No. 648,274. Patented Apr. 24, 1900.

C. A. LINDSTROM.

CONTROLLER SWITCH.

(Application filed Feb. 8, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

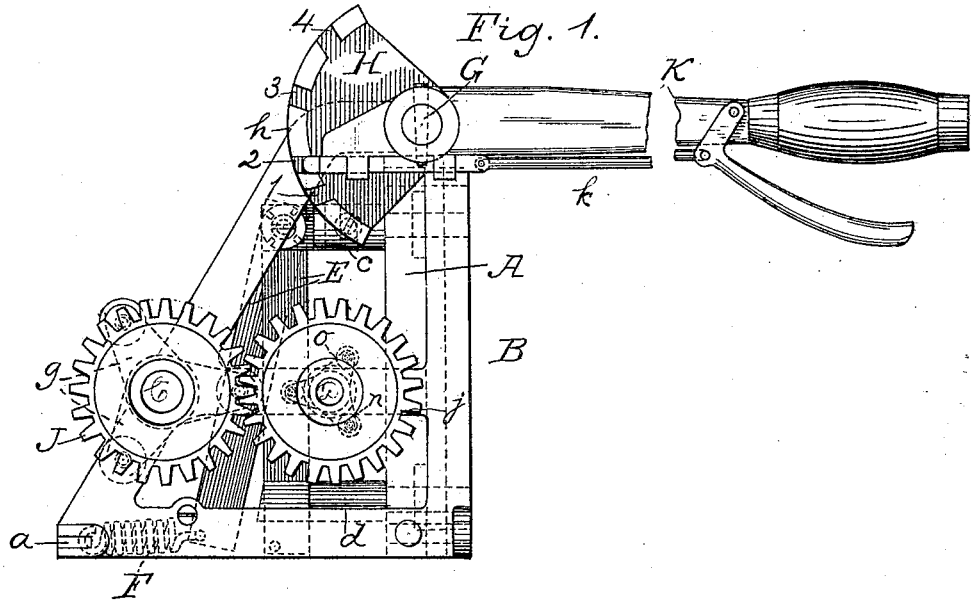

Fig. 2.

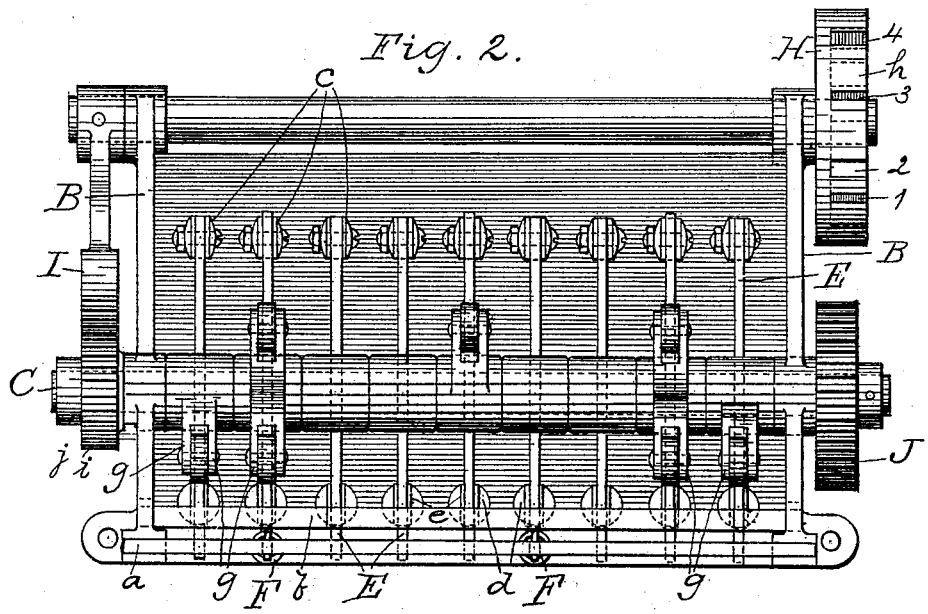

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Fig. 3.

