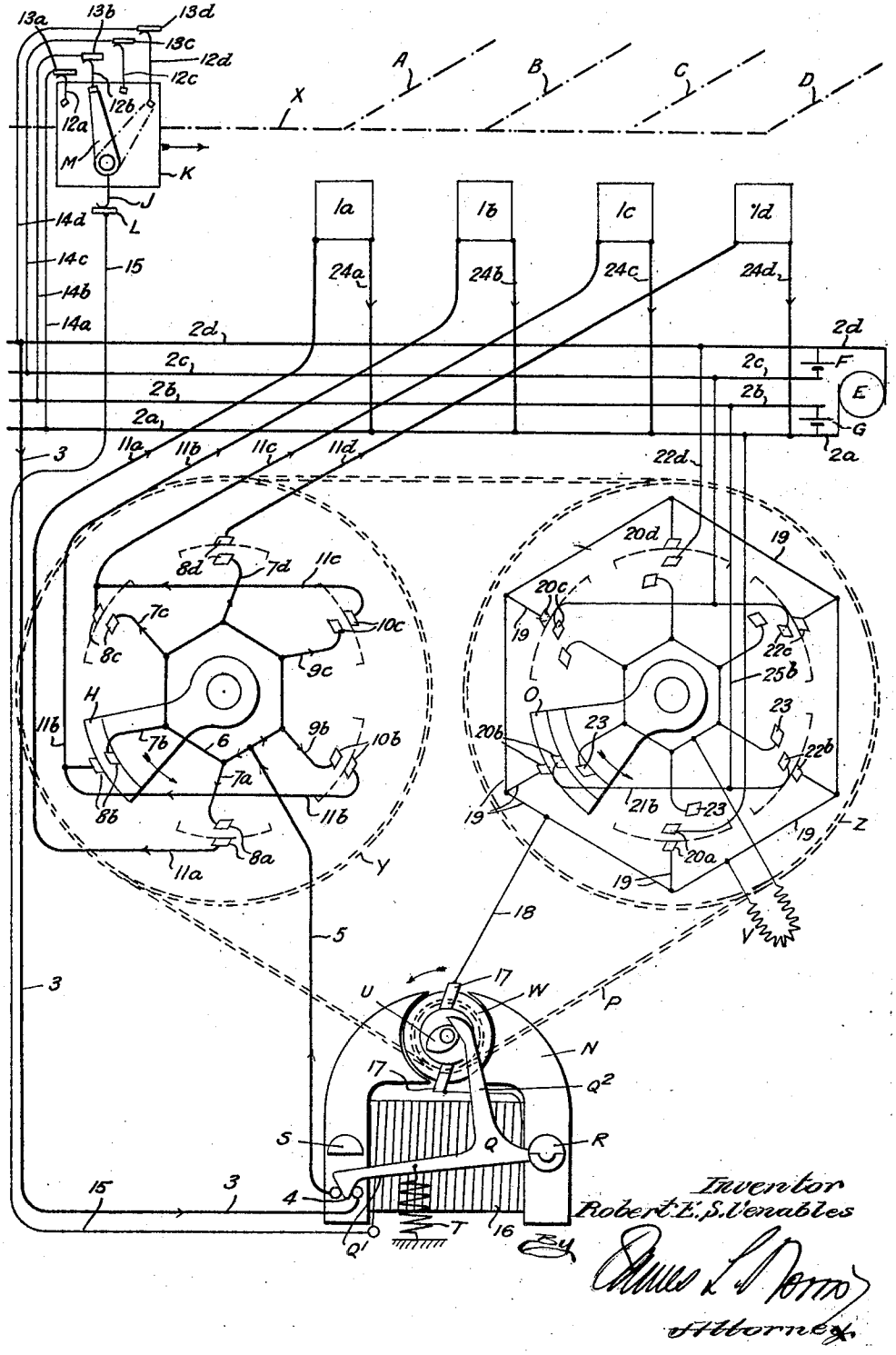
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AUTOMATIC DIRECTION OF TRAVELING BODIES

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AUTOMATIC DIRECTION OF TRAVELING BODIES.

