Nov. 3 1925. 1,560,165

T. F. JOHNSON, JR

HIGH TENSION SWITCH

Filed Nov. 17, 1923 3 Sheets-Sheet 1

Fig. 1.

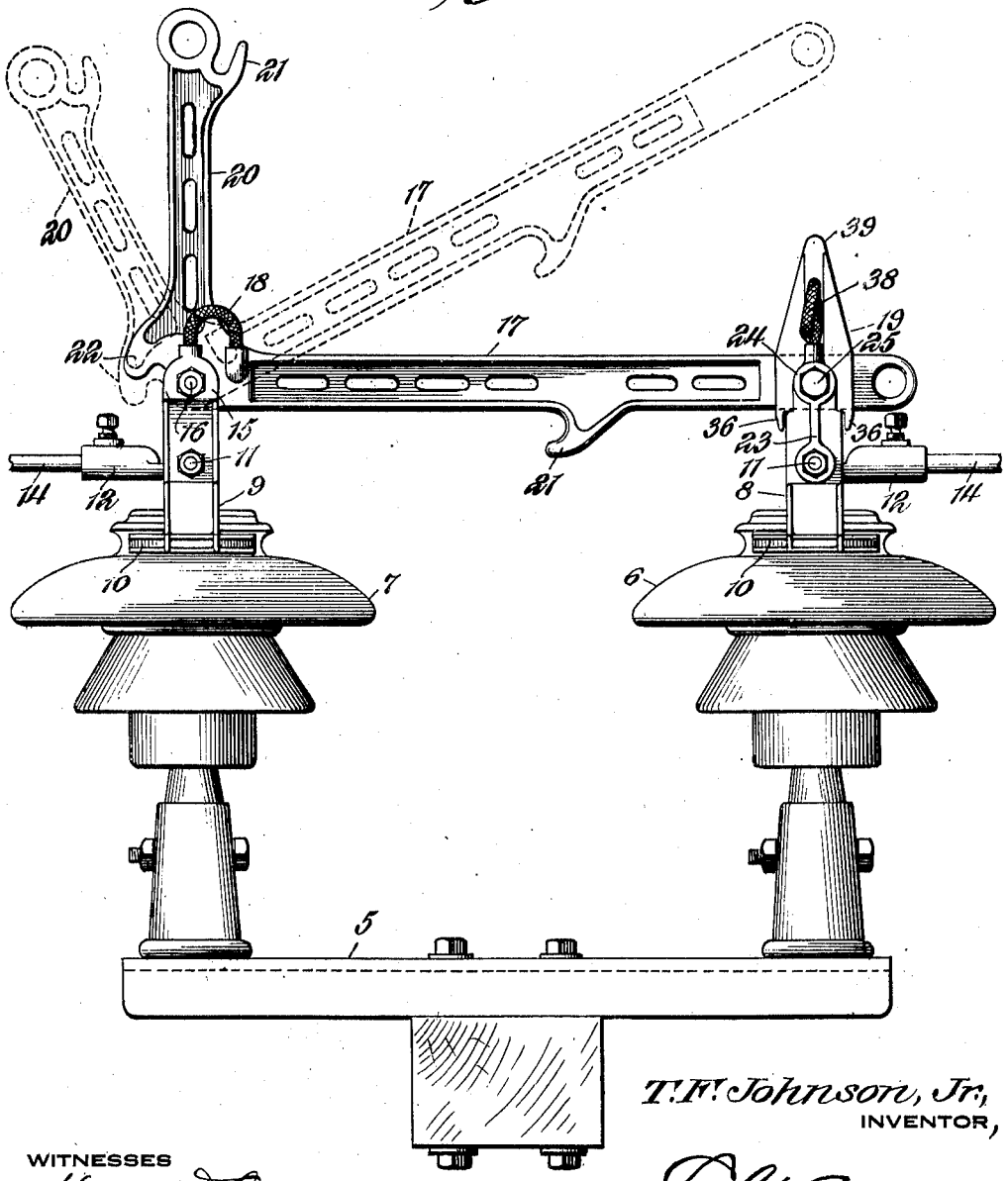

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Fig. 2.

