

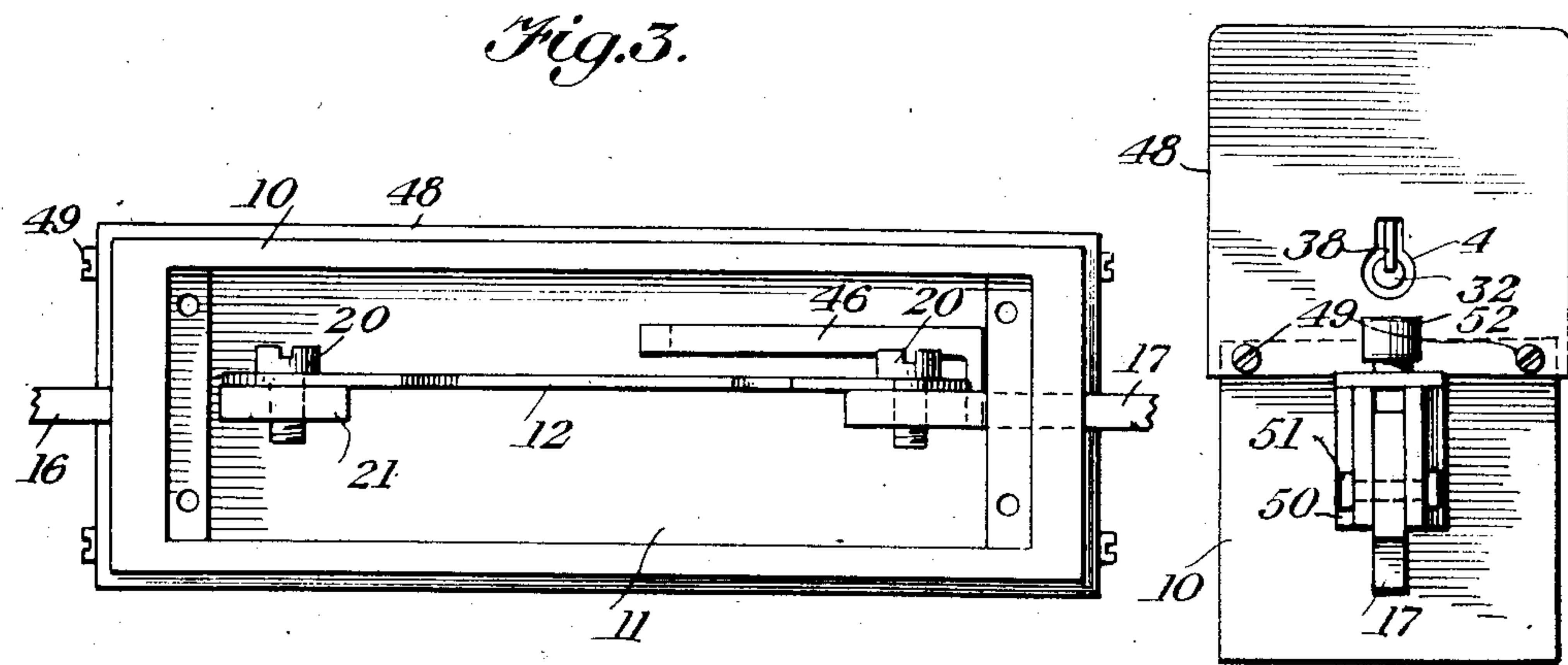
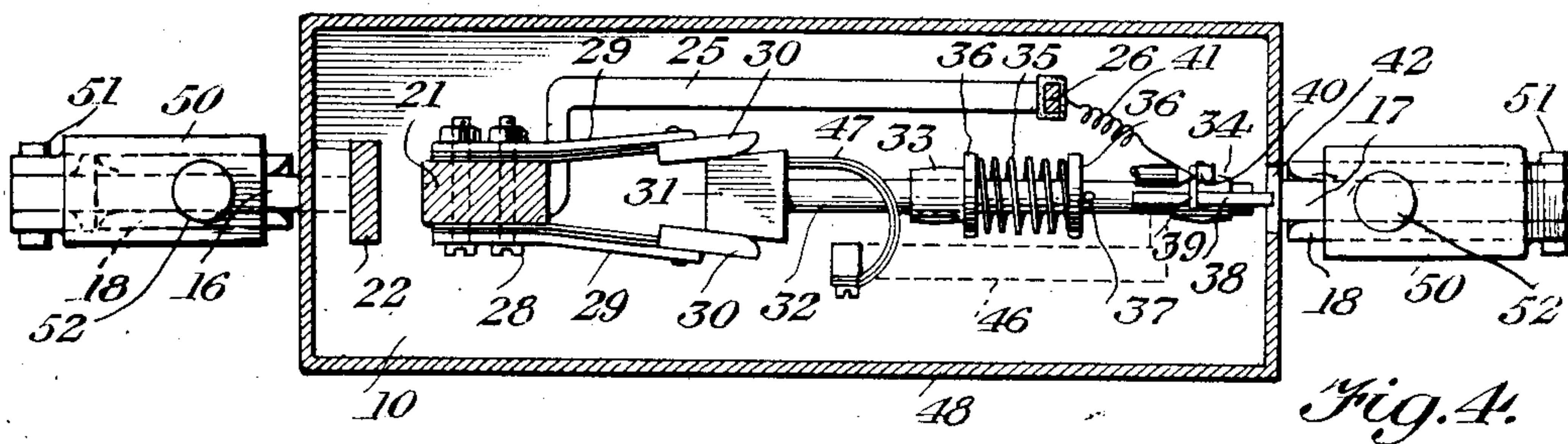
