July 15, 1924. 1,501,510

R. H. AHLERS

ARMATURE CONSTRUCTING FIXTURE

Filed June 20, 1921 4 Sheets-Sheet 1

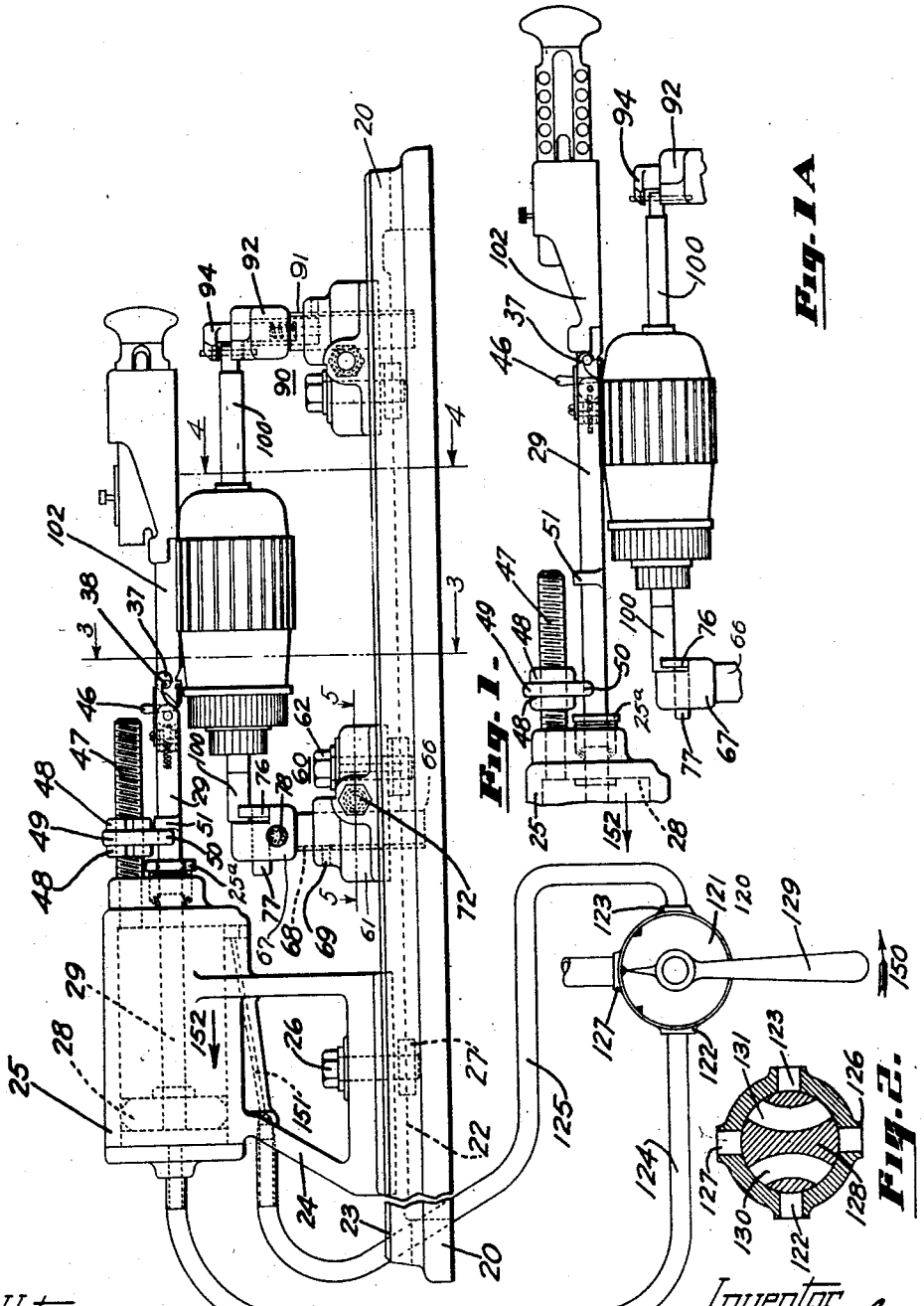

Fig. 1A

Fig. 1

Fig. 2.

