

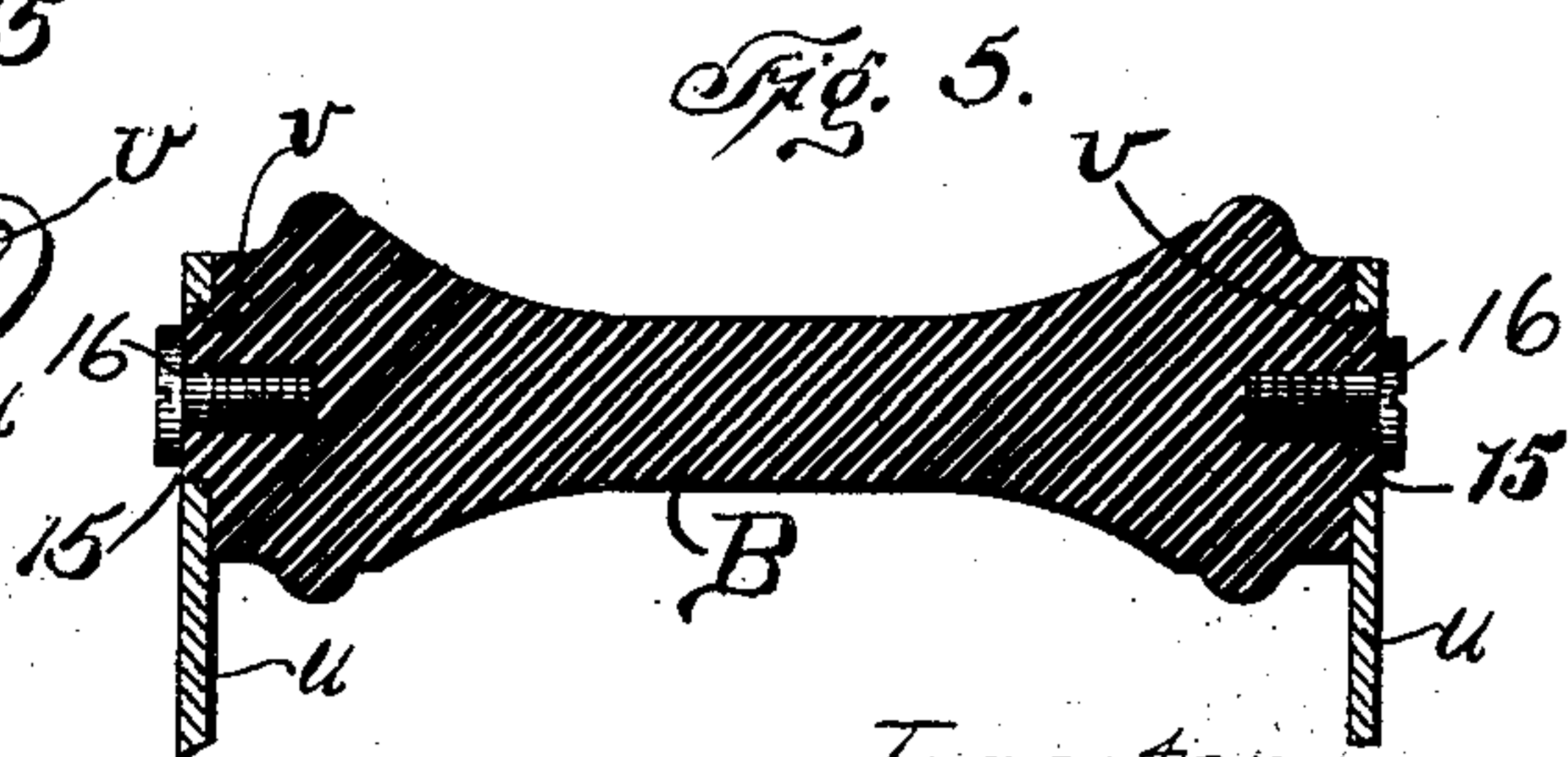
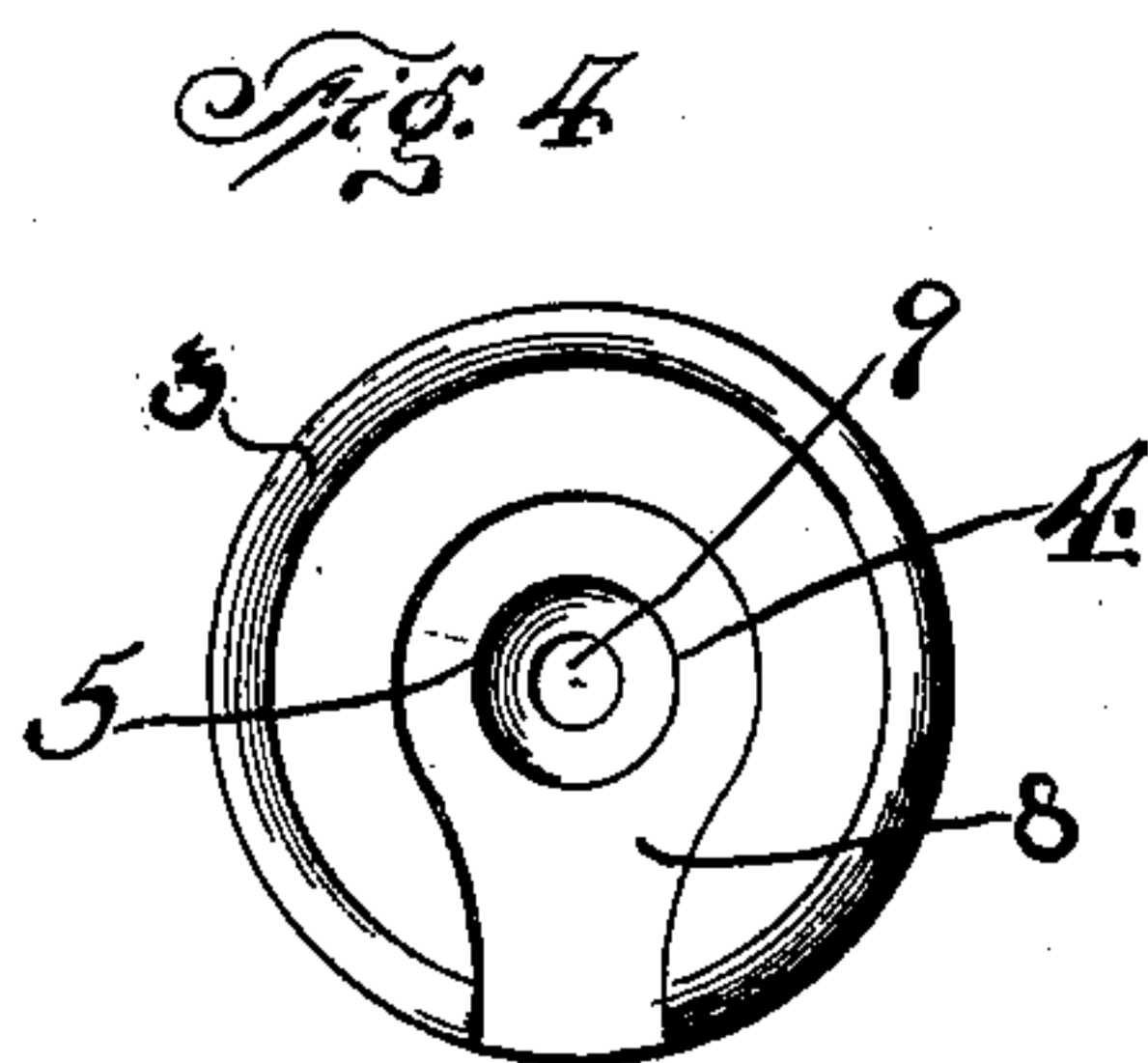
