Oct. 25, 1932. L. C. SHIPPY ET AL 1,884,309

MACHINE FOR SURFACING THE RUBBING BLOCKS OF THE CIRCUIT BREAKER LEVERS OF IGNITION TIMERS

Filed Nov. 21, 1927 4 Sheets-Sheet 1

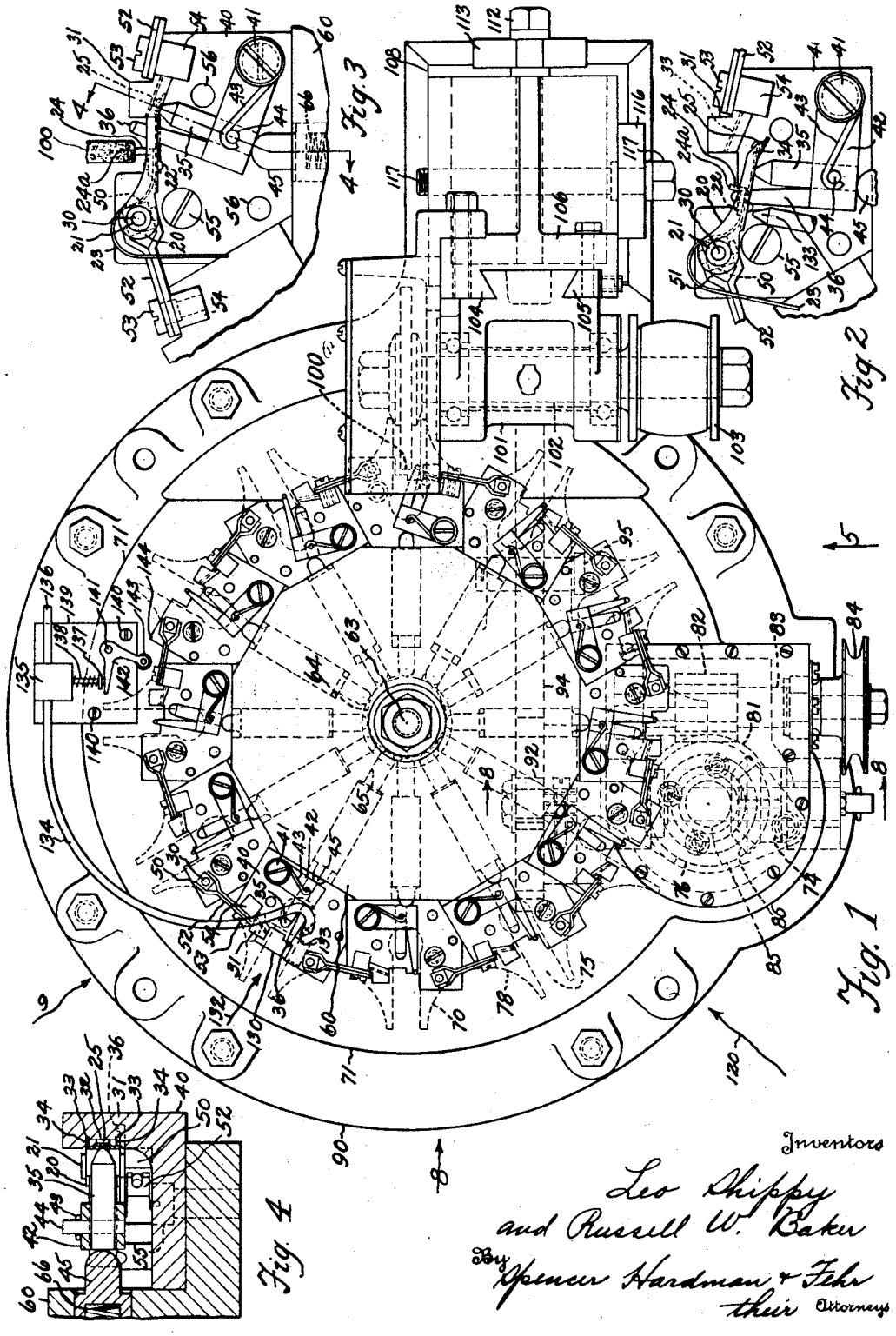


Fig. 1

Fig. 4

Inventors

Leo Shippy

