

H. W. CHENEY.
POTENTIAL STARTER ATTACHMENT.
APPLICATION FILED NOV. 23, 1908.

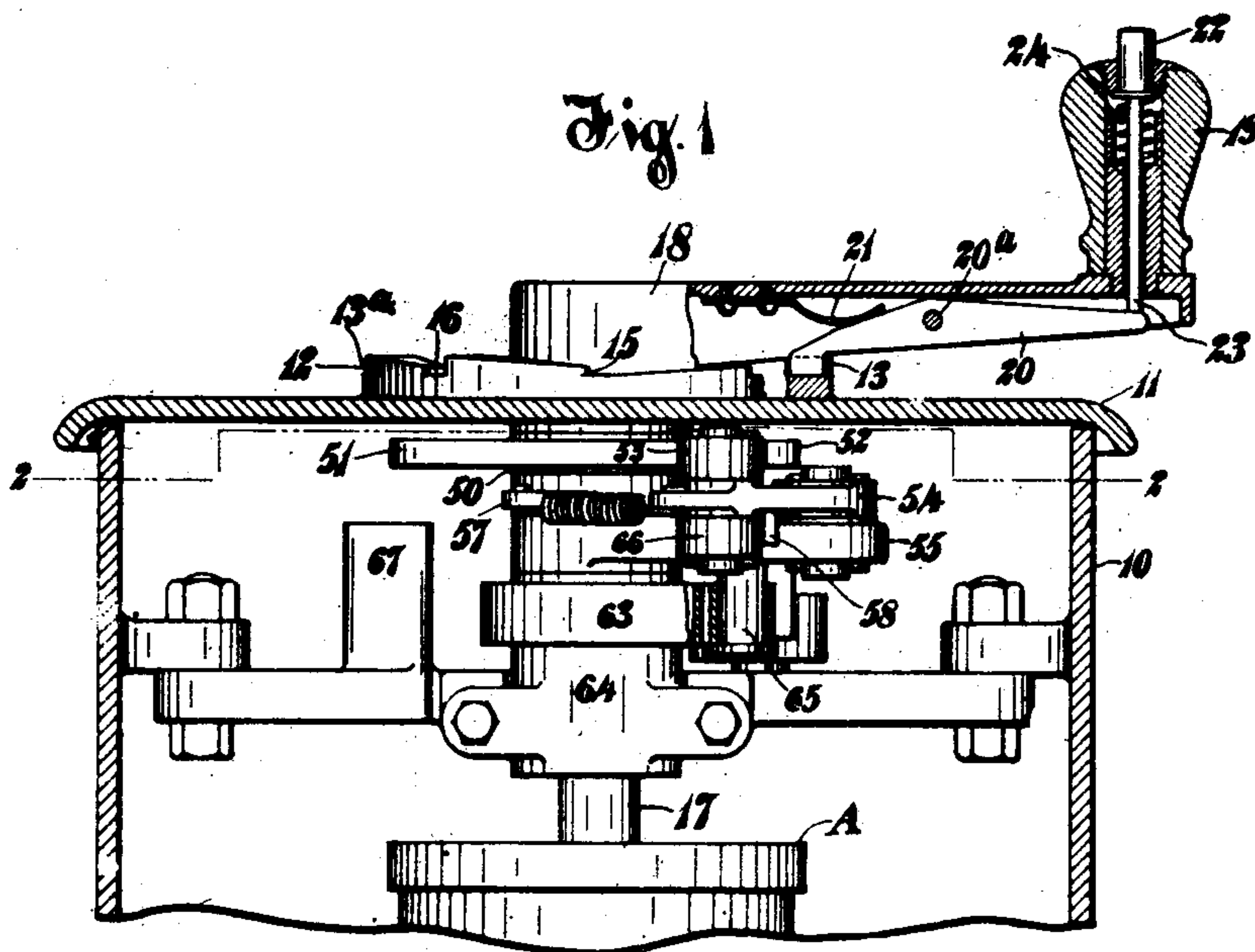