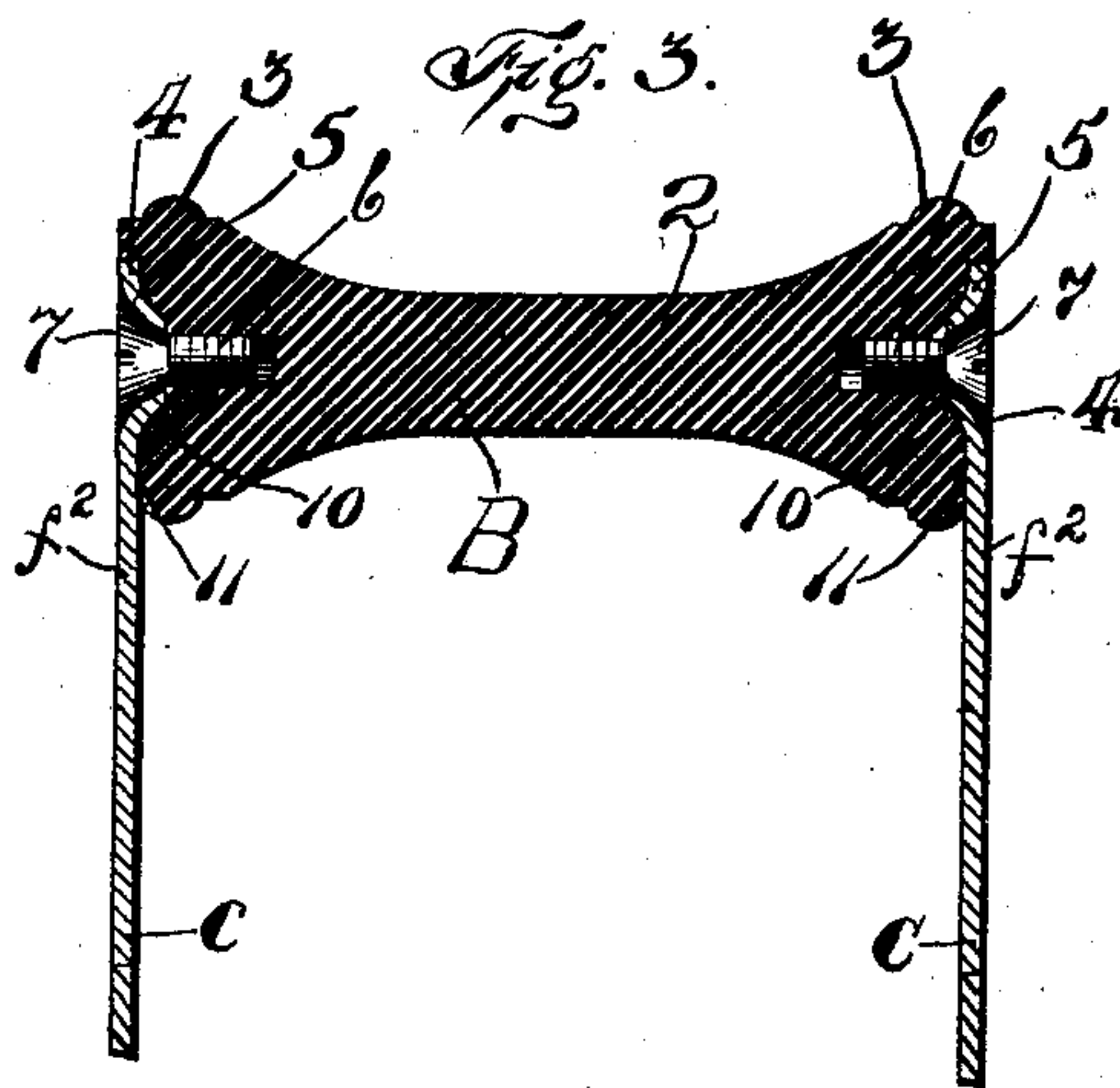
