M. H. LOUGHRIDGE.

AUTOMATIC CARRIER.

APPLICATION FILED MAR. 13, 1919.

1,381,317.

Patented June 14, 1921.

5 SHEETS—SHEET 1.

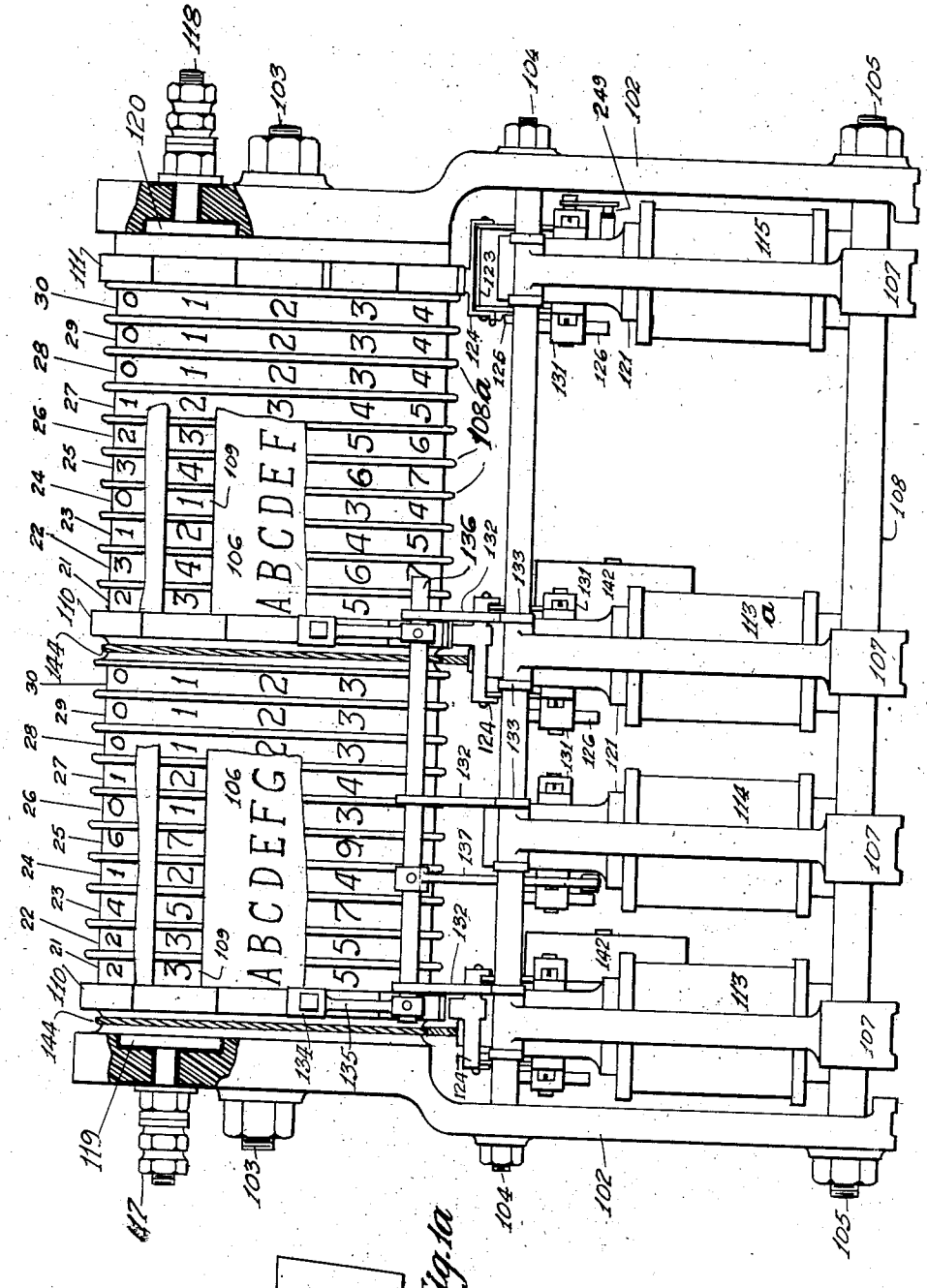


Fig. 1.

Fig. 1a

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5 SHEETS—SHEET 2.

Fig. 3.

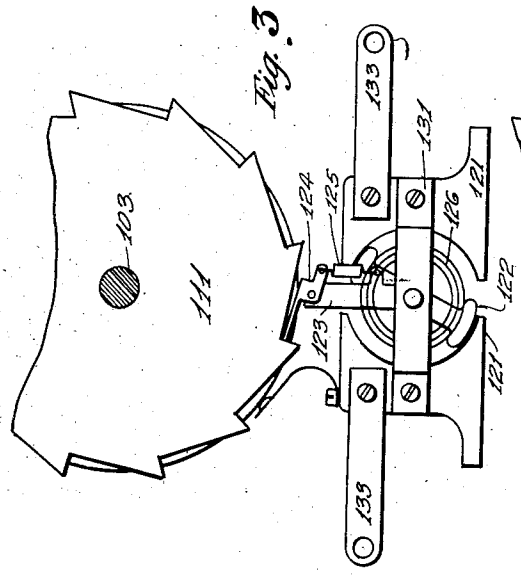


Fig. 4

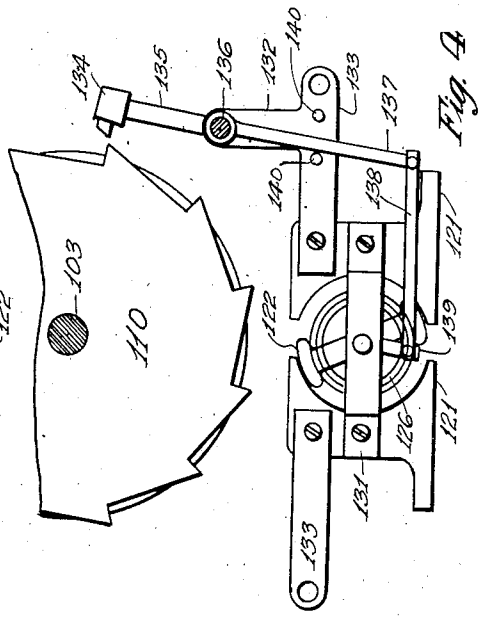
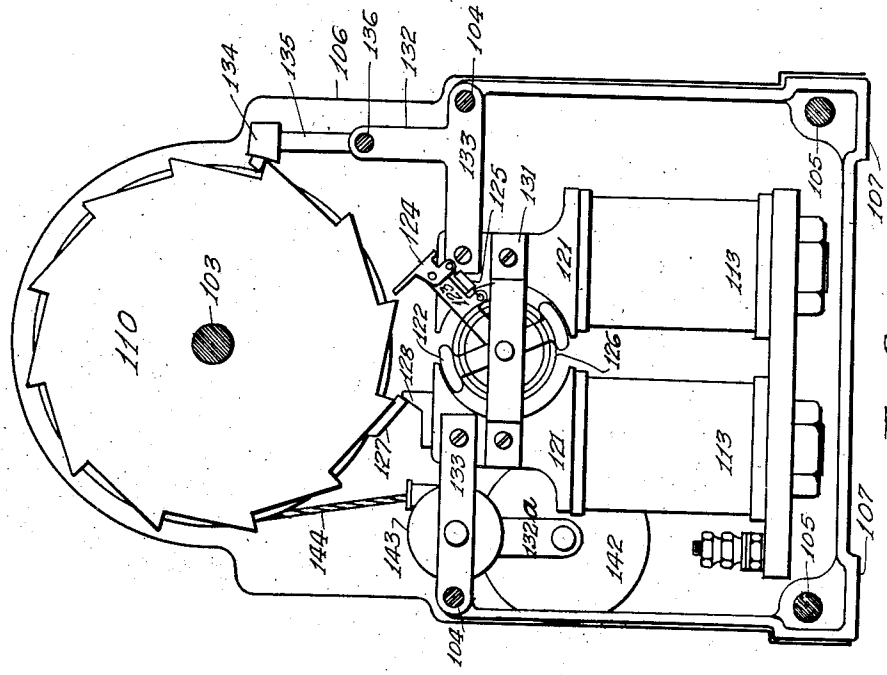


