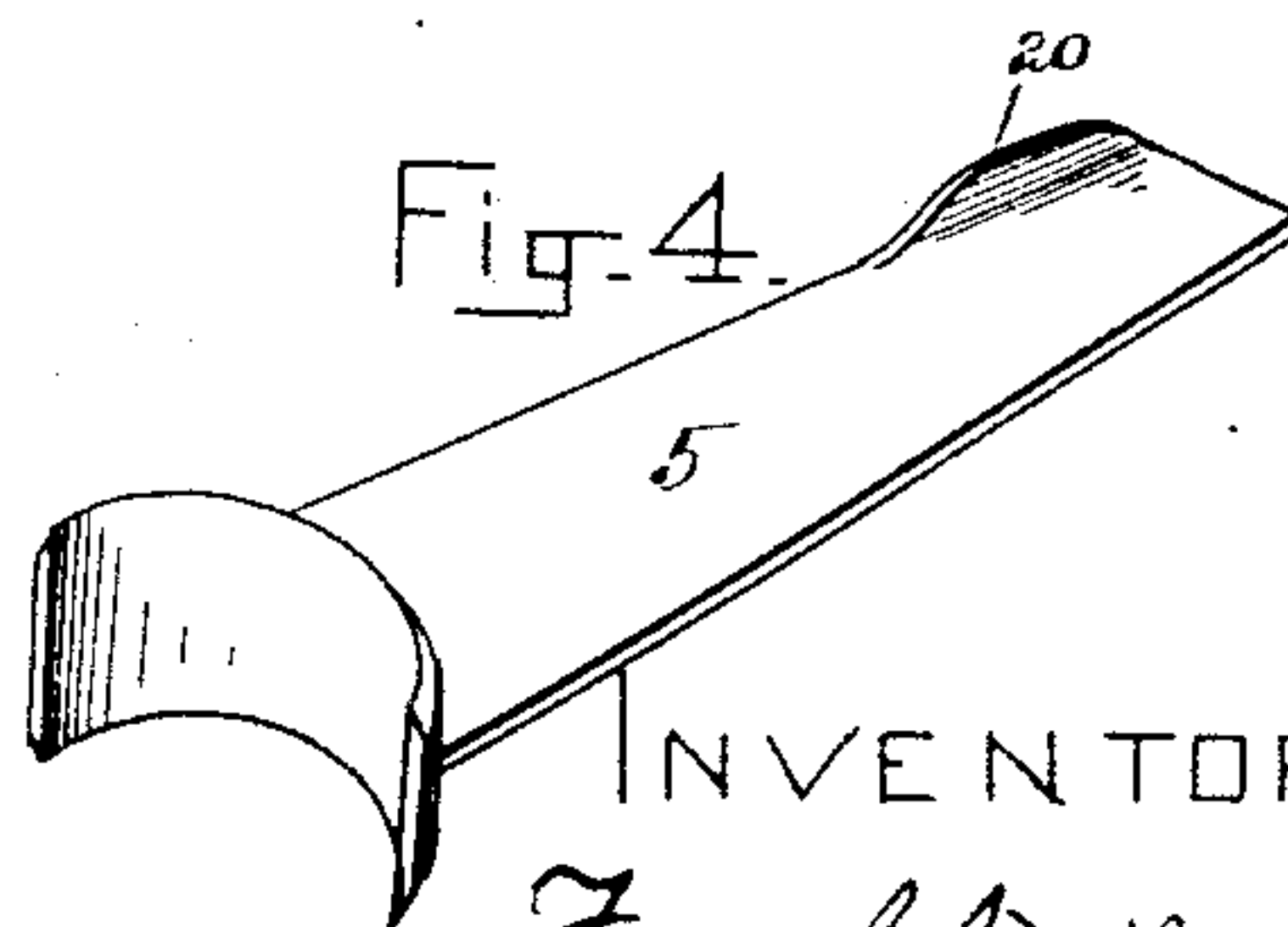