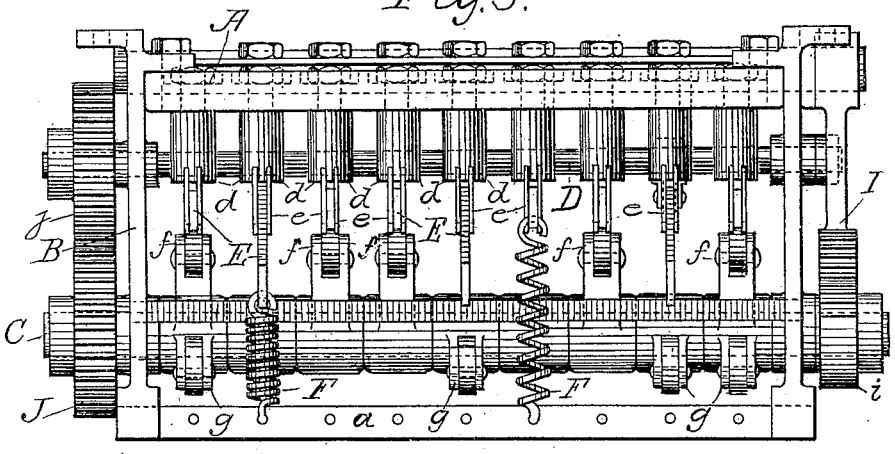


Fig. 4.

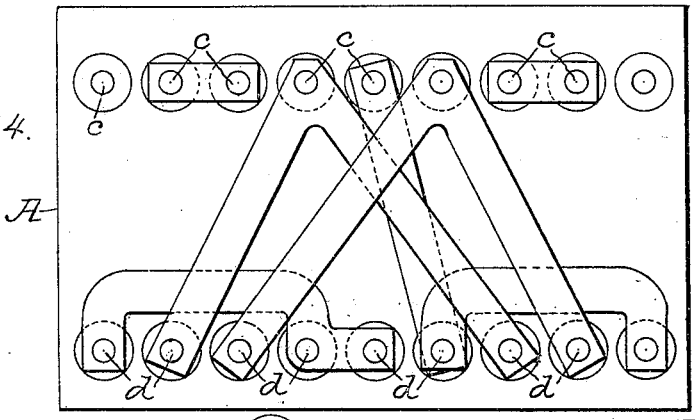


Fig. 5.

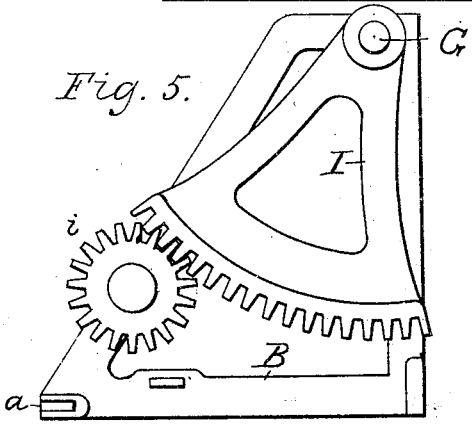
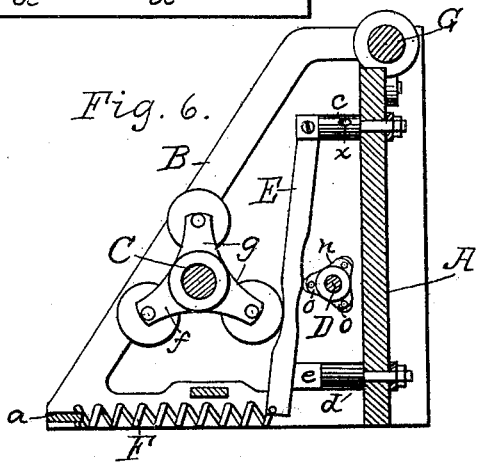


Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES A. LINDSTROM, OF CHICAGO, ILLINOIS, ASSIGNOR OF TWO-THIRDS TO JOHN HEWITT AND THOMAS C. HEWITT, OF SAME PLACE.

CONTROLLER-SWITCH.

SPECIFICATION forming part of Letters Patent No. 648,274, dated April 24, 1900.

Application filed February 8, 1900. Serial No. 4,489. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. LINDSTROM, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Controller-Switches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates more particularly to switches for controlling the electromotive force of electrically-operated automobiles; and its object is to insure the simultaneous movement of the blades of the several switches employed to switch the current to obtain the first, second, and third speeds of the vehicle in connection with which the instrument is used. This I accomplish by simple and economical means which take up less space and are of less weight than switches of a like character heretofore in use, substantially as hereinafter fully described, and as particularly pointed out in the claims.