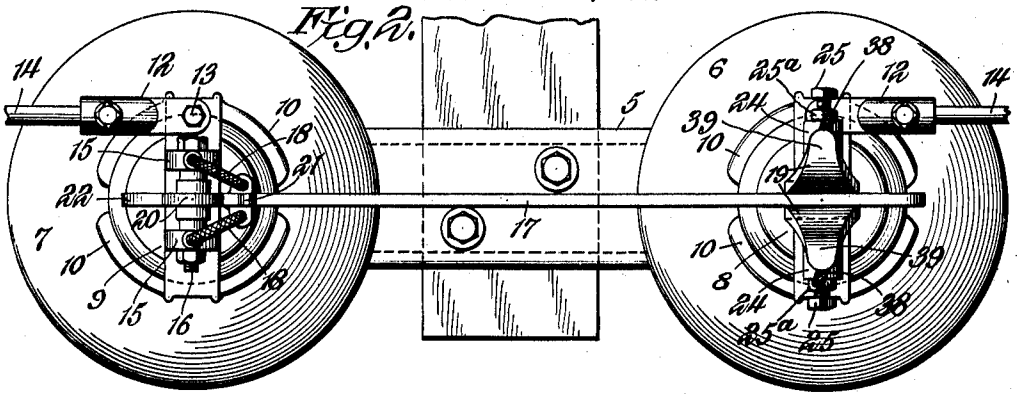

Fig. 3.

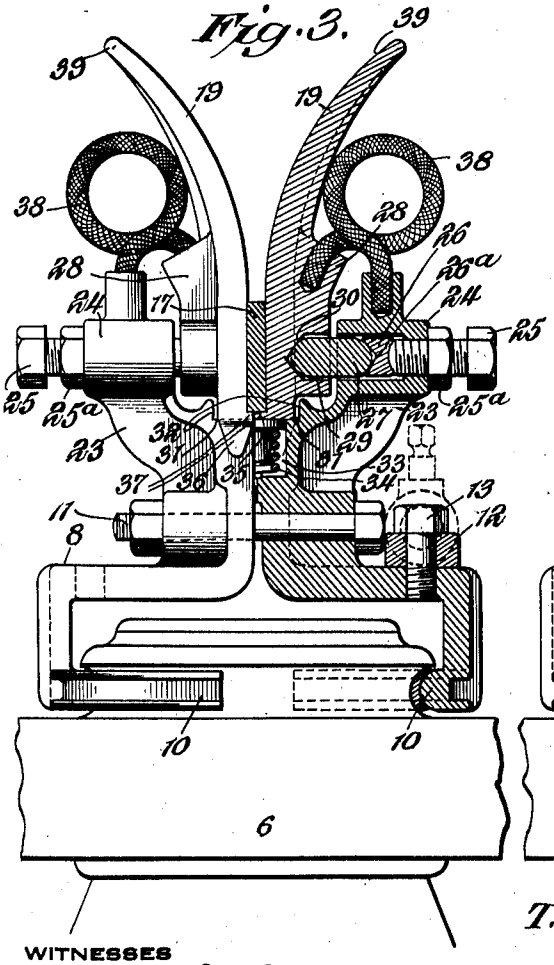

Fig. 4.