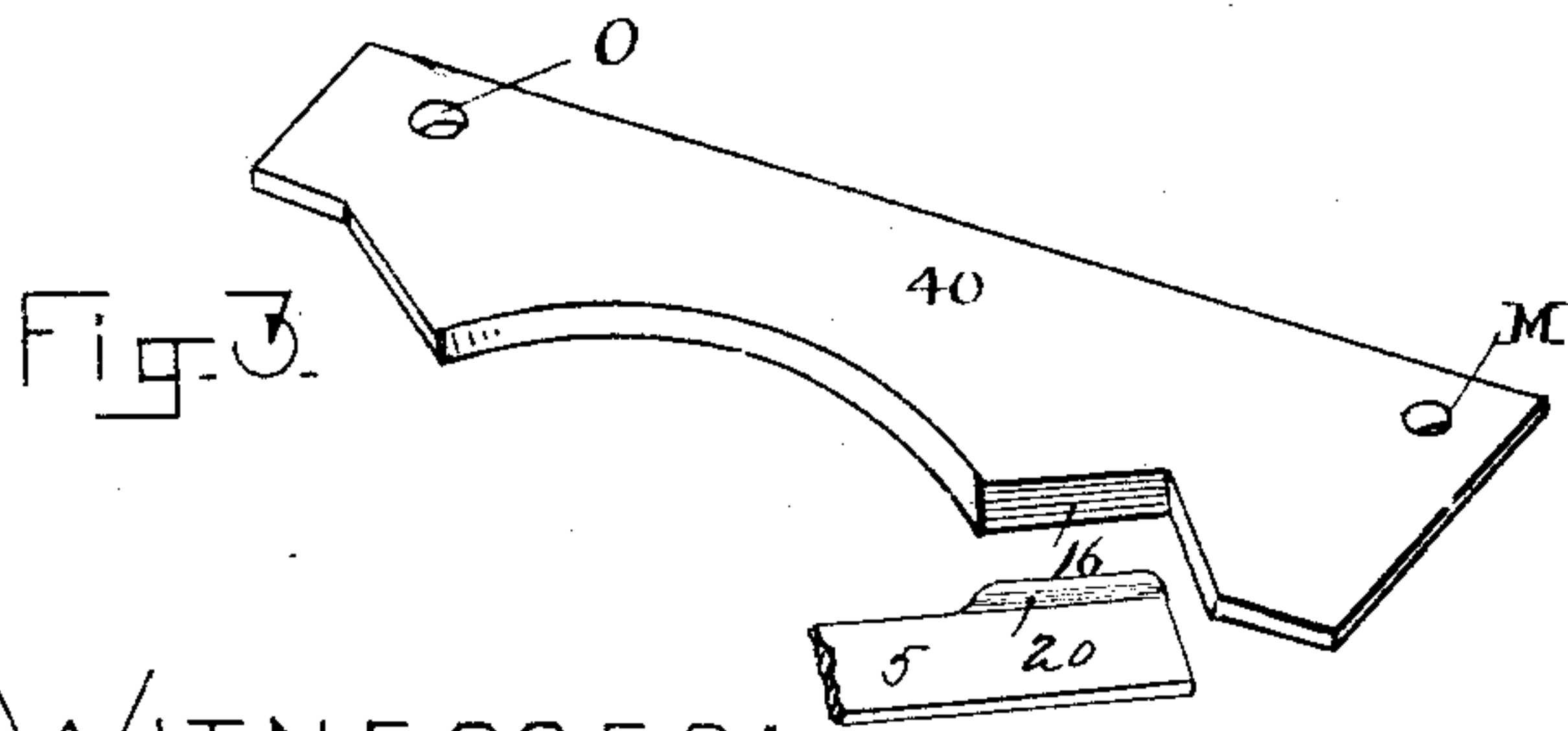
