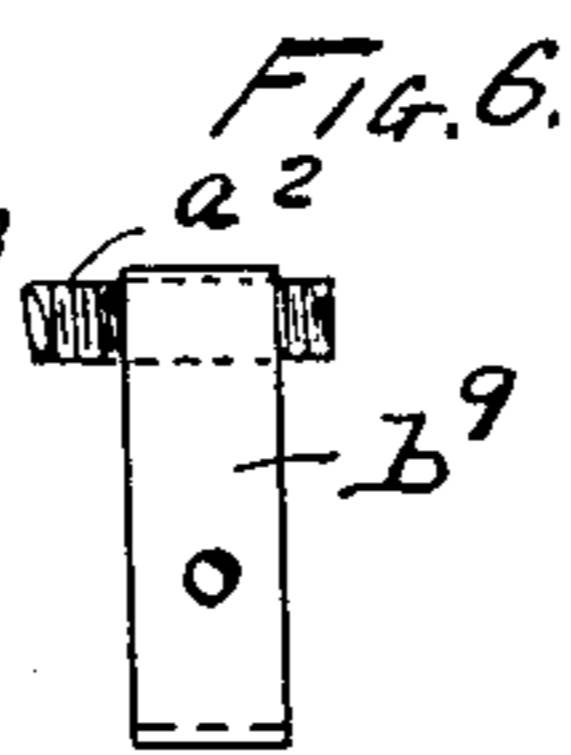
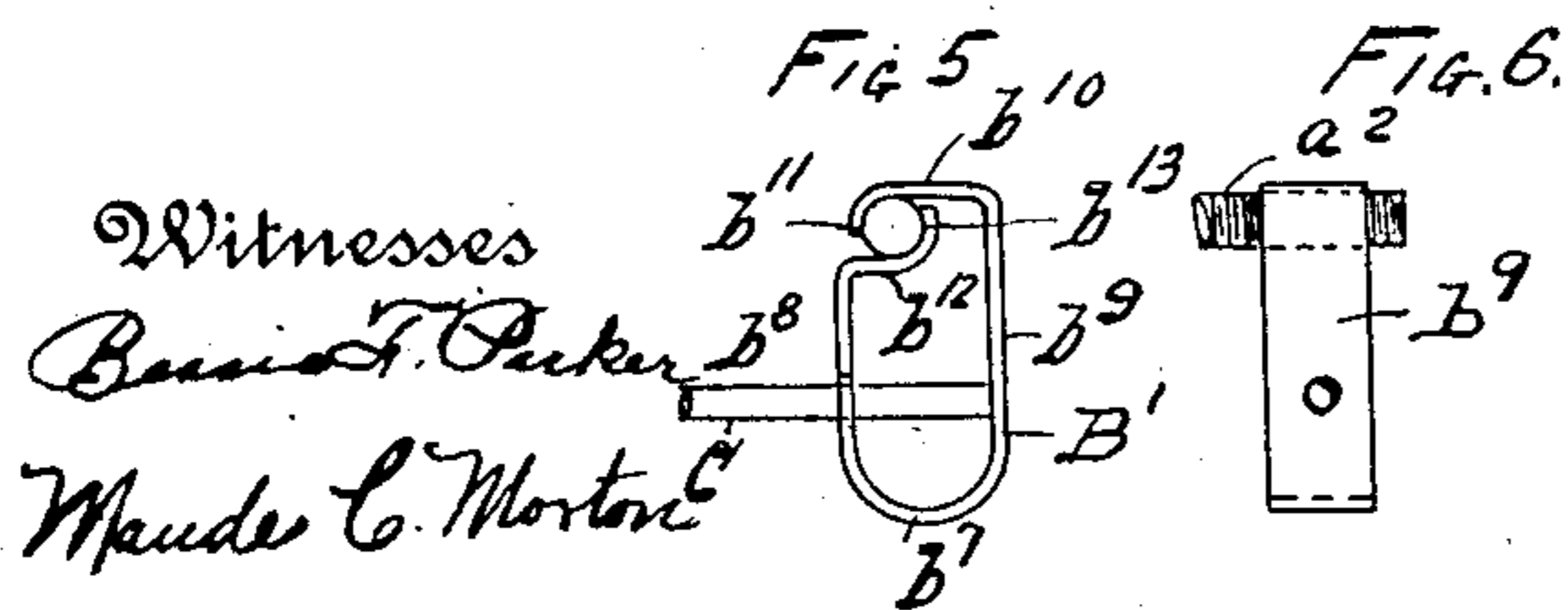