and Russell W. Baker

By Spencer Hardman & Fehr

their Attorneys

Oct. 25, 1932. L. C. SHIPPY ET AL 1,884,309

MACHINE FOR SURFACING THE RUBBING BLOCKS OF THE CIRCUIT BREAKER LEVERS OF IGNITION TIMERS

Filed Nov. 21, 1927 4 Sheets-Sheet 2

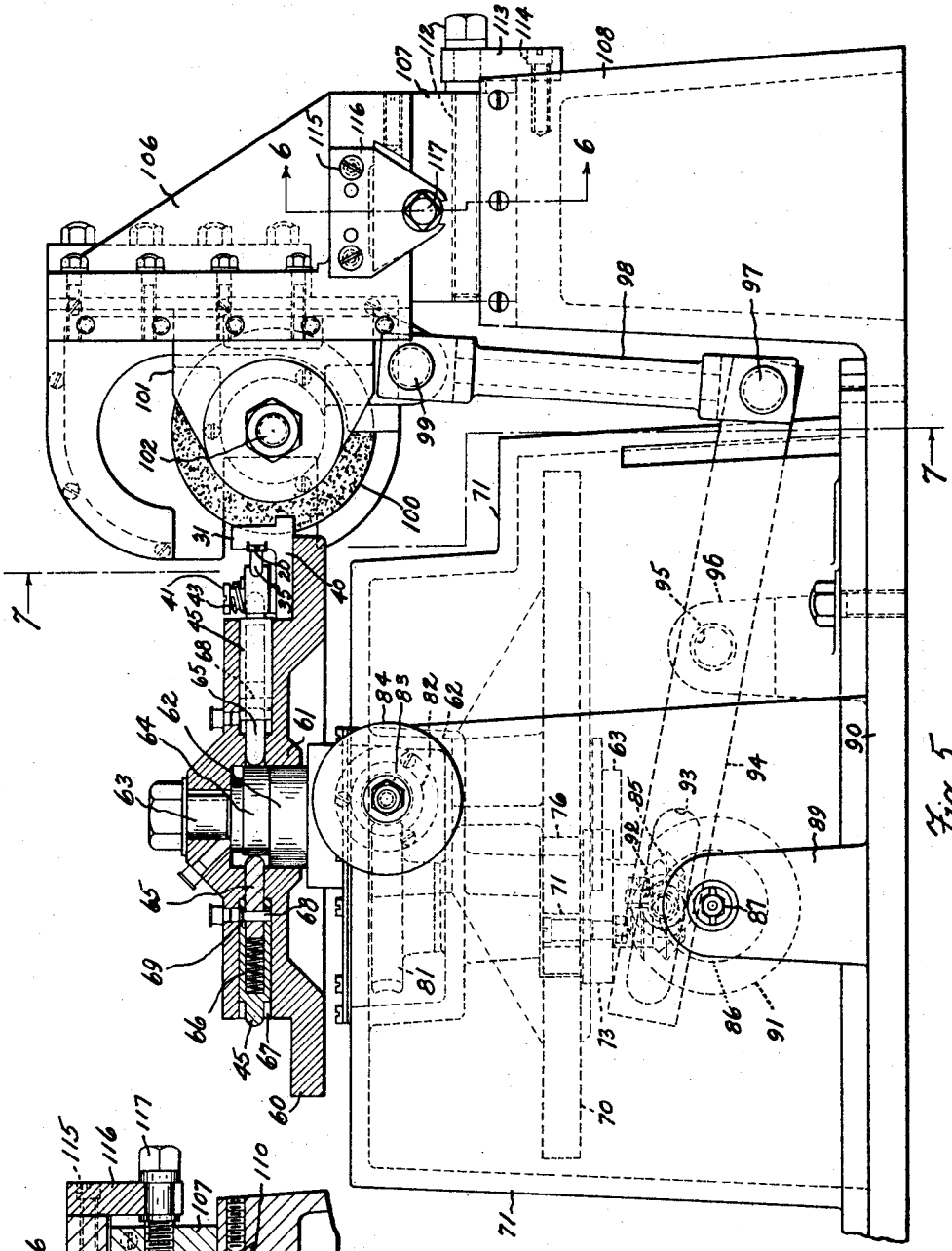


