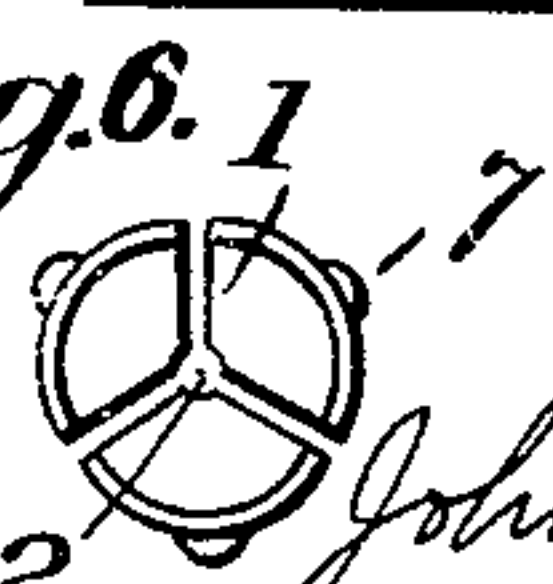
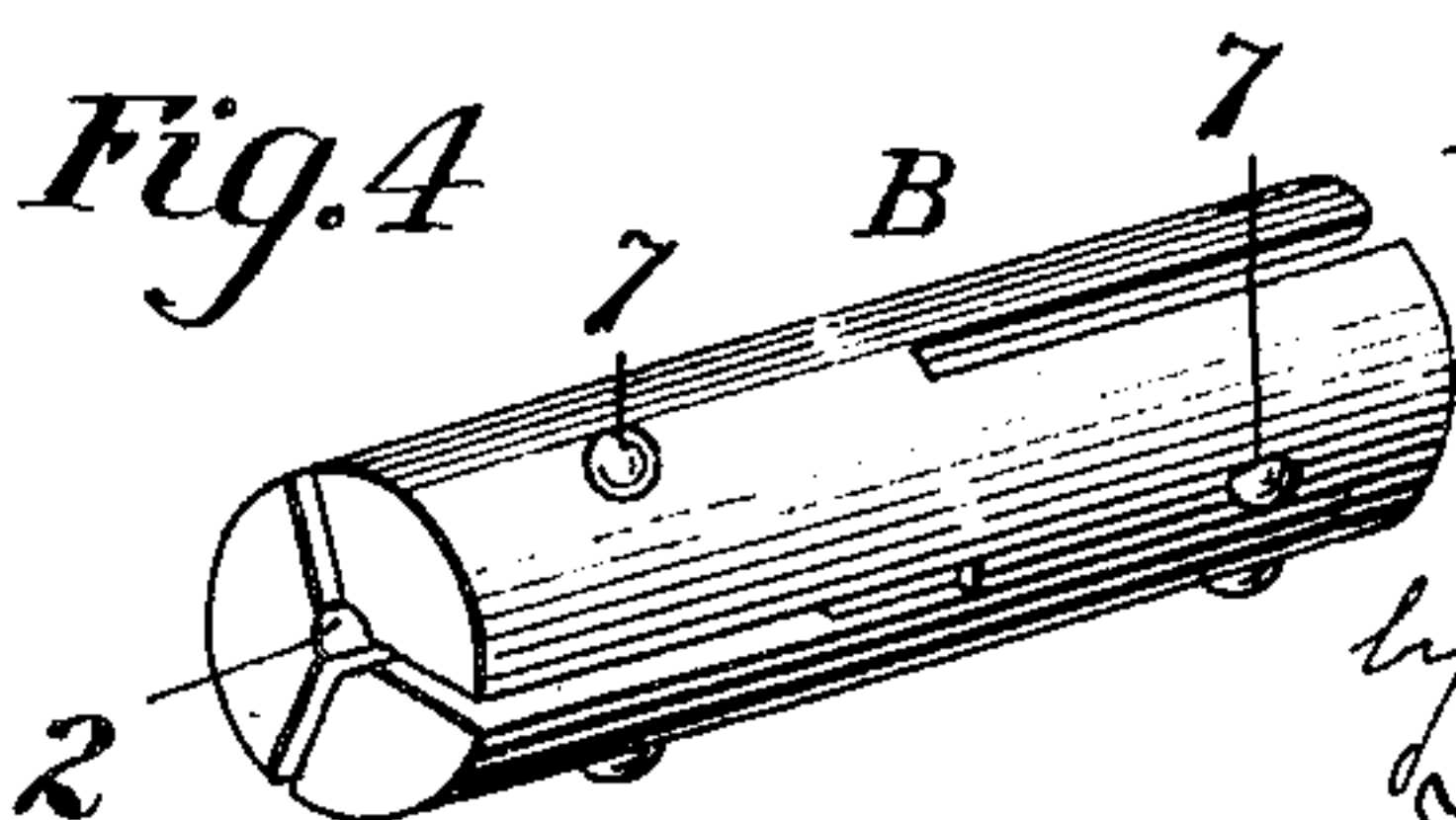