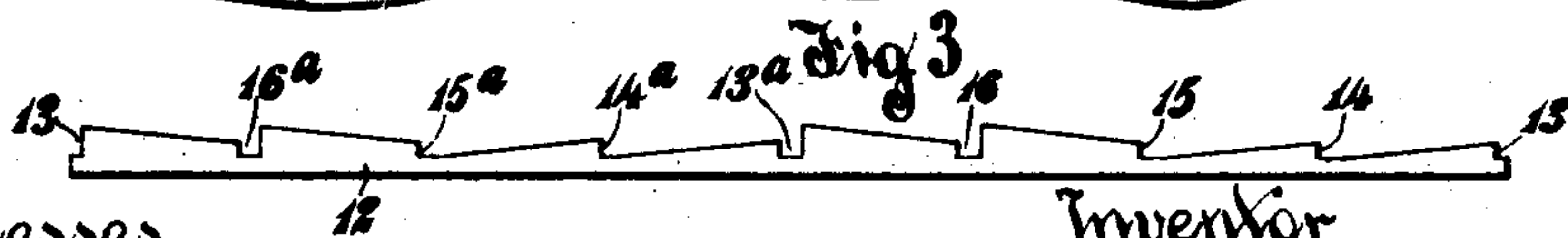
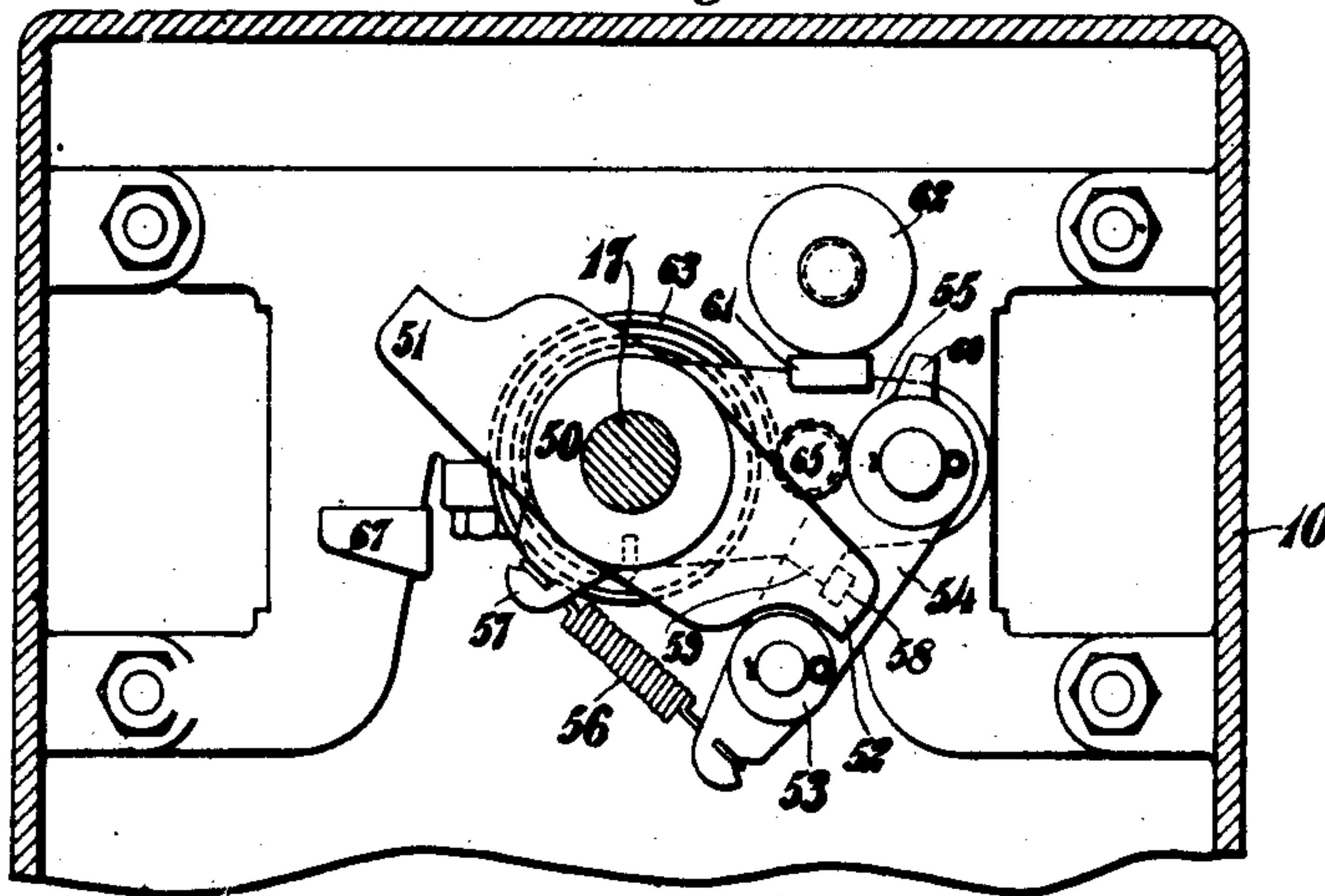


Fig. 2.



