Jan. 1, 1924

1,479,248

W. E. MOORE

MACHINE FOR INSULATING ARMATURE WINDINGS

Filed Sept. 12, 1921

4 Sheets-Sheet 1

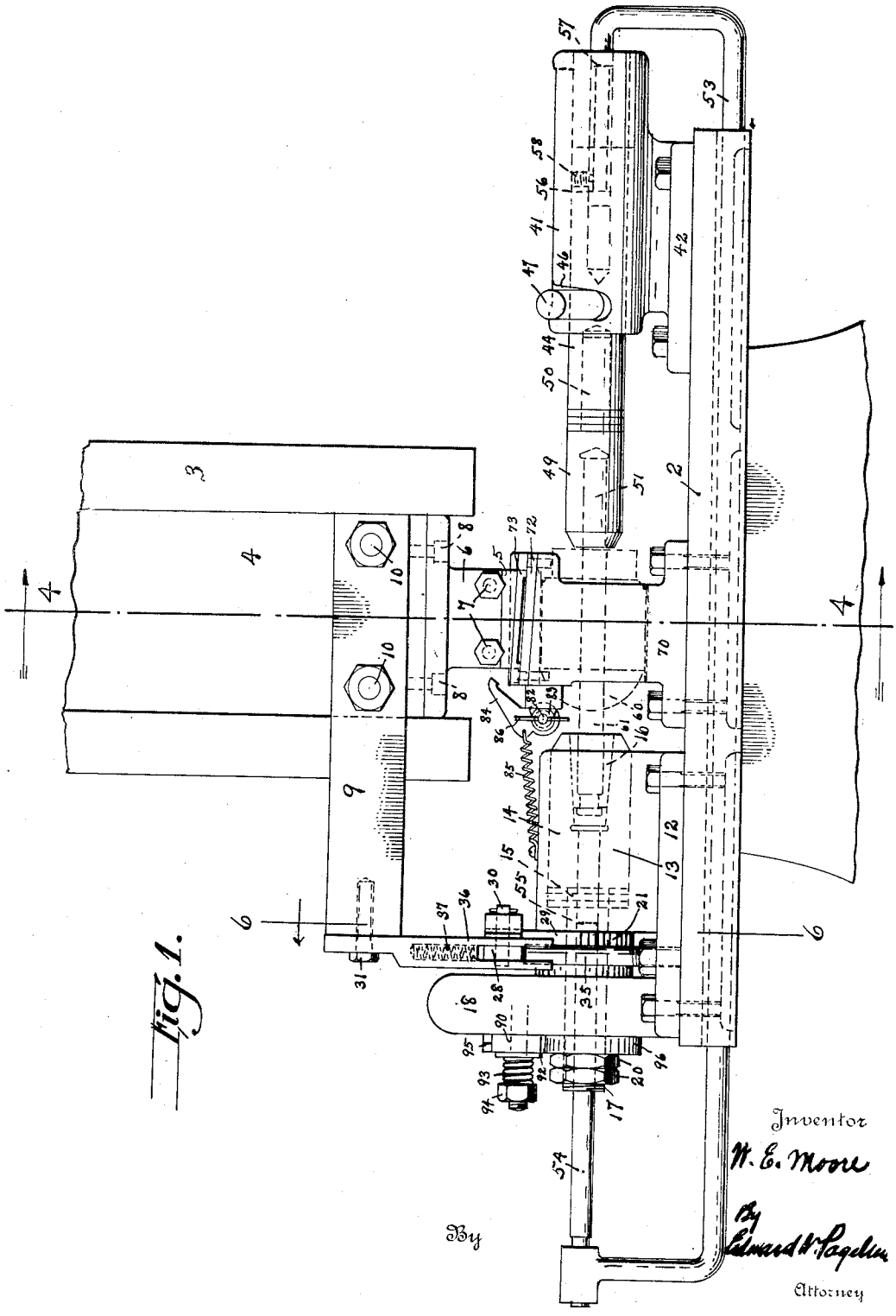


Fig. 1.