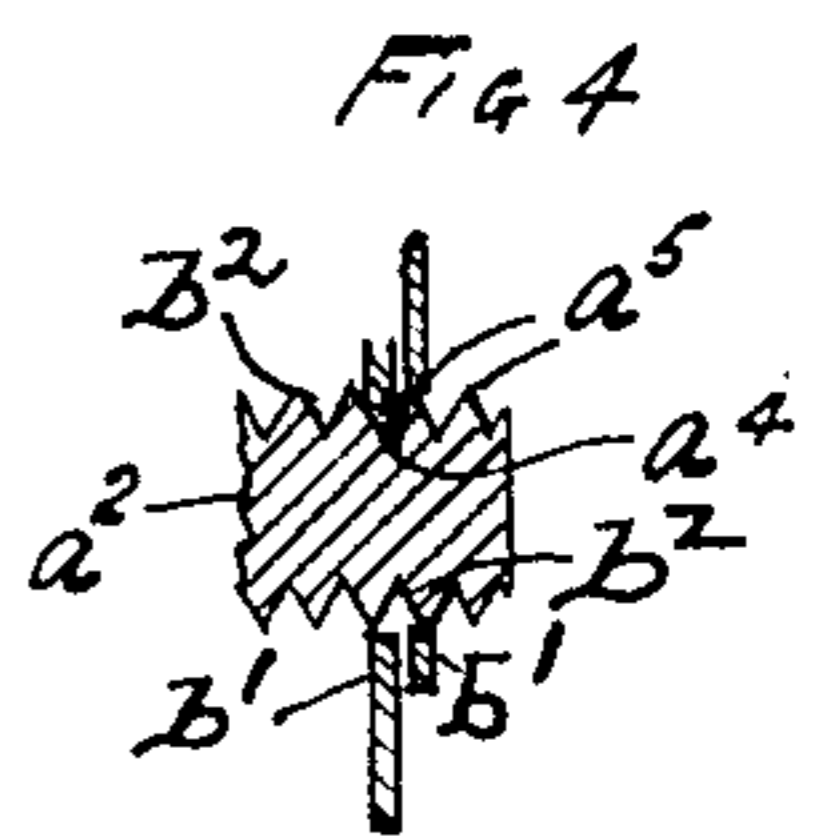
