June 5, 1934. J. G. PETERSON 1,961,864

ELECTRIC SWITCH

Original Filed July 29, 1931

Fig. 1.

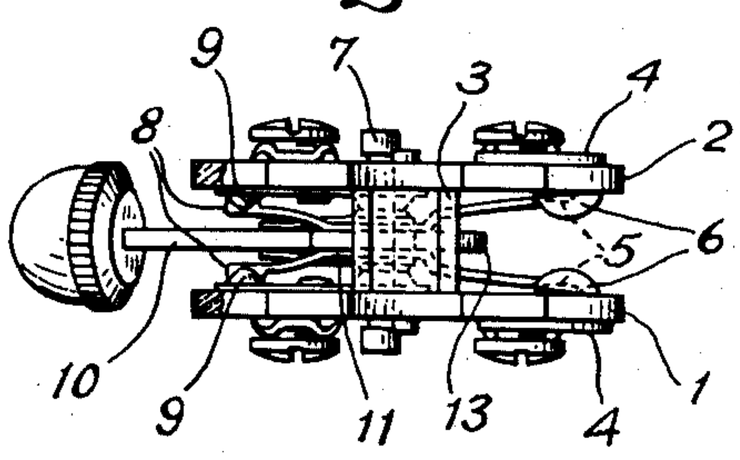


Fig. 2.

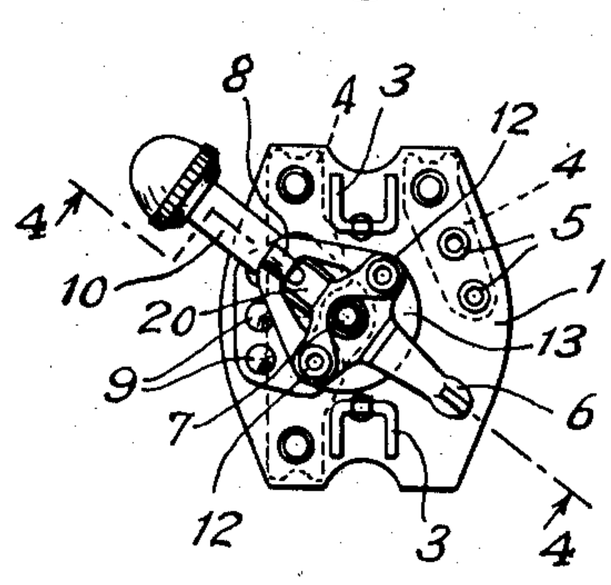


Fig. 4.

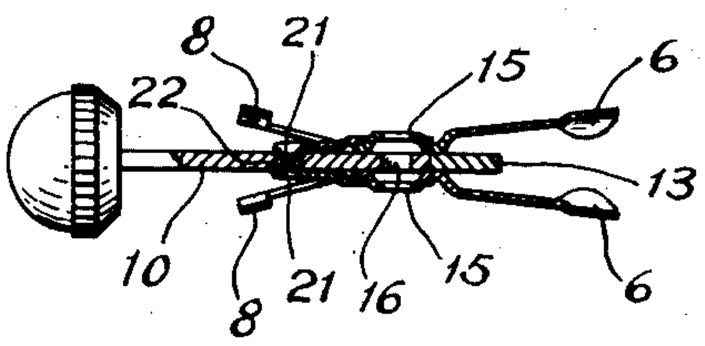


Fig. 3.

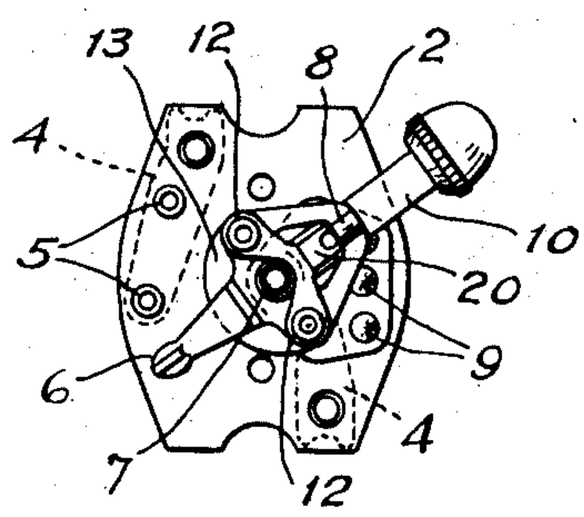


Fig. 6.