In the drawings, Figure 1 is an end elevation of my invention. Fig. 2 is a front elevation of the same. Fig. 3 is a plan view of the same looking at it from underneath. Fig. 4 is a rear elevation of the switchboard used in connection with my invention. Fig. 5 is an elevation of the end thereof opposite that shown in Fig. 1. Fig. 6 is a transverse vertical section taken on dotted line 6 6, Fig. 2.

In the drawings the rectangular wooden switchboard A of my invention has its ends connected to the rear portions of corresponding trapezoidal-shaped open end frames B B in any suitable manner, and said end frames are provided with suitable lugs for securing the controller to its support. The rigidity of these end frames is further secured by three shafts C, D, and G, that have their bearings therein, and by bars *a* and *b*, of compressed wood fiber or other suitable material. The former, *a*, of these bars has its ends removably seated in slots in the lower forward angles of said frames and the latter, *b*, has its ends secured in suitable openings in the lower horizontal stretch thereof back of and slightly above the plane of bar *a*.

Projecting forward from the front of the switchboard A, near its upper edge, is a series of nine horizontally-arranged positive posts *c c c*, the rear reduced portion of each of which extends through said board and is provided with suitable electrical connections, as will hereinafter be more fully described. Pivoted in a longitudinal slit in the forward end of each of these posts is a vertically-disposed steel blade.

Projecting forward from board A, near its lower edge, is a horizontally-arranged series of nine negative posts *d d*, that are located an equal distance apart and in such position that each will be in vertical alinement with some one of the positive posts *c*. The rear reduced and threaded portions of these negative posts *d* also extend through the switch-board and are suitably electrically connected.

Secured in and extending forward from the forward ends of the negative posts *d* are two parallel plates *e*, of elastic steel, which are separated a distance sufficient to permit the blades E to be forced between them when brought into a vertical position. The length of the blades E is such that when forced between plates *e* their lower ends extend below the same, and secured to each of these lower extended ends is a coil contraction-spring F, which has its forward end suitably secured to the transverse cross-bar *a* hereinbefore mentioned.

The shaft G is journaled in bearings in the upper rear portion of the end frames and has secured on one of its extended ends an operating-lever K, through the medium of which a rocking motion is imparted to it. This operating-lever is provided with a spring-projected bolt *k*, which is operated from the handle of the lever K in the usual manner, as shown. This bolt is adapted to enter, when the operating-lever is in the proper position, either of the recesses 1, 2, 3, or 4, made in the segmental flange *h* of a plate H, which is secured to the adjacent end frame of the controller. When the lever is in the positions wherein the bolt can engage the recesses of the segmental flange *h*, the shaft G by means of a segmental gear I, secured to its opposite extended end, will operate the controller, so as to open the same or to obtain the first, sec-

ond, or third potential of the generator connected therewith.

The segmental gear engages with a pinion *i* on the adjacent end of the rock-shaft C, which latter has its bearings about midway the height of the forward inclined stretch of the end frames. This shaft C is provided between its bearings with a series of nine bosses, from five of which five corresponding single arms *f* project and from each of the other four of which two arms *g* project. All of these arms have their ends bifurcated and friction-rollers journaled between the same. The five bosses having single arms are clustered together, and the central one projects from the shaft at an angle of one hundred and twenty degrees to the others. The two arms projecting from each of the remaining bosses are arranged so as to project therefrom at about one hundred and twenty degrees apart. Without going into a detailed explanation of the various positions in which these single and siamese arms are placed it is sufficient to say that their relative positions are such that when the operating-lever is moved to one position certain of these arms engage the forward edges of the blades E to push the lower ends of the same into sliding contact between the parallel plates of the negative posts to obtain either the first, second, or the third potential of the generator. When the shaft C is moved so that none of the arms *f* or *g* bears against the blades E, said blades should be automatically moved out of engagement with the contact-plates of the negative posts. The power of coil contraction-springs F is not sufficient to break the contact, but is only effective to make a quick break when the blades have been moved outward to such position that only a slight contact remains between them and said plates. I have shown but two of these springs F, one expanded and the other contracted, because their presence would obscure other construction. One of these openings is used for each blade, however. I accomplish this automatic opening of the circuit between the blades and the negative posts by means of a rock-shaft D, arranged parallel to shaft C, between the blades E and the switchboard and devices secured thereon. Shaft D is operated by shaft C through the medium of the gears J and *j* on the ends thereof opposite those next which the segmental gear is located. The devices for pushing the blades out of contact consist of a series of five bosses each having a single arm *n* and four bosses each having three arms *o*. The series of arms *n o* are constructed in all respects similar to the arms *f* and *g* on shaft C, only smaller, and are so arranged with reference to arms *f* and *g* and the time of their engagement with the blades that when said arms *f* and *g* move out of engagement with said blades they—that is, arms *n o*—engage the rear edges of the blades and push them out of contact with the contact-plates of the negative posts to such an extent that the contractive power of the coil-springs F can be utilized to complete the break of the circuit quickly, so as to avoid sparking. When the blades are drawn out of contact with said negative posts, the springs F move back against the bar *b*, which when said blades are not in contact holds them in a uniform position convenient for engagement by the arms *f* and *g*.

