July 14, 1942. B. D. WELLS 2,289,814

APPARATUS FOR LURING HAT BODIES

Filed March 2, 1940 7 Sheets-Sheet 1

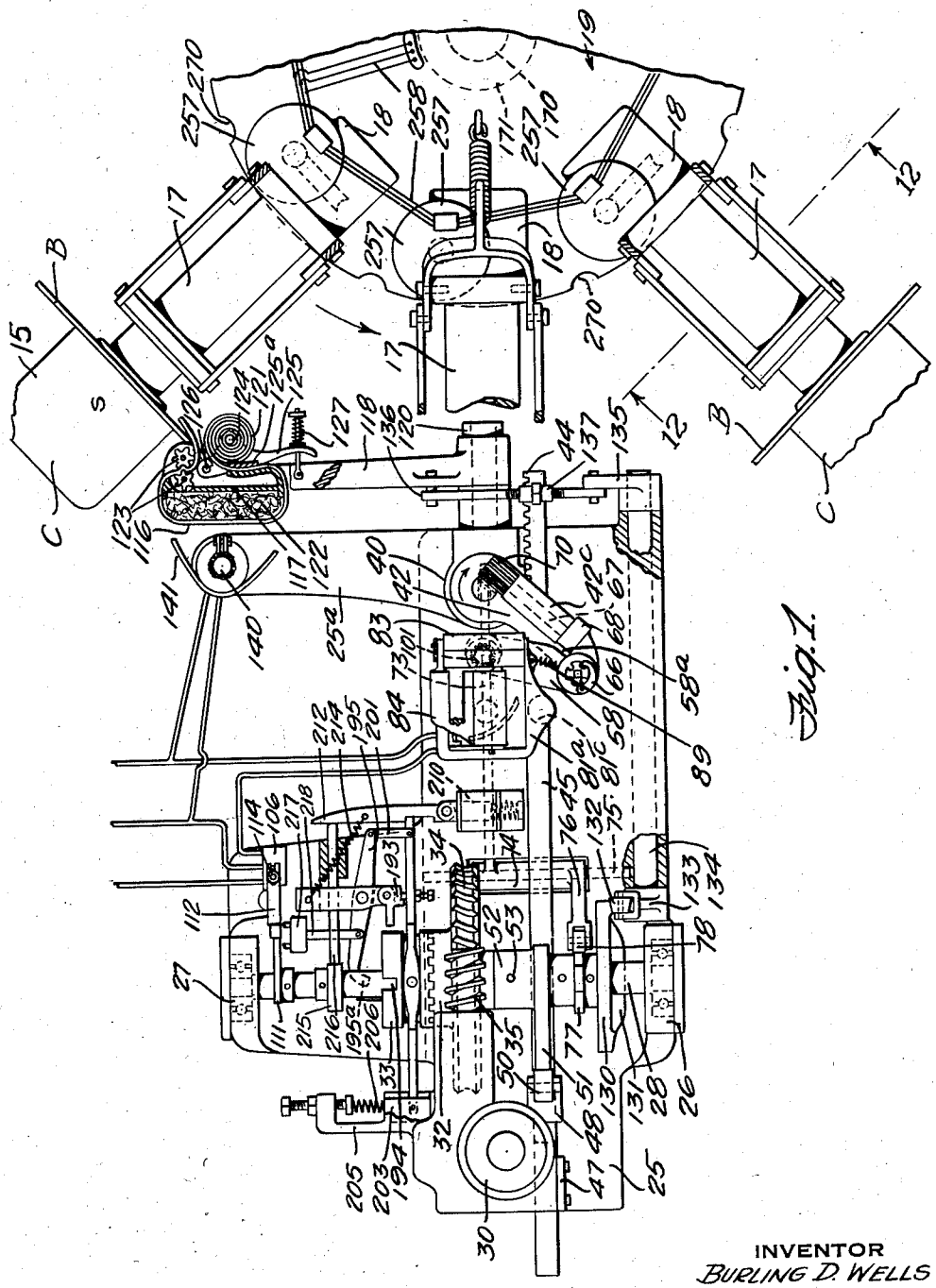


Fig. 1.

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APPARATUS FOR LURING HAT BODIES

