F. C. NICKOL.

MACHINE FOR BLANKING AND ASSEMBLING DISKS.

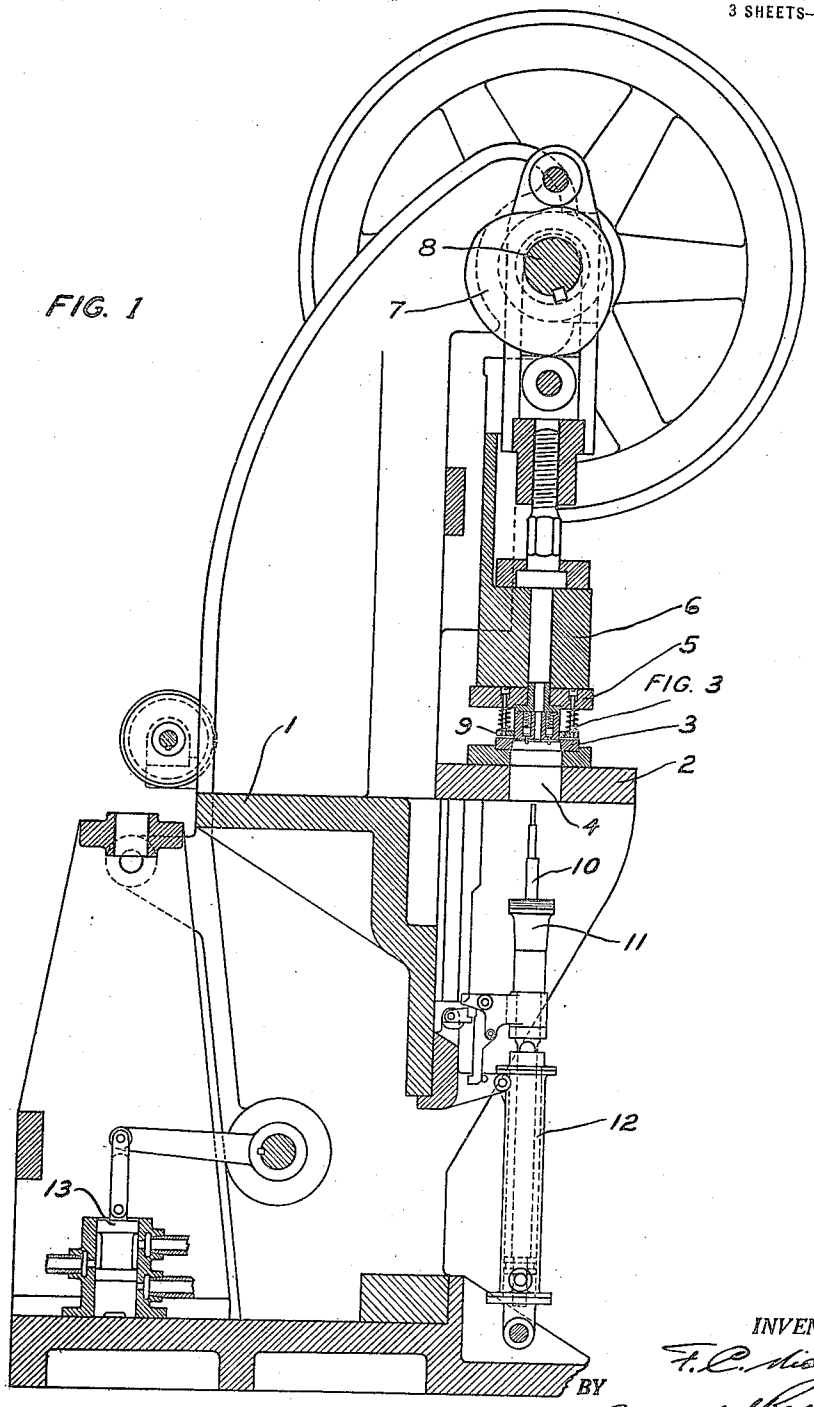
APPLICATION FILED JAN. 5, 1921.

