A. J. LOGUIN.

POTENTIAL STARTER.

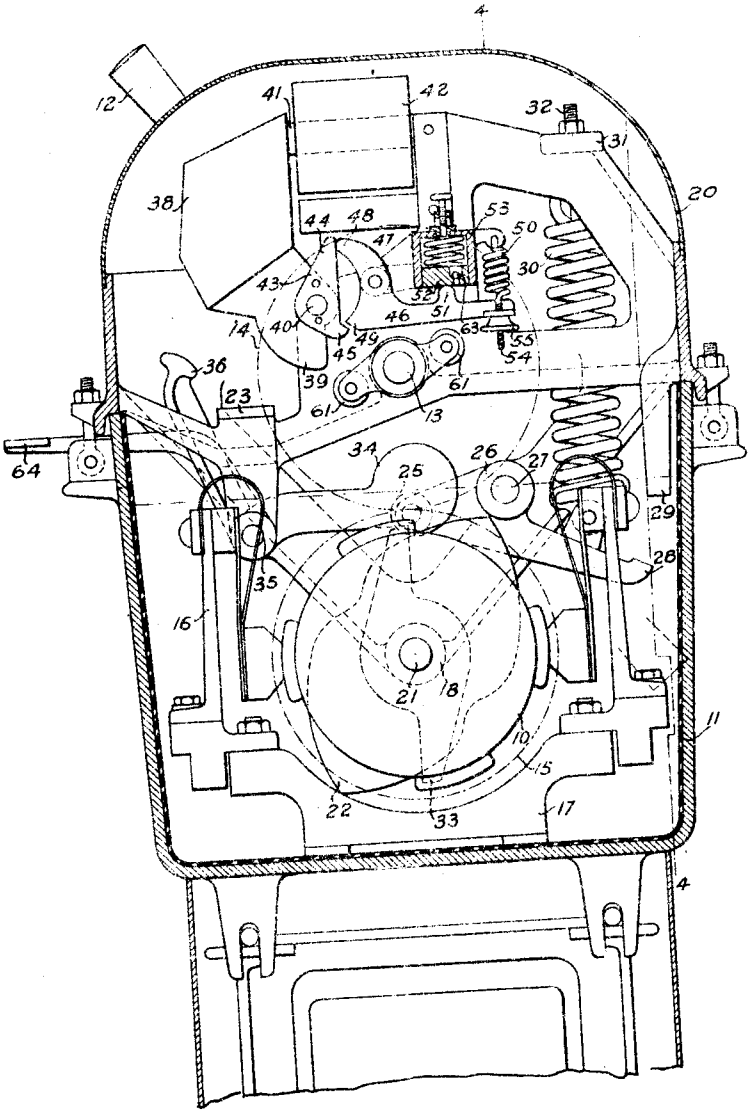
APPLICATION FILED MAR. 23, 1912.

Patented May 30, 1916.

3 SHEETS—SHEET 1.

1,185,218.

Fig. 1



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3 SHEETS—SHEET 2.