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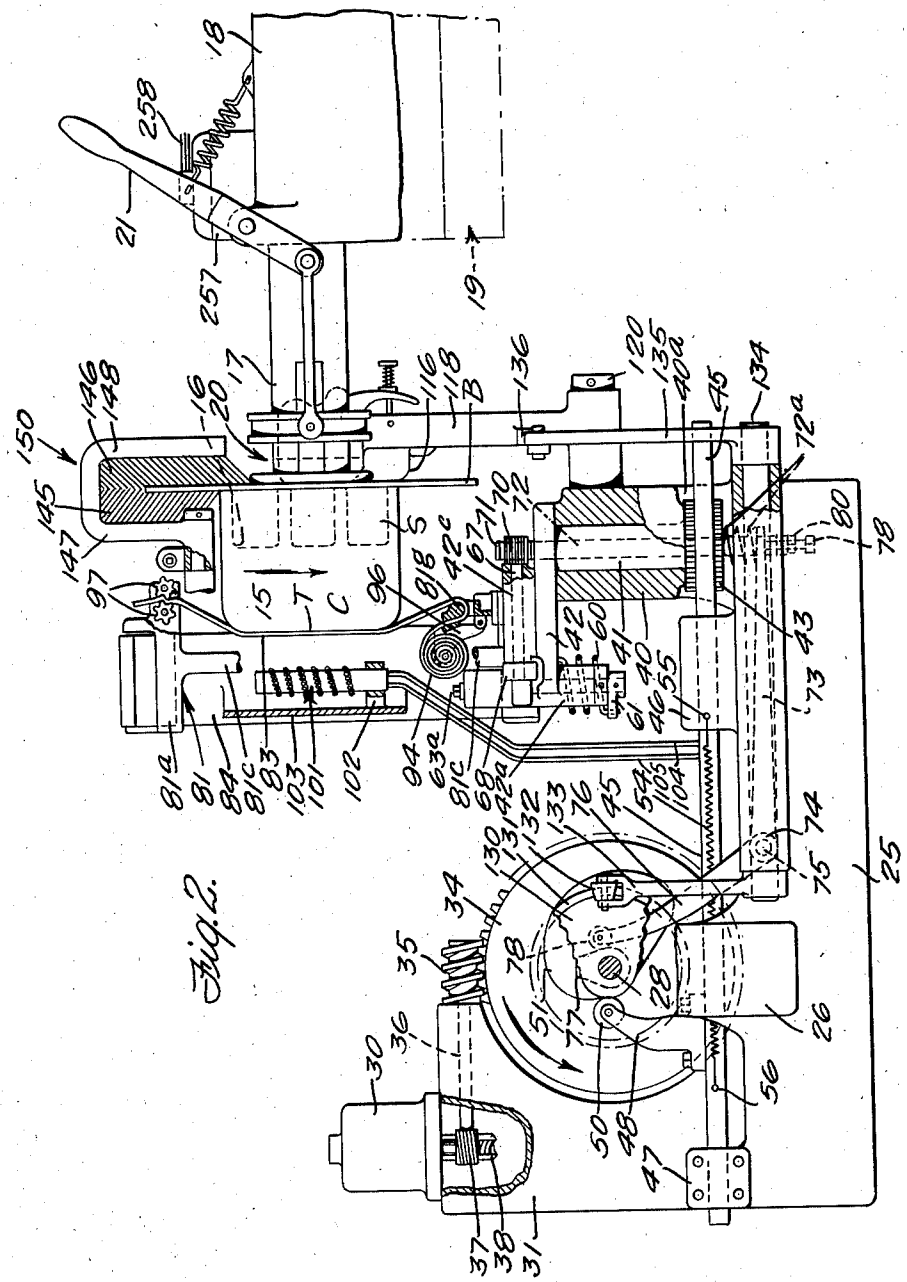


Fig. 2.

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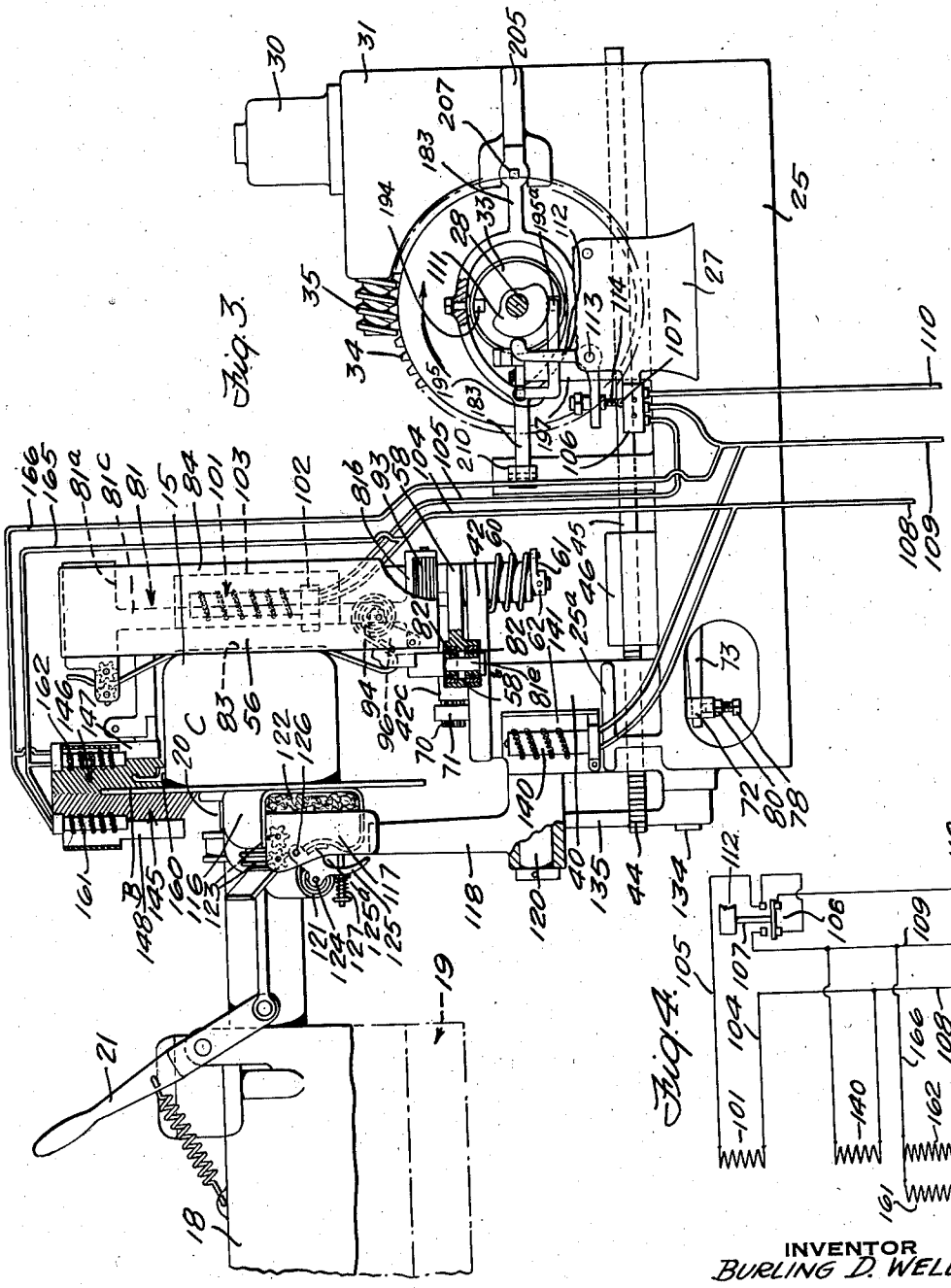


Fig. 3.

