

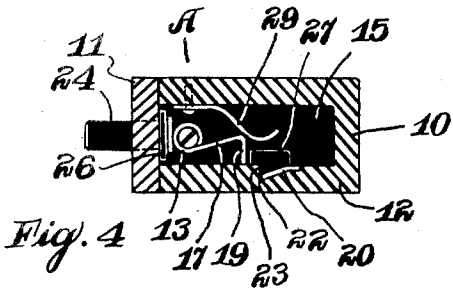
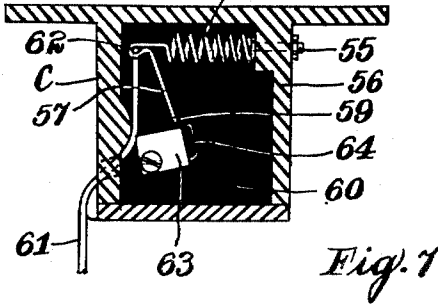
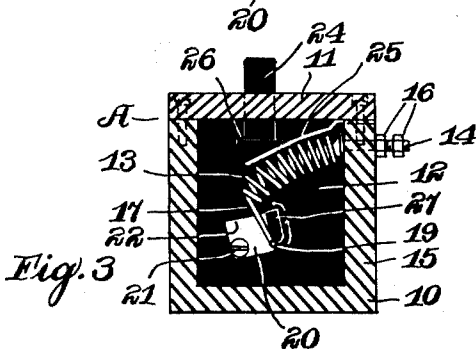
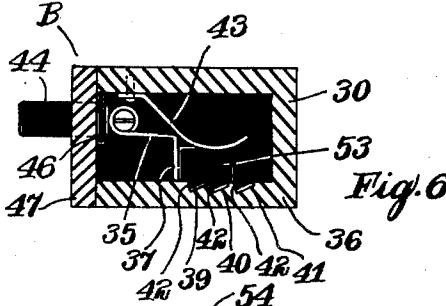
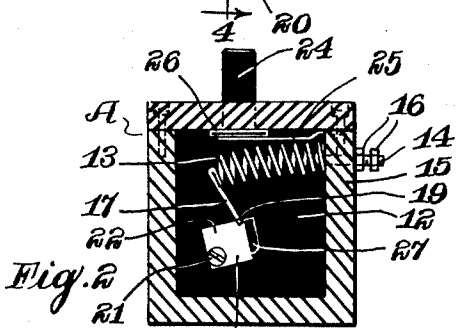
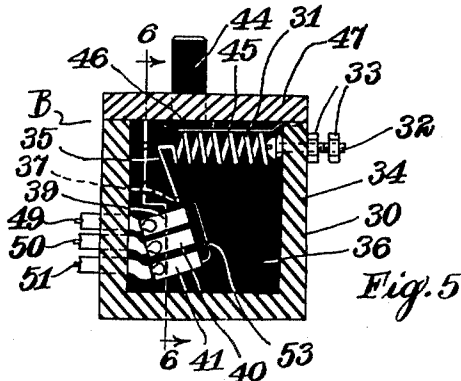
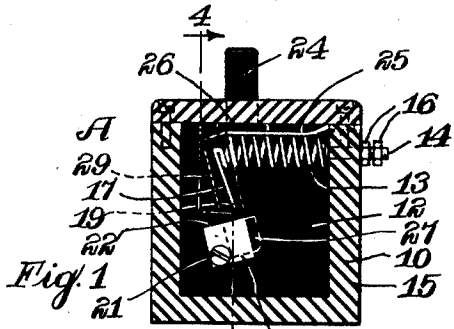
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C. WESCHKE

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SWITCH

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Inventor
Carl Weschke

Norman Fischer

By

Attorney

UNITED STATES PATENT OFFICE

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SWITCH

Carl Wescheke, St. Paul, Minn.

