H. W. CHENEY.

CIRCUIT BREAKER.

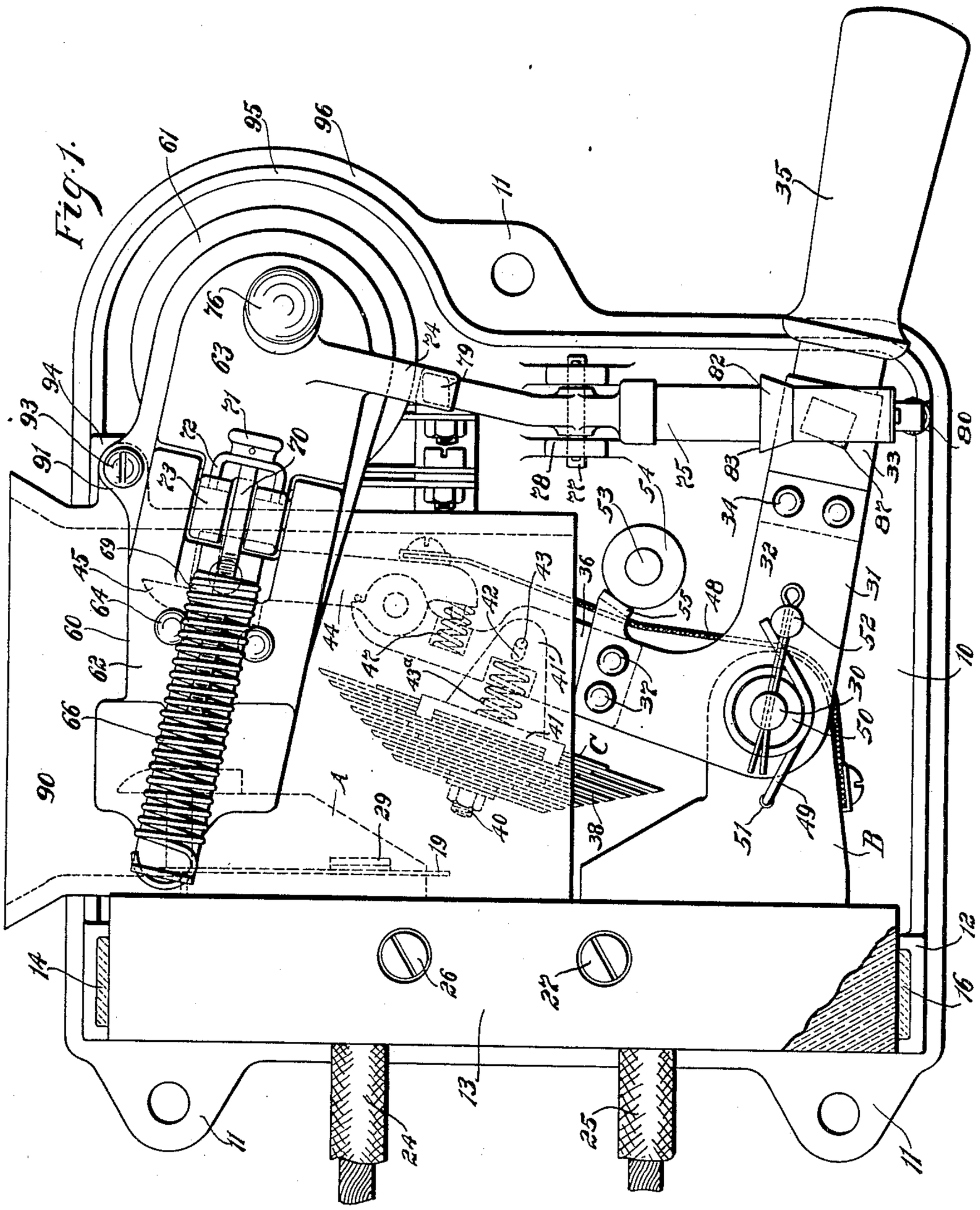
APPLICATION FILED SEPT. 25, 1905.

925,441.

Patented June 15, 1909.

4 SHEETS—SHEET 1.

Fig. 1.