Fig. 2



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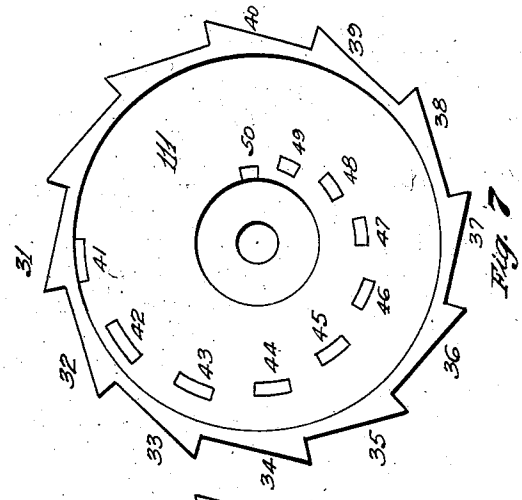


Fig. 7

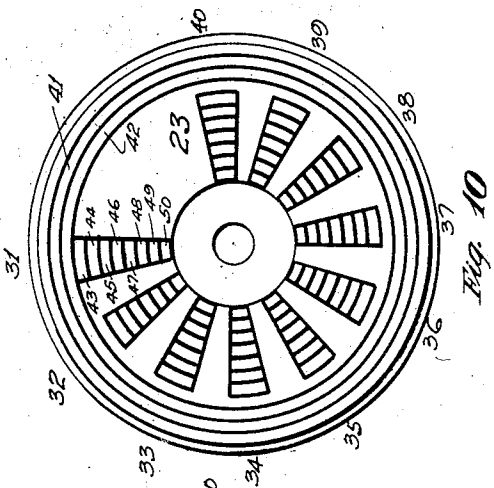


Fig. 10

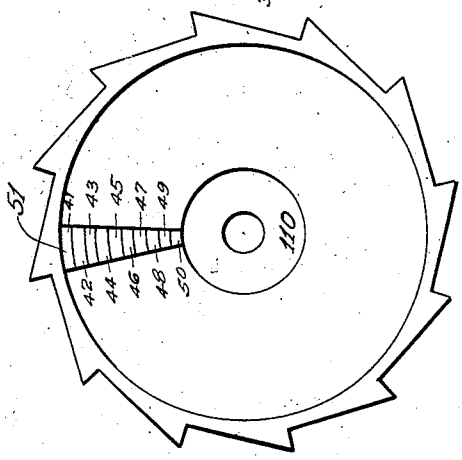


Fig. 6

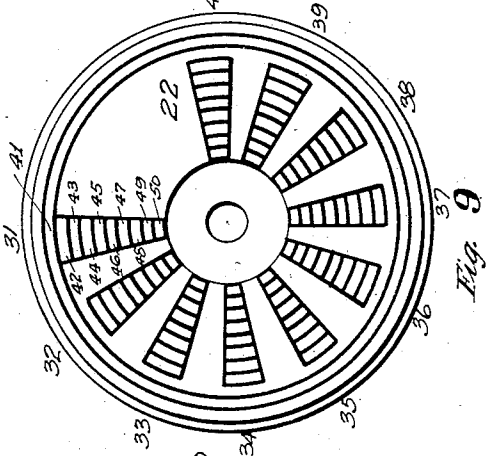


Fig. 9

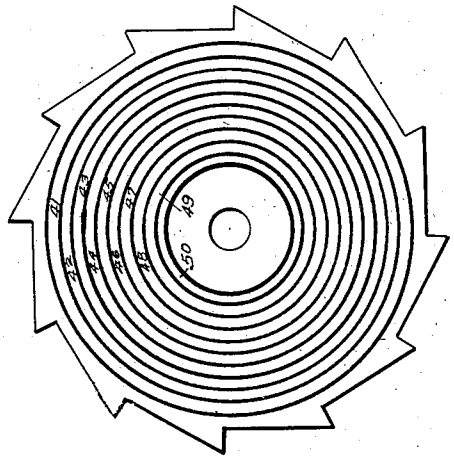


Fig. 5

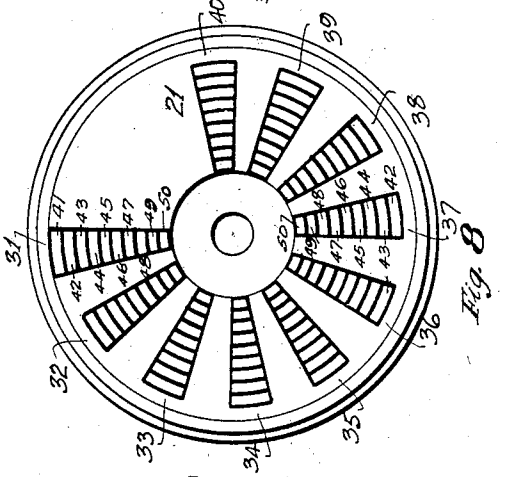


Fig. 8

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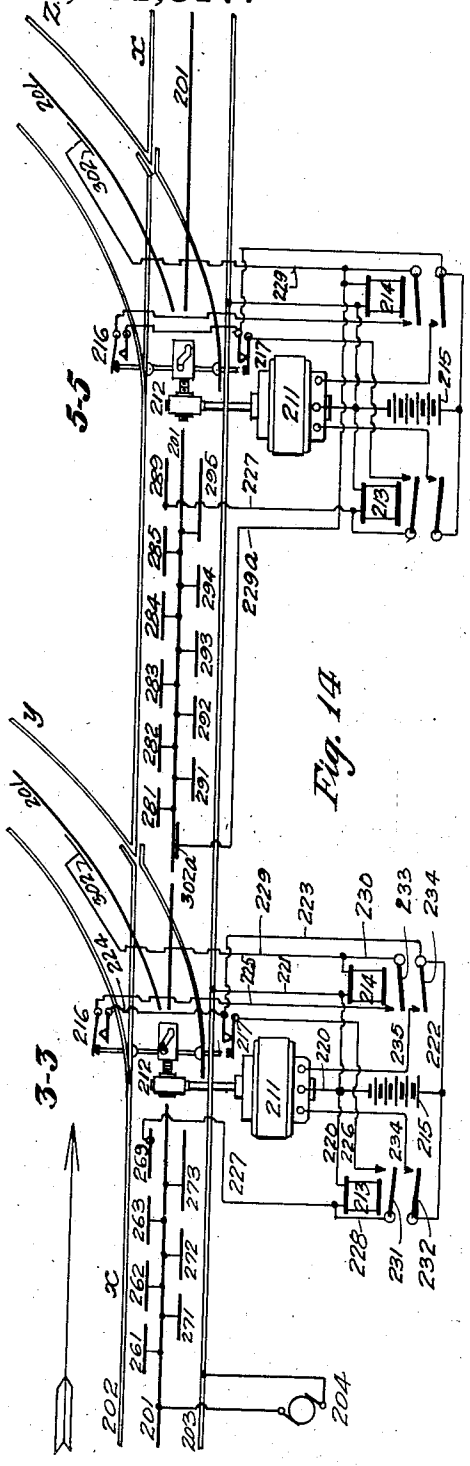