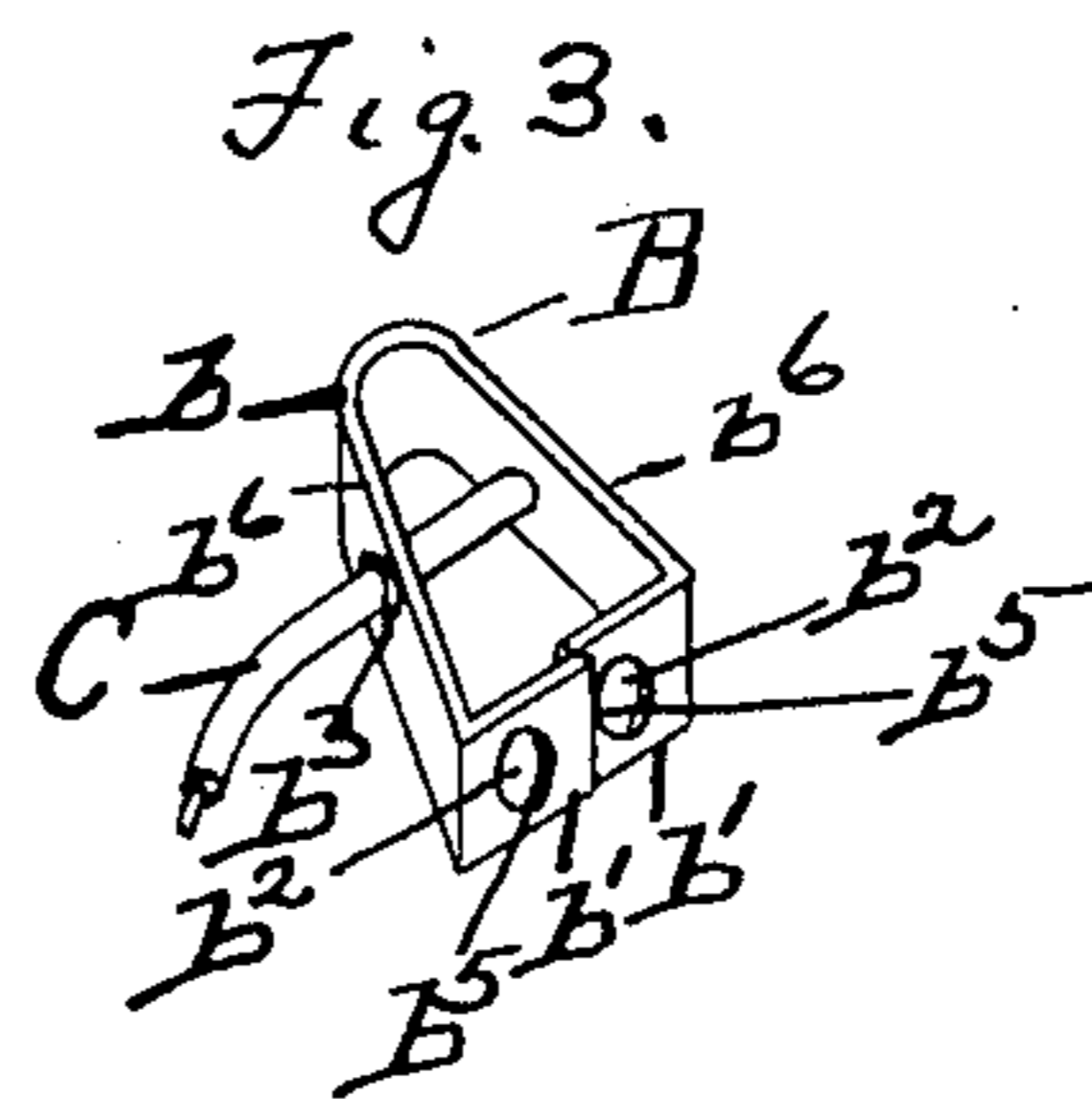
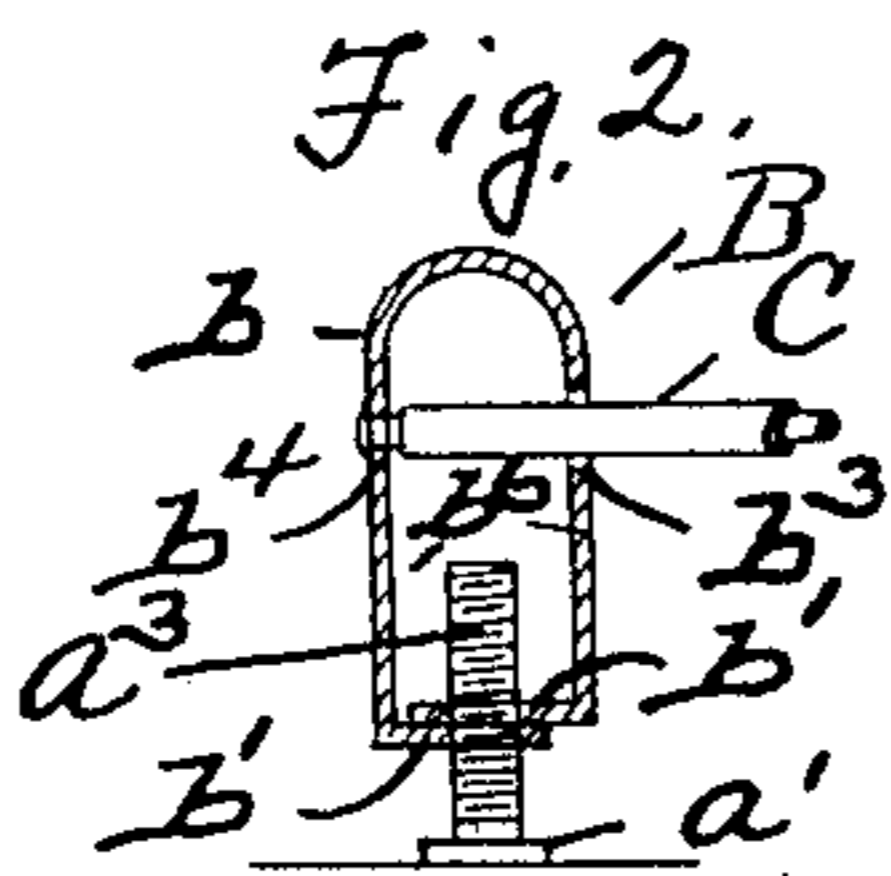