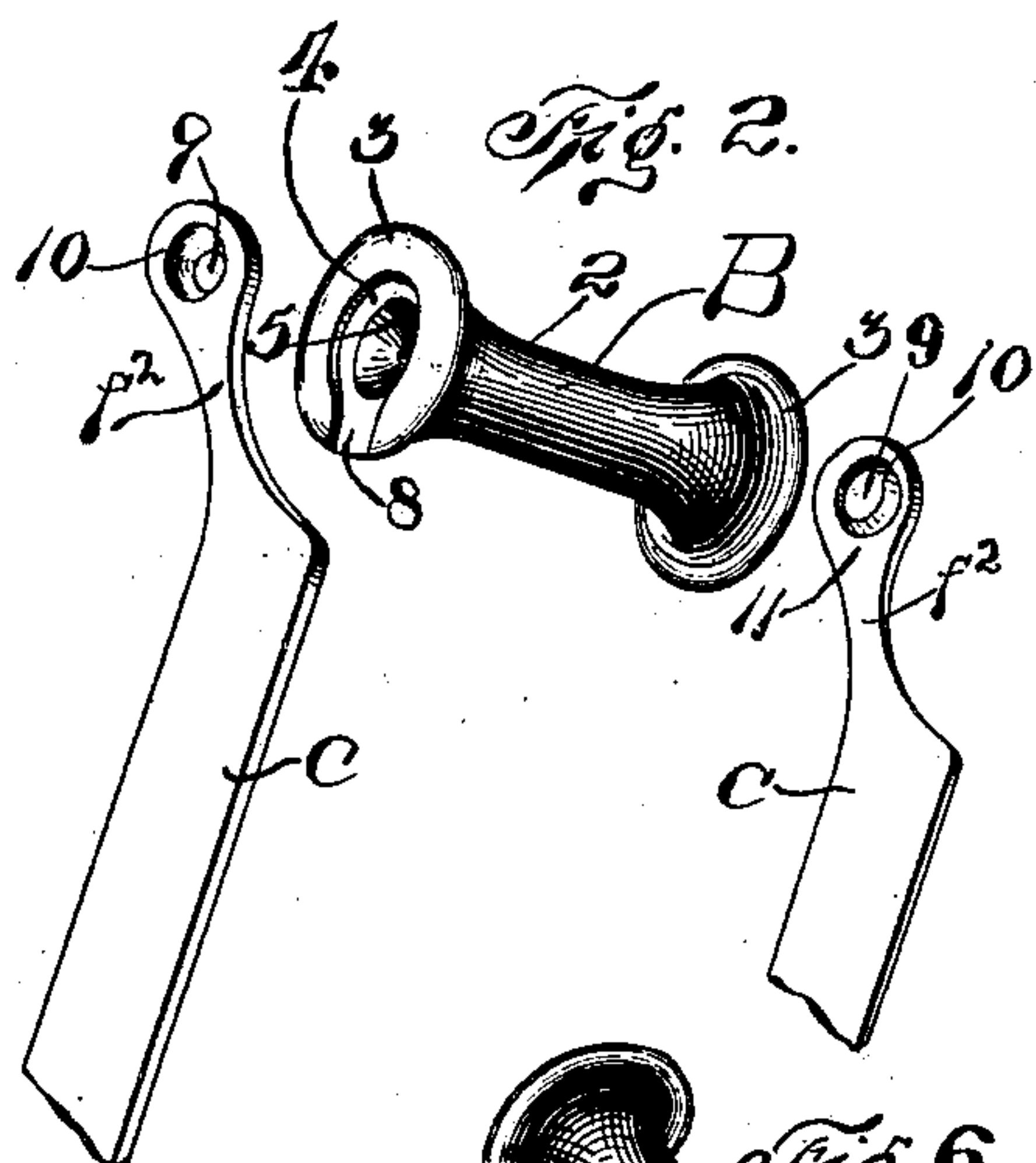
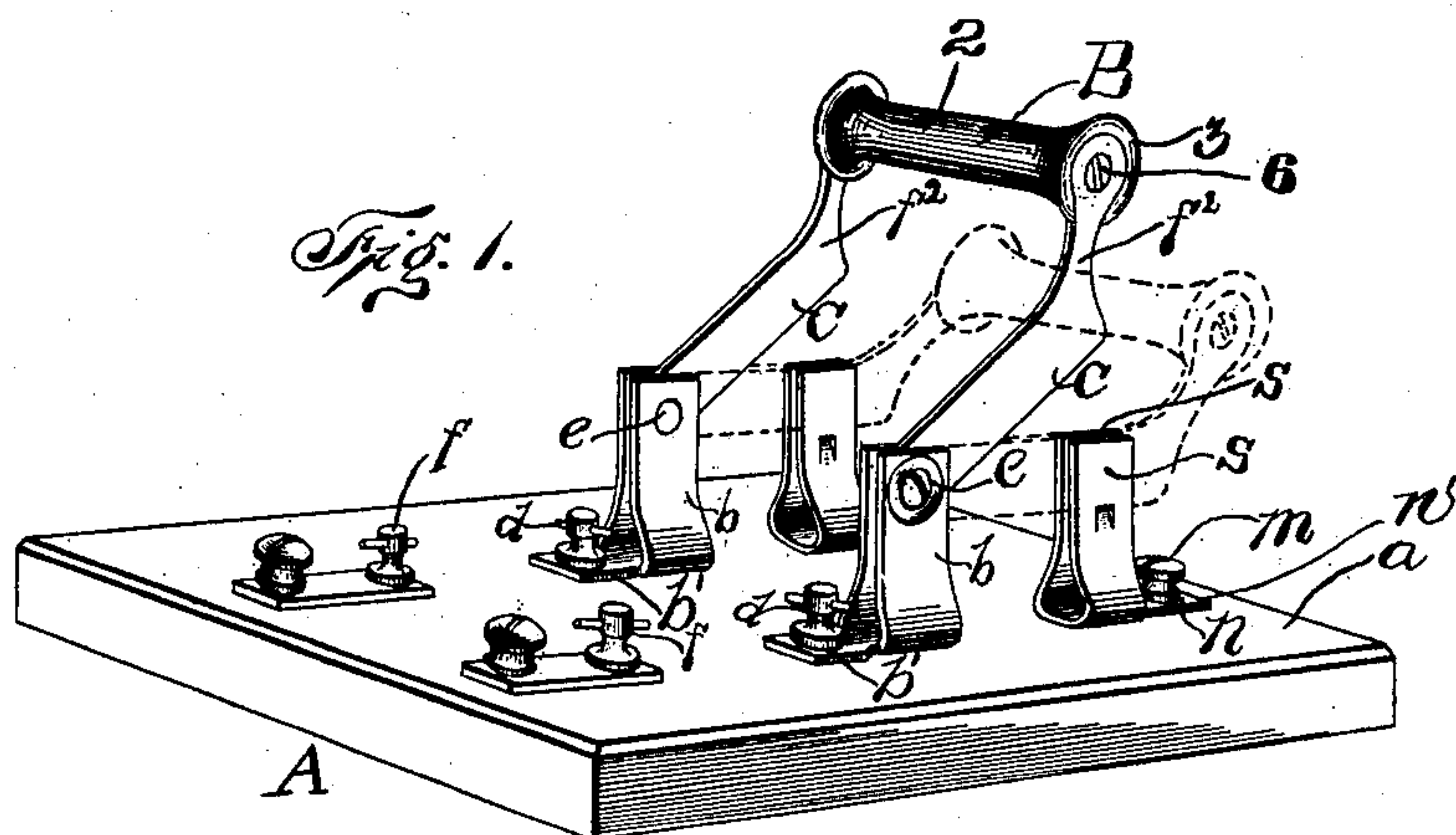
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PATENTED AUG. 11, 1903.