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Fig. 4.

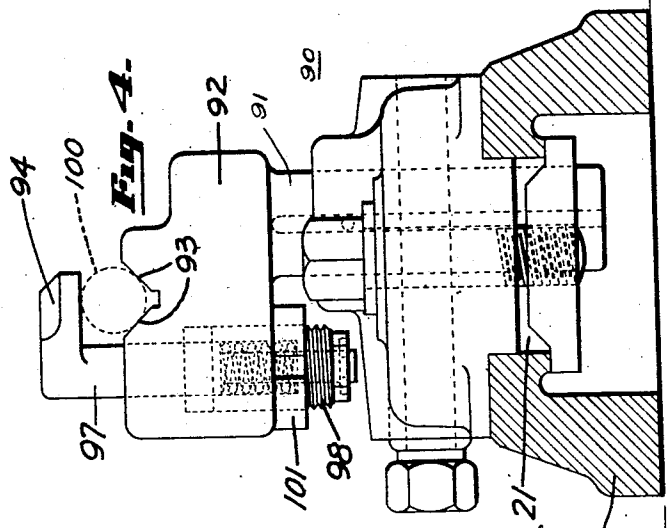
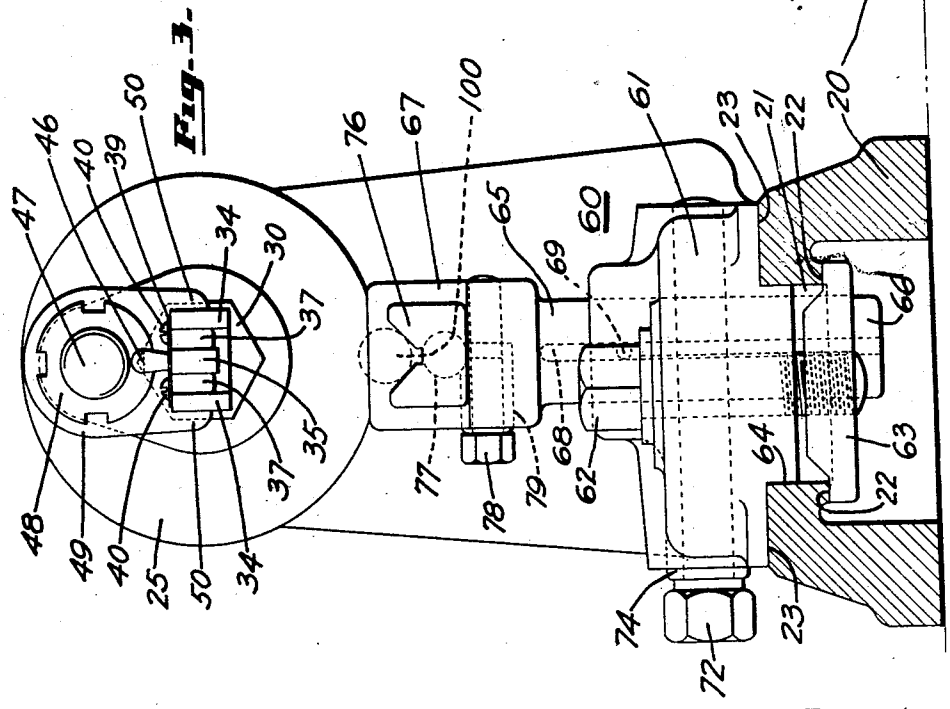



Fig. 3.

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ARMATURE CONSTRUCTING FIXTURE

Filed June 20, 1921 4 Sheets-Sheet 3

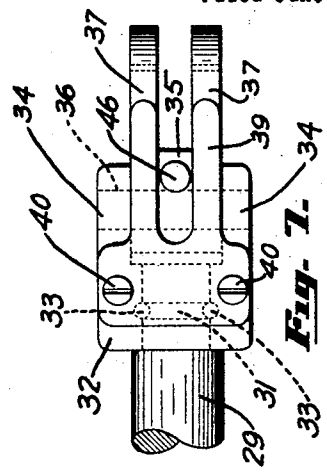

Fig. 1.