Fig. 4.

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Fig. 5.

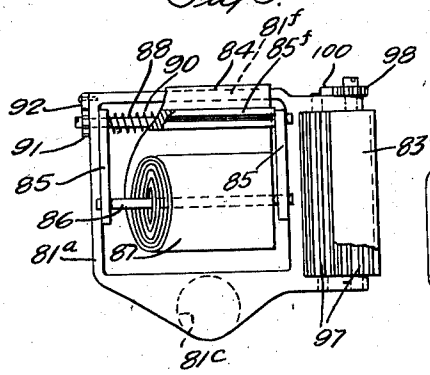


Fig. 6.

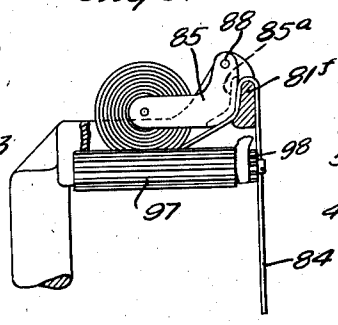


Fig. 7.

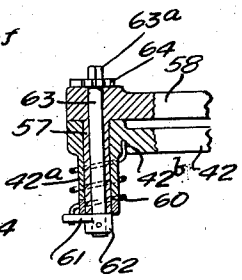


Fig. 8.

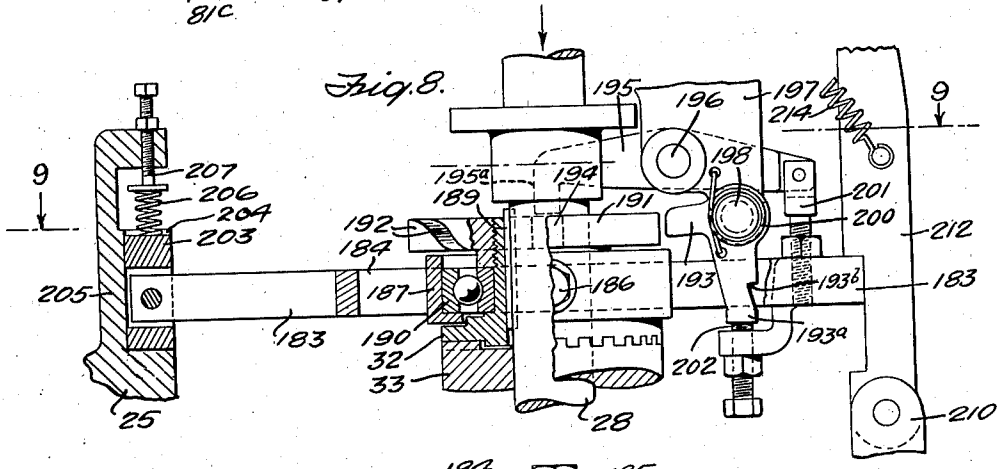
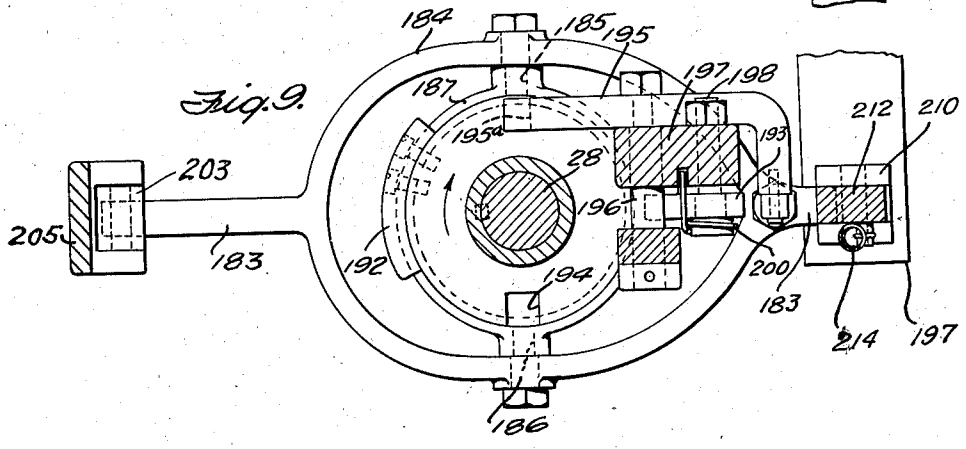


Fig. 9.



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Fig. 10.