1,426,760.

Patented Aug. 22, 1922.

3 SHEETS—SHEET 1.

FIG. 1



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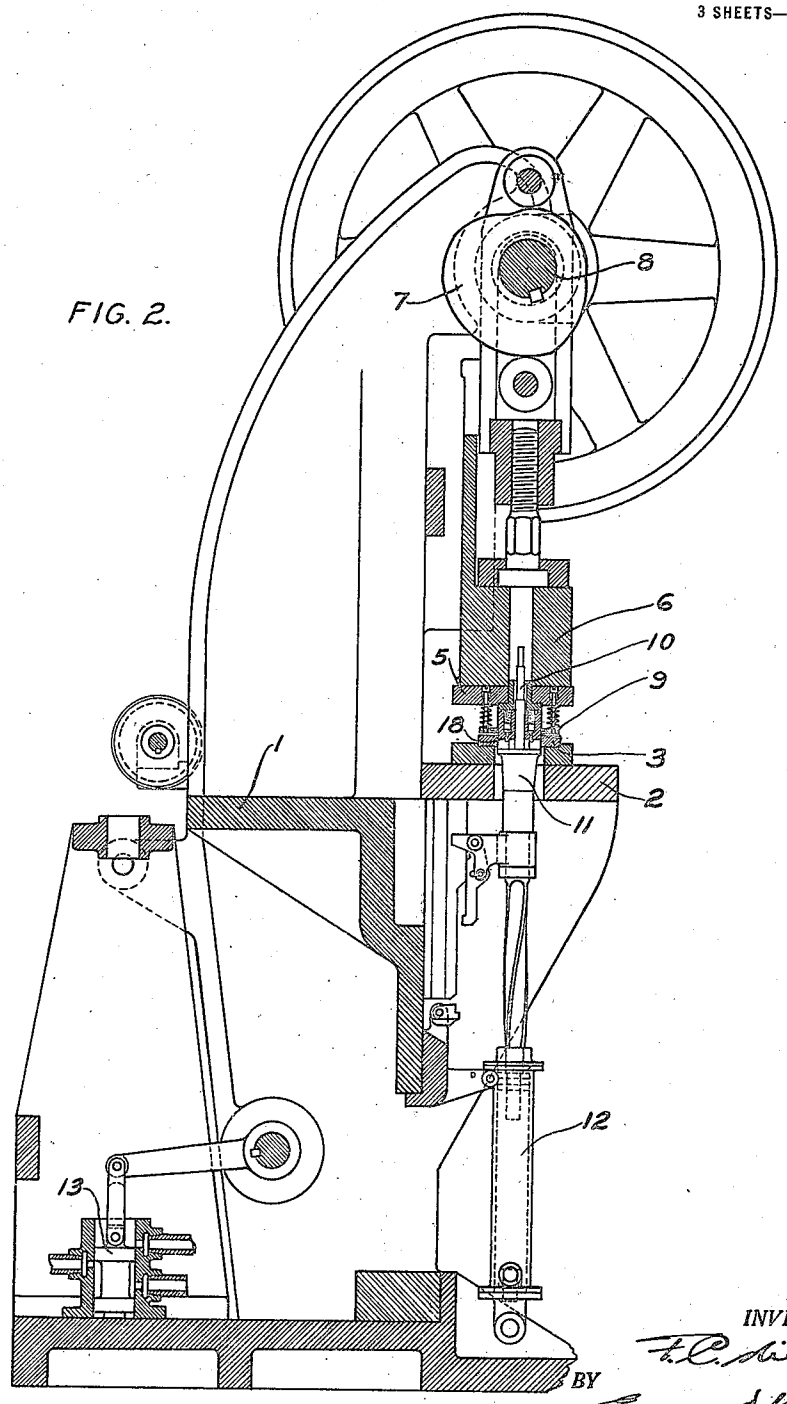
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3 SHEETS—SHEET 2.

