

A. H. DYSON.
 AUTOMATIC SWITCH FOR TELEPHONE SYSTEMS.
 APPLICATION FILED MAY 5, 1911.

1,103,040.

Patented July 14, 1914.

2 SHEETS-SHEET 1.

Fig. 2.

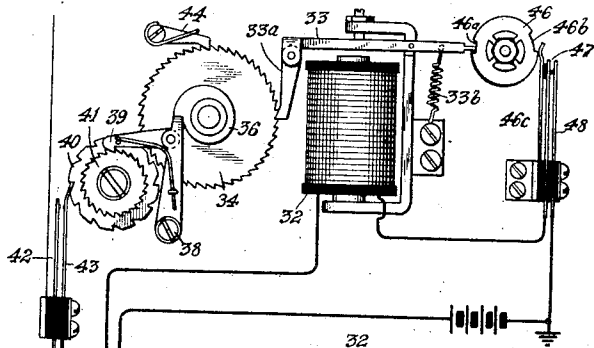
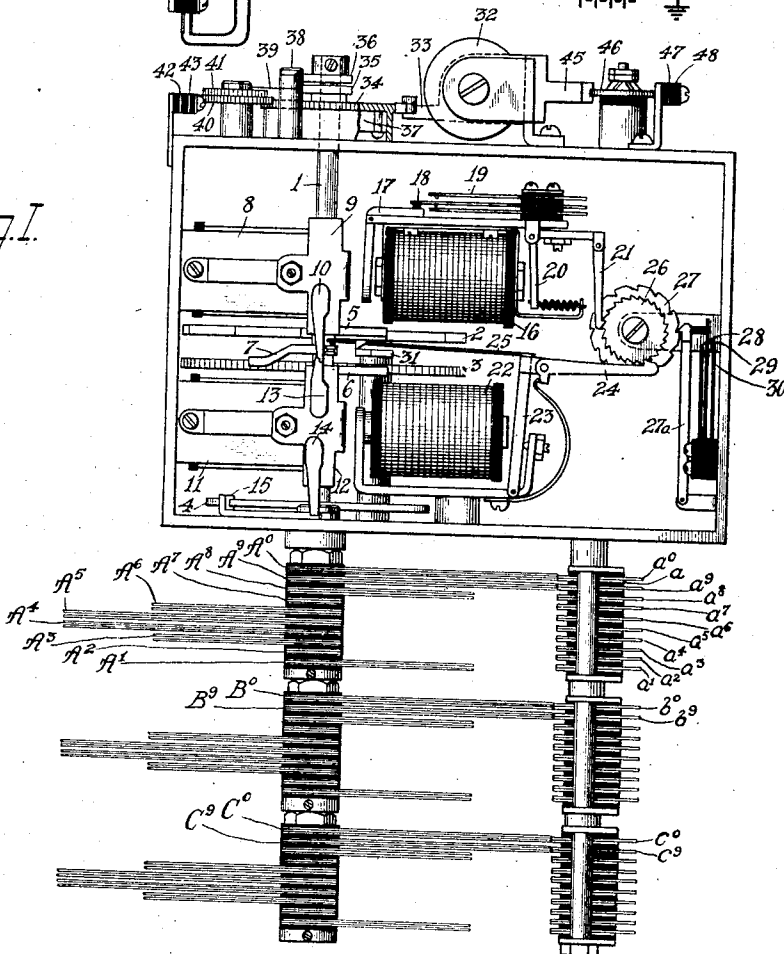


Fig. 1.