Fig. 3

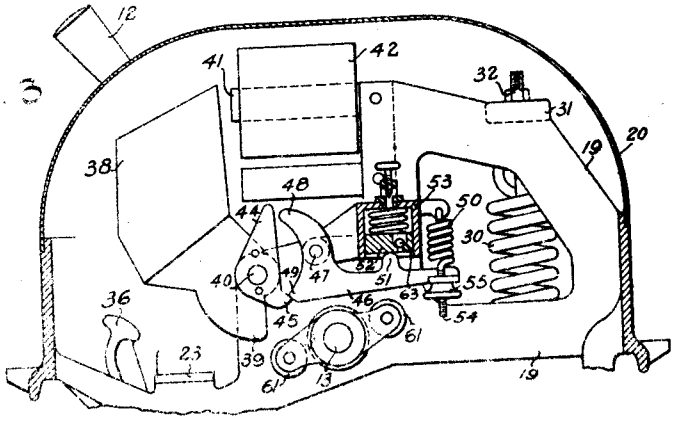
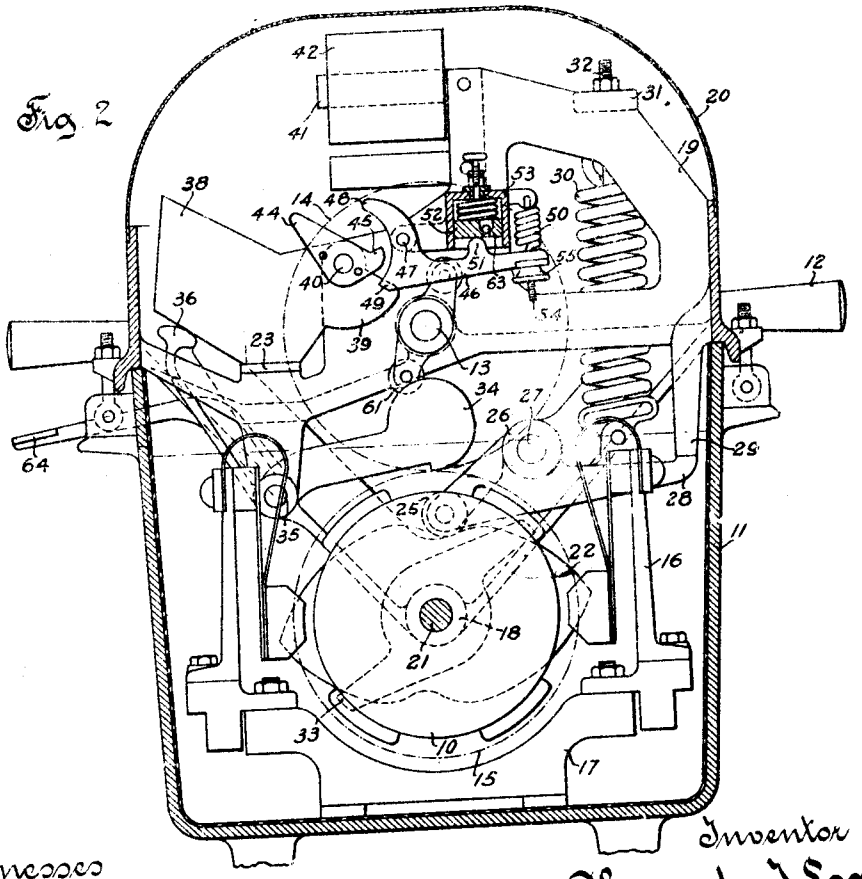


Fig. 2



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[illegible]NTIAL STARTER.

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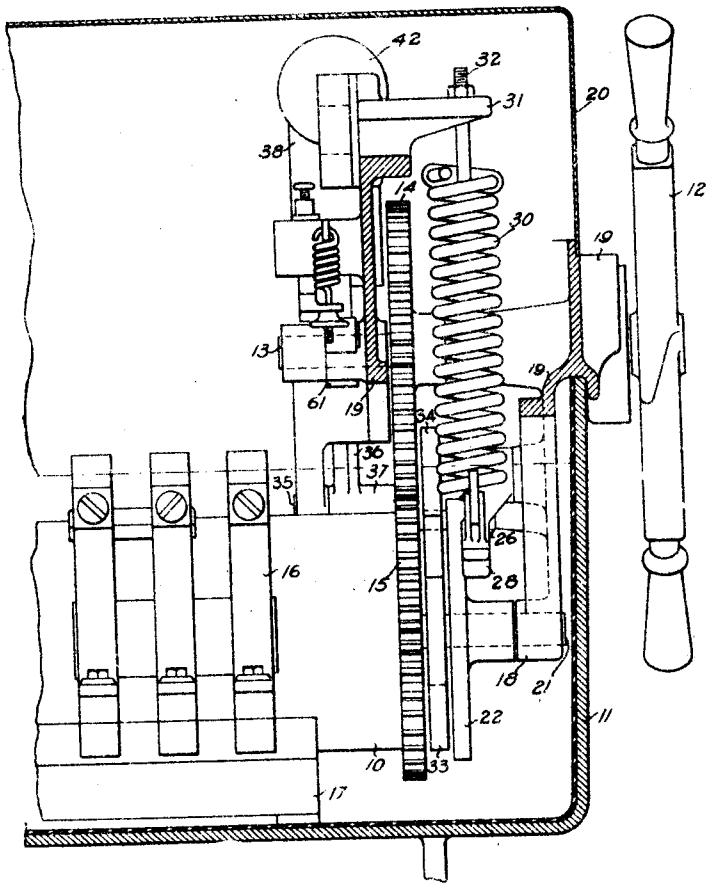
3 SHEETS—SHEET 3.

