Feb. 3, 1942. H. A. WILCOX 2,271,727

CYCLIC CIRCUIT CONTROLLER

Filed July 12, 1940 2 Sheets-Sheet 1

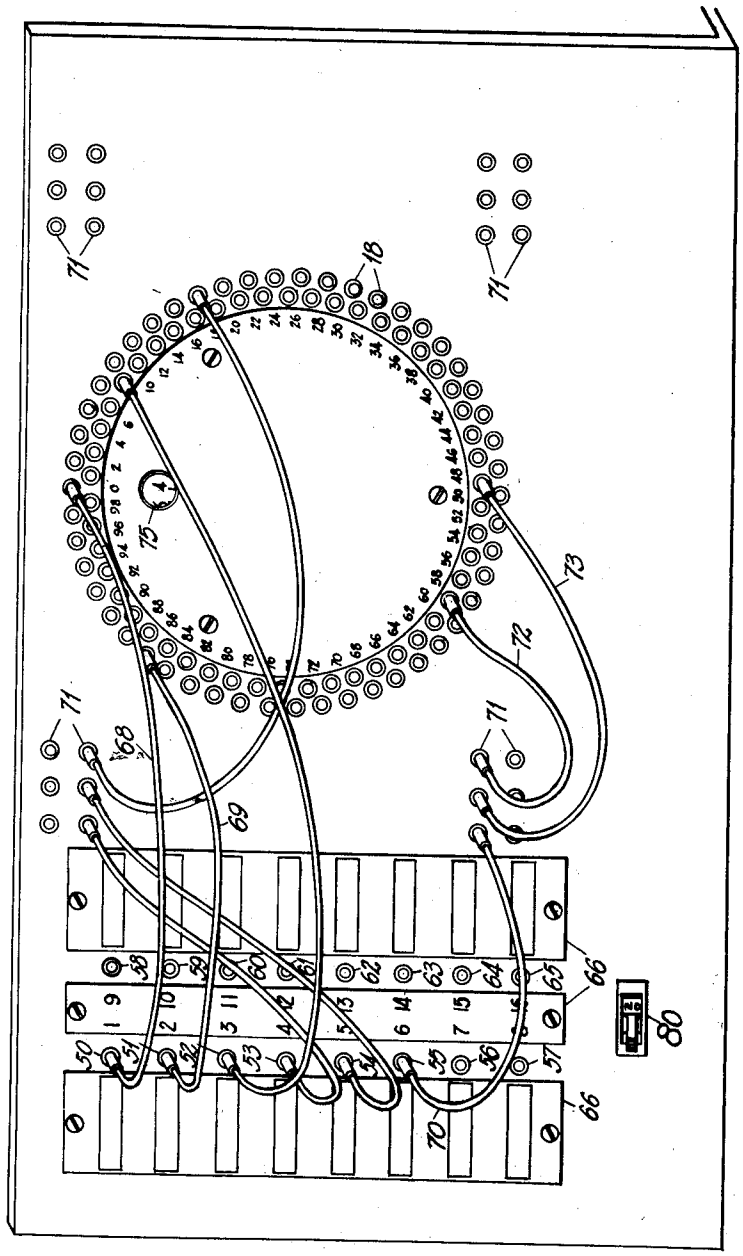


Fig. 1.