H. O. SWOBODA.  
ELECTRIC SWITCH.

APPLICATION FILED SEPT. 6, 1902.

NO MODEL.



Witnesses  
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# UNITED STATES PATENT OFFICE.

HANS O. SWOBODA, OF EAST ORANGE, NEW JERSEY.

## ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 735,841, dated August 11, 1903.

Application filed September 6, 1902. Serial No. 122,290. (No model.)

*To all whom it may concern:*

Be it known that I, HANS O. SWOBODA, a citizen of the United States, residing in East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

This invention relates to electric switches; and it consists, substantially, in the improvements hereinafter particularly described.

Though applicable to electric switches of different kinds, the present improvements have reference more especially to hand-operated "double-pole" switches, such as are employed in electric lighting and other systems for altering connections of a line or circuit or for connecting one circuit with another—as, for instance, a local circuit with a main-line circuit, whereby electric current may be supplied to one or more lamps or other devices included in the local circuit. An electric switch of this character usually comprises duplicate straight arms or members of conducting material which are pivoted at one of their ends adjacent to or intermediate the termini of each of the two electric circuits to be connected, while the other ends thereof are joined together or united by a bar or block of insulating material, either provided with or itself constituting a handle for manipulating the switch, the said handle in many instances being secured in place by means of screws passing through openings in the switch arms or members and entering corresponding openings in the ends thereof. This construction of switch possesses certain advantages in use; but owing to the frequency with which the switch is operated the fastening-screws for the handle soon become loose, and either the screws or handle (one or both) often drop or fall away from their supports and become lost or broken, and consequently the switch is rendered incapable of being manipulated in the manner intended.