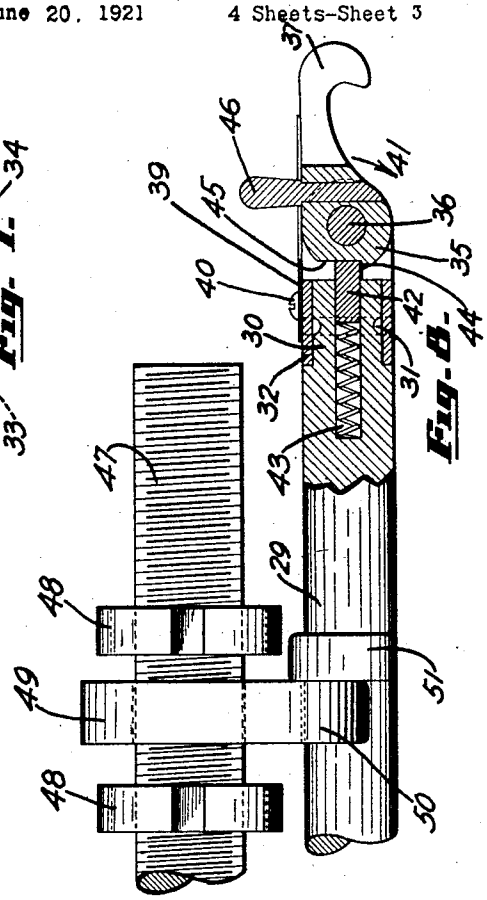

Fig. 2.

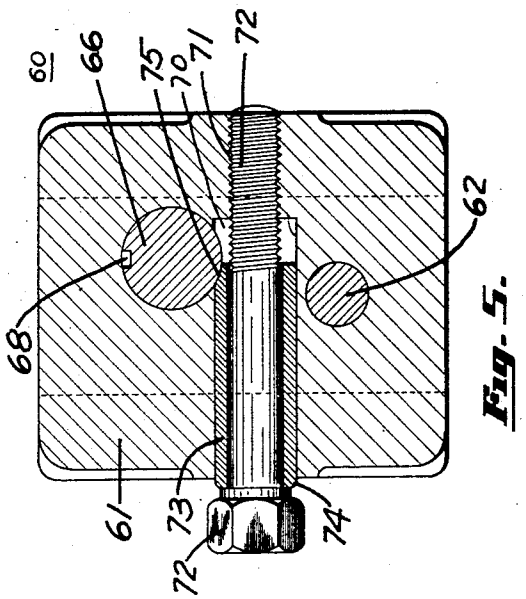

Fig. 5.

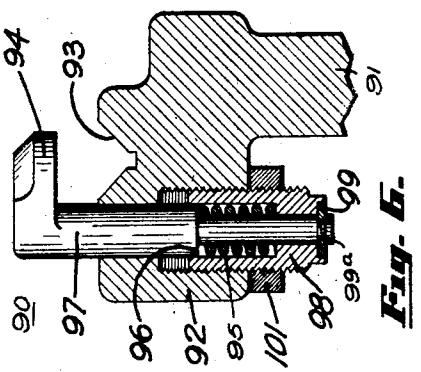

Fig. 6.

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ARMATURE CONSTRUCTING FIXTURE