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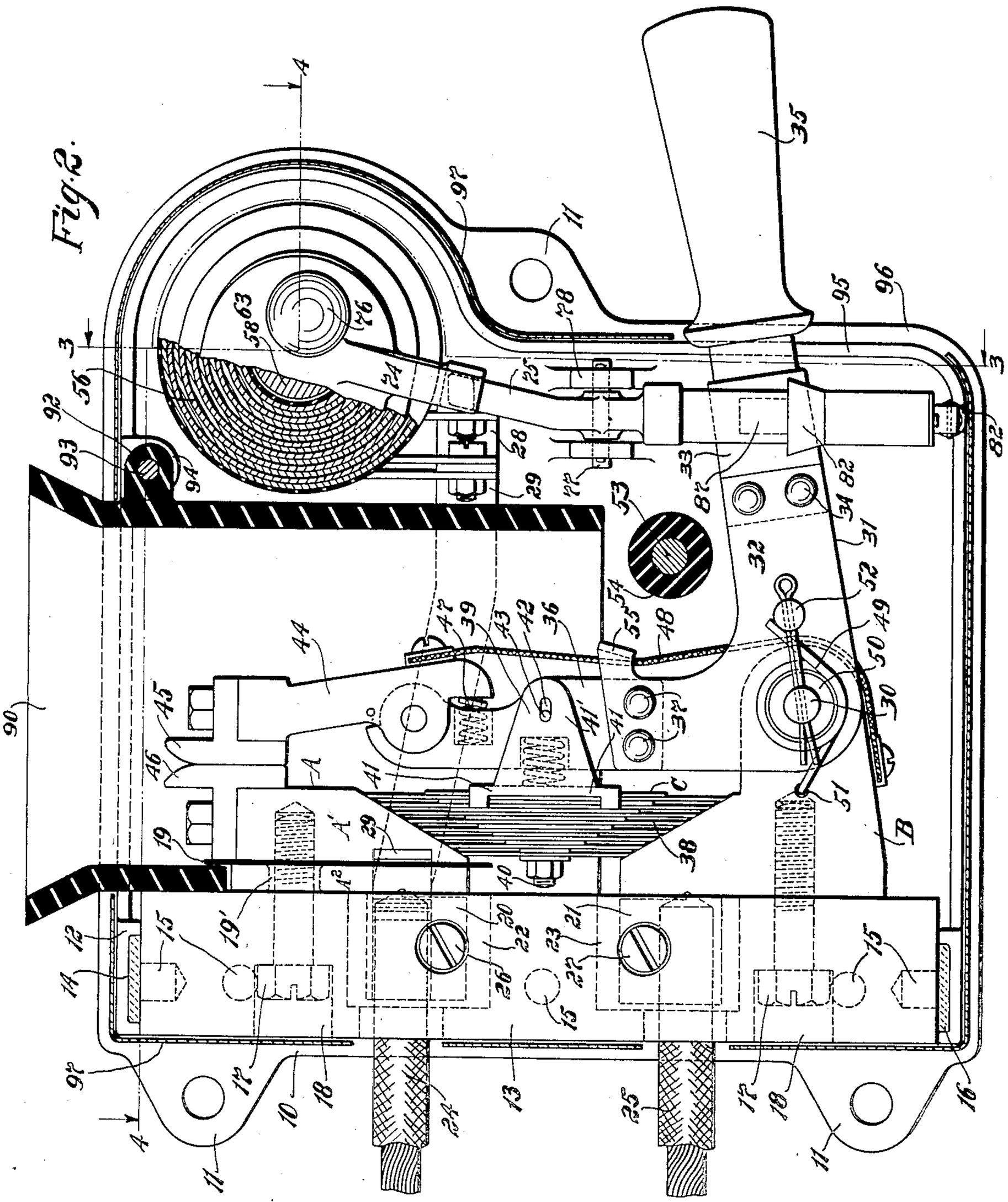
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 4.