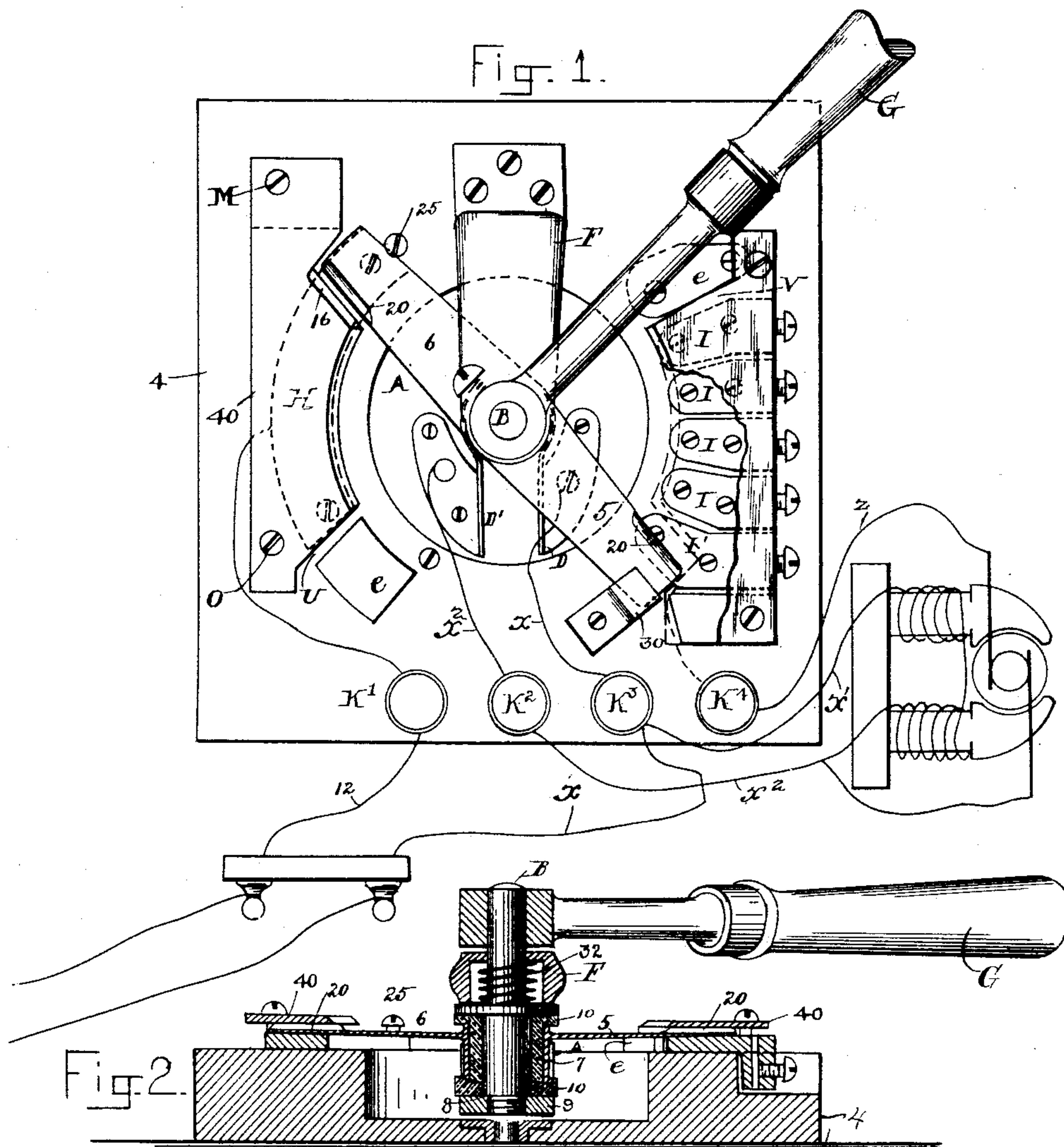