Filed June 20, 1921 4 Sheets-Sheet 4

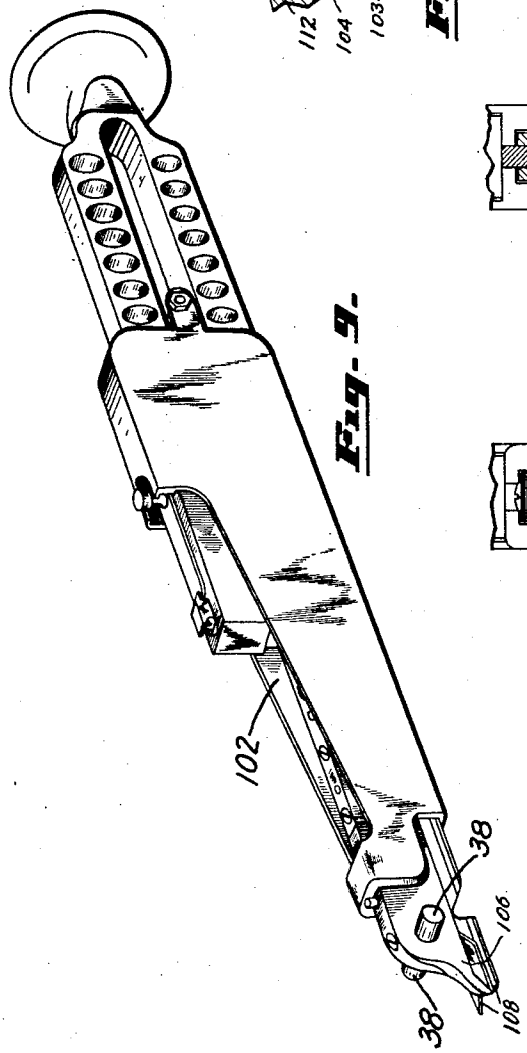


Fig. 9.

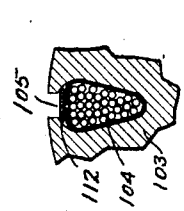


Fig. 13.

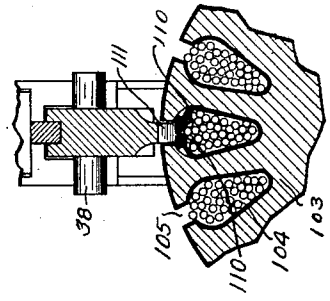


Fig. 12.

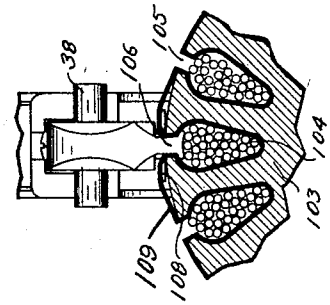


Fig. 11.

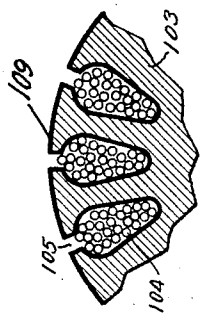


Fig. 10.

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# UNITED STATES PATENT OFFICE.

ROBERT H. AHLERS, OF DAYTON, OHIO, ASSIGNOR TO THE DAYTON ENGINEERING LABORATORIES COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO.

## ARMATURE-CONSTRUCTING FIXTURE.

Application filed June 20, 1921. Serial No. 478,815.

*To all whom it may concern:*

Be it known that I, ROBERT H. AHLERS, a citizen of the United States of America, residing at Dayton, county of Montgomery, State of Ohio, have invented certain new and useful Improvements in Armature-Constructing Fixtures, of which the following is a full, clear, and exact description.

This invention relates to a machine or fixture for mechanically operating an armature fabricating tool such as is described, illustrated, and claimed in the copending application of George H. Leland and Robert H. Ahlers, filed May 17, 1920, Serial No. 382,089. As shown and described in said copending application this tool is adapted to be inserted in the armature slot and then to be manually pushed through said slot causing the wires in the slot to be forced down, the insulating paper sheared at the edges of the slot, the sheared edges of the paper turned down against the wires, and a retainer strip called "the peg" inserted in the slot.

It is among the objects of the present invention to operate such a tool by power means whereby to aid the operator in the manufacture of armatures so that the time required for producing an armature will be materially reduced.

In order to accomplish the object, the present invention provides a fixture adapted to support armatures of various dimensions in correct relation to a power operated movable member which grasps a tool, such as referred to, and moves it relative to the armature in order to perform, by power application, such operations as the tool is adapted to perform.