FIG. 2.



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3 SHEETS—SHEET 3.

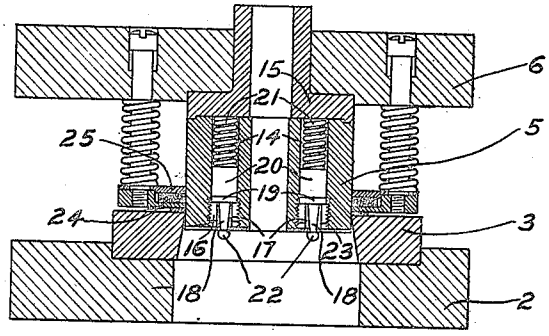


FIG. 3.

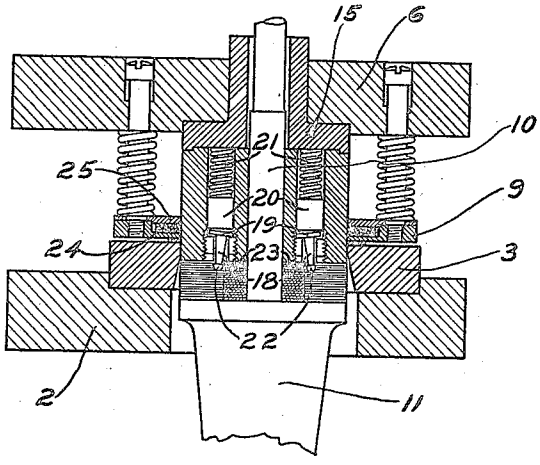


FIG. 4.

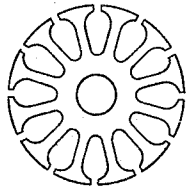


FIG. 5.

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UNITED STATES PATENT OFFICE.

FREDERICK C. NICKOL, OF DAYTON, OHIO, ASSIGNOR TO CITY MACHINE & TOOL WORKS, OF DAYTON, OHIO, A COPARTNERSHIP CONSISTING OF FREDERICK C. NICKOL AND OSCAR M. POOCK.

MACHINE FOR BLANKING AND ASSEMBLING DISKS.

1,426,760. Specification of Letters Patent. Patented Aug. 22, 1922.

Application filed January 5, 1921. Serial No. 435,248.

To all whom it may concern:

Be it known that I, FREDERICK C. NICKOL, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Machines for Blanking and Assembling Disks, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a machine for blanking and assembling disks, or laminæ, and is designed more particularly for use with a machine for building laminated armature cores.

One object of the invention is to provide means for supporting the disk, or lamina, after it has been blanked out and during the assembling operation.

A further object of the invention is to provide such a supporting device which will be very simple in its construction and which will operate automatically to engage the disk during the blanking operation and to release the same during the assembling operation.

Another object of the invention is to provide in a machine of this kind means for lubricating the punch without applying thereto a surplus of oil which may come in contact with the faces of the disks.

Other objects of the invention may appear as the device is described in detail.

In the accompanying drawings Fig. 1 is a vertical sectional view taken through a machine embodying my invention, showing the positions of the parts at the beginning of the assembling operation; Fig. 2 is a similar view showing the positions of the parts at the end of the assembling operation; Fig. 3 is a sectional view taken vertically through a punch and die with the supporting device applied thereto, showing the same at the end of the blanking operation; Fig. 4 is a sectional view taken vertically through a punch and die showing the positions of the detents at the end of the assembling operation; and Fig. 5 is a plan view of one of the disks or laminæ.

In these drawings I have illustrated one embodiment of my invention and have shown the same as applied to a machine for building laminated armature cores, such as is shown and described in the application for patent filed by me July 2, 1920, Serial No. 393,712. It will be understood, however, that this particular embodiment of the invention has been chosen for the purpose of illustration only and that the invention may be applied to machines of various kinds and may take various forms without departing from the spirit thereof.

