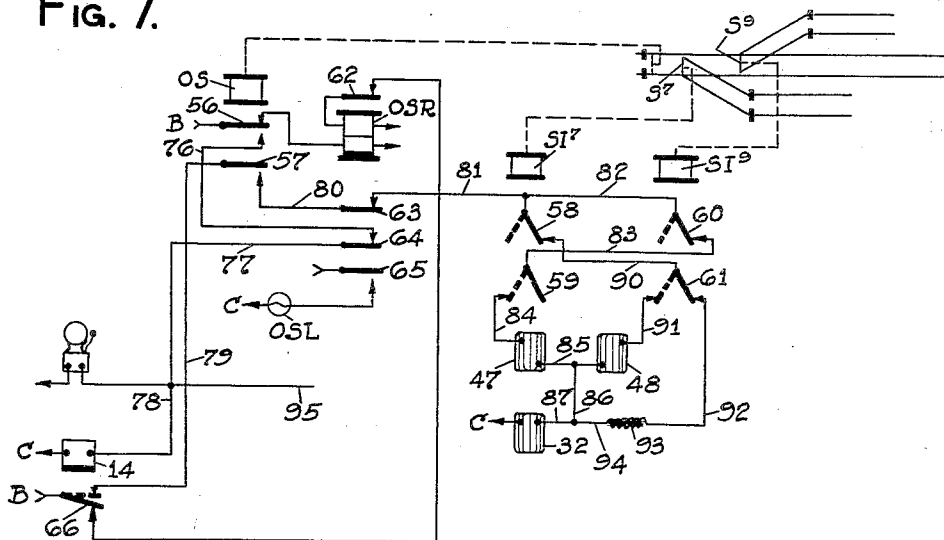


FIG. 7.



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RECORDER FOR CENTRALIZED TRAFFIC CONTROLLING SYSTEMS

Filed Jan. 14, 1931

6 Sheets-Sheet 5

FIG. 10 A.

FIG. 10.

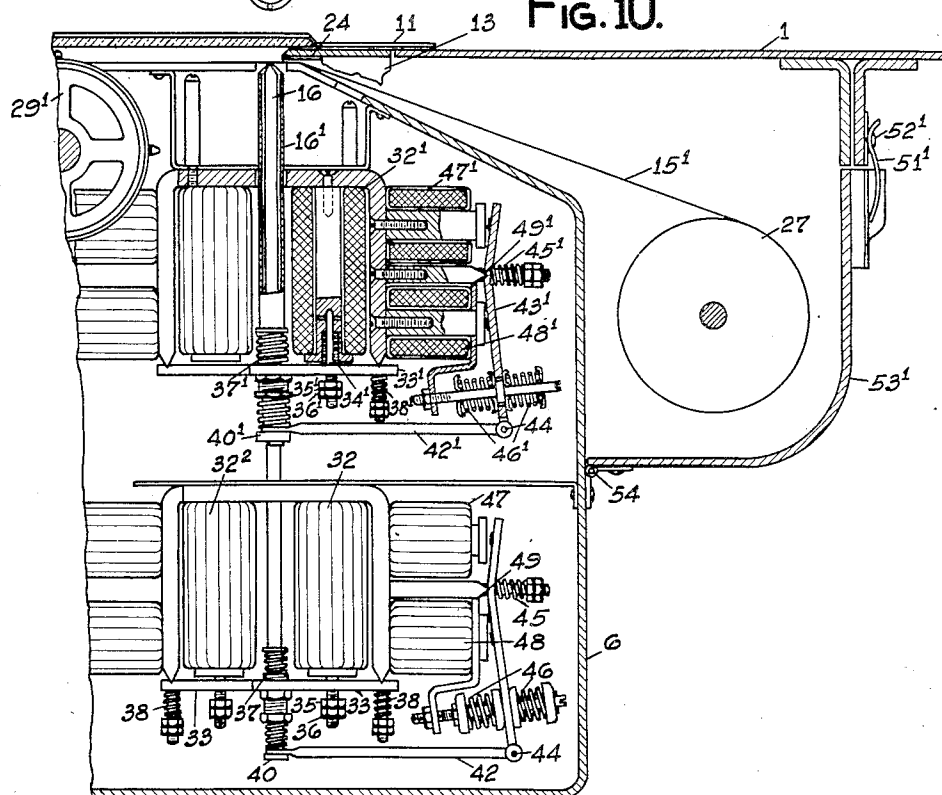
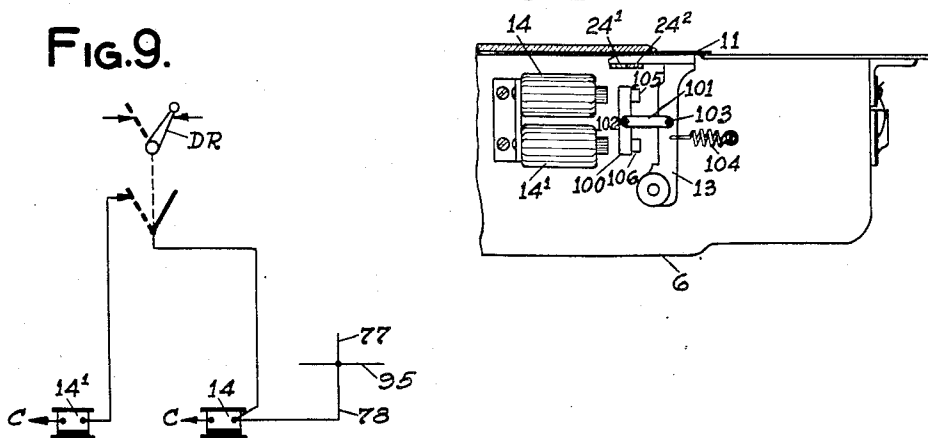


FIG. 8.

FIG. 9.



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RECORDER FOR CENTRALIZED TRAFFIC CONTROLLING SYSTEMS

Filed Jan. 14, 1931

6 Sheets-Sheet 6

FIG. 13.