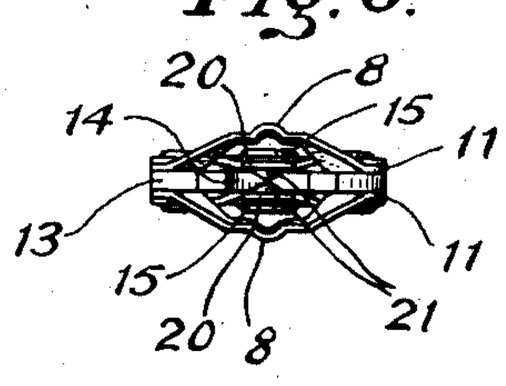
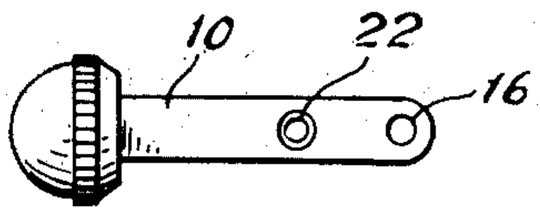


Fig. 5.

Fig. 7.



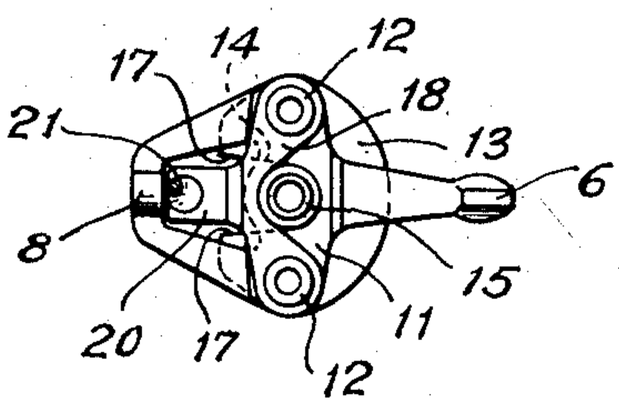
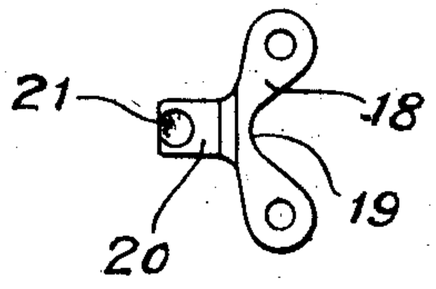


Fig. 8.



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1,961,864

UNITED STATES PATENT OFFICE

1,961,864

ELECTRIC SWITCH

Johann G. Peterson, West Hartford, Conn.

Application July 29, 1931, Serial No. 553,796
Renewed October 7, 1933

32 Claims. (Cl. 200—11)

My invention relates to electric switches.

It has for its object to provide an improved and simplified switch construction, and, more particularly, such a construction of the type utilizing a plurality of snap actuating means for the movable contact. A further object of my invention is to provide a switch of the general type described and claimed in my co-pending application Serial No. 329,570, filed December 31st, 1928, now Patent 1,894,225, having improved supplementary or additional snap actuating means for the contact which are tensioned upon movement of the actuating lever to tension the other snap switch mechanism, and which automatically operate when the latter mechanism is operated, irrespective of the rate of movement of the actuating lever. These and other objects and advantages of my improved construction will, however, hereinafter more fully appear.

In the accompanying drawing, I have shown for the purposes of illustration, one embodiment which my invention may assume in practice.

In this drawing,—

Figure 1 is a side elevation of a switch unit equipped with my improvement;

Fig. 2 is a plan view of the same with one of the insulating plates removed to expose the switch mechanism;

Fig. 3 is a similar view, but with the other plate removed;

Fig. 4 is a detail enlarged sectional view of the movable elements of the switch mechanism, the same being shown in section substantially on line 4—4 of Fig. 2;

Fig. 5 is a detail plan view of the movable elements of the switch, with the actuating lever withdrawn;

Fig. 6 is an end view of the structure shown in Fig. 5;

Fig. 7 is a detail plan view of the actuating lever, and

Fig. 8 is a detail plan view of one of the spring members co-operating therewith.