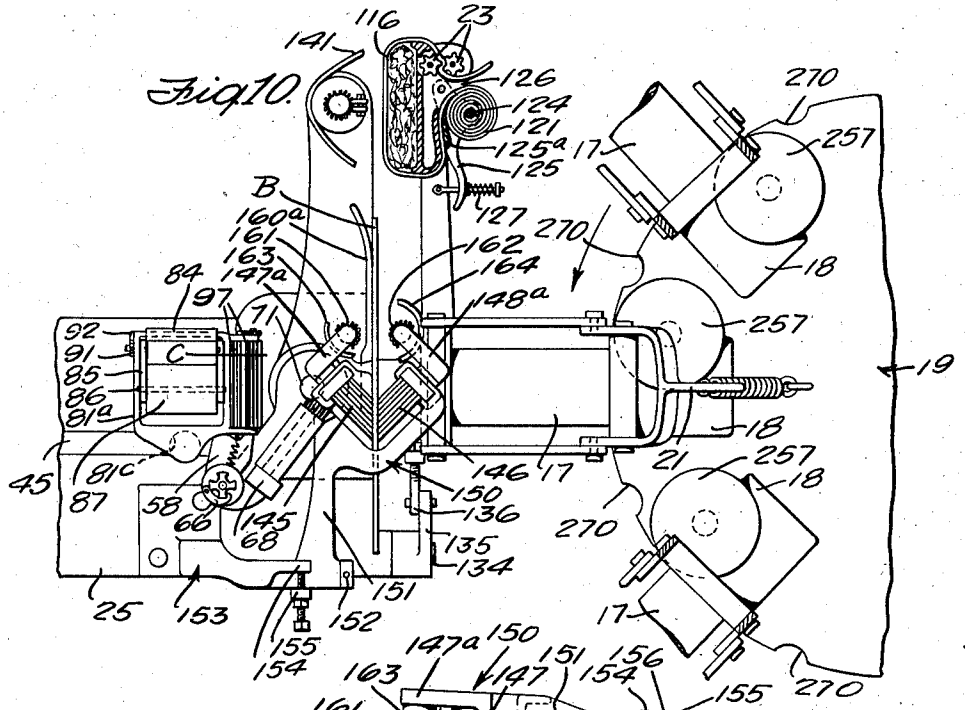
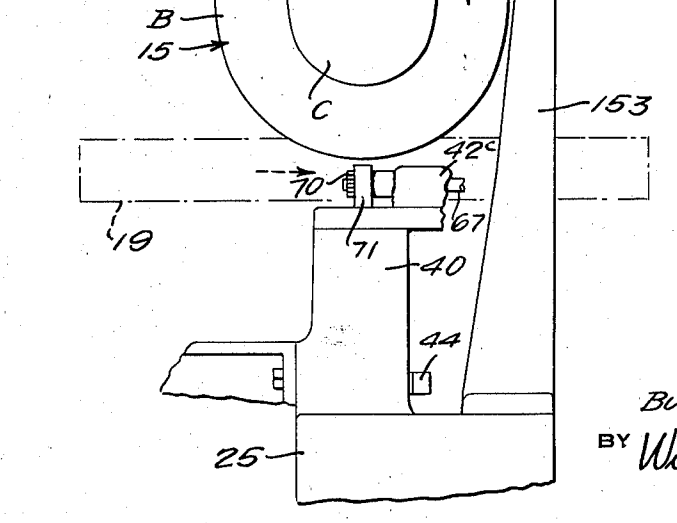


Fig. 11.



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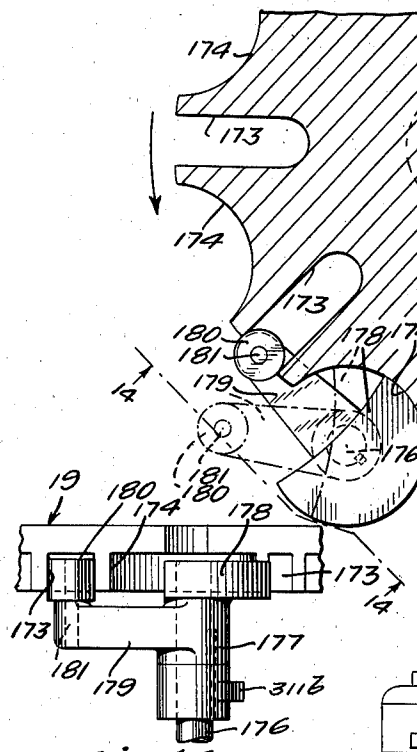


Fig. 13.

Fig. 14.

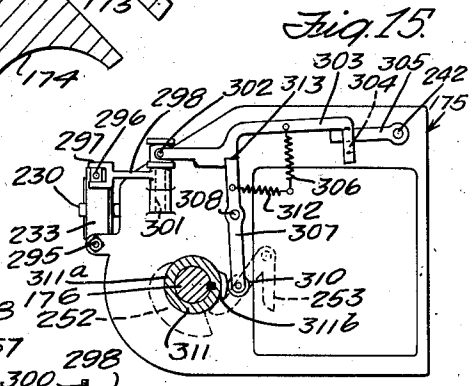


Fig. 15.

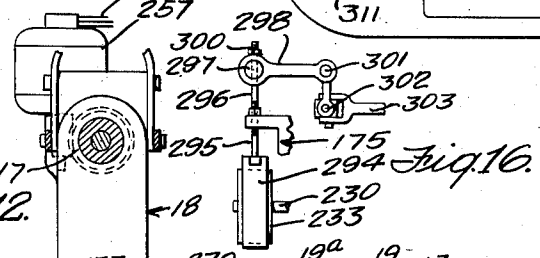
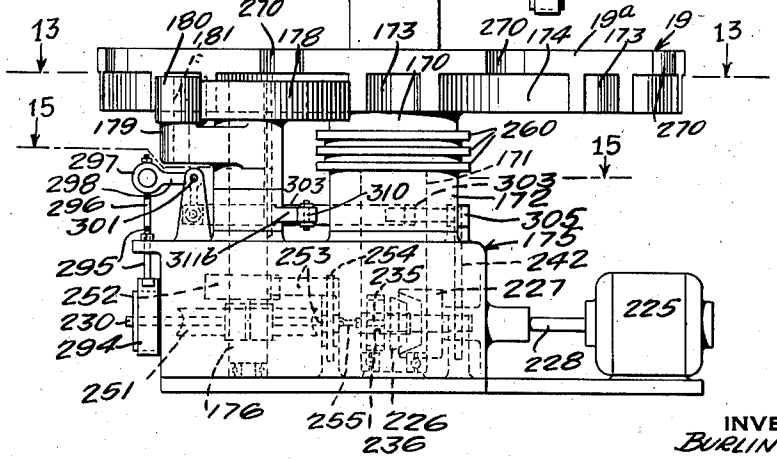


Fig. 16.