The machine here illustrated is in its main features of construction fully shown and described in the above mentioned application and I will, therefore, merely describe such parts thereof as are necessary to an understanding of the operation as it involves the present invention. The machine comprises a main frame 1 having a transverse, or horizontal, bed plate 2 upon which is mounted a blanking die 3, the opening in which is in line with an opening 4 in the bed plate. Cooperating with the die is a punch 5 which is carried by a ram 6 mounted for reciprocating movement above the bed plate and operated by a cam 7 on a driving shaft 8. The punch is provided with stripper plates 9 to strip the stock therefrom upon the upward movement of the punch. In the operation of the machine the strips of material which are fed to the punch and die are first acted upon by a piercing die to form therein perforations, which, in the present instance, consist of a central perforation to receive the armature shaft and a series of substantially radial slots arranged concentrically to the central perforation and adapted in the completed core to receive the armature windings. The piercing die and its associated parts are not here shown but are clearly illustrated and described in the above mentioned application. The perforated portion of the stock is advanced to the blanking die and upon a subsequent operation of the machine is acted upon by the punch to sever, or blank out, the disk, the line of severance extending through the ends of the radial perforations, or slots, so that in the completed disk these slots open through the peripheral edge of the disk, as shown in Fig. 5. When the disk has been blanked out it is supported in a position adjacent to, or in contact with, the face of the punch during the assembling operation and, in the present machine, the assembling is accomplished by inserting the armature shaft, which is shown at 10, through the central perforation in the disk, the punch

and the ram being provided with openings to permit the passage of the shaft. The shaft may be supported and operated, to cause it to be inserted in the disk, in any suitable manner, but, as here shown, it is carried by a plunger 11 which is actuated by a fluid operated device 12, the operation of which is controlled by a valve 13 which is actuated by suitable connections, from the main driving shaft 8, as shown in the above mentioned application. The operation is so timed that the plunger 11 and the shaft carried thereby will move upwardly and then downwardly between each operation of the punch, thus causing the shaft to be inserted in the disk which is supported adjacent to the punch, and causing the disk to be withdrawn by the shaft. It will be understood, of course, that the shaft fits snugly in the opening in the disk so that when the disk is unrestrained it will move downwardly with the shaft. The upward movement of the plunger 11 is variable so that the disk last assembled will be moved into engagement with the disk supported adjacent to the punch, thus causing the disks to be packed tightly one against the other on the shaft. When disks have been assembled on the shaft in sufficient number to form a complete armature, the operation of the machine is interrupted, the shaft 10 and the armature withdrawn, and an empty shaft placed in position on the plunger. The end disks of the armature are of insulating material, such as fiber, and one of these fiber disks, is placed on the shaft by hand before the operation of the machine begins, thus there is always a disk on the shaft during the upward movement thereof.