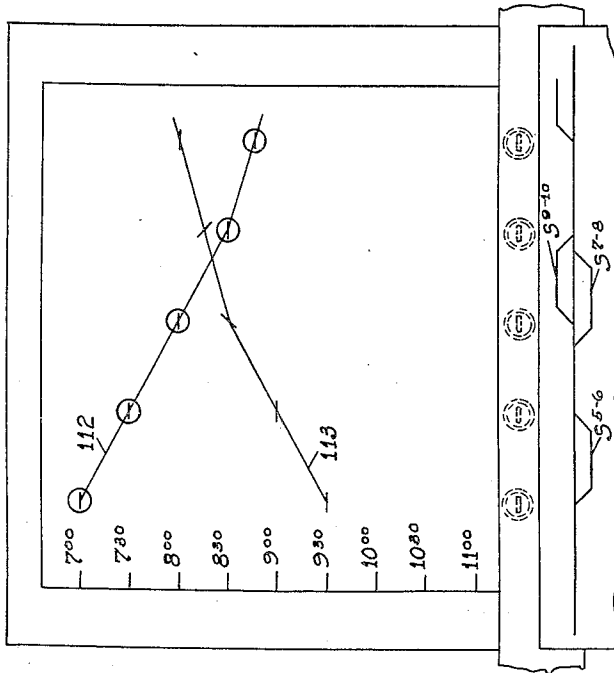


FIG. 14.

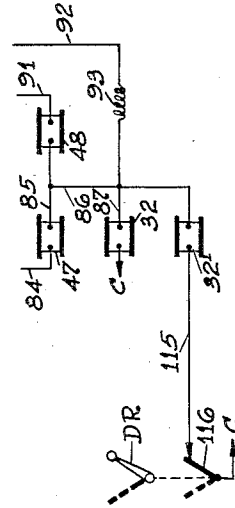


FIG. 11.

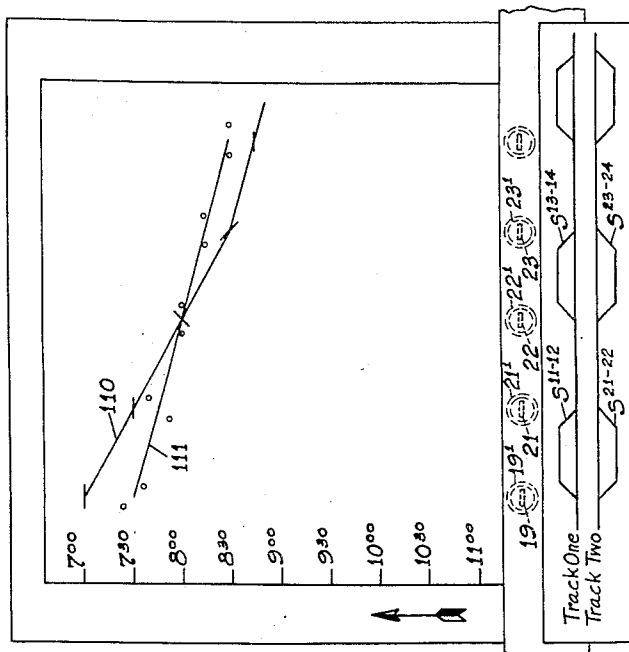
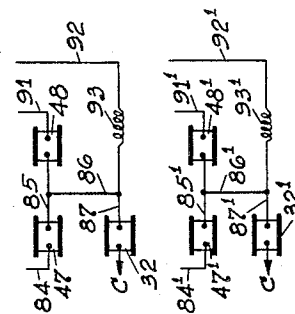


FIG. 12.



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UNITED STATES PATENT OFFICE

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RECORDER FOR CENTRALIZED TRAFFIC
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Application January 14, 1931, Serial No. 508,660

27 Claims. (Cl. 246—122)

This invention relates to recorders, and more particularly to recorders for recording the progress of trains over a railway system and distinctively recording the particular track, of a plurality of tracks, over which the train, the progress of which is to be recorded, is moving.

The present invention particularly relates to recorders applicable to centralized traffic controlling systems of the type such as shown in the prior application of S. N. Wight, No. 120,423 filed July 3, 1926, and N. D. Preston et al., Ser. No. 455,304 filed May 24, 1930.

In centralized traffic controlling systems of the type shown in these prior applications the progress of trains moving over a large part of the railway system, out of view of the dispatcher, is dispatched from a centralized office through the medium of control levers, the operator or dispatcher being informed as to the passage of trains by certain control points through the medium of indicating lamps on the dispatcher's board. Obviously, if the dispatcher or operator is informed as to the passage of a train over a certain switch, and he is also visually informed as to the position of such switch, the dispatcher has a mental picture of the particular track over which the train in question moves. In accordance with the present invention it is proposed to record on a chronometer operated train sheet this same information or picture, not only the time of passage of a train over a particular switch is to be recorded, but also the position of such track switch at the time the train is passing thereover. In the particular embodiment of the invention illustrated a mark is made along a particular margin on the train sheet identifying the control point along the track each time that a train passes that particular point, the time of passage of course being recorded by the point on this margin where the record is made, and this mark has a distinctive characteristic depending upon the position of the track switch at the time the mark is made. More specifically, a hammer striking a carbonized ribbon to make an oblong line is actuated upon the passage of a train by a particular control point, the angular position of this hammer being automatically fixed in accordance with the position of the track switch at the time that the hammer is actuated, so that a line having a corresponding angular relation will be made.

Other objects of the present invention include the provision of apparatus for indicating the position of two track switches located at the same OS point, together with means for actuating the recording hammer momentarily only, in spite of

the fact that a train may occupy a particular OS point for a much longer period.

Other objects, purposes and characteristic features of the invention will in part be obvious from the accompanying drawings and will in part be more specifically pointed out hereinafter.