(No Model.)

F. A. WELLER.  
ELECTRIC MOTOR SWITCH.

No. 445,741.

Patented Feb. 3, 1891.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

FRANKLIN A. WELLER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO WILLIAM S. HADAWAY, JR., TRUSTEE, OF SAME PLACE.

## ELECTRIC-MOTOR SWITCH.

SPECIFICATION forming part of Letters Patent No. 445,741, dated February 3, 1891.

Application filed February 1, 1890. Serial No. 338,910. (No model.)

*To all whom it may concern:*

Be it known that I, FRANKLIN A. WELLER, of Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain Improvements in Motor-Switches, of which the following, taken in connection with the accompanying drawings, is a specification.

In the accompanying drawings, Figure 1 is a plan view of mechanism embodying my invention. Fig. 2 is an elevation of a vertical section on line 2 2, Fig. 1. Fig. 3 represents the insulating-cap 40 detached; and Fig. 4 represents one member of a two-part switch-bar A, all of which will be referred to and more specifically described hereinafter.

This invention relates to means for starting and stopping electric motors on constant-potential circuits, and has for its object to provide a means of the character and for the purpose stated, whereby in starting the motor the rush of current is graduated to the increasing speed of the motor, and whereby also the potential current may be quickly broken for the purpose of stopping the motor when desired.

In carrying out my invention as represented in the accompanying drawings I employ a supporting frame-work composed of block 4 and its overhanging arm F. The arm F is provided with an opening to receive spindle B. Said spindle has on its top end a projecting handle G, and the bottom end of said spindle is socketed in a suitable bearing supported by the block 4, to the end that a rotary reciprocating movement may be imparted to the spindle by a person moving the handle G. Connected with the spindle B is a switch-bar A. Said bar is composed of two members 5 and 6. Said members are duplicates of each other, and are formed of conducting material, preferably of a conducting spring metal. Said members are attached to the spindle B in such manner that when the spindle is rotated by a movement of the handle G the two members are thereby made to travel uniformly as one part or bar, and thus combined said members constitute what for convenience in this specification I have designated as "switch-bar A."

Said members 5 and 6 are carefully insulated

from each other and from the spindle B and its supporting frame-work. To this end the spindle B is surrounded by a ring 7, of non-conducting material, Fig. 2, against which the two members 5 6, composing switch-bar A, are brought to bear, as shown in Fig. 2. Said spindle B is further provided with a shoulder 8 and receives a threaded nut 9, by means of which the two members 5 and 6 are clamped tightly between the insulating-collars 10 10, as shown, Fig. 2, the inner end faces of said members being allowed to bear against the ring 7.

On the supporting-base are mounted dead-blocks *e e*, on which the outer ends of switch-bar A are allowed to rest while the motor is not running. On the base-block is also mounted the conducting-plate H, to which is connected one side of the line-wire 12, through an intermediate post K'. The other side of the line-wire is connected through wire X and intermediate post K<sup>3</sup> to a metallic commutator-strip D, one end of which is secured to the base-block 4 and the opposite end of which bears yieldingly against the shank of member 5 of switch-bar A. Said post K<sup>3</sup> is also connected with the field-magnet coils of the motor by the wire X', and a wire X<sup>2</sup> connects said coils with the metallic commutator-strip D' through post K<sup>2</sup>. One end of the strip D' is supported on the base-block 4 and the opposite end bears yieldingly electrically against the shank of member 6 of switch-bar A. Said post K<sup>2</sup> is also connected with one brush of the armature. The opposite motor-brush is connected by a suitable wire Z to post K<sup>4</sup>.