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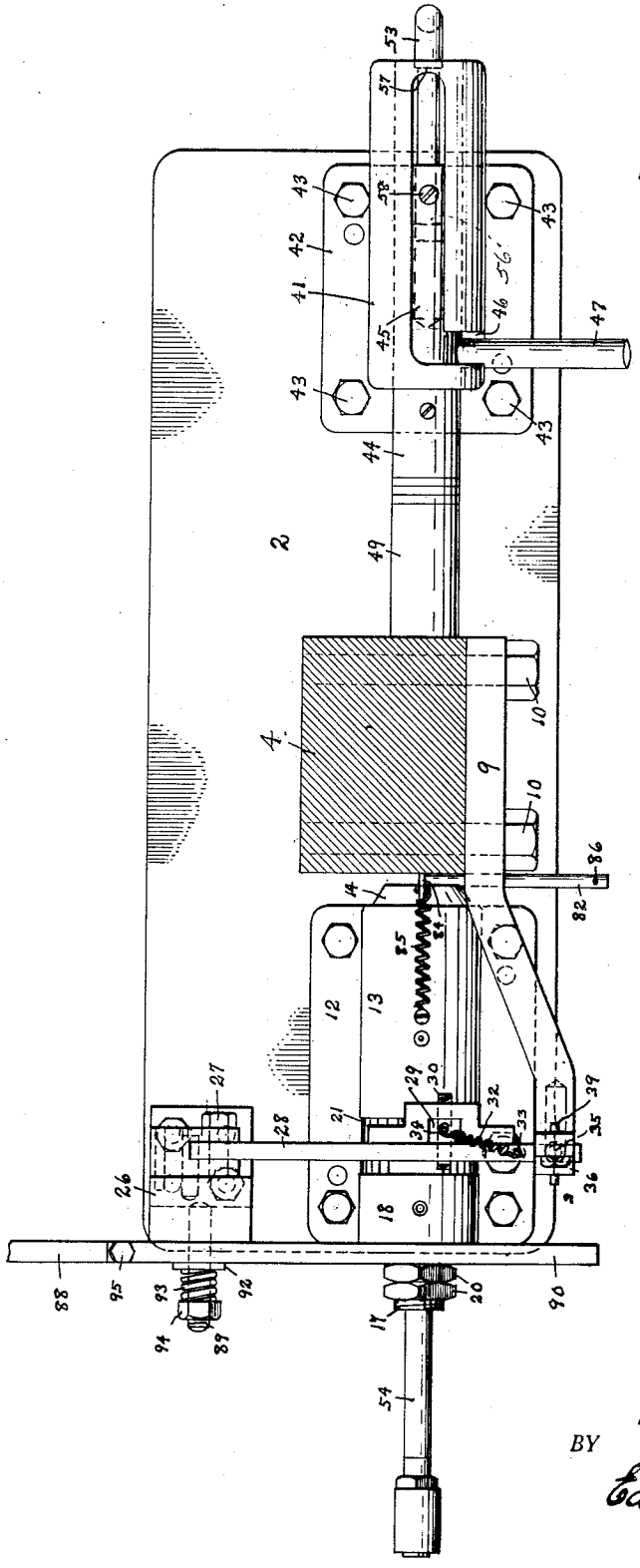


Fig. 2.

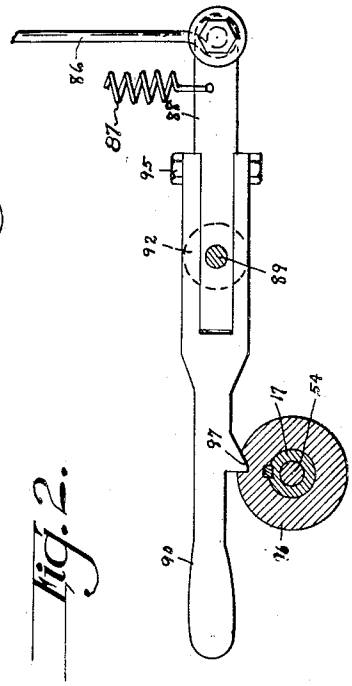


Fig. 3.