In describing the invention in detail reference will be made to the accompanying drawings, in which:—

Fig. 1 shows a side elevation of the operator's board and desk of a centralized traffic controlling system of any suitable type, having a recorder embodying the present invention mounted in a cabinet countersunk in said desk, the record sheet of which is visible through a glass cover;

Fig. 2 is a partial plan view of the contents of the recorder cabinet illustrated in Fig. 1 of the drawings;

Fig. 3 is a cross sectional elevation taken on the lines 3—3 of Fig. 2, as viewed in the direction of the arrows;

Fig. 4 is another sectional elevation taken on the lines 4—4 of Figs. 2 and 3, as viewed in the direction of the arrows;

Fig. 5 is a horizontal section taken through the hammer of Fig. 3 along the lines 5—5, as viewed in the direction of the arrows, illustrating the operating crank for operating this hammer angularly;

Fig. 6 is a plan view of the recorder shown in Fig. 1 illustrating the record sheet together with a record thereon, and illustrating the track layout as well as the hammers for making a record on the record sheet;

Fig. 7 shows diagrammatically the wiring for operating the anvil and the hammer associated with the track switches S^7 and S^9 shown in Fig. 6, together with the actual track layout at that particular OS point;

Fig. 8 shows a fragmentary portion of the apparatus illustrated in Fig. 1 with a modified three-position anvil carrying a two color typewriter ribbon;

Fig. 9 shows a portion of the wiring diagram of Fig. 7 modified to illustrate the circuit for operating the coil 14¹ of Fig. 8;

Fig. 10 shows a fragmentary portion of the apparatus illustrated in Fig. 3 modified to include two concentrically located hammers, each of which may be actuated separately and each of which may be shifted about a common axis to make three distinctive marks;

Fig. 10A is a plan view of the hammers 16 and 16¹, in which the sleeve 16¹ is constructed to print dots;

Fig. 11 shows a plan view of the recorder when modified as illustrated in Fig. 10, showing how the movement of trains on two different tracks may be graphically recorded on the same record sheet, and with the track switches on different tracks recorded on the same vertical lines of the record sheet;

Fig. 12 illustrates how the wiring diagram in Fig. 7 may be modified to record the movements of trains on two separate tracks as illustrated in Fig. 11;

Fig. 13 shows a plan view of a recorder such as illustrated in Fig. 10, except that the shifting coils 47¹ and 48¹ are omitted and the sleeve 16¹ prints a circle instead of two dots, this to definitely indicate on the record sheet the direction of train movement; and

Fig. 14 illustrates how the wiring diagram of Fig. 7 may be modified when the structure of Fig. 10 with the coils 47¹ and 48¹ omitted, is employed to make a record as illustrated in Fig. 13.

Referring to Fig. 1, the table or desk 1, having legs 2, and preferably having the operator's board, comprising the front panel of the dispatcher's cabinet 3, mounted against the back thereof, so that the indicating lamps, such for instance as the OS-ing lamp OSL (see also Fig. 7) are clearly visible to the operator, so that the levers for controlling the wayside signals and switch machines of the railway system, such as the lever 5, are within easy reach of the operator. In the cabinet 6 mounted below the desk 1 is housed a suitable recorder, the record sheet of which is visible through the glass cover 7. The cover 7 may be readily moved to its open dotted position by the operator depressing the foot pedal 8, which foot pedal through the medium of the operating rod 9, the pivoted lever 10 and the roller 4 engaging the cover 7 operates said cover.

The anvil 11 supported pivotally about the pivot pin 12 through the medium of the rocker arm 13 is adapted to be moved toward the left through the medium and upon energization of the anvil magnets 14 (see Fig. 3), so that the anvil 11 which is disposed above the record sheet 15 assumes a position directly over the various hammers 16, 17, 18, 19, 20, 21, 22, and 23 (see Figs. 2, 3, 4, and 6) in a manner so that the carbonized ribbon 24 is disposed between the record sheet 15 and the anvil 11. The record sheet, on the other hand, is located between the ribbon 24 and the hammers 16, 17, etc.

Attention is directed to the fact that the anvil, as well as its supporting arm 13, are shown in the actuated position in Fig. 1, whereas in Figs. 2 and 3 of the drawings they have been shown in their retracted position. The carbonized ribbon 24 has its ends wrapped on the two carbon spools 25 (see Figs. 1 and 4), which spools 26 may be rotated by hand as the ribbon 24 wears, or these spools 26 may be power driven from the rolls that move the record sheet 15 in accordance with the lapse of time. This record sheet 15 is unwrapped from the roll 27 (see Fig. 3) through the medium of the sprocket rollers 28 and 29 containing two sprocket belts 30, the record sheet falling into a pocket when it has passed through the recorder, as illustrated in Fig. 3. The endless sprocket belts 30 are each provided with alternately arranged sprockets and holes, through the holes of which pass the sprockets contained in the sprocket rollers 28 and 29, this arrangement affording a large number of teeth on the rollers and belt to engage the holes in the record

sheet 15 at the same time. The sprocket rollers 28 and 29 are operated in accordance with the lapse of time, by any suitable time measuring means, such as a clock work mechanism or by an electrically operated ratchet mechanism controlled by a suitable clock mechanism.

Referring to Fig. 3 the hammer 16 may be operated to its active position, in which position it strikes the record sheet against the carbonized ribbon beneath the anvil 11, by the electromagnet including the coil 32 and the armature 33, this armature 33 being held in its retracted position by the spring 34 urging the armature 33 against the adjustable stop nut 35, a lock nut 36 being provided for locking the nut 35 in position. The armature 33 is connected to the hammer 16 through the medium of centering and yielding springs 37. The stationary end of the armature 33 is pivoted by means comprising a knife edge bearing held in position by the spring 38.

At the lower extreme end of the hammer 16 and secured to the hammer 16 by a pin 41, is a crank 40, which crank may be operated electromagnetically in any suitable way, as by the pitman rod 42, having its other end pivotally connected to the armature 43 as by the pin 44, this armature 43 also contains a groove engaged by the knife edge bearing 49 and is held in position by the spring 45. This armature 43 is maintained in its middle neutral position by the centering springs 46. The armature 43 may be operated in one direction by the energization of the angle magnet 47 and may be operated in the opposite direction by energization of the angle magnet 48, thereby in turn operating the hammer 16 in one direction or the other about its axis from its normal biased position.

Referring to Fig. 2 it will be noted that the hammer magnets 32, 32², 32³, 32⁴, and 32⁵ are arranged in staggered relation, in order to conserve space; and similarly, the coils of angle magnets 47, 47², 47³, 47⁴, and 47⁵ (see Fig. 2) are similarly arranged in staggered relation to conserve space and bring the hammers 16, 17, 18, 19, and 20 as closely together as possible. Referring to Fig. 3 it will be noted that there are two steel sprocket belts 30, one near each edge of the record sheet 15. In order to facilitate the arrangement of wires within the recorder, a suitable terminal block 50 (see Figs. 2 and 3) has been provided.