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To all whom it may concern:

Be it known that I, ROBERT EDWARD STOPFORD VENABLES, a subject of the King of Great Britain, residing in London, England, have invented certain new and useful Improvements Relating to the Automatic Direction of Traveling Bodies, of which the following is a specification.

My invention relates to electrical methods of causing a body, which is traveling in a set path, to take one path of two or more possible paths at a junction of paths, and to do this as the automatic result of an action performed by hand before the body started on its automatic journey.

It has been proposed that the automatic transference of a parcel at a place in its path from one conveyer to another or to one of a number of fixed receptacles shall be determined automatically by an electric current flowing through one electric contact when this completes a circuit by touching another contact as the parcel approaches the place in question. Again, it has been proposed to determine the automatic setting of railroad switch points in a classification yard by an electric current flowing through one contact touching another. In some cases the electric contacts which touch are both in a compact self-contained piece of apparatus situated, for instance, in a switch cabin; in other cases one contact is traveling with the parcel or car, and the other is fixed in the path of the first.

My invention is not concerned with the nature of the traveling body, or with the way it is propelled or guided in its path, or with the automatic means for transferring it; such means are known.

My invention relates solely to a new and improved method of enabling a single electric contact which touches successively other contacts (conveniently termed "track contacts") to produce different results so that the same single contact can on one occasion cause one transfer action to occur by touching one track contact, and on another occasion cause a different transfer action to occur by touching the same or another track contact; and these different automatic actions occur in consequence of different actions performed by hand before the body starts on its automatic journey.

The method of my invention consists in associating with each transfer action a different one of a number of potential points on one or more electric circuits, in connecting the single contact on each occasion with that potential point which has thus been associated with the transfer action desired on that occasion, and in connecting with the same circuit a track contact which, before the action is required, is touched by the single contact.

The accompanying diagram will serve to illustrate one mode in which the invention can be applied in practice.

In the diagram, X is the path being followed by a traveling body (not known) and A, B, C, D are four paths which the body can take; it is transferred into path A if an electric operating circuit through a device 1^a is closed, into path B if an operating circuit through a device 1^b is closed, or into path C or D is a circuit through device 1^c or 1^d respectively is closed. The nature of these devices forms no part of this invention: for railroad cars they may be known switch points and motors; for parcels they may be the known apparatus depending on the type of conveyer used. 2^d and 2^a are electric mains from the terminals of a source of electric supply, for example dynamo E. The leads of operating circuits are shown by thick lines and the current through device 1^b, for example, passes from main 2^d by lead 3, switch 4, leads 5, 6 and 7^b, brushes 8^b joined by switch H, lead 11^b, device 1^b and lead 24^b to main 2^a.

Switch H can rotate counter-clockwise and when it is in a position at 60° from that shown, in the direction of rotation, it joins brushes 8^a and so closes the operating circuit of evice 1^a through leads 7^a, 11^a, device 1^a and lead 24^a; when it is in a position at 120° from that shown, in the direction of rotation it joins brushes 10^b and so closes the operating circuit through leads 9^b, 11^b, device 1^b and lead 24^b; at 180° from the position shown it joins brushes 10^c and so closes the operating circuit through leads 9^c and 11^c, device 1^c and lead 24^c; at 240° from the position shown it joins brushes 8^d and so closes the operating circuit through leads 7^d, 11^d, device 1^d and lead 24^d; at 300° from the position shown it joins brushes 8^c and so closes the operating circuit through 7^c, 11^c, device 1^c and lead 24^c.

It will be seen that the operating circuit through device 1^b is closed twice in the course of one revolution of the switch H, namely at the position shown, and that at

120° from this in counter-clockwise direction. Also that the operating circuit through device 1^c is similarly closed twice, first at the position 180° from that shown and again at 300° from that shown. The reason for these duplications will appear presently.