Each of the positive posts has a suitable opening *x x* therein for the reception of a contact pin or plug, (not shown); but only one of the negative posts—namely, the central—is constructed so as to permit this sort of a connection. The rear extended ends, however, of both the negative and positive posts are connected in such manner that when the operating-lever is moved to obtain the first, second, or third potentiality of the generator the proper connections between them will be accomplished to obtain the desired result. As the mere closing of certain circuits to obtain a greater potentiality for a given translating device is a common expedient well known to electricians, no invention would be involved in the means I have employed to connect the rear terminals of the negative and positive posts. A more extended description therefore of such connections is not deemed essential.

What I claim as new is—

1. In an electrical controller, the combination with a positive and a negative post, of a blade pivotally connected at one end to one of said posts, a device in front of the same for pushing said blade into sliding contact with the other post, and means positively actuated back of said blade for removing it out of contact with said other post simultaneously with the withdrawal of said pushing device from said blade.

2. In an electrical controller, the combination with a positive and a negative post, of a spring-controlled blade pivotally connected at one end to one of said posts, a device in front of the same for pushing said blade into sliding contact with the other post, and means positively actuated back of said blade for removing it out of contact with said other post simultaneously with the withdrawal of said pushing device from said blade.

3. In an electric controller, the combination with a series of positive posts, and a corresponding series of companion negative posts, of a series of blades pivotally connected at one end to each of the posts of one of said series, a series of differently-adjusted devices arranged in front of said blades certain groups of which successively push certain cooperating blades into sliding contact with the companion posts of the other of said series, and a series of differently-adjusted devices back of said blades, respective groups of which are arranged with reference to the several groups of pushing devices to thrust the

closed blades out of contact according as the pushing devices withdraw therefrom.

4. In an electric controller, the combination with a series of positive posts, and a corresponding series of companion negative posts, of a series of spring-controlled blades pivotally connected at one end to each of the posts of one of said series, a series of differently-adjusted devices arranged in front of said blades certain groups of which successively push certain coöperating blades into sliding contact with the companion posts of the other of said series, and a series of differently-adjusted devices back of said blades, respective groups of which are arranged with reference to the several groups of pushing devices to thrust the closed blades out of contact according as the pushing devices withdraw therefrom.

5. In an electric controller the combination with a positive and a negative binding-post, and a blade for making and breaking the circuit thereof, of a shaft in front of the same, and an arm projecting therefrom and having a non-electrical engagement therewith to make a sliding contact between said posts, and positively-actuated means arranged back of said blade for moving the same forward to break said contact upon the withdrawal therefrom of said arm.

6. In an electric controller the combination with a positive, and a negative binding-post, and a blade for making and breaking the circuit thereof, of a shaft in front of the same and an arm projecting therefrom and having a non-electrical engagement therewith to make a sliding contact between said posts, means arranged back of said blade for moving the same forward to break said contact upon the withdrawal therefrom of said arm, and springs connected to said blade for quickly breaking the circuit between the same and coöperating posts.

7. In an electric controller the combination, with a positive and a negative post, and a blade pivoted to one and having a sliding contact with the other of said posts, of a shaft in front of said blade, an arm projecting therefrom having a non-electrical engagement with said blade to make a contact between the same and said other post, a shaft extending back of said blade and an arm projecting therefrom having a non-electrical engagement therewith to move said blade out of contact with the independent post upon the withdrawal of the arm in front thereof.