Fig. 14

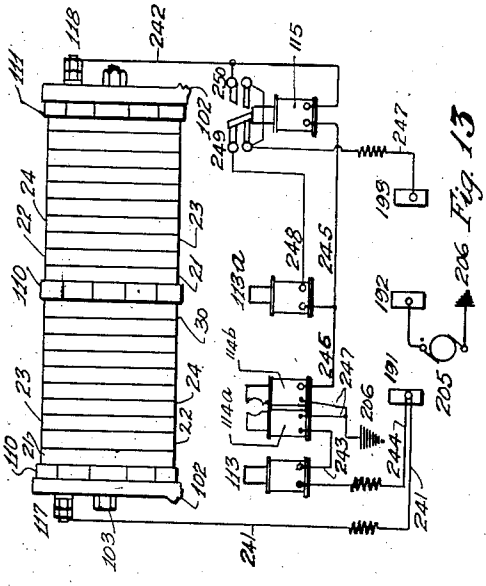


Fig. 13

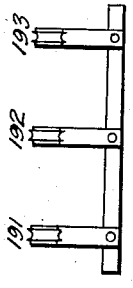


Fig. 12

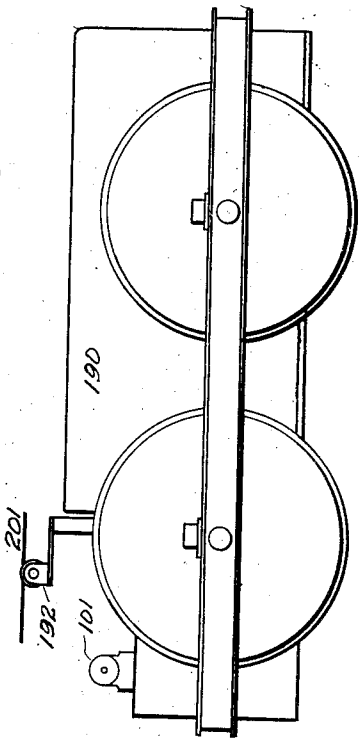


Fig. 11

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5 SHEETS—SHEET 5.

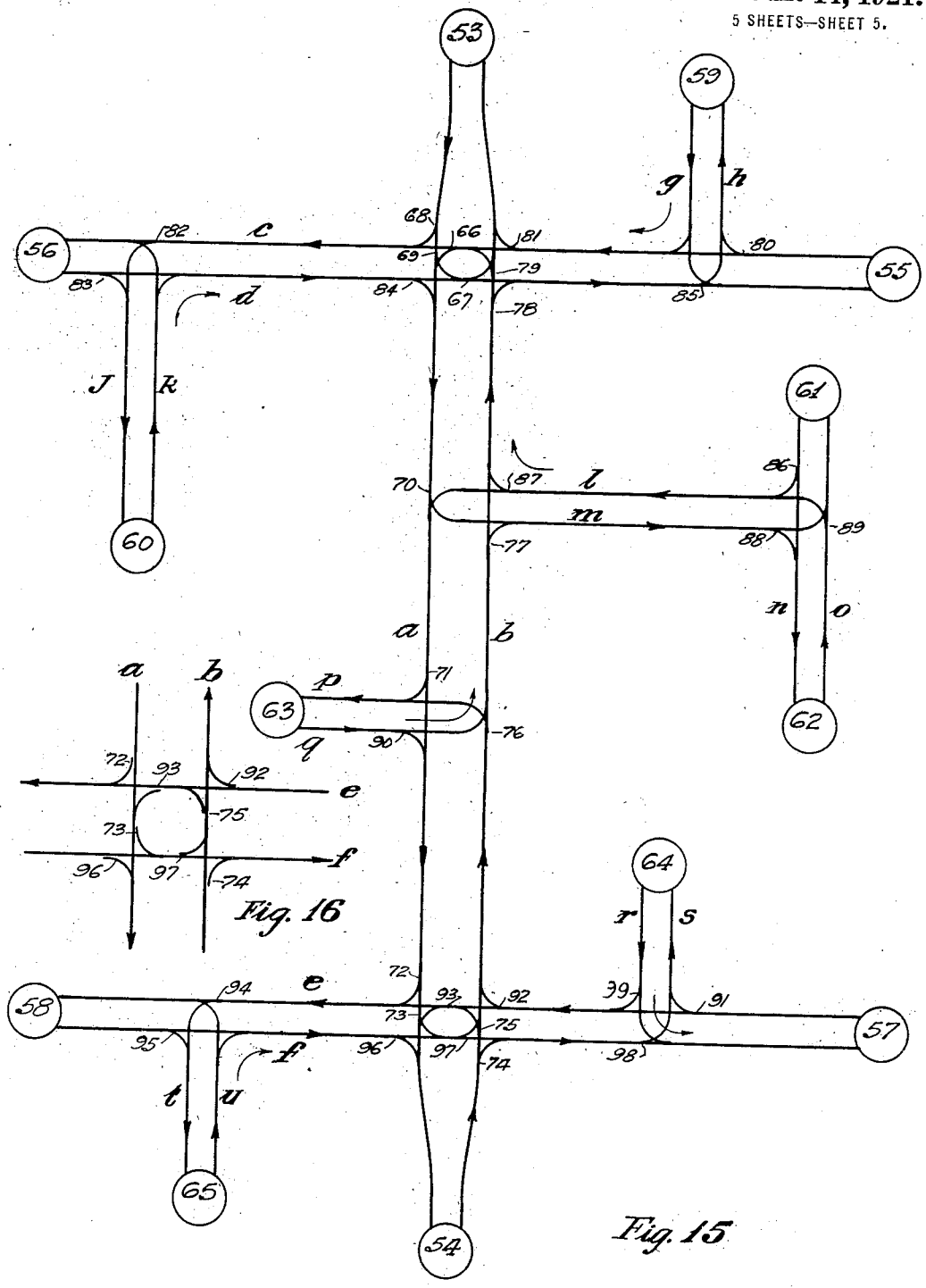


Fig. 16

Fig. 15

Inventor.

Matthew H. Loughridge

UNITED STATES PATENT OFFICE.

MATTHEW H. LOUGHRIDGE, OF BOGOTA, NEW JERSEY.

AUTOMATIC CARRIER.

1,381,317. Specification of Letters Patent. Patented June 14, 1921.

Application filed March 13, 1919. Serial No. 282,412.

To all whom it may concern:

Be it known that I, MATTHEW H. LOUGHRIDGE, a citizen of the United States, residing at Bogota, in the county of Bergen and State of New Jersey, have invented a new and useful system of Automatic Carriers, of which the following is a specification.

This invention relates to railways and particularly to light railways and has for its objects a means for despatching cars or trains from any point of origin to any other predetermined point throughout an interconnecting system of railroads without human intervention. This includes a selective method of operating track switches in response to predetermined conditions set up by a compound selector as described in the following specification and drawings in which Figure 1 is a side elevation of the compound selector, Fig. 1ª is a detail, Fig. 2 is a sectional view and Figs. 3 and 4 are sectional details of the selector. Figs. 5 to 10 inclusive show the selector disks, Fig. 11 is a side view of the cars and Fig. 12 is a plan view of the current collectors. Fig. 13 shows the wiring of the selector and Fig. 14 shows the wiring of the track apparatus for operating the switches. Fig. 15 is a layout of an interconnecting railway system and Fig. 16 is a detail of the switch arrangement.

This invention is a continuation in part of application Serial No. 879,834 filed Dec. 31st, 1914, and includes broadly the use of a selector carried by a moving train or car on which a predetermined combination has been set up and means on the track for operating this selector whereby any predetermined switch may be operated, also, this invention includes the use of a compound selector for this purpose in which a series of predetermined combinations may be set up to operate corresponding switches throughout the different tracks of an interconnecting system.

