Feb. 14, 1939. A. V. HEATH 2,147,531

HAT MAKING APPARATUS

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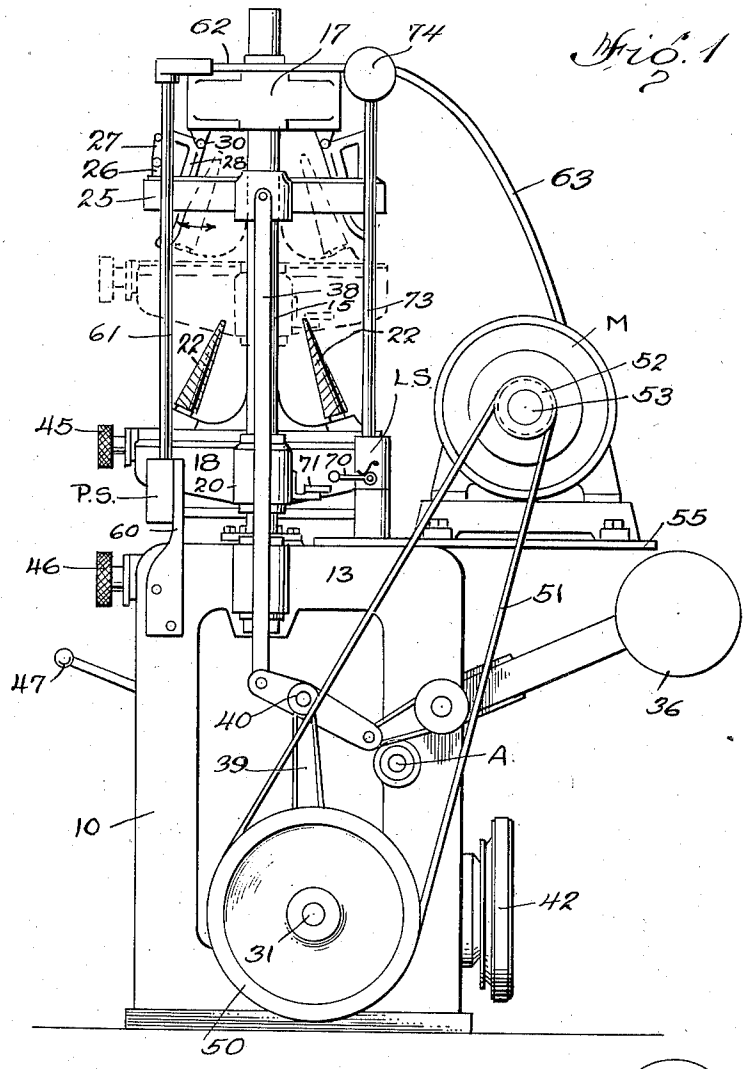