One of the principal objects of the present invention is to overcome the above-mentioned inconveniences and disadvantages and to provide an electric switch of this character with means whereby the handle thereof is securely held in place against manipulative or other forces tending to loosen the same and also to simplify the construction of both the

handle and its fastening and to cheapen the cost of manufacture of the switch as a whole.

A further object is to provide means whereby the manipulation of the switch may be effected more easily and also to reduce the size of the handle of the switch to considerably smaller compass than in many instances hitherto.

The above and additional objects are attained by means substantially such as are indicated in the accompanying drawings, wherein—

Figure 1 is a view in perspective of a double-pole electric switch embodying my improvements. Fig. 2 is a view in perspective of portions of the movable arms or contact members, together with the handle of the switch, the said parts being in segregate relation to more clearly illustrate the construction thereof. Fig. 3 is an enlarged sectional view of the handle and portions of the movable arms or contact members of the switch. Fig. 4 is an end view of the switch-handle detached. Fig. 5 is a view similar to Fig. 2, representing a modification of the means for fastening the switch-handle in place. Fig. 6 is a perspective view of the form of handle represented by said modification.

Before proceeding with a more detailed description it may be stated that I preferably employ a double-pole electric switch, which in respect to the connections for the terminals of the electric circuits and the stationary contact devices may be of ordinary or well-known construction or embodiment, and I may also employ movable arms or contact members which are straight throughout, which construction or embodiment is also well known. Preferably, however, I provide movable arms or contact members of special form, whereby when the switch is closed the handle thereof is maintained in position beyond the live conducting portions of the switch, thus to enable application of the finger to the handle without liability to electric shock, the said movable arms or contact members being duplicates of each other and the handle being of insulating material, as is apparent. I preferably employ a handle of special form or embodiment, and I also employ special means for fastening the same in place between the outer end portions or extremities of the said mov-



able arms or contact members, it being here mentioned, however, that the particular form of said latter elements is in no wise dependent upon the particular form of the handle and its fastening means, nor vice versa. The construction and organization of parts or elements constituting my improvements are both simple and effective, and it will be understood that I am not limited thereto in the precise details herein shown and referred to, since departures therefrom may be made and still come within the scope of my invention.

Specific reference being had to the accompanying drawings by the designating characters marked thereon, A represents a double-pole electric switch comprising a suitable base *a*, of insulating material, having mounted thereon duplicate supports *b b* for the movable arms or contact members *c c* of the switch, said supports being secured in place by means of binding-screws *d d* passing through base portions *b' b'* thereof, and each support being preferably formed of a strip of copper or other electric conducting material which is bent upwardly or outwardly from its said base portion, the two branches of each support being brought together, as shown, so as to yieldingly clamp between them the sides of the inner end of the movable arm or member *c* cooperating therewith. The inner ends of the movable arms or contact members *c c* are held in position between the said branches of the duplicate supports *b b* by means of screws *e e* passing through corresponding openings therefor in both the said arms or members and the said branches, as shown, and it is apparent that a good electrical connection is thus established between said parts. The base *a* is provided at one side of the supports *b b* with binding-screws *f f*, to which connection of the terminals of the main-line conductors (not shown) may be made, while at the opposite side of said supports the said base is provided with contact devices *m m*, to which connection of the terminals of the conductors (not shown) of a local or some other electric circuit may be made through the medium of binding-screws *n*, passing through base portions *n'* of said contact devices, as indicated in Fig. 1 of the drawings. Each of said contact devices *m m* is constructed of a strip of conducting material bent upwardly or outwardly from its base portion, as shown, and having the two branches *s s* thereof brought together to enable the corresponding movable arm or contact member *c* to be carried therebetween in close contact (see dotted lines, Fig. 1) to form electrical connection therewith, the construction described being well known. To enable the movable arms or contact members *c c* to be operated together, the outer ends or extremities thereof are joined or united by means of a handle B, of insulating material, and in order that such handle may be maintained in position beyond the contact devices *m m* (in the closed relation of the switch) I