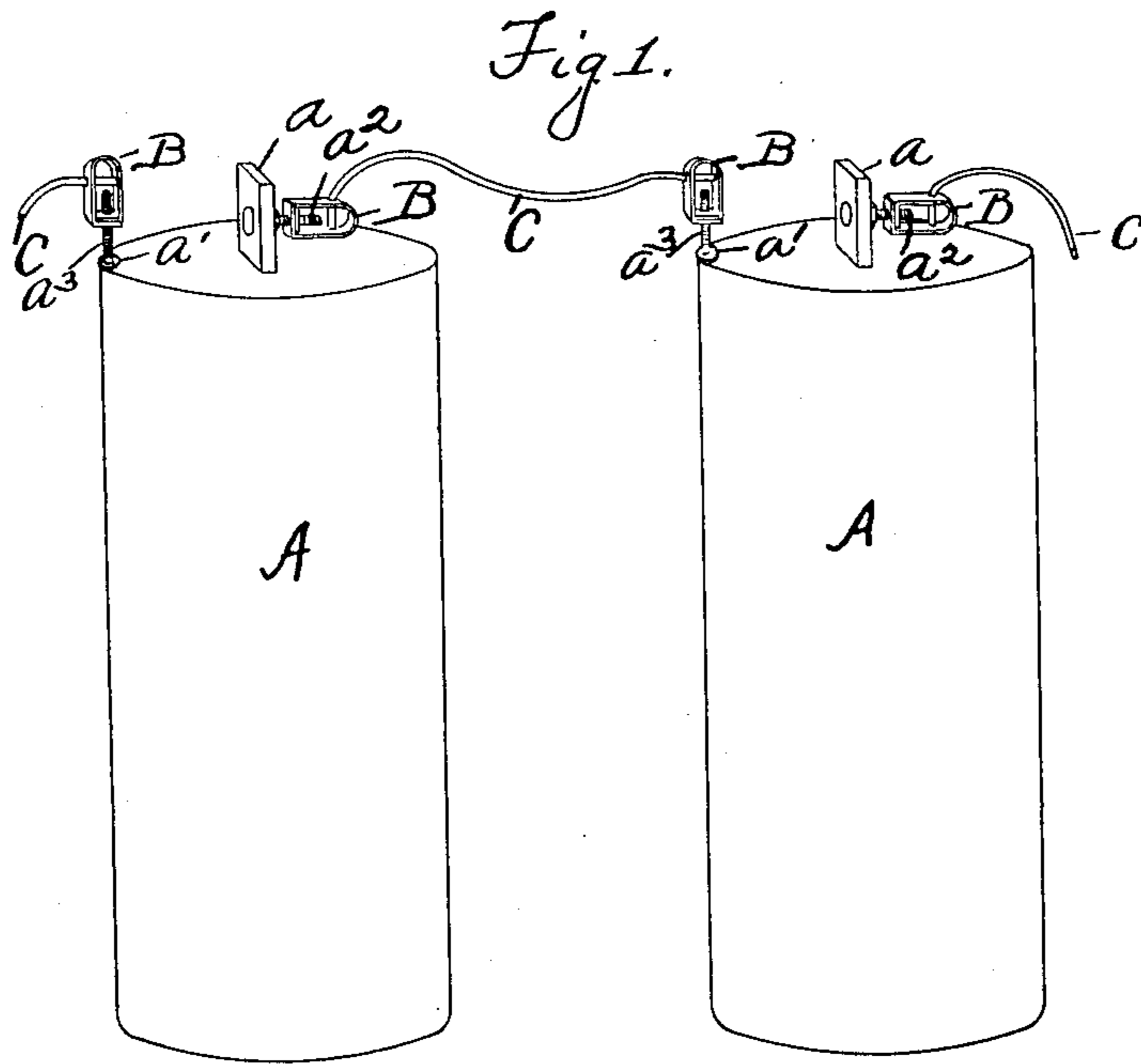


