F. W. HARRIS.

CIRCUIT BREAKER.

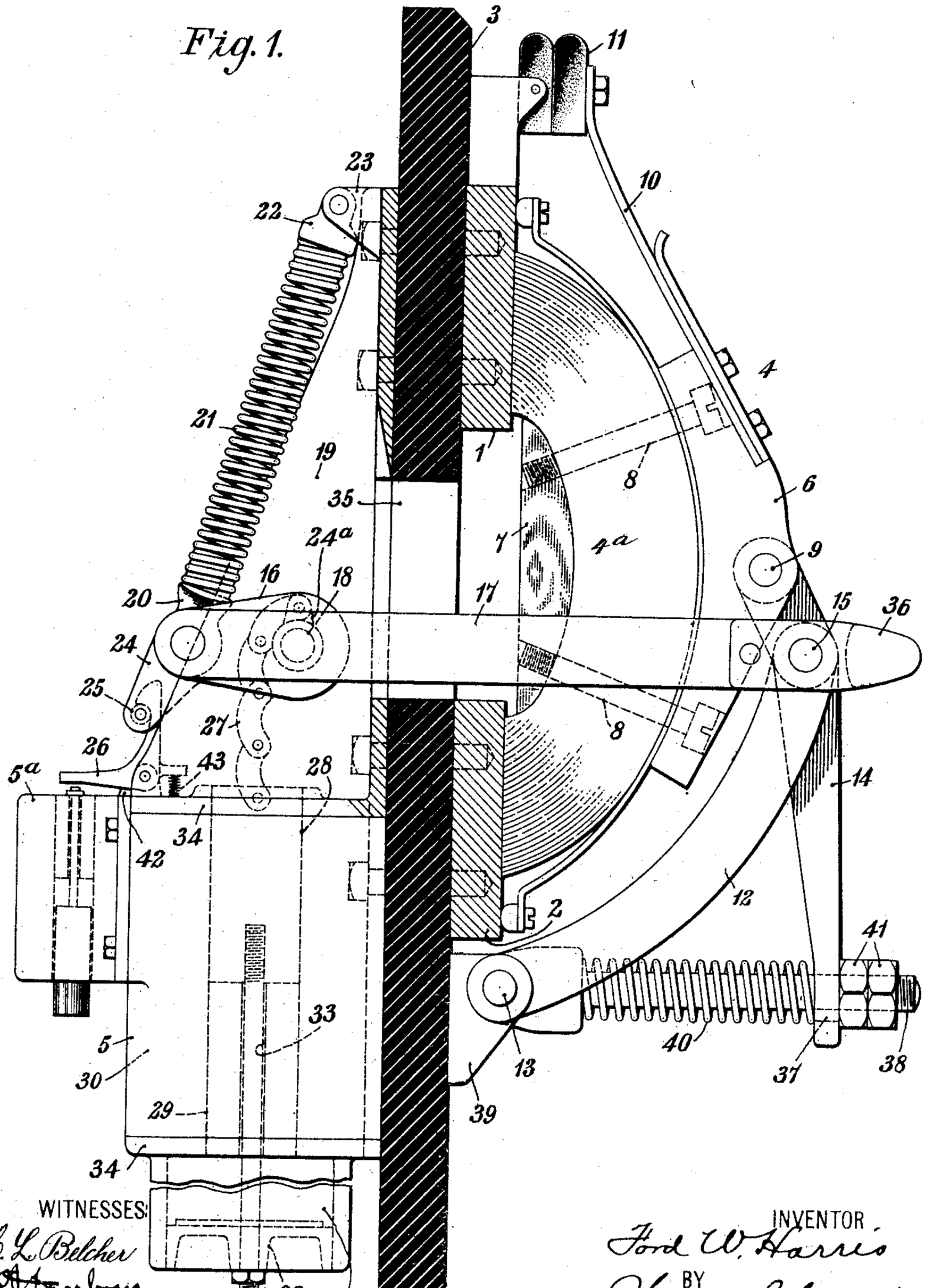
APPLICATION FILED DEC. 14, 1908.

978,882.