The object of the remaining apparatus is to determine the position of switch H and thereby the path into which the traveling body is transferred, by the connection with one of four different potential points in one electric supply circuit of a single electric contact associated with the traveling body. This contact J is carried on a switch-board K traveling with the body in the direction of the arrow and is shown touching a track contact L fixed in its path before the body arrives within the control of device 1^a. This contact L is associated with the four different transfer actions performed by the devices 1^a, 1^b, 1^c, 1^d. Of the four different potential points used, two are the generator terminals, and mains 2^b, 2^c may be maintained at intermediate potentials by batteries F and G. The potential differences between mains 2^a and 2^b, between mains 2^b and 2^c and between mains 2^c and 2^d are preferably equal.

When contacts J and L touch, the contacts 12^a, 12^b, 12^c, 12^d on the switch-board also touch contacts 13^a, 13^b, 13^c, 13^d respectively fixed in their paths, which are connected by leads 14^a, 14^b, 14^c and 14^d with mains 2^a, 2^b, 2^c, 2^d respectively. In the position shown, therefore, each of the contacts 12^a, 12^b, 12^c, 12^d is connected with a different one of the four potential points used; these are allotted thus: If the body is to enter path A, contact J is to be connected with main 2^a; similarly to paths B, C and D the mains 2^b, 2^c and 2^d respectively are allotted. The path which is to be entered is determined automatically as the result of setting by hand, before the body starts on its automatic journey, switch M to connect contact J with one of the four contacts 12^a, 12^b, 12^c, 12^d.

The current which flows through contact L is used to energize a relay and all the leads carrying energizing current are shown by thin lines to distinguish from those carrying operating current. The relay used is of the type in which the switch in the operating circuit closes only when current ceases in the energizing circuit. The drawing shows the position of rest which occurs when switch M has been initially set on contact 12^b, as shown, and contacts J and L have touched, and the current through them has died away. The arrangements and actions producing the result of this occurrence are as follows:—Track contact L is connected through lead 15, field winding 16 and brushes 17 of a motor N, and leads 18, 19 with one brush of each of six pairs of brushes 20^a, 20^b, 20^c, 20^d, 22^b, 22^c in the path of a rotary switch O adapted to join the brushes of one pair at a time. Switch O in the energizing circuit and switch H in the operating circuit are on parallel spindles which also carry pitch wheels Y and Z respectively, driven by a pitch chain P from electric motor N which has a pitch wheel W on the shaft of its armature. The direction of rotation of these several wheels is indicated by the arrows, and the rotation of the switch O is through 60° for each revolution of the motor N. In the position shown switch O joins brushes 20^b and therefore continues the connection of lead 18 through leads 19, 21^b, 25^b with main 2^b. Both ends of the energizing circuit being at the same potential, no current flows.

But, supposing that the preceding traveling body entered path D and that therefore switches H and O were left in their vertical positions, 120° behind those shown, the action would have been as follows: lead 15 being connected as above described with main 2^b and lead 18 being connected through lead 19 brushes 20^d, switch O and lead 22^a with main 2^a, energizing current flows through the winding of motor N; a bell crank Q pivoted at the pole-piece R turns clockwise under the attraction of the now energized pole-piece S, against the pull of spring T, and this (*i*) lifts from heart-shaped cam U on the armature spindle the arm Q^2 which normally holds the cam and therefore the armature and chain P at rest, (*ii*) lifts the arm Q^1 and thus opens switch 4 common to all the operating circuits; these two conditions prevail as long as energizing current flows. The armature is revolved by the energizing current and when switch O consequently leaves brushes 20^d and then joins brushes 20^c the potential difference becomes that between mains 2^b and 2^c instead of that between mains 2^b and 2^d; the armature turns through a second revolution, and energizing current ceases when switch O leaves brushes 20^c and joins brushes 20^b, and the armature is brought to rest by the pressure of arm Q^2 of bell crank Q on cam U due to spring T, no longer opposed by the magnet pull, and switch 4 closes the operating circuit.