preferably construct said movable arms or contact members with corresponding angular projections *f<sup>2</sup> f<sup>2</sup>*, it being between the ends of such projections that the said handle is directly secured, as shown. In this way the switch may be operated or manipulated by the finger of the hand without liability of contact with live conducting portions of the switch, and it is of course apparent that this feature of my improvement is not dependent for its results upon the particular form of handle or fastening therefor. As before stated, however, it often happens in electric switches of this type that either the handle or its fastening works loose from the frequency with which the switch is operated, and to obviate which I have devised the special form of handle and fastening therefor about to be described. Thus I preferably construct the said handle B substantially spool-shaped—that is to say, straight and comparatively slender—as indicated at 2, and having the end portions 3 3 thereof enlarged, each of said end portions being formed in the outer face thereof with a substantially circular recess 4, the base of which in turn is sunken to form a substantially conical recess 5, communicating with a centrally-disposed circular cavity 6, the walls of which are threaded, as shown, the said cavities receiving screws 7 7, by which the said handle is held in place between the ends of the said angular projections *f<sup>2</sup> f<sup>2</sup>* of the movable arms or contact members *c c*. Each of the said end portions 3 3 of the handle is formed also in its outer face with a radial groove or notch 8, said notches corresponding in position, and it will be observed that the angular projections *f<sup>2</sup> f<sup>2</sup>* of the movable arms or contact members are reduced in width to fit snugly between the sides of said grooves or notches. It will further be observed that the said angular projections are formed with screw-holes 9 9, through which the fastening-screws 7 7 are inserted in the said cavities 6 6 therefor, and also that the material of the angular projections surrounding said holes is sunken inwardly to form conical protuberances 10 10, which snugly fit the conical recesses 5 5 in the ends of the handle, the inner surface portions 11 11 of the angular projections being left flat all around said protuberances to fit against the corresponding flat surface portions of the bases of the recesses 4 4. The ends or extremities of the angular projections of the movable arms or contact members *c c* are enlarged and shaped on their outer edges to snugly fit within the said recesses 4 4, and it will be seen that said arms or members are thus countersunk or brought flush with the extreme outer surfaces of the ends of the handle, while the heads of the fastening-screws are also countersunk or brought flush therewith, the construction thus furnished or presented being both stable and symmetrical. I thus provide means whereby the handle is locked against movement relatively to either the fastening-screws therefor or the



movable arms or contact members, and by making the said handle of reduced diameter for the greater part of its length, as shown and described, I am enabled to considerably  
 5 reduce the length of the angular branches  $f^2$   $f^2$  and still provide an ample amount of space for the introduction of a finger of the hand beneath the handle for the purpose of opening the switch or separating the movable  
 10 arms or contact members from engagement with the stationary contact devices  $m m$ .

The means described for locking the handle B in place are such as are preferred in most instances; but it is of course apparent  
 15 that other equivalent means may also be sometimes employed. Thus, as shown in Figs. 5 and 6 of the drawings, I may construct the outer faces of the ends of the handle with substantially oblong (or any other  
 20 form than round) protuberances 15 15, having cavities with threaded walls with which the threads of the fastening-screws 16 16 engage similarly as the fastening-screws referred to in the figures previously described.  
 25 In this embodiment the angular projections  $u u$  of the movable arms or contact members are formed with slots or oblong openings  $v v$ , in which the said protuberances are received when the handle is applied in position, and  
 30 the fastening-screws are inserted in the cavities through said slots or oblong openings with the heads of the screws bearing against the surrounding outer surface portions of the angular projections, as shown. If desired, I  
 35 may countersink the heads of the screws similarly as in the first instance referred to, and it may be stated that the purpose of making the protuberances 15 15 oblong is to obtain an increased locking engagement between the ends of the handle and the extremities of the angular projections of the movable arms or contact members. Other equivalent modifications of construction and organization of parts may also be resorted to,  
 45 as is apparent.