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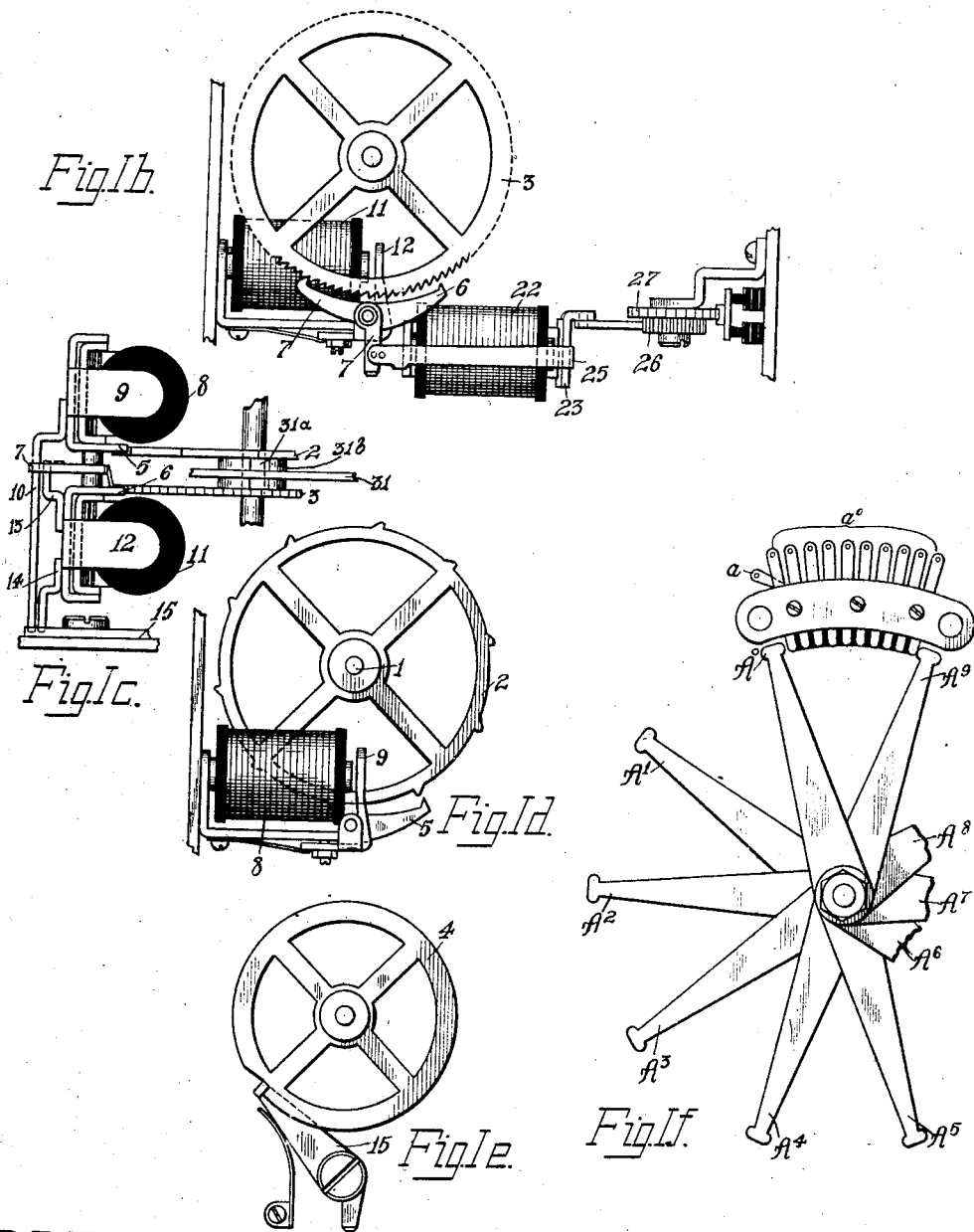
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UNITED STATES PATENT OFFICE.

ALFRED H. DYSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD & SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

AUTOMATIC SWITCH FOR TELEPHONE SYSTEMS.

1,103,040.

Specification of Letters Patent.

Patented July 14, 1914.

Original application filed July 20, 1905, Serial No. 270,492. Divided and this application filed May 5, 1911. Serial No. 625,280.

To all whom it may concern:

Be it known that I, ALFRED H. DYSON, a citizen of the United States, resident of Chicago, county of Cook, and State of Illinois, have invented new and useful Improvements in Automatic Switches for Telephone Systems, of which the following is a specification.

The present invention relates to automatic switches for telephone systems and particularly to that type of switch in which the bank contacts are divided into groups and in which coöperating wipers are first given a primary adjustment to select a group of contacts in the bank and thereafter given a secondary adjustment to select a contact in a group, an object being to provide a device of this sort which shall be certain and efficient in operation, readily adaptable to adjustment and comparatively simple in construction.

The present application is a division of my application, Serial Number 270,492, filed July 20, 1905, entitled "Telephone systems".