The selector works on the group-combination principle, that is, the combinations of the selector are made in characterized groups, in combination so that a great variety of effects can be obtained from comparatively few movements of the apparatus. A multiple of these combinations is contained in each selector and may be manually adjusted to correspond with the operating conditions at predetermined switches thus outlining the course of the car through an interconnecting system.

As shown in Fig. 1 the selector 101 consists of a series of cylindrical disks contained between two end frames 102 and held together by means of bolts 103, 104 and 105. The bolt 103 forms the axis for the combination disks 21 to 30 inclusive, also the stepping disks 110 and 111. It will be noted that these disks, with the exception of 111 are duplicated in the combination cylinder.

113, 113ª and 115 are the stepping magnets and 114 is the holding magnet, these are supported by the frames 107 and by the supporting cleats 133 from the bolts 104. A pipe spacer 108 may be used on the bolt 105 as shown to keep the frames 107 in position.

These magnets are provided with pole pieces 121 in which the shuttle armature 122 partially revolves on the bearing strap 131. A retracting coil spring 126 is provided to bring the armature to the starting position. To the armature is attached an arm 123 carrying the pawl 124 which under the tension of spring 125 engages the teeth of stepping wheels 110 and 111 thereby causing these wheels to revolve progressively in response to the intermittent operation of the magnets.

The stepping wheel 111 shown in Fig. 3 is moved forward by the action of the coil spring 126, energizing magnets 115 simply moves the pawl back for the next step, the wheel 110 is stepped directly forward by energizing the magnet 113.

Stepping wheels 110 are provided with a resetting mechanism, as shown in Fig. 2, consisting of a spring 142 supported by an arm 132ª and geared to a drum 143 around which the flexible band 144 is wound. This puts a bias on the stepping wheel tending to bring it into position where the piece 127 engages the stop 128. This, therefore, is always the starting position of this wheel.

In order that the progressive steps of these stepping wheels may be accumulated it is necessary that a retaining or holding mechanism be provided during the interval in which the pawl is moving back. I provide the mechanism shown in Fig. 4 for this purpose operated by the magnet 114. In this case the arm 139 attached to the armature 122 by the connections 138 and 137 swings the shaft 136 supported by the arms 132 between the stops 140. This, in turn, moves the arm 135 carrying the pawl 134 into engagement with the teeth of the stepping wheels 110 and thereby holding these

wheels in position against the bias of the setting mechanism while magnets 114 are energized.

The operation of the selector consists in establishing a circuit between the binding posts 117 and 118, Fig. 1, through the selector disks, this circuit is arranged to perform the desired function. The cylinder of the selector consists of a number of longitudinal conductors in circular layers divided into segments within the circle and each disk has the means of interrupting or controlling at least one of these longitudinal conductors by its position, which position is adjustable.

Fig. 5 shows the left side of stepping disk 110 and the left side of disk 111 and Fig. 6 shows the right side of disk 110, all as arranged in Fig. 1. The longitudinal conductors are numbered 41 to 50 inclusive and are insulated from each other. The side shown in Fig. 5 is placed against the insulated contact plate 119, similar to Fig. 1[a], to which the binding post 117 is attached. As the conductors are continuous on this side, this plate makes connection with all of these conductors in any position. The longitudinal conductors are divided into segments as shown and indicated by the numerals 31 to 40 inclusive, the space between the segments being about equal to the segments themselves; however, on the side shown in Fig. 6 of the stepping disk 110 only one segment 51 is required. The sides of the combination disks, Figs. 8, 9 and 10, are alike. The contacting members are shown as flat rings. In practice these may be constructed to give a contact in the form of a knife switch.

By referring to Fig. 8 showing disk 21 it will be noted that conductor 41 appears in segment 31 only. This disk, therefore, controls conductors 41. Also in disk 22, Fig. 9, conductor 42 appears in segment 31 only. This conductor is, therefore, controlled by the position of this disk. Again in disk 23, Fig. 10, conductor 43 appears in segment 31 only and consequently is controlled by the position of this disk. The same conditions are maintained for the remaining disks up to 30, each one in turn controlling a different conductor of the segment 31.

The segments of each disk preserve the continuity of all the longitudinal conductors except the one which it controls; thus all the conductors appear in each segment except one. It is moreover necessary to preserve the individuality of each step of the stepping wheel on the combination disks. This is the object of dividing the longitudinal conductors into segments.

When segment 51, Fig. 6, of disk 110 is placed against segment 31 of disk 21 it is apparent that the continuity of all the conductors is carried over to disk 22, or is, in fact, the equivalent of placing segment 51 against disk 22 and if it engages segment 31 again it will be the equivalent of placing this disk against disk 23 and so on with relation to the remaining disks. It will be noted these disks are assembled consecutively.

Now suppose that the combination disks are adjusted for a combination so that when the stepping disks are on zero or the starting position segment 31 does not coincide with segment 51. Suppose disk 21 is moved forward 3 steps and disk 22 is moved forward 3 steps and disk 23 is moved 5 steps, then it is apparent that the main circuit through the selector will be interrupted on conductor 41 except for the interval in which disk 110 rests on the third step; also the circuit will be interrupted on conductor 42 except when the disk rests on step 3, and it will be interrupted on disk 23 except when the stepping wheel rests on the fifth step, and so on throughout the selector. The segments, as stated, preserve the individuality of the steps of the stepping wheel. It is not necessary, however, to maintain this individuality beyond the disk where a conductor is controlled. For instance, conductor 41 is controlled by disk 21, in the following disk 22, conductor 41 appears as a ring, likewise in disk 23 conductors 41 and 42 are rings, these conductors being controlled in previous rings there is no further need to maintain their individuality.

The selector as shown in Fig. 1 consists of two banks of combination disks similarly numbered, the one being set up to operate in series with the other. The face, Fig. 5, of the middle stepping disk 110 will carry over any circuit established in the first bank from terminal 117 to segment 51 on the obverse side which is in position to effect the combinations in the following bank in the manner already explained. From this it will be apparent that disks 21 in both banks control conductor 41; disks 22 control conductor 42, disks 23 control conductor 43 and so on for the remaining disks. Hence it is possible to obtain combinations in both banks of disks operating together in a group to affect the main circuit and these combinations are answered by the characteristics operating the two stepping disks 110. Moreover, time becomes a factor in the operation of these groups as the answering combinations must consummate simultaneously to establish the main circuit.

The combination disks can be adjusted by the knurled rings 108[a] to the combination desired. This is conveniently shown by the series of numerals placed on the outside of each disk as indicated. The particular combination set up may be read through an aperture 109 cut in the cover 106, Fig. 1, the capital letters in each bank indicating the various combinations which will estab-

lish a circuit through the selector; thus over letter "A" in both banks appears the numerals 3—3 and over letter "B" appears the numerals 3—4 and so on, hence, when the first stepping wheel 110 makes three steps and the next stepping wheel makes 3 steps at the same time, a continuous conductor will be established through both banks on conductor 41. In the same way conductor 42 will be continuous in both banks when the first wheel has made 3 steps and the second wheel has simultaneously made 4 steps.

Ten segments are provided on each disk, this means ten active positions of the stepping wheel, hence, with two banks of combination disks it is possible to get 99 different combination with a total number of steps not exceeding the sum of these digits. Attention is here called to the fact that the selector is built on the multiple unit principle and is capable of expansion indefinitely by the addition of similar parts. For instance to include another bank of combination disks to the selector it is simply necessary to increase the length of the rods 103, 104 and 105 and insert another stepping wheel 110 followed by the combination disks between the end frames, the shaft 136 being extended to carry another holding pawl for the new stepping wheel. This selector with this addition would have a total of 999 possible combinations and the movements of the stepping wheels would not exceed the sum of these digits.