Patented Dec. 20, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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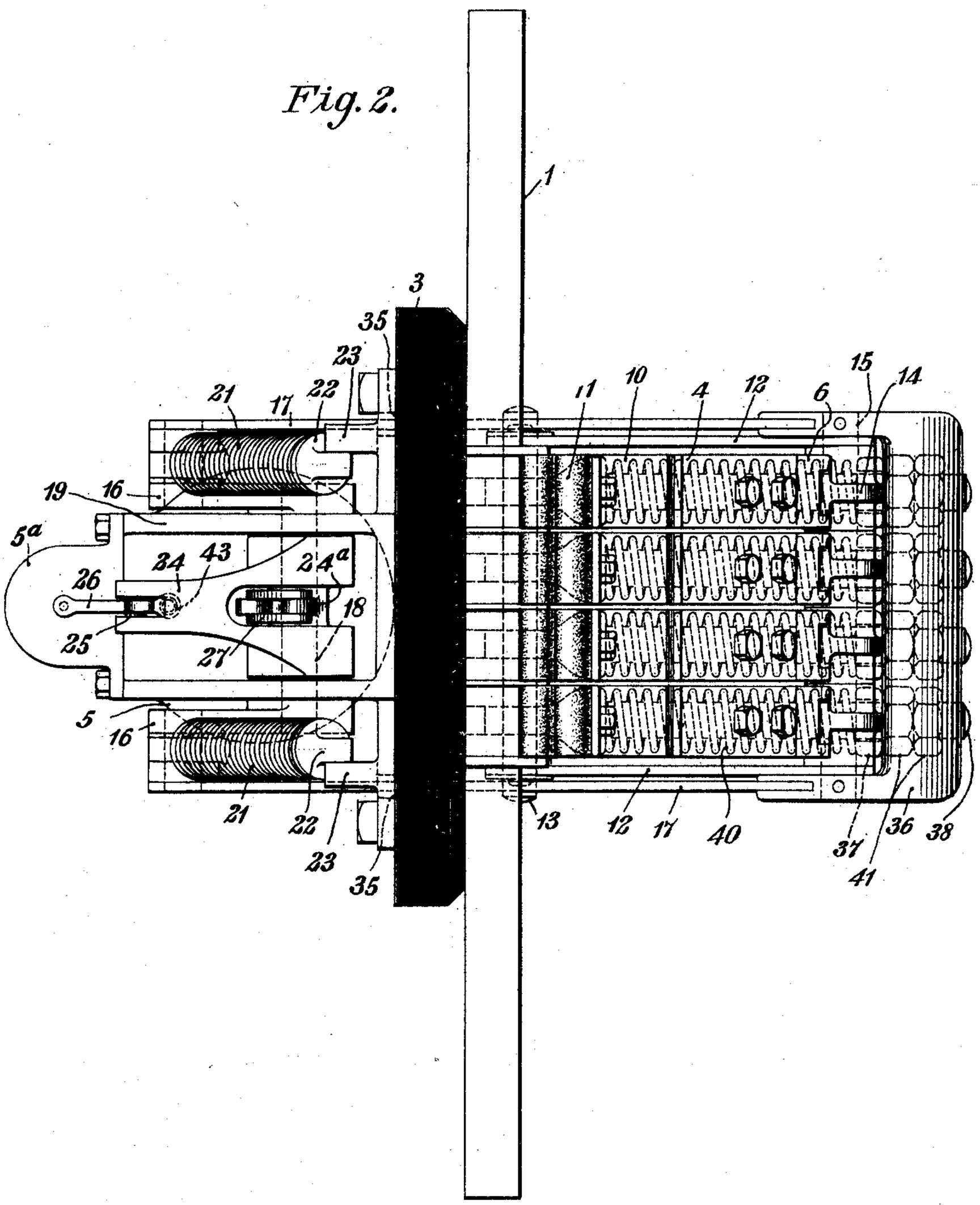
3 SHEETS—SHEET 2.

Fig. 2.