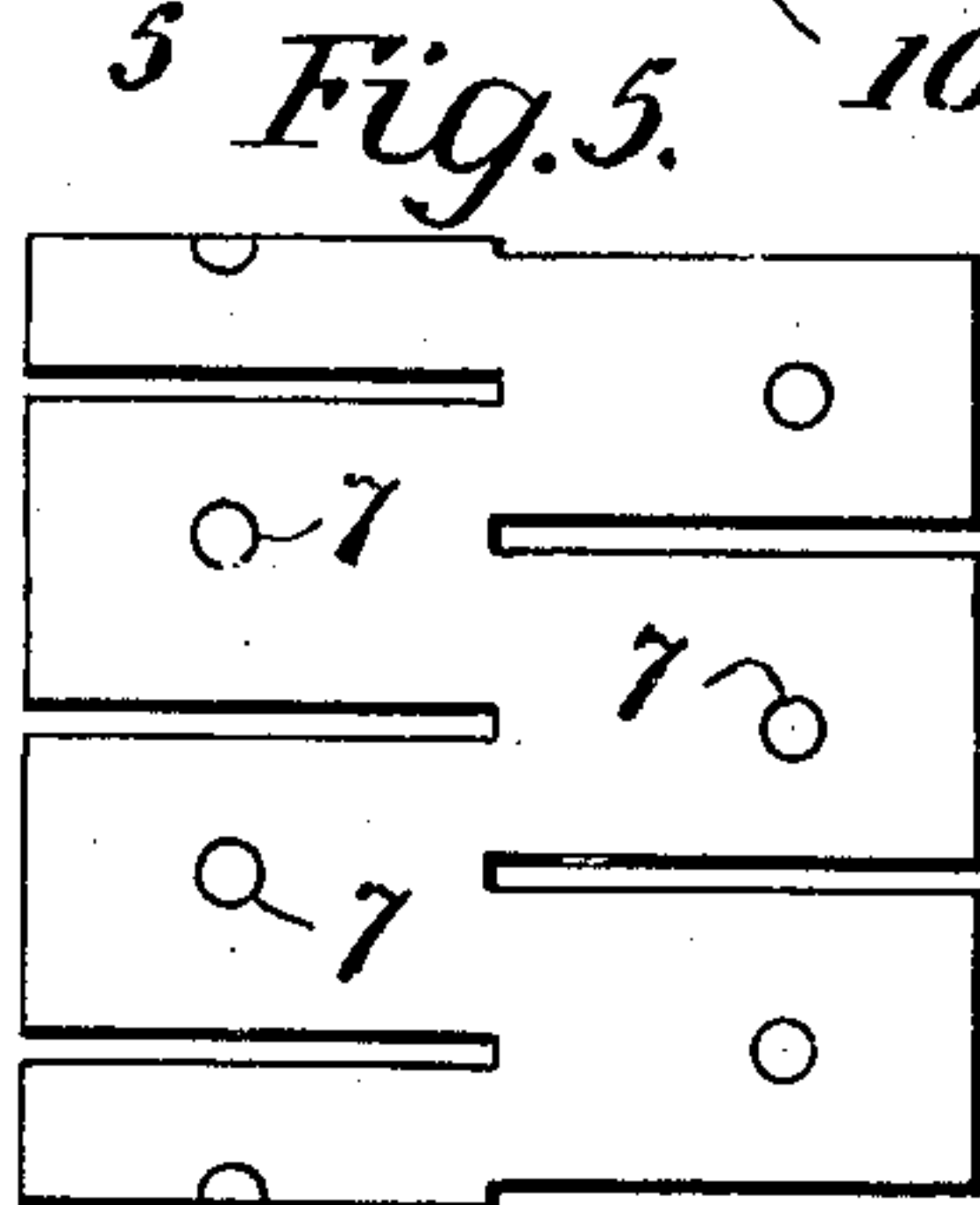