Heretofore it has been shown that ten longitudinal conductors extend through the combination disks, each disk controlling a different conductor and any of these conductors may establish the main circuit through the selector. It is necessary, however, that only one of these conductors be effective at any one time and, moreover, it is necessary under certain conditions that the effective conductor be changed when it is desired to function the selector under a different combination. These results are obtained by means of the stepping wheel 111, which prevents more than one conductor being in circuit at once and selects between the various longitudinal conductors.

Stepping wheel 111 is placed at the end of the selector against the end plate and the face shown in Fig. 7 makes contact with the plate 120 connected to the binding post 118. The opposite or left side of this disk as arranged in Fig. 1, corresponds to that shown in Fig. 5, in which the conductors are in the form of continuous bands which maintain the circuit with disk 30 in any position. It will be observed from Fig. 7 that one conductor in each segment appears on this face, these however being the termination of a different longitudinal conductor in each segment which appears in the form of a spiral numbered 41 to 50 respectively. Now the strip 120 is a solid piece of the same shape as indicated in Fig. 1[a], so that in any position of the stepping wheel 111, only one of these conductors can be in circuit and as the wheel is stepped around other conductors are brought into circuit.

It was previously explained that disk 21 controlled conductor 41, now if stepping wheel 111 is in position to make the circuit between 41 and 120, then a circuit will be established through the selector when the stepping wheels 110 have simultaneously consummated the number of steps called for respectively by each of the disks 21, under any other conditions this circuit will not be established and no other circuit can be established. In the same way, disk 22 controls conductor 42 and when wheel 111 is in position to make circuit between 42 and 120 the selector will function corresponding to the combinations set up on the disks 22 and the corresponding number of steps of wheels 110. This condition is repeated for each of the other disks and it, of course, holds good throughout the number of banks that may be in the selector. This makes a compound selector capable of responding to a variety of different predetermined combinations arranged to function progressively.

One type of car or locomotive that may be used with this system is illustrated in Fig. 11. This car has a body 190 with a low center of gravity and may be operated on self contained power or by power supplied from a conductor. The selector 101 is shown in position. These cars are provided with a plurality of current collectors, generally referred to as "shoes" 191, 192 and 193 Fig. 12.

The electrical operation of the selector will be understood from Fig. 13. current is collected on shoe 191 and by wire 241 connects to terminal 117, main circuit of the selector. Also from shoe 191 by wire 244 to magnet 113, wire 243 to magnet to coil 114[a] of holding magnet and wire 247 to ground 206. Shoe 192 may be connected to the propulsion motor 205 as shown. Shoe 193 connects by wire 247, switch 249 and wire 248 to magnet 113[a] and wire 246 to magnet coil 114[b] and ground by wire 247. When the main circuit is established through the selector from terminal 117 to terminal 118 wire 242 is energized. This energizes 115 by wires 245, 246 to magnet coil 114[b] and ground on wire 247 as before; this arrangement secures that when all or any of magnets 113 and 115 are energized magnet coils 114[a] or 114[b] must be energized, or it provides for the continuous energizing of the holding circuit. The coils of the holding magnet 114[a], 114[b] are separated in these circuits to provide better operation. When magnet 115 is energized switch 249 is opened and switch 250 is closed, thus disconnecting magnet 113[a]

and connecting shoe 193 with wire 242 controlled by the main circuit of the selector.

The track wiring for two switches is shown in Fig. 14. 201 represents a power supply wire and also may be used as a block wire but this invention does not include a block system as it may be applied with any system in which the safe operation of cars is provided for. 202 and 203 are the track rails. A source of power may be supplied between the power wire 201 and the track as indicated at 204. 211 is a motor arranged to operate a switch mechanism 212 whereby cars may be diverted from the main track X to branch tracks *y* or *z*. These switches are so wired that when the main circuit of the selector is established the switch is set for the branch track, thus diverting the car to another line.

When wire 227 is energized a circuit is established through magnet 213 and common wire 220 and 221 to track. This picks up the armature closing contact 231 forming a stick circuit from wire 228, contact 231, wire 226, contact 217, wires 223 and 222 to battery 215 and wire 220 to relay 213, holding this relay energized. At the same time a circuit is established from battery 215, wire 222, contact 232, wire 234 to motor 211 and common wire 220 to battery. This causes the motor to operate the switch mechanism changing its position and on the completion of the stroke opening contact 217 which breaks the holding circuit and deënergizes this relay. When the train passes onto a side track the shoe 192 makes a circuit between wire 201 and 302 thereby energizing wire 229, relay 214 and wire 221 to track. This relay is also operated on stick circuit from wire 230, contact 233 energized, wire 225, contact 216 now closed, wire 224, wire 233 and wire 222 to battery 215 and common wire 220 to relay 214. An operating circuit for the motor is also established from battery 215, wire 222, contact 234 wire 235 to motor and common wire 220 to battery, operating this motor in the reverse direction and placing the switch normal, to be operated again when the proper combination is set up. The wiring for the two switches is exactly alike except that in the switch to track *z*, wire 229 restoring the switch is also extended by wire 229[a] to contact 302[a] encountered before entering the switch and energizing relay 214 to insure that it is normal before cars pass over it. The advantage of the stick circuit secured by relays 213 and 214 is that while these relays are momentarily energized by the passage of a car, the relays maintain the circuit of the motor until the switch movement has been completed and insures against it stopping when partially thrown.

Ahead of each switch are a series of contacts on the track arranged as shown, by 261—263 and 271—273 and energized from a source of energy such as 201. The shoe 193 engages the contacts in the row beginning with 261 and shoe 191 engages contacts in row beginning with 271, making a circuit with each contact as the car passes along the track. This will intermittently energize wire 244 and 247 thereby operating stepping wheels 110 of the selector. Resistances may be placed in circuit with these wires as shown when they are energized from the power mains. The number of steps therefore which these magnets will make depends upon the number of contacts placed in each row ahead of a switch; the switch to track "*y*" in the illustration having three energized contacts in each row has a combination 3—3. The switch to track *z* has five contacts in each row energized and its combination therefore is 5—5.

It will be noted that these contacts in each row are staggered with relation to each other, for instance 271, and 272 are placed opposite the gap between 261, 262 and 263 respectively, this, in effect, secures that either shoe 191 or 193 is always energized and, consequently, holding magnet is always energized when a car passes over these contacts. Contact 269 to which wire 227 is connected is insulated and no material effect is produced on magnets 113[a] or 213 when shoe 193 is on this contact unless a circuit has been established through the selector. In this latter case magnet 115 is energized, contact 249 is opened and 250 is closed and shoe 193 is energized through the main circuit of the selector which in turn energizes relay 213 and operates the switch, the energy coming from contact 273 and shoe 191. Now when the car passes off contacts 269 or 273 magnet 115 is deënergized, this moves stepping disk 111 by one step changing the selector to operate upon a new combination as determined by the position of the next pair or combination of disks, this also restores the circuit of magnet 113[a] to operate directly from shoe 193, until magnet 115 is again energized.

A study of this operation will show that a car will pass over switches without effect until it encounters one having the same combination of steps as the first disks of the selector have been set to, then it will operate the switch mechanism and pass onto another track, at the same time changing the selector to operate upon the combinations set up on the next two disks until it encounters a switch having corresponding contact arrangements when it again operates the switch movement to pass onto another track and changes the selector as before to operate upon the combination of the next two disks until another corresponding track arrangement is encountered and so on throughout an interconnecting system. In each case the route selected being predeter-

mined by the combinations set up on the combination disks of the selector. The system contains means of restoring the switches to agree with the normal direction of traffic after a car passes over them. The same arrangement may be provided for trailing switches although, under ordinary operation, cars may trail over these switches without any setting.