Having described my invention, I claim—

1. An electric switch comprising movable arms or contact members having relatively short angular projections therefrom at the  
 50 outer ends, and a handle of insulating material supported between the ends of said projections, the ends of said handle being constructed to be positively engaged by said projections to prevent the handle from turning  
 55 on its supports.

2. An electric switch comprising movable arms or contact members having relatively short angular projections therefrom at the outer ends, a handle of insulating material  
 60 located between the ends of the projections, and screws for holding the handle in place, the ends of said handle being constructed to be positively engaged by said projections to prevent the handle from turning upon said  
 65 screws.

3. An electric switch comprising movable arms or contact members having relatively

short angular projections therefrom at the outer ends, and a relatively thin handle of insulating material supported between the  
 70 ends of the projections, the ends of said handle being enlarged and constructed on their outer faces to be positively engaged by said projections to prevent the handle from turning  
 75 on its supports.

4. An electric switch comprising movable arms or contact members having relatively short angular projections therefrom at the outer ends, a relatively thin handle of insulating material located between the ends of  
 80 the projections, and screws for supporting the handle in place, the ends of said handle being enlarged and constructed on the outer faces thereof to be positively engaged by said projections to prevent the handle from turning  
 85 on the screws.

5. An electric switch comprising movable arms or contact members having relatively short angular projections therefrom at the outer ends, and a handle of insulating material supported between the ends of said  
 90 projections, said handle having radial notches in the end faces thereof with portions of said projections fitting between the sides of said notches.  
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6. An electric switch comprising movable arms or contact members having screw-holes near the outer ends thereof, a handle having cavities at the ends and formed also at the ends with radial notches for receiving portions of said arms or members, the walls of the cavities being threaded, and screws inserted in said cavities through said screw-holes for supporting the handle in position.  
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7. An electric switch comprising movable arms or contact members having screw-holes near the outer ends thereof and formed with inner conical protuberances surrounding such holes, a handle formed in its end faces with corresponding conical recesses for receiving said protuberances, and having cavities communicating with said screw-holes, the walls of said cavities being threaded and said handle having radial notches at the ends for receiving portions of said arms or members, and screws entering the cavities through said screw-holes for supporting the handle in position.  
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8. An electric switch comprising movable arms or contact members having screw-holes near the ends thereof and formed with inner conical protuberances surrounding such holes, the inner surface portions of the arms or members surrounding said protuberances being flat, a handle formed in its end faces with recesses having conical recesses in the bases thereof for receiving said protuberances, the surface portions surrounding said conical recesses also being flat to receive the said inner flat surface portions of the arms or members thereagainst, and the walls of the cavities being threaded and said handle having radial notches at the ends for receiving parts of said arms or members, and screws  
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entering the cavities through the screw-holes for supporting the handle in position.

9. An electric switch comprising movable arms or contact members having angular projections formed with screw-holes near the ends thereof, a handle reduced in diameter at its middle portion and having cavities at the ends, and formed also at the ends with radial notches for receiving portions of said arms or members, the walls of the cavities being threaded, and screws inserted in said cavities through said screw-holes for supporting the handle in position.

10. An electric switch comprising movable arms or contact members having angular projections formed with screw-holes near the ends thereof, and having inner conical protuberances surrounding such holes, a handle reduced in diameter at its middle portion and formed in its end faces with corresponding conical recesses for receiving said protuberances, and having cavities communicating with said screw-holes, the walls of said cavities being threaded and said handle having radial notches also at the ends for receiving portions of said arms or members, and screws entering the cavities through the screw-holes for supporting the handle in position.

11. An electric switch comprising movable

arms or contact members having angular projections formed with screw-holes near the ends thereof and having inner conical protuberances surrounding such holes, the inner surface portions of the arms or members surrounding said protuberances being flat, a handle formed in its end faces with recesses having conical recesses in the bases thereof for receiving said protuberances, the surface portions surrounding said conical recesses also being flat to receive the inner flat surface portions of the arms or members thereagainst, and the walls of the cavities being threaded and said handle having radial notches at the ends for receiving parts of said arms or members, and screws entering the cavities through the screw-holes for supporting the handle in position.

12. An electric switch comprising movable arms or contact members, and a handle of insulating material supported between the outer ends of said members, the ends of said handle being constructed to be positively engaged by portions of the members to prevent the handle from turning on its supports.

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