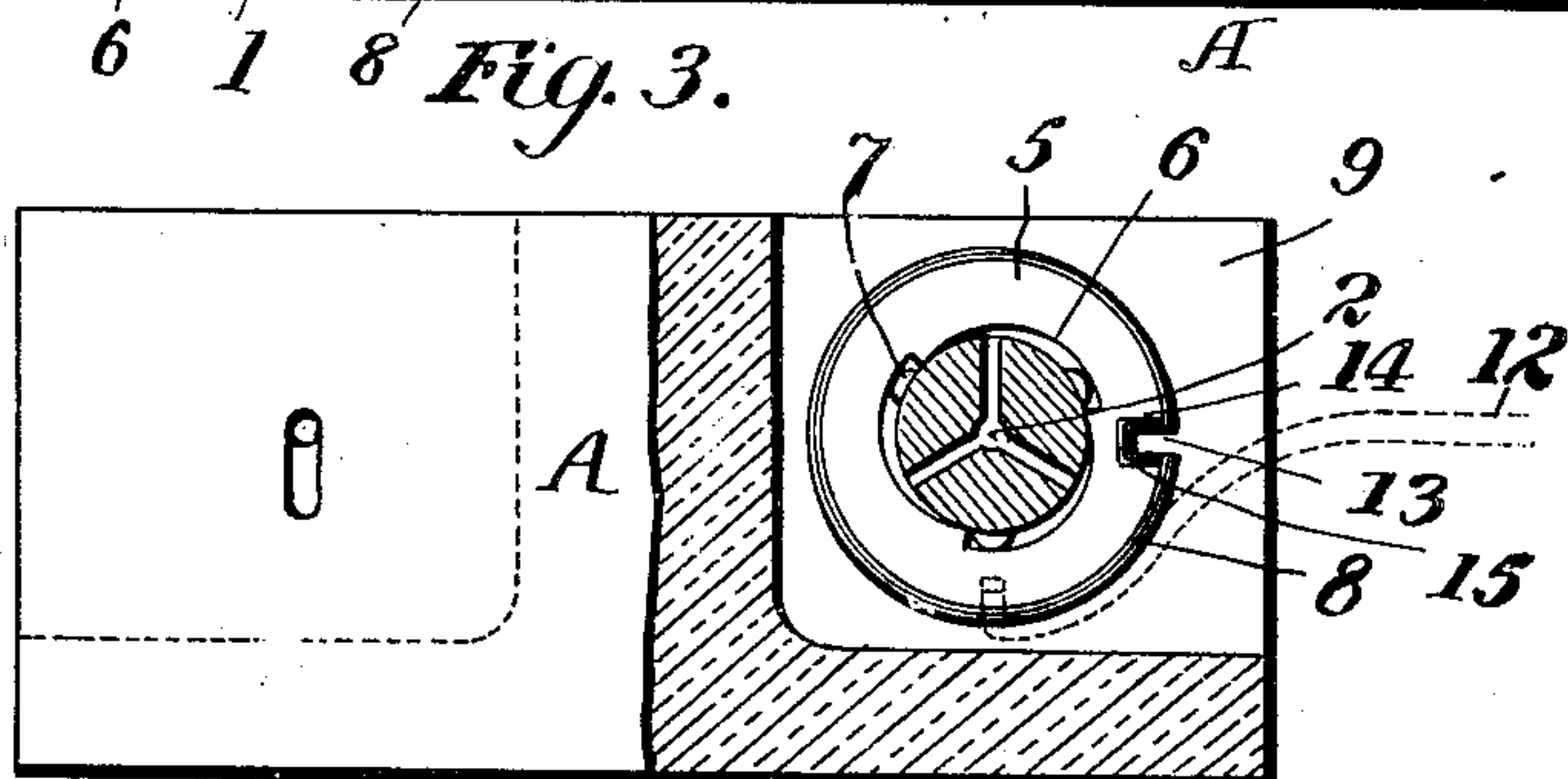
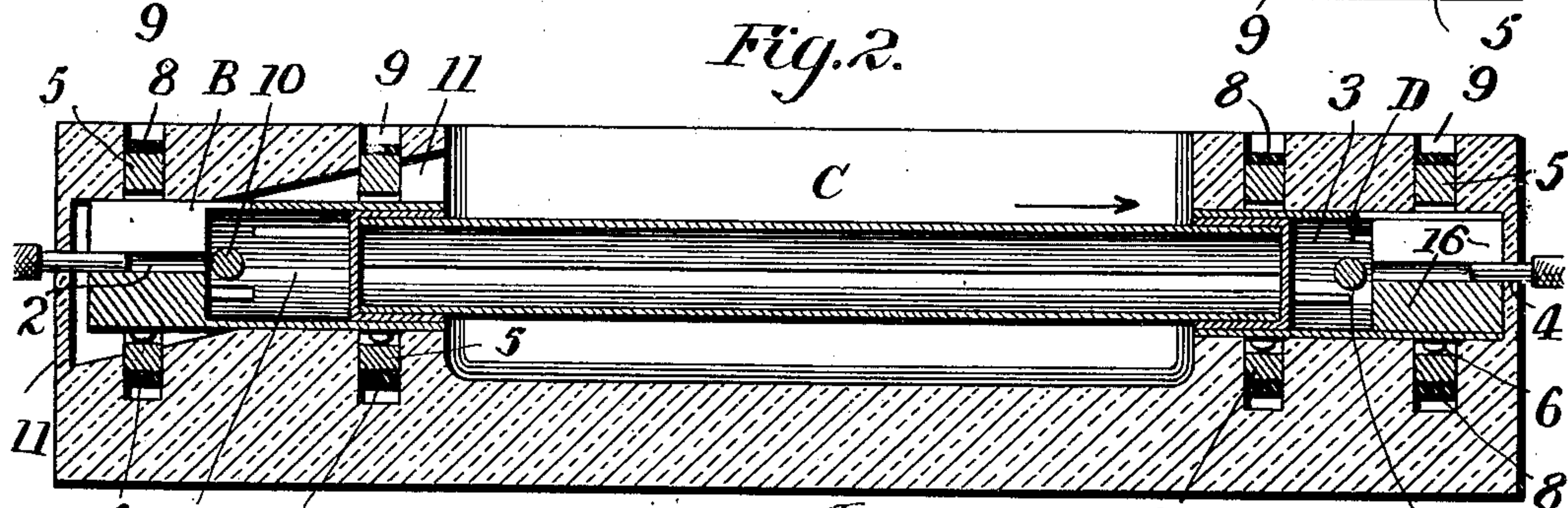