Fig. 5

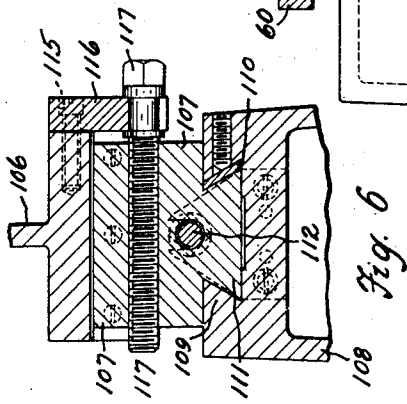


Fig. 6

Inventors

Leo Shippy

and Russell W. Baker

By Spencer Hardman & Fehr

their Attorneys

Oct. 25, 1932. L. C. SHIPPY ET AL 1,884,309

MACHINE FOR SURFACING THE RUBBING BLOCKS OF THE CIRCUIT BREAKER LEVERS OF IGNITION TIMERS

Filed Nov. 21, 1927 4 Sheets-Sheet 3

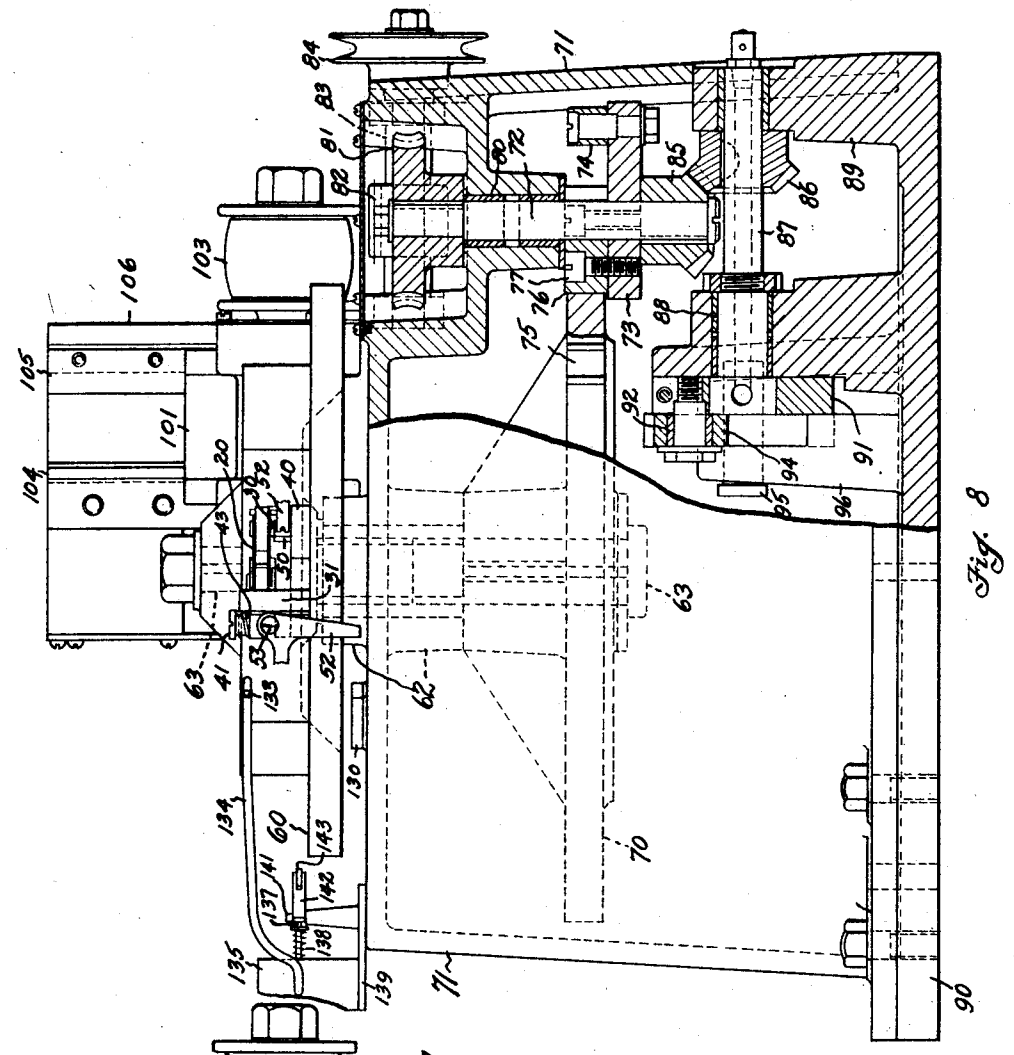


Fig. 8

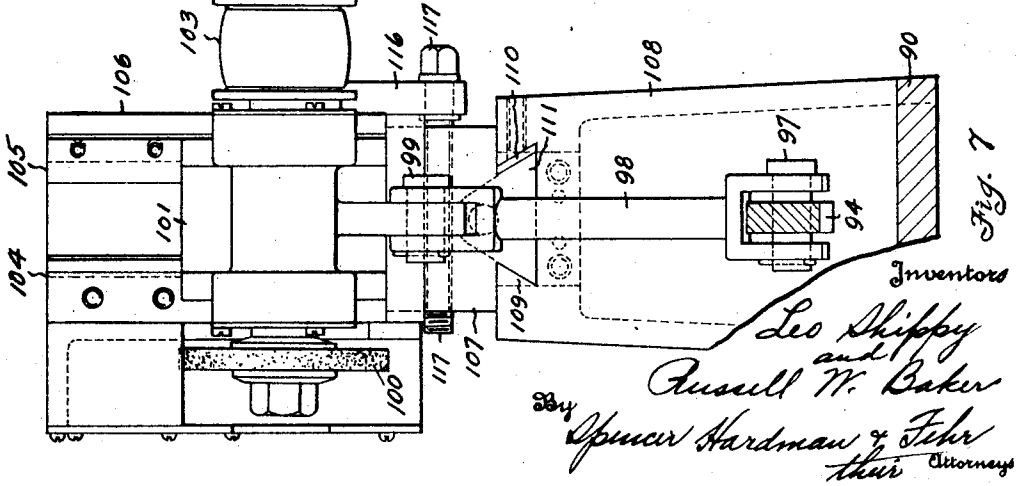


Fig. 7

Inventors
Leo Shippy
and
Russell W. Baker
By Spencer Hardman & Fehr
their Attorneys