Referring to Fig. 3 it will be noted that the recorder cabinet 6 is of unitary construction and may be bodily removed. Also the cabinet has a cover 53 pivotally fastened thereto by a hinge 54, which cover may be held closed by a latch comprising the spring clip 51 engaging the pin 52.

Referring now to Fig. 7, which conventionally shows the track switches S⁷ and S⁹, both switches of which are located on the same detector track section, the occupancy of which is indicated by movement of the contacts 55 and 57 of the indicating relay OS, located in the central office, to their deenergized position. Similarly, the switch indicating relays SI⁷ and SI⁹, respectively, indicate the position of the track switches S⁷ and S⁹, these track switches S⁷ and S⁹ as shown in the drawings now assuming their normal position corresponding to the right hand position of the contacts 58, 59, 60 and 61 of the relays SI⁷ and SI⁹. For reasons more clearly understood from the operation considered hereinafter, the relay OS is repeated by a slow acting repeater relay OSR, which repeater relay may under certain conditions be stuck up through a circuit including its stick contact 62. This repeater relay OSR

is also provided with front contacts 63 and 64 and a back contact 65. The anvil magnet 14 is also provided with a contact 66, the function of which is more readily pointed out in connection with the operation of the recorder.

Let us now refer to Fig. 6 of the drawings, showing a portion of the record sheet 15 together with a record which was automatically made thereon. The hammers 16 to 23, inclusive, are clearly shown below the anvil 11, which anvil is in its active position as illustrated in Fig. 1 as distinguished from its inactive position as shown in Fig. 3. Directly in front of this anvil, and preferably on the metal plate 25 (see Figs. 1, 3, and 6) is engraved a miniature track layout of the actual railway system the performance of which this recorder makes a record. Referring to this miniature track layout (see Fig. 6), the sidings S^{1-2} , S^{3-4} , S^{5-6} , S^{7-8} , S^{9-10} , are a typical representation of the railway system the performance of which is to be recorded. Referring to the record sheet 15, it will be noted that the time by hours and half hours is printed on the edge of this record sheet 15, and that it is now 12 o'clock noon, because the character

$12^{\frac{00}{N}}$

meaning 12 o'clock noon, is directly in line with the central line passing through the various hammers 16 to 23, inclusive. The record sheet also shows that a record for the last five hours, namely from 7:00 A. M., is visible through the glass cover over the recorder cabinet. It is believed that the operation of the recorder, as well as its co-ordination with the railway system under consideration, is best understood by considering the operation of the system.

Operation

It is of course understood that the operator or dispatcher has control over the various wayside signals (not shown) and over the track switches, which he may operate, and that he operates these signals and track switches in accordance with the information recorded on the record sheet and indicated by the indicating lamps on his control board. Referring to the record sheet, this record clearly indicates that a train, which we will for convenience call train No. 70, passed over a track switch represented in miniature by the switch S^1 assuming its normal main track position at 7:00 A. M. and that it passed over the switch corresponding to switch S^2 at 7:16 A. M. The record sheet further shows that a west bound train No. 71 passed over the track switches represented by switches S^8 and S^{10} , both assuming the normal main track position at 7:30 A. M., and that this same train No. 71 passed over the track switches represented by switches S^9 — S^7 , S^6 , S^5 , S^4 and S^3 at 7:37, 7:45, 7:52, 8:00, and 8:17 A. M. This record sheet also shows that the train No. 70, which is the slower train of the two, this being indicated by the slope of the lines connecting the various record marks, entered the side track by passing over the switch corresponding to the miniature switch S^3 assuming its take-siding position at 7:45 A. M. and that this train No. 70 remained in the siding S^{3-4} from 7:45 until 8:17, during which time the train No. 71 passed through the main track of this passing siding S^{3-4} , entering this passing siding at the east end at 8:00 o'clock and leaving it at the west end at 8:17, and that this train No. 71 proceeded westwardly passing over the track switch

represented by switch S^2 at 8:28 and passing over the track switch represented by switch S^1 at 8:30 A. M. The record further shows that the train No. 70 proceeded eastwardly passing over the track switch represented by switch S^5 at 8:30, passing over the track switch represented by switch S^6 at 9:00 A. M., and passing into the siding S^{7-8} at 9:45, the train No. 73 moving westwardly passing into the passing siding S^{9-10} at 9:45, and train No. 72, which is also a fast train passing over the track switches represented by switches S^8 and S^{10} , both assuming the main track position at 10 A. M., this train No. 72 passing over the track switches represented by switches S^8 — S^7 , S^6 , S^5 , S^4 , S^3 , S^2 , and S^1 at 10:15, 10:20, 10:30, 10:36, 10:45, 10:52, and 11:00 A. M., respectively. The train No. 70, on the other hand, passed out of the passing siding S^{7-8} , at 10:15, and the train No. 73 passed out of the passing siding S^{9-10} in a westwardly direction at 10:22, this train No. 73 passing over the track switches S^6 , S^5 , S^4 , and S^3 at 10:45, 11:15, 11:30, and 11:45, respectively. Referring to the record in Fig. 6, this record clearly shows that train No. 70 occupied the siding S^{7-8} and train No. 73 occupied siding S^{9-10} when the train No. 72 passed through the main tracks of these sidings.