Fig. 1

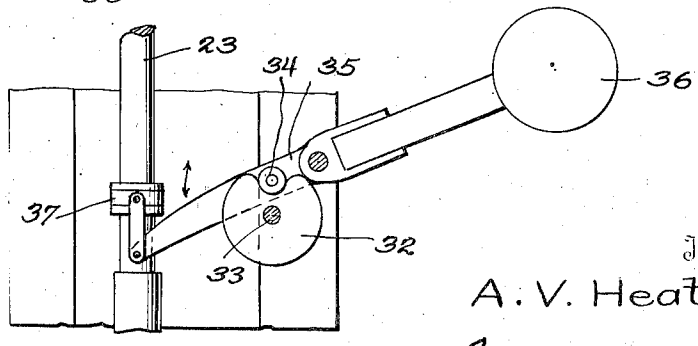


Fig. 4

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Fig. 2

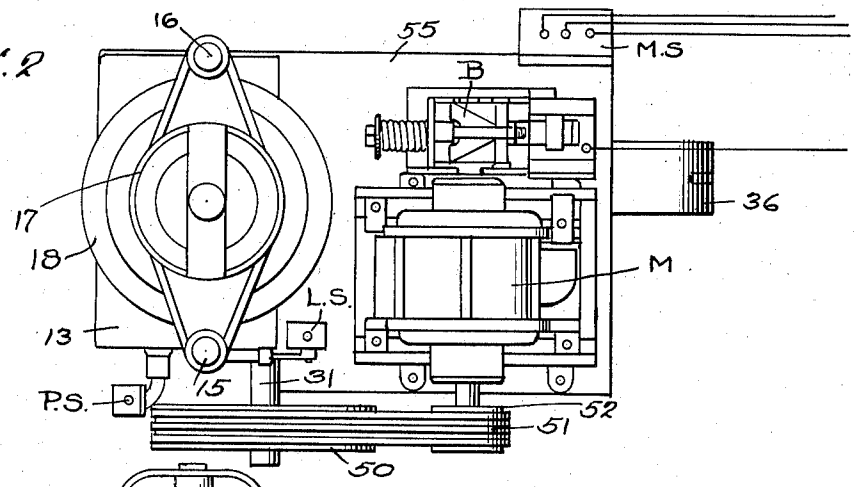


Fig. 3

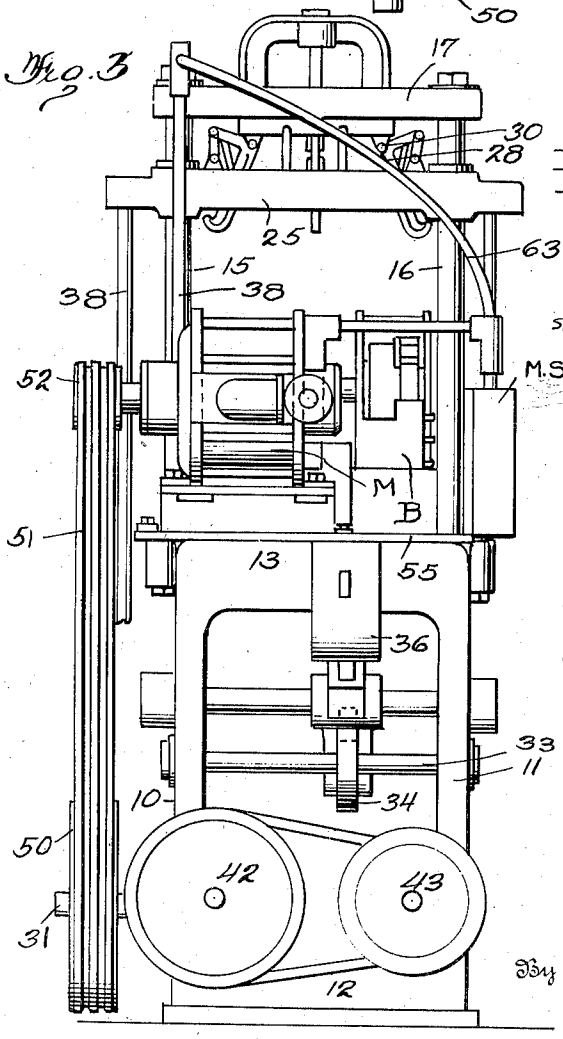
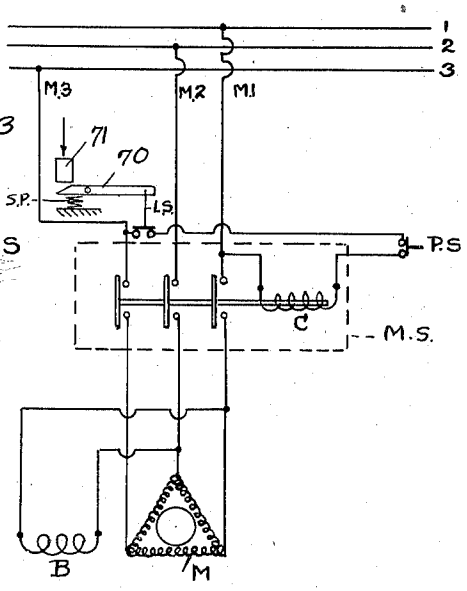


Fig. 5



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Patented Feb. 14, 1939 2,147,531

UNITED STATES PATENT OFFICE

2,147,531

HAT-MAKING APPARATUS

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Application May 25, 1938, Serial No. 210,027

8 Claims. (Cl. 192—148)

This invention relates to improvements in hat making apparatus, and more particularly to drive and control means for hat body stretching machines known to the art as brim-stretching machines.