Other and further objects of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a side elevation of the machine and controlling valve, the power operated movable member being in engagement with the armature fabricating tool which is in engagement with an armature core slot;

Fig. 1[A] is a side view of a portion of the machine, the various elements being shown in a position preparatory to pulling the armature fabricating tool through an armature slot;

Fig. 2 is a detail view of the power controlling valve;

Fig. 3 is a sectional view of the machine taken on line 3—3 in Fig. 1, the armature and tool having been omitted for the sake of clearness;

Fig. 4 is a sectional view similar to Fig. 3 but taken on line 4—4 in Fig. 1;

Fig. 5 is a detail sectional view taken on line 5—5 in Fig. 1;

Fig. 6 is a sectional view showing the retaining hook in one of the supports;

Fig. 7 is a detail top view of the armature assembling device gripping element associated with the piston rod of the machine;

Fig. 8 is a fragmentary, part sectional view of the piston rod and the adjustable stop associated therewith;

Fig. 9 is a perspective view of the armature fabricating tool as shown in the copending application referred to;

Figs. 10, 11, 12, and 13 are sectional views illustrating the fabricating of an armature by means of the tool referred to, Fig. 10 showing the armature preparatory to the operations by said tool, and the remaining views showing the successive operations performed by the tool.

Referring to Figs. 1, 3 and 4, numeral 20 designates a base having a central longitudinal opening 21. On each side of the opening 21 and running longitudinally therewith, the base 20 is provided with a lower bearing surface 22. The top of the base 20 is also provided with a bearing surface 23, on which the supporting frame 24 of the horizontal cylinder 25 is adapted to rest. This frame 24 is held in position on the base 20 by a clamping bolt 26 projecting through a hole in the frame 24 and screwing into a clamping plate 27 engaging with the lower bearing surface 22. By this structure the cylinder supporting frame 24 may be moved longitudinally, and rigidly held in any desired position on the base 20.

Referring to Fig. 1, a piston 28 slides in cylinder 25 and is provided with a piston rod 29. This rod 29 projects through a stuffing box bushing 25[a] and means for gripping an armature fabricating tool is se-

cured to its outer extremity. Figs. 7 and 8 show in detail this gripping means. The piston rod 29 has a reduced portion 30 provided with an annular channel 31 semicircular in section. A swivel 32 is provided with a bore adapting the swivel to fit over the reduced portion 30 of the rod 29, said swivel carrying pins 33 which project across the portion 29 and are received by the channel 31 formed on the rod 29, thereby tending to hold said swivel rotatably on said rod. The swivel 32 is provided with a forked portion 34 within which a hub 35 is pivotally mounted by means of pin 36. The hub 35 is provided with hook members 37 which are adapted to engage with the oppositely disposed pins 38 on the armature assembling device shown in Fig. 9. A flat spring 39 is secured to the swivel 32 by screws 40, said spring being adapted to push the hooks 37 in the direction of the arrow 41. In order to hold the hooks 37 in alignment with the rod 29, there is provided a spring pressed plunger 42 mounted in a recess 43 in the rod 29, said plunger 42 being adapted to engage with a stop or shoulder 44 formed on the hub 35 in order to limit downward movement of the hooks 37 from the position shown in Fig. 8. The plunger 42 cooperates with a flat 45 to hold the hooks 37 in alignment with the rod 29. A handle 46 is secured to the hub 35 for pulling the same upwardly in the direction opposite to arrow 41 for releasing the engagement between hooks 37 and pins 38 on the armature assembling device.

Directly above and adjacent to the rod 29 there is provided a screw threaded shaft 47 secured to the cylinder in any suitable manner. Two adjusting nuts 48 are carried by this shaft, and a stop element 49 loosely mounted on the shaft 47 is located between these nuts. This stop 49 has a downwardly projecting arm 50 adapted to fit over the rod 29 and engage a stop 51 secured to or formed integrally with the said rod. The stop 49 may be held in any desired position on the shaft 47 by adjusting nuts 48; and, since the arm 50 is in the line of travel of the stop 51, the travel of rod 29 in one direction will be limited.