A complete interconnecting system operating by this method is illustrated in Fig. 15. Since this is primarily a light railway system, grade crossings are not contemplated as these can readily be eliminated. This diagram is a single line track plan in which the tracks are indicated by the letters *a* to *u* respectively and the stations by the numerals 53 to 65 respectively. The direction of traffic, normally, is indicated by the arrow heads. This layout shows a trunk line *a*—*b* crossing two main tracks *c*—*d* and *e*—*f* at different points with various branch lines connected to these tracks. Switches are indicated by the numerals 66 to 99 respectively and for the purpose of explanation it is assumed these numerals are the combinations to which the switches will respond. Facing switches only are numbered, the normal position of these will be more clearly understood by referring to the enlarged diagram in Fig. 16.

Suppose a car is to move from station 53 to 54 over the trunk line *a*, all the switches are normally set for this route and the car will run over the route without the use of the selector, the same condition is true for a run from station 54 to 53 over track *b*. This condition also applies to a movement from 55 to 56 over track *c* and from 56 to 55 over track *d*, and these relations are maintained between stations 57 and 58 over tracks *e* and *f*. That is, since the switches are set for the main route normally, they do not have to be operated except when diverting from this route.

Now suppose a car leaves station 53 with a destination 60, it will pass over tracks *a*, *c* and *j*. The first combination will be 6—8, diverting the car from *a* to *c*, the next combination will be 8—2 diverting it from *c* to *j* which takes it to destination. In the same way, a car from station 62 to station 53, will move over tracks *o*, *l*, and *b*, the first switch operated being 89 the next being 87 which leads to the main track *b* where no further switch movements are necessary. If a car moves from station 63 to 61, it will move over tracks *q*, *b*, *m*, and *o*, and the combinations to operate the switches will be 9—0, 7—7, 8—8. It should be noted that the switches toward the most important points are normally set for this direction, for instance if 53 were such a point then switch 90 would be normally set for track *b* and not operated for the above movement. Suppose now a movement is to be made from station 56 to 57, it will be over tracks, *d*, *a*, and *f*, calling for combinations 8—4, 7—3. If a movement is to be made from 64 to 59, it will be over tracks *r*, *e*, *b*, *d*, and *h*, and will require combinations 9—2, 7—8 and 8—5, switch 99 being normally set for track *e*.

It will be noted that these routes can be selected with very few combinations of the selector and, in fact, a selector of the capacity shown will control traffic over an extensive railroad layout and over unlimited distances.

Having thus described my invention, I claim:

1. In a railway system, a track having responsive means, cars running on said track, a device carried on said cars having a plurality of selective members, means on said track at intervals for operating said selective members separately and coöperatively whereby said device operates said responsive means.

2. In a railway system, a track having responsive means, cars running on said track, a device on said cars having a plurality of moving selective members, fixed members on said track at intervals arranged to operate said moving selective members separately and coöperatively whereby said device operates said track responsive means.

3. In a railway system, a track having a plurality of fixed members disposed at intervals, cars running on said track, a device on said cars having a plurality of moving selective members, means for making a plurality of movements of said members at each location in response to said fixed track members.

4. In a railway system, a track having a plurality of fixed members disposed at intervals, said members having definite characteristics, cars running on said track, a unitary device on said cars having an ultimate condition, and means for operating said device to said ultimate condition in response to said characteristics.

5. In a railway system, a track having a plurality of fixed members in parallel rows, cars running on said track, a unitary device on said cars having a plurality of moving members making coöperative movements toward an ultimate condition, and means for operating said device to said ultimate condition in response to said fixed members.

6. In a railway system, a track having a plurality of fixed members in parallel rows, cars running on said track, a unitary device on said cars having a plurality of moving members making coöperative movements toward an ultimate condition, and means

for operating each moving member to said ultimate condition in response to track members in a particular row.

7. In a railway system, a track having a plurality of members in parallel rows, said members spaced to have defined characteristics, cars running on said track, a device on said cars having a plurality of moving members making cooperative movements, and means for operating each moving member in response to the characteristics of the track members in a particular row.

8. In a railway system, a track having a plurality of fixed members disposed in spaced rows at intervals, cars running on said track, a device on said cars having a plurality of conductors and a movable member, and means for operating said movable member in response to said track members, whereby the arrangement of said conductors is changed.

9. In a railway system, a track having a plurality of fixed members with definite characteristics disposed in spaced rows at intervals, cars running on said track, a device on said cars having a plurality of conductors and a movable member controlling said conductors, and means for operating said movable member in response to the characteristics of said track members.

10. In a railway system, a track having a plurality of fixed members in parallel rows, cars running on said track, a device on said cars having a plurality of conductors and a plurality of movable members moving toward an ultimate condition and controlling said conductors, and means for operating each movable member in response to the track members in a particular row.

11. In a railway system, a track having a plurality of fixed members spaced in parallel rows arranged with definite characteristics, cars running on said track, a device on said cars having a plurality of conductors and a plurality of moving members controlling said conductors, and means for operating each movable member in response to the characteristics of the track members in a particular row.

12. In a railway system, a track having fixed members at intervals, cars running on said track, a device on said cars having a plurality of conductors, a plurality of adjusting disks and a movable member controlling said conductors, and means for operating said movable member in response to said track members.

13. In a railway system, a track having fixed members in parallel rows, said members having defined characteristics, cars running on said track, a device on said cars having a plurality of conductors, a plurality of adjusting disks and movable members controlling said conductors, and means for operating each movable member in response to the characteristics of the track members in a particular row.

14. In a railway system, a track having a plurality of fixed members disposed in spaced rows at intervals, cars running on said track, a device on said cars having a plurality of conductors and a moving member controlling said conductors, and means operated by said track members for making effective one only of said conductors at a time.

15. In a railway system, a track having a plurality of members disposed at intervals, cars running on said track, a device on said cars having a plurality of conductors divided into segments and moving members controlling said conductors, and means operated by said track members for establishing the continuity of one of said conductors.

16. In a railway system, a track having a plurality of fixed members in spaced relation, said members arranged to have defined characteristics, cars running on said track, a device on said cars having a plurality of conductors, movable members controlling said conductors, and means responsive to the characteristic of said track members for establishing the continuity of one of said conductors.

17. In a railway system, a track having a plurality of members disposed at intervals, cars running on said track, a device on said cars having a plurality of conductors, a plurality of adjusting disks and movable members controlling said conductors, means for establishing the continuity of one of said conductors when the position of said movable members corresponds to the position of said adjusting disks, and means for operating said movable members from said track members.

18. In a railway system, a track having a plurality of members disposed at intervals, cars running on said track, a device on said cars having a plurality of conductors, a plurality of adjusting disks progressively arranged, each of said disks controlling a different conductor, a moving member controlling individually the conductors controlled by each adjusting disk, and means for operating said moving member in response to said track members.

19. In a railway system, a track having a plurality of members, cars running on said track, a device on said cars having a plurality of conductors, a plurality of adjusting disks, each of said disks controlling a different conductor, a moving member controlling independently the conductors controlled by each adjusting switch, means for making one conductor effective at a time, and means for operating said moving member in response to said track members.

20. In a railway system, a track having a

plurality of members, cars running on said track, a device on said cars having a plurality of conductors, a plurality of adjusting disks arranged adjacently, each of said disks controlling a different conductor and maintaining the continuity of the other conductors, a moving member controlling said conductors, and means for operating said moving member in response to said track members.

21. In a railway system, a track having a plurality of members, in parallel rows, cars running on said track, a device on said cars having a plurality of conductors and a plurality of groups of adjusting disks controlling said conductors, a movable member controlling the conductors for each group, and means for operating each movable member in response to the track members in a parallel row.

22. In a railway system, a track having a plurality of members in parallel rows, cars running on said track, a device on said cars having a plurality of conductors and a plurality of groups of adjusting disks controlling said conductors, means for selecting one conductor to be effective at a time, a movable member controlling the conductors for each group, and means for operating each movable member in response to the track members in one of said parallel rows.