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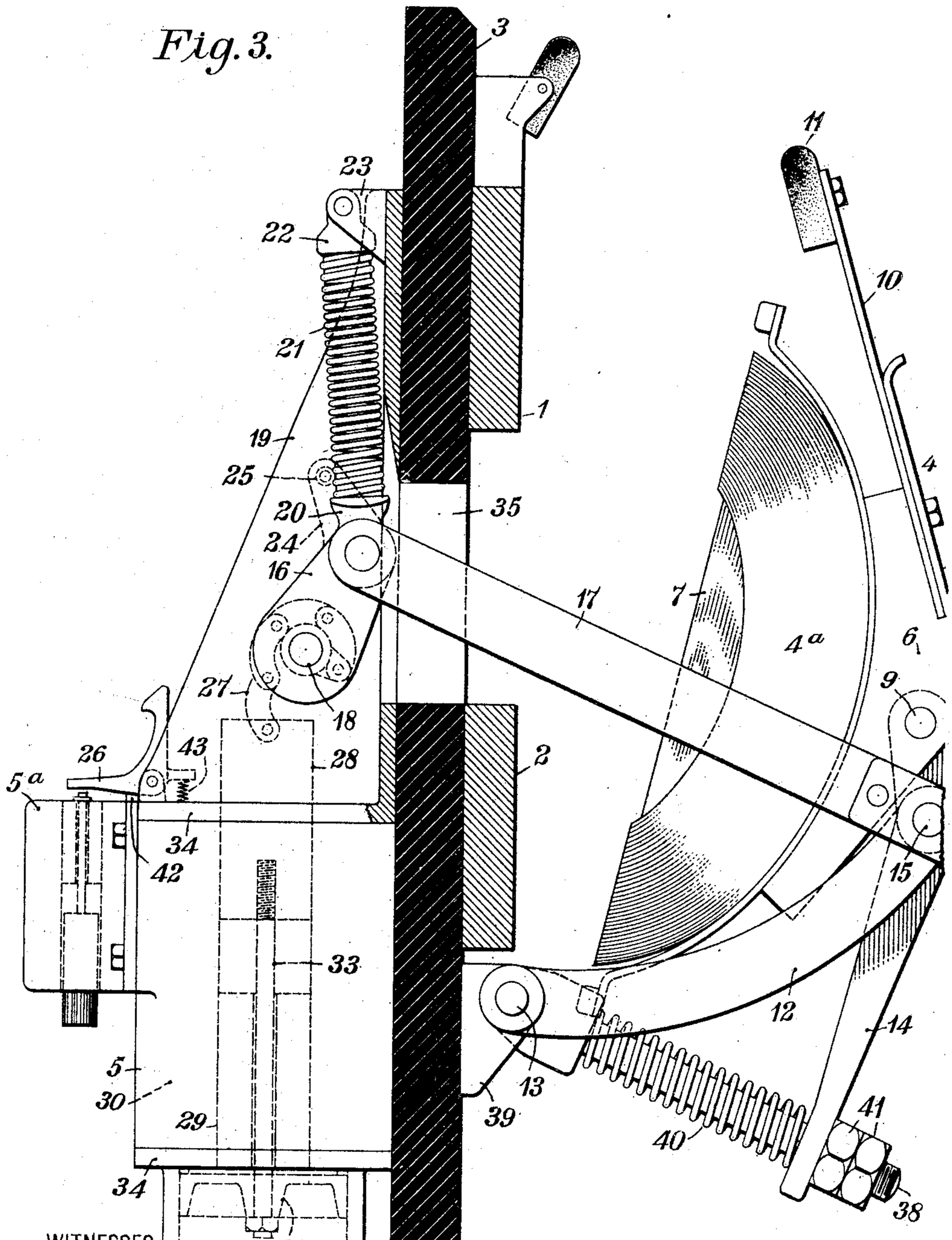
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

FORD W. HARRIS, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

CIRCUIT-BREAKER.

978,882. Specification of Letters Patent. Patented Dec. 20, 1910.

Application filed December 14, 1908. Serial No. 467,523.

To all whom it may concern:

Be it known that I, FORD W. HARRIS, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Circuit-Breakers, of which the following is a specification.

My invention relates to circuit breakers and particularly to devices of this character which are adapted for circuits carrying very large currents at relatively low voltages.