The base 20 carries two armature supports 60 and 90. Referring to Figs. 1, 3, and 5, the main body portion 61 of support 60 rests on the bearing surface 23 of base 20. A clamping stud 62 projects through the body and screws into a clamping plate 63 engaging the lower bearing surface 22. By means of this stud and clamping plate, the support 60 can be secured in various positions of longitudinal adjustment on the base 20. The body portion 61 is prevented from rotating on the base 20 by means of a shoulder 64 formed thereon which projects within the opening 21 of said base. A post 65 is supported by the body portion 61, said post comprising a shank portion 66 projecting through said body and a head portion 67. A channel 68 in the shank 66 cooperates with a pin 69 carried by the body 61, and prevents rotation of the post while permitting it to slide vertically in the body portion 61 whereby to obtain vertical adjustment.

Fig. 5 shows the means for rigidly holding the post 65 in a desired position of vertical adjustment. The body 61 is provided with a channel 70 transverse to the shank portion 66 of the post 65 which projects into the channel 70. A tapped hole 71 extending from channel 70 receives the threaded shank of clamping stud 72. Located within the channel 70 and surrounding the stud 72, there is a bushing 73 having its outer end engaging with the head of the stud 72 while the inner end has a rounded surface 75 adapted to engage the shank portion 66 of post 65. By screwing out the stud 72, pressure of the bushing 73 against the shank 66 is released, thereby permitting said shank 66 to be moved vertically relative to the body portion 61. When the desired position of vertical adjustment is obtained, the stud is again screwed into said body portion 61, causing the bushing 73 to be forced into engagement with the shank 66 whereby rigidly to hold said shank in position.

The head portion 67 of the post 65 is provided with a V-grooved support 76 which is adapted to receive one end of the armature shaft 100. This support 76 has a shank portion 77 projecting into the head portion 67. A clamping stud 78 and a clamping bushing 79 are arranged transversely to shank portion 77, and function to hold said portion 77 in adjusted position in a manner similar to that of the stud 72 and bushing 73 for holding the shank portion 66 of post 65.

Referring to Figs. 4 and 6, a second support 90 has a body portion similar to the support 60 and it is adjustable relative to the base 20 in like manner. Support 90 includes a post 91 supported in positions of vertical adjustment in a manner similar to that of post 65 of support 60. No detail description of this portion of the support 90 will therefore be given. The head portion 92 of this post 91, however, differs from that of post 65. A V-shaped notch 93 is formed in the head 92 and is adapted to receive the armature shaft 100 as shown in Fig. 1. When making the armature, pulling of the armature tool 102 through the armature slot will tend to pull the end of the armature shaft supported by the head 92 out of the notch 93. To prevent this, there is provided a retaining hook 94 which is rotatably supported by the head so that said hook can be turned from armature shaft

engaging position when it is desired to remove the armature from the fixture. Referring to Fig. 6, a spring 95 is interposed between a shouldered portion 96 formed on the shank 97 of hook 94 and an adjustable bushing 98 to cause a frictional drag on the hook, thereby tending to eliminate accidental turning of the hook from armature shaft engaging position during the assembling of the armature. To compensate for varying diameters of armature shafts, the adjustable bushing 98 can be screwed into or out of the head portion 92 for increasing or decreasing the space between notch 93 and hook 94. Movement of the hook 94 away from the bushing 98 is prevented by split or C-washer 99 engaging a groove 99a in shank 97. The nut 101 provides means for locking the bushing 98 in adjusted position.

Referring to Figs. 1 and 2, a power control valve 120 for admitting pressure fluid to the cylinder 25 comprises a main body portion 121 having outlets 122 and 123 connected to the cylinder 25 by flexible pipes 124 and 125 respectively. An exhaust outlet is provided at 126. The power fluid inlet is designated by the numeral 127. The controlling element 128, which controls the direction of the flow of power medium, is operated by a lever 129, said element having two channels 130 and 131 which are adapted respectively to connect the outlets 122 or 123 either with the source of power medium or with the exhaust outlet.