Witnesses

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POTENTIAL-STARTER ATTACHMENT.

No. 868,596.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed November 23, 1906. Serial No. 344,685.

To all whom it may concern:

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

My invention relates to starting controllers for electric motors, and more particularly to fool-proof potential starters for polyphase induction motors.
10

In operating starting devices for some types of motors, especially in potential starters for induction motors, it is often undesirable that the controller be moved backwards from a "running" to a "starting" position.
15 To this end controllers have been designed which move directly from the "running" to the "off" position without passing through the "starting" positions. In my co-pending application No. 336,757, filed September 29, 1906, there is described an attachment for motor
20 starters in which means are provided for preventing such a controller from being moved backward from a "running" to a "starting" position, or from an "off" position directly to a "running" position, while allowing a backward movement of the controller from any
25 "starting" position. It is possible however for controllers such as are there shown to be left in a "starting" position indefinitely instead of being moved to a "running" position as soon as the motor has gained sufficient speed. As the various windings which are connected
30 in circuit when the controller is in a "starting" position are not proportioned to carry current continuously but only for a brief period during starting, the result of leaving the controller indefinitely in a "starting" position may be to cause such windings to be burned out.
35 It is the object of my present invention to provide means whereby it is impossible for an operator to leave the controller in a "starting" position, arrangements being provided to move the controller backward to "off" position if it is released by the operator while it
40 is in a "starting" position.

In one aspect my invention consists of a controller biased toward "off" position when in a "starting" position, and means for unbiasing said controller when it is moved to "running" position.

45 In a more specific aspect my invention consists of a controller for electric motors comprising a rotatable drum, contact fingers cooperating therewith, means for preventing backward movement of the controller from certain positions, a spring which tends to move the
50 drum to "off" position when it is in any position from which it may be moved backward, and means for releasing the drum from said spring when it is moved to any other position.

Other features of my invention will appear hereinafter and will be particularly pointed out in the claims. 55

Figure 1 is a partial sectional elevation of the upper part of a controller embodying my invention. Fig. 2 is a section on the line 2—2 of Fig. 1; and Fig. 3 is a development of the notched ring on the controller cap-plate. 60

Referring to the drawings 10 is a controller casing surmounted by a cap-plate 11. Within the casing 10 is a controller drum A of any desired structure, but the operating mechanism here shown is especially designed for a controller having duplicate halves, respectively 65 co-acting with the two sets of diametrically opposite contact fingers during one complete operation of the controller and with the opposite sets during the next complete operation thereof. Such a controller has duplicate "off", "starting", and "running" positions as 70 indicated in Fig. 3. The controller here shown passes through two "starting" positions between the "off" and the "running" positions, though any desired number of "starting" positions may be used. In the arrangement shown analogous positions are 180° apart. 75 The particular construction and arrangement of the controller drum, however, forms no part of my present invention, which is equally applicable to controllers having but one "off" and one "running" position with any desired number of "starting" positions between 80 them.

Extending upwardly from the cap-plate 11 and preferably integral therewith is a ring or plate 12 having pairs of notches 13 and 13^a, 14 and 14^a, 15 and 15^a, and 16 and 16^a, which correspond to the "off", "first starting", "second starting", and "running" positions respectively of the controller. The controller drum A is mounted on a shaft 17, on the upper end of which fits the operating handle 18 movable by a knob 19 at its outer end. Pivoted at 20^a to the under side of the 90 handle 18 is a pawl 20, the inner end of which is normally pressed downward by a spring 21 into engagement with the upper surface of the ring 12. The inner end of the pawl 20 however may be lifted by means of a push-button 22 in the knob 19, said push-button 95 having a downward extension 23 which normally engages the outer end of said pawl. If desired, there may be a spring 24 which normally holds the push-button 22 in its uppermost position.