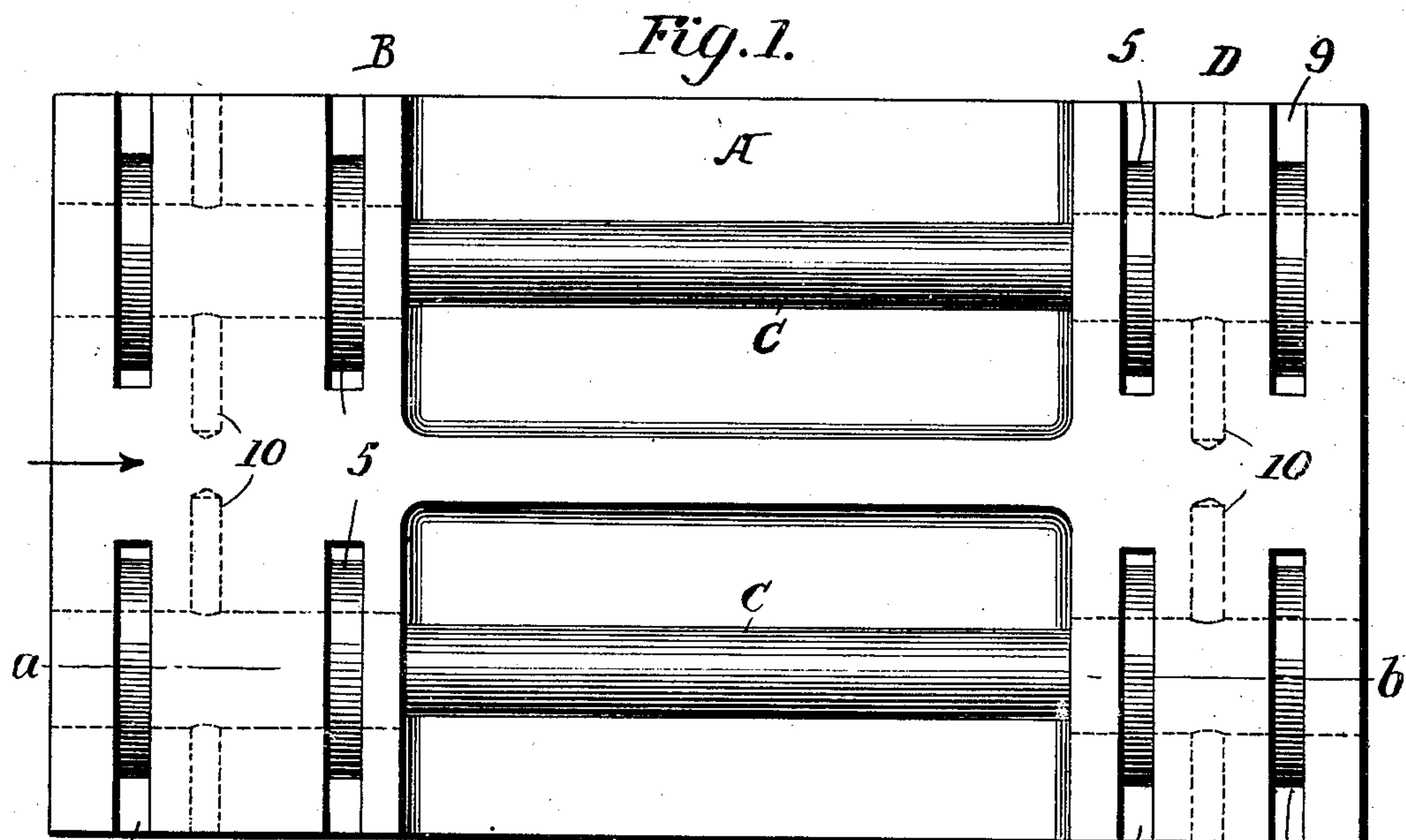