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9 Claims. (Cl. 200-160)

My invention relates to an improvement in switches wherein it is desired to provide a simple type of make and break switch having a snap action.

Numerous types of snap switches have been constructed most of which require the assembly of a number of parts in the formation thereof. While these prior constructions have been mechanically fit to accomplish the desired result, they are usually quite complicated in construction and costly to manufacture.

It is the object of the present invention to provide a make and break switch which comprises very few parts and which is extremely simple to manufacture and to assemble. All of the parts may be simply constructed by existing machines and devices so that little or no special machinery is necessary in the formation of my switch.

It is the purpose of my invention to provide a snap switch having a simple action and which embodies a slidable resilient member which slides both on the surface of a conductor and upon the surface of an insulation member. The movement of the slidable member from the contact to the insulated portion is accomplished by a snap action which quickly makes and breaks the contact, thereby preventing arcing of the current.

It is a purpose of the present invention to provide a simple switch which may be operated to turn the switch into closed position by a simple sliding movement and to release the switch or to open the same by continuing the sliding action in the same direction.

It is an added purpose of my invention to provide a simple switch which may close progressively a series of separate circuits and then to return to open position. This action may be accomplished by movement of a slidable member continuously in a single direction.

These and other objects and novel features of my invention will be more clearly and fully set forth in the following specification and claims.

In the drawing forming a part of my invention: Figure 1 is a sectional view through the switch housing at a point above the mechanism thereof to show the relationship of parts therein.

Figure 2 is a view similar to Figure 1 showing the parts of the switch in a different relationship.

Figure 3 is a view similar to Figures 1 and 2 but showing the parts of the switch in slightly different relationship.

Figure 4 is a cross-sectional view through the

switch taken on a line indicated by the line 4-4 of Figure 1.

Figure 5 is a sectional view through the switch casing showing the relationship of parts of a modified form of construction.

Figure 6 is a cross-sectional view on a line indicated by 6-6 of Figure 5.

Figure 7 is a slightly different modification of switch operating construction shown in a view similar to Figure 1.

The switch A illustrated in Figures 1, 2, 3, and 4 is provided with a hollow casing 10 which is shown rectangular in shape but which may be of any desired shape or size. A removable side 11 permits the mechanism of the switch to be opened for inspection. One side 12 of the casing 10 may be considered the base of the switch as the sliding action of the switch takes place upon this side 12.

A coil spring 13 is mounted by means of a bolt 14 or other suitable means to one side 15 of the frame 10 overlying the base 12. The spring 13 is mounted adjacent a second side of the frame which in the form disclosed is the removable side 11. Nuts 16 are provided on the bolt 14 to hold the bolt in place and to provide a means of securing a conductor thereto.

The end of the spring 13 opposite that secured to the frame 10 by the bolt 14 is provided with a transversely extending arm 17 which overlies the base 12 and which is provided with a downwardly extending end 19. This downwardly extending end 19 rides upon the surface of the base 12 formed of insulating material. A contact plate 20 is secured to the base 12 by means of the bolt 21. The bolt 21 extends out of the casing 10 through the base 12 and may be secured to a suitable conductor forming the other lead to the switch A. The plate 20 is recessed into the base along one edge 22 thereof as best illustrated in Figure 4 of the drawing, so that in the travel of the end 19 of the arm 17 on the spring 13, this end 19 will drop off of the insulation material forming the base 12 and into contact with the end 22 of the plate 20. A shoulder 23 of insulating material is formed between the edge 22 of the plate 20 and the surface of the base 12 and this shoulder 23 holds the spring 13 from returning into the position illustrated in Figure 1 after the spring has been moved into the position illustrated in Figure 2.

A push button 24 is provided for moving the spring 13. This push button 24 may if desired engage a flat spring 25 positioned along the edge of the removable side 11. This spring 25 engages

the spring 13 to move the same. The button 24 extends through an opening in the side 11 of the housing 10 and a flange 26 on the end of the button holds the same from being forced entirely out through this opening in the side 11.