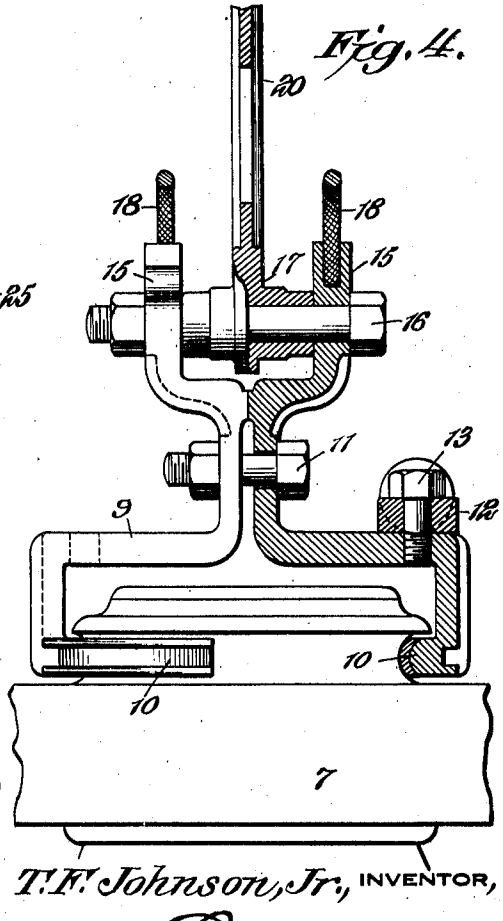

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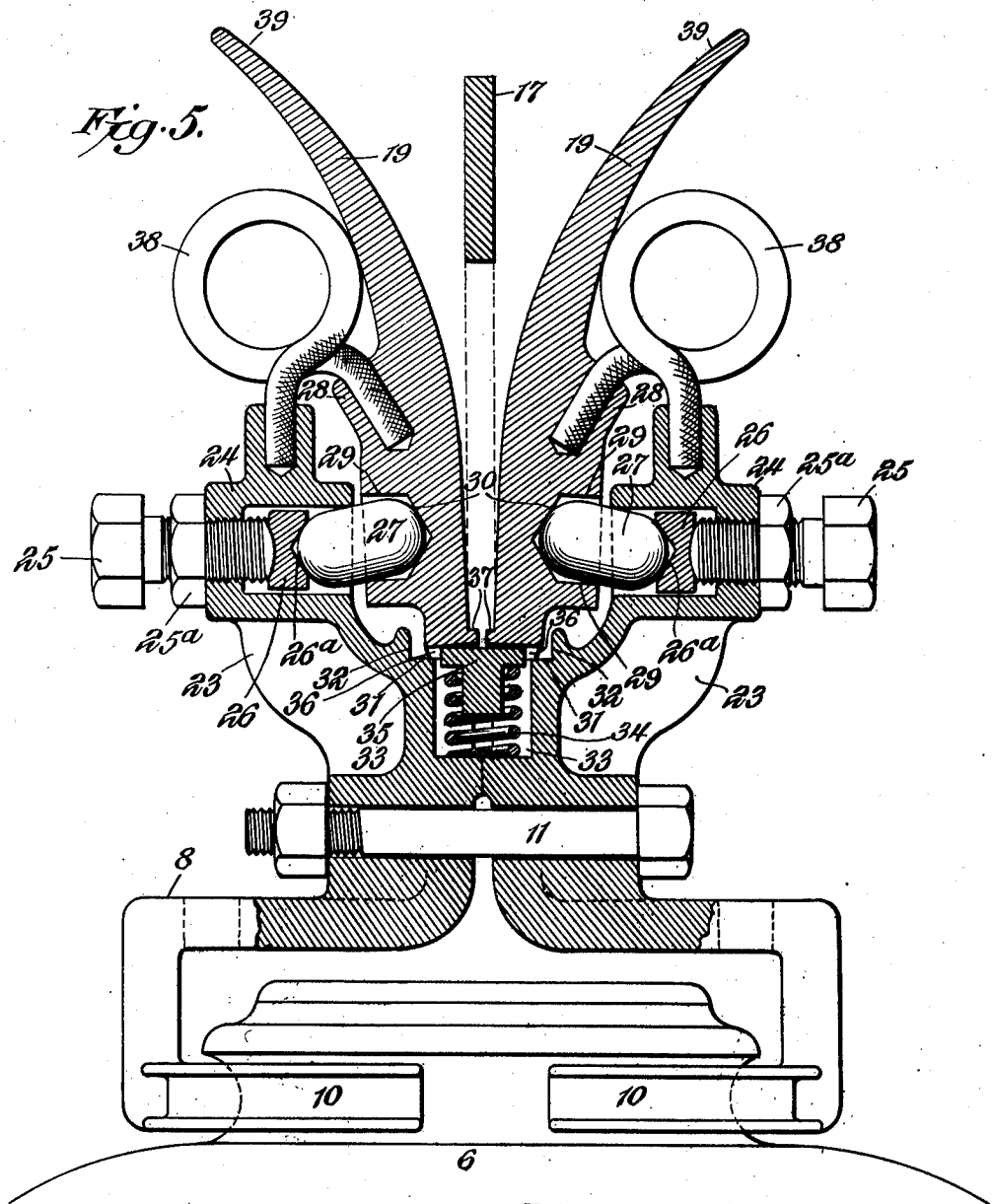
Fig. 5.