938,477.

Patented Nov. 2, 1909.



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# UNITED STATES PATENT OFFICE.

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## FUSE-HOLDER.

938,477.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed July 5, 1904. Serial No. 215,365.

*To all whom it may concern:*

Be it known that I, JOHN E. GRAYBILL, a citizen of the United States, residing at York, in the county of York and State of Pennsylvania, have invented certain new and useful Improvements in Fuse-Holders, of which the following is a specification.

This invention relates to fuse holders otherwise known as fuse blocks, which are employed to support fuses in operative relations to the circuits they are intended to protect.

It is one object of the invention to simplify apparatus of the character described by reducing the number of parts.

It is a further object to produce a reliable and substantial fuse holder at small cost.

It is a further object to provide means for securing a standard fuse in place, such that it will be difficult to secure an improper fuse or conductor.

It is a further object to provide large surfaces at contacting points so that the least possible resistance will be introduced into the circuit.

It is a further object to so inclose the conducting parts that there will be no danger of accidental contacting with them in replacing or removing a fuse or at other times.

It is a further object to provide means for securing the fuse in place, which cannot be operated by unauthorized persons.

It is a further object to reduce the number of current carrying connections between the fuse and a line wire and thereby reduce the number of contacts across which the current must flow.

While the invention may be embodied in a large number of different structures, it is illustrated in its preferred form in the accompanying drawings, of which—

Figure 1 is a top plan view of a fuse holder embodying my invention which is adapted to receive two fuses, one for each side of the line; Fig. 2 is a vertical longitudinal section on the line *a—b* of Fig. 1; Fig. 3 is an end view looking in the direction of the arrow in Fig. 1, partially broken away to show one securing means and means whereby it is operated; Fig. 4 is a perspective view of a terminal; Fig. 5 is a view showing blanks from which a terminal may be formed; Fig. 6 is an end view of a terminal looking in the direction of the arrow in Fig. 2.

Referring to the drawings, a block A of

porcelain, fiber or other suitable insulating material supports terminals B of conducting material for securing fuses, as C, shown as of the inclosed type, to line wires upon one side and terminals D for securing the fuses to the line wires upon the other side. Each of the terminals B has two sockets 1 and 2, for receiving an end of a line wire or conductor and an end of a fuse respectively. The terminals D have similar sockets 3 and 4. Ordinarily the line wires will be smaller than the ends of the inclosed fuses and for that reason the sockets 1 and 3 will usually be larger than the sockets 2 and 4. The walls of the sockets are collapsible, being rendered so in the case shown by cutting longitudinal slots in them, and may be formed of phosphor bronze or other elastic conducting material which will spring outwardly when released from the collapsing means. It is, however, sufficient if the walls may be caused to grip and release any object thrust between them.

To cause collapsing of the socket walls there is shown a washer 5 surrounding each socket, which has interior cam faces 6 adapted to engage with the socket walls through projections 7 fixed to the walls so that as the washer is turned in one direction or the other, the socket walls will be collapsed or released. The outside of the washer may be covered with insulation 8 for a purpose to be hereinafter set forth.

The terminals are placed in longitudinal recesses in the block A so that the insulating material of the block surrounds the terminals and prevents lateral contact with them and also incloses the outer ends of the terminals to render them secure against external contact. Transverse recesses 9 for the reception of the washers are provided and the walls of these recesses extend beyond the washers on all sides so that the washers are effectually protected against forming a contact, but as an additional precaution the outside surfaces of the washers may be covered with insulation 8 as shown.

The washers 5 may be turned to collapse or release the socket walls by means of a special key such as 12 which is adapted to engage with a notch 13 between shoulders 14 and 15 formed on the washer, the notch being on the underside as shown by the dotted lines of Fig. 3, so that it is concealed when the washer is in secured position, that is, when the socket walls are collapsed. It



will be seen, therefore, that unauthorized persons cannot tamper with the fuse as the method of operation is not apparent and even if it were known it could not be effected without a proper key.

The terminals may be secured by means of pins 10 as shown, and if certain of the longitudinal recesses are cut away as at 11, the terminals, as B, may turn on their pins as on a hinge for a purpose which will be shown later.