The invention herein claimed is for an automatic switch adapted for use with the circuits illustrated and described in the application above referred to, of which the present case is a division.

I have not illustrated herein a circuit arrangement for operation in connection with the automatic switch of the present application, but reference may be had to the above identified application, for such a circuit arrangement as is adapted for use with the switch of the present application.

The many features and advantages of the automatic switch herein described will be better understood upon reference to the following detailed description taken in connection with the accompanying drawings.

Referring to the drawings, Figure 1 is a side elevation of the automatic switch of my invention. Fig. 1^a is a plan view of the power storing mechanism mounted upon the top of the frame of the switch. Fig. 1^b illustrates more in detail the secondary magnet and release magnet together with their co-operating mechanism. Fig. 1^c is an end view of the primary and secondary magnets 11 and 8 respectively together with their co-operating escapement wheels. Fig. 1^d illustrates the primary magnet 8 and its coöper-

ating escapement wheel. Fig. 1^e is a view of the mechanism which normally locks the wiper shaft against rotation. Fig. 1^f shows the radial disposal of the wipers upon the wiper shaft together with one of the groups of bank contacts.

Referring first to Fig. 1, the switch there shown is adapted to be operated by means of escapement movements; shaft 1, when the switch is in its idle or normal position, having a tendency to revolve, due to its being attached to motor-spring 37. Upon the lower portion of shaft 1 are rigidly mounted thirty wipers in sets of three, A⁰, A¹, A², etc.; B⁰, B¹, etc.; C⁰, C¹, etc.; those having the same coefficient constituting a set. These wipers are insulated from each other and are disposed radially by sets, with respect to the shaft. Adapted to be engaged by these wipers are thirty sets of curved rows, of immovable contacts, of which a sectional view is shown in Fig. 1, each row being provided with a common strip extending beneath and parallel to it. The said contacts are mounted in three banks in horizontally curved rows.

A top view of the wipers and contact banks is shown in Fig. 1^f, *a* being the common terminal. When shaft 1 is caused to rotate from left to right, wiper A⁰ passes over the horizontal curved row of contacts *a*⁰. When the said wiper has revolved a distance such that it assumes the position of wiper A¹, as shown in Fig. 1^f, wiper A¹ is in a position, with respect to the vertical edge of the contact bank, similar to that of wiper A⁰ shown in the illustration. The shaft continuing to revolve, wiper A¹ passes over the lowest curved row of contact points *a*¹. When the said wiper has passed over the last of said contact points, the shaft continuing to revolve, wiper A² engages the first contact at the left of row *a*²; and when the said wiper has left the row, wiper A² begins passing over the contacts of its appropriate row. It will be seen that one complete revolution of the shaft 1 will cause each immovable contact of a bank to be wiped by its appropriate wiper. Wipers B⁰, B¹, etc., C⁰, C¹, etc., operate coincidentally with wipers A⁰, A¹, etc., with respect to their appropriate contact banks.

In accordance with my invention, in oper-

ating the switch, a number of primary rotary movements of the shaft are allowed, depending upon the level of immovable contracts with which it is desired to connect. Each of these first movements is sufficient to move a set of wipers entirely across its respective rows of contracts. When the desired set of wipers is, in this manner, brought, with respect to its contact banks, to a position corresponding to that of wiper A^o, as shown in Fig. 1^a, a number of secondary rotary movements of the shaft in the same direction are allowed, to move the said desired set of wipers from contact to contact of its rows, each movement causing the wipers to close contact between successive contacts and their commons, the movement of the wipers being arrested when the proper contacts are engaged by them.

To secure the return of the switch to normal, the shaft is allowed to complete the revolution upon which it has been started, its movement being arrested as soon as the revolution is completed. Upon such completion, apparatus is automatically brought into play to cause spring 37 to be wound up, preparatory for a further use of the switch. It will be noted that each time the switch is operated and returned to normal, each contact in the different banks is wiped by its appropriate wiper, and this is believed to be a new and valuable feature of a switch of this character, inasmuch as the accumulation of dust upon contacts and wipers is prevented and they themselves kept, at all times, bright and clean.