A cam projection or shoulder 27 projects upwardly from the base 12 and extends along the edge of the plate 20. This shoulder 27 is engaged by the end 19 of the arm 17 in the movement of the spring 13 and the end 19 is held in contact with the plate 20 by this shoulder 27. A spring 29 illustrated in Figure 4 and in dotted outline in Figure 1 of the drawing engages the top of the arm 17 during a portion of its movement holding the end 19 in contact with the plate 20.

In the operation of this switch the normal open position of the same is shown in Figure 1 of the drawing. To close the circuit passing through the switch A, it is necessary to depress the button 24, thereby bending or flexing the spring 25 if such a spring is used, and urging the spring 13 into position shown in Figure 2 of the drawing. During this movement the end 19 of the arm 17 on the spring 13 slides over the surface of the insulation base 12, finally dropping over the shoulder 23 into engagement with the conductor plate 20. The spring 29 may be desirable in holding the arm 17 in engagement with the plate 20, but if it is desired this spring 29 may be eliminated and the natural resiliency of the spring 13 and arm 17 will hold the end 19 in engagement with the plate 20. The shoulder 23 prevents the spring 13 from flexing back into the position illustrated in Figure 1 by engaging the end 19.

When it is desired to open the switch circuit, the button 24 is depressed a greater amount as illustrated in Figure 3 of the drawing. During this movement the end 19 of the spring 17 slides along the inclined surface of the plate 20 and is held in engagement with the plate 20 by engagement with the shoulder or cam 27. The cam or shoulder 27 flexes the arm 17 so that the end 19 thereof moves along an unnatural path. The tension of the arm 19 constantly increases during this sliding movement. When the end 19 of the arm 17 reaches the position illustrated in Figure 3 of the drawing, the plate 20 has raised the end 19 to a plane flush or slightly above the surface of the base 12. As the end 19 moves to the extremity of the shoulder or cam 27, the tension in the arm 17 is released, and this arm snaps off from the contact plate 20 and is thus moved with a snap action from engagement with the contact plate 20 to a position substantially spaced therefrom.

After the arm 17 has snapped off from the plate 20, the button 24 is released and the spring 13 assumes the position illustrated in Figure 1 of the drawing. In the return movement of the spring 13, the arm 17 engages the reverse side of the cam 27, finally passing this cam 27 and moving into position shown in Figure 1 of the drawing.

Figures 5 and 6 of the drawing illustrate a modified form of construction and disclose a switch B having a casing 30 which may be similar to the casing 10. A spring 31 is secured by a bolt 32 and nuts 33 thereupon to one wall 34 of the casing 30. The free end of the spring 31 is provided with an arm 35 overlying the base 36 of the housing 30. A downwardly extending end 37 is provided on the arm 35 which end 37 slides over the surface of the base 36. A series of contact plates 39, 40, and 41 respectively, are angularly positioned in the base 36 so as to provide

shoulders 42 adjacent each contact plate. The angular position of the plates 39, 40, and 41 acts to raise the end 37 up to the level of the surface of the base 36. A spring 43 may engage the arm 35 during the time the end 37 is in contact with the contact plates 39, 40, and 41. This spring 43 adds to the natural resiliency of the material forming the same. A push button 44 is provided for bending the spring 31 and a flat spring 45 may be interposed between the spring 31 and the button 44 if desired. This spring 45, while not necessary acts to distribute the force of the movement of the button 44 against the spring 45 when used, and also acts to hold the button 44 normally in inoperative position. A shoulder 46 on the button 44 limits the outward movement of the same as it slides in its aperture through the side 47 of the housing 30.