The ring 12 is constructed so that between certain of 100 the notches as between 15 and 16, 16 and 13^a, 15^a and 16^a, and 16^a and 13, ratchet teeth are formed to prevent backward movement of the controller while between the remaining notches are formed lower ratchet teeth facing in the other direction. All of the notches have 105 that side toward the next position in a forward or clock-

wise direction of the same height, which is such that the inner end of pawl 20 may be lifted over said sides by the push-button 22; the notches 14, 15, 14^a, and 15^a have that side toward the next position in the backward or anti-clockwise direction cut away to form the low sides of the low ratchet teeth; while the notches 13, 16, 13^a and 16^a have the side toward the next backward position of such height that the inner end of pawl 20 cannot be lifted over them by means of the push-button 22 to allow a backward movement but can be raised over them in the forward movement by the inclined-plane action of the surfaces approaching said notches in a forward or clockwise direction. With the arrangements just described the controller can be moved forward from any position by depressing the push-button 22 to raise the inner end of pawl 20 over the forward side of the notch with which it is in engagement. From the "off" and the "running" positions, backward movement is impossible because of the height of the rear sides of the notches 13, 16, 13^a and 16^a. From the "starting" positions, backward movement is possible without depressing push-button 22.

Fixed on the drum shaft 17 just below the cap-plate 11 is a collar 50 having projections 51 and 52 notched at the ends as shown. In the path through which these projections must travel is a roller 53 mounted on the end of the arm 54, which in its turn is pivoted on the outer end of a second arm 55, the inner end of which is loosely mounted on the shaft 17. A spring 56 extending between the free end of the arm 54 and a projection 57 on the hub of arm 55 tends to draw the arm 54 inwardly, the movement of the latter in this direction being limited by the stops 58 and 59 on the arms 54 and 55 respectively. The outward movement of the arm 54 is limited by stops 60 and 61 respectively mounted on the arms 54 and 55. The stop 61 normally engages with a buffer 62 toward which it is biased by means of a spiral spring 63 extending between the bearing 64 in which the shaft 17 is mounted and a pin 65 extending downward from the arm 55. On the lower side of the arm 54 and preferably on the same pin as the roller 53 is a similar roller 66, which, when the various parts are moved in a clockwise direction is arranged to engage with a projection 67 extending upwardly from the support for the bearing 64 into its path. This projection is so shaped that when it is engaged by the roller 66, the latter is moved outwardly against the action of the spring 56, carrying the arm 54 and the roller 53 with it and separating the roller 53 from the notch in the projection 51 or 52.

When the controller is in either of its "off" positions, the parts are as shown in Figs. 1 and 2 or 180° therefrom. The notch in projection 52 say is just about to engage the roller 53. When the push-button 22 is depressed to release the pawl 20 from the notch 13 with which it is in engagement, and the controller is moved forward into the first "starting" position to bring said pawl into engagement with notch 14, the projection 52 engages the roller 53 and moves it together with its attached parts in a clockwise direction against the action of a spring 63. This spring acting through the parts 65, 55, 53 and 52 now tends to move the controller backward to "off" position and will do so if the hand of the operator is removed from the handle 19. The pawl 20 in its engagement with the notch 14 does not prevent

this. When the motor has started and gained sufficient speed, the operator continuously holding the handle 19 during this starting, the controller is moved forward successively into the "second starting" and "running" positions indicated by the notches 15 and 16. Until the "running" position is reached, the spring 63 still tends to move the controller drum backwards and will do so if the handle 19 is released. As the controller is moved into "running" position, the pawl 20 drops into the notch 16 sliding over its high side. Now backward movement is prevented, because the push-button 22 can not be depressed sufficiently to raise the pawl 20 over the high side of the notch 16. Also as the controller approaches this "running" position the roller 66 engages with the projection 67 and is forced outwardly, and finally, as the notch 16 is reached, is moved out far enough to disengage the projection 52 from the roller 53, thus allowing spring 63 to move the arms 55 and 54 backward to their normal position, the stop 61 contacting with the buffer 62 to take the shock. The stops 60 and 61 prevent the free end of the arm 54 from flying outward too far during this movement. As the controller while in this "running" position is free from any tendency to backward movement and indeed is locked against such movement by the pawl 20 and the high side of notch 16, the handle 19 may now be released by the operator. The controller can now be moved forward from the "running" position, upon depressing the push-button 22, which movement will place the controller again in an "off" position, this "off" position being 180° removed from the former "off" position, the projections 51 and 52 having exchanged places. The same series of operations may now be repeated, the finger 51 acting during this operation as the finger 52 did in the former.