Fig. 12.



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July 14, 1942. B. D. WELLS 2,289,814

APPARATUS FOR LURING HAT BODIES

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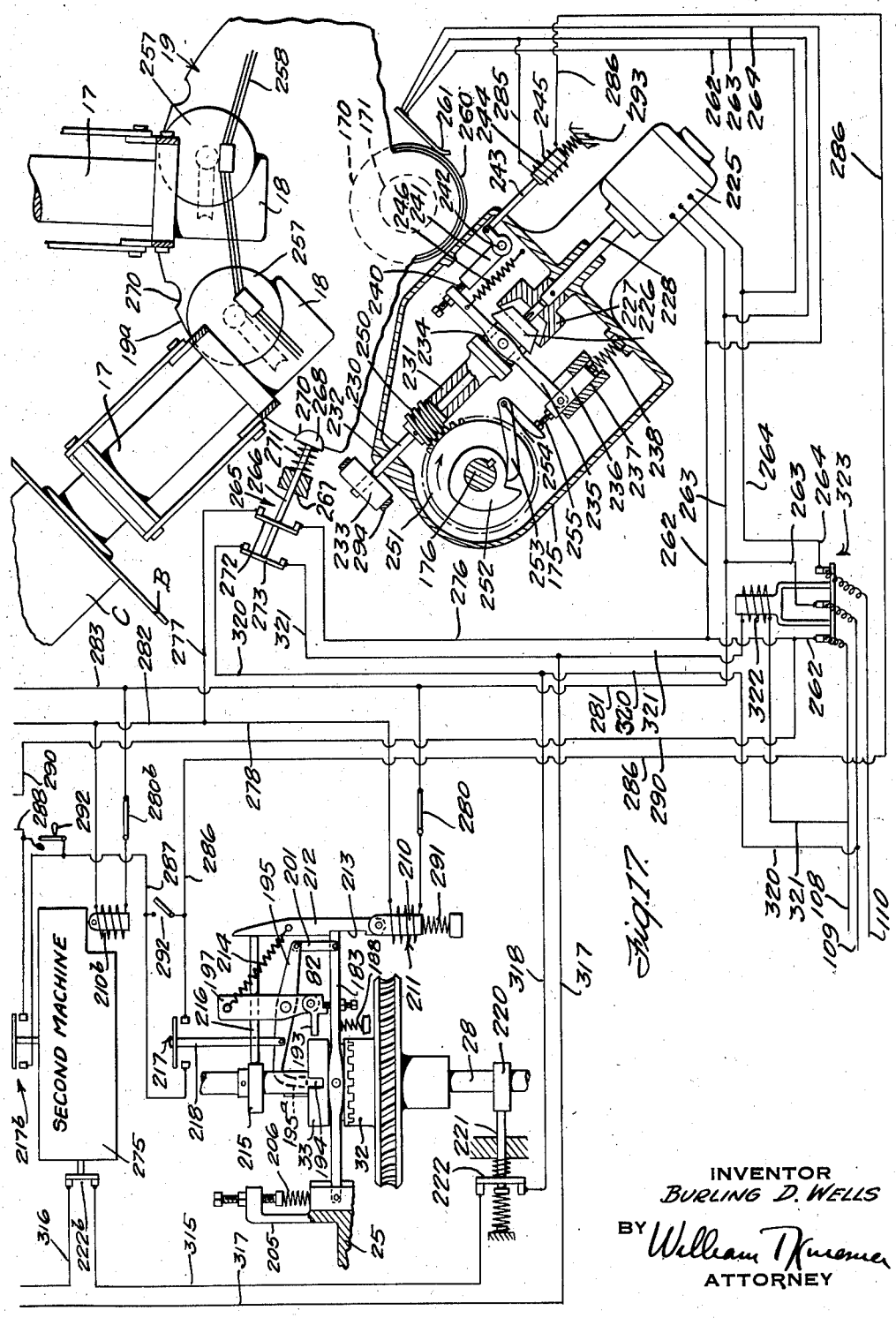


Fig. 17.

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Patented July 14, 1942 2,289,814

UNITED STATES PATENT OFFICE

2,289,814

APPARATUS FOR LURING HAT BODIES

Burling D. Wells, Danbury, Conn., assignor to The Mallory Hat Company, Danbury, Conn., a corporation of Connecticut

Application March 2, 1940, Serial No. 321,828

46 Claims. (Cl. 223—20)

This invention relates to apparatus for performing operations upon hat bodies, such as felt hats.

One of the objects of this invention is to provide a simple, practical and efficient apparatus for improving the "finish," as by luring, of a hat body. Another object is to provide a dependable and practical apparatus for achieving dependable luring of both the crown and the brim of a hat body. Another object is to provide an apparatus for effecting dependable surface treatment, as by luring, of both sides of the brim of a hat. Another object is to provide a practical and efficient apparatus for effecting uniform operation or action, as by luring, upon hat bodies and that will be capable of simple and effective control, yet requiring little, if any, supervision in so far as its action and operation are concerned. Another object is to provide a machine of the above-mentioned character that will be of compact construction, reliable in action, and well adapted to meet the varying requirements of practical use.