In this illustrative construction, I have shown a switch of the general type described and claimed in my co-pending application Serial No. 529,510, filed April 11th, 1931, now Patent 1,894,002, and provided with an additional spring mechanism of the general type described and claimed in my co-pending application Serial No. 329,570, filed December 31st, 1928, now Patent 1,894,225, but herein of an improved construction hereinafter described.

Inasmuch as the switch unit is substantially of the construction described in my application Serial No. 529,510, now Patent 1,894,002, it seems unnecessary to describe the same in detail herein. However, it will be noted that it comprises a plurality of superimposed spaced insulating plates 1 and 2 having connecting and spacing means 3 therebetween, and having terminal and through connections 4 on the outer faces of the plates, while contacts 5 are carried on the inner faces of the plates and engaged by swinging resilient contacts 6 pivoted at 7 on a suitable stationary pivot pin or stud carried by the plates. Also, it will be noted that swinging resiliently mounted cams 8 are likewise movable about the pivot 7 and ride over a series of aligned stationary cams 9 when the members 6 and 8 are moved about their pivot by an actuating lever 10 likewise pivoted on the pivot 7. Here it will also be noted that the members 6 and 8 are preferably integrally united to an intermediate portion 11 (Figs. 5 and 6) and are in the form of resilient, oppositely disposed extensions thereon, while the extensions carrying the members 8 are of hollow centered, generally V-shaped form. As shown, two portions 11 are suitably attached as by rivets 12 on opposite sides of a body member 13. The latter, in turn, is provided with a lateral opening 14 in one side adapted to receive the inner end of the actuating lever 10, while the pivot pin 7 also passes down through this opening, bearing forming apertures 15 in the portions 11, and an aperture 16 in the inner end of the lever 10. Thus it will be noted that, as described in application Serial No. 529,510, when swinging in either direction, the resiliently mounted cams 8 will ride over the stationary cams 9 in such manner as to impart a series of snap actions to the contacts 6 as the cams 8 successively pass over the peaks of the cams 9 in either direction.

In my improved construction, it will be noted that the opening 14 is provided with inclined side walls 17 sloping away from the opposite sides of the inner end of the member 10 in such manner as to permit a limited swinging movement of the latter member about its pivot 7 in each direction. Further, it will be noted that the rivets 12 also act to hold in place on opposite sides of the portions 11, a plurality of members 18 each of which is herein cut out at 19 to extend to one side of the pivot aperture, and is further provided with a resilient extension 20 in alignment with the pivot aperture and the cams 8, while being freely movable vertically relative to the latter in the hollow portion of the extension carrying the cam 8. Herein it will also be noted that each of these extensions 20 is provided with a projection 21 extending toward the lever 10 and preferably of conical form and adapted normally to seat in opposite conical communicating recesses 22 in the latter disposed between the pivot of the lever 10 and the free end of the same, herein more closely adjacent the pivot.

In the operation of my improved construction,

it will be evident that when the lever 10 is moved in either direction about its pivot 7, it will be free to move laterally within the limit established by one sloping side wall 17 of the aperture 14 in the member 13, and that this movement will cause the projections 21 to ride up out of the conical recesses 22 in the lever 10, the extensions 20 then moving apart in the openings between the cams 8 and the pivot 7. When, however, the lever 10 engages a side wall of the opening 14, the whole swinging mechanism, including the members 6, 8, and 13, will be moved bodily laterally in such manner as to move the resiliently mounted cams 8 up the peaks of the adjacent stationary cams 9. When they have passed the peaks of these cams, the cams 8, being released, will automatically move downward and laterally on the opposite slopes of the cams 9, and thereby swing the contact members 6 laterally at the same time that the resiliently mounted projections 21 tend to return strongly to their normal or supplementary indexing positions in the recesses 22 in the lever 10, all in such manner as to impart an impetus to the swinging contacts which it is impossible to retard by retarding the rate of movement of the lever 10.