On the base-block 4 are metallic blocks I I'. Said blocks I I' are connected with the rheostat or resistance-coils. The block I' is further connected electrically with the post K<sup>4</sup>. The conductor H is covered by an insulating-cap 40, Fig. 3, which is formed of fiber or other non-conducting material. The cap is held in position by screws M O. The blocks I I' are covered by a duplicate insulating-cap, as shown. The switch-bar A in moving from left to right travels beneath the said insulating-caps, one end bearing directly on the blocks I I', the opposite end bearing on the conductor H. To this end the insu-



lating-caps have their ends adjacent to the dead-blocks *e e* slightly elevated to allow the switch-bar A in going from the dead-blocks *e e* to pass readily under the insulating-caps.

5 The opposite ends of said caps are pressed more closely down upon their respective blocks, to the end that when the switch-bar A has emerged from under the caps a backward movement of the switch-bar will cause

10 the ends thereof to ride up over the insulating-caps. To facilitate this operation, the caps have their edges 16 16 chamfered, as shown. They are also preferably made sufficiently thin to yield upwardly while the

15 switch-bar passes under and spring downwardly when the switch-bar emerges. As a further means of facilitating this operation, the switch-bar A has its edges 20 20 also chamfered or rolled slightly upward. As the

20 switch-bar passes from left to right its progress is stopped by a suitable stud or pin 25, just after the ends of the bar emerge from under the insulating-caps and bear upon conductor-blocks I' and H. The backward move-

25 ment of the switch-bar A causes it to lift above the insulating-caps, and a stop 30 operates to prevent the switch-bar from being again brought into contact with the terminals H I' until the bar has been first carried

30 to its proper starting-point—i. e., the dead-blocks *e e*.

The stop 30 is made of spring metal or otherwise adapted to yield upwardly to permit the lifting of the switch-bar onto the insulating-caps, after which the stop settles

35 down to prevent the return of the switch-bar.

In addition to its own flexibility, a spring 32, arranged as shown in Fig. 2, operates to press downwardly the switch-bar A and cause

40 it to bear downwardly upon the terminals or insulating-caps. Instead of the stop 30 being made to yield upwardly, a fixed stop may be employed, and the torsional spring of the switch-bar A will allow it to escape onto the

45 insulating-caps, provided the stop 30 is positioned to act upon one edge only of the switch-bar.

The operation of this switch is as follows: The switch-handle is moved from left to right

50 and brought into position with the ends of the switch-bar bearing upon the blocks *e e*, which is the normal position of the switch-bar while the motor is not in operation. To start the motor, said handle is moved from

55 right to left, thereby causing the bar A to approach the terminals H I I'. Said terminals are positioned relatively to the blocks *e e*, so that the switch-bar travels air-space U, Fig. 1, before its opposite end reaches air-space V,

60 so that the line-current passes through post K', terminal H, switch-bar member 6, connector D' to post K<sup>2</sup>, through the field-magnet coils of the motor to K<sup>3</sup>, and to the other side of line, thereby making the coils magnetic or active before the switch-bar contacts

65 with electric terminals I' I. As the switch-bar contacts with the first block terminal I,

the current passes to armature through resistance-coils connected to terminals I I' and post K<sup>4</sup>. As the switch-bar continues its

70 movement over the terminals I I', the resistance is gradually cut out till the switch-bar reaches its extreme forward movement and bears upon the block I', that being its normal position when the motor is in full speed.

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To stop the motor, handle G is given a reversed movement, whereby the ends of switch-bar A are made to ride upon the top of insulating strips or caps 40 40, the lifting of the switch-bar being effected by the cham-

80 ferred edges of the insulating-caps and the upturned edges of the switch-bar. The switch-bar, when once lifted to bear upon the insulating-cap, is prevented by stop 30 from returning to contact with terminals H I' until

85 it is first carried to the dead-blocks *e e*, and made to travel under the insulating-caps over the resistance-terminals I I, and in this way approach the terminals H I', as before.