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Patented Nov. 3, 1925. 1,560,165

UNITED STATES PATENT OFFICE.

TOMLINSON FORT JOHNSON, JR., OF ATLANTA, GEORGIA.

HIGH-TENSION SWITCH.

Application filed November 17, 1923. Serial No. 675,367.

To all whom it may concern:

Be it known that I, TOMLINSON F. JOHNSON, Jr., a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented a new and useful High-Tension Switch, of which the following is a specification.

This invention relates to an improved switch, which is particularly adapted to high tension transmission lines.

In switches used in modern electric transmission lines, where it is not unusual to carry a voltage as high as 220,000, it is of a special importance to secure an accurate fit and firm contact between the switch blade and the jaws throughout their meeting surfaces. Attempts heretofore made to accomplish this result have depended upon the use of spring pressed jaws, which are spread by the blade upon entering between the same. With this construction, the jaws grab the blade as it enters between them, and the blade must be forced down to the bottom of the contact against the friction thus created. The jaws thus constructed are not self-alining, can not be ground to an accurate fit, and are easily bent by the blade in closing the switch should the blade not meet the jaws accurately. On overloads the jaws become overheated and consequently annealed, and since they depend upon the spring action of the metal composing the jaws for their contact, this overheating results in a loss of resiliency, the current carrying capacity is diminished, and the switches burn up. Then too, if the jaws are held against the switch with sufficient pressure to insure the proper contact under these conditions, it is impossible to open the switch.

The general object of the present invention is to provide a switch which will have none of the above objectionable features, a switch which is absolutely self-alining, and which may be ground in emery and oil to a perfect fit, a switch which may be easily opened and closed, but which when closed establishes a firm contact of great pressure, so that an enormous load my pass therethrough without excessive heat. Moreover, the switch is so constructed that if it did heat, no injurious effect would result.

With the above and other objects in view the invention comprises a pair of jaws having a slight oscillatory movement tangential to the direction of movement of the switch blade, being carried by pressure members which swing downwardly with the jaws as the switch blade is closed, with a toggle action, which causes the jaws to suddenly grab the blade with tremendous pressure at the end of its downward movement.

The construction of the invention and the principles of its operation will be more fully understood from the following detailed description taken in connection with the accompanying drawings, which illustrate the preferred form of the invention.

In the drawings:

Figure 1 is a side elevation of the invention shown in connection with a transmission line.

Figure 2 is a plan view thereof.

Figure 3 is a view, partly in elevation and partly in section, showing the jaws and the relative position of the same to the switch blade when closed.

Figure 4 is a view, partly in section and partly in elevation, showing the mounting of the switch blade.

Figure 5 is a vertical section with parts in elevation, the jaws being shown as held open to receive the switch blade.