As a result of my improved construction, it will be observed that, while the resiliently mounted cams 8 will function relative to the stationary cams 9 by movements toward and from the lever 10 on opposite sides of the same, the supplementary spring portions 20 herein will operate reversely, moving out of and into their conical sockets or recesses 22 in the actuating lever 10 in such manner as to provide a very effective supplementary spring or snap actuating mechanism which is automatic in its operation and wholly beyond the control of the operator. Further, it will be noted that not only is the supplementary mechanism exceedingly simple, but that all necessity for providing a spring of elongated form is eliminated, the extensions 20 being short and readily formed. It will also be observed that these springs may be readily attached to the swinging unit by the same rivets which hold the contacts and other cams thereto. Further, the construction is also very compact, the supplementary springs being movable in the space between the resiliently mounted cams 8 and their pivot 7. The construction is also inexpensive and readily adapted to be used in connection with the structures of both of my applications mentioned above. These and other advantages of my improved construction will, however, be clearly apparent to those skilled in the art.

While I have in this application specifically described one embodiment which my invention may assume in practice, it will be understood that the same is shown for purposes of illustration only, and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:—

1. In a switch, stationary and movable contacts, an actuating member, and snap actuating mechanism for the movable contact having a plurality of resiliently mounted cams successively tensioned upon each actuating movement of said actuating member.

2. In a switch, stationary and movable contacts, an actuating member, and actuating mechanism for the movable contact having on the same side of said member a plurality of resiliently mounted cams and means for tensioning and releasing the same to actuate said contact upon each actuating movement of said actuating member.

3. In a switch, stationary and movable contacts, an actuating member, and actuating mechanism for the movable contact having a plurality of resiliently mounted cams and means for successively tensioning and simultaneously releasing said cams to actuate said contact upon each actuating movement of said actuating member.

4. In a switch, stationary and movable contacts, an actuating member, and snap actuating mechanisms for the movable contact having a plurality of separately resiliently mounted cams tensioned by said actuating member, one of said mechanisms having stationary co-operating cam actuating means and the other having movable co-operating cam actuating means.

5. In a switch, stationary and movable contacts, an actuating member, and co-operating snap actuating mechanisms for the movable contact having a plurality of resiliently mounted cams tensioned by said actuating member, one of said mechanisms having stationary co-operating cam actuating means and the other having movable co-operating cam actuating means carried by said actuating member.

6. In a switch, stationary and movable contacts, an actuating member, and co-operating snap actuating mechanisms for the movable contact having a plurality of resiliently mounted cams successively tensioned upon movement of said actuating member and movable in opposite directions relative to the latter during tensioning.

7. In a switch, stationary and movable contacts, an actuating member, and co-operating snap actuating mechanisms for the movable contact having a plurality of resiliently mounted cams successively tensioned upon movement of said actuating member and movable in opposite directions relative to the latter during tensioning and both being simultaneously releasable.

8. In a switch, stationary and movable contacts, an actuating member, and co-operating snap actuating mechanisms for the movable contact having a plurality of resiliently mounted cams tensioned upon movement of said actuating member and movable in opposite directions relative to the latter and one within the other during tensioning.

9. In a switch, stationary and movable contacts, an actuating member, and snap actuating mechanism for the movable contact having on the same side of said member a plurality of resiliently mounted cams operatively connected thereto and means for moving said cams in opposite directions relative to said actuating member upon movement of the latter.

10. In a switch, stationary and movable contacts, an actuating member, and snap actuating mechanism for the movable contact having on the same side of said member a plurality of resiliently mounted cams operatively connected thereto and means for moving one of said cams toward and another away from said actuating member upon movement of the latter.

11. In a switch, stationary and movable contacts, an actuating member, and snap actuating mechanism for the movable contact having a plurality of resiliently mounted cams operatively

connected thereto and means for moving said cams in opposite directions relative to said actuating member upon movement of the latter, including a peaked cam over which one of said cams is movable, and a sloping cam on which the other cam is reversely movable.

12. In a switch, stationary and movable contacts, an actuating member, and snap actuating mechanism for the movable contact having a plurality of resiliently mounted cams operatively connected thereto and means for moving said cams in opposite directions relative to said actuating member upon movement of the latter, including a peaked cam and a sloping cam co-operating with different resiliently mounted cams, said peaked cam being stationary and said sloping cam being on said actuating member.

13. In a switch, stationary and movable contacts, an actuating member, and co-operating snap actuating mechanisms for said movable contact having a plurality of swinging resiliently mounted cams on said contact and one having stationary co-operating cam actuating means and the other having swinging co-operating cam actuating means.