Referring now to Fig. 7, let us observe how the record mark made by the hammer 22 and recorded on the sheet at 9:45 was made. At this time the switch S^7 assumed its take siding position, as a result of which the indicating relay SI^7 , controlled in any suitable way as for instance shown in the above identified applications (conventionally shown by dotted line) in accordance with the position of the track switch S^7 , assumed its dotted position. The approach of the train No. 70 as it stepped on the detector track circuit associated with the control point S^7 — S^9 effected operation of the relay OS to its retracted position. Although this movement of the relay OS to its retracted position deenergized the lower winding of the repeater relay OSR, this repeater relay OSR did not assume its retracted position, because it is still energized through a stick circuit including its stick contact 62 and the back contact 66 of the anvil magnet 14. Movement of the relay OS to its retracted position closes the following circuit for the anvil magnet 14:—beginning at the terminal B of a suitable battery, contact 66 of the relay OS assuming its retracted position, wire 76, front contact 64 of the relay OSR, wires 77 and 78, winding of the anvil magnet 14, to the other terminal C of said battery. The completion of this circuit moves the anvil 11 to its active position, as shown in Figs. 1 and 6, and corresponding to the dotted position, as shown in Fig. 3. With the anvil magnet now assuming its active position and its contact 66 assuming its dotted position the following circuit for the angle magnet 47 and the hammer magnet 32 is completed:—beginning at the terminal B, front contact 66 of the anvil magnet 14, wire 79, contact 57 of the relay OS, wire 80, front contact 63 of the relay OSR, wires 81 and 82, contact 60 of the relay SI^9 , wire 83, contact 59 of the relay SI^7 , wire 84, winding of the angle magnet 47, wires 85, 86 and 87, hammer magnet 32 to the other terminal C of said battery. It is thus noted that the anvil is first moved to its active position so that it as well as its carbonized ribbon 24 is disposed directly over the hammer 16, and that the angle magnet 47 will turn the hammer 16 to make an oblique line instead of a line directly cross-wise over the record sheet 15,

and further that energization of the magnet 32 will cause the hammer 15 to strike the record sheet against the carbonized ribbon 24 to make the oblique line under consideration. As soon as the anvil magnet is operated to its energized position the stick circuit for the repeater relay OSR is broken, and since this relay OSR is slow dropping its contacts 63, 64, and 65 will not drop for a few moments, during which time the record is actually made. At the expiration of this time, the contacts 63, 64, and 65 will drop to their retracted position in which position the circuits for the anvil magnet 14, the angle magnet 47 and the hammer magnet 32 are all broken, and dropping of the contact 65 illuminates the indicating lamp OSL (see Figs. 1 and 7), thereby indicating to the operator that a train is occupying the detector track circuit associated with the track switches S⁷ and S⁹.

Referring to the graph for train No. 73 it will be noted that it indicates that the switch S⁹ assumed its take-siding position when the train passed thereover. This record is made in exactly the same way as the one just described, except that the hammer 22 is rotated to an acute angular position in the reverse direction, this being accomplished by the energization of the angle magnet 48 instead of the angle magnet 47, and the circuit for energizing the magnet 48 under the conditions assumed may be readily traced as follows:—beginning at the terminal B, contact 66, wire 79, contact 57, wire 80, contact 63, wire 81, contact 58, wire 90, contact 61 assuming its left hand position, wire 91, magnet 48, wires 83 and 87, magnet 32 to the other terminal C of said battery. Also, as indicated by the graph of the train No. 72 when it passed the control point S⁷—S⁹ indicates that the track switches S⁷ and S⁹ both assumed their normal position, and this record is made in the same way as the records heretofore described except that the circuit for energizing the hammer magnet 32 does not include an angle magnet, and may be traced as follows:—beginning at the terminal B, front contact 66 of the anvil magnet 14, wire 79, contact 57, wire 80, contact 63, wire 81, contact 58, wire 90, contact 61 assuming its normal position, wire 92, impedance unit 93, wires 94 and 87, hammer magnet 32 to the other terminal C of said battery. The impedance 93 is included in this circuit to replace the impedance offered by the magnets 47 or 48, as the case may be. It should be noted that if a train were to pass over the control point S⁷—S⁹ with both switches in their take-siding position, which should never occur no record will be made.

The lines connecting the various hammer marks on the record sheet 15 are preferably added by the operator from time to time, although these lines are not absolutely necessary, they are useful in observing the records made by the various trains.

Although the anvil 11 has been shown as a movable anvil which is electro-magnetically operated, this electro-magnetic feature may be entirely dispensed with and the anvil made stationary in a manner to always assume its active position, if desired. The only reason for retracting the anvil 11 to its inactive position, as by a spring, and moving it to its active position automatically, is to expose that part of the record sheet which might otherwise be hidden by the anvil for a few moments immediately after the record has been made. Obviously if the anvil magnet 14 is dispensed with its contact 66 would not be avail-

able, and in this case the stick circuit for the repeater relay OSR would include a normally closed contact of the associated hammer magnet 32. In this connection it may be pointed out that the anvil magnet 14 is common to all of the various OS relays and anvil magnets as conventionally illustrated by the wire 95 which leads to the contacts of the relays and magnets associated with other control points than the control point S⁷—S⁹.

Referring to Fig. 6 the connecting lines 70, 71, 72, and 73, which represent trains correspondingly numbered, and which connect the various hammer marks, may be drawn in at any time, either as each mark is made or even weeks later. This drawing of the train graphs may be done later, because each hammer mark definitely identifies the train it represents, for the reason that each train which enters a particular section of track must again leave that section, and since the position of the switch is given for each train passing over such switch there can be no doubt as to which train is passing over such switch, this with the understanding, of course, that two trains moving through the same stretch of single track cannot pass each other and therefore the first to enter is the first to leave such section.

Modified structure Figs. 8 and 9

As above pointed out the anvil 11 of Figs. 1, 2, 3, and 4 is operated to an active position each time that a hammer 15 is operated, this in order to move the typewriter ribbon 24 directly over the hammers 15. The purpose of this construction, as already explained, is to render the record sheet directly over the hammers 15 visible, so that the record can be seen as soon as it has been made. In accordance with the invention as illustrated in Fig. 8, the anvil 11 may assume any one of three positions, namely, may assume a normal position in which the record sheet directly over the hammers 15 is visible, may assume an intermediate position in which the black portion 24¹ of the ribbon 24 is directly over the hammers 16, and may assume an extreme position in which the red portion 24² of the typewriter ribbon is directly over the hammers 16, from which it is apparent that the record may be made in either black or red depending upon whether the anvil assumes the intermediate or the extreme actuated position.