The movements of the shaft are controlled in the following manner, reference being had to Fig. 1: One or more impulses of current are first caused to flow through primary magnet 8, depending upon the contact levels to be selected. Each impulse of current causes the attraction and release of armature 9. Mounted upon shaft 1 is a disk 4, having a single tooth in its periphery which, as shown in the illustration, is engaged by detent 15, preventing movement of the shaft. Arm 10 mounted upon armature 9 (the end of which is illustrated as broken) extends downward so as to overlap arm 14 mounted upon armature 12, its lower end being on a level with the lower end of arm 14, this being shown complete in Fig. 1^c. The first attraction of armature 9 causes arm 10 to press against the projection shown upon detent 15, causing the said detent to move out of engagement with the tooth upon disk 4, so that the detent no longer restrains movement of shaft 1. Mounted upon armature 9 is detent 5 which, upon the attraction of the armature, presses against the circumference of circular ratchet wheel 2 rigidly attached to shaft 1, arresting movement of the shaft when it has rotated the distance from one tooth of ratchet wheel 2 to the

next by engaging said next tooth. Successive attractions and releases of armature 9 permit movements as described, and the extent of these movements is so gaged as to bring successive sets of wipers to positions in front of, but not engaging, the first contacts of their respective levels.

Fig. 1^d is a top view of ratchet wheel 2, detent 5 being shown in the normal position. 3 is a second ratchet wheel rigidly attached to shaft 1, its teeth being so spaced that successive movements, as determined thereby, allow movements of the wipers from contact to contact only. Normally engaging the said ratchet wheel 3, is detent 7, having upon it a projection adapted to be engaged by arm 10 upon armature 9 with each attraction of the said armature, and moved out of engagement with ratchet wheel 3 and so held as long as the armature is attracted. With each release of armature 9, detent 7 engages a tooth of wheel 3 and arrests rotation of the shaft. The rows having been selected in the manner described, one or more impulses of current are now caused to flow through secondary magnet 11, depending upon the proper contacts in the rows. Each impulse causes the attraction and release of armature 12 which controls detent 6 in a manner generally similar to that in which detent 5 is controlled by magnet 8, the shaft being permitted to rotate one step for each impulse. Detent 7, with each energization of magnet 11, is caused to release ratchet wheel 3 by the operation of arm 13; and upon the de-energization of the magnet, again engages the wheel, preventing movement of shaft 1. Fig. 1^e is another view of the arrangement of these parts. Upon armature 12 of magnet 11, is shown arm 14, adapted to cause the retraction of detent 15, should the detent be in its normal position at the time magnet 11 is energized. This is necessary to enable wipers A^o, B^o and C^o to be controlled by magnet 11 in a from-contact-to-contact movement, inasmuch as a complete revolution of the shaft is required to bring the said wipers into positions where they may be controlled by magnet 11. In other words, ten impulses of current are sent through magnet 8 to bring the zero wipers into operative position, thus constituting a complete revolution and causing engagement of disk 4 by detent 15.

Referring now to Fig. 1, when magnet 16 is energized, pawl 21, pivotally associated with its armature 20, moves downward, engaging the next tooth of ratchet wheel 26. When the magnet is deenergized, armature 20 is retracted and pawl 21 moves in a vertical direction, causing ratchet wheel 26 to revolve one step from left to right. The said ratchet wheel is rigidly attached to ratchet wheel 27, moving the latter with it, and the end of lever 27^a is moved out of engagement

with the tooth of ratchet wheel 27, previously engaged by it, and rests upon the periphery of the wheel. The said lever being mechanically connected to circuit changing spring 29 as shown, this movement causes the said spring to disengage spring 28 and to engage spring 30. Lever 27^a may be mechanically attached to, and cause simultaneous movements of, a plurality of circuit changing springs. When release magnet 22 is energized, its armature 23 is attracted. Pivotally associated with the said armature is pawl 24, engaging a tooth of ratchet wheel 26, the pawl upon the attraction of armature 23 moving toward the left, revolving ratchet wheel 26 one step and thereby moving ratchet wheel 27 into such a position that lever 27^a again engages with its end a tooth of ratchet wheel 27, adjacent to that from engagement with which it was moved by the above described operation of pawl 21. This operates to move the circuit changing spring 29 out of engagement with spring 30 and again into engagement with spring 28, its normal position. The attraction of armature 23 also moved arm 25 toward the left in such manner that an orifice toward its projecting end is caused to slip over and engage the pin shown in the illustration upon detent 7. In Fig. 1^b, a top view of these parts is shown. When release magnet 22 is deenergized, arm 25 is moved toward the right by the return of armature 23, and reference to Fig. 1^b makes clear the manner in which this movement of arm 25 moves detent 7 out of engagement with ratchet wheel 3. The disengagement of detent 7 in the manner described operates to restore the wipers to normal by allowing a free rotation of the shaft, until detent 15 engages the single tooth of disk 4.