8. In an electric controller the combination, with a positive and a negative post, and a blade pivoted to one and having a sliding contact with the other of said posts, of a shaft in front of said blade, an arm projecting therefrom having a non-electrical engagement with said blade, to make a contact between the same and said other post, a shaft extending back of said other an arm projecting therefrom having a non-electrical engagement therewith to move said blade out of contact with the independent post upon the withdrawal of the arm in front thereof, and spring-connected to said blades to quickly break circuit between same and said independent post.

9. In an electric controller the combination with a series of positive posts, a corresponding series of companion negative posts, and a series of blades pivotally connected at one end to each post of one of said series, and adapted to have sliding contact with the electrically-coöperating independent posts of the other series, of a transverse shaft extending in front of said blades a series of arms projecting therefrom at several certain angles and adapted to successively push certain coöperating blades into sliding contact with the companion independent posts, and means for moving said blades out of contact with said independent posts.

10. In an electric controller the combination with a series of positive posts, a corresponding series of companion negative posts, and a series of blades pivotally connected at one end to each post of one of said series, and adapted to have sliding contact with the electrically-coöperating independent posts of the other series, of a transverse shaft extending in front of said blades a series of arms on said shaft projecting therefrom at several certain angles and adapted to successively push certain coöperating blades into sliding contact with the companion independent posts, a transverse shaft extending back of said blades, and a series of arms projecting therefrom at several certain angles, whereby they are adapted to bear against and move said blades out of contact with said independent posts, upon the withdrawal of said contact-actuating arms.

11. In an electric controller the combination with a series of positive posts, and a corresponding series of companion negative posts, and blades for closing the circuit between the same, of means for closing different groups of said shunt-blades at different times, and a transverse shaft extending back of said blades, and a series of arms projecting therefrom at different angles and adapted to be moved against the rear of said blades to force them out of contact with one of said series of posts.

12. In an electric controller the combination with a series of positive posts, and a corresponding series of companion negative posts, and blades for closing the circuit between the same, of means for closing different groups of said blades at different times, a transverse shaft extending back of said series of blades, and a series of bosses some having two arms projecting therefrom and the remainder having three arms projecting therefrom, adapted at different times to engage and move said blades so as to break the circuit traversing the same.

13. In an electric switch, the combination of opposite contact points or posts, a device for establishing electrical communication therebetween; rotary means for throwing this

device into position to close the circuit, and means positively actuated for throwing this device into position to open the circuit when permitted by the rotary means, substantially as and for the purpose described.

14. In an electric switch, the combination of opposite contact-posts, and a movable blade adapted to establish electrical connection between said posts; with a rotary blade-pusher adapted to positively shift the blade so as to close the circuit, and means positively actuated for opening the circuit when said pusher permits, substantially as and for the purpose described.

15. In an electric switch, the combination of opposite contact points or posts, a device for establishing electrical communication therebetween, rotary means for throwing this device into position to close the circuit, and opposing rotary means for throwing this device into position to open the circuit, said rotary devices acting in opposition and alternation with each other, substantially as described.

16. In an electric switch, the combination of opposite contact-posts, a movable blade adapted to make or establish electrical connection between said posts, a pair of rotary blade-pushers on opposite sides of said blade, working simultaneously but in opposition and adapted to positively shift the blade so as to open or close the circuit as said pushers are rotated.

17. In a multiple switch, the combination of opposite series of contacts or binding-posts, devices adapted to establish electrical communication between pairs of opposite posts, a rotary shaft provided with a series of arms adapted to engage said devices and close the circuits between two or more pairs of posts during the rotation of the shaft and means for throwing said devices out of contact when released by the arms, all substantially as and for the purpose described.

18. In a multiple switch, the combination of opposite series of contacts or binding-posts, devices adapted to establish electrical communication between pairs of opposite posts in the series, a rotary shaft provided with a series of arms adapted to cause said devices to close the circuits between two or more pairs of posts during the rotation of the shaft, an opposite rotary shaft carrying series of arms adapted to throw the devices out of contact and open the circuits as the devices are released by the arms on the other shaft, and means for operating said shafts, all substantially as and for the purpose described.

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