Fig. 4



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UNITED STATES PATENT OFFICE.

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POTENTIAL-STARTER.

1,185,218. Specification of Letters Patent. Patented May 30, 1916.

Application filed March 23, 1912. Serial No. 685,687.

To all whom it may concern:

Be it known that I, ALEXANDER J. LOGUIN, a subject of the Czar of Russia, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Potential-Starters, of which the following is a full, clear, and exact specification.

This invention relates to potential starters and particularly to potential starters having means responsive to abnormal circuit conditions with time element attachments.

In the operation of potential starters, it is desirable that such starters be moved into off position when in running position in response to abnormal circuit conditions. Such potential starters can be moved backward from starting position to off position without danger to the switch parts, but to avoid injury to the switch parts it is necessary that the starter or switch when in running position be moved forward to off position. In potential starters thus far manufactured the movable switch member has been thrown into off position upon the occurrence of abnormal circuit conditions without respect to the time that such abnormal circuit conditions have existed. This means that in potential starters thus far used it has been necessary to again actuate the potential starter through its starting and into its running position after the occurrence of every abnormal circuit condition.

It is therefore the object of my invention to improve potential starters and switches by providing them with an arrangement to prevent the opening of such starters or switches upon the occurrence of low or no-voltage circuit conditions until or unless said abnormal circuit conditions have existed for a predetermined time.

The various novel features of my invention will be apparent from the description and drawings, and will be particularly set forth in the appended claims.

The invention is illustrated on the accompanying sheets of drawings, in which—

Figure 1 is an end elevation of a potential starter embodying my invention, one end of the tank being broken away for the sake of clearness, and the switch being in running position; Fig. 2 is a similar view, the switch being in off position; Fig. 3 is a fragmentary elevation, similar to that shown in Figs. 1 and 2 with the parts shown in an intermediate position; and, Fig. 4 is a sectional view, some of the parts being shown in elevation, of the same potential starter taken along the line 4—4 of Fig. 1.

The details of the starting controller proper will not be fully described herein because they form no part of my present invention and are unnecessary to an understanding thereof.

The normal operation of the potential starter is substantially in the same direction, a movement through 180° forming a complete operation. The controller drum 10, which is immersed in oil in the tank 11, is moved by an operating handle 12 through a shaft 13 and gear wheels 14 and 15. The two opposite halves of the controller drum are identical in structure and each half cooperates in turn with each of two sets of contact fingers 16 during successive operations of the controller, the sets of contact fingers being on opposite sides of the drum and arranged to simultaneously coact with the two halves of the drum respectively. The stationary contacts 16 are mounted on an insulating support 17, which is located in the bottom of the stationary oil tank 11. The switch drum 10 with which these contact fingers coöperate is rotatably mounted in bearings 18 formed in the lower part of a large irregular shaped casting 19, which forms a portion of the cover for the oil tank, the remaining part 20 of the cover being of sheet metal and secured over the part 19. The shaft 13 upon which the handle and gear 14 are mounted is supported in another bearing portion of the irregular shaped casting 19.

Mounted upon the drum shaft 21 is a cam 22 upon which a roller 25 is adapted to ride. The roller is mounted in a casting 26 which is pivotally mounted on a rod 27 and which is provided with a finger 28 adapted to engage a stop 29 forming a part of the casting 19. Secured to the finger 28 is one end of a spring 30, the other end of which is secured to a portion 31 of the casting 19 by a bolt 32. This spring 30 presses the roller 25 against the surface of the cam 22 under all conditions, biasing the movable switch member or drum to off position. Also secured to the drum shaft 21 is a catch 33 adapted, when the potential starter is in running position, to be held by a weighted latch 34 which is pivotally mounted on a

rod 35 and which is provided with an arm 36. The latch 34 and arm 36 are integrally formed and connected by a sleeve 37. By means of the latch the movable switch member is normally locked in running position.