The terminals may be constructed in a large number of ways. The terminals B, however, since they are hinged, should have a rigid structure and are therefore preferably formed from a single block by boring to form the sockets. On the other hand, the terminals D are fixed and to cheapen them they are preferably formed from a blank of sheet metal stamped into a shape as shown in Fig. 5, which sheet is rolled into a cylinder and its ends secured by soldering or in any other suitable manner or they may be even left unsecured and be supported in proper form by the walls of the recesses in the block A. The socket at either end may be decreased in diameter by means of segmental blocks 16 secured to the blank in any suitable manner.

In order that the walls of the sockets may make good contact with the ends of the fuses, it is desirable that what is known as a "rubbing" contact be formed. This may be accomplished by making up the walls of sections bent in arcs having radii less than the radius of the surface arc of the fuse end with which the walls come in contact. Then, as the walls of a socket are collapsed against a fuse end, they will flatten and rub upon it.

If a fuse is in position as shown and it is desired to remove it, the key 12 will be placed in engagement with a washer 5 engaging the walls of the fuse socket of a terminal D and the washer moved in a counterclockwise direction (Fig. 3) thus releasing the socket walls and fuse end. The other end of the fuse may be released in a similar manner and the fuse may then be slid to the left (Fig. 2) until its right hand end clears the terminal D. Its right hand end may then be raised, the terminal B turning on the pin 10, until it clears the top of the block. It may then be withdrawn from the terminal B. A fuse may be inserted by performing these operations in an inverse order. The line wires may be removed from the terminals by turning the appropriate washers in a manner as described.

The method of contacting by collapsing the walls of the sockets upon the conductors is of great value because it does away with screws which are inconvenient and liable to become lost and also because the contacting surfaces are very greatly increased, a contact surface much larger than the cross-section

of the wire being obtained, thereby reducing the resistance introduced into the circuit.

While a block is shown which carries two fuses, one for each side of the line, it will be obvious that a greater or less number of fuses might be employed and numerous other modifications made without departing from the spirit of the invention and it should not therefore be limited to the construction shown.

Without limiting myself to the precise construction shown, I claim:—

1. In a fuse block, the combination of a suitable body, a terminal supported by said body, a fuse, and means for securing the fuse to the terminal, movable into and out of securing position and adapted to be engaged by a key at a point inaccessible except to said key when in securing position, substantially as described.

2. In a fuse block, the combination of a suitable body, having a recess therein, a terminal supported by said body, a fuse, and means for securing the fuse to the terminal and adapted to be engaged at a point located within and concealed by the walls of said recess when said means is in securing position, substantially as described.

3. In a fuse block, the combination of a suitable body having a recess therein, a terminal supported by said body, a conductor, and means for securing the conductor to the terminal, movable into and out of securing position and adapted to be engaged at a point located within and concealed by the walls of said recess when in securing position, substantially as described.

4. In a fuse block, the combination of a suitable body, a terminal supported by the body, a fuse, a conductor, means for securing said fuse to said terminal, and means for securing said conductor to said terminal, each of said securing means being movable into and out of securing position and adapted to be engaged by a key at a point inaccessible except to said key when in securing position, substantially as described.

5. In a fuse block, the combination of a suitable recessed body, a terminal supported by said body, a fuse, a conductor, means for securing said fuse to said terminal, and means for securing said conductor to said terminal, each of said means being movable into and out of securing position and adapted to be engaged at a point located within and concealed by the walls of one of said recesses when in securing position, substantially as described.

6. In a fuse block, the combination of a suitable recessed body, a terminal supported by said body, an inclosed fuse, a conductor, means for securing said fuse to said terminal, and means for securing said conductor to said terminal, each of said means



being movable into and out of securing position and adapted to be engaged at a point located within and concealed by the walls of one of said recesses when in securing position, substantially as described.

7. In a fuse holder, the combination with a suitable body, of a terminal supported by said body, a fuse, a line wire, said terminal having a socket for said fuse and a socket for said line wire, means for collapsing the walls of one socket about said fuse, and means for collapsing the walls of the other of said sockets about said line wire, substantially as described.

8. In a fuse holder, the combination with a support, of a fuse, a line wire, a hinged terminal having a socket for said fuse and a socket for said line wire, means for collapsing the walls of one of said sockets about said fuse, and means for collapsing the walls of the other of said sockets about said line wire, substantially as described.

9. In a fuse holder, the combination with a suitable body, of a terminal supported by said body, having collapsible walls inclosing a socket, and a washer inclosing said walls and having cam faces engaging said walls, substantially as described.

10. In a fuse holder, the combination with a suitable body, of a terminal supported by said body and having a socket inclosed by a collapsible wall, said socket being adapted to receive the end of a conductor or fuse, the said walls being formed of segments bent in the shape of arcs having radii of less length than the surface of the conductor or fuse with which they come in contact, and means for collapsing said walls upon said surface, substantially as described.