In applying my invention to such a machine I provide a detent which will engage the edge of the disk during the blanking operation and will support the same adjacent to, and preferably in contact with, the face of the punch after the blanking operation has been completed. This detent is preferably carried by the punch itself and there may be a single detent or a plurality of detents. In the present instance, I have shown the punch 5 as provided with two recesses opening through the face thereof and arranged on opposite sides of the center of the punch. These recesses may be formed in any suitable manner but, as here shown, each comprises an opening extending vertically through the punch block, as shown at 14, and having its upper end closed by the structure 15 to which the punch block is secured. The lower portion of the recess, which opens through the face of the punch is of reduced diameter and is preferably formed by a plug 16 which is inserted in the lower end of the opening 14 and has formed therein an opening 17 of less diameter than the opening 14, thus providing a shoulder at the point of junction of the two openings. Mounted in each recess is a detent which, in the form here shown, comprises a stem 18 extending through the reduced portion 17 of the recess and having at its inner end a base 19 which is here shown in the form of a flat disk adapted to rest upon the shoulder in the recess and support the stem 18 in a central, or operative, position. The detent is yieldably held in this position by means of a plunger 20 slidably mounted in the recess and acted upon by a spring 21 which presses the same downwardly against the base of the detent. The outer end of the stem 18 projects a short distance beyond the face of the punch and is provided with a head 22, the lower edge of which is beveled and, which, in the present instance, is substantially spherical in shape. Each detent is so located that as the punch moves downwardly into engagement with the stock the head of the detent will engage the edge of the stock at the inner end of one of the radial slots therein and will be deflected thereby so that it will pass through the slot in the disk, the disk being shown at 23. After the head of the detent has passed through the slot the action of the spring 21 will restore the detent to its normal, or operative position, and the head will engage beneath the edge of the disk and will support the same in position within the die opening and preferably in contact with the face of the punch, although it is not necessary that the disk should remain in direct contact with the punch. When the shaft 10 moves upwardly through the central opening in the disk the edge of the uppermost disk which has been previously assembled on the shaft will engage the head of the detent and move the same laterally into an inoperative position, as shown in Fig. 4, thereby releasing the disk which has just been blanked out and which is being assembled on the shaft. Inasmuch as the head of the disk will then lie against the edge of the preceding disk and the disk which has just been released is placed tightly against said preceding disk, it will be apparent that the head of the detent can not again operatively engage the disk and that the disk is free to move downwardly with the shaft. When the shaft has been withdrawn the detent will again assume its normal, or operative, position. In this manner the disk that has been blanked out is positively supported in a position to be assembled on the shaft and in such relation to the punch that the punch will serve as a part of the assembling mechanism, to hold the disk against upward movement, while the shaft is being inserted therein. It will be noted, that the operation of the detent is wholly automatic, both in the engagement of the disk during the blanking operation and in the releasing of the disk

during the assembling operation. Very satisfactory results may be had with a single detent but by providing two or more detents, as shown in the present drawings, the possibility of the disk being displaced laterally is reduced to a minimum.

In the operation of the machine of this character it is desirable that the punch should be lubricated, but the ordinary methods of lubrication are such that surplus oil will come in contact with the stock, or disks, and this is objectionable, particularly in connection with electrical apparatus. I have, therefore, provided the present device with means for applying to the punch sufficient lubrication but which will prevent an excess of lubrication and will, consequently, prevent any surplus oil coming in contact with the stock or disks. To accomplish this I have provided the stripper plate 9 with an annular recess opening through the inner edge thereof in which is confined a ring of absorbent material, such as felt, saturated with a lubricant. The edge of this felt ring is flush with the inner edge of the stripper disk and will bear against the outer surface of the punch as the latter moves relatively to the stripper plates and will apply the lubricant thereto. The absorbent material may be mounted in any suitable manner, but as here shown, the body portion of the stripper plate 9 is provided with a channel along the inner edge thereof in which the felt is placed and a top plate 25 is applied thereto to retain the lubricating ring in position therein.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a machine for blanking and assembling disks, the combination with a die and a punch to blank said disks, of a detent carried by one of said members and arranged to engage the disk which is being blanked and to support the same after the completion of the blanking operation.

2. In a machine for blanking and assembling disks, the combination with a die and a punch to blank said disks, of a detent carried by one of said members and arranged to engage the disk which is being blanked and to support the same after the completion of the blanking operation, and means for assembling said disk on a supporting structure and releasing the same from said detent.

3. In a machine for blanking and assembling apertured disks, the combination with a die and a punch to blank said disks, of a detent carried by said punch and arranged to pass through an aperture in the disk and engage the same during the blanking operation and to support the disk after the completion of the blanking operation.