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CYCLIC CIRCUIT CONTROLLER

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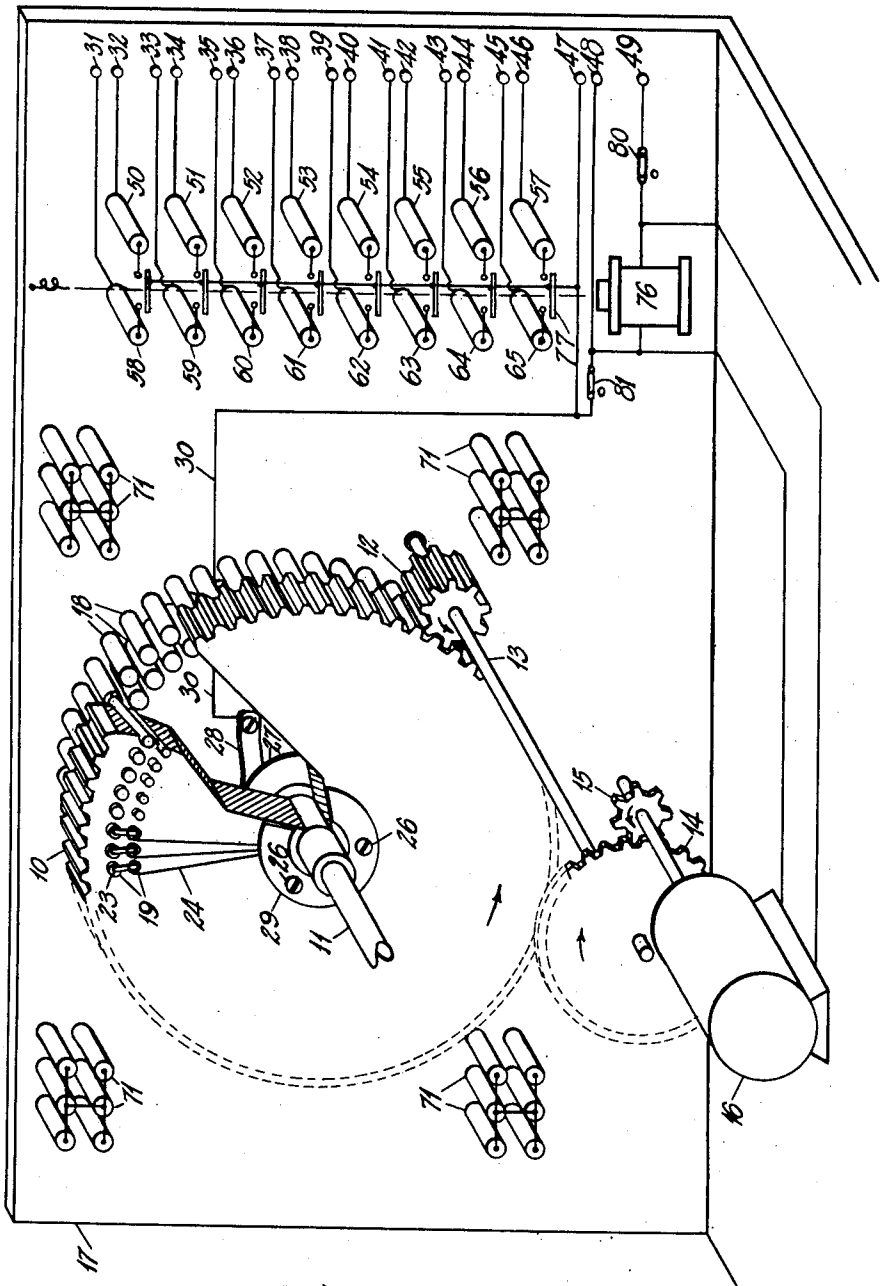


Fig. 2.

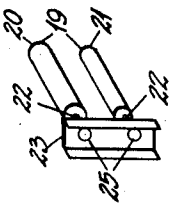


Fig. 3.

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UNITED STATES PATENT OFFICE

2,271,727

CYCLIC CIRCUIT CONTROLLER

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14 Claims. (Cl. 177—337)

This invention relates to an improved cyclic impulse distributor or circuit controller in the form of a cyclic rotary switching mechanism in which a plurality of contacts are engaged periodically and sequentially by a contact brush member or wiper by relative rotary movement between the contacts and the brush member.

A cyclic impulse distributor embodying the invention may be used in many different circumstances but is of especial value as a master controller in traffic control systems for a plurality of street intersections. A master controller of this type may distribute permissive impulses to local cyclic traffic signal controllers at the individual intersections for permitting each of the latter to initiate a right of way signalling cycle individually, in accordance with a prearranged plan, in response to traffic actuation, or may distribute resynchronizing impulses to several local cyclic controllers for maintaining them in some definite time relation with one another, or may function in other ways to be described.

In such traffic control system the control impulses to the several local intersection controllers are issued by the master controller for short periods at predetermined points in the time cycle of the master controller. The appearance of the go signal periods for traffic travelling along a highway at several cross streets, for example, is determined in synchronism or according to a progressive plan as preferred. In such systems it is desirable to have the relative time spacing of the impulses for the several local controllers adjustable individually at the master controller without the use of tools and without shutting off the controller.

Examples of systems illustrating the manner in which a cyclic impulse distributor may serve as a master controller providing periodic permissive impulses to local traffic actuated signal controllers are disclosed in Patent 2,110,723 issued March 8, 1938, to C. D. Geer and J. L. Biach, and Patent 2,122,411, issued July 5, 1938, to E. H. Eames. Another patent, 2,105,443, issued January 11, 1938, to A. P. B. Renshaw, discloses another form of such system and also discloses a system in which the master controller distributes recycling impulses to local cyclic controllers of the non-traffic actuated type.