Oct. 25, 1932. L. C. SHIPPY ET AL 1,884,309

MACHINE FOR SURFACING THE RUBBING BLOCKS OF THE CIRCUIT BREAKER LEVERS OF IGNITION TIMERS

Filed Nov. 21, 1927 4 Sheets-Sheet 4

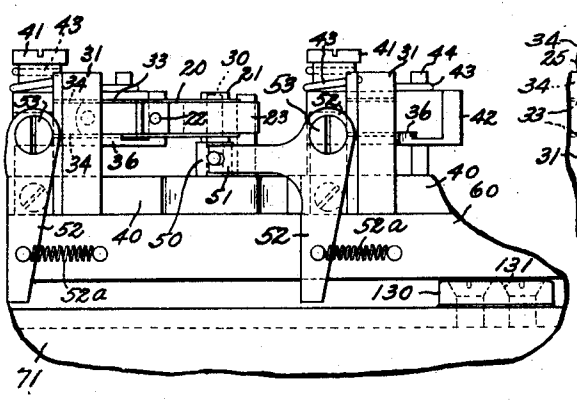


Fig. 9

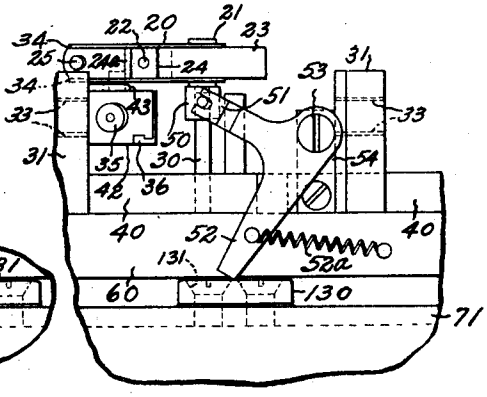


Fig. 10

Inventors

Leo Shippy

and Russell W. Baker

By Spencer Hardaway & Fehr

their Attorneys

Patented Oct. 25, 1932 1,884,309

UNITED STATES PATENT OFFICE

LEO C. SHIPPY AND RUSSELL W. BAKER, OF ANDERSON, INDIANA, ASSIGNORS TO DELCO-REMY CORPORATION, OF DAYTON, OHIO, A CORPORATION OF DELAWARE

MACHINE FOR SURFACING THE RUBBING BLOCKS OF THE CIRCUIT BREAKER LEVERS OF IGNITION TIMERS

Application filed November 21, 1927. Serial No. 234,644.

This invention relates to the manufacture of ignition timers for internal combustion engines and particularly to the manufacture of the circuit breaker lever which carries one of the interrupter contacts and a rubbing block adapted to be engaged by a cam driven by the engine.

One object of the present invention is to facilitate the finishing of the cam engaging surfaces of the rubbing block after it has been attached to circuit breaker lever so that this surface will be located correctly with respect to the circuit breaker contact. In order to accomplish this aim of the invention we provide a machine which comprises a plurality of work holders carried by a conveyor automatically to a grinding or cutting wheel which is moved while rotating across the cam engaging face of the rubbing block. After the work has been operated upon it is automatically ejected from the conveyor. Thus the operator is required only to load the empty work holders of the conveyor. All other operations are performed by the machine.

Fig. 1 is a plan view of a machine embodying the present invention.

Fig. 2 is a fragmentary plan view of a portion of Fig. 1 but drawn to a larger scale to show more clearly the position of the work with respect to the work holder before the work holder has been moved to the grinding station of the machine.

Fig. 3 is a view similar to Fig. 2 showing the relation of the work to the work holder when being operated upon by the grinding wheel.

Fig. 4 is a sectional view on the line 4—4 of Fig. 3.

Fig. 5 is a side view looking in the direction of the arrow 5 of Fig. 1 the conveyor turntable being shown in section and only one of the work holders being shown for sake of clearness.

Fig. 6 is a sectional view on the line 6—6 of Fig. 5.

Fig. 7 is a view on the line 7—7 of Fig. 5.

Fig. 8 is a side view in the direction of the arrow 8 in Fig. 1 and is partly in section on the line 8—8 of Fig. 1.

Figs. 9 and 10 are views which are drawn to the same scale as Figs. 3 and 4; Fig. 9 is looking in the direction of the arrow 9 in Fig. 1 to show the work just before being ejected from the machine; and Fig. 10 shows the operation of the ejecting means.