Another object is to provide a simple and practical apparatus for effecting and controlling the heating of the tool, such as a so-called luring cloth, that will be of high efficiency and productive of good results upon the hat body. Another object is in general to provide an improved apparatus for luring hats, to achieve superior luring effects, and to provide for durability of luring tools. Another object is to provide a practical apparatus for luring hat bodies capable of operating at higher temperatures than have heretofore been possible and of achieving improved luring action. Another object is to provide an apparatus for effecting dependable and efficient relative traverse between the operating tool or tools, such as luring tools and the hat body.

Another object is to provide an apparatus for dependable, safe and rapid relative shifting between one or more hat-operating machines and one or more hat-supporting means, for bringing a hat body into and out of operative relation to the tool or tools of the machines or to replace the hat body by a succeeding one. Another object is to provide an apparatus of the above-mentioned character that will be well adapted for long continued automatic operation upon successive hat bodies and that will be capable of producing efficient and high quality results without requiring continuous manual supervision. Another object is to provide an apparatus of the above-mentioned character capable of producing high quality of result at a high production rate. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, arrangements of parts and in the several steps and relation and order of each of the same to one or more of the others, all as will be illustratively described herein, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings in which is shown a preferred illustrative embodiment of the mechanical features of my invention,

Figure 1 is a plan view of the apparatus, certain parts being in section or broken away;

Figure 2 is a front elevation, partly in vertical section, and other parts broken away;

Figure 3 is a rear elevation of the apparatus, certain parts being broken away or shown in section;

Figure 4 is a diagram of the circuit arrangement for certain heater elements;

Figure 5 is a plan view on an enlarged scale of one of the luring tools as seen from the top in Figure 2;

Figure 6 is an end elevation of the parts shown in Figure 5 as seen from the right in Figure 5;

Figure 7 is a detached vertical sectional view of certain of the parts of the apparatus of Figures 1, 2 and 3;

Figure 8 is a detailed plan view, partly in horizontal section and on an enlarged scale of a clutch mechanism seen also in plan in Figure 1;

Figure 9 is a view of the clutch mechanism of Figure 8 as seen along the line 9—9 of Figure 8;

Figure 10 is a fragmentary view like Figure 1 showing in plan certain other parts;

Figure 11 is an end elevation, with parts omitted, as seen from the left in Figure 10;

Figure 12 is a front elevation of the hat support carrier or bed, as seen along the line 12—12 of Figure 1, with parts omitted;

Figure 13 is a view along the line 13—13 of Figure 12 with parts omitted;

Figure 14 is a fragmentary elevation along the line 14—14 of Figure 13;

Figure 15 is a plan view along the line 15—15 of Figure 12, with parts omitted;

Figure 16 is a detached elevation, as viewed from the left in Figure 15, and

Figure 17 is a plan view, partly broken away, partly in section, and with parts omitted, showing certain interrelationships and controls, partly diagrammatically, between the carrier or bed and the various hat tool or operating mechanisms.

Similar reference characters refer to similar

parts throughout the several views in the drawings.

Referring first to Figures 2 and 3, I have shown a hat body 15 having a crown C and a brim B, both of which, to better illustrate certain features of my invention, may be assumed to require being operated upon at an appropriate stage in the manufacture; in so far as certain specific features of my invention are concerned, let it be assumed that the hat body 15 is ready to be lured and that both the crown C and both sides of the brim B are to be lured. Preferably, hat body 15 is mounted upon a block 16 over which the crown C snugly fits, thus forming a dependable interior backing for the crown throughout, leaving the brim B free.

The block 16 with the hat body 15 is preferably mounted for rotation about an appropriate axis, illustratively a horizontal axis, provided by a shaft 17 mounted for rotation in a frame 18 and driven at a suitable, preferably relatively low, rate of speed. Any suitable or known means mounts the block 16 onto the shaft 17, such as a chuck 20, whose jaws are operable to release or engage the block 16 as by a handle 21, even during the rotation of shaft 17 and of the chuck itself.

Preferably, I mount a number of frames 18 with chucks 20 on a carrier or bed 19 and arrange for effecting successive relative movements therebetween and one or more hat-operating machines; of the latter, I have shown in detail one of them, with its tool or tools and related mechanisms preferably related to a single frame 25.

Frame 25 has suitable pillars having bearings 26, 27, preferably antifriction, for rotatably supporting shaft 28 which carries a number of cams hereinafter described and which is driven at a suitably slow rate of speed by any suitable means, preferably by an electric motor 30 (Figure 2) carried in a suitable upstanding frame part 31. The driving connection is preferably through a clutch which may comprise two cylindrical parts 32, 33 (Figure 1); part 33 is splined to the shaft 28 while part 32 is free to rotate about the shaft unless the adjacent toothed members of these two clutch parts are in engagement, as in Figure 1. Clutch part 32 may be formed in the hub of, or is attached to, a gear such as worm wheel 34, which meshes with a worm 35 mounted on a horizontal shaft 36 which is rotatably carried in the upper part of the frame part 31 (Figure 2), whence it is driven from the motor 30 by worm 37 on the motor shaft and worm wheel 38 on shaft 36. With the clutch parts 32, 33 in engagement, motor 30, which is of any convenient type and connected to a power circuit in any suitable way, effects the drive of cam shaft 28 at the desired slow rate of speed and in counterclockwise direction, as viewed in Figure 2. Clutch 32, 33 is preferably constructed and automatically controlled to insure the drive, once the clutch is engaged, of cam shaft 28 throughout a single complete revolution.