According to the invention the impulse distributor comprises a set of contacts arranged in a circle and engaged periodically in succession by a contact brush comprising a group of parallel-connected contacts closely spaced arcuately, the contacts around the circle being provided with connection jacks, and additional terminal connection jacks being provided for the wires to the several intersection controllers, with cross connection leads for plugging into the jacks to connect any individual intersection controller to any particular part of the contact circle and corresponding master time cycle and to permit the individual connections to be changed readily without interfering with the others.

In a preferred embodiment of the invention the arcuately arranged contacts are flexibly mounted in a rotating insulated disc driven at constant speed through a system of gearing by a synchronous motor. These moving contact buttons as they will be termed are rotated with the disc to engage in succession the plurality of stationary contacts arranged in a circle and impart to each of the latter in turn an electrical connection from one pole of a power source to which all of the moving contacts in parallel are connected.

The stationary contacts which are preferably cylindrical in shape are mounted in one side of a panel and the ends of these contact buttons not adapted to be contacted by the moving contacts are fashioned into jacks on the opposite side of the panel for receiving plug-fitted leads by which connection to a number of receiver stations or local traffic signal controllers is established. By plugging the leads from terminal equipment in the several local controller or receiver stations into the jacks of desired stationary contacts around the circle an impulse may be dispatched cyclically to the receiver stations in accordance with a prearranged program.

To permit issuing of the impulse to two or more receiver stations at the same time, or the connection of one receiver station to more than one stationary contact for providing plural impulses to such station in one cycle of the brush contacts, or both, suitable repeating jacks and additional leads or jumpers are provided to facilitate such connection.

The invention also contemplates a novel arrangement of the moving contact buttons or brushes. These buttons are of cylindrical shape and are closely spaced in the rotating disc so that before one moving button is revolved off any particular stationary button the next moving button engages the stationary button to insure continuity of the impulse.

The number of moving contact buttons, or the percentage of a full circle occupied by the arc in which they are placed, together with the speed of the disc determines the duration of time the impulse is extended to each stationary contact.

To prevent catching and jamming of the moving contact buttons against the projecting ends of the stationary contacts as the disc rotates the moving buttons are inserted in the disc at an oblique angle so that only the trailing edge of the contacting surface or face of each moving button bears against the stationary contacts. To prevent undue wear on this rear edge of the

moving button, each moving button in addition to its inclination in the direction of rotation of the disc is also slightly inclined outward from the axis of the disc. As each moving button loosely fits the hole in the disc through which it is inserted, the oblique or biased position of the button permits it to be slowly and continuously rotated in its hole by frictional pressure as the disc revolves, thus distributing wear uniformly over the button. Contact pressure against the stationary buttons is maintained by spring wire conductor clips on the rear of the disc which are brought to bear against the moving buttons.

It is accordingly an object of the invention to provide an improved cyclic impulse generator or distributor in which a plurality of contacts arranged in a circle are engaged sequentially and periodically by one or more other contacts by relative rotary movement between the two sets of contacts.

It is another object to provide an improved cyclic impulse generator in which a plurality of contacts arranged in a circle are engaged sequentially and periodically by a plurality of contacts arranged arcuately with the latter contacts connected in parallel and sufficiently closely spaced to maintain continuous connection between some of the latter contacts and any particular one of the first mentioned contacts while the several said latter contacts engage such one particular contact sequentially.

Still another object is the provision of an improved cyclic controller for distributing impulses to a plurality of receiver stations in which the controller has a plurality of contacts arranged in a circle and connected to the several receiver stations and a constant-speed rotating disc in which one or more contacts are mounted arcuately for engagement with the circularly arranged contacts periodically as the disc revolves to transmit the impulses to the receiver stations.

It is a further object to provide in an impulse distributing arrangement of this general character a relay-operated means operable to connect continuously the impulse power to all the receiver stations upon failure of disc driving power and consequent stopping of the disc and interruption of the normal periodic impulse distribution.

Another object is to provide a rotating contact brush whose contacting element comprises a cylindrical-shaped contact button which is brought into sequential engagement with a plurality of arcuately arranged contacts by a holding means which supports the cylindrical contact button flexibly on its axis at an angle with the arcuately arranged contacts so that the cylindrical button shall by friction be rotated slowly on its own axis as the contact button engages the arcuate contacts sequentially during relative motion between the holding means and the arcuate contacts, to render the contacting face of the button free running in operation and substantially self-polishing and even-wearing for long periods of service.

Another object is the provision of an improved cyclic controller for distributing impulses to a plurality of receiver stations and providing a multiplicity of connection jacks for the respective receiver stations, spaced contacts and associated connection jacks, a plurality of leads provided with plug terminals for cross connecting the receiver stations to one or more of the spaced contacts as desired, and a contact brush arranged to engage the spaced contacts periodically in sequence.