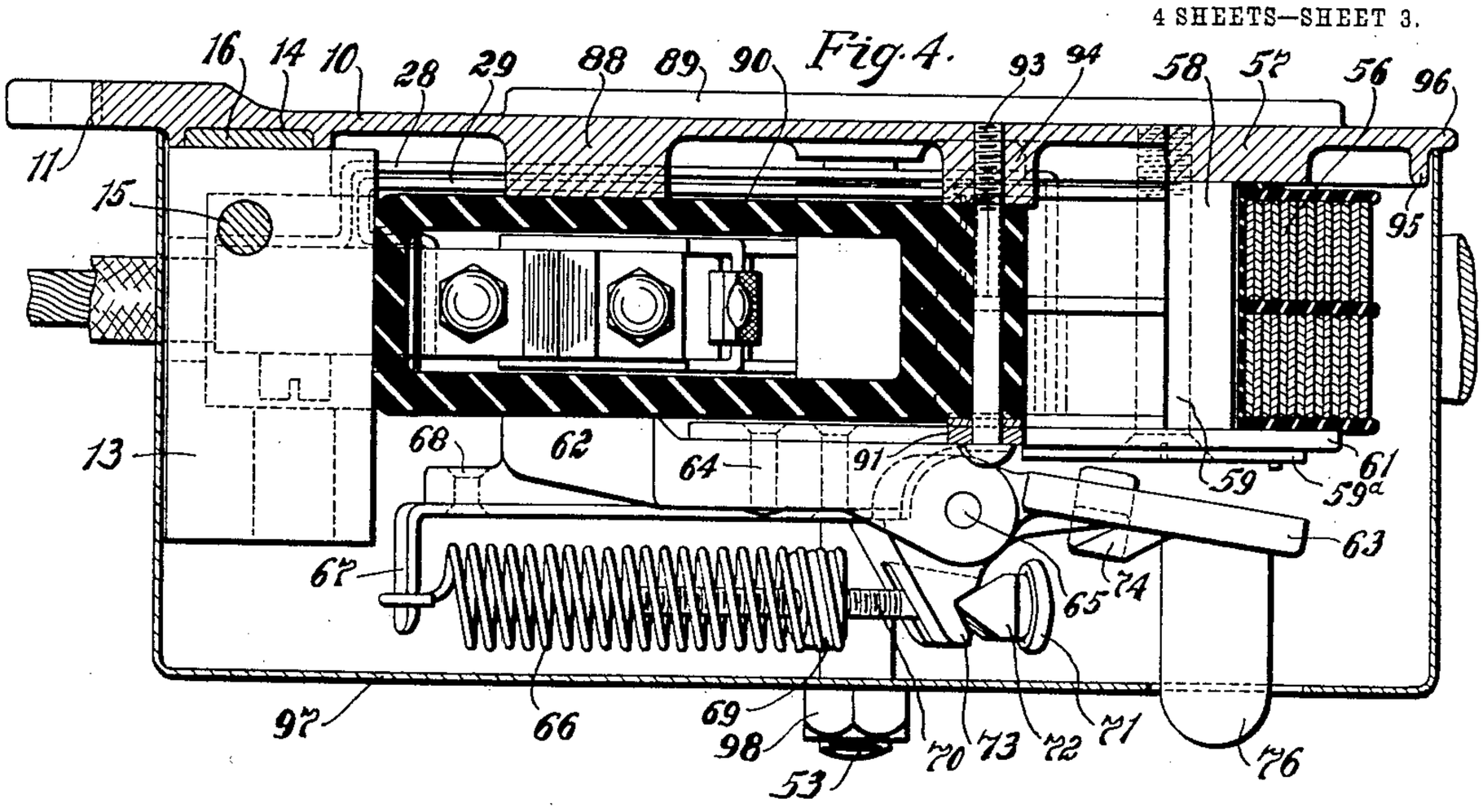
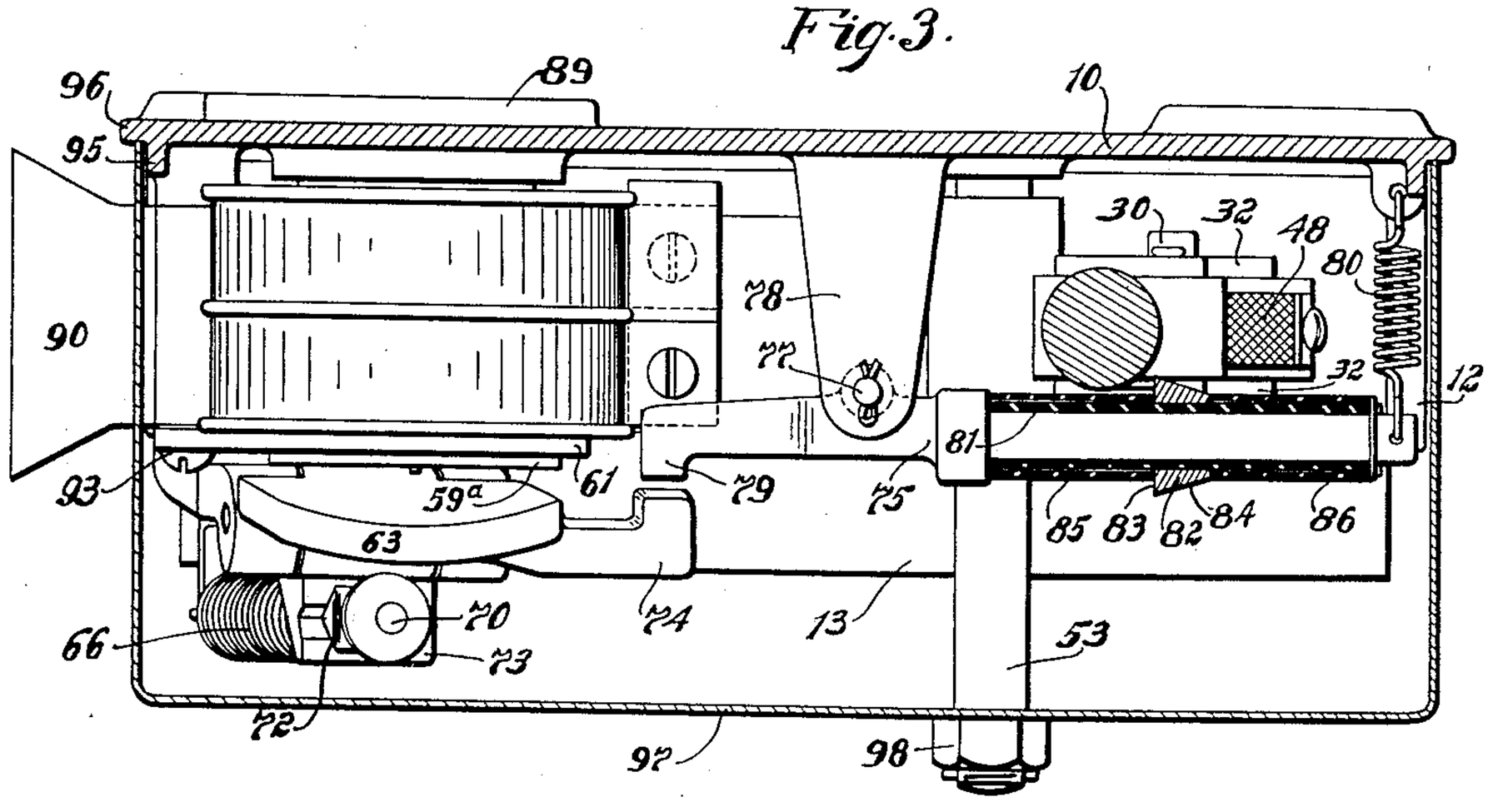


Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 5.