The invention is shown in connection with an electric transmission system, which includes a bar 5 supporting the spaced insulators 6 and 7, on which are secured the bronze brackets or supports 8 and 9, respectively. Each of these brackets or supports consists of a pair of complementary sections connected by a bolt 11 and having semicircular clamping members 10, which embrace the upper end of the insulator. A suitable lug 12 is secured to each bracket by a set screw 13 or the like, and receives a conductor 14, which is connected to the incoming or outgoing line as the case may be. The bracket 9 is formed with upstanding spaced ears 15, which support a pivot bolt 16 on which is pivoted the switch blade 17, which is electrically connected to the bracket 9 and conductor 14 through the medium of flexible conductors 18. The switch blade 17 when closed, as shown in full lines in Figure 1, forms a contact with the jaws 19, which are specially constructed in accordance with my invention, as will be hereinafter more fully described. The switch blade 17 is preferably provided with an upstanding arm 20, and both the blade and the arm are provided with a curved lug or hook 21 for engagement by a suitable implement in opening or

closing the blade. The rear end of the blade is provided with a heel 22, which engages against the outer side of the bracket 9 to support the blade when in open position. The sections of the bracket 8 have integral upwardly and outwardly extending arms 23 of particularly strong construction, so as to withstand enormous pressure, and these arms terminate in opposed cylindrical sockets 24, into the bottom of which are threaded adjusting screws 25. Each of these adjusting screws may be secured in its adjusted position by a lock nut 25ª. Bearing against the inner end of each screw 25 is a head 26 having a conical seat 26ª, which is adapted to receive the end of a pressure member 27. This pressure member is substantially elliptical shaped or in the shape of a capsule, with rounded ends, and is somewhat smaller in diameter than the socket 24, so that it has a limited rocking movement on its seat 26ª. Each of the jaws 19 is also of particularly strong construction, and is thickened at 28 to provide a socket for receiving the end of a conductor loop 38. In the outer face of each jaw, near its lower end, there is formed a cylindrical recess 29, terminating in a conical seat 30 adapted to register with the corresponding conical seat 26ª in the end of the screw 25.

From the construction thus far described, it will be noted that the jaws 19 have a limited oscillatory movement, both laterally and in the direction of movement of the blade 17, the movement in an upward direction being limited by the engagement of the side of the pressure member 27 with the upper side of the socket 24, and when the jaws 19 are moved downwardly, the pressure members 27 are moved into alinement with the screws 25 and with each other, so as to exert pressure from opposite sides against the outer faces of the jaws.

Opposed offsets or shoulders 31 are formed on the sides of the bracket 8 between flanges 32, which form guides for the jaws 19. Extending downwardly between these shoulders is a cylindrical socket 33, within which is located an expansile coiled spring 34 supporting a head 35, which presses against the lower ends of the jaws. The strength of the spring 34 is sufficient to hold the jaws 19 upwardly in the position shown in Figures 1 and 5, with their opposed faces diverging upwardly when the switch is open, but the spring 34 is easily held compressed by the pressure of the jaws against the blade 17 when the latter is closed. The jaws 19 have lips 36 extending downwardly from their sides to prevent lateral disalinement, and are also provided with inwardly extending shoulders 37 against which the blade 17 may engage as it is moved downwardly between the jaws. If the contact is tight, however, the friction of the blade in entering the jaws causes the same to grab the blade without the latter coming in contact with the shoulders 37. The jaws are electrically connected to the sections of the bracket 8 and to the incoming line by suitable flexible conductors 38. The upper ends of the jaws are curved outwardly, as at 39, so as to receive and guide the blade 17 into alinement therewith.