While not limited thereto, the invention contemplates improvements in hat making apparatus as exemplified by the type "AA" automatic brim-stretching machine as manufactured by Soc. An. Mezzera, of Milan, Italy. In such a known machine the cone-shaped hat bat is placed on a support formed by a plurality of spaced rotating cones of relatively small diameter with reference to the diameter of the bat, each turning on its own axis, with the axes of the cones being arranged in converging relation. Upon depression of a foot lever by the operator, the main shaft of the machine is connected through the medium of a mechanical clutch with a continuously operating driving motor, and the machine thereupon operates throughout a cycle of operations in automatic manner. Such operations include that of raising of the bat support to a position with reference to the machine head that pivoted stretching fingers fulcrumed in the head are forcibly oscillated into engagement with the lower or skirt portion of the bat which subsequently forms the hat brim, and more particularly into engagement with portions of the bat lying between the spaced rotating cones whereby to stretch such portions. Due to the rotation of the supporting cones, the bat is given a limited rotation about its axis so that different portions of the bat are presented for treatment by the stretching fingers. Upon completion of this portion of the cycle, the support lowers to its initial position and a knock-out pin carried by a rotating gear embodied in the mechanism comes into a position as to cooperate with the clutch to disengage the same, thus to interrupt the drive between the motor and the main shaft.

In the practical operation of such a machine, certain objectionable features have developed which have not only reduced the efficiency of the machine, but in many cases have seriously impaired its operation. Among such features may be noted the likelihood of the knock-out being sheared off as it disengages the clutch and the unsureness of the pin in effecting disengagement of the clutch due to the complicated nature of the clutch rigging. Again, the machine as aforesaid has shown a tendency to overrun or coast past its stop position due to the mass of the rotating parts of the drive and driven mechanisms, there being provided no braking effect as would cause the machine to be held in its predetermined stop position at the end of each cycle of operations.

It is accordingly an object of the present invention to provide improved hat making apparatus as specified, which is characterized by efficiency in operation and which is further so designed and constructed that the machine operates with surety and in predetermined manner throughout its cycle. More particularly the present invention contemplates an improved drive and control means for machines such as the Mezzera machine as aforesaid, by which the machine parts are positively driven throughout their cycle of operation and, upon reaching the stop position of the machine, are thereupon positively prevented from overrunning or coasting past that position. In order, further, to simplify the operation and control of the machine, the present invention provides a completely electric control for the driving means, according to which a driving motor is energized upon closing of an operator controlled switch and is thereafter automatically deenergized upon completion of the machine cycle. The control further exercises control function over a brake, preferably of the magnetic type, which may be actuated to release position upon the motor being energized, but which simultaneously with the motor being deenergized becomes effective to brake the motor shaft or related parts, thus to insure that the machine is held at its predetermined stop position.

Other objects will be in part obvious and in part hereinafter pointed out in connection with the following analysis of this invention wherein is illustrated an embodiment of the invention in detail.

In the drawings—

Fig. 1 is a side elevation of an automatic brim-stretching machine incorporating the drive and control features of the present invention;

Fig. 2 is a top plan view and Fig. 3 is a rear elevation of the apparatus illustrated in Fig. 1;

Fig. 4 is a detail view illustrating a preferred manner of actuating a cyclically moving part of the machine; and

Fig. 5 is a wiring diagram illustrating the electrical control features.

Referring now to the drawings wherein like reference characters designate like parts throughout the several views, reference characters 10 and 11 represent, respectively, the side frames extending upwardly from the machine base 12 to provide a horizontal table or support 13. Mounted at the sides of the support 13 and extending

upwardly therefrom are side posts 15 and 16 secured at their upper ends in a fixed head 17.

Arranged to slide vertically with reference to the posts 15, 16 is a cyclically movable head 18 provided with side ears 20 through which the posts extend and by which the head is guided in its cyclical movement as will be described.

Carried by the head 18 is a plurality of bat supporting elements in the nature of elongated cones 22 of relatively small diameter, the cones being spaced from each other and arranged on axes which have a converging relation. Each of the cones 22 is adapted to be rotated on its own axis by means of a pinion secured to the lower end of each cone shaft, the pinions being arranged about and meshing with a central gear fast on a vertical shaft 23 (Fig. 4) and the pinions and central gear (not shown) being enclosed within the head 18.

Disposed below the fixed head 17 is a reciprocating member 25 journaled on and guided by the side posts 15, 16. The reciprocating member carries on its upper surface a plurality of spaced lugs or bosses 26 to each of which is secured a link 27, the other end of which is pivoted to an outwardly directed end of a stretching finger 28 pivoted as at 30 to the under face of the fixed head 17. Upon limited reciprocatory movement being imparted to the member 25, the stretching fingers 28 will be swung or oscillated toward and away from the vertical axis of the machine, as indicated by the arrow (Fig. 1).