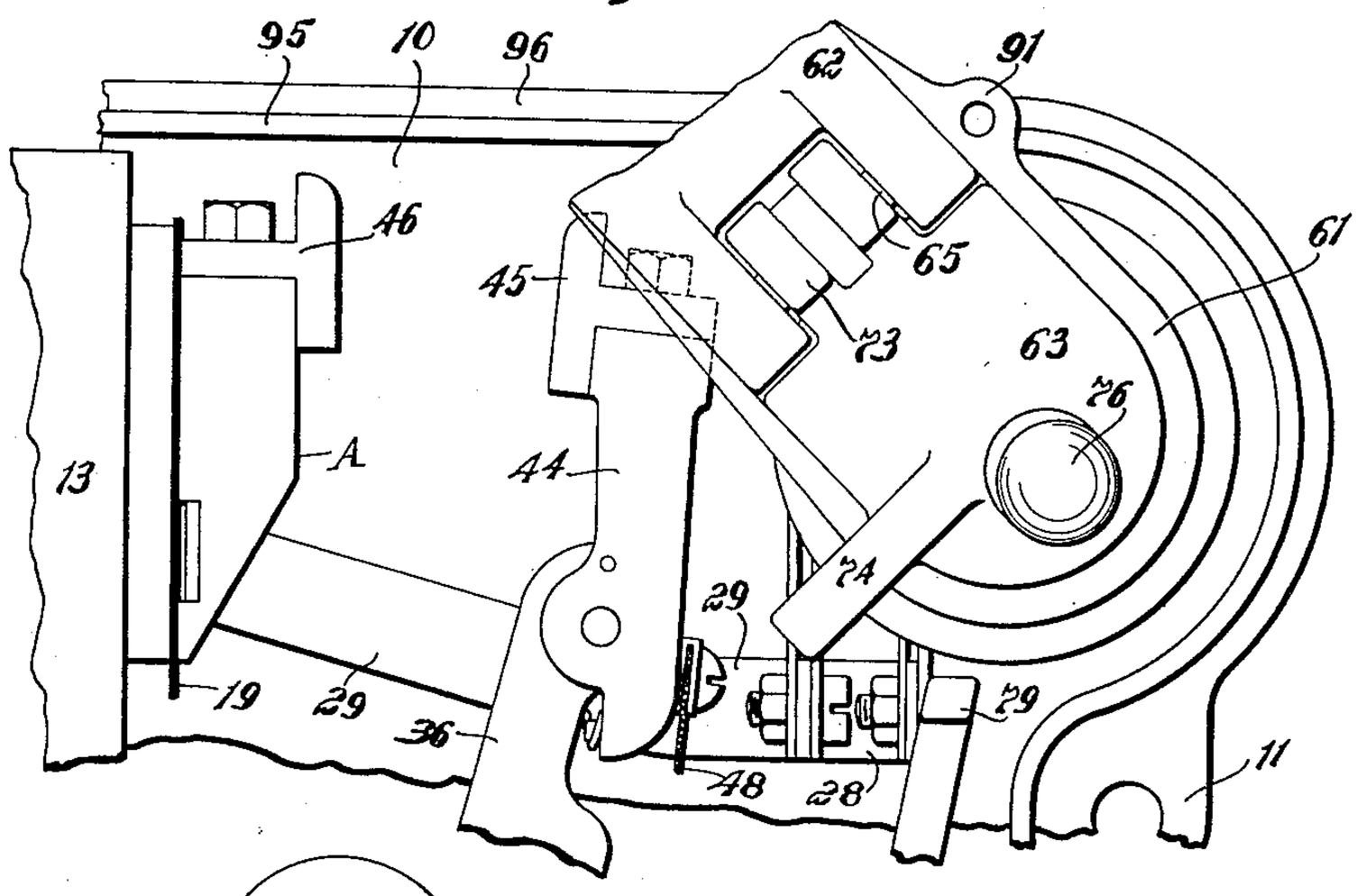


Fig. 7.

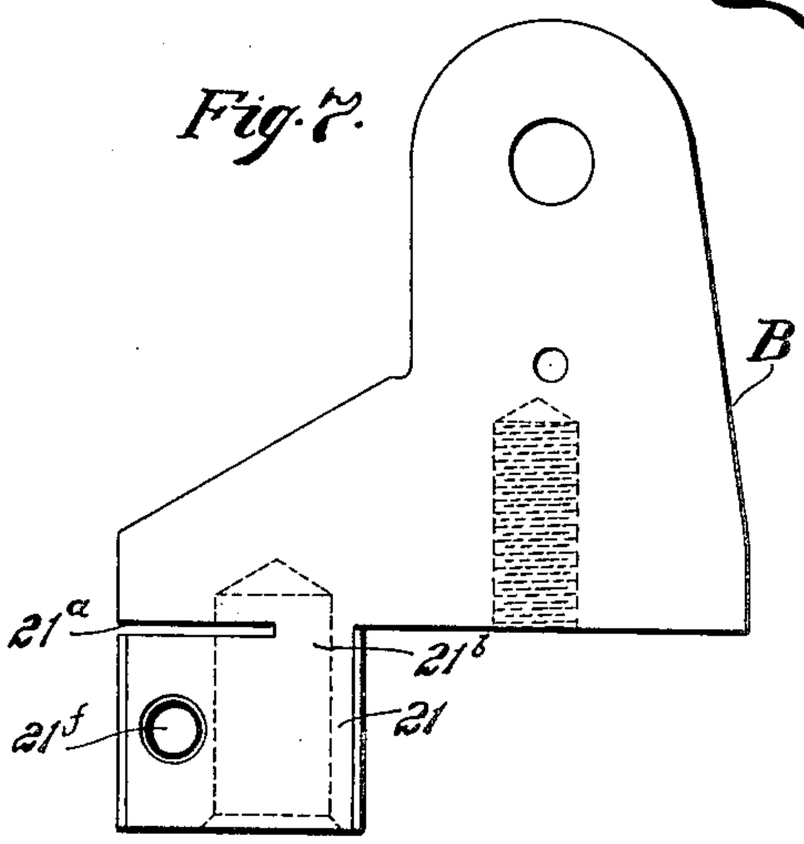


Fig. 6.