At that end of the frame 25 substantially underneath the hat block chuck 20 when the latter and the mechanism carried by frame 25 are appropriately alined for operation upon the hat body, and preferably with its vertical axis intersecting the axis of the chuck shaft 17, an upstanding boss 40 is provided in frame 25, being bored out, as is better shown in Figure 2, to form a bearing for a hollow vertical shaft 41 which at its upper end has formed integrally with it or secured to it a horizontal arm 42 and which at its lower end has secured to it a pinion 43, the latter thus coacting with arm 42 to hold the shaft 41 against movement lengthwise of its bearing in the boss 40; the latter is suitably hollowed out, as at 40a, to accommodate pinion 43 and also to expose a suitable portion of it for meshing engagement with a rack 44 formed on a square cross-sectioned bar 45 which extends lengthwise of frame 25 and just above its upper face, suitable upstanding bosses 46 and 47 of the frame 25 providing bearings for slidably guiding the rack bar 45 for longitudinal movement.

Near its left-hand end, as seen in Figures 1 and 2, the rack bar 45 has secured to it an upstanding bracket 48 bifurcated at its upper end where it has rotatably mounted a cam follower in the form of a roller 50 which coacts with a suitably shaped cam 51 secured to cam shaft 28 as by its hub 52 and pin 53 (Figure 1). Where, as in the present illustration, cam 51 operates upon cam follower 50 by its periphery, suitable means are employed to maintain the cam follower 50 always in engagement with the cam 51, such as a spring 54 (Figure 2) anchored at one end to the frame 25 as by a pin 55 and secured at its other end as by pin 56 to the rack bar 45, spring 54 being of sufficient strength and tension always to urge rack bar 45 toward the right and thus always to hold the cam roller 50 in engagement with the periphery of the cam 51.

Depending upon the shape of the cam 51, illustratively like that shown in Figure 2, a single rotation of cam 51 causes rack bar 45 to partake of a single cycle of motion of translation which by the rack 44 and pinion 43 is translated into a swinging of hollow shaft 41 about its axis and hence into a swinging of horizontal arm 42, the direction and rate of swing being determined by the shape of cam 51.

The outer end of arm 42 is provided with a sleeve-like extension 42a (Figure 2 and also Figure 7), thus providing a vertical bearing for the hollow shaft part 57 of another arm 58 which is thus mounted to swing in a horizontal plane above the plane of swing of the arm 42. Arm 58, which carries certain tools, as later described, is preferably biased or yieldingly urged to swing in clockwise direction, as viewed in Figure 1, relative to the oscillatable arm 42 to which it is pivotally jointed as above described, and this is preferably achieved by a spring 60 (Figures 2, 3 and 7) which preferably takes the form of a helical spring having its one end anchored to the arm 42, as by having it engaged in a recess 42b (Figure 7) and having its other end engaged in a short lever 61 having a hub 62 by which it is secured, as by pinning, to the lower end of a shaft 63 which extends through and is rotatably carried by the hollow shaft part 57 of arm 58. The upper end of the shaft 63 is suitably shaped as by making it square, as at 63a, to be engaged by a wrench so that it may be manually turned to adjust the tension of spring 60. The shaft 63 has at its upper end also a toothed part 64 like a ratchet wheel or gear with which may be engaged a pawl 66 pivotally carried on the upper face of the arm 58, thus to hold the shaft 63 into whatever position of adjustment of the tension of the spring 60 that is given it.

As above noted, spring 60 biases the arm 58 and the parts carried by it, as later described, in clockwise direction, as viewed in Figure 1, relative to the swinging arm 42; the latter has a sleeve-like portion 42c which serves as a bearing for a shaft 67 at one end of which is a peripheral cam 68 for coaction with a suitably shaped

portion 58[a] of the arm 58, cam 68 having a peripheral configuration suitable to change the angle between arms 58 and 42, in opposition to the bias of spring 60, in accordance with certain factors, such as the shape or contour of the crown of the hat which is to be acted upon by the tool or tools carried by the arm 58.

At the other end, shaft 67 has a pinion 70 which meshes with a rack 71 formed in a cylindrical rack bar 72 which is slidably supported by and within the hollow shaft part 41 of the arm 42 (Figure 2) so that upon movement in an up and down direction rack 71 effects rotary movement of pinion 70 and hence of cam 68. The lower end of rack bar 72 has a slot 72[a] in which engages arm 73 of a bell crank lever that has a hub portion 74 (Figures 1 and 2) for pivotally supporting the lever by a shaft 75 suitably supported by the frame 25, the latter having an appropriate aperture to permit the other arm 76 of the bell crank lever to pass upwardly through the frame 25 for coaction with a peripheral cam 77 secured to the cam shaft 28. Arm 76 is bifurcated (Figure 1) for the pivotal mounting of a roller or cam follower 78 for engagement with the periphery of cam 77.

Rotation of cam 77 thus causes bell crank lever 76—73 to swing about its axis 75 in directions and to extents according to the shape of cam 77, illustratively shaped as shown in Figure 2, rack bar 72 being correspondingly moved up or down and through rack 71 and pinion 70 changing the rotary position of cam 68. The connection between arm 73 of the bell crank lever and the rack bar 72 is preferably adjustable in any suitable way as, for example, by a screw 78 with a lock nut 80 (see also Figure 3); by such means the angular relationship between cam 77 on cam shaft 28 and cam 68 on the shaft 67 of arm 42 may be varied or set.