Referring to Figs. 2 and 3 the work operated upon is a circuit breaker lever 20 having a non-conducting hub 21 by which the lever is insulatingly supported upon the pivot post of an ignition timer. A rivet 22 secures to the lever 20 a leaf spring conductor 23 and an L-shaped rubbing block 24 having a cam engaging surface 24*a* which is engaged by the engine operated ignition timer cam. The lever 20 carriers a timer contact 25 adapted to engage a relatively stationary contact of the ignition timer. It is a function of the present machine to surface the cam engaging surface 24*a* of the rubbing block so that it will have a predetermined relation with respect to the breaker lever and particularly its hub 21 and its contact 25. Accordingly the machine is provided with one or more work-holders each providing a pivot post 30 for receiving the hub 21 of the breaker lever, and each providing a block 31 having as shown particularly in Fig. 4 a finished surface 32 for receiving the contact face 25 and two grooves 33 each receiving a flange 34 of the circuit breaker lever 20 which is channel shaped in cross section. Each work holder provides a movable rod 35 for pushing the lever 20 from the position shown in Fig. 2, to the position shown in Figs. 3 and 4 in order to cause the surface of the contact 25 to engage the finished surface of the block 31. Each work-holder provides a finger 36 for pulling the lever 20 away from the stop block 31 in order to permit elevating the lever 20 from the position shown in Fig. 2 so that it may be ejected when in the position shown in Fig. 10 as will be explained later. The pivot post 30 and the block 31 are supported by a plate 40 carrying a screw 41 which provides a pivot for a lever 42 carrying both the rod 35 and the finger 36. A spring 43 is coiled around the screw 41 and has one end fastened to the screw the other coiled around a pin 44 carried by the

lever 42. This spring yieldingly urges the lever 42 counterclockwise as viewed in Figs. 2 and 3 against a slidable bar 45 which is actuated by the machine for the purpose of moving the lever 42 from the position shown in Fig. 2 to that shown in Fig. 3; or from a position permitting the loading of the breaker lever upon its pivot post 30 or the removal thereof to the position shown in Fig. 3 in which the rubbing block surface 24*a* is in position to be finished by a grinding wheel 100.

The means for automatically removing the circuit breaker lever from its supporting post 30 comprises a block 50 vertically slidable along the post 30 and pivotally connected with the bifurcated end 51 of a lever 52 which, as shown in Fig. 9, is fulcrumed upon a screw 53 threaded into a block 54 carried by a work holder plate 40. By means to be described later the lever 52 may be moved from the position shown in Fig. 9 to that shown in Fig. 10 in order to remove the circuit breaker lever from the post 30. A spring 52*a* restores the lever 52 to the position shown in Fig. 9.

A plurality of, for example twelve, of the work holders which have been described are attached by screws 55 and locating pins 56 to a conveyor turntable 60 having centrally recessed hub 61 rotatable about a vertically arranged stationary bearing 62 which is provided internally with a bearing surface for receiving a shaft 63 which drives the turntable 60. The bearing member 62 is provided externally with an eccentric cam 64 which is adapted to be engaged by a plurality of rods 65 there being one rod for each of the work holders. Motion is transmitted from each rod 65 to a slide 45 of a work holder by resilent means including a spring 66. Each slide 45 is guided by horizontal recess 67 provided by the turntable 60. The spring 66 is maintained under a state of compression between the slide 45 and the rod 65 and separation of these parts is limited by a pin 68 which passes through the rod 65 and through slots 69 in the slide 45. This construction provides for limited relative motion between the members 45 and 65 so that each spring 66 is permitted to transmit motion yieldingly from the cam 64 to a lever 42. During each revolution of the table 60 each plunger slide 45 will be forced by the cam 64 from the position shown in Fig. 2 to that shown in Fig. 3 and then the cam will permit the retraction of the slide 45 so that the spring 43 may move the lever 42 again to the position shown in Fig. 2.

The turntable 60 is intermittently rotated in order to bring the work pieces successively against the grinding wheel 100. This mechanism comprises a Geneva driven-gear 70 supported by and connected at the lower end of the shaft 63 which, as stated before, is supported by the bearing member 62 carried by the main frame 71 of the machine. The Geneva gear 70 is driven intermittently $\frac{1}{12}$ of a revolution for each revolution of a shaft 72 which carries a lever 73 carrying a pivoted roller 74 adapted to be received by each slot 75 of the Geneva gear. While the roller 74 is out of a slot 75, the Geneva gear 70 is locked against rotation by Geneva gear-locking-member 76 attached by screws 77 to the arm 73. The locking member 76 is received by the cylindrical surfaces 78 lying between the notches 75 of the Geneva gear. The shaft 72 is supported by bearing 80 provided by the machine frame and is connected at its upper end with a worm gear 81 which is driven by worm 82 driven by a shaft 83 supported horizontally by the machine and carrying a driving pulley 84. It is therefore apparent that as the shaft 83 rotates, the work-holders will be moved successively past the grinding wheel 100.