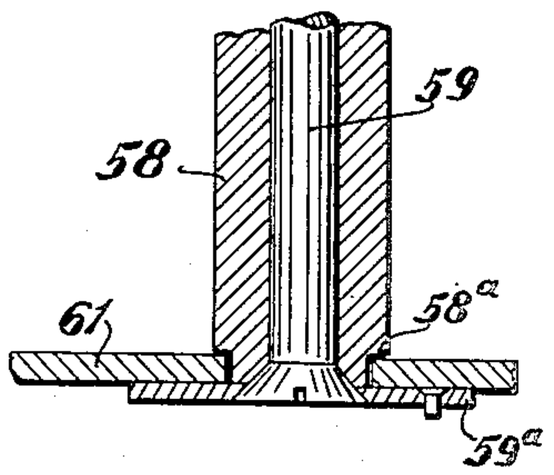
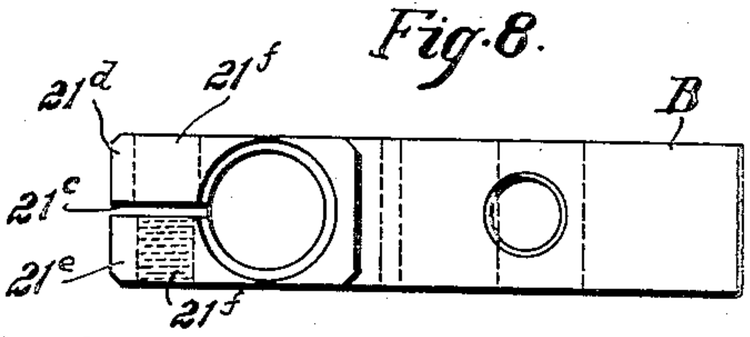


Fig. 8.



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UNITED STATES PATENT OFFICE.

HERBERT W. CHENEY, OF NORWOOD, OHIO, ASSIGNOR TO THE BULLOCK ELECTRIC MANUFACTURING COMPANY, A CORPORATION OF OHIO.

CIRCUIT-BREAKER.

No. 925,441. Specification of Letters Patent. Patented June 15, 1909.

Application filed September 25, 1905. Serial No. 280,077.

To all whom it may concern:

Be it known that I, HERBERT W. CHENEY, citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Circuit-Breakers, of which the following is a full, clear, and exact specification.

This invention relates to circuit-breakers especially of the railway type.

One of the objects of my invention is to simplify and to lessen the cost of the construction of this type of circuit-breakers.

A further object is to provide a circuit-breaker which consists of few parts, and which is durable, efficient and reliable in operation.

A still further object is to provide a circuit-breaker all the parts of which can be easily inspected and removed in case of injury or for any other purpose.

Further objects will appear from the description.

My invention consists in certain novel details of construction and the combinations of elements described in the specification and set forth in the appended claims.

Reference is had to the accompanying drawings in which—

Figure 1 is a plan of a circuit-breaker in its open position or with the contacts out of engagement, the inclosing cover being removed; Fig. 2 is a plan view of the same with parts in section and parts broken away for the sake of clearness; the circuit-breaker is here shown as closed; Fig. 3 is a section along the irregular line 3—3 of Fig. 2 looking in the direction of the arrows; Fig. 4 is a section along the irregular line 4—4 of Fig. 2 looking in the direction of the arrows; Fig. 5 is a view of a portion of the circuit-breaker with the arcing chute removed and the pole shoe turned on its pivot out of its operative position; Fig. 6 is a sectional detail of a portion of the core of the magnet and pole shoe showing the swivel support of the latter; and Figs. 7 and 8 are plan and side views respectively of one of the stationary contacts.

Referring to the figures of the drawings, I have shown at 10 a cast metal base provided with perforated ears 11 by means of which the circuit-breaker is adapted to be supported, preferably, at the top or ceiling of the railway car or platform hood. At opposite sides of, and adjacent the corners of the base are two similar arms 12 extending outward at right angles to the base. Seated on the base and between the two arms is an insulating block 13, preferably of slate or soapstone. The block is held to the base by Babbitt metal or other easily fusible metal or alloy instead of screws or bolts. The arms 12 and base 10 are provided with a continuous channel or groove 14, the groove in the arms 12 being shown in Figs. 1 and 2 and in the base at the upper left hand side of Fig. 4. The block 13 is provided at intervals with openings or recesses 15 which communicate with this channel. As the block is placed in position on the base, metal 16 is run into the channel and openings 15 in the block, the latter being thereby securely and permanently held to the base. I prefer to secure the insulating block to the base in this manner instead of bolts or screws, for the reason that the block and parts supported thereby can be accurately alined with respect to the other parts of the circuit-breaker, without necessitating careful machining of the base. A further advantage is that the insulating block and base are held together by the holding means which is distributed evenly along the ends and side of the block. Whereas if bolts and screws were employed the block would be held to the base at a few points only. The insulating block supports directly or indirectly all the contact members of the circuit-breaker. The circuit-breaker is provided with two stationary contact members A and B and the bridging contact brush C which are made of good conducting material such as brass or copper. The stationary contact members are spaced apart as shown and are held to one side of the supporting block 13 by screws 17, the heads of the latter being seated or received in openings 18 at the opposite side of the block.