The object of my invention is to provide an electrically operated circuit interrupter suitable for the uses indicated above, that shall be simple and durable in construction and adapted to be so mounted on a switch board panel as to occupy a minimum amount of space with its weight distributed on both sides of the panel.

Figure 1 of the accompanying drawings is an elevation and Fig. 2 is a plan view of a circuit interrupter constructed in accordance with my invention. Fig. 3 is a view similar to Fig. 1 but showing the device in open position.

Referring to the drawings, the circuit breaker illustrated comprises a pair of stationary contact members 1 and 2 which are secured to an insulating panel or slab 3, a multiple-unit bridging contact member 4, an operating electro-magnet 5, a release magnet 5^a and suitable operating mechanism.

The bridging contact member 4 comprises a plurality of laminated brushes 4^a the thin plates of which are clamped together by blocks 6 and 7 and binding screws 8, the blocks 7 being located on the concave sides of the semi-elliptical contact brushes and the blocks 6 being located on their convex sides. The blocks 6 are pivotally mounted on independent pins or shafts 9 and each is provided with a spring arm 10 to the free end of which a carbon contact block 11 is secured.

The operating mechanism comprises a pair of levers 12 the inner ends of which are mounted upon a shaft 13, a plurality of bell crank levers 14 pivotally mounted on a shaft 15, cranks 16 and links 17. The cranks 16 are secured to a shaft 18 which is supported in bearings provided by a stationary bracket 19 on the back of the plate or slab 3. The outer ends of the cranks 16 are pivotally connected to the inner ends of the links 17 and to blocks 20 to which the lower ends of springs 21 are secured. The upper ends of the springs 21 are secured to blocks 22 that are pivotally mounted on projections 23 at the upper end of the bracket 19 so that the springs tend to produce a clockwise rotation of the shaft 18 when the breaker is closed. An arm 24 is also secured to the shaft 18 and is provided with a roller 25 at its outer end that may be engaged by a latch 26, when the breaker is closed. The inner end of the arm 24 is recessed and a chain 27 is secured to a projection 24^a on the hub of the arm. The opposite end of the chain 27 is pivotally secured to the movable core member 28 of the operating magnet 5. The magnet 5 is supported by the plate or slab 3 and comprises a stationary core member 29, a winding 30 and a dash pot 31 having a plunger 32 that is connected to the movable core member 28 by means of a rod 33. The stationary part of the dash pot 31 and the end plates 34 of the magnet are preferably integral with the bracket 19. The links 17 project through a recess 35 in the plate or slab 3 and their outer ends are joined by a clevis 36, the arms of which support the shaft 15. One arm of each of the bell crank levers 14, which are alike, is secured to one of the blocks 6 and the other arm is provided with a hole 37 through which a bolt or spring guide 38 projects. The bolts or spring guides 38 are pivotally mounted on the shaft 13 which is supported by brackets 39 secured to the plate or slab 3. Coil springs 40 surround the bolts 38 between the bolt heads and the arms 14, the outer ends of the bolts being provided with nuts 41 that limit the movement of the bell crank levers in one direction, relative to the bolts or spring guides 38. The arms of the bell crank levers, which form connecting links between the blocks 6 and the shaft 15, are relatively short and the arrangement of parts is such that the springs 40 tend to hold the bridging contact members 4 in close engagement with the stationary contact blocks 1 and 2 after the circuit breaker has been closed by the operating magnet 5. The latch 26 is normally held in engagement with a stop 42 by means of a spring 43, and also by gravity.

The operation of the device is as follows: Assuming that the circuit breaker is closed,

as shown in the drawings, if it is desired to interrupt the circuit which is completed through it, the tripping magnet 5ª is energized, whereupon the latch 26 is withdrawn from the roller 25 and the springs 21 serve to rotate the crank 16 through an angle of substantially 120 degrees and a considerable outward and downward movement of the bridging contact members 4 is permitted. When it is desired to close the breaker, the operating magnet winding 30 is energized and the springs 21 tend to assist the initial action of the magnet in so rotating the cranks 16 and the shaft 18 as to bring the bridging contact members into engagement with the stationary contact members 1 and 2.