No. 882,514.

PATENTED MAR. 17, 1908.

F. O. BALL.
CONNECTION FOR ELECTRIC CONDUCTORS.
APPLICATION FILED JAN. 31, 1906.



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UNITED STATES PATENT OFFICE.

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CONNECTION FOR ELECTRIC CONDUCTORS.

No. 882,514.

Specification of Letters Patent.

Patented March 17, 1908.

Application filed January 31, 1906. Serial No. 298,736.

To all whom it may concern:

Be it known that I, FREDERICK O. BALL, a citizen of the United States, residing at Plainfield, in the county of Union, State of New Jersey, have invented new and useful Improvements in a Connection for Electric Conductors, of which the following is a specification.

This invention relates to connections for electric conductors, and consists in certain improvements in the construction thereof as will be hereinafter fully described and pointed out in the claims.

The objects of the invention are to form connections that may be readily applied and which when applied will maintain perfect contact. It is peculiarly adapted for use with electric currents of small volume and low voltage, as for instance the current developed by the ordinary dry cell.

Heretofore the common practice has been to use a flexible conductor with perforated disks. These are placed on a screw threaded stud on the cells and clamped in place by nuts. Seemingly this large area of contact would form a better connection than a smaller one, but unless care is used in preparing the surfaces, the naked metal is not brought into contact, and a poor connection is the result. Then too where this connection is used with the conditions such as to subject it to jar, the nut is apt to become loosened thus impairing the connection. With the small volume and voltage of the current developed from the ordinary dry cell, it is more important to have a perfect contact than a large area of contact. By making one of the contact surfaces in the form of a thin edge the naked metal may be brought into contact with a slight pressure, and if it is a spring pressed contact these conditions are maintained under all conditions of use. In fact if the connection is subjected to jar, the slight abrasion incident to it along the contact surfaces only serves to make the connection more perfect. I believe that the conditions for the most desirable connection for such currents can be best accomplished by attaching to the threaded or serrated stud of the dry cell a spring clamp presenting a thin edge as a contact surface on the stud. Under these conditions the thin contact edge of the clamp pressed by the spring will reach the naked metal of the stud and the threads or serrations will not only be efficient in add-

ing to the effect of the thin edge of the clamp in perfecting the contact, but also makes the attachment of the clamp more secure.

The invention is illustrated in the accompanying drawings as follows:

Figure 1, shows two dry cell batteries connected in series with my device as a means of connection. Fig. 2, shows a central section of the device. Fig. 3, shows a perspective view of the clamp. Fig. 4, shows an enlarged section of a fragment of the threaded stud and conductor plates of the clamp, illustrating the relative position assumed by these parts. Figs. 5 and 6, show front and side elevations of an alternative construction.

A A mark the two batteries; $a a$ and $a' a'$ the electrodes from which extend the serrated studs $a^2 a^2$ and $a^3 a^3$, the serrations being the usual threads of the studs.