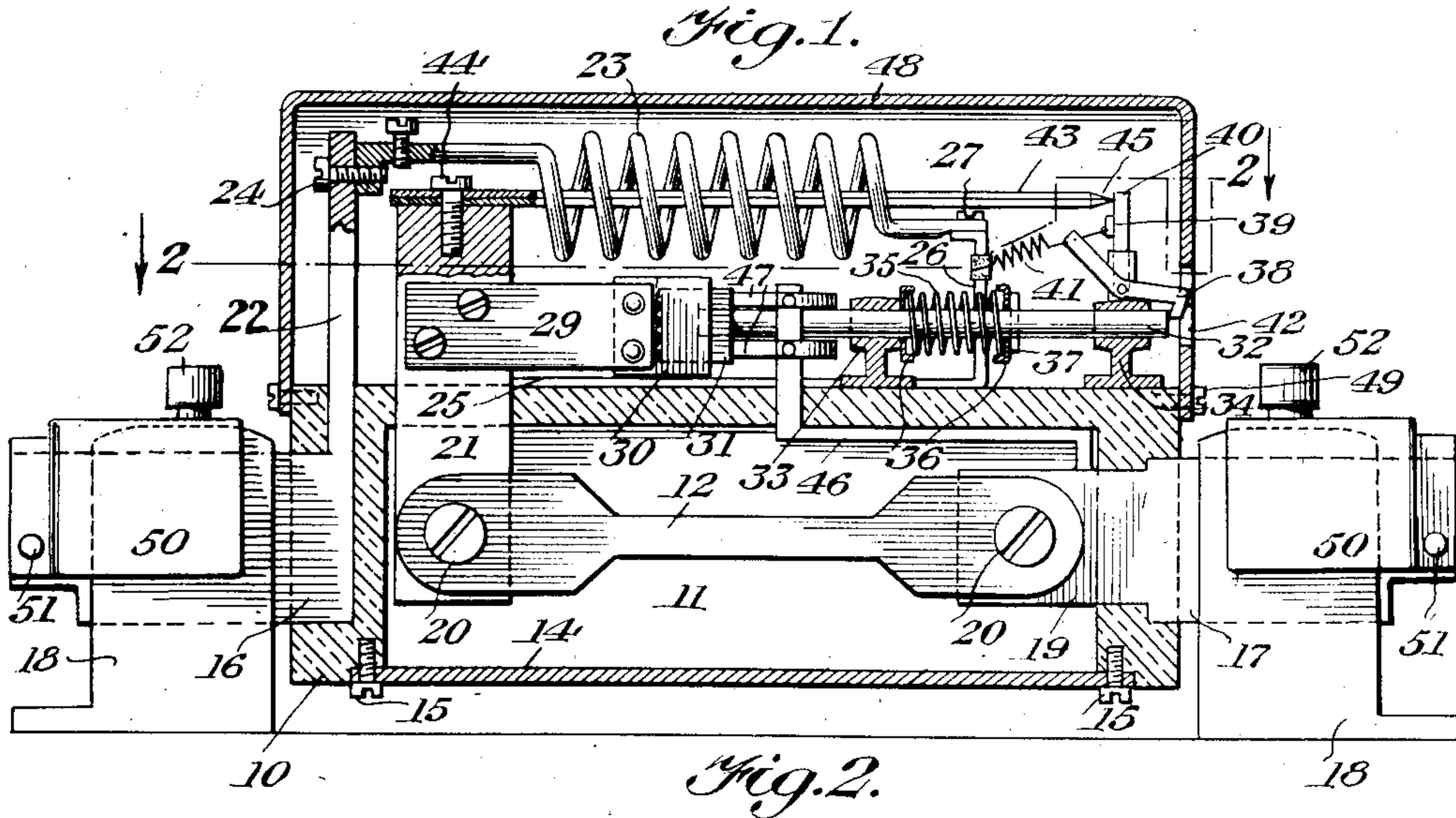
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TIME DELAY FUSE