23. In a railway system, a track having a plurality of members in parallel rows, cars running on said track, a device on said cars having a plurality of conductors and a plurality of groups of adjusting disks, said disks placed adjacently in said groups, each disk controlling a different conductor and maintaining the continuity of the other conductors, a movable member controlling the conductors for each group, and means for operating said movable member in response to the track members in one of said parallel rows.

24. In a railway system, a track having a plurality of members in parallel rows, cars running on said track, a device on said cars having a plurality of conductors and a plurality of groups of adjusting disks, each of said disks controlling a different conductor in said groups, means for selecting one conductor to be effective at a time, a movable member controlling the conductors for each group, and means for operating said movable member in response to the track members in one of said parallel rows.

25. In a railway system, a track having a plurality of members, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks and a movable member for each group controlling said conductors, the continuity of one of said conductors being established when said movable members correspond to the position of said adjusting disks, and means for operating said movable members by said track members.

26. In a railway system, a track having a plurality of members, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks and a movable member for each group controlling said conductors in series, and means for operating said movable members from said track members.

27. In a railway system, a track having a plurality of members, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks and a movable member for each group controlling said conductors, said movable member placed at the end of each group and operated by said track members.

28. In a railway system, a track having a plurality of members, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks and a movable member for each group controlling said conductors, means for continuing the character of said control in each group, and means for operating said movable members in response to said track members.

29. In a railway system, a track having a plurality of members, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks similarly arranged and a movable member for each group controlling said conductors, the continuity of one of said conductors being established when said movable members correspond to the position of the corresponding adjustable switch in each group, and means for operating said movable members by said track members.

30. In a railway system, a track having a plurality of members, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks and a movable member for each group controlling said conductors, said movable members operated independently by said track members.

31. In a railway system, a track having members placed in rows with particular characteristics, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks and a movable member for each group controlling said conductors, and means for operating the movable member for each group according to the characteristics of said track members.

32. In a railway system, a track having a plurality of members arranged in a row, cars running on said track, a device on said cars having a plurality of conductors, a plurality of adjusting disks and a movable

member controlling said conductors, and means for operating said movable member progressively in response to said track members.

33. In a railway system, a track having a plurality of members arranged in rows, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks and a movable member for each group controlling said conductors, and means for operating each movable member progressively in response to the track members in a particular row to establish the continuity of one of said conductors.

34. In a railway system, a track having a plurality of members placed in parallel rows, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks and a movable member for each group controlling said conductors, means for making one conductor in said device effective at a time, and means for operating said movable members in response to said track members.

35. In a railway system, a track having a plurality of members in rows, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks and a movable member for each group controlling said conductors, means for establishing the continuity of one of said conductors and means for changing to another conductor, said movable members being operated by said track members.

36. In a railway system, a track having a plurality of members in rows, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks, each disk controlling one of said conductors, movable members responding to said track members also controlling said conductors, and means for establishing the continuity of one of said conductors.

37. In a railway system, a track having a plurality of members in rows, cars running on said track, a device on said cars having a plurality of conductors, a plurality of groups of adjusting disks placed adjacently, each disk controlling one of said conductors, movable members responding to said track members also controlling said conductors, and means, after the continuity of one of the conductors controlled by one of said adjusting disks is establihed for arranging said device so that the conductor controlled by the adjoining disk will be established next.

38. In a railway system, a track, a plurality of fixed members in parallel rows and a responsive device placed at each location on said track, cars running on said track, a device on said cars having a plurality of conductors, a movable member operated a plurality of times by said fixed track members and controlling said conductors, and means for operating said track responsive device by said car device.

39. In a railway system, a track, a plurality of fixed members and a responsive device placed on said track, cars running on said track, a device on said cars having a plurality of conductors, adjusting disks and a movable member controlling said conductors, said movable member operated in response to said fixed track members, and means for operating said track responsive device by said car device.

40. In a railway system, a track, a plurality of fixed members and a responsive device placed on said track, cars running on said track, a device on said cars having a plurality of adjustable disks and a movable member operated by said fixed track members, and means for setting up the conditions in said car device for operating said track responsive device.

41. In a railway system, a track, a plurality of fixed members and a responsive device placed on said track, cars running on said track, a device on said cars having a plurality of adjustable disks and a movable member operated by said fixed track members, and means for operating said track responsive device when said movable member corresponds with the position of one of said adjustable disks.

42. In a railway system, a track, a plurality of fixed members on said track, said members spaced to have particular characteristics, a responsive device also placed on said track, cars running on said track, a device on said cars having a plurality of conductors, a moving member responding to the characteristics of said fixed track members and controlling said conductors, and means for operating said track responsive device by said car device.

43. In a railway system, a track, a plurality of fixed members in parallel rows and a responsive device placed at intervals on said track, cars running on said track, a device on said cars having a movable member responding to the rows of said fixed track members, and means for operating said track responsive device by said car device through one of said fixed members.

44. In a railway system, a track, a plurality of fixed members and a responsive device placed on said track, cars running on said track, a device on said cars having a plurality of adjusting disks in groups and a moving member for each group, said moving members responding to said fixed track members, and means for operating said track responsive device when said moving members correspond with the position of said adjusting disks in each group.

45. In a railway system, a track, a plu-

rality of fixed members in rows on said track having particular characteristics, a responsive device also placed on said track, cars running on said track, a device on said cars having a plurality of adjusting disks in groups and a moving member for each group, each of said moving members responding to the characteristics of said fixed track members in a particular row, and means for operating said track responsive device from said car device.

46. In a railway system, a track, a plurality of fixed members in spaced rows and a responsive device electrically operated placed on said track, cars running on said track, a device on said cars having a plurality of conductors, a movable member operated by the members of each row of said fixed track members and controlling said conductors, and means for establishing the circuit of said track responsive device by said car device.

47. In a railway system, a track, a plurality of fixed members and a responsive device electrically operated placed on said track, cars running on said track, a device on said cars having a plurality of conductors, adjusting disks and a movable member controlling said conductors, said movable member responding to said fixed track members, and means for establishing the circuit of said track responsive device by said car device.

48. In a railway system, a track having a plurality of switches and switch operating mechanisms and a plurality of members located near said switches, cars running on said track, a device on said cars coöperatively operated by said track members at each location and means for operating said switch mechanisms by said device.

49. In a railway system, a track having a plurality of switches and switch operating mechanisms, a plurality of members located near said switches, cars running on said track, a device on said cars having a plurality of adjusting disks and a movable member, said movable member operated by said track members, and means for operating said switch mechanisms when the position of said movable member corresponds with the position of said adjusting disks.

50. In a railway system, a track having a plurality of switch operating mechanisms, a plurality of members located near said switches, cars running on said track, a device on said cars having a plurality of adjusting disks in groups, a movable member for each group operated by said track members, and means for operating said switch mechanisms by said device.

51. In a railway system, a track having a plurality of switch operating mechanisms, a plurality of members located near said switches, cars running on said track, a device on said cars having a plurality of adjusting disks in groups and a movable member operated by said track members for each group, means for operating said mechanisms in response to one of said adjusting disks in each group and to said movable members.

52. In a railway system, a track having a plurality of switch operating mechanisms, a plurality of members located near said switches, cars running on said track, a device on said cars having a plurality of conductors, a plurality of adjusting disks in groups, each disk of a group controlling one of said conductors, a moving member for each group responding to said track members, and means for operating said switch mechanism when the continuity of one of said conductors is established.

53. In a railway system, a track having a plurality of switch operating mechanisms, a plurality of members located near said switches, cars running on said track, a device on said cars having a plurality of conductors, a plurality of adjusting disks in groups and a movable member for each group responding to said track members, said adjusting disks and movable members controlling said conductors in series, and said device controlling said switch operating mechanisms.