The main shaft of the machine is indicated at 31 and, upon rotation thereof, is adapted through gearing and shaft transmission (only generally shown) to actuate the machine throughout a predetermined cycle of operation. During the first part of the cycle, head 18 carrying the cones 22 is raised to the dotted line position indicated in Fig. 1. During the intermediate portion of the cycle, the head 18 is maintained in its raised position; and the cycle terminates upon the head lowering to its stop position. The raising and lowering movement as aforesaid results upon rotation of a cam 32 (Fig. 4) fixed on a cross shaft 33 which is driven from the main shaft 31, the cam engaging a roller 34 on an arm 35, one end of which is counterbalanced by a weight 36. The other end of arm 35 is yoked to the collar 37 with reference to which shaft 23 may turn but which imparts vertical movement to said shaft.

The arrangement and cycle of operations of the machine generally described in the foregoing are such that a conical hat bat is positioned in upright position on the small cones 22, with the head 18 in its starting position being illustrated in full lines (Fig. 1). Upon commencement of the cycle by rotation of main shaft 31, head 18 is actuated upwardly against the counter-balancing effect of weight 36 to a position that the hat bat carried by the cones 22 is engaged by the stretching fingers upon oscillation thereof. The arrangement of cones 22 and stretching fingers 28 is such the stretching fingers engage the portions of the raised bat intermediate the cones 22, thus to stretch such portions between the cones. Rotation of the cones 22, as results from rotation of shaft 23 driven from the main shaft 31, imparts a limited rotation to the hat bat about its vertical axis, with the result that different portions of the hat bat are presented for treatment by the stretching fingers 28. Upon completion of the stretching portion of the cycle, the head and hat bat are lowered to stop position, and the hat bat may now be lifted from the support. The stretching fingers 28 are oscillated about fulcrum points 30 upon reciprocation of member 25 by arms 38 which in turn are actuated through crank and pitman connections 39, 40 so related to the main shaft 31 that rotation of the latter causes arms 38 and hence the member 25 to be reciprocated.

The shaft and gear train operative between the main shaft 31 and the working parts of the machine may incorporate pulleys 42, 43 of varying diameter whereby the working time of the cycle may be varied in accordance with requirements such as the particular type of hat being stretched or otherwise. Adjusting features are incorporated, such as means for adjusting the relative height of the cones 22, thus to adjust for different heights of the bat or body being worked upon, such being under the control of an operating knob 45. Adjustment of the amount or degree of stretching imparted to the body may be provided through mechanism under the control of an operating knob 46. A manually controlled handle 47 may also be provided for controlling flow of steam to the hat bats or portions thereof being stretched whereby to utilize the softening effect of the steam during the mechanical stretching operation.

It will be understood that the stretching machine as generally described above is of a type now available on the market and known as the type "AA" automatic brim-stretching machine, as manufactured by Soc. An Mezzera, of Milan, Italy, and accordingly no claim is made to the machine as described excepting as it enters into combinations falling within the scope of claims appended hereto.

Considering now the drive and control mechanism forming the subject-matter of the present invention, main shaft 31 has keyed or otherwise affixed thereto a pulley 50 which is preferably of the multi-groove type to receive a plurality of driving belts 51 engaging with pulley 52, similarly of the multi-groove type. The pulley 52 is fast on one end of the shaft 53 of a three-phase electrical motor generally indicated at M.

The support for the motor M and parts to be described may take the form of a rigid plate 55 bolted or otherwise fixedly secured to the horizontal table 13 of the machine support, the plate extending rearwardly as indicated in Fig. 1.

The other end of the motor shaft is extended beyond the motor casing for cooperation with a brake B, preferably of the magnetic type, such as manufactured by General Electric Company, Type CR9503–206–B. In a brake of the character specified, brake shoes are mechanically closed as by springs, but are opened i. e., released, upon energization of a magnet coil therein embodied. Brake B is also carried by the supporting plate 55 and is arranged generally in alignment with the motor M and its shaft 53.

Arranged in convenient location with respect to the motor and brake, and preferably also mounted on the support 55, as indicated particularly in Figs. 2 and 3, is a magnetic switch or relay MS, which may be of known construction, such as is manufactured by General Electric Company, Type C. R. 7006–D4OH 220 volts—60 cycles—5 H. P.