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## TIME DELAY FUSE

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2 Claims. (Cl. 200—116)

The object of the invention is to provide a circuit interrupting device to serve as a protecting medium on a switchboard or the like to protect motors, transformers and service lines in the event of an excess load but so constructed as to carry out the circuit interrupting function only after the elapse of a predetermined time element, in order that an instantaneous overload will not result in circuit interruption and its attendant disadvantages; to provide a circuit interrupting device in which the circuit interrupting function is ultimately carried out by a fuse; to provide a device of the kind indicated which incorporates a circuit breaker and means for actuating the same after a prescribed interval of time to place the load on the fuse to blow the latter if the load be excessive; to provide a construction in which the fuse is readily replaceable; to provide a circuit interrupting device embodying a fuse and attendant circuit breaker and control means for the latter in which the whole is entirely enclosed; to provide means for maintaining a firm contact between the device and the conventional fuse clips in which it is mounted; and generally to provide a device of the kind indicated which, for the functions performed, is of comparatively simple construction and cheap to manufacture.

With this object in view, the invention consists in a construction and combination of parts of which a preferred embodiment is illustrated in the accompanying drawing, wherein:

Figure 1 is a central vertical longitudinal sectional view of an interrupting device constructed in accordance with the invention.

Figure 2 is a horizontal sectional view on the plane indicated by the line 2—2 of Figure 1.

Figure 3 is a bottom plan view with the cover for the fuse chamber removed.

Figure 4 is an end elevational view looking from the right as the invention is viewed in Figure 1.

The invention comprises a block 10 of insulating material hollowed out to provide a chamber 11 in which the fuse 12 is disposed, this chamber opening on the bottom of the block and being normally closed but made accessible by means of a removable cover 14 secured, when attached, by means of screws 15. In the ends of the block, the blades 16 and 17 are mounted, the block being of the length of the conventional enclosed fuse, so that the device may be mounted in the conventional fuse clips 18 usually provided on distribution panels.

The blade 17 is extended into the chamber 11 to provide a lug 19 serving as a seat for one end of the fuse 12, on which the fuse is secured by

means of a screw 20. A post 21 extending through the top wall of the chamber provides, on that part interior to the chamber, the other seat for the fuse by which it is secured in place through the instrumentality of a screw similar to the screw 20. The blade 16, does not enter the chamber but has a tail extension 22 standing above the top of the block 11 and at its upper end serves as a support for one extremity of the coil 23 which is preferably of comparatively heavy copper wire, the coil terminal being secured to the extension 22 by means of a screw 24.

A bus bar 25 laid on the top face of the block 10 has a permanent connection with the post 21 and this bar is upturned, as indicated at 26, to provide a post to which the other end of the coil 23 is anchored by means of a screw 27.

Bolted, as indicated at 28, on opposite sides of the post 21, are the laminated spring fingers 29 terminally provided with the contact blocks 30, these spring fingers and blocks functioning as the stationary members of the circuit breaker of which the movable member is in the form of a wedge block 31 entering between the blocks 30 to make firm contact with the two. The wedge block 31 is carried at one extremity of a stem 32 slidably mounted in spaced bearings 33 and 34 mounted upon the block 10 on the upper face thereof. A coil spring 35 surrounds the stem 32 and is compressed between the cup washers 36, one of which abuts the bearings 33 and the other a pin 37 which is inserted diametrically through the stem. The tendency of the spring, therefore, is to move the stem 32 in a direction to disengage the wedge block 31 from between the blocks 30 and the spring will effect this disengagement, except when it is restrained through the instrumentality of the latch 38, which is in the form of a pawl, pivotally mounted on the bearing 34 and having a tail projecting across the path of movement of a lateral finger 39, the latter being carried by a pivotally mounted arm 40 also supported on the bearing 34. A spring 41 having one end anchored to the extension 26 of the bus bar and the other end anchored to the pivotally mounted arm 40 functions to pull the arm down and engage the finger 39 with the tail of the latch pawl 38, so as to move it out of restraining position with respect to the stem 32.