Referring to Fig. 1, 31 illustrates (viewing it from in front) an arm of considerable length, extending from the rear of the switch and engaging, with one edge a disk fastened to shaft 1 at all times. When the shaft is in its normal position, as shown in Fig. 1, the edge of arm 31 engages a depression or flattened portion 31^a in the periphery of disk 31^b, as shown in Fig. 1^a, and, in this position the arm 31 engaging the projection shown upon arm 25, holds the said arm above the pin on detent 7. With the first rotary movement of the shaft, the edge of arm 31 disengages the depression mentioned, and rests upon the periphery of the shaft; its end, under these circumstances, being moved to the right so that it no longer supports arm 25 in the position shown in Fig. 1. It is retained thus retracted until the shaft has completed one revolution. When this occurs, its edge again engages the depression in shaft 1 before mentioned; its end moves forward and lifts arm 25 out of engagement with detent 7 in which it was

placed to release the switch, so that the said detent again engages ratchet wheel 3. This, it will be noted, occurs at the termination of the release operation before described and simultaneously with the engagement of detent 15 with disk 4, detent 7 being thereby returned to normal and ready to perform its usual function upon the next operation of the switch.

The means by which spring 37 is wound up after the return of the wipers to normal will now be described. The details of the mechanism used for this purpose are shown in detail in Fig. 1^a. Attached to the upper portion of shaft 1, is a cam 36 having an off-set, as shown in Fig. 1^a, normally engaged by pawl 38. As the shaft is revolved, cam 36 gradually moves pawl 38 to the left; and when the shaft approaches the completion of its revolution, pawl 39, attached to and moving with pawl 38, engages a tooth of ratchet wheel 41 adjacent to that previously engaged by it. As soon as the revolution of the shaft is completed, pawl 38 engages the off-set in cam 36, its free end moving toward the center of the shaft and retracting pawl 39 to move ratchet 41 one step from left to right. Ratchet 40 is rigidly attached to ratchet 41 and moves with the latter, the end of spring 43 (see Fig. 1^a) being moved out of its engagement with a tooth of ratchet 40, which is its normal position, in such a manner that it rests upon the periphery of the said ratchet. Spring 43 is thereby caused to engage spring 42, and this closes circuit through winding magnet 32. The said magnet is arranged in a vibratory circuit, a novel form of circuit breaker being provided consisting of disk 46 (see Fig. 1^a) and its associated parts. This circuit breaker is designed to secure a full stroke of the armature of magnet 32 before the magnet's circuit is broken, and operates in the following manner: The energizing circuit of magnet 32 passes through contact 47—48. Upon disk 46 is provided a depression 46^a engaged by one end of armature 33, and a second depression 46^b adapted to be engaged by lever 46^c. When armature 33 is attracted, its end, engaging depression 46^a, moves upward, and as the full stroke of the armature is completed, it impacts upon the upper edge of depression 46^a. This causes a slight rotary movement of disk 46 from left to right, and lever 46^c is thereby caused to move out of the position shown in the illustration into depression 46^b, breaking the circuit of magnet 32 by opening contact through springs 47 and 48. Magnet 32 is thereby deenergized, and its armature is retracted by spring 33^b to the position shown, the end of the armature engaging the lower edge of orifice 46^a and moving disk 46 a short distance from right to left so that lever 46^c again rests upon the periphery of the disk,

reestablishing contact between springs 47 and 48, and causing another energization of the magnet.