A hammer 38, having a projection 39, and being pivotally mounted on a rod 40, is adapted to engage the arm 36 to disengage catch 33 and latch 34 to permit the spring 30 to throw the starter into off position. After striking the arm 36 the hammer 38 engages and rests on a padded stop 23. This hammer 38 forms the armature of a low or no-voltage magnet having a core 41, forming a part of the casting 19, and a coil 42. The hammer 38 is moved into engagement with the core 41 by one of the rollers 61 being forced against the top of the hammer projection 39 while the handle is turned from off to running position.

When the magnet is energized it holds the hammer armature 38 against the core 41, but when said magnet becomes sufficiently deënergized the armature or hammer 38 being biased to fall, due to its own weight and the position of its pivotal point 40, has the tendency to swing about its pivotal support to engage arm 36 for tripping the latch 34 to permit the switch drum to be thrown into off position. But instead of rapidly rotating under its own weight and about its pivotal point 40 the movement of the armature 38 is retarded by a time element arrangement. To effect this retarding movement of the armature 38, said armature is provided with a latch member, preferably formed integrally with the armature 38 and having two projections 44 and 45 which are adapted to engage, under different circuit conditions and at different times, a lever 46 pivotally mounted at 47 in the irregular shaped casting 19. The lever 46 is provided with a projection 48 normally in engagement with the projection 44 of latch member 43. This lever is also provided with a detent portion 49 adapted to hold the armature 38 against rapid rotation about its pivotal point 40 until the detent portion of the lever 46 has been rotated out of the path of projection 45 of latch 43. The lever 46 is normally biased, under the action of a spring 50, to force the armature 38 out of engagement with the magnet core 41 through the agency of projections 44 and 48 of the armature 38 and lever 46 respectively. The lever 46 is also provided with a lug 51 which presses against the movable spring-pressed member 52 of a dash-pot 53 which acts in opposition to the spring 50. One end of the spring 50 is provided with a threaded portion 54 which is engaged by a thumb screw 55 for adjusting the time element.

Under normal operating conditions the armature 38 is held in engagement with the magnet core 41 by the action of current in the magnet coil 42. In this position projection 44 of latch 43 presses against the projection 48 of lever 46 tending to rotate said lever in a clockwise direction about its pivotal point 47 against the action of spring 50. In other words, under normal operating conditions, the action of the current in the magnet coil 42 has to overcome the normal tendency of the armature 38 to fall and also to overcome the action of spring 50. If no-voltage or certain low voltage circuit conditions should arise the magnet will become deënergized to a greater or less extent, and the hammer armature, due to its own weight, has a tendency to rapidly rotate about its pivotal point 40 to trip the latch 34. But the armature 38 is prevented from rotating rapidly due to the fact that the projection 45 of latch 43 comes into engagement with the detent 49 of lever 46. The spring 50 at this time becomes effective in rotating the lever 46 in a counter-clockwise direction about its pivotal point 47 to gradually draw the detent in a manner to permit the projection 45 to escape said detent 49. If, however, within a certain predetermined time the circuit condition should return to normal, the armature 38 would be drawn back to the core 41 by the action of the current in the magnet coil, forcing the lever 46 back into its normal position. But if such abnormal circuit conditions should continue longer than said certain predetermined time the lever 46 would be slowly rotated by the spring 50 against the action of the dash-pot 53, to remove the detent 49 from the path of the projection 45 of the latch 43. At the instant that the detent 49 is completely removed from the path of said projection 45, the armature 38 falls into engagement with the arm 36, as shown in Fig. 2, to trip latch 34, permitting the switch drum 10 to move to off position under the influence of spring 30. When the lever 46 is rotated in a counterclockwise direction the air in the dash-pot 53 is compressed by the slow upward movement of the piston 52. The piston 52 is provided with a valve 63 for permitting a comparatively rapid return movement. The time element may be made any desirable value by adjusting nut 55 to vary the effect of spring 50. In addition to being automatically tripped, the movable switch member may be tripped manually by pressing the hand lever 64 which is connected to the latch 34. While this time element arrangement is particularly adapted for use in connection with potential starters it can be used in connection with switches of all types which are responsive to low or no-voltage circuit conditions.