Having thus described my invention, I

90 claim—

1. A switch for controlling motors, having the armature-coils in a branch or shunt circuit comprising a series of resistance-contacts in the shunt-circuit, a long contact in the

95 main line to both field and armature coils, an operating-handle, and a pair of contacts thereon moving in unison with but insulated from each other, one controlling the main line to both the field and armature coils and the

100 other the shunt through the armature and resistance coils, said parts being so positioned with relation to each other that the main line shall be established through the field-coils in

105 advance of the establishment of the circuit through the armature-coils, substantially as described.

2. A switch for controlling motors, having the armature-coils in a branch or shunt circuit comprising a pair of pivoted contact-

110 arms insulated from each other, a series of resistance-contacts in the shunt-circuit, with which one arm is adapted to contact, and a contact in the main line to the shunt and field coils, located relatively in advance of the

115 first resistance-contact, whereby the circuit is established through the field-coils in advance of the establishment of the circuit through the shunt-circuit and armature-coils, substantially as described.

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3. A switch for controlling a main line and a resistance-shunt circuit in said main line, comprising a pair of yielding switch-arms moving together but insulated from each

125 other, a contact in the main line, and a series of resistance-contacts in the shunt, with which said arms are adapted to co-operate during their movement in one direction, and insulating-plates overlying both the main line and resistance contacts, upon which the arms are

130 supported during the return movement, substantially as described.

4. A switch for controlling a main line and a resistance-shunt circuit in said main line,



comprising a pivoted operating-handle, a pair of switch-arms mounted on said handle and insulated from each other, a pair of contact-springs engaging said switch-arms, respectively, one forming one terminal of the main line, a main-line contact with which the arm engaging with said spring is adapted to co-operate to establish the main line, and a series of resistance-contacts forming one terminal of the shunt-circuit, the opposite terminal being formed by the spring engaging the arm adapted to co-operate with said resistance-terminals, substantially as described.

5. In a switch such as described, the combination, with the pivoted operating-handle having an insulating-hub movable therewith, a pair of independent switch-arms mounted on said hub opposite and out of electrical connection with each other and having the extended hub-flanges and the terminal springs engaging said hub-flanges, the long main-line contact with which one of the arms co-operate, and the series of contacts with which the opposite arm co-operates, whereby a main line and a resistance-shunt in said line may be controlled, substantially as described.

6. In a switch such as described, the combination, with the pivoted operating-handle having an insulating-hub movable therewith, flanges at top and bottom of said hub, and a pair of independent switch-arms having hub-flanges held between said first-mentioned flanges out of electrical connection with each other, and the terminal springs engaging said hub-flanges on the arms, of the long main-line contact with which one of the arms co-operates and the series of contacts with which the opposite arm co-operates, whereby a main

line and a resistance-shunt in said line may be controlled, substantially as described. 40

7. In an electrical switch, the combination, with the pivoted switch-arm and contact with which the same is adapted to co-operate, of the spring insulating-plate overlying and between which and the contact the arm passes, having one of its ends slightly nearer the contact than the other, whereby the arm in its return movement is caused to travel over the plate, substantially as described. 45

8. In an electrical switch, the combination, with the yielding pivoted switch-arm having the "rolled up" or beveled edge and contact with which the arm is adapted to co-operate, of the insulating-plate overlying and between which and the contact the arm passes, having its rear end beveled and adapted to engage the beveled edge of the arm, whereby the arm is caused to travel over the plate in the return movement, substantially as described. 50 55 60

9. In an electrical switch, the combination, with the yielding switch-arm, the contact with which the arm is adapted to co-operate, and the insulating-plate overlying and between which and the contact the arm passes in its forward movement and over which it passes in the return-stroke, of the stop for said arm having the overhanging end for preventing the re-entry of the arm without returning to first position, substantially as described. 65 70

Signed at Boston, Massachusetts, this 20th day of January, A. D. 1890.

FRANKLIN A. WELLER.

Witnesses:

W. S. HADAWAY, Jr.,  
C. B. TUTTLE.