As the driving and control means of the present invention contemplates that the machine shall be put into operation by an attendant, the motor is adapted to be energized from the front of the machine. Accordingly the front end of

the machine carries a switch supporting plate 60 to which is secured a motor starting switch PS, preferably of the push button type, such as manufactured by General Electric Co., Type C. R. 2940–BS 79 J. The electrical conductors leading to and from switch PS may be conveniently housed in a vertically disposed conduit 61 which at its upper end is connected to the horizontally secured conduit 62, the latter being connected to a rearwardly extending conduit 63 leading to the magnetic switch MS.

In order that the motor will be deenergized upon the completion of the machine cycle, the present invention contemplates a machine operated limit switch which is normally closed but which is broken upon completion of the machine cycle to effect deenergization of motor M. Such a switch which may take the form of Type C. R. 9440–A1A as manufactured by The General Electric Company incorporates a control arm 70 which is normally biased to a horizontal or circuit-closing position. By reference particularly to Fig. 1, it will be seen that journal box 20 extending from the head 18 carries a projecting finger 71 which, upon movement upwardly from its lowermost position, has no effect upon control arm 70. Upon termination of the lowering movement of head 18, however, projection 71 engages control arm 70 of switch LS and causes movement thereof in counter-clockwise direction, whereupon limit switch LS acts to break the motor circuit and simultaneously therewith to deenergize the magnet coil of brake B, whereupon the brake closes on motor shaft 53 to positively prevent any coasting or overrunning movement thereof past stop position as would result in disturbance of the machine cycle.

The limit switch LS may be conveniently carried by a fixed part of the machine as indicated in Fig. 1, the electrical connections thereto passing through the conduit 73 terminating at its upper end in a connection box 74 into which are connected the conduits 62 and 63.

Referring to Fig. 5, such being a typical wiring diagram of the electrical control arrangement, motor M is indicated as of the three-phase type, leads M^1, M^2 and M^3 from the supply lines 1, 2 and 3 extending thereto. The magnetic switch MS, which as shown is of the three-element contactor type, is arranged in the supply leads to the motor and incorporates a solenoid coil C which is connected across leads M^1, M^3 substantially as illustrated, the push button switch PS being connected in series with coil C. Also in series with coil C is the normally closed limit switch LS diagrammatically illustrated as biased to its circuit-closing position by a spring SP. Opening of switch LS results when projection 71 of the machine part actuates the switch arm 70 in counterclockwise direction, thus to open the switch and deenergize coil C of the switch MS, whereupon the contactor elements thereof open the circuit of motor M.

Connected across leads M^1 and M^2 and preferably on the secondary side of switch MS is the magnet coil of the brake B as diagrammatically illustrated. Thus, deenergizing of coil C also results in deenergization of the brake coil, whereupon the brake closes on motor shaft 53.

Assuming the cycle of operation is to be started, with switch PS open and limit switch LS closed, the machine attendant actuates switch PS causing energization of coil C, whereupon the relay closes both the motor and the brake circuits, the latter resulting in release of the brake. The motor upon being energized drives the pulley 52 and hence the main shaft 31 of the machine to initiate the cycle, the brake B being now inactive. As the cycle progresses and head 18 ultimately lowers to its initial starting position (which is the stop position of the cycle), projection 71 opens switch LS causing deenergization of coil C and opening of the motor and brake circuits. Simultaneously therewith the brake is closed and operates on motor shaft 53 to prevent any overrunning or coasting thereof as would normally occur. Braking of the motor shaft 53 thus positively interrupts drive between motor M and main shaft 53 of the machine, with the result that the machine parts are maintained in their "stop" position and are prevented from overrunning such position.

It will be understood that conventional auxiliaries may be incorporated in the control circuit as aforesaid. For example, a holding coil (not shown) for maintaining the switch PS closed following first closing thereof by the operator may be provided, the holding coil being energized and deenergized with coil C of the magnetic switch. It is to be understood also that the typical wiring diagram as illustrated is intended to portray an arrangement in which the limit switch LS is normally open and is connected across leads M^1 and M^3 in series with a coil which when energized operates reversely with reference to coil C in positively actuating the contactors of switch MS to circuit opening position. With such a latter described arrangement the machine-actuated projection 71 is adapted to close the limit switch and thus complete a circuit through the switch opening coil which thereupon functions in opposition to the coil C to open the motor and brake circuits. These and like arrangements as would suggest themselves to one skilled in the art in the light of the present teaching are intended to be included within the scope of this invention.