Each attraction and release of armature 5 33 of magnet 32 causes ratchet 34 to be revolved a step from left to right by means of pawl 33^a, the said ratchet moving independently of shaft 1, and the shaft remaining motionless under these conditions. One 10 end of spring 37 it attached to ratchet 34 and the movement of freely moving ratchet 34 is in the same direction as the movement of the shaft when the switch is operated. This movement of ratchet 34, therefore, operates to wind up the said spring. Mounted 15 upon ratchet 34 is cam 35 (Fig. 1), its shape being similar to that of cam 36, being provided with an off-set normally engaged by pawl 38. The described winding movement of ratchet 34 moving cam 35 with it, gradually moves pawl 38 to the left; and when 20 ratchet 34 approaches the completion of its revolution, pawl 38 causes pawl 39 to engage the next tooth of ratchet 41. When armature 33 has been vibrated a sufficient number of times to cause a complete revolution of ratchet 34, cam 35 will also have made a complete revolution and pawl 38 again engages its off-set. Pawl 39 then moves to 30 the right and effects a rotary movement of ratchet 41 one step from left to right. It will be noted that this is the second movement of ratchet 41 accomplished in the winding operation, and this second movement operates to bring ratchet 40 in such a position 35 that spring 43 moves from the periphery of the ratchet into engagement with the tooth next to that engaged by it before the winding operation commenced. This engagement causes spring 43 to disengage spring 42 and opens the circuit of magnet 32, preventing further operation of the said magnet. All operating parts of the switch have 40 now been returned to normal, and energy has been stored for operating the switch a second time.

Although I have worked out my invention in commercial form and illustrated and described it as such, I contemplate many 50 changes and modifications thereof, and I do not wish to be limited to the structure as shown and described, but aim to cover all such changes and modifications as come within the spirit and scope of the appended 55 claims.

I claim—

1. In an electrical switching mechanism, the combination with passive switching contacts arranged radially in rows, of movable 60 contact arms for making connection with said contacts, one for each row, means for suitably supporting said arms whereby they are adapted to be moved to wipe successively their respective rows, and apparatus for

moving said arms to wipe a portion of said 65 contacts to cause an arm to select a contact of its row.

2. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of movable contact 70 arms for making connection with said contacts, one for each row, means for suitably supporting said arms whereby they are adapted to be moved to wipe successively their respective rows, apparatus for moving 75 said arms to wipe a portion of said contacts to cause an arm to select a contact of its row, and apparatus for moving said arms to wipe the remainder of said contacts to return said arms to normal. 80

3. In an electrical switching mechanism, the combination with immovable switching contacts arranged in rows, of movable contact arms for making connection with said contacts, means for causing said arms to 85 wipe a portion of said rows to select a row, and apparatus for causing an arm to wipe along its row to select a contact.

4. In an electrical switching mechanism, the combination with immovable switching 90 contacts arranged in rows, of movable contact arms for making connection with said contacts, means for causing said arms to wipe a portion of said rows to select a row, apparatus for causing an arm to wipe along 95 its row to select a contact, and apparatus for causing said arms to wipe the remainder of said rows to return to normal.

5. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch 10 shaft, wipers controlled thereby, one for each row, means for suitably supporting said wipers whereby they are adapted to successively wipe their rows when the shaft is 10 rotated and apparatus for controlling rotation of said shaft to select a contact.

6. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch 11 shaft, wipers controlled thereby, one for each row, means for suitably supporting said wipers whereby they are adapted to successively wipe their rows when the shaft is rotated, apparatus for controlling rotation 11 tion of said shaft to select a contact, and apparatus for controlling rotation of said shaft to return it to normal.

7. In an electrical switching mechanism, the combination with passive switching contacts arranged radially in rows, of a rotatable switch shaft, movable contact arms spirally fastened to said shaft, one for each row, apparatus for controlling rotation of said shaft to bring to a selected row its 125 arm, and apparatus for controlling movement of said arm along the row to select a contact.

8. In an electrical switching mechanism, the combination with passive switching contacts arranged radially in rows, of a rotatable switch shaft, movable contact arms spirally fastened to said shaft, one for each row, apparatus for controlling rotation of said shaft to bring to a selected row its arm, apparatus for controlling movement of said arm along the row to select a contact, and apparatus for controlling rotation of said shaft to bring said arms to normal.

9. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch shaft, active contact arms attached thereto, one for each row, adapted to successively wipe their respective rows when the shaft is rotated, motor apparatus adapted to rotate said shaft and mechanism adapted to control the rotation of said shaft to cause an arm to select a contact.

10. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch shaft, active contact arms attached thereto, one for each row, adapted to successively wipe their respective rows when the shaft is rotated, motor apparatus adapted to rotate said shaft, mechanism adapted to control the rotation of said shaft to cause an arm to select a contact, and apparatus for controlling rotation of said shaft to normal.

11. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch shaft, active contact arms attached thereto, one for each row, adapted to successively wipe their respective rows when the shaft is rotated, motor apparatus adapted to rotate said shaft, mechanism for controlling the rotation of said shaft to select a row and mechanism for controlling the rotation of said shaft to cause an arm to select a contact of a selected row.

12. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch shaft, active contact arms attached thereto, one for each row, adapted to successively wipe their respective rows when the shaft is rotated, motor apparatus adapted to rotate said shaft, mechanism for controlling the rotation of said shaft to select a row, mechanism for controlling the rotation of said shaft to cause an arm to select a contact of a selected row, and apparatus for controlling rotation of said shaft to normal.

13. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch shaft, active contact arms attached thereto, one for each row, adapted to successively wipe their respective rows when the shaft is rotated, motor apparatus for rotating said

shaft, means for releasing said shaft to permit operation of said apparatus, and mechanism adapted to control and arrest the rotation of said shaft to cause an arm to select a contact.

14. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch shaft, active contact arms attached thereto, one for each row, adapted to successively wipe their respective rows when the shaft is rotated, motor apparatus for rotating said shaft, means for releasing said shaft to permit operation of said apparatus, mechanism adapted to control and arrest the rotation of said shaft to cause an arm to select a contact and apparatus adapted to release said shaft to allow it to complete a revolution to normal.

15. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch shaft, active contact arms attached thereto, one for each row, adapted to successively wipe their respective rows when the shaft is rotated, motor apparatus adapted to rotate said shaft, means for releasing said shaft to permit operation of said apparatus, mechanism for controlling the rotation of said shaft to select a row and mechanism for controlling and arresting the rotation of said shaft to select a contact of a selected row.

16. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch shaft, active contact arms attached thereto, one for each row, adapted to successively wipe their respective rows when the shaft is rotated, motor apparatus adapted to rotate said shaft, means for releasing said shaft to permit operation of said apparatus, mechanism for controlling the rotation of said shaft to select a row, mechanism for controlling and arresting the rotation of said shaft to select a contact of a selected row and apparatus adapted to release said shaft to allow it to complete a revolution to normal.

17. In an electrical switching mechanism, the combination with passive switching contacts, of a movable contact arm for making connection with said contacts, a motor spring for moving said arm when the mechanism is operated, electromagnets for controlling the movement of said arm and apparatus automatically brought into play by the operation of the mechanism to restore said spring.

18. In an electrical switching mechanism, the combination with passive switching contacts, of a movable contact arm for making connection with said contacts, motor mechanism storing energy for moving said arm when the switching mechanism is operated, apparatus for controlling movement of said

arm to select a contact, means for effecting the return of said arm to normal and apparatus automatically brought into play upon the return of said arm to normal for restoring energy to said motor mechanism.

19. In an electrical switching mechanism, the combination with immovable switching contacts, of a movable contact arm for making connection with said contacts, motor mechanism storing energy for moving said arm, apparatus for rendering said energy effective to move said arm when the switching mechanism is operated, mechanism for controlling such movement to select a contact, and apparatus actuated by the operation of the switching mechanism to restore said motor mechanism.

20. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch shaft, active contact arms attached thereto, one for each row, adapted to successively wipe their respective rows when the shaft is rotated, motor mechanism storing energy for moving said shaft when the switching mechanism is operated, apparatus adapted to control the rotation of said shaft to cause an arm to select a contact and apparatus adapted to be actuated by the operation of the switching mechanism to restore energy to said motor mechanism.

21. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch shaft, active contact arms attached thereto, one for each row, adapted to successively wipe their respective rows when the shaft is rotated, motor mechanism storing energy for rotating said shaft when the switching mechanism is operated, apparatus for controlling the movement of said shaft to select a row, apparatus for controlling the movement of the shaft to cause an arm to select a contact of a selected row, means for effecting rotation of the shaft to normal and apparatus actuated upon the return of the shaft to normal for restoring energy to said motor mechanism.