14. In a switch, stationary and movable contacts, an actuating member, and co-operating snap actuating mechanisms for said movable contact having a plurality of swinging resiliently mounted cams on said contact and one having stationary co-operating cam actuating means and the other having swinging co-operating cam actuating means comprising an aperture in said actuating member.

15. In a switch, stationary and movable contacts, an actuating member, and co-operating snap actuating mechanisms for said movable contact having a plurality of swinging resiliently mounted cams, one having stationary co-operating cam actuating means and the other having swinging co-operating cam actuating mean and both of said means having their resiliently mounted cams movable with the movable contact.

16. In a switch, stationary and movable contacts, a swinging resiliently mounted cam member operatively connected to the movable contact, a series of stationary actuating cams engageable by said cam member, a swinging actuating member operatively connected to swing said resiliently mounted cam member and also carrying cam means, and a second resiliently mounted cam operatively connected to actuate said movable contact and co-operating with said last mentioned cam means.

17. In a switch, stationary and movable contacts, a swinging resiliently mounted cam member operatively connected to the movable contact, a series of stationary actuating cams engageable by said cam member, a swinging actuating member operatively connected to swing said resiliently mounted cam member and also carrying cam means, and a second resiliently mounted cam operatively connected to actuate said movable contact and co-operating with said last mentioned cam means, said cam means and second resiliently mounted cam being disposed between the pivot of said actuating member and said first mentioned cam member and its stationary actuating cams.

18. In a switch, stationary and movable contacts, a swinging resiliently mounted cam member operatively connected to the movable contact, a series of stationary actuating cams engageable by said cam member, a swinging actuating member operatively connected to swing said resiliently mounted cam member and also carrying cam means, and a second resiliently mounted cam operatively connected to actuate said movable contact and co-operating with said last mentioned cam means, said cam means and second resiliently mounted cam being disposed between the pivot of said actuating member and said first mentioned cam member and its stationary actuating cams and said resiliently mounted cams being movable reversely during tensioning.

19. A switch actuating member comprising a body member carrying a contact and a resiliently mounted cam, an actuating member having a limited movement relative to said body, and co-operating cam means on said actuating member and body.

20. A switch actuating member comprising a body member carrying a contact and a resiliently mounted cam, an actuating member having a limited movement relative to said body, and co-operating cam means on said actuating member and body comprising a resiliently mounted cam carried by one of the same and a co-operating socket carried by the other.

21. A switch actuating member comprising a body member carrying a contact and a resiliently mounted cam, an actuating member having a limited movement relative to said body, and co-operating cam means on said actuating member and body comprising a resiliently mounted cam carried by one of the same and a co-operating socket carried by the other, said resiliently mounted cam being carried by said body and said socket being formed in said actuating member.

22. A switch actuating member comprising a body member carrying a contact and a resiliently mounted cam, an actuating member having a limited movement relative to said body, and co-operating cam means on said actuating member and body, said resiliently mounted cam having provision for receiving the movable element of said co-operating cam means.

23. A switch actuating member comprising a body carrying a contact and a resiliently mounted cam projecting in opposite directions from said body, an actuating member carrying cam means and pivoted on a common axis with said body and movable relative thereto, and cam means carried by said body and co-operating with said cam means on the actuating member.

24. A switch actuating member comprising a body carrying a contact and a resiliently mounted cam projecting in opposite directions from said body, an actuating member carrying cam means and pivoted on a common axis with said body and movable relative thereto, and resiliently mounted cam means on said body and tensioned by said cam means on said actuating member as the latter moves about its pivot.

25. In a switch, stationary and movable contact means, an actuating member movable relative to said movable contact means, combined actuating and indexing means for said movable contact means actuating the same with a snap action upon each actuation of said member, and co-operating combined actuating and indexing means comprising resiliently connected engaging cam means, one on said actuating member and movable relative to said first mentioned actuating and indexing means and relative to said movable contact means, and the other on said

movable contact means and movable therewith and relative to said cam means on said actuating member.