This three-position actuation of the anvil is accomplished by the armature 100 pivotally connected to the link 101 as by a pin 102, the other end of which link 101 is pinned to the rocker arm 13 as by a pin 103. The rocker arm 13 is biased, as by the tension spring 104, to a normal position in which the armature 100 is arrested by the stops 105 and 106. It is thus noted that the energization of the electromagnet 14 draws the upper end of armature 100 against its pole face, thereby moving the anvil 11 to the intermediate position, but if both the electromagnets 14 and 14¹ are simultaneously energized, as will be the case for west bound traffic, both ends of the armature 100 will assume their left extreme position, and the anvil 11 will assume its extreme position in which the red portion of the typewriter ribbon is effective.

Referring to Fig 9, it will be noted that the electromagnet 14 is only energized upon the reception of an O. S. indication when the direction signal lever DR assumes its right hand position, corresponding to east bound traffic. On the other

hand, if this lever DR assumes its left hand dotted position both of the coils 14 and 14¹ will be momentarily energized in response to an O. S. indication, whereupon the record will be made in red, because the anvil 11 assumes its extreme actuated position when the hammer 16 is driven into engagement with the record sheet 15. It may be stated, that the direction signal lever DR is preferably used to clear signals on a single track railroad, east-bound signals being cleared when moved toward the right and west-bound signals being cleared when it assumes the dotted position.

Modified structure Figs. 10, 11, and 12

Referring to Fig. 10, it will be noted that a side elevation shown partly in section, similar to Fig. 3 has been illustrated, but that the structure has been modified to the extent that a sleeve 16¹ surrounds the hammer 16, and that this sleeve 16¹ may be turned about its axis as through the medium of the crank 40¹ and that it may be raised so as to strike the record sheet 15 and impress two dots, as by an armature 33¹, corresponding to the armature 33 for actuating the hammer 16. Since the parts 32¹, 33¹, 34¹, 35¹, 36¹, 37¹, 38¹, 40¹, 42¹, 43¹, 44¹, 45¹, 46¹, 47¹, 48¹, and 49¹ are exactly the same as the elements already described and having the same reference characters with the exponents one omitted, it is considered unnecessary to specifically describe these elements.

Referring to Fig. 11, which shows a plan view of the recorder as modified in Fig. 10, illustrating how a train 110 on track "one", and a train 111 on track "two", have had their movements recorded on the record sheet. It will be noted that the train 110 has had its record made by the hammer 16, which makes a short line angularly positioned in accordance with the position of the track switch at a particular location, whereas a record has been made of the performance of train 111 by two dots made by the sleeve 16¹ (see Figs. 10A and 11), these dots being angularly positioned in accordance with the position of the track switch of track "two" over which train 111 moves. By observing the two train graphs 110 and 111, it will be noted that the train 110 entered the west end of the passing siding S¹³⁻¹⁴ of track "one" at 8:00 and again departed from siding at 8:30, also, that the train 111 entered the siding S²¹⁻²² of track "two" at 7:30 and left this passing siding at 7:45, and that the two trains passed each other on different tracks at 8:00.

It is thus apparent that the structure illustrated in Fig. 10 is capable of making exactly the same record for two tracks that the structure illustrated in Figs. 1 to 5, inclusive, is capable of making for a single track, and that any two of six distinctive marks can be made at the same point on the record sheet, which marks may signify the positions of four track switches upon the passage of trains by the particular location. A record of the position of two different track switches at the same location on one track has been indicated in Fig. 6 of the drawings, and this same information can be given for two separate tracks at a single point on the record sheet in accordance with the apparatus of Fig. 10.

Modifications Figs. 13 and 14

Instead of making three distinctive marks with the sleeve hammer 16¹, the two points on this sleeve may be omitted so that the sleeve upon

striking the record sheet will print a circle instead of two dots. In this event the coils 47¹ and 48¹ may, of course, be omitted since the angular position of the sleeve 16¹ no longer makes a distinctive mark. If the coils 47¹ and 48¹ are now omitted from the apparatus of Fig. 10 the sleeve 16¹ may be used for indicating the direction in which traffic is moving over the same track of which the hammer 16 shows the position of the track switch during the passage of a train. In other words, if desired, the coil 32¹ may be rendered effective only for east bound traffic, as indicated by the wire 115 and contact 116 of the direction lever DR (see Fig. 14), so that for east bound traffic not only will the short line impressed by the hammer 16 be made to indicate the position of the track switch and the passage of a train, but these lines will be surrounded by a circle 112, as indicated in Fig. 13 of the drawings, to manifest an east bound train movement, but for west bound traffic these circles will be omitted as indicated by the train 113 in Fig. 13. It will be noted that train 113 entered the east end of passing siding S⁹⁻¹⁰ at 8:15 and left this siding at 8:30.

For simple train moves the direction of train movement can in most cases be deciphered by the registration of trains at different locations, and the use of this specific registration of direction of train movement, as by color as shown in Fig. 8 or by a circle as shown in Fig. 13, becomes very useful only when peculiar train movements, such as car shifting in combination with train meets, are carried out.

Referring to Fig. 14 it will be noted that the hammer coil 32 is connected in exactly the same way as in Fig. 7 of the drawings, a portion of the wiring diagram having been omitted for convenience, and that the coil 32¹, which actuates the sleeve 16¹ is controlled in exactly the same way as the coil 32 except that it is only effective when the direction signal lever DR assumes its right hand east bound position.

Having thus shown and described several rather specific embodiments of the present invention, it is desired to be understood that the particular embodiments selected have not been selected for the purpose of showing the scope of the invention nor the exact construction preferably employed in practicing the invention, but have been shown for the purpose of facilitating description of the underlying principles of the invention as well as its operating features, and it should further be understood that various modifications, additions or changes may be made to adapt the invention to the particular problem encountered in practicing the same, all without departing from the spirit or scope of the invention or the idea of means underlying the same, except as demanded by the scope of the following claims.

What I claim as new is:—

1. A railway traffic recorder for recording the passage of a train by a particular location at a particular time as well as distinctively recording the track over which such train moves comprising, a recording sheet, means for moving the sheet in accordance with the lapse of time, automatic stamping means for stamping a mark on said sheet at a point in a line transverse to the movement of said sheet identifying the location of said train, and automatic means for angularly disposing said stamping means in accordance with the track on which said train is moving.