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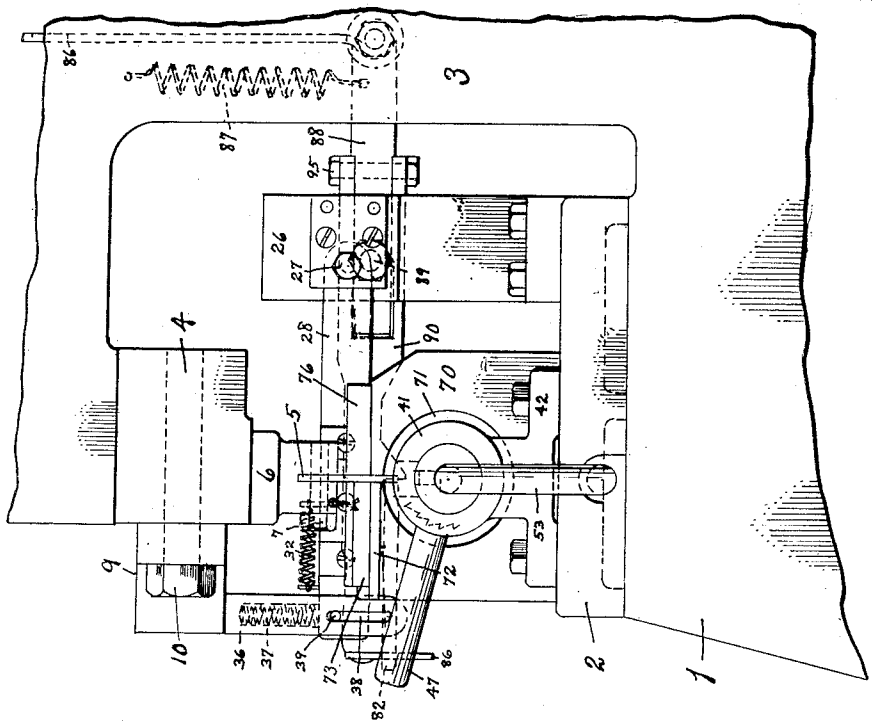


fig. 5.

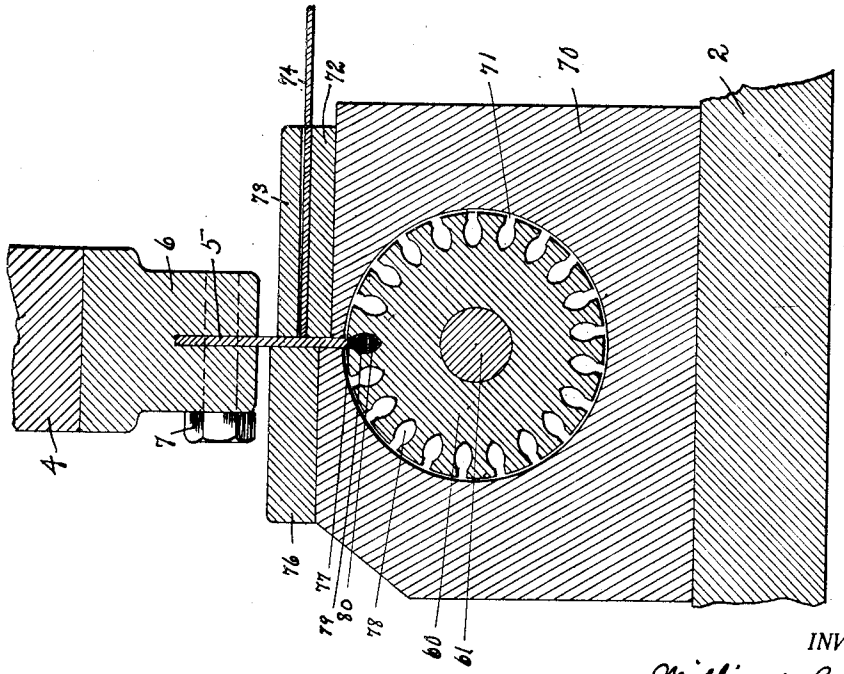


fig. 4.