From the foregoing description, it will be seen that when the switch is open the jaws 19 will be held upwardly by the spring 34 and head 35. The pressure members 27 will be inclined upwardly and inwardly from the conical seat 26ª, and the inner surfaces of the jaws 19 which are ground so as to form a smooth and uniform contact with the blade 17 will be inclined upwardly and outwardly. As the blade 17 is thrown downwardly to close the switch, it will move between the jaws, the friction of the blade in entering causing the jaws to approach each other and grab the blade, whereupon further downward movement of the blade will carry the jaws downwardly against the resistance of the spring 34, until the lower edges and the pressure members 27 are brought substantially into alinement. If the jaws when raised are slightly out of parallelism, or if the switch blade 17 is slightly bent, the curved faces 39 of the jaws will automatically bring the blade and jaws into alinement. As the jaws approach their lowermost position they grab the blade 17 with tremendous force and form a complete and uniform contact therewith, capable of carrying a current of any capacity. The pressure of the contact of the jaws against the blade is absolutely independent of the strength of any spring. This pressure may be varied at will. This oscillatory movement of the jaws is of comparatively limited extent, and the pressure exerted by the members 27, which have a relative movement similar to that of a toggle is correspondingly great. The force of this pressure may be regulated by the adjustment of the screws 25. By the reapeated opening and closing of the switch, the meeting surfaces of the pressure member 27 and the seats 26ª and 30 may be ground to a perfect fit. Upon withdrawing the blade from between the jaws the latter separate thus releasing the blade easily.

Owing to the positive action of the pressure members 27 upon the jaws, the operation of the switch will not be affected by heating, and since there is no spring action in the jaws themselves, they may be made of heavy cast bronze, brass or copper capable of withstanding any pressure without injury. Owing to the oscillatory movement of the jaws which permits them to move with the blade 17, it is still possible to open and close the latter with a pressure many

times as great as would be possible if the jaws had a fixed support.

While I have shown and described the specific construction of the invention in its preferred form, it is to be understood that this is merely illustrative, and that various changes may be made in the size, shape and relative arrangement and construction of the various details without departing from the salient features of the invention, which include, primarily, a pair of jaws for receiving the switch blade, which jaws have an oscillatory tangential movement with respect to the path of movement of the blade.

What is claimed is:

1. A switch comprising a pair of spaced jaws with opposed plane faces, and a switch blade movable into contact with said plane faces to close the switch, said jaws being movable in the same direction with the blade as the latter approaches its closed position.

2. A switch comprising a pair of spaced jaws with opposed plane faces, a blade movable into contact with said plane faces of the jaws for closing the switch, means for holding the jaws with their faces outwardly divergent when the blade is open, said jaws having a limited movement in the same direction as the blade when the latter moves into position between them.

3. A switch comprising a pair of spaced jaws with opposed plane faces, a switch blade movable into contact with said faces to close the switch, and means for mounting the jaws whereby on pressing the blade between the jaws, the jaws approach each other, thereby exerting a heavy pressure on the blade, and on withdrawing the blade from between the jaws the latter separate thus releasing the blade.

4. A switch comprising a pair of jaws with opposed flat faces and flared ends, and a switch blade movable between said flared ends into contact with the flat faces, said jaws having a limited lateral oscillatory movement, whereby they automatically aline with said blade.

5. A switch comprising a pair of jaws with opposed flat faces, and a switch blade movable into contact with the flat faces to close the switch, said jaws being so supported that they have a limited free oscillatory movement laterally and horizontally.

6. A switch comprising a pair of spaced jaws with opposed plane faces, a switch blade movable into contact with said faces to close the switch, and means for mounting the jaws whereby they are caused to move downwardly to a limited extent upon the movement of the blade.

7. A switch comprising a support, a pair of movably mounted jaws with opposed plane faces, a switch blade movable into contact with the plane faces to close the switch, and pressure members connected with the jaws to impart a toggle action thereto upon movement of the blade between the jaws.

8. A switch comprising a support having a pair of opposed seats, a pair of opposed pressure members extending inwardly from said seats and having a limited oscillatory movement, and a pair of opposed jaws loosely mounted on the inner ends of said pressure members and oscillatable therewith.

9. A switch comprising a support, a pair of opposed pressure members mounted in said support so as to have a limited universal rocking movement, and a pair of jaws loosely mounted on the inner ends of said pressure members and universally movable therewith, said jaws having flat opposed faces.