4. In a machine for blanking and assembling apertured disks, the combination with a die and a punch to blank said disks, of a detent carried by said punch and arranged to pass through an aperture in the disk and engage the same during the blanking operation and to support the disk after the completion of the blanking operation, and means for assembling said disks on a supporting structure and releasing the same from said detent.

5. In a machine for blanking and assembling apertured disks, the combination with a die and a punch to blank said disks, of a detent yieldably mounted on said punch and arranged to engage and to be displaced by the edge of an aperture in a disk during the blanking operation and to engage beneath the edge of said disk to support the same after the completion of said blanking operation.

6. In a machine for blanking and assembling apertured disks, the combination with a die and a punch to blank said disks, of a pair of detents yieldably mounted on said punch on opposite sides of the center thereof and each arranged to engage and to be displaced by the edge of an aperture in a disk during the blanking operation and to engage beneath the respective edges of said disk to support the same after the completion of said blanking operation.

7. In a machine for blanking and assembling apertured disks, the combination with a die and a punch to blank said disks, said punch having a recess in the face thereof, of a detent yieldably mounted in said recess and arranged to engage the edge of a disk at one of said openings during the blanking operation and to support said disk after the completion of said blanking operation.

8. In a machine for blanking and assembling apertured disks, the combination with a die and a punch to blank said disks, said punch having a recess in the face thereof, of a detent movably mounted in said recess, a spring acting on said detent to hold the same in its normal position, said detent having a head arranged to engage the edge of a disk at one of said openings during the blanking operation, whereby said head is caused to ride over the edge of said disk and engage beneath the same to support the disk after the completion of said blanking operation.

9. In a machine for blanking and assembling apertured disks, the combination with a die and a punch to blank said disks, said punch having a recess therein and having a shoulder spaced from the outer end of said

recess, of a detent comprising a stem extending through said opening and having a base at its inner end adapted to engage said shoulder, and a spring acting on said base to yieldably hold said detent in its normal position, said detent having at its outer end a head to engage the edge of a disk at one of said openings and to ride over said edge and engage beneath said disk after said head has passed through the opening therein.

10. In a machine for blanking and assembling apertured disks, the combination with a die and a punch to blank said disks, of a detent yieldably mounted on said punch and arranged to engage and to be displaced by the edge of an aperture in a disk during the blanking operation and to engage beneath said edge of said disk to support the same after the completion of said blanking operation, and means for assembling said disk on a supporting structure and moving said detent into an inoperative position.

11. In a machine for blanking and assembling apertured disks, the combination with a die and a punch to blank said disks, of a detent yieldably mounted on said punch and arranged to engage and to be displaced by the edge of an aperture in a disk during the blanking operation and to engage beneath said edge of said disk to support the same after the completion of said blanking operation, and means for assembling said disk on a shaft and causing a disk which has been previously mounted on said shaft to engage said detent and move the same into an inoperative position, thereby releasing the first mentioned disk.

12. In a machine for blanking and assembling disks, the combination with a die and a punch to blank said disks, and a detent carried by one of said members and arranged to engage the disk which is being blanked and to support the same after the completion of the blanking operation, of a ring of absorbent material extending about said punch and adapted to apply a lubricant to the surface thereof.

13. In a machine of the character described, a die and a punch, a stripper plate for said punch, and means carried by said stripper plate for applying a lubricant to said punch as it moves relatively to said stripper plate.

14. In a machine of the character described, a die and a punch, a stripper plate for said punch, said stripper plate having an annular recess in the inner edge thereof, and a ring of absorbent material mounted in said recess and engaging the surface of said punch.

15. In a machine of the character described, a die and a punch, a stripper plate for said punch comprising a lower member having a channel about the inner edge thereof, a top plate to close the upper side of said channel, and a ring of absorbent material mounted in said channel and arranged to apply a lubricant to said punch as the latter moves relatively to said stripper plate.

In testimony whereof, I affix my signature hereto.

FREDERICK C. NICKOL.