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4 Sheets-Sheet 4

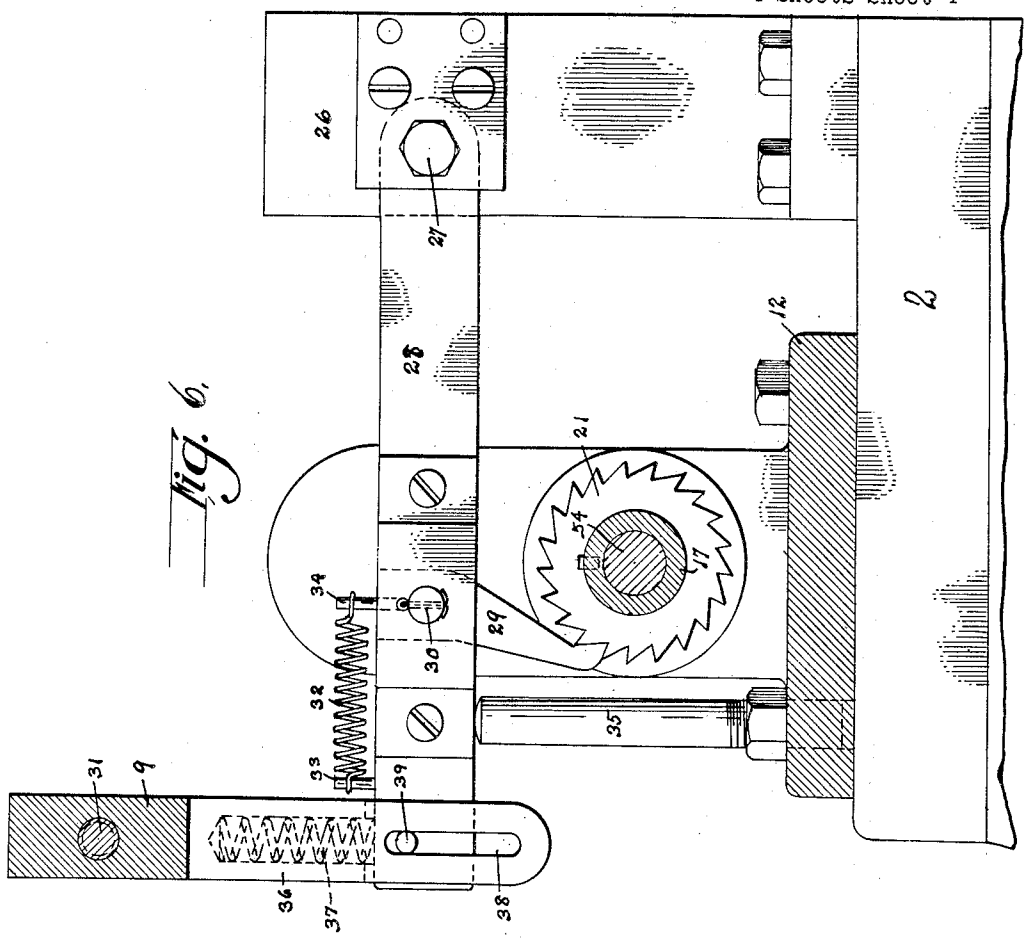


Fig. 6.

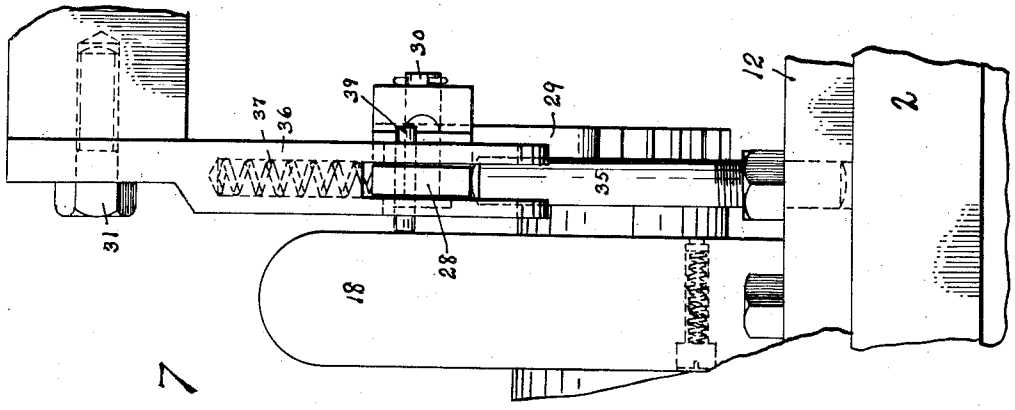


Fig. 7

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Patented Jan. 1, 1924. 1,479,248

UNITED STATES PATENT OFFICE.