11. The combination with an insulating support having a tubular recess and a recess transverse thereto, of a fuse, a terminal supported in said tubular recess and adapted to receive an end of said fuse, and means located in said transverse recess for securing said fuse to said terminal, substantially as described.

12. The combination with an insulating support having a tubular recess and recesses transverse thereto, of a fuse, a conductor, a terminal supported in said tubular recess and adapted to receive an end of said fuse and an end of said conductor, means for securing said fuse to said terminal, and means for securing said conductor to said terminal, said securing means being located in said transverse recesses, substantially as described.

13. The combination with an insulating support having a tubular recess and recesses transverse thereto, of an inclosed fuse, a conductor, a terminal supported in said tubular recess and adapted to receive an end of said fuse and an end of said conductor, means for securing said fuse to said terminal, and

means for securing said conductor to said terminal, said securing means being located in said transverse recesses, substantially as described.

14. The combination with an insulating support having a tubular recess, of a fuse, and a terminal supported in said recess and surrounded by insulation throughout its length, said terminal being adapted to receive an end of said fuse, substantially as described.

15. The combination with an insulating support having a tubular recess and a recess transverse thereto, of a fuse, a terminal supported in said tubular recess between the ends thereof, said terminal being adapted to receive an end of said fuse, and means located in the transverse recess for securing said fuse to said terminal, substantially as described.

16. The combination with an insulating support having a tubular recess, of an inclosed fuse, and a terminal supported in said recess and permanently surrounded throughout its length by insulation, said terminal being adapted to receive an end of said fuse, substantially as described.

17. The combination with an insulating support having a tubular recess, of a fuse, a conductor, and a terminal in said recess between the ends thereof, said terminal being adapted to receive an end of said fuse and to receive an end of said conductor, substantially as described.

18. The combination with an insulating support having a tubular recess and recesses transverse thereto, of a fuse, a conductor, a terminal supported in said tubular recess between the ends thereof, said terminal being adapted to receive an end of said fuse and to receive an end of said conductor, and means located in said transverse recesses for securing said fuse and conductor to said terminal, substantially as described.

19. The combination with an insulating support having a tubular recess and a recess transverse thereto, of a fuse, a terminal supported in said tubular recess between the ends thereof, and a washer located within said transverse recess and surrounding said terminal, said washer being adapted to engage said terminal to secure said fuse, substantially as described.

20. The combination with an insulating support having a tubular longitudinal recess and a recess transverse thereto, of a fuse, a terminal supported in the longitudinal recess of said support, and a washer located within said transverse recess and surrounding said terminal, said washer being adapted to engage said terminal to secure said fuse and to be engaged by a key at a point movable inwardly as said washer is moved into securing position, substantially as described.

21. The combination with an insulating



support having separated tubular recesses in line with each other, of a fuse, and a terminal mounted in each of said recesses between the ends thereof, said terminals being  
 5 each permanently surrounded by insulation throughout their length and adapted to receive the ends of said fuse, substantially as described.

22. The combination with an insulating  
 10 support having separated tubular recesses, of a terminal mounted within each of said recesses between the ends thereof, one of said terminals being hinged to said support, and a fuse, said terminals being adapted to re-  
 15 ceive the ends of said fuse, substantially as described.

23. The combination with a support having separated tubular recesses, of a fuse, conductors, a terminal within each of said re-  
 20 cesses between the ends thereof, each of said terminals being adapted to receive an end of said fuse and an end of one of said conductors, and means for securing said fuse and said conductors within said terminals,  
 25 substantially as described.

24. The combination with an insulating support, of a terminal carried by said support and adapted to receive a fuse, and means for securing a fuse to said terminal,  
 30 movable into and out of securing position and adapted to be engaged by a key at a point inaccessible except to said key when in securing position, substantially as described.

25. The combination with an insulating support having a recess, of a terminal carried by said support and adapted to receive a fuse and means for securing the fuse to said terminal and adapted to be engaged at  
 40 a point located within and concealed by the walls of said recess when said means is in securing position, substantially as described.

26. The combination with an insulating support, of a terminal carried by said support and adapted to receive an inclosed fuse, and means for securing said fuse to said terminal movable into and out of securing position and adapted to be engaged by a key  
 50 at a point inaccessible except to said key when in securing position, substantially as described.

27. The combination with an insulating support having a recess, of a terminal carried by said support and adapted to receive  
 55 an inclosed fuse, and means for securing said fuse to said terminal and adapted to be engaged at a point located within and concealed by the walls of said recess when said means is in securing position, substantially  
 60 as described.