The contact A consists of two parts A′ and A² which are insulated from each other by strips of mica or other insulating material 19 and by an insulating tube 19′ surrounding the screw 17. The members A² and B are provided respectively with extensions 20 and 21 which are received in openings or recesses 22 and 23 at one side of the supporting block 13. The main leads 24 and 25 extend through openings in the opposite side of the block which communicate with the large openings in which the contact extensions are seated, and the ends of the

leads are received in openings in the contact extensions being held thereto by screws 26 and 27 as will be explained more fully.

In Figs. 7 and 8 I have shown the stationary contact member B. The extension 21, which is similar to the extension 20 on member A^2, is slotted or sawed transversely as shown at 21^a, leaving a narrow neck portion 21^b, and is slotted or sawed longitudinally as shown at 21^c. The slot 21^c extends from the outer face of the extension to the transverse slot 21^a, forming two flexible jaw portions 21^d and 21^e. The outer faces of the extensions are recessed, as shown, to receive the ends of the leads 24 and 25. The free ends of the jaws are provided with openings 21^f one of which is tapped or screw-threaded, to receive the tightening screws 26 and 27. Thus it will be seen that by means of the screws 26 and 27, the jaws of the extensions can be tightly clamped about the ends of the leads.

Connected to the member A^2 is a copper strap 28 shown clearly in Figs. 2 and 4 which strap is connected to one terminal of the coils of the combined tripping magnet and blow out magnet which will be described later. The other terminal of the coils of the magnet is connected to strap 29, which strap is connected to block A′ preferably by solder and rivets. The member A′ is recessed to receive the strap 29 as shown in Fig. 2.

Pivoted to the end of the contact block B by means of the pintle 30 is the hand lever 31. This lever consists of two L-shaped copper or brass punchings 32 which are spaced apart at one end by a block 33 of extruded metal section to which the punchings are held by rivets 34. The handle 35 which extends through a suitable opening in the cover (described later) is attached to the end of the block 33 in any desired manner. The other ends of the L-shaped punchings 32 are spaced apart by the block 36 of extruded metal section to which the punchings are held by rivets 37. The block 36 carries the bridging contact or brush C and the arcing tip which will now be described. The bridging contact consists of a bundle of laminæ 38 connected together and to the holder 39 by bolt 40. The holder 39 consists of a punched plate 41 having upwardly extending ears 41′ which straddle the block 36. The ears are each provided with an elongated opening 42 into which extends a pin or projection 43 passing through and beyond each side of the block 36. Thus by means of the slots in the ears 41′ and the pins or projection on the block 36 the bridging contact or brush is held to the block 36 in such a manner that there can be a slight relative movement between the block and the bridging contact. The side of the block 36 adjacent to the brush is provided with a recess in which is seated the spring 43^a, which bears on the bridging contact and presses the latter away from the block 36 as shown in Fig. 1 when the circuit breaker is open or the contacts are out of engagement. When the circuit breaker is closed and the bridging contact C is pressed against the stationary contact members A′ and B there will be a slight relative movement between the block 36 and the bridging contact and the spring will be slightly compressed as shown in Fig. 2. The advantages of this construction are that it will be unnecessary to accurately position the locking or engaging parts of the contact carrying lever and holding trigger or latch, and the pressure of the bridging contact on both stationary contact members will be the same.

To the outer free end of the block 36 is pivoted the arm 44 made of metal punching carrying at its free end the arcing tip 45 which is adapted to engage the arcing tip 46 bolted or screwed to the block A′. The arcing tips 45 and 46 are preferably made of rolled or extruded sections. A spring 47 seated in a recess in the arm 36 engages the end of the arm 44 and normally presses the arcing tip 45 toward the arcing tip 46. In order that there may be a good electric contact between the arm 44 and the stationary block or contact member *b*, the arm and block are joined by the flexible shunt 48.

A spiral spring 49 mounted on a sleeve 50 carried by the pintle 30 opens the circuit-breaker with a quick movement when the lever is released by the tripping magnet. One end of the spring 49 is secured in a hole 51 in the contact member B and the other end rests against a lug or projection 52 on the lever. The backward movement of the lever under the pressure of the spring 49 is limited by a stop consisting in this case of a bolt 53 secured to the base and a rubber sleeve 54 which acts as a buffer to lessen the shock when the circuit breaker is opened. As here shown the lever is provided with a lug or projection 55 which engages the sleeve 54.

The combined tripping and blow-out magnet which has been previously referred to is provided with a pair of coils 56 of concentrically wound strap conductor, a cylindrical core 58 and a movable pole shoe 60. The coils and core rest against a lug 57 on the base which as will be explained serves as part of the magnetic circuit of the magnet, and the coils, core and pole shoe are held to the base by a screw 59 which passes through the core into the lug 57 and by a washer or disk 59^a on the outer end of the screw. The pole shoe is composed principally of three parts, a plate 61 of non-magnetic material such as copper or brass, a plate or arm 62, and a movable armature 63, the parts 62 and 63

being of magnetic material such as cast iron. The arm or plate 62, the outer end of which is over the arcing tips, is secured to the plate 61 by rivets 64, and the armature 63 is pivoted to the arm or plate 62, at 65. The end of the core 58 is recessed or cut away forming a shoulder 58ª between which and the disk 59ª the plate 61 is held. This construction permits the pole shoe to be turned about the pole as a pivot when it is desired to inspect or remove the contacts. The armature 63 extends over the magnet and is normally held away from the core by a spring 66 which is connected at one end to an L-shaped sheet metal plate 67 riveted to the pole shoe as shown at 68, and at the other end is attached to a nut 69 adjustably mounted on a screw 70. This screw 70 has a threaded shank or body, a knurled head, and U-shaped member 72 having V-shaped legs which engage or bear on two notched lugs 73 integral with the pivoted armature 63. The armature is adapted to be normally held in position shown in Fig. 4 by means of a spring 66 and will be attracted to the magnet core when a predetermined current passes through the magnet coils. By adjusting the tension of the spring 66, the armatures can be caused to be attracted at any desired value of current in the magnet coils. The plate 67 is preferably provided with graduations for calibrating the spring 66.