While the work-holders are stationary the grinding wheel 100, while rotating, moves automatically across the surface 24*a* of a rubbing block 24 as shown in Fig. 3. Referring to Figs. 5 and 8 the shaft 72 drives a bevel gear 85 meshing with a bevel-gear 86 connected with a shaft 87 supported by brackets 88 and 89 provided by the machine base 90. The shaft 87 drives a disc 91 pivotally supporting a roller 92 received by a slot 93 in a lever 94 which is pivoted at 95 upon the base 90 and is connected by a pin 97 with a link 98 connected by a pin 99 with a frame 101 which is mounted for vertical sliding movement and rotatably supports a shaft 102 carrying at one end the grinding wheel 100 and at the other a pulley 103.

The frame 101 is slidably supported by ways 104 and 105 provided by a frame 106 which is adjustable across a block 107 in a direction parallel to the axis of a shaft 102. The block 107 is supported by pedestal 108 provided by the base 90 and the block 107 is adjustable in a direction at right angles to the axis of the shaft 102. The bracket 108 provides ways 109 and 110 for guiding horizontally the dove tail tang of the block 107. A screw 112 which is supported by, and prevented from moving endwise by a block 113 cooperates with a screw-threaded hole in the block 107. The block 113 is attached by screws 114 to the pedestal 107. By turning the screw 112 the block 107 is moved in a direction transverse to the axis of the grinding wheel 100 in order to move the wheel closer to or further away from the rubbing block 24. Screws 115 attach to the frame 106 a plate 116 which supports and prevents the endwise movement of the screw 117 threaded through the block 107 as shown in Fig. 6. By turning screw 117 the frame 106 may be adjusted parallel to the axis of the grinding wheel 100 in order to bring dif-

ferent portions of the wheel into alignment with the rubbing block of the work.

The manner of operating the machine is as follows: The operator will stand approximately in the position of the arrow 120 in Fig. 1 and will place the circuit breaker levers 20 upon the various pivot studs 30 as they move adjacent to him. The machine is operated so that the turntable 60 will rotate counter-clockwise as viewed in Fig. 1. As the work progresses toward the grinding wheel 100 it is moved from the position shown in Fig. 2 to that shown in Fig. 3 due to the cooperation of the cam 64 with the rod 65 and slide 45 which are associated with each work holder. While each work piece is held stationary in the position immediately adjacent the grinding wheel 100, the grinding wheel frame 101 will be caused to move down and up automatically so that it will traverse the rubbing block 24 in two directions while rotating in order to finish its cam-engaging surface 24*a* to a predetermined dimension relative to its hub 21 and its contact 25.

After the rubbing block has been ground the work will continue in a counter-clockwise direction to a position in which the lever 52 associated with it will engage a stationary block 130 attached by screws 131 to the machine frame 71. When this occurs the lever 20 will be elevated from the position shown in Fig. 9 to that shown in Fig. 10, thereby causing the lever 20 to be removed from its pivot stud 30 so that it may be ejected from the machine. When in the position indicated by the arrow 132 in Fig. 1 the breaker lever 20, which has been elevated above its stud 30, will be ejected from the machine by a jet of air issuing from a nozzle 133 at the end of a pipe 134 which is connected with an air valve 135 the inlet of which is connected with a source of compressed air by pipe 136. The valve 135 is operated by a plunger 137 and is normally maintained closed by spring 138. The valve is mounted upon a plate 139 attached by screws 140 to the frame 71. The plate 139 carries a pivot stud 141 supporting a bell crank lever 142 carrying a roller 143 adapted to be engaged by a corner portion 144 of each of the work supporting plates 40 as they rotate past the roller 143. The location of the plate 139 to the work holders is such that by the time a circuit breaker has been elevated to the position shown in Fig. 10 and is located opposite the air nozzle 133 the roller 143 will have been engaged by a plate 40 and the lever 142 will have been moved into position for opening the air valve 135. Consequently the lifting of the work from its pivot stud will be followed immediately by the ejection of the work from the machine by directing a blast of air against it in the manner described.