The connection comprises the clamp B preferably formed of spring sheet metal, sufficiently thin to make a thin contact edge. As shown this clamp is formed of one piece having the spring loop b , conductor plates b' and the extensions b'' which are oppositely faced and connect the spring loop and conductor plates, and conveying the pressure of the spring to the plates exert an edgewise pressure on the plates. The extensions are preferably on opposite sides of a plane with which the axis of the stud coincides. The conductor plates are preferably provided with the perforations $b^3 b^3$ which when the sides of the clamp are sprung together are brought into register so that they can be passed onto the studs. Simply releasing the clamp forces the contact surfaces $b^5 b^5$ into engagement with the stud, and completes the attachment to the electrode. These contact surfaces are only the thickness of the conductor plates, the corners of which are pressed against beveled sides a^4 of the threads a^5 or on the sharp edges of the threads as clearly shown in Fig. 4 so that with a clamp that can readily be operated with the fingers, there is sufficient pressure to force the contact surfaces into intimate contact with the naked metal of the stud. The serrations also make the attachment secure, and any jar to which the connection is subjected only serves to increase the abrasion, thus maintaining a perfect contact.

In the alternative construction shown in Figs. 5 and 6 the thin edges of the threads or serrations a^5 are depended on to cut through

any foreign matter on the surface of the conductor plate. In this construction the spring clamp B' has the spring loop b^7 and oppositely faced extensions b^8 and b^9 . A conductor plate b^{10} projects from the extension b^9 and is bent over forming a contact surface b^{11} which engages the serrated stud a^2 . The conductor plate b^{12} projects from the extension b^8 and is turned at the end forming the contact surface b^{13} which is opposed to the surface b^{11} . While this connection is more desirable than that in common use, the attachment is not as secure as in the preferred construction, and by reason of the plurality of serrations in contact greater pressure must be exerted to maintain a perfect contact.

I attach the flexible conductor C preferably by passing it through the perforation b^3 in one of the extensions and securing the end in the perforation b^4 in the opposite extension. By this construction the attachment is strengthened as the attachment at b^4 cannot be subjected to a side pull. This mode of connection gives an initial direction to the flexible conductor at right angles to the studs a^2 a^3 . This is advantageous where the space is limited especially where the batteries are used in series as the flexible conductor can be passed horizontally from one to the other without an upbend.

I prefer that the line of the bend between the conductor plate and the extension be at right angles to the edge of the extension or in other words that the sides of the plates and extensions lie in the same planes as shown, as this construction permits of the use of a piece of metal having a uniform width.

It will be noted that the perforations b^2 are larger than the stud especially the parts of the stud between the serrations so that the surface b^5 does not coincide with the surface on the stud engaged by it, the area of contact being for this reason as well as those heretofore stated, so small that it might properly be described as a point. The points engaged can therefore be more readily forced into intimate contact and kept in this relation as they wear.

What I claim as new is:

1. In a connection for electric conductors comprising a thin plate having an opening therein, the edge of which is adapted to form electrical contact; a contact piece opposing the thin plate; a spring arranged to exert pressure on the thin plate and contact pieces to press the contact surfaces thereon toward each other; and an electric conductor connected with the plate.

2. A connection for electric conductors comprising two thin conductor plates, each having an opening therein and contact surfaces along the edges of the openings; a spring exerting pressure on said plates in opposite directions and at right angles to the edges forming the contact surfaces to hold

said surfaces in spring pressed contact with an electric conductor; and an electric conductor connected with one plate.

3. In a connection for electric conductors, the combination of a thin conductor plate having a contact surface along an exposed edge; a serrated electric conductor; a spring arranged to exert an edgewise pressure on said plate to hold the contact surface thereon in spring pressed contact with said conductor; a contact piece opposing the thin plate and acted upon by the spring; and a second electric conductor connected with said conductor plate.

4. In a connection for electric conductors the combination of a thin conductor plate having an opening therein along the edge of which is a contact surface; a serrated electric conductor arranged in the opening; a spring arranged to exert edgewise pressure on the plate to hold the contact surface thereon in spring pressed contact with said conductor; a contact piece opposing the thin plate and acted upon by the spring and a second electric conductor connected with said conductor plate.

5. In a connection for electric conductors the combination of a thin conductor plate having an opening therein along the edge of which is a contact surface; a serrated electric conductor arranged in the opening; a spring arranged to exert pressure on the plate substantially at right angles to the edge of the plate to hold the contact surfaces thereon in spring pressed contact with said conductor; a contact piece opposing the thin plate and acted upon by the spring and a second electric conductor connected with said conductor plate.