10. A switch comprising a support, pressure members mounted in said support so as to have a limited vertical rocking movement, a pair of jaws loosely mounted on said pressure members, and a spring held seat engaging the bottom of the jaws.

11. A switch comprising a support having spaced arms, pressure members extending inwardly from the arms and having a limited universal rocking movement, a pair of jaws loosely mounted on the inner ends of said pressure members and having flat opposed faces, and a spring held seat engaging the bottom of the jaws.

12. A switch comprising a support, opposed pressure members seated in said support, said pressure members having a limited rocking movement, a pair of jaws loosely supported on said pressure members, and means for adjusting said pressure members inwardly.

13. A switch comprising a support, inwardly adjustable opposed seats mounted in said support, pressure members extending inwardly from said seats and having a limited rocking movement thereon, and a pair of jaws loosely mounted on the inner ends of said pressure members.

14. A switch comprising a support having a pair of spaced arms, a pair of pressure members extending inwardly from the arms and having a limited rocking movment, means for adjusting said pressure members inwardly, a pair of jaws mounted for oscillation on the inner ends of said pressure members, and a spring held seat engaging the bottom of the jaws.

15. A switch comprising a bracket having a pair of spaced arms, a pair of pressure members extending inwardly from the arms and having a limited universal rocking movement, means for adjusting said pressure members inwardly, a pair of jaws loosely mounted for oscillation on the inner ends of said pressure members, and a spring held seat engaging the bottom of the jaws.

16. A switch comprising a support having a pair of spaced arms with opposed alined sockets therein, opposed pressure members seated in said sockets, each of said pressure members being rounded at the ends and having a circular cross section of less diameter than the socket so as to have a limited free rocking movement in the socket, and a pair of opposed jaws having sockets in their outer faces receiving the inner ends of the respective pressure members.

17. A switch comprising a bracket having a pair of spaced arms with opposed alined sockets therein, opposed pressure members pivotally seated in the bottoms of the sockets and each having a circular cross section of less diameter than the sockets so as to have a limited universal rocking movement therein, a pair of opposed jaws having sockets in their outer faces receiving the inner ends of the respective pressure members, and means for limiting the downward movement of the jaws.

18. A switch comprising a bracket having a pair of spaced arms with opposed alined cylindrical sockets therein, a pair of opposed pressure members disposed within said sockets, each of said pressure members having a circular cross section of less diameter than the socket, an inwardly adjustable seat in the bottom of each socket in which the outer end of the pressure member bears, and a pair of opposed jaws having sockets in their outer faces receiving the inner ends of the respective pressure members.

19. A switch comprising a support, pressure members mounted therein having a limited oscillatory movement, a pair of jaws loosely mounted on said pressure members, spaced flanges on said support forming guides for the lower ends of the jaws, a socket below the space between the flanges, a head mounted in the socket, and a spring for holding the head in contact with the lower ends of the jaws.

20. A switch comprising a support, pressure members mounted therein and having a limited oscillatory movement, a pair of jaws loosely mounted on said pressure members, and lips extending downwardly from the jaws along the sides of the support to prevent lateral disalinement of said jaws.

21. A switch comprising a support, pressure members mounted therein and having a limited oscillatory movement, a pair of jaws loosely mounted on said pressure members, and inwardly extending shoulders at the lower ends of the jaws.

22. A switch comprising a support, pressure members mounted therein and having a limited oscillatory movement, a pair of jaws loosely mounted on said pressure members, said support having a socket below the lower ends of the jaws, and a spring-actuated head mounted in said socket to press against the lower ends of the jaws.

23. A switch comprising a support, pressure members mounted therein and having a limited oscillatory movement, a pair of jaws loosely engaged with said pressure members, and a switch blade movable into contact with the jaws, said jaws having a toggle movement imparted thereto by said pressure members upon movement of the blade between the jaws.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

TOMLINSON FORT JOHNSON, JR.