When it is desired to work upon an armature, the operator adjusts the supporting elements 60 and 90 vertically in accordance with the diameter of the armature core to bring the periphery thereof into correct position relative to the piston rod 29 so that when the armature tool 102 is inserted in the armature slots, the hook 37 can readily engage with the pins 38 on said tool. This correct vertical adjustment is shown in Fig. 1A. The supports 60 and 90 are adjusted horizontally on the base 20 so that each end of the armature shaft will readily be received by the bearings 76 and 93. Then the cylinder 25 and supporting frame 24 are adjusted on the base relative to the supports 60 and 90 so that the hook 37 will readily engage pins 38 of assembling device 102 when the piston is in the extreme right hand position as shown in Fig. 1. Nuts 48 are manipulated to adjust and hold the stop 49 in correct position where the portion 50 thereof will cause the piston rod to stop when the armature tool has been drawn the desired distance through a slot in the armature core.

Having completed all these adjustments, the operator then inserts an armature in position on the supports 60 and 90 and turns the retaining hook 94 rigidly to hold the armature in position when being operated on. Referring to Fig. 10, a fragment of the armature core 103 is shown in section with the armature conductors 104 loosely compacted and some lying in the restricted neck portion 105 of the slots. The pilot 106 of the tool 102 is inserted in the armature slot as shown in Fig. 11 and the tool is pushed toward the cylinder 25 until the hooks 37 are engaged by the pins 38 on said tool, as shown in Fig. 1A. Movement of the tool 102 toward the hooks 37 causes the pins 38 to strike the hooks and cam them upwardly against the action of springs 39. When the pins 38 clear the points of the hooks, the hooks will return to the position shown in Fig. 1A. Thus the tool and movable rod are automatically coupled by the movement of the tool into the armature core. The control valve lever 129 is turned in the direction of the arrow 150 to cause the power medium to be directed from the inlet 127, through channel 131, outlet 123, pipe 125, channel 151, and into the cylinder. This will cause the piston 28 to be moved in the direction of the arrow 152 and cause the armature tool 102, which is now secured to the piston rod 29, to be pulled through the armature slot. The stops 50 and 51 will prevent the piston from moving further than necessary in this direction. In traveling through the armature slot, the tool 102 will pack the conductors 104 down into the slot, and shear, by means of blades 108, the insulating lining 109, see Fig. 11, at the edge of the slot and core periphery. Then, as shown in Fig. 12, the sheared edges 110 of the insulating lining are turned, by means of the folding portion 111, down against the conductors 104; and the retainer strip 112 is inserted in the slot as shown in Fig. 13. This strip tends to prevent the conductors from flying out of the armature slots due to centrifugal force when the armature is rotating at high speed. A more detailed description of the armature fabricating operations is to be found in the copending application of Leland and Ahlers referred to.

After these operations have been performed, the various elements of the machine and the armature tool 102 are in the position shown in Fig. 1. The operator turns the handle 46 to disengage the hooks 37 from the pins 38, permitting the removal of the tool 102. The lever 129 is turned in a direction opposite to the arrow 150 to connect the power source with the left end of the cylinder 25 (see Fig. 1) to cause the piston 28 to move to the right. The air on the right-hand side of the piston 28 (Fig. 1) will be exhausted through the pipe 125, channel 131, and outlet 126. From the foregoing description it will be seen that to operate upon an armature, the operator needs only to insert the tool 102 in the armature slot until it is connected with the rod 29 and then manipulate the power control lever 129.

This lever may be replaced by a pedal operated mechanism whereby the operator can shift the control valve by means of his feet, permitting the use of both hands for the manipulation of the armature and armature tool, thereby facilitating the fabrication of armatures.

The invention therefore provides a power operated actuating member, the rod 29, and a fixture by means of which an armature can be supported with a core slot thereof parallel to the line of travel of the actuating member. An armature fabricating tool having parts adapted to operate in a slot of the core is provided with means permitting the tool to be inserted manually into a slot. Then after the tool has been pushed manually a certain distance toward the movable member, which has been previously advanced toward the work, cooperating provisions on the tool and movable member automatically connect said tool and member. The member is caused to recede from the armature by power means to pull the tool along a core slot to perform certain operations. These cooperating provisions permit the tool to be released from the actuating member so that the tool can be inserted manually into another core slot. The fixture is adjustable so that armatures of varying dimensions may be accommodated; and the travel of the actuating member is limited by adjustable stop means to adapt the movement of the actuating member to armatures of various lengths.