Each of the four settings of switch M therefore connects contact J with the corresponding potential point when it touches contact L, and the motor, if necessary (that is to say if the second transfer action is not to be the same as the first), rotates switches H and O together until leads 15 and 18 in the energizing circuit are connected with the same potential point, so that for each potential point switch O has a position of rest and switch H completes the corresponding operating circuit.

The reason for having six instead of only

four positions of the switches H and O is as follows:—suppose brushes 22^b and 22^c omitted and brushes 20^a, 20^b, 20^c, 20^d equally spaced so that brush 20^d is touched next after brush 20^a, and suppose contact J connected through leads 12^c, 14^c with main 2^c and that switch O has been left joining brushes 20^b. Energizing current will flow from main 2^c to main 2^b, while switch O joins brushes 20^b, from main 2^c to main 2^a while brushes 20^a are joined, and from main 2^d to main 2^c while brushes 20^d are joined, before switch O comes to rest joining brushes 20^c. Therefore, in the course of one movement, energizing current through the motor N would be reversed, which is undesirable for reliable operation, and this reversal is avoided by duplicating symmetrically as shown all brushes except those for the highest and lowest of the potential used.

The object of the brushes 23 arranged to be touched by switch O is to prevent sparking as switch O leaves brushes such as 20^a, 22^b by the use of the non-inductive resistance V in the well-known manner.

It will now be understood how great is the utility of my invention when the path has to be selected from a large number. By merely adding to this moving body a second contact, such as J (but not touching the same track contacts), and a switch like M which can connect it with any of the contacts 12^a, 12^b, 12^c, 12^d, then from each path determined by contact J, one of four subsidiary paths can be determined by this second contact, or one out of a total of $4^2=16$ ultimate paths. Similarly, a third contact, using the same potential points and the same means of connection with one of them, gives the power of selecting one out of $4^3=64$ ultimate paths, and so on. It is to be understood that each junction of a path, such as A, with a subsidiary path is furnished with a device, such as 1^a, and that each such group of subsidiary paths has a track contact, such as L, through which a rotary relay, such as that shown, is energized, each subsidiary path having one such complete relay comprising a motor, a rotary switch in its energizing circuit, a rotary switch in the operating circuit, and a switch in the latter circuit opened by energizing circuit.

Having thus fully described and ascertained the nature of the said invention and the best means I know of carrying the same into practical effect, I claim:—

1. In a system of traveling bodies, wherein the transfer action to be performed on a body traveling in a set path is determined by an electric contact associated with said body touching another electric contact associated with the transfer action, a method of using the same contact associated with a body to cause different transfer actions on different occasions, which consists in associating with each such action one of a number of potential points in at least one electric supply circuit, and in connecting the said contact on each occasion with the potential point thus associated with the action that is then desired to be caused.

2. In a system of traveling bodies, wherein the transfer action to be performed on a body traveling in a set path is determined by an electric contact associated with the body touching another electric contact associated with the transfer action, a method of varying the transfer action to be performed which consists in associating with each of a number of transfer actions one of an equal number of potential points in at least one electric supply circuit, in connecting temporarily by hand with this potential point the contact associated with the body and in connecting automatically by permanent means with the same circuit any contact which the said contact associated with the body is to touch for the purpose of causing a transfer action.

3. In a system of traveling bodies, wherein one of a number of transfer actions to be performed on a body traveling in a set path is determined by an electric contact associated with the body touching another electric contact associated with the transfer actions, a method of varying the transfer action to be performed from that previously performed, which consists in associating with each of the transfer actions one of an equal number of potential points in an electric supply circuit, in connecting temporarily the contact associated with the body with the potential point associated with the transfer action to be performed upon the body, in connecting the contact associated with the transfer actions with the potential point associated with the transfer action last performed upon the body, and using the current which thereby flows to cause a variation in the transfer action to be next performed.

In testimony whereof I have signed my name to this specification.

ROBERT EDWARD STOPFORD VENABLES.