It will be appreciated that the driving and control mechanism as above described provides an extremely simple and effective form of control and further overcomes any likelihood of disruption of service of the machine due to defects in mechanical parts where mechanical controls are incorporated. The braking effect on the drive further increases the efficiency of the machine as the attendant can be assured that the machine following one cycle of operation is in the necessary position to commence on the next and succeeding cycles and thus can be assured of the correct working of the machine with no attention on his part as would be necessary in the event that the machine has overrun its stop position. Further, the improved driving and control mechanism as described above is equally adapted for both machines in the course of manufacture and on machines already in operation, with its substitution for the old form of drive in the latter case being effected with no substantial modification of the machine or without requiring lengthy disruption of its service. Again, the drive means of the present invention with its attendant control features also effects a considerable saving in power as the driving motor is in operation only when the machine is working, whereas under the previously known arrangements the motor operated continuously.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or

shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:—

1. The combination of automatic hat stretching apparatus including a main shaft and a member adapted to be actuated thereby throughout a cycle of operations, driving means for the main shaft, manually operable means for energizing the driving means thereby to initiate the cycle, and means responsive to the completion of the cycle to deenergize and simultaneously to brake the driving means.

2. The combination of automatic hat stretching apparatus including a main shaft and a member adapted to be actuated thereby throughout a cycle of operations, driving means for the main shaft, manually operable means for energizing the driving means thereby to initiate the cycle, means responsive to the completion of the cycle to deenergize the driving means, and means effective upon such deenergization to apply a braking effect on the driving means.

3. The combination of automatic hat stretching apparatus including a main shaft and a member adapted to be actuated thereby throughout a cycle of operations, an electric motor including a motor shaft, a driving connection between the motor shaft and the main shaft, manually operable means for energizing the motor, and means responsive to the completion of the cycle to deenergize the motor and simultaneously therewith to brake the motor shaft.

4. The combination of automatic hat stretching apparatus including a main shaft and a member adapted to be actuated thereby throughout a cycle of operations, an electric motor including a motor shaft, a driving connection between the motor shaft and the main shaft, manually operable means operative to energize the motor thereby to initiate the cycle, means responsive to completion of the cycle to deenergize the motor, and means effective upon such deenergization to brake the motor shaft.

5. The combination of automatic hat stretching apparatus including a main shaft and a member adapted to be actuated thereby throughout a cycle of operations, an electric motor having a motor shaft, a drive connection operative between one end of the motor shaft and the main shaft, a magnetically releasable brake operatively related to the other end of the motor shaft, manually operable means operable simultaneously to energize the motor and to magnetize the brake whereby to initiate the cycle, and means operative upon completion of the cycle to demagnetize the brake whereby the brake closes to interrupt the drive between the motor and the main shaft.

6. The combination of automatic hat stretching apparatus including a main shaft and a member adapted to be actuated thereby throughout a cycle of operations, an electric motor having a motor shaft, a driving connection operative between one end of the motor shaft and the main shaft, a magnetically releasable brake operatively related to the other end of the motor shaft, manually operable means operable simultaneously to energize the motor and to magnetize the brake whereby to initiate the cycle, and means operative upon completion of the cycle simultaneously to deenergize the motor and to demagnetize the brake.

7. The combination of automatic hat stretching apparatus including a main shaft and a member adapted to be actuated thereby throughout a cycle of operations, an electric motor including a shaft, a driving connection operative between one end of the motor shaft and the main shaft, a magnetically releasable brake operatively related to the other end of the motor shaft, a magnetic relay in controlling relation to the motor and the magnetic brake and operable when energized to effect energization of the motor and magnetization of the brake, operator-controlled means for energizing the magnetic relay thereby to energize the motor and to magnetize the brake, thus to initiate the cycle, and means responsive to the completion of the cycle to deenergize the relay thereby to deenergize the motor and to effect closing of the brake.

8. The combination of automatic hat stretching apparatus including a main shaft and a member adapted to be actuated thereby throughout a cycle of operations, a driving motor including a shaft, a source of electrical energy, a driving connection between one end of the shaft and the main shaft, a brake operatively related to the other end of the motor shaft, said brake including a magnet coil which when energized operates to release the brake in opposition to mechanical closing means therein embodied, a magnetic relay operable when energized to complete a circuit between the source, the motor and the brake coil, an operator-controlled switch operable when closed to effect energization of the relay, and a normally closed limit switch operable when opened to effect deenergization of the relay and hence opening of the motor and brake circuits, said limit switch being opened by said member upon completion of the cycle.

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