6. A connection for electric conductors comprising two conductor plates each having contact surfaces along an exposed edge thereon; oppositely faced extensions on said plates, said extensions terminating in a connecting spring loop tending to move said conductor plates in opposite directions and at substantially right angles to the edges forming the contact surfaces to exert spring pressure upon said surfaces; and an electric conductor connected with one of said plates.

7. In a connection for electric conductors, the combination of a serrated electric conductor; two conductor plates having perforations therein extending over said conductors, said plates having contact surfaces along the edges of the perforations adapted to engage the serrations on said conductor; oppositely faced extensions on said plates, said extensions terminating in a connecting spring loop tending to move said conductor plates in opposite directions and at substantially right angles to the edges forming the contact surfaces thereon; and a second conductor connected to one of said plates.

8. A connection for electric conductors

comprising conductor plates; opposingly
faced extensions on said conductor plates;
a spring acting on said extensions and tend-
ing to move said plates relatively to each
5 other to maintain a contact; and an electric
conductor passed through one extension and
secured to the other.

9. A connection for electric conductors
comprising a spring loop formed of sheet
10 metal; opposingly faced extensions on said
loop actuated by the spring loop to main-
tain a spring pressed contact; and an electric
conductor passed through one extension and
secured to the other.

15 10. In a connection for electric conductors
the combination of a stud; conductor plates
arranged at right angles to the stud; op-
posingly faced extensions on said plates; a
spring acting on said extensions for forcing
20 said conductor plates into contact with the
stud, and an electric conductor passed
through one of said extensions and secured
to the other.

11. In connections for electric conductors
25 the combination of a stud, conductor plates
arranged at right angles to the stud and in
contact therewith; extensions opposingly
faced on said plates, terminating in a spring
loop tensioned to press said plates into con-
30 tact with the stud; and an electric conduc-
tor passed through the extension and se-
cured to the other.

12. In a connection for electric conductors
the combination of a serrated stud; a spring
35 clamp having jaws engaging said stud to
attach the connector to the stud, one of the
jaws being formed of a plate of less thickness
than the distance between one serration and
another, the edge of the plate forming a
40 contact surface entering between the serra-
tions on the stud and engaging a wall of
said serration.

13. In a connection for electric conductors
the combination of a stud and a clamp hav-
45 ing jaws actuated by the clamp to engage
and attach themselves to said stud, one of
said jaws being disposed at right angles to
the stud and being provided with a perfora-
tion through which the stud passes, the
50 diameter of the perforation being greater

than the diameter of the stud at the point
of engagement, the said clamp acting upon
the jaw having a perforation to exert pres-
sure upon the stud in a direction substan-
tially at right angles to the axis of the stud. 55

14. In a connection for electric conductors
the combination of a conductor stud; two
thin plates having contact surfaces on the
edges thereof opposingly placed on opposite
sides of the stud; means for yieldingly press- 60
ing said contact edges toward each other into
engagement with the stud; and a second con-
ductor connected with the plate.

15. In a connection for electric conductors
comprising two thin plates having opposing 65
contact surfaces on the edges thereof; means
for yieldingly pressing said contact edges
toward each other; and a conductor con-
nected with the plate.

16. In a connection for electric conductors 70
the combination of a conductor stud; a
connector comprising a plate provided with
a contact surface on the edge thereof and a
contact piece on the opposite side of the
stud, said connector being provided with a 75
perforation through which the stud extends;
and means for yieldingly pressing said con-
tact surface and said contact piece toward
each other into engagement with the stud;
of a conductor connected with said plate. 80

17. In a connection for electric conductors
the combination of a conductor stud; a
connector comprising a plate provided with
a contact surface on the edge thereof and a
contact piece on the opposite side of the 85
stud, said connector being provided with a
perforation through which the stud extends;
and means for yieldingly pressing said con-
tact surface and said contact piece toward
each other into engagement with the stud; 90
and a conductor permanently attached to
said plate.

In testimony thereof I have hereunto set
my hand in the presence of two subscribing
witnesses.

FREDERICK O. BALL.

Witnesses:

W. H. WEART,
CHAS. H. HALL.