An additional object is to provide an improved master controller for traffic signal control systems in which terminal connection jacks are afforded for connection of leads individually from several local intersection signal controllers, and a multiplicity of other connection jacks and associated contacts are arranged in a circle, with a contact brush member operated cyclically over the circle of contacts at a predetermined time rate and with a plurality of cross-connection leads having plug ends to connect the intersection controller terminals to selected points in the circle of contacts for transmission of control impulses to selected intersection controllers in selected parts of the time cycle.

A still further object provides that the impulse generator or distributor shall be comprised of relatively few parts and of simple construction so that it shall be substantially trouble-free in operation for relatively long periods and that a minimum replacement of parts from wear or failure shall be necessary.

Other objects will subsequently appear.

A preferred form of the invention will be described in connection with the accompanying sheets of drawings and in which:

Fig. 1 is a front view of the panel of the master controller or impulse generator, showing the jack-fronts of the stationary contacts and terminal jacks for each of the circuits to individual local controllers, jumpers for interconnecting them as desired, and four groups of repeating jacks.

Fig. 2 is a partly schematic view of the reverse side of the panel of the master controller or impulse generator showing the insulated disc with its inserted spring contact buttons and means for rotating the disc, part of the disc being cut away in this view to show the panel-mounted stationary contact buttons and other details, and the reverse side of the terminal jacks and the relay-operated multiple contact means associated therewith; and

Fig. 3 is an enlarged view of a pair of moving contact buttons removably insertable in the rotating disc and held in place therein by means of a spring wire contact clip.

Referring now to Fig. 2 a disc 10 of suitable insulating material is mounted on a shaft 11 which is suitably journalled in bearings (not shown). Around the periphery of disc 10 there are provided gear teeth which mesh with pinion 12 to provide a means of rotating the disc 10. The disc 10 is driven at constant speed through pinion 12 mounted on shaft 13 and the system of gears 14, 15 is driven by the motor 16 which is preferably of the self-starting synchronous type Other arrangements for driving the disc 10 at constant speed may be provided in lieu of the one shown, especially when it is desired to operate the disc at a number of different speeds in which case any of a number of well-known speed-change mechanisms may be employed.

Mounted in the panel 17, which is in a plane parallel to the plane of disc 10, and closely spaced from the disc are a plurality of stationary contact buttons 18. These buttons of which there may preferably be 100 are located 50 each in each of two concentric circles having diameters slightly less than the diameter of disc 10. The buttons in each row are uniformly spaced from one another and each of those in the inner row is located equidistant from the two nearest but-

tons in the outer row so that a radial constant speed contacting brush revolving about the shaft 11 will engage a contact in first one and then the other circle of contacts at evenly spaced intervals.

The brush arrangement comprises however a double row of spring contact buttons 19 inserted in the disc 10 each row being arranged to engage successively the buttons comprising one of the two circles of stationary contacts 18. The moveable spring contact buttons are removably inserted in holes in the disc 10, the radial angle of the disc occupied by the buttons determining for any predetermined disc speed the length of time a particular stationary contact button will be engaged by any of the moving contacts.

The arcuate spacing of the moving contacts is slightly less than that of the corresponding row of stationary contacts so that as the rear edge of one moving contact moves off a stationary contact the latter will be engaged by the rearward edge of the next moving button in order that the circuit to the stationary contact from the parallel-connected moving contact buttons will not be interrupted.

The diameter of each inner-row moving button is slightly less than the corresponding outer row button and they are so positioned that a line joining the trailing edges of corresponding moving buttons in the inner and outer rows passes through the axis of shaft 11 and provides that as the disc rotates at constant speed the first pair of moving contacts will engage successively stationary contacts in the inner and outer rows at equally-spaced intervals.

A preferred construction for each pair of moving contacts is disclosed in Fig. 3 showing two cylindrical contact buttons 20, 21 of different diameters, the larger button 20 being for the outer row in disc 10. Each cylindrical contact has at one end a spindle-shaped neck 22 which passes loosely through a hole in channel member 23 and is peened or riveted at 25 within the channel member 23. This entire contact assembly is removably inserted in a pair of holes in disc 10 and is forced into firm contact with the stationary buttons by means of a radial spring wire contact clip 24 which bears against the member 23.

If desired only a single row of contacts on the panel and disc may be utilized instead of the plurality of rows as illustrated in the drawings but the latter arrangement has the advantage of obtaining in effect closer spacing of the contacts in the circle.