As shown in Figs. 1 and 2 the armature 63 has a laterally extending arm 74 which is adapted to engage the releasing trigger 75 of the circuit breaker when the latter is attracted to the core of the magnet, and in its lower side a wooden knob 76 which is adapted to extend through the cover of the circuit-breaker. Means is thus provided for manually opening the circuit-breaker.

The releasing trigger 75 is pivoted intermediate its ends on a pin 77 mounted in ears 78 integral with the base 10. One end 79 of the trigger extends toward the magnet and is adapted to be engaged by the arm 74 on the armature 63, and the opposite end is connected to a lug on the base 10 by a spring 80. One arm of the trigger is surrounded by insulating sleeve or tube 81 on which is mounted a hardened steel collar or ring 82 provided with a straight perpendicular face 83, and an inclined or cone-shaped surface 84. The collar or ring 82 is held in position by two insulating sleeves or tubes 86. Mounted on the face of the hand lever is a hardened steel lug 87 which is adapted to engage the perpendicular face 83 of the ring 82 when the circuit breaker is closed. When the armature is attracted to the core, or when the armature is moved by hand, the arm 74 engages the end 79 of the trigger, rocks the latter on the pin 77 and swings the holding collar or ring 82 out of engagement with the lug 87 on the lever, thus allowing the spring 49 to quickly open the circuit-breaker by swinging the lever to the position shown in Fig. 1.

Directly opposite the arcing tips on the inner side of the base 10 is a lug 88 which serves as a pole face of the magnet, and on the outer side of the base extending between the lug 88 and lug 57 is an elongated lug 89 which serves as a second pole shoe of the magnet. The magnetic circuit of the magnet includes the following parts, core 58, armature 63 and arm 62 of pole shoe 60, lug 88, pole shoe 89 and lug 57. It is seen that the arcing tips are in the gap between the ends of the pole shoes and therefore in a strong magnetic field. Consequently any arc formed at the tips will be quickly extinguished. The arcing tips are inclosed in a blow out or arcing chute 90 which is made of non-combustible insulating material and is preferably rectangular in shape as shown. The chute is open at both ends, the outer end extending through the cover of the circuit-breaker and being flared or enlarged. One side of the chute is slotted or cut away as shown most clearly in Fig. 2 so that it can be slid into position over the arcing tips.

The plate 61 is held to the core by the screw 59 and is so mounted that it can be turned about the screw as a pivot as was explained. As shown in Fig. 2 the plate 61 has a perforated ear 91 and the arcing chute has a perforated lug 92 which registers with the perforated ear 91 when the chute and pole piece are in position. The pivotally mounted pole shoe and the blow out or arcing chute 90 are locked in position by a screw 93 of non-magnetic material, which screw engages the ear 91, lug 92 and lug 94 on the base. If it is desired to move the chute 90 and to inspect or remove the contact members, the screw 93 is first removed whereupon the chute can be withdrawn and the pole shoe can be swung to one side about the core 58. In Fig. 5 I have shown the chute removed and the pole shoe swung to one side or out of its normal position, thus exposing the arcing tips and other parts.

The base 10 is provided near its perimeter with a ridge 95 and narrow flange 96 upon which a cover is adapted to rest. The cover 97 has substantially the same outline as the base 10 and is preferably made from hardened sheet metal. This cover is held to the base by a single nut 98 which engages the outer threaded end of the step bolt 53 previously described.

The metal parts of the circuit-breaker except the base, bridge, pole piece, trigger and standard commercial details such as screws, rivets, etc., are preferably made from rolled, extruded, or drawn metal sections. All the parts can thus be easily and cheaply made.

I aim in my claims to cover all modifications which do not involve a departure from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent is:—

1. In a circuit breaker, a base having two spaced arms extending outwardly at right angles therefrom, said arms and the base intermediate the same having a groove or channel, a block of insulating material resting on the base intermediate said arms, said channel being filled with an easily fusible metal, which holds the insulating block to the base, and contact members mounted on said block.

2. In a circuit breaker, a supporting base having at opposite sides two outwardly extending arms or projections, the adjacent faces of the arms and the base between the arms being provided with a groove or channel, a block of insulating material seated on said base between the arms, said block having recesses or openings communicating with the channel, said channel and recesses being filled with an easily fusible metal which holds the block in place, and contact members carried by said block.

3. In a circuit breaker, a supporting base having on opposite sides arms or side portions extending outwardly at right angles therefrom, said arms and the base intermediate the same having a groove or channel, a block of insulating material seated on said base between the arms, said block having recesses or openings communicating with the groove in the arms and in the base, said groove and recesses being filled with an easily fusible metal which holds the block in place, and contact members carried by said block.

4. In a circuit breaker, a supporting base, a pair of stationary contact members secured thereto, said contact members having flat contact faces, and one of said members having a perforated extension, an L-shaped lever pivoted to said extension, a bridging contact member pivoted to said lever and arranged to bear upon said flat contact faces, and a coil spring encircling the pivotal support of said lever and having one end engaging the contact member to which the lever is pivoted and the other end engaging the lever.