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

What I claim is as follows:

1. In a machine for power operating an armature making tool, the combination with a cylinder and a piston; of adjustable supports for rigidly holding the armature in desired position; and means associated with said piston for engaging the armature making tool in order that the tool will be moved by said piston.

2. In a machine for power operating an armature making tool, the combination with a cylinder and a piston; of supports vertically and longitudinally adjustable for holding the armature in the desired position; and means associated with said piston for engaging the armature making tool in order that the tool will be moved by the piston.

3. In a fixture for power operating an armature making tool, the combination with a cylinder, a piston and a piston rod; of supports vertically and longitudinally adjustable for holding the armature in desired position; and a spring controlled latch associated with the piston rod for engaging the armature making tool in order that the tool will be moved by the piston.

4. In a machine for power operating an armature making tool, the combination with a base; of a cylinder, a piston and piston rod adjustably supported thereon; flexible means connecting the cylinder with a power control device for causing longitudinal movement of the piston and piston rod in either direction; supports vertically and longitudinally adjustable for holding the armature in desired position; and a spring controlled latch associated with the piston rod for engaging the armature making tool.

5. In a machine for power operating an armature making tool, the combination with a base; of a cylinder, a piston and piston rod adjustably supported thereon; power means for longitudinally moving the piston and rod in either direction in the cylinder; an adjustable stop associated with the piston rod for limiting the inward travel of the piston rod into the cylinder; supports adapted to support the armature and adjustably secured to the base for varying the relative position of the armature to the piston rod, said supports also being vertically adjustable to permit assembling armatures of different diameters; and a spring controlled latch associated the piston rod for engaging with the armature making tool.

6. In a machine for power operating an armature making tool, the combination with a cylinder, a piston and piston rod; of supports adjustably secured to a base and adapted to carry the armature, one support being provided with a V-shaped bearing plate on which one end of the armature shaft is adapted to rest while the other support is provided with a V-shaped bearing plate and a rotatable retaining hook for securely holding said other end of the armature shaft in position, said retaining hook being provided with a spring for preventing the hook from accidentally moving out of armature shaft retaining position; and a spring controlled latch associated with the piston rod for engaging the armature making tool.

7. Apparatus for making armatures comprising the combination with a tool member having a part adapted to be moved manually into an armature core slot; of a power operated movable member; means for supporting an armature; cooperating provisions on said members whereby, upon movement of one member relatively to the other, said members will be automatically connected; and means for controlling said movable member.

8. Apparatus for making armatures comprising the combination with means for supporting an armature; of a power oper-

ated member movable parallel to an armature core slot; a tool having a part manually movable into a core slot; means operated by movement of the tool toward the power operated member for connecting the tool and member; and means for controlling said movable member.

9. Apparatus for making armatures comprising the combination with a power operated member supported for linear movement; of means for supporting an armature core with a slot thereof parallel to the line of motion of said member; a tool having a part manually insertable into a core slot and adapted to be guided by said slot; means for connecting the tool and member; and means for controlling said member.

10. Apparatus for making armatures comprising the combination with means for supporting an armature core; of a tool having a part adapted to be inserted manually into an armature core slot, and to be guided by said slot; a power operated member for moving said tool relative to said core; means for connecting said member and tool, said connecting means permitting the core to guide the tool; and means for controlling said member.

11. Apparatus for making armatures comprising the combination with means for supporting an armature core; of a tool having a part adapted to be inserted manually into one end of an armature core slot; a power operated member movable across the periphery of the core; means for connecting said tool and member, said means being releasable to permit manual removal of said tool from said core; and means for controlling said member.

In testimony whereof I hereto affix my signature.

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