To connect the moving contacts to the power source of desired polarity which is to comprise the transmitted impulse the inner ends of the radial spring clips 24 are clamped to the disc by washer-shaped member 29, which does not touch the shaft 11 but which is connected by the screws or rivets 26 to a corresponding member 27 on the opposite side of disc 10. A spring contact member 28, connected to one side of the power supply and mounted on the panel 17, bears against washer-shaped member 27 to supply power to the moving contact buttons 19 via member 29 and spring clips 24.

In order to prevent jamming or sticking of the moving contacts against stationary contacts the moving contacts 19 are inserted through disc 10 at an angle such that the contact end of each cylindrical button 19 is forward of the supporting spring end of the button in respect to the rotation of the disc. Accordingly the contact surface or face of each cylindrical button is inclined respecting the stationary button surfaces, so that each moving button is entirely out of contact with the stationary buttons at its leading edge and makes contact with the latter only at its trailing edge. As the disc moves in the predetermined direction of rotation indicated, therefore, it is impossible for a moving contact button 19 to jam or become stuck between stationary contacts 18 even if there is some variation in the distance the latter extend from panel 17.

In order further to obtain trouble-free operation of the contact buttons over long periods, the moving contact buttons 19 are each inclined outward from the axis of the disc very slightly when they are positioned in disc 10 in addition to their forward inclination. This bias is indicated in Fig. 2, and provides that the contacting face of each moving contact button makes contact on its inside trailing edge so that as the disc 10 rotates each moving contact button 19 revolves slowly about its own axis. The sliding of the moving contacts across the stationary contacts and the slight continual rotation of each moving contact together ensure against uneven wear of moving contacts, and against accumulation of dust or other foreign deposits at any particular spot on the contacts, and other difficulties which normally beset contact devices involving a contact brush rubbing against a series of contacts, when operated without maintenance over long periods.

The row of terminals 31—48 at the right of panel 17 in Fig. 2 are for connection of leads from each of the local intersection controllers (or other impulse receiver stations utilized) to the master controller. The impulse generator shown has provision for 16 independent leads for the transmission of impulses to controlled receiver stations although it will be appreciated that the generator can readily be constructed to accommodate a greater number of independent circuits if desired.

Each of the terminals 31—48 is connected to a corresponding jack 50—65 situated in panel 17. In Fig. 1 is shown the front view of the panel 17 and jacks 50—65 which are provided with etched identification plates 66.

Methods of connecting the impulse generator or distributor to a number of local receiver stations at each of a series of street intersections for cyclic transmission of control impulses to the latter at desired intervals will now be described. It will be assumed that the receiver stations are local traffic signal controllers which are dependent upon the impulse generator or master controller for permissive impulses which enable the local intersection controllers to initiate a cycle of operations during which right of way signals are accorded successively to each of the intersecting streets at the individual intersection, with right of way returned finally to the original street where the controller rests again until receipt of another control impulse for example.

Such a cyclic operation is preferably initiated upon receipt of the master impulse only if actuation of a traffic actuated device in one of the intersecting streets at the local intersection has occurred, but where the local signal controllers are not of the traffic-actuated type they may be initiated in their cycle automatically upon receipt of the master impulse, for example.

It will be understood that the present impulse generator may be utilized for control of receiver stations other than traffic signal controllers with the same or similar method of connection.

Jumpers 68—70 and 72—73 for example, consisting of an insulated wire fitted with a plug at both ends capable of insertion into the jacks permit the connection of each of local-intersection jacks 50—65 to the desired stationary contact button jacks 18. For example if it be desired that the impulse be transmitted to "intersection 1" commencing with the start of the master controller cycle jumper 68 will be plugged to the 0 or 100 per cent jack on the master controller, and if it be desired that the impulse be issued to "intersection 2" starting at the 86 per cent point in the cycle jumper 69 will be plugged to the 86 per cent jack, and so on.

As pointed out above the duration of the impulse depends on the speed of the disc 10 and the amount of angular portion of the disc covered by the moving contacts 19. For a particular setting of the speed of disc 10 and the total controller cycle time, the length of the impulse may be altered as desired by removing or inserting additional pairs of movable contacts 19 in holes provided in the disc 10, thus increasing the angular portion of the disc serving as a contact brush or wiper. If the moving contacts cover 30 degrees of the disc, for example, the impulse transmitted to intersections 1 and 2 will be one-sixth of the total time of one cycle of the disc 10. If a longer impulse is desired for transmission to intersection 6, for example than to intersections 1 and 2, jumper 70 will be plugged to one of the groups of repeating jacks 71, wherein all the jacks are connected together, and a pair of jumpers connected to desired cycle-percentage points on the master controller, care being taken that the jumpers 72, 73 be plugged sufficiently close together in the jacks 18 to be overlapped by the arc of moving contact buttons 19. Otherwise two separate impulses will of course be transmitted.