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MACHINE FOR INSULATING ARMATURE WINDINGS.

Application filed September 12, 1921. Serial No. 500,136.

To all whom it may concern:

Be it known that I, WILLIAM E. MOORE, a citizen of the United States, and residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Machine for Insulating Armature Windings, of which the following is a specification.

This invention relates to means for securing the windings of the armatures of electric generators and motors in the longitudinal grooves in the cores of such armatures and its object is to provide a device which will shear a narrow strip of heavy insulating material from a band and drive this strip down into the groove in the core onto the windings therein, and to provide means to turn the armature at each operation of the shear so as to present a second groove after a first has been filled.

This invention consists in a support for the ends of the shafts of armatures for electric motors and generators and a base therefor, a guide and a stationary shear member for bands of insulating material, a movable shear member which is adapted to force the sheared strips of insulating material into the longitudinal grooves in the cores of the armature onto the windings therein, a reciprocating head on which the movable shear member is mounted, and means actuated by the head to turn the armatures step-by-step so as to carry succeeding grooves to strip-receiving position. It further consists in means actuated by the head to stop the mechanism when the armature therein has made one complete rotation. It also consists of the details of construction illustrated in the accompanying drawings and particularly pointed out in the claims.

In the accompanying drawings, Fig. 1 is a front elevation of a machine embodying the present invention. Fig. 2 a plan thereof. Fig. 3 is an elevation of a stop lever. Fig. 4 is a section on the line 4—4 of Fig. 1. Fig. 5 is an end elevation of this machine. Fig. 6 is a section in the line 6—6 of Fig. 1 on a larger scale. Fig. 7 is a front elevation of the mechanism shown in Fig. 6.

Similar reference characters refer to like parts throughout the several views.

Narrow strips of heavy insulating paper or composition are often forced into the longitudinal grooves in armature cores onto the windings therein so as to act as retainers therefor, the insulating strips being of such width that when forced into the spaces between the outer edges of the walls of the slots, the friction between these walls and the strips is sufficient to hold the strips and the windings in position. In many cases the armature is thereafter dipped in proper insulating liquid and then baked which results in the windings being imbedded in a solid mass of insulating material.

The mechanism shown in the drawings is adapted to be used in connection with many types of punch presses, Fig. 3 showing the table 1 on which the base 2 of this machine is mounted and the frame 3 in which the usual head 4 is vertically slidable. On the base are mounted a head-stock, a tail-stock and a shear frame. The head-stock is adapted to receive and support one end of the armature shaft and rotate it, the tail-stock is adapted to receive and support the other end of the armature shaft and permit its rotation, and the shear frame is adapted to receive the core of the armature and position a band of insulating material relative thereto so that strips may be cut therefrom by means of a blade mounted on the vertically slidable head which strips are pushed down into place by means of the blade. As shown in Figs. 1 and 2, the blade 5 may be secured in position in a holder 6 by means of screws 7 and the holder secured to the head 4 by means of screws 8. A cross bar 9 which operates the feeding mechanism may be secured to the head by means of bolts 10.

The headstock.

The head-stock has a foot 12 and a body 13 in which the cylindrical head spindle 14 is rotatable, a thrust bearing 15 of any desired character being employed. Mounted within the head are the tapering jaws 16 of well known design which are adapted to wedge down into the armature shaft when that is forced into the head. These jaws together are often known as a collet. A sleeve

17 extends outward from this head and is journaled in the bracket 18 mounted on the foot 12. Jamb nuts 20 prevent inward movement of the spindle 14. Secured on the sleeve 17 and between the body 13 and bracket 18 is a ratchet wheel 21 whereby the head spindle 14 may be rotated. The teeth of this ratchet wheel are of the same number as the grooves 78 in the core of the armature 60 being operated upon, this being shown in Fig. 4.