In operation separate conductors 49, 50, and 51, respectively, are secured to the contact plates 39, 40, and 41. When in open position the switch B is normally in the position illustrated in Figure 5 of the drawing. Depression of the button 44 will flex the spring 31 to move the end 37 of the arm 35 over the surface of the base 36 until it drops over the shoulder 42 into engagement with the contact plate 39. A circuit is closed through the switch from the bolt 32 to the conductor 49. Additional depression of the button 44 will act to slide the end 37 of the arm 35 over the contact plate 39 and a portion of the base 36, separating the contact plates 39 and 40 until the end 37 drops into engagement with the contact plate 40. The end 37 will be held in this position in engagement with the contact plate 40 closing a circuit from the bolt 32 to the conductor 50 until the push button 44 is further depressed.

Additional depression of the push button 44 will flex the spring 31 and urge the end 37 of the arm 35 over the surface of the contact plate 40 and over a portion of the surface of the base 36 until this end 37 drops over the shoulder 42 into contact with the contact plate 41. A circuit will then be closed from the bolt 32 to the conductor 51.

Further depression of the button 44 will cause the end 39 to ride up the surface of the contact plate 41 until the end 37 reaches a position flush with or slightly above the surface of the base 36. Simultaneously, with this movement the end 37 will move beyond the cam 53 or shoulder which has been instrumental in holding the end 37 in contact with the various contact plates. During the movement of the end 37 over these plates 39, 40, and 41, the end 37 has engaged the cam projection 53 which acts to flex the arm 35. Upon movement of the end 37 past the projection 53 the resiliency of the arm 35 and the spring 31 will snap the end 37 over the surface of the base 36 quickly moving the end 37 from contacting engagement with the plate 41 to non-contacting position. The button 44 may then be released and the spring 31 moves into the normal position illustrated in Figure 5 of the drawing, the end 37 engaging the opposite surface of the projection or cam 53 in this return movement.

In Figure 7 of the drawing, I have disclosed a type of switch C which is similar in construction to that shown in Figures 1, 2, 3, and 4 with the exception that a pull chain is provided in place of the button 44. In this construction, a coil spring 54 is secured by a bolt 55 to the insulation housing 56. An arm 57 on the free end of the spring 54 is provided with a downwardly extending end 59 engageable with the insulation

surface 60 forming a part of the casing 56. A pull chain 61 is secured at 62 to the free end of the spring 54 so as to bend this spring. A downward pull on the pull chain or cord 61 causes the end 59 to engage with the contact plate 63 which is recessed into the surface 60 in the manner shown in Figure 4 of the drawing. A further downward pull on the chain or cord 61 will flex the arm 57 past the cam projection 64 so that when the chain or cord 61 is released, the spring 54 will assume the normal position illustrated in Figure 7 of the drawing in which position the circuit through the switch is broken.

It may be seen that my switch may be actuated by a push button or a pull chain or cord. Any lever arrangement or any other device for bending the spring within the switch may be used in place of the specific means disclosed. In every form, however, it will be seen that a snap action is provided both in closing the switch and in opening the same and that a pull in a single direction will act to both open the switch and to close the same.

Although I have illustrated a series of preferred embodiments of my invention, it will be readily understood that various changes coming within the spirit of my invention may suggest themselves to those skilled in the art, and hence I do not wish to be limited to the specific form shown or uses mentioned except to the extent indicated in the appended claims which are to be interpreted as broadly as the state of the art will permit.

I claim:

1. A switch comprising a substantially flat insulation base, a coil spring mounted at one end to overlie said base and having a free end, a contact end on the free end of said spring resiliently engaging said base, the flexing of said spring moving said contact end in a predetermined path of said base, said base having a notch therein in the path of movement of said contact end into which said end may resiliently engage, said spring flexing in one direction, contact means in said notch engageable with said end, and cam means flexing said contact end in another direction to hold said contact end in engagement with said contact for a predetermined movement of the same and to permit said contact end to disengage said contact with a snap action.