If it is desired that more than one intersection-jack be connected to the same cycle-percentage jack this may of course be achieved by intermediate connection to one of the groups of repeating jacks 71 as shown for intersections 4 and 5. It will also be appreciated that a plurality of local-intersection-jacks may be tied to a number of cycle-percentage jacks by the use of "starfish" or H-connection jumpers or other multiple jumpers.

In order that the position of the leading one of the brush contacts 19, can be at all times determined from the front of the controller, a small window 75 is provided in the panel, through which can be seen the numbers printed on the revolving disc to indicate at all times the stationary contact and jack being engaged by the leading moving contact pair.

Power to the motor is supplied from terminals through leads 48, 49 with the latter intercepted by a power control switch 80 operable from the front of the machine.

Whenever power to the master controller is interrupted either by failure of the power supply or by manipulation of switch 80, the relay 76, which is normally energized, becomes de-energized and by a multiple back-contact arrangement 77 connects power (of the polarity of the transmitted impulse) from terminal 47 to each local-intersection jack 50—65 and terminal 31—46. The polarity of the impulse transmitted by the master may be that of the grounded power lead 48, for example, with switch 81 closed as shown, or may be of the polarity of power lead 49 by connection thereto, with switch 81 open, with the proper return to the power supply through the individual local controllers, as required. With switch 81 closed as shown the outside return of the impulse circuits would be to power terminal 49. Accordingly if the local intersection controller is dependent upon receipt of a cyclic impulse from the master for operation at a predetermined point in its own local cycle, failure of power at the master controller will not interrupt operation of the local controller independently on continuous impulse power provided its local power supply is not interrupted.

Where a plurality of local intersection controllers are to be controlled by the master and the power supplying all the local controllers is not from the same source, it is desirable that in addition to the leads from terminals 31—46, a common lead be extended from the latter to the receiving device—as for example, a relay—in each local controller, in order that differences in polarity of the power supply at the master and at each local will not interfere with proper operation. The common lead from the master would be permanently connected from one lead of the power supply at the master to one side of the relay coil in each local and the circuit to operate each local relay would be completed from the local via a lead to one of terminals 31—46 at the master, which in turn are connected via contacts 18, 19 and brush 28 to the opposite power lead.

It will be appreciated that the master controller comprising the present invention may be used in a number of circumstances besides that of controlling local signal controllers through their respective cycles, as for example it might be used to control the signals at one or more intersections directly by controlling the operation of one or two relays at each intersection. In this case leads would extend from two of the local-intersection jacks for the control of the relays at each intersection and the impulse-on and impulse-off periods over each lead would determine the operating periods of the control relays and signals.

As aforementioned a simplified form of this master controller or impulse generator may be located at each intersection and arranged to control only the local controller thereat. By synchronizing the rotating brush contact elements of several such master controllers the several local controllers may be kept in step with one another without interconnecting wires other than the power wires. In cases where each synchronized master is arranged to control a number of locals, a system may be built up having an indefinitely large number of controlled local controllers.

The master controller may be used in fields other than traffic signal control wherever it is desired to issue over several circuits cyclic and periodic impulses of predetermined lengths.

It will be apparent from the foregoing description that applicant's invention is of utility in many circumstances and indeed in many not described above in detail with or without minor changes in construction or design. It will also be seen that the novel arrangement and construction of parts of the impulse generator will provide great flexibility in operation, permitting the easy setting and resetting at the master controller for dispatching control impulses of desired length at desired cyclic intervals to the plurality of subordinate controllers, and that reliability in trouble-free operation for long periods of time is achieved by the present design.

It is understood that various modifications may be made in the design or structural detail herein exemplified without departing from the spirit of the invention as defined in the appended claims.

I claim:

1. In an impulse distributor a plurality of contacts arranged in a circle, a constant speed rotating insulated disc mounted adjacent said contacts, said disc providing a series of more than two closely spaced holes arranged in an arc thereon, a second plurality of contacts inserted in a number of adjacent holes of said series and arranged to engage the first-named contacts and being sufficiently closely spaced so that before one of the disc contacts moves out of engagement with any particular one of the first-named contacts the next one of disc contacts will engage said particular contact for maintaining to such contact continuous connection while the several disc contacts engage such particular contact, whereby the number of disc contacts inserted determines the time length of such continuous connection.