28. The combination with a support having a tubular recess and a recess transverse thereto, of a terminal supported in said tubular recess between the ends thereof, said  
 65 terminal being adapted to receive an end of

a fuse, and means located in said transverse recess for securing said fuse to said terminal, substantially as described.

29. The combination with an insulating support having a tubular recess and a recess  
 70 transverse thereto, of a terminal supported in said tubular recess between the ends thereof, said terminal being adapted to receive an end of an inclosed fuse, and means located in said transverse recess for securing said  
 75 fuse to said terminal, substantially as described.

30. The combination with an insulating support, of a terminal carried by said support, a fuse, and means surrounding said  
 80 terminal for securing said fuse and terminal together, substantially as described.

31. The combination with an insulating support, of a terminal carried by said support, a fuse, and means surrounding said  
 85 terminal and movable about the axis thereof for securing said fuse and terminal together, substantially as described.

32. The combination with an insulating support, of a terminal carried by said sup-  
 90 port, a fuse, and means surrounding said terminal and having its exterior insulated for securing said fuse and terminal together, substantially as described.

33. The combination with an insulating  
 95 support, having a tubular recess, of a terminal within said recess, a fuse, and means surrounding said terminal for securing said fuse and terminal together, substantially as described.  
 100

34. The combination with an insulating support having a tubular recess, of a terminal within said recess, a fuse, and means surrounding said terminal and having its exterior insulated for securing said fuse and  
 105 terminal together, substantially as described.

35. The combination with an insulating support, of a terminal carried by said support, a fuse, and means movable about said  
 110 terminal for securing said fuse and terminal together, substantially as described.

36. The combination with an insulating support, of a terminal carried by said support, a fuse, a conductor, means surrounding said terminal for securing said fuse and  
 115 terminal together, and means surrounding said terminal for securing said conductor and terminal together, substantially as described.

37. The combination with an insulating  
 120 support, of a terminal carried by said support, a fuse, and adjustable means for securing the fuse to the terminal and adapted to be engaged only at a point that is concealed when said means is in securing position  
 125 specifically as described.

38. In a fuse block, the combination of a suitable base or body, a fuse, and a terminal carried by the body and adapted to make  
 130 lateral contact with the fuse and to be en-



gaged with and disengaged therefrom only by a relative movement in the direction of the length of the fuse, and means for varying the pressure with which the terminal bears against the fuse.

39. The combination with an electric fuse, of a terminal adapted to make electrical contact with the sides of one end of the fuse and to be engaged with or disengaged therefrom only by relative movement in the direction of the length of the fuse, a support for said terminal and means for varying the distance between the sides of the terminal.

40. The combination with an electric fuse, of a terminal having at one end a socket to receive an end of the fuse, whereby a longitudinal movement of the fuse is required to connect or disengage the terminal and fuse, means for contracting the walls of the terminal socket, and a support for said terminal.

41. The combination with an electric fuse, of a terminal comprising a body adapted to be electrically connected with a conductor and having at one end a socket adapted to receive one end of a fuse, a support for the terminal, and supplemental means adjustable relative to said walls for holding the walls of the terminal socket in close contact with the fuse.

42. The combination with an electric fuse, of a terminal comprising a body adapted to be electrically connected with a conductor and having at one end means for receiving an end of the fuse, a support for the terminal, and supplemental means adjustable relative to the fuse and terminal for holding the fuse engaging portion of the terminal in close engagement with the fuse.

43. In a fuse block, the combination of a suitable body of insulating material having a depression in one face, terminals connected with said body on opposite sides of the de-

pression therein, and entirely above the plane of the bottom of said depression each terminal being adapted to be connected with a conductor and having at its inner end a socket, and a fuse extending across said depression and having its ends supported in the terminal sockets.

44. In a fuse block, the combination of a suitable body of insulating material having a depression in one face, terminals connected with said body on opposite sides of the depression therein, each terminal being adapted to be connected with a conductor and having at its inner end a socket, which is completely surrounded by the insulating material of the block and a fuse extending across said depression and having its ends supported in the terminal sockets, the cross sectional form of the terminal sockets preventing engagement or disengagement of the fuse there-with except by a relative movement in the direction of the length of the fuse.

45. In a fuse block, the combination of a suitable body of insulating material having a depression in one face, terminals connected with said body on opposite sides of the depression therein, each terminal having at its outer end a socket to receive a conductor and at its inner end a socket adapted to receive one end of a fuse, a fuse having its ends supported in the sockets at the inner ends of the terminals, means for clamping the walls of the socket at the outer end of each terminal upon the conductor, and means for holding the walls of the socket at the inner end of each terminal in close contact with the fuse.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN E. GRAYBILL.

Witnesses:

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