A bracket 26 extends upward from the base 2 and carries a pin 27 on which the lever 28 is mounted. A pawl 29 is mounted on a pin 30 carried by this lever and a spring 32 between the pin 33 on the lever and the pin 34 on the pawl holds the lower end of this pawl against the ratchet wheel 21. The downward movement of this lever is limited by a post 35 while an arm 36 secured to the end of the cross bar 9 by a screw 31 extends down and is bifurcated to receive the lever 28 and is formed with a longitudinal hole to receive the spring 37. The forked lower end of this arm is formed with slots 38 for the pin 39 by means of which the lever and pawl are elevated.

As the head of the press rises and falls, the arm 36 moves with it, lifting the lever 28 at the end of its upward movement and depressing it at the beginning of its downward movement so that the armature will be turned at the beginning only of the downstroke of the press.

The tailstock.

The tail-stock has a body 41 mounted on a foot 42 which may be secured to the base by the screws 43. The body is bored to permit free movement of the spindle 44 and is also formed with a longitudinal slot 45 and a transverse slot 46 at the end thereof to permit the passage of the handle 47 which connects to the spindle and by which it may be moved back and forth and be locked at its inner position.

The inner end 49 of the spindle is rotatable relative to the main body thereof and has a stem 50 rotatable therein. It also has a central hole 51 to receive one end of the armature shaft. Extending longitudinally of the base is a releasing rod 53 which connects at its left end to the knock-out rod 54, this rod 54 being slidable in the sleeve 17 and terminating at about the point 55. The right end of the releasing rod is bent up and then in, being reduced between the shoulders 56 and 57 which limits its movement by contacting with the screw 58 mounted in the tail spindle.

The armature 60 and its shaft 61 are indicated in dotted lines in Fig. 1. When the armature has been properly supplied with insulating strips, the handle 47 is swung up to a vertical position and moved out along the slot 45, carrying the spindle 44 with it, usually leaving behind the armature which is supported by the collet 16. After the spindle has moved to the right sufficiently to carry the screw 58 against the shoulder 57 of the rod 53, this rod is also moved to the right, carrying with it the knock-out rod 54 which strikes against the left end of the armature shaft 61, driving it out of the collet 16 or freeing the collet from the grip of the tapering end of the head spindle 14. The operator's right hand moves the handle 47 while his left receives the right end of the armature shaft which can be readily moved out of the shear frame without being bruised.

The shear frame.

The stationary shear is mounted on a block 70 having a cylindrical cavity 71 to receive the armature 60 and the shear consists of a lower plate 72 on which the band 74 of insulating material is slidable and a guide plate 73 which has its lower side cut-away to form a passage for this band, as indicated in Fig. 1. This plate 72 co-operates with the blade 5 to cut the band 73 into strips, the width of which is determined by a stop-plate 76. The band is fed in by the operator and at each downstroke of the blade 5 a narrow strip 77 is cut from the band and forced down into a groove 78 in the core of the armature 60 onto the windings 79 and 80 therein. As shown in Fig. 4, these grooves are preferably quite narrow at the surface of the core and the walls of the grooves are substantially parallel where the strips 77 are driven in so that their escape is improbable.

When an armature is to be provided with these sealing strips, it is slipped into the cavity 71 in the block 70 with one end of its shaft in the collet 16.

The tail spindle 44 is then moved inward to support the opposite end of the armature shaft. Mounted on a small shaft 82 carried by a lug 83 is a locating finger 84 normally held out by the spring 85. A pin 86 is adapted to turn this shaft and swing the locating finger into one of the grooves 78 of the armature core to aline this groove with the blade 5. After the core is properly positioned, the tail spindle is forced inward to the limit of its movement which causes the adjacent end of the armature shaft to be gripped by the collet 16 to cause the armature to turn with the ratchet wheel 21.

The punch press has the usual driving mechanism and stop mechanism. A rod 86 is provided which is automatically pulled up by a spring 87 of the stop mechanism of the machine at the end of each stroke but when held down, prevents the stop mechanism from working. As this is a well known mechanism in punch presses everything ex-

cept the lower end of the rod is omitted. Instead of the usual treadle, a lever 88, (Fig. 3) is shown attached to this rod 86, the lever being mounted on a pin 89 carried by the bracket 26. An operating handle 90 is attached to this lever 88 by a bolt 95 and both lever and handle are held in alinement against the bracket 26 by means of a washer 92, spring 93 and nut 94 on this pin 89.