2. In an impulse generating mechanism for distributing electrical impulses to a plurality of receivers, a plurality of stationary contacts mounted in a circle, a constant-speed rotating insulating disc adjacent said circle of contacts, a plurality of contacts arranged in an arc and inserted in said disc for sequential and periodic engagement with the stationary contacts, each said disc-mounted contact engaging a particular stationary contact before the preceding disc-mounted contact leaves said particular contact for insuring continuous connection to said particular contact during engagement by all said disc-mounted contacts for a time interval substantially proportional to the number of such disc-mounted contacts, means including spring connection means for continuously connecting the disc-mounted contacts to a source of electric potential, terminals for connection to such receivers, and selective connecting means for connecting each of said receiver terminals to desired stationary contacts for transmission of the connected electric potential to the receivers whenever said disc-mounted contacts engage stationary contacts to which the receiver terminals are connected.

3. In an impulse generating mechanism for distributing electrical impulses to a plurality of receivers, a plurality of stationary contacts mounted in a circle, a constant-speed rotating insulating disc adjacent said circle of contacts, a plurality of contacts arranged in an arc and inserted in said disc for sequential and periodic engagement with the stationary contacts, each said disc-mounted contact engaging a particular stationary contact, before the preceding disc-mounted contact leaves said particular contact for insuring continuous connection to said particular contact during engagement by all disc-mounted contacts, for a time interval substantially proportional to the number of such disc-mounted contacts, means including spring connection means for providing continuous connection of the disc-mounted contacts to an electric source, terminals for connections individually to such receivers, jack receptacles fitted to each stationary contact and plug connector means cooperable with said jacks for joining any of said receiver terminals to any stationary contact for connection of the receiver to said electric source periodically whenever said disc-mounted contacts engage such stationary contact to which the receiver is connected.

4. In an impulse generating mechanism for distributing electrical impulses to a plurality of receivers, a plurality of stationary contacts mounted in a circle, a rotatable insulated disc adjacent said circle of contacts, driving means for said disc including a motor operated from a power source, a plurality of contacts arranged in an arc and inserted in said disc for sequential and periodic engagement with the stationary contacts, means including spring connection means for establishing connection of the disc-mounted contacts to an electric potential, terminals for connection individually to such receivers, selective connecting means for joining each of said receiver terminals to desired stationary contacts for connection of the receivers to said electric potential periodically and sequentially whenever said disc-mounted contacts engage said desired stationary contacts, and relay-operated means for connecting all of said receiver terminals to said electric potential continuously upon failure of the power supply to the motor for driving said disc.

5. In an impulse generating mechanism for distributing electrical impulses to a plurality of receivers, a plurality of stationary contacts mounted in a circle, a constant-speed rotating insulating disc adjacent said circle of contacts, a plurality of contacts arranged in an arc and inserted in said disc for sequential and periodic engagement with the stationary contacts, driving means for the disc, means including spring connection means for establishing connection of the disc-mounted contacts to an electric potential, terminals for connection individually to such receivers, means for connecting said receiver terminals to said stationary contacts for connection of the receiver terminals to said electric potential periodically and sequentially whenever said disc-mounted contacts engage the so-connected stationary contacts, and means interposed between said stationary contacts and said receiver terminals and operative upon cessation of operation of the disc driving means to connect said receiver terminals to said electric potential continuously while said cessation persists.

6. In a rotary multi-position cyclic switch having a plurality of contacts arranged in a circle, a rotating insulating disc parallel to and adjacent said plurality of contacts and having an axis of rotation which passes through the center of the contact circle, a cylindrical-shaped contact for successively engaging each of said plurality of contacts as the disc revolves, said cylindrical contact being inserted through said disc at a slight angle from a perpendicular to the disc so that engagement of said contact with each of the plurality of contacts is made along an edge of said cylindrical contact.

7. In a rotary multi-position cyclic switch having a plurality of contacts arranged in a circle, a rotating insulating disc parallel to and adjacent said plurality of contacts and having an axis of rotation which passes through the center of the contact circle, a cylindrical-shaped contact button for engaging successively each of the contacts of said plurality as the disc revolves, said contact button inserted loosely through said disc at an angle with a perpendicular to the disc so that the contact button inclines through the disc both outwardly from the disc axis and forwardly in the direction of rotation of the disc and presents only an inner rearward edge of the button for

engagement with the contacts mounted in the circle, and means on the disc including a spring for maintaining the button in firm engagement with the said contacts.