It will be observed that the nuts 41 may be so adjusted as to take up for the wearing of the engaging contact surfaces, while the surfaces are always pressed together when the breaker is closed by means of the springs 40.

While the springs 21 assist the electro-magnet when the air gap between the stationary and movable core members is large, they oppose the action of the electro-magnet when the air gap between these members is small and when the force tending to close the breaker is proportionately great. The opening of the circuit breaker is retarded by the dash pot 31 and, consequently, mechanical stops which usually appear in devices of this character are unnecessary. The final rotation of the crank 16, in opening the circuit breaker, is also retarded by the springs 21, which are under tension to a greater or less degree, as above indicated.

Since structural modifications may be effected within the spirit and scope of my invention, I desire that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. A circuit interrupter comprising an insulating slab or plate having an aperture, stationary contact members secured to one surface of the plate at opposite sides of the aperture, movable bridging contact members, operating means on the opposite side of the plate from the contact members, connecting links extending through the aperture in the plate for establishing an operative connection between the movable contact members and the operating means, and a tension spring for assisting the initial action and for opposing the final action of the operating means in closing the circuit breaker.

2. A circuit interrupter comprising an insulating slab or plate having an aperture, stationary contact members secured to one surface of the plate at opposite sides of the aperture, movable bridging contact members, levers pivotally secured to the plate or slab adjacent to one of the stationary contact members, short links interposed between the bridging contact members and the outer ends of the levers, an operating magnet mounted on the opposite side of the plate or slab from the contact members, cranks rotatably mounted above the magnet and links extending through the aperture in the plate and interposed between the outer ends of the levers and the outer ends of the cranks.

3. A circuit interrupter comprising an insulating slab or plate having an aperture, stationary contact members secured to one surface of the plate at opposite sides of the aperture, movable bridging contact members, levers pivotally secured to the plate or slab adjacent to one of the stationary contact members, bell crank levers pivotally secured to the outer ends of the levers, a stationary bracket secured to the opposite side of the plate from the contact members, an operating magnet secured to the bracket, a crank shaft rotatably mounted above the operating magnet and having crank projections extending away from the plate, an operative connection between the magnet and the crank shaft, links extending through the aperture in the plate and interposed between the ends of the crank projections and the fulcrum of the bell crank levers, stops for limiting the rotation of the bell crank levers in one direction and springs tending to hold the bell crank levers against the stops, the movable bridging members being pivotally secured to the opposite ends of the bell crank levers from the stops.

4. A circuit interrupter comprising an insulating slab or plate having an aperture, stationary contact members secured to one surface of the plate at opposite sides of the aperture, a plurality of movable bridging contact members, a pair of levers pivotally secured to the plate or slab adjacent to one of the stationary contact members, a shaft supported at the ends of the levers, bell crank levers pivotally mounted on the shaft, a stationary bracket secured to the opposite side of the plate from the contact members, an operating magnet secured to the bracket, a crank shaft rotatably mounted above the operating magnet and having crank projections extending away from the plate, when the interrupter is closed, an operative connection between the magnet and the crank shaft, links extending through the aperture in the plate and interposed between the ends of the crank projections and the bell crank lever shaft, a tension spring for assisting the initial action of the operating magnet and for opposing the final action thereof, a latch for holding the crank projections in opposition to the spring, a release magnet for the latch secured to the stationary bracket, stops for limiting the rotation of the bell crank levers in one direction and springs tending

to hold the bell crank levers against the stops, the movable bridging members being pivotally secured to the opposite ends of the bell crank levers from the stops.

5. A circuit interrupter comprising a slab or plate having an aperture, stationary contact members secured to one surface of the plate, a movable contact member pivotally secured on the same surface of the plate, an operating crank shaft on the opposite side of the plate from the contact members, connecting links extending through the aperture in the plate for establishing an operative connection between the movable contact members and the crank shaft and springs for assisting the initial action of the crank shaft and opposing the final action thereof in opening the circuit breaker.

In testimony whereof, I have hereunto subscribed my name this 30th day of November, 1908.

FORD W. HARRIS.

Witnesses:
C. AOLBORG,
BIRNEY HINES.