26. In a switch, stationary and movable contact means, an actuating member movable relative to said movable contact means, combined actuating and indexing means for said movable contact means actuating the same with a snap action upon each actuation of said member, and co-operating combined actuating and indexing means comprising resiliently connected engaging cam means, one on said actuating member and movable relative to said first mentioned actuating and indexing means and relative to said movable contact means, and the other on said movable contact means and movable therewith and relative to said cam means on said actuating member, said cam means on said actuating member comprising oppositely inclined cams, and said cam means movable with said movable contact means comprising a resiliently connected cam successively movable up and down one of said inclined cams upon each operation of said actuating member and acting on different cams when said actuating member is moved in opposite directions.

27. In a switch, stationary and movable contact means, an actuating member movable relative to said movable contact means, combined actuating and indexing means for said movable contact means actuating the same with a snap action upon each actuation of said member having cooperating stationary peaked cams and movable resiliently mounted cams movable over the same, and co-operating combined actuating and indexing means comprising resiliently connected engaging cam means, one on said actuating member and movable relative to said first mentioned actuating and indexing means and relative to said movable contact means, and the other on said movable contact means and movable therewith and relative to said cam means on said actuating member, said cam means on said actuating member comprising oppositely inclined cams, and said cam means movable with said movable contact means comprising a resiliently connected cam successively movable up and down one of said inclined cams upon each operation of said actuating member and acting on different cams when said actuating member is moved in opposite directions.

28. In a switch, stationary and movable contact means, an actuating member movable relative to said movable contact means, combined actuating and indexing means for said movable contact means actuating the same with a snap action upon each actuation of said member having co-operating stationary peaked cams and movable resiliently mounted cams movable over the same, and co-operating combined actuating and indexing means comprising resiliently connected engaging cam means, one on said actuating member and movable relative to said first mentioned actuating and indexing means and relative to said movable contact means, and the other on said movable contact means and movable therewith and relative to said cam means on said actuating member, said cam means on said actuating member comprising oppositely inclined cams, and said cam means movable with said movable contact means comprising a resiliently connected cam successively movable up and down one of said inclined cams upon each operation of said actuating member and acting on different cams when said actuating member is moved in opposite directions.

29. In an electric switch, swinging and stationary contact means, a pivoted actuating member swinging relative to said swinging contact means, indexing means comprising swinging cam means on said actuating member and a movable indexing member for said swinging contact means swinging therewith and having co-operating cam means engaging said swinging cam means and movable along said means to release said movable contact means upon swinging of said actuating member, means for swinging said movable contact means with a snap action following release thereof, and means tensioned during movement of said moveable indexing member and automatically operable upon swinging of said movable contact means to return said movable indexing member to normal indexing position.

30. In an electric switch, swinging and stationary contact means, a pivoted actuating member swinging relative to said swinging contact means, a stationary stud about which both said movable contact means and actuating member are separately movable, indexing means comprising swinging cam means on said actuating member and a movable indexing member for said swinging contact means swinging therewith and having co-operating cam means engaging said swinging cam means and movable along said means to release said movable contact means upon swinging of said actuating member, means for swinging said movable contact means with a snap action following release thereof, and means tensioned during movement of said movable indexing member and automatically operable upon swinging of said movable contact means to return said movable indexing member to normal indexing position.

31. In an electric switch, swinging and stationary contact means, a pivoted actuating member swinging relative to said swinging contact means and movable progressively in the same direction from "off" position into a plurality of "on" positions, indexing means comprising swinging cam means on said actuating member and a movable indexing member for said swinging contact means swinging therewith and having co-operating cam means engaging said swinging cam means and movable along said means to release said movable contact means upon swinging of said actuating member, means for swinging said movable contact means with a snap action following release thereof, and means tensioned during movement of said movable indexing member and automatically operable upon swinging of said movable contact means to return said movable indexing member to normal indexing position.

32. In an electric switch, swinging and stationary contact means, a pivoted actuating member swinging relative to said swinging contact means and movable progressively in the same direction from "off" position into a plurality of "on" positions, a stationary stud about which both said movable contact means and actuating member are separably movable, indexing means comprising swinging cam means on said actuating member and a movable indexing member for said swinging contact means swinging therewith and having co-operating cam means engaging said swinging cam means and movable along said means to release said movable contact means upon swinging of said actuating member, means for swinging said movable contact means with a snap action following release thereof, and means tensioned during movement of said movable indexing member and automatically operable upon swinging of said movable contact means to return said movable indexing member to normal indexing position.

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