8. In a rotary multi-position cyclic switch a plurality of spaced contacts arranged in a circle, a cylindrical contacting button for use as an electrical contact brush or wiper and arranged to be revolved into successive engagement with each of said plurality of contacts, means for so revolving said contact button, means for maintaining said contact button inclined slightly forward in the direction of rotation from a perpendicular to the plane of the circle of contacts to provide smooth operation of said contact button over the spaces between the contacts of said circle.

9. In a rotary multi-position cyclic switch having a plurality of contacts arranged in a circle, a rotating insulating disc parallel to and adjacent said circle of contacts and having an axis of rotation concentric with the center of the circle, a cylindrical shaped contact button mounted in the disc for successively engaging each of the contacts in the circle as the disc revolves, said contact button inserted loosely through the disc with the axis of the cylinder inclining through the disc both outwardly from the axis of the disc and forwardly in the direction of rotation of the disc, and means including a spring on the disc for maintaining said contact button in firm engagement with the contacts in said circle so that rotation of the disc and friction of the contact button in engagement with said contacts in the circle imparts rotation to the cylindrical contact button on its own axis for rendering the surface of its contacting face substantially self-polishing and even-wearing.

10. In a rotary multi-position cyclic switch having a plurality of contacts arranged in a circle, a cylindrical contacting button for use as an electrical contact brush or wiper and arranged to be revolved into successive engagement with each of said plurality of contacts, means for so revolving said contact button, means for maintaining said contact button inclined slightly in respect to the contacts of the circle with the contacting face of said button engaging said circle contacts only on one edge of said face to provide that as said contact button is revolved by said revolving means the button is rotated slowly on its own axis for rendering the edge of the contact face of said button substantially self-cleaning and even-wearing.

11. In a rotary multi-contact cyclic switch the combination of a panel, a plurality of contacts arranged in a circle on one face of said panel and provided with connection jacks corresponding to the several contacts and appearing on the opposite face of said panel, a contact brush member rotated at a predetermined rate to engage cyclically and sequentially with said contacts on the first mentioned side of said panel, a power connection to said brush member, a plurality of additional jack connection terminals arranged on the said opposite of said panel, and a plurality of cross connection leads provided with plug ends for selective connection of the contact jacks with the jack connection terminals.

12. In a rotary multi-contact cyclic switch including the combination of a panel, a plurality of contacts arranged in a circle on one face of said panel and provided with connection jacks corresponding to the several contacts and appearing on the opposite face of said panel, a contact brush member rotated at a predetermined rate to engage cyclically and sequentially with said contacts on the first mentioned side of said panel, a power connection to said brush member, a plurality of additional jack connection terminals arranged on the said opposite side of said panel, and a plurality of cross connection leads provided with plug ends for selective connection of the contact jacks with the jack connection terminals, an insulating disc for supporting said tact brush member and having an axis substantially perpendicular to said panel, and motor means for rotating said disc at such predetermined time rate.

13. In a master controller for distribution of control impulses to a plurality of secondary controllers in a traffic control system, a plurality of contacts and corresponding connection jacks arranged in a circle, a contact disc adapted to be rotated on its axis, a plurality of contact brush members arranged at close spacing thereon so as to engage said contacts in overlapping sequence as said disc rotates and having a power connection to provide such control impulses to the several contacts, driving means for said contact disc for rotating the same cyclically in a predetermined time cycle, terminal connection jacks for the several secondary controllers, and a plurality of cross connection leads provided with plug ends for selective connection from said terminal jacks to said contact jacks whereby the control impulses may be distributed to the several secondary controllers in predetermined time phase relation in desired parts of the time cycle.

14. In a master controller for distribution of control impulses to a plurality of secondary controllers in a traffic control system, a plurality of contacts and corresponding connection jacks arranged in a circle, a contact brush adapted to be rotated so as to engage said contacts sequentially and having a power connection to provide such control impulses to the several contacts, driving means for said contact brush for rotating the same cyclically in a predetermined time cycle, terminal connection jacks for the several secondary controllers, and a plurality of cross connection leads provided with plug ends for selective connection from said terminal jacks to said contact jacks whereby the control impulses may be distributed to the several secondary controllers in predetermined time phase relation in desired parts of the time cycle, a plurality of switches connected individually to the several terminal jacks and having a common switching member connected therewith only when said switches are closed and connected with the same source of power as said contact brush member, power supply connection for said driving means for rotating said brush member, and electro magnetic operating means for said several switches and connected to said driving power supply connection to maintain all of said switches normally open when said driving means is operated and to close said switches when said driving power ceases, whereby the control impulse power will be continuously connected to the several secondary controllers upon interruption of the cyclic impulse distribution.

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