2. A railway traffic recorder for recording the passage of a train by a particular location at a

particular time as well as distinctively recording the track over which such train moves comprising, a recording sheet, means for moving the sheet in accordance with the lapse of time, stamping means for automatically stamping a mark on said sheet at a point in a line transverse to the movement of said sheet identifying the location of said train, and means for automatically changing the characteristics of said mark in accordance with the track on which said train is moving.

3. A railway traffic recorder for recording the passage of a train by a particular location at a particular time as well as distinctively recording the track over which such train moves comprising, a recording sheet moved in accordance with the lapse of time, stamping means for automatically stamping a mark on said sheet at a point in a line transverse to the movement of said sheet for identifying the switch over which said train moves, and means for automatically changing the characteristics of said mark in accordance with the track selected according to the position assumed by said switch.

4. A railway traffic recorder for recording the passage of a train past a particular location at a particular time as well as distinctively recording the track over which such train moves comprising, a recording sheet, means for moving the sheet in accordance with the lapse of time, means for automatically stamping a mark on said sheet corresponding to the location of said train, and automatically operating means for imparting a distinctive configuration to said mark for identifying the track over which said train is moving.

5. A railway traffic recorder for recording the passage of a train by a particular track switch at a particular time as well as distinctively recording the position the switch assumes comprising, a recording sheet, means for moving the sheet in accordance with the lapse of time, traffic controlled means for automatically stamping a mark at a point on a line transverse to the direction of movement of said sheet corresponding to the location of the switch over which said train is moving, and automatically operating means for giving the stamped mark a configuration identifying the position of said switch.

6. A railway traffic recorder for recording the movement of a train past a particular point at a particular time comprising, a recording sheet moved in accordance with the lapse of time, a carbonized ribbon associated with said sheet, and means controlled in accordance with the traffic for transferring carbon from said ribbon to said sheet at a point on a line transverse to the direction of movement of said sheet to identify the location of a train at a particular time, and means to impart a character to the mark to identify the track upon which said train is operating.

7. A railway traffic recorder for recording the movement of a train by a particular point at a particular time comprising, a recording sheet moved in accordance with the lapse of time, a carbonized ribbon disposed over said sheet with the carbonized side thereof engaging the upper face of said sheet, an anvil located over said ribbon, and means for striking said sheet and ribbon against said anvil to make a mark indicating the location of a train at a particular time, and means to give the mark a character to identify the track upon which said train is operating.

8. In a railway traffic recorder for recording the movement of a train past a particular point at a particular time on a recording sheet moved in accordance with the lapse of time, a carbonized

ribbon disposed over the sheet with the carbonized side thereof engaging the upper face of said sheet, a striker located below said sheet, an anvil disposed over said sheet but to the rear of said striker with respect to the direction of movement of said sheet and carrying said ribbon between itself and said sheet, and means for moving said anvil over said striker and causing said striker to strike said sheet to transfer carbon from said ribbon to said sheet to register the location of a train at a particular time.

9. A railway traffic recorder for recording the movement of a train by a particular point at a particular time comprising, a recording sheet moved in accordance with the lapse of time, a carbonized ribbon disposed over said sheet with the carbonized side thereof engaging the upper face of said sheet, a striker having a striking surface of distinctive character, an anvil disposed over said sheet and striker and supporting said ribbon between said sheet and anvil, means for turning said striker in accordance with the position assumed by a particular track switch, and means for actuating said striker to cause said sheet to strike said ribbon and said ribbon to strike said anvil when there is a train moving over said track switch.

10. A railway traffic recorder for recording the movement of a train by a particular point at a particular time comprising, a recording sheet moved in accordance with the lapse of time, a carbonized ribbon associated with said sheet, and means for transferring carbon from said ribbon to said sheet at a point on a line transverse to the direction of movement of said sheet to identify the location of a train at the time, including a stick relay picked up when there is no train at said particular point and dropped upon transferring of carbon from said ribbon to said sheet, and electro-responsive means for transferring said carbon when there is a train at said point and said stick relay is energized, whereby said transferring of carbon continues only momentarily.

11. A railway traffic recorder for recording the time of passage of a train by a particular point on a railway system comprising, a recording sheet moved in accordance with the lapse of time, means which if actuated momentarily will make a mark on said sheet, and other means for momentarily actuating said first mentioned means including, an actuating magnet, a track relay deenergized during each passage of a train by said point, a stick relay having a pick-up circuit including a front contact of said track relay, a stick circuit for said stick relay including a contact closed when said actuating magnet is deenergized, and a circuit for said magnet including a back contact of said track relay and a front contact of said stick relay.

12. A railway traffic recorder for recording the time of passage of a train by a particular point on a railway system comprising, a recording sheet moved in accordance with the lapse of time, two devices each having an operating coil which if actuated sequentially will make a mark on said sheet, and means for energizing said operating coils sequentially comprising, a track relay, a stick relay having a pick-up circuit including a front contact of said track relay and having a stick circuit including a contact closed when one of said operating coils is deenergized, a circuit for said one coil including a front contact of said stick relay and a back contact of said track relay, and a circuit for the other operating coil includ-

ing a contact closed when said coil is energized, said stick relay is energized and said track relay is deenergized.

13. A railway traffic recorder for recording the passage of a train past a particular location at a particular time as well as distinctively recording the track over which such train moves comprising, a recording sheet moved in accordance with the lapse of time, traffic controlled means for making a mark on said sheet for identifying the location of said train, and means for imparting a distinctive character to the mark to thereby identify the track on which said train is moving.

14. A railway traffic recorder for recording the passage of a train past a particular location at a particular time as well as distinctively recording the track over which such train moves comprising, a recording sheet moved in accordance with the lapse of time, traffic controlled means for making a mark on said sheet at a point in a line transverse to the movement of said sheet for identifying the track location over which said train is passing, and means to impart a character to the mark to thereby identify the position said track switch is assuming.

15. A railway traffic recorder for recording the passage of a train past a particular location at a particular time as well as for distinctively recording the particular track over which such train moves comprising, a recording sheet moved in accordance with the lapse of time, traffic controlled means for making a mark on said sheet identifying the location of said train and means for giving the mark a distinctive character to thus identify the direction in which said train is moving.