2. A switch comprising a substantially flat insulation base, a resilient member spring urged into contact with said base and movable thereover, said base having a step notch formed therein in the path of movement of said resilient member, a contact means in said step notch, and cam means projecting above said base engaging said resilient member and flexing the same in a plane substantially at right angles to the direction of flexing of said resilient member as it moves into said step notch.

3. A switch comprising a substantially flat insulation base, a resilient contact arm resiliently flexible in a plane substantially parallel to said base and also in a direction substantially normal to said base, means supporting said contact arm slidable over said base and resiliently urged thereagainst, means on said base flexing said contact arm in a plane parallel to said base and guiding said contact arm through an endless path, said base including a step notch therein in said endless path into which said arm is resiliently urged, moving substantially normal to

the plane of said base, and contact means in said step notch.

4. A switch comprising a substantially flat insulation base, a resilient contact arm resiliently flexible in a plane substantially parallel to said base and also in a direction substantially normal to said base, means supporting said contact arm slidable over said base and resiliently urged thereagainst, means on said base guiding said contact arm through an endless path, flexing said arm in a plane substantially parallel to said base; said base having a step notch therein in said endless path, said step notch causing said arm to flex in a direction substantially normal to said plane, and contact means in said notch.

5. A switch comprising an insulation base, a flexible resilient contact arm slidable over said base and resiliently urged thereagainst, means flexing said contact arm along a plane substantially parallel to said base, said arm sliding upon said base, means in the path of movement of said contact arm when flexed to guide said arm along one path when flexed by said flexing means and guiding said arm along a second path when said flexing means is released, said base having a step notch therein in said one path, said arm flexing into said step notch, moving said arm in a direction substantially normal to said plane.

6. A switch comprising an insulation base having a flat surface, a flexible resilient contact arm slidable over said flat surface of said base and resiliently urged thereagainst, means for flexing said arm out of normal position, sliding said arm in a plane substantially parallel to said flat surface, cam means engaging said arm as it is flexed by said flexing means and guiding said arm along one predetermined path of movement, said cam means disengaging said arm upon continued flexing thereof, cam means engaging said disengaged arm as the same springs back toward normal position to guide said arm along a second predetermined path of movement, said base having a step notch therein in said one path of movement into which said arm may spring, and contact means in said step notch.

7. A switch comprising an insulating base having a substantially flat surface, a flexible resilient arm mounted in a normal position and slidable over said flat surface and urged against the same under spring tension, means for flexing said arm along a plane substantially parallel said flat surface, means engageable with said arm for deflecting said arm along one path of movement as the arm is flexed, and for deflecting said arm along another path of movement as said arm is released to move back into normal position, said base flat surface having a step notch therein including a stop shoulder to prevent said arm from moving rearwardly over said one path of movement, and contact means in said step notch.

8. A switch comprising an insulating base having a substantially flat surface, a flexible resilient arm mounted in normal position above said surface, a contact end on said arm pressed against said surface by the resiliency of said arm, means for deflecting said arm in a plane substantially parallel said surface, said contact end thereof sliding over said surface, means for deflecting said arm along one path of movement as said arm is flexed by said flexing means, said arm returning to normal position by reason of its resiliency, means engaging said arm during

return movement of said arm to deflect said contact end along a second path of movement, said base having a step notch therein in said one path of movement, the resilience of said arm urging said contact end thereinto, and contact means in said step notch.

9. A switch comprising an insulating base having a substantially flat surface thereupon, a flexible resilient arm mounted in a normal position slidable over said flat surface and urged thereagainst under spring tension, means for flexing said arm along a plane substantially parallel to said surface, means engageable with

said arm for deflecting said arm along one path of movement as the arm is flexed, and for deflecting said arm along another path as said arm is unflexed, said base having a step notch therein into which said arm may drop, moving in a direction substantially normal to said surface, auxiliary spring means engaging said arm when said arm is engaged in said notch to supplement the pressure of said arm against said base, and contact means on said base in said notch.

CARL WESCHCKE.