Attached to the outer end of the sleeve 17 is a cam 96 which has a notch to receive a tooth 97 on this handle 90, which notch permits the rod 86 to rise and the press to stop. As there is but one notch, the sleeve 17, the collet 16 connected thereto, and the armature shaft 61 gripped by the collet will make one revolution and then stop. In order to cause them to rotate the operator lifts the handle 90 to pull down the rod 86 and holds up this handle until the press has made one stroke and the cam 94 has moved the notch from under the tooth 97. If the operator should wish to stop the press before the cam reaches the position shown in Fig. 3, he pushes the front end of the handle 90 to the left against the pressure of the spring 93 which carries the tooth 97 from the plane of the cam and permits the spring 87 to pull up the rod 86 and stop the press. To start the press it is merely necessary to swing the handle 90 up into the cam 96 which pulls down the rod 86.

The details of construction and the proportions of the several parts of this device may all be changed by those skilled in the art without departing from the spirit of my invention as set forth in the following claims.

I claim:—

1. In combination, means to rotatably support an armature shaft and to turn it step-by-step, and means to shear strips of insulating material and to force the strips into the grooves in an armature core onto the windings therein.

2. In combination, means to rotatably support an armature shaft and to turn it step-by-step, and shearing mechanism embodying a reciprocating blade to shear strips of insulating material and to force the strips into the grooves in an armature core onto the windings therein.

3. In combination, means to rotatably support an armature shaft and to turn it step-by-step, means to support a band of insulating material, and means to shear strips therefrom and to force the strips into the grooves in an armature core onto the windings therein.

4. In combination, means to rotatably support an armature shaft and core and turn them step-by-step, means embodying an arm adapted to be swung into one of the grooves in the armature core to position the armature, and shearing mechanism embodying a reciprocating blade to shear strips of insulating material and to force the strips into the grooves in said core.

5. In combination, means to rotatably support an armature shaft and core and turn them step-by-step, means to shear strips of insulating material and to force the strips into the grooves of the armature core onto the windings therein, and means to force the shaft out of the rotatable support therefor.

6. In combination, means embodying a gripping device to rotatably support an armature core and shaft, means to shear strips of insulating material and to force the strips into the grooves in the core onto the windings therein, and a longitudinally movable rod adapted to engage the end of the armature shaft to force it out of the said gripping means.

7. In combination, means to rotatably support an armature shaft, shearing mechanism including a reciprocating blade to shear strips of insulating material and to force the strips into the grooves of an armature core onto the windings therein, a vertically movable head on which the blade is mounted, and means operated by said head to turn the shaft step-by-step.

8. In combination, a head-stock and a tail-stock, a rotatable spindle mounted in the head-stock adapted to receive one end of an armature shaft, means to turn the same step-by-step, a spindle mounted in the tail-stock adapted to receive the other end of the armature shaft, means to slide the spindle in the tail-stock, means adapted to be engaged by said spindle in the tail-stock and extending into the spindle in the head-stock whereby the armature shaft may be forced out of the spindle in the head-stock, and means to shear strips of insulating material and to force the strips into the grooves in the armature core onto the windings therein.

9. In combination, means to rotatably support an armature shaft and to turn it step-by-step, a shear support having a cylindrical cavity to receive the armature core, stationary shear mechanism mounted on said support, a slotted head and a vertically reciprocating blade mounted in the slotted head to shear strips of insulating material and to force the strips into the grooves in the armature onto the windings therein.

10. In combination, a rotatable spindle adapted to receive and support an armature shaft, a vertically reciprocating head and a blade secured thereto and adapted to shear strips of insulating material and to force the strips into the grooves in an armature core onto the windings therein, a ratchet wheel attached to said rotatable spindle, a lever mounted adjacent thereto, a pawl on

the lever adapted to engage the ratchet wheel, an arm on the reciprocating head and a spring mounted in said arm adapted to engage the lever to force down the pawl to turn said spindle, and a stop to limit the movement of said lever and pawl.

11. A device of the type described comprising a frame adapted to rotatably support an armature, a strip carrying means reciprocably supported by said frame and being adapted to wedge a strip of material into the slots of the armature, whereby the strips are firmly held in the slots.

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