It is evident that many substitutions and modifications may be made in the particular structure herein shown and described, and I intend to cover in my claims the broad features of my invention including all such obvious modifications and substitutions.

What I claim as my invention is:—

1. A controller biased toward "off" position when in "starting" position, and means for unbiasing said controller whenever it is moved to "running" position.
2. A controller for electric motors, comprising fixed and movable contacts, said movable contacts being biased toward "off" position when the controller is in "starting" position, and means for unbiasing said movable contacts whenever the controller is moved into "running" position.
3. In a controller, contact fingers, a drum cooperating therewith, said drum having "off", "starting" and "running" positions, a spring which tends to move said drum to "off" position when it is in a "starting" position, and means for releasing said drum from said spring whenever it is moved to "running" position.
4. In a controller, a rotatable drum, fixed contacts with which said drum cooperates, means whereby said drum is biased toward "off" position when in certain operative positions, and means for freeing said drum from said bias when it is moved into certain other operative positions.
5. A controller for electric motors, comprising a rotatable drum cooperating with fixed contacts, said drum being biased toward "off" position when in "starting" position, and means for unbiasing said drum whenever it is moved to "running" position.
6. A controller for electric motors comprising a rotatable drum, contact fingers cooperating therewith, means for preventing backward movement of said drum from the "off" or the "running" position, a spring-returned member which is engaged by the drum as the latter is moved

to "starting" position, and means for disengaging said drum from said member as the drum is moved into "running" position.

7. A controller for electric motors comprising a rotatable drum, contact fingers cooperating therewith, means for preventing backward movement of said drum from the "off" or the "running" position, a spring-retained member which is engaged by the drum as the latter is moved away from "off" position, and means for disengaging said drum from said member as the drum is moved into "running" position.

8. A controller for electric motors comprising a rotatable drum, contact fingers cooperating therewith, means for preventing backward movement of the controller from certain positions, a spring which tends to move the drum to "off" position when it is in any position from which it may be moved backward, and means for releasing the drum from said spring when it is moved to any other position.

9. A controller for electric motors, comprising a rotatable drum, contact fingers cooperating therewith, a collar movable with said drum, a projection from said collar, a spring pressed lever in the path of said projection and arranged to engage it when the controller is in a "starting" position whereby the controller is returned to "off" position if then released, and means for disengaging said lever and said projection when the controller is moved to "running" position.

10. A controller for electric motors, comprising a rotatable drum, contact fingers cooperating therewith, a collar movable with said drum, projections from said collar, a spring pressed lever in the path of said projections, and arranged to be engaged by one of them when the controller is in "starting" position, and means for releasing said lever from engagement with said projection when the controller is moved into "running" position, whereby the drum while in "starting" position is biased toward "off" position.

11. A controller for electric motors, comprising a rotatable drum normally movable always in the same direction, means for preventing backward movement of said controller from "off" or "running" position, means tending to move said controller backward to "off" position when it is in other than "off" or "running" positions, and

means for releasing the controller from said backward tending means when it is moved into a "running" position.

12. In a controller, a rotatable drum, an operating shaft therefor, a handle on said shaft, a manually released latch on said handle cooperating with a stationary notched plate, some of the notches of said notch plate being formed to lock the handle against backward movement and others to allow a free backward movement, and means tending to move said drum backward when it is in a position in which the notch-plate allows backward movement.

13. In a controller, a shaft, a handle therefor, and a fixed notched plate cooperating with a manually releasable latch in the handle, the notches of said plate being so formed that some of them prevent backward movement of the handle and others offer no hindrance to such backward movement while all of them necessitate a manual release of the latch in order to move the handle forward.

14. In a controller, a shaft, a handle therefor, a fixed notched plate cooperating with a manually releasable latch in the handle, the notches of said plate being so formed that some of them prevent backward movement of the handle and others offer no hindrance to such backward movement while all of them necessitate a manual release of the latch in order to move the handle forward, and a spring tending to move said handle backward.

15. In a controller, a shaft, a handle therefor, a fixed notched plate cooperating with a manually releasable latch in the handle, the notches of said plate being so formed that some of them prevent backward movement of the handle and others offer no hindrance to such backward movement while all of them necessitate a manual release of the latch in order to move the handle forward, and a spring tending to move said handle backward when it is in a position from which backward movement is not prevented.

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

HERBERT W. CHENEY.

Witnesses:

GEO. B. SCHLEY,
FRED J. KINSEY.