16. A railway traffic recorder for recording the passage of a train past a particular location at a particular time as well as distinctively recording the track over which such train moves comprising, a recording sheet moved in accordance with the lapse of time, traffic controlled means for making a character on said sheet at a point in a line transverse to the movement of said sheet for identifying the location of said train lengthwise of the railroad and means to make the character distinctive to identify the track on which said train is moving and the position of the track switch over which it moves and means for indicating the direction in which such train is moving.

17. A railway traffic recorder for recording the passage of a train past a particular location at a particular time as well as for distinctively recording the track over which such train moves comprising, a recording sheet moved in accordance with the lapse of time, traffic controlled means for making a mark on said sheet at a point in a line transverse to the movement of said sheet for identifying the track switch over which said train is passing, and means for imparting a character to the mark to identify the position said track switch is assuming and the direction in which said train is moving.

18. A railway traffic recorder for recording the movement of a train by a particular point at a particular time comprising, a recording sheet moved in accordance with the lapse of time, a carbonized ribbon disposed over said sheet with the carbonized side thereof engaging the upper face of said sheet, two strikers each having a striking surface of distinctive character, an anvil disposed over said sheet and striker and supporting said ribbon between said sheet and anvil, means for turning one of said strikers in accordance with the position assumed by a par-

ticular track switch, and means for actuating one or both of said strikers to cause said sheet to strike said ribbon and said ribbon to strike said anvil depending on traffic conditions.

19. A railway traffic recorder for recording the movement of a train by a particular point at a particular time comprising, a recording sheet moved in accordance with the lapse of time, a carbonized ribbon associated with said sheet, and traffic controlled means for transferring carbon from said ribbon to said sheet at a point on a line transverse to the direction of movement of said sheet to identify the location of a train at a particular time and of a character to identify the track upon which said train is operating.

20. A railway traffic recorder for recording the movement of a train by a particular point at a particular time comprising, a recording sheet moved in accordance with the lapse of time, a carbonized ribbon disposed over said sheet with the carbonized side thereof engaging the upper face of said sheet, an anvil located over said ribbon, and means for striking said sheet and ribbon against said anvil to make a mark indicating the location of a train at a particular time and of a character to identify the track upon which said train is operating.

21. A railway traffic recorder for recording the movement of a train by a particular point at a particular time comprising, a recording sheet moved in accordance with the lapse of time, a carbonized ribbon disposed over said sheet with the carbonized side thereof engaging the upper face of said sheet, a striker located below said sheet, an anvil disposed over said sheet but to the rear of said striker with respect to the direction of movement of said sheet and carrying said ribbon between itself and said sheet, and means for moving said anvil over said striker and causing said striker to strike said sheet to transfer carbon from said ribbon to said sheet to register the location of a train at a particular time and by its character indicate the track over which said train is running.

22. A railway traffic recorder for recording the movement of a train by a particular point at a particular time comprising, a recording sheet moved in accordance with the lapse of time, a carbonized ribbon associated with said sheet, and means for transferring carbon from said ribbon to said sheet at a point on a line transverse to the direction of movement of said sheet to identify the location of a train at a particular time and of a character to identify the particular track of three different tracks upon which said train is travelling.

23. A railway traffic recorder for recording the passage of a train by a particular track switch at a particular time as well as distinctively recording the position the switch assumes comprising, a recording sheet moved in accordance with the lapse of time, and means for stamping a mark at a point on a line transverse to the direction of movement of said sheet corresponding to the location of the switch over which said train is moving and of a configuration identifying the position of said switch, said means comprising a striker having a striking surface of distinctive character located below said sheet which strikes against the bottom of said sheet, and a carbonized ribbon engaging the top side of said sheet directly over said striker.

24. A railway traffic recorder for recording the passage of a train by a particular track switch

at a particular time as well as distinctly recording the position the switch assumes comprising, a recording sheet moved in accordance with the lapse of time, and means for stamping
 5 a mark at a point on a line transverse to the direction of movement of said sheet corresponding to the location of the switch over which said train is moving and of a configuration identifying the position of said switch, said means comprising a striker having a striking surface of
 10 distinctive character located below said record sheet which strikes against the bottom of said sheet, a carbonized ribbon engaging the top side of said sheet directly over said striker, and
 15 an anvil located above said ribbon.
 25 A railway traffic recorder for recording the passage of a train by a particular track switch at a particular time as well as distinctively recording the position the switch assumes comprising, a recording sheet moved in accordance
 20 with the lapse of time, and means for stamping a mark at a point on a line transverse to the direction of movement of said sheet corresponding to the location of the switch over which said
 25 train is moving and of a configuration identifying the position of said switch, said means comprising a striker having a striking surface of distinctive character located below said record sheet which strikes against the bottom of said
 30 record sheet, an anvil supporting a carbonized ribbon between itself and said record sheet and located above said record sheet but to the back of said striker, whereby if said anvil with its ribbon is moved forward and said striker is
 35 caused to strike said record sheet said distinctive mark is made upon the top of said record

sheet and is visible as soon as said anvil is returned to its normal position.

26. A railway traffic recorder for recording the movement of a train by a particular point at a particular time comprising, a recording sheet
 5 moved in accordance with the lapse of time, a carbonized ribbon disposed over said sheet with the carbonized side thereof engaging the upper face of said sheet, two strikers each having a
 10 striking surface of distinctive character, an anvil disposed over said sheet and striker and supporting said ribbon between said sheet and anvil, means for turning each of said strikers in accordance respectively with the position assumed
 15 by a particular track switch in each of two independent tracks, and means for actuating one or both of said strikers to cause said sheet to strike said ribbon and said ribbon to strike said anvil depending on traffic conditions on the two
 20 tracks.

27. A railway traffic recorder for recording the movement of a train by a particular point at a particular time comprising, a recording sheet
 25 moved in accordance with the lapse of time, a carbonized ribbon bearing carbon of different characters associated with said sheet, and traffic controlled means for selectively transferring carbon of distinctive character from said ribbon to
 30 said sheet at a point on a line transverse to the direction of movement of said sheet to identify the location of a train at a particular time and of a character to identify the track upon which
 35 said train is operating and to indicate the direction of travel of the train.

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