There may be various modifications and arrangements other than that here shown and described, and it is my intention to cover all such modification and arrange-

ments which do not involve a departure from the spirit and scope of my invention as set forth in the appended claims.

What I claim as new is:

1. In a potential starter, the combination of a movable switch member, means for holding said switch member against movement when in a certain position, means including a latch member and being responsive to no-voltage circuit conditions adapted to render said holding means ineffective, and means for retarding effective action of said last mentioned means, said retarding means including a member coöperating with said latch member and adapted to prevent effective movement of said latch means until the no-voltage circuit conditions have existed a predetermined time.

2. In a potential starter, the combination of a movable switch member biased to off position when in closed position, means for holding said movable switch member in closed position, means including a latch member responsive to low voltage circuit conditions adapted to render said holding means ineffective, and means for retarding effective action of said last mentioned means, said retarding means including a pivotally mounted member coöperating with said latch member and adapted to prevent effective movement of said latch means until the low voltage circuit conditions have existed a predetermined time.

3. In a potential starter, the combination of a movable switch member biased to a certain position, means for normally retaining said member against movement to said position, and means responsive to abnormal circuit conditions for rendering said retaining means ineffective after said abnormal conditions have existed for a predetermined time, said means responsive to abnormal conditions comprising a member coöperative with said retaining means to actuate the latter and having a latch portion, a member having a detent portion coöperative with said latch portion, and a device for retarding effective movement of said latter member.

4. In a potential starter, the combination of a movable switch member, means for holding said switch member in a certain position, means including a member having a latch portion and being responsive to low voltage circuit conditions for rendering said holding means ineffective, and means including a pivotally mounted detent member coöperating with said latch portion for retarding effective action of the means for rendering the holding means ineffective.

5. In a controller, the combination of a movable switch member, means for biasing said switch member to one position, a latch for retaining said switch member against movement to said position, means for tripping said latch comprising a member movable in response to abnormal circuit conditions, and means for retarding effective action of said latter member, said retarding means comprising a latching device for said member and a time element mechanism for gradually releasing said latching device to permit effective movement of said member.

6. In a controller, the combination of a movable switch member, means for biasing said switch member to one position, means for holding said switch member against movement to said position, means responsive to no-voltage circuit conditions including a pivotally mounted latch member for rendering said holding means ineffective, and means including a detent portion associated with said latch member for retarding effective action of said latch member.

7. In a potential starter, the combination of a movable switch member, means for holding said switch member in a certain position, a member biased to a position in which it trips said holding means and normally held in another position, said member having a latch portion and being responsive to no-voltage circuit conditions, and means including a detent portion coöperating with said latch portion for retarding effective movement of said biased member to trip said holding means.

8. In a potential starter, the combination of a movable switch member, a latch for holding said switch member in a certain operative position, a weighted pivotally mounted member biased to a position in which it renders said latch ineffective and normally held in another position, said member having a latch portion and being responsive to no-voltage circuit conditions, and a retarding device including a pivotally mounted detent operatively associated with said weighted member.

9. In a potential starter, the combination of a movable switch member, means for holding said switch member in a certain operative position, pivotally mounted means responsive to no-voltage circuit conditions and biased to a position to render said last mentioned means ineffective and normally held in another position, said means including a latch member having two portions, and means including a member having a projection and a detent adapted to be engaged under different circuit conditions by different portions of said latch member, said means acting to retard effective action of said pivotally mounted means upon the occurence of no-voltage circuit conditions.

10. In a potential starter, the combination of a movable switch member, means for holding said switch member in a certain position, a member having a projection and a

latch portion and being responsive to no-voltage circuit conditions for rendering said holding means ineffective, and means including a member having a projection and a detent and adapted to retard effective action of said member, the projections normally engaging each other and the latch and detent portions being adapted to engage each other during abnormal circuit conditions.

11. In a potential starter, the combination of a movable switch member, means for holding said switch member in a certain position, an electromagnet provided with an armature member having a projection and a latch and being responsive to no-voltage circuit conditions to render said holding means ineffective, and means normally opposing said armature member through said projection and under no-voltage conditions through said latch for a predetermined time for retarding effective action of said armature member.

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

ALEXANDER J. LOGUIN.

Witnesses:
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C. B. TAYLOR, Jr.