22. In an electrical switching mechanism, the combination with passive switching contacts arranged in rows, of a rotatable switch shaft, active contact arms attached thereto, one for each row, adapted to successively wipe their respective rows when the shaft is rotated, motor mechanism storing energy for rotating said shaft, means for releasing said shaft to permit operation of said motor mechanism, mechanism adapted to control and arrest rotation of said shaft to cause an arm to select a contact, apparatus adapted to release said shaft to allow it to complete a revolution to normal and apparatus actuated by the return of said shaft to normal for restoring energy to said motor mechanism.

23. A selector for automatic exchanges including multiple terminals arranged radially in rows, a series of adjustable terminals corresponding to said rows, means for adjusting said last-mentioned terminals to bring a desired one into operative relation with its row, and a magnet for controlling travel of said desired one along the row.

24. A selector for automatic exchanges comprising a plurality of groups of stationary contacts, a rotatable shaft having a plurality of spirally disposed adjustable contacts, one for each row of stationary contacts, means for rotating said shaft to bring a desired adjustable contact opposite or adjacent to its row, and apparatus for rotating the desired contact step by step along the row.

25. A selector for automatic exchanges comprising multiple terminals arranged in arc-shaped rows, a rotary shaft carrying adjustable contacts, one for each row, a magnet for causing travel of said shaft to bring a desired contact adjacent to its row, means for causing said desired contact to travel along its row, and a release magnet for restoring the switch to normal.

26. A selector for automatic exchanges comprising a series of groups of stationary contacts, a rotary shaft having a number of adjustable contacts, one for each group of stationary contacts, a magnet for rotating said shaft step by step to select a group, each step bringing a different adjustable contact into operative relation with its group of stationary contacts, and apparatus for thereafter causing an adjustable contact, brought into operative relation with its group, to select a desired stationary contact of said group.

27. An automatic switch for telephone systems comprising bank contacts arranged in groups, cooperating wipers, means for rotating said wipers to select a group and means for thereafter rotating said wipers to select a contact in a group.

28. A selector switch including groups of contacts, cooperating wipers one for each group, means for rotating said wipers to cause one of them to select a group, and means for thereafter rotating said wiper to connect with a contact in a selected group.

29. A selector switch comprising contacts and cooperating contact-makers, a rotatable shaft for operating said contact-makers, a pair of toothed wheels supported upon said shaft adapted for controlling the operation thereof, electromagnetic mechanisms for controlling said wheels, and a motor device also supported upon said shaft for operating said shaft to move said contact-maker according to the operation of said electromagnetic mechanisms.

30. A selector switch comprising a wiper operating shaft, primary and secondary

toothed wheels supported by said shaft and coöperating mechanisms, and a motor device also supported by said shaft for driving said shaft according to the selecting operation of said primary and secondary wheels and mechanisms.

31. A selector switch comprising contacts adapted to be grouped, movable contact-makers adapted for selecting said contacts, a pair of toothed wheels and coöperating electromagnetic mechanisms for controlling the selecting of a contact of any of said groups, and a motor device for moving said contact makers according to the operation of said electromagnetic mechanisms.

32. A selector switch comprising passive switching contacts, movable contact makers adapted for selecting said contacts, units and tens toothed wheels and coöperating electromagnetic mechanisms for controlling the selecting operation of said contact makers, and a motor device for moving said contact makers according to the operation of said electromagnetic mechanisms and wheels.

33. In an electrical switching mechanism, the combination with passive switching con-

tacts, of a movable contact arm for making connection with said contacts, a motor device for moving said arm when the mechanism is operated, electromagnets for controlling the movement of said arm, and apparatus automatically brought into play by the operation of the mechanism to restore said motor device.

34. A selector switch comprising groups of passive switching contacts, of a movable contact arm for making connections with said contacts, a motor device for moving said arm when the mechanism is operated to select any group and a contact therein, electromagnetic mechanisms for controlling the movement of said arm to effect such selection, and apparatus automatically brought into play by the operation of the mechanism to restore said motor device.

Signed by me at Chicago, county of Cook and State of Illinois, in the presence of two witnesses.

ALFRED H. DYSON.

Witnesses:

GEORGE E. MUELLER,
M. R. ROCHFORD.