5. In a circuit breaker, a pair of stationary contacts having flat faces, and a pivoted lever having mounted thereon a bridging contact or brush arranged to engage the flat faces of said stationary contacts, said bridging contact and lever having a pin and slot connection in line with the center of said bridging contact.

6. In a circuit breaker, a pair of stationary contacts having flat faces and a lever carrying a bridging contact or brush, said bridging contact and lever having a pin and slot connection, said pin and slot connection being substantially in line with the center of the bridging contact, and a compression spring intermediate said bridging contact and lever and bearing against said bridging contact midway between the ends thereof.

7. In a circuit breaker, a pair of stationary contacts, a laminated bridging contact, a holder for the laminæ, a pivoted lever to which said holder is secured, one of said two last mentioned members having a slotted portion and the other having a lug or projection loosely engaging the slotted portion, and a yieldable member between the holder and lever, whereby the bridging contact is pivotally and yieldingly connected to the lever.

8. In a circuit-breaker, a pair of stationary contacts, a movable bridging contact consisting of a bundle of laminæ and a holder having a pair of slotted ears, a pivoted lever having projections engaging the slots in the ears, and a spring between the lever and laminæ holder.

9. In a circuit-breaker, a block of insulating material, a pair of stationary contacts mounted on one side thereof, a lever carrying a bridging contact, terminals entering the insulating block from the other side and connected with the stationary contacts, one of the stationary contacts consisting of two insulated superimposed portions, and a tripping magnet having terminals connected respectively to the two portions.

10. In a circuit-breaker, a stationary contact, a movable contact, arcing tips carried thereby, and a combined tripping and blow-out magnet having a pole shoe extending over said arcing tips, said pole shoe being pivoted to the magnet core.

11. In a circuit-breaker, a stationary contact, a movable contact, arcing tips carried by said contacts, a combined tripping and blow-out magnet having a pole shoe extending over said arcing tips, said shoe being pivoted whereby it may be swung to either side of its normal position to expose the arcing tips, and a single screw for locking the pole shoe in its normal position.

12. In a circuit-breaker, contacts having arcing tips, a combined tripping and blow-out magnet having a pivotally mounted pole shoe extending over the arcing tips, and a blow-out chute inclosing the arcing tips, said shoe and chute being locked in position by a single holding means.

13. In a circuit-breaker, contacts having arcing tips, a combined tripping and blow-out magnet having a pivotally mounted pole shoe, a removable blow-out or arcing chute inclosing the arcing tips, and a single screw for holding the shoe and blow-out chute in position.

14. In a circuit-breaker, a combined trip-

ping and blow-out magnet comprising a coil, core and a pole shoe movable about the core, a blow-out or arcing chute and unitary means for holding said pole-shoe and chute in position.

15. In a circuit-breaker, a combined tripping and blow-out magnet comprising a coil, core and pivoted pole-shoe, a removable blow-out or arcing chute, and a screw passing through or engaging said shoe and chute for holding said parts in position.

16. In a circuit-breaker, a supporting base, stationary and movable contacts, a lever on which the movable contact is mounted, means for automatically moving the lever to open the circuit, a bolt or projection on said base to limit the movement of said lever, and a cover for said circuit breaker, said bolt or projection extending through the cover and provided with a nut for locking the cover in position.

17. In a circuit breaker, a base, an insulating support mounted thereon, contact members secured to said support, each contact member having a cut or slotted extension seated in an opening in said support, each extension having a socket adapted to receive a terminal lead or conductor and screws extending into said support and into the slotted extensions so as to draw the parts of the same together.

18. In a circuit-breaker, an operating lever, and a trigger having an insulated metal ring, said ring being adapted to engage the lever and hold it in its closed position.

19. In a circuit-breaker, an operating lever having a laterally extending lug or projection, and a trigger having an insulated metal ring, said ring being adapted to engage the projection on the lever to hold the lever in its closed position.

20. In a circuit-breaker, a base, a magnet core attached thereto, and a plate of non-magnetic material mounted on the core and carrying an armature, said plate being adapted to swivel in a plane normal to the core.

21. In a circuit-breaker, a base, a magnet, a swivel shoe, an arcing chute mounted between the base and the pole shoe, and a single screw adapted to hold the pole shoe and chute in position.

22. In a circuit breaker, a base, a block of insulating material mounted thereon, said block having openings extending therethrough, contacts secured to said block and having cut or slotted extensions seated in said openings, said extensions having sockets adapted to receive terminal leads or conductors, and screws passing into said slotted extensions and serving to draw the parts of the same together.

23. In a circuit breaker, a supporting base or frame, a combined tripping and blow out magnet comprising a coil, a core and a pole shoe, and a bolt or screw passing through the shoe into the core, said shoe being movable freely about said core.

24. In a circuit-breaker, a base, a magnet comprising a coil, a core, and a pole shoe, and means for clamping said core and pole shoe to said base comprising a screw or bolt passing through the core into the base, the pole shoe being mounted for pivotal movement about the end of the core.

25. In a circuit breaker, a magnet comprising a coil, a core and a pole shoe, said pole shoe including a sheet or plate of non-magnetic material secured to said core, a member of magnetic material secured to said plate, and an armature of magnetic material pivoted to said member.

In testimony whereof I affix my signature, in the presence of two witnesses.

HERBERT W. CHENEY.

Witnesses:
ARTHUR F. KWIS,
FRED J. KINSEY.