A thermostatic restraining member 43 is provided in the form of a laminar strip of two dissimilar metals having different coefficients of expansion, this strip being mounted by means of a screw 44 on the upper end of the post 21 and being arranged axially of the coil 23. The strip



is tapered to a point as indicated at 45 and normally is disposed in obstructing position to the arm 40, so that the latter is restrained. Subject to heat, however, the strip 43 bends upwardly out of obstructing position with reference to the arm 40, leaving the latter free to be swung down by its spring 41 and thus trip the latch out of restraining position with reference to the stem 32.

A bus bar 46, for the most part, within the chamber 11 where it is disposed against the top wall thereof, is terminally connected to the lug 19, the other terminal extending through the top wall of the chamber to provide an extension to which the flexible conductor strips 47 are secured, these conductor strips being disposed respectively above and below the stem and connecting with the wedge block 31. This, so that the sliding parts of the movable element of the circuit breaker may not be called upon for any current carrying function.

A housing member 48 is secured by means of screws 49 to the block 10 and serves to enclose the coil 23 and its associated parts as well as the circuit closer comprising the fixed and movable elements thereof. The housing member is provided with an opening 42 of keyhole form to provide for movement of the latch pawl 38 and the stem 32 in carrying out their indicated functions.

In order that the blades 16 and 17 may be securely held in their associated clips 18, so that there may be firm contact between the blades and clips, the clamp members 50 are provided, these being of U-shaped form and pivotally connected, as at 51, with the blades. The clamp members are designed to straddle the clips 18 when the blades are seated between the leaves of the clips but in removing and attaching the device as a whole, the clamp members may be swung out of engagement with the clips by reason of the pivotal connection, so that the blades may be inserted between or readily withdrawn from the clips. Finger pieces 52 are formed as elements of the clamp members to permit them being readily swung into and out of straddling relation to the clips.

In operation, when the device is mounted on a switchboard or control panel, current passes through it, say, from the clip 18 to the blade 16, thence to the extension 22, thence through the coil 23 to the bus bar 25, reaching the post 21. It thence passes jointly through the fuse and circuit breaker to the blade 17, the path through the circuit breaker being through the spring fingers 29, the blocks 30, the wedge block 31, the spring conductors 47 and bus bar 46. Should the current in circuit exceed the predetermined maximum, the invention will not immediately operate

to open the circuit but should this excess continue for a period that would be dangerous, the heat generated in the coil 23 will cause the thermostatic strip 43 to function, the latter curling upwardly out of obstructing position with respect to the pivotal arm 40, so as to leave the latter free to be swung down by the spring 41. The latch pawl 38 will thus be tripped, whereupon the spring 35 will immediately force the stem 32 back and withdraw the wedge block from between the blocks 30, thus opening the circuit breaker, thereby confining any current flowing to the fuse 12, thus resulting in blowing the fuse. There will be no arcing at the circuit breaker when the block 31 is withdrawn from between the blocks 30, because of the by-pass provided by the fuse 12. Thus there will be no deterioration of the circuit breaker by reason of sparking. If the excess of current obtains only for a limited period which would not ordinarily result in damage to the apparatus protected, the fuse will not be blown because of the fact that the circuit breaker will not be opened, due to the time element involved in the operation of the same.

The invention having been described, what is claimed as new and useful is:

1. A time delay circuit interrupting device comprising a fuse, a circuit breaker in shunt with the fuse and spring impelled to open position, a latch retaining the circuit breaker in closed position, a current carrying heat radiating coil in series with the fuse, and a thermostat disposed axially of the coil and anchored at one end and having a free end normally disposed in obstructing relation to the latch, the current carrying coil consisting of spaced convolutions disposed in surrounding relation to the thermostat and the thermostat consisting of a bimetallic strip laterally flexed in the presence of heat, the convolutions of the coil being of sufficient diameter to preclude engagement by the thermostat when the latter is flexed.

2. A time delay circuit interrupting device comprising a fuse, a circuit breaker in shunt with the fuse and spring impelled to open position, a latch retaining the circuit breaker in closed position, a flexible thermostatic strip anchored at one end and having its free end disposed in obstructing relation to the latch at normal temperatures, and a current carrying heat radiating coil in series with the fuse and in surrounding relation to the strip to cause flexing of the latter at abnormal temperatures and thereby effect release of the latch with the consequent opening of the circuit breaker.

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