54. In a railway system, a plurality of tracks having a plurality of switch operating mechanisms, a plurality of members located near said switches, cars running on said tracks, a device on said cars having a plurality of conductors, a plurality of adjusting disks and a moving member controlling said conductors, said moving member operated by said track members, and each of said conductors controlling the operation of said switch mechanisms on a particular track.

55. In a railway system, a plurality of tracks having a plurality of switch operating mechanisms, a plurality of track members for said switch mechanisms, cars running on said track, a device on said cars having a plurality of adjusting disks in groups and a movable member for each group responding to said track members, and corresponding adjusting disks in each group controlling the operation of said switch mechanisms on a particular track.

56. In a railway system, a plurality of tracks having a plurality of switch operating mechanisms, a plurality of track members for said switch mechanisms, cars running on said track, a device on said cars having a plurality of conductors, a plurality of adjusting disks in groups each controlling one of said conductors in a group, a movable member for each group responding to said track members and controlling said conductors, and means for operating the

switch mechanisms on a particular track when the continuity of a particular conductor is established.

57. In a railway system, a plurality of tracks with connecting switches, mechanisms operating said switches, cars running on said track, a selector on said cars having a prearranged combination, a plurality of members at the same location on said tracks arranged to operate said selector in accordance with said combination, said selector operating said switch mechanisms.

58. In a railway system, a plurality of tracks with connecting switches, a mechanism operating said switches, cars running on said tracks, a selector on said cars having a combination to establish a circuit through itself, members on said tracks at the same location arranged to operate said selector in accordance with said combination, and said circuit operating said switch mechanism.

59. In a railway system, a plurality of tracks with connecting switches, mechanisms operating said switches, cars running on said tracks, a selector on said cars having a prearranged combination, a plurality of members on said track at the same location arranged to operate said selector, said selector operating said switch mechanisms only when it is operated in accordance with said prearranged combination.

60. In a railway system, a plurality of tracks with connecting switches, a mechanism for operating said switches, cars running on said tracks, a selector on said cars having a movable selective member, means on said tracks for operating said movable selective member and means for automatically restoring said selective member, said selector arranged to operate said switch mechanism.

61. In a railway system, a plurality of tracks with connecting switches and switch mechanisms, cars running on said tracks, a selector on said cars having a movable member, a row of devices on said tracks in spaced relation arranged to operate said movable member, said selector arranged to operate said switch mechanisms.

62. In a railway system, a plurality of tracks with connecting switches and switch mechanisms, cars running on said tracks, a selector on said cars having a plurality of movable members, means on said tracks for operating said movable members, and means for affecting the operation of said switch mechanisms by a correlated movement of said movable members.

63. In a railway system, a plurality of tracks with connecting switches and switch mechanisms, cars running on said tracks, a selector on said cars having a plurality of adjustable disks and a movable member, means on said tracks for operating said movable member, and means for operating said switch mechanisms on each track when said movable member corresponds with the position of the particular adjustable disk for that track.

64. In a railway system, a plurality of tracks with connecting switches and switch mechanisms, cars running on said tracks, a selector on said cars having a plurality of adjustable disks in groups and a movable member for each group, means on said tracks for operating said movable members, and means for operating said switch mechanisms when the position of said movable members corresponds with the position of said adjustable disks.

65. In a railway system, a plurality of tracks with connecting switches, cars running on said tracks, a selector on said cars having a plurality of adjustable disks and a movable member, means on said tracks for operating said movable member, means for operating said switches when said movable member corresponds with the position of one of said adjustable disks and means for changing the effective adjustable disk.

66. In a railway system, a plurality of tracks with connecting switches, each of said switches having particular characteristics, cars running on said tracks, a selector on said cars for operating said switches, and means on said tracks for operating said selector in accordance with the characteristic of each switch.

67. In a railway system, a plurality of tracks with connecting switches, cars running on said tracks, a selector on said cars for operating said switches, devices on the tracks for operating said selector, and members on said tracks coöperating with a member on said cars for operating said switches independently of said selector.

68. In a railway system, a plurality of tracks with connecting switches, cars running on said tracks, a selector on said cars operated from said tracks and arranged to operate said switches before said cars pass over them and means on said tracks operated by said cars for restoring said switches after said cars pass over them.

69. In a railway system, a plurality of tracks with connecting switches, cars running on said tracks, a selector on said cars having a plurality of combinations, a plurality of means on said tracks at the same location arranged to operate said selector, said selector operating said switches in accordance with said combinations, and means for automatically changing the effective combination of said selector.

70. In a railway system, a plurality of tracks with connecting switches, cars running on said tracks, a selector on said cars

having a plurality of combinations, a plurality of means on said tracks at the same location having particular characteristics for each switch, said means arranged to operate said selector and said selector arranged to operate said switches in accordance with said characteristics.

71. In a railway system, a plurality of tracks with connecting switches, cars running on said tracks, a selector on said cars operating said switches and having a plurality of combinations, one of said combinations being effective at one time, means for changing the effective combination of said selector by the operation of said switches as said cars pass from one track to another.

72. In a railway system, a plurality of tracks with connecting switches, cars running on said tracks, a selector on said cars operating said switches and having a plurality of combinations arranged in groups, one of said combinations being effective at a time, and means for changing from one effective combination to another effective combination by the operation of said connecting switch.

73. A railway system embodying a plurality of tracks with connecting switches, cars running on said tracks, a device on said cars having a plurality of adjustable members for each track for routing said cars over said switches, and a plurality of means on said tracks engaged before passing a switch for coöperatively operating said device.

74. A railway system embodying a main track with connecting tracks and switches, cars running on said tracks, a selector on said cars, means for automatically operating said selector, said switches normally set for said main track, and said selector selectively operating said switches when diverting a car from said main track to one of said connecting tracks.

75. A railway system embodying a main track with connecting tracks and switches, cars running on said tracks, a selector on said cars, means for automatically operating said selector, means for normally setting said switches for said main track and means for operating a particular switch by said selector when diverting a car to one of said connecting tracks.

76. In a railway system, a track with connecting tracks and switches, a mechanism for operating said switches, cars running on said tracks, a selector on said cars for momentarily establishing the conditions for operating said mechanism and means for maintaining said conditions until said operation is completed.

77. In a railway system, a track with connecting tracks and switches, a mechanism for operating said switches, a stick relay for maintaining the operating conditions for said mechanism, cars running on said tracks and a device on said cars for operating said relay.

78. In a railway system, a track having members in spaced relation, cars running on said track, a device on said cars having a plurality of cylindrical disks placed adjacently, a plurality of conductors, each of said disks controlling an independent conductor, and a movable member responsive to said track members and controlling said conductors.

79. In a railway system, a track having members in spaced relation, cars running on said track, a device on said cars having a plurality of longitudinal conductors, a plurality of disks interrupting said conductors transversely, and a movable member responsive to said track members and controlling said conductors.

80. In a railway system, a track having members in spaced relation, cars running on said track, a device on said cars having a plurality of conductors, a plurality of disks in groups interrupting said conductors transversely, a movable member for each group controlling said conductors, said movable members responsive to said track members.

81. In a railway system, a track having members in spaced relation, cars running on said track, a device on said cars having a plurality of conductors, a plurality of disks placed adjacently, each disk controlling one of said conductors and providing for the continuity of the other conductors, and a movable member responsive to said track members controlling said conductors.

82. In a railway system, a track having members in spaced relation, cars running on said track, a device on said cars having a plurality of longitudinal conductors, a plurality of disks placed adjacently interrupting said conductors, each disk controlling a different conductor, means for making one of said conductors effective at a time, and a movable member responsive to said track members controlling said conductors.

MATTHEW H. LOUGHRIDGE.

Witnesses:
T. E. LOUGHRIDGE,
FLOYD FARRANT.