It is therefore apparent from the foregoing description of the construction and mode of operation of this machine that the finishing of the rubbing blocks of ignition timer circuit breaker levers can be performed accurately and uniformly with the minimum of labor and expense. Consequently the cost of manufacture may be materially reduced.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A machine for finishing the cam-engaging surfaces of the rubbing block of ignition timer circuit breaker levers comprising, in combination, a plurality of work-holders each provided with a pivot post and means for holding the lever in predetermined relation to its post, means for removing material from the rubbing block of a lever, means for successively conveying the work-holders to the material removing means, and means for automatically removing the levers from their pivot posts after their rubbing blocks have been surfaced.

2. A machine for finishing the cam-engaging surfaces of the rubbing block of ignition timer circuit breaker levers comprising, in combination, a plurality of work holders each providing a pivot post for the lever and a stop for engagement by the lever contact, means for removing material from the lever rubbing block, means for conveying the work-holders successively toward and then away from the material removing means, and means for clamping the levers against their stops as they approach the material removing means and for releasing the levers from their stops as they move away from the material removing means.

3. A machine according to claim 2 and having means for lifting the levers from their pivot posts and for ejecting them from the machine after their rubbing blocks have been surfaced.

4. A machine for finishing the cam-engaging surfaces of the rubbing block of ignition timer circuit breaker levers comprising, in combination, a plurality of work-holders each providing a pivot post for the lever, and a stop for engagement by the lever contact, a grinding or cutting wheel for surfacing the rubbing blocks, a turntable for carrying the work-holders toward and away from the wheel, means for clamping the levers against their stops as the levers approach the wheel and releasing the levers as they move away from the wheel, and mechanism for automatically causing the table to rotate intermittently and causing the wheel to engage a rubbing block while the table is at rest.

5. A machine according to claim 4 and having means for lifting the levers from their pivot posts and for ejecting them from the

machine after their rubbing blocks have been surfaced.

6. In a machine for facing the cam-engaging surfaces of the rubbing blocks of ignition timer circuit breaker levers, the combination of an operating tool for facing the rubbing block with means for pivotally supporting a circuit breaker lever, means for moving the circuit breaker lever about its pivotal support to approach the operating tool, and means for automatically ejecting the lever from its support after the rubbing block of the lever has been faced.

7. A machine for facing the cam-engaging surfaces of the rubbing blocks of ignition timer circuit breaker levers comprising in combination, an operating tool for facing the rubbing block; a work-holder, said work-holder including a pivot post for pivotally supporting the lever, a stop for engaging the contact carried by said lever, and clamping means for holding said contact firmly against said stop during the facing of the rubbing block during the facing operation; and means for automatically ejecting the lever from its support after its rubbing block has been faced.

8. A machine according to claim 7 in which the ejecting means includes a device for lifting the lever from its pivot.

9. In a machine for facing the cam engaging surfaces of the rubbing blocks of ignition timer circuit breaker levers, the combination of an operating tool for facing the rubbing block with means for pivotally supporting a circuit breaker lever, a stop engageable with the lever to limit its pivotal movement toward the operating tool, means for yieldingly moving the circuit breaker lever into engagement with said stop, and means for automatically ejecting the lever from its support after the rubbing block of the lever has been faced.

In testimony whereof we hereto affix our signatures.

LEO C. SHIPPY.
RUSSELL W. BAKER.