Arm 58 carries a tool structure which preferably comprises a frame generally indicated by the reference character 81 (Figures 2 and 3) that has an upper frame part 81[a] and a lower frame part 81[b] joined by an upright frame part 81[c] that holds the upper and lower frame parts together and in vertically spaced relation. Lower frame part 81[b] has an offset downwardly extending stud 81[e] (Figure 3) which is pivotally mounted in any suitable way, preferably as by a pair of combined radial and thrust ball bearings 82 (Figure 3) whose inner races are fitted to the frame stud 81[e] and whose outer races are assembled and secured to the free end of arm 58 which is suitably conformed or shaped as at 58[b], for that purpose. A relatively weak spring 89 (Figure 1) is connected between the lower frame part 81[b] and the pivoted end of arm 58 to bias the frame 81 about the axis of its mounting stud 81[e] generally in the manner indicated in Figure 1, all, of course, with respect to the arm 58. With the cams 51 and 77 in such a rotary position that their respective cam followers engage parts of the cams that are of minimum radius, oscillatable arm 42 assumes a position substantially like that of Figure 1, being practically the extreme position which it assumes in counter-clockwise direction of movement, while cam 68 that acts upon the arm 58 presents such a portion of its periphery to the arm 58 that under the action of spring 60 arm 58 and the spring-biased tool frame 81 assume positions relative to each other and to the arm 52 which carries them approximately like those shown in Figure 1, from which it will be seen that the vertical axis of the frame stud 81[e] falls substantially in a vertical plane through the axis of the chuck shaft 17, the vertical axis of the hollow stud shaft 41 of arm 42 being also substantially in that vertical plane. These relationships of these parts may be considered to be those that exist at the starting of the operation of the tool carried by the frame 81 upon the tip portion T of the crown C of hat 15 (Figures 2 and 3), and also at substantially the beginning and end of the later described traversing movements of the tool frame and its tools relative to the hat body 15.

In this position of the tool frame 81, the latter presents for engagement with the tip T of the crown C a tool preferably taking the form of a strip 83 of a suitable material for operating upon the hat body and in luring the material of strip 83 may be a suitable cloth, leather like chamois, or other appropriate material, but according to certain features of my invention the strip 83 is preferably made of woven mineral fibers like fiber glass of any suitable fineness of both fiber and mesh of weave. The luring tool 83 is stretched or supported between the upper and lower frame parts 81[a] and 81[b] are preferably from those edges or sides of these frame parts as face toward the block chuck when the parts are in the above-described positions and generally shown in Figure 1.

Such a luring tool or strip 83 may thus be brought into engagement, as shown in Figures 2 and 3, with the tip T of the crown, and, as is later described, may be traversed to operate also upon the side S of the crown.

Preferably, also, I provide frame 81 with another tool of strip material 84 preferably of the same nature as the material 83 and hence of fiber glass cloth, strip 84 being also suspended or stretched from upper frame part 81[a] to lower frame part 81[b] but from those edge or side portions of the latter that make an angle of 90° with the side portions from which the above-described strip 83 is suspended, the two strips 83 and 84 extending generally in vertical planes but at right angles to each other, as will be clear from Figures 1, 2 and 3.

For both strips 83 and 84 I preferably provide means for convenient replacement and since the means that I employ are preferably substantially identical, it will suffice to describe only one of them in detail.

Thus, considering first the tool strip 84 and referring first to Figures 5 and 6, upper frame part 81[a] is preferably in the form of an open four-sided structure within which is a U-shaped frame or roll carriage 85 in the outer ends of whose arms is releasably mounted a pin 86 on which is supported the supply roll 87 of the strip material 84. From the supply roll 87 the strip material passes over a suitably rounded edge of one side 81[f] of the upper frame 81[a] being pressed against the inside edge or face of part 81[f] by the crosspiece 85[a] of the roll carriage which is pivotally connected to the frame part 81[a] by a pin 88 suitably supported in appropriate opposed ear-like extensions of the upper frame part 81[a].

Preferably, the force with which the strip material 84 is gripped between the parts 85[a] and 81[f] (Figure 6) is adjustable and a suitable arrangement for that purpose may comprise a helical spring 90 about the pin 88, the ends of the spring 90 being suitably anchored to bias the roll carriage or frame 85 in counter-clockwise direction, as viewed in Figure 6, thus to aid the factor of

weight of the roll carriage in pressing the carriage part 85a toward the frame part 81f.

Preferably one end of the spring 90 is hooked or secured to roll carriage 85 and the other is anchored to the pin 88, the latter having (Figure 5) a toothed member 91, like a ratchet or gear, with which coacts a pawl 92 for holding the pin 88 in whatever rotary position it has been turned for adjustment of the tension of the spring 90, the outer end of pin 88 being suitably shaped for engagement by a tool, such as a wrench or screw driver for making the just described adjustment.

Thus, the parts 85a and 81f (Figure 6) dependably grip the tool strip 84 at its upper portion, whence it extends downwardly and vertically (see Figure 3) over the outermost of a pair of parallel fluted rollers 93 and thence in between the rollers to be tightly gripped and held therebetween, rollers 93 being mounted in the lower frame part 81b.

The tool strip 83 is served from a supply roll 94 (Figure 2) carried in a U-shaped frame 95 substantially like the frame 85 of Figure 5 and 6 and similarly pivotally mounted but in the lower frame part 81c, and similarly spring biased in clockwise direction, as viewed in Figure 2, to grip the strip material between part of the frame 96 and a part 81g of the lower frame part 81b, whence the strip material extends upwardly to be gripped between two parallel fluted rollers 97 suitably mounted in ear-like extensions of the upper frame part 81a (Figures 2, 5 and 6), one of the rollers 97 having a toothed part 98 like a gear or ratchet with which coacts a pawl 100 whereby the roller is held in whatever position of rotary adjustment is given it as by a tool, such as a screw driver or wrench, the endmost portion of the shaft of the roller adjacent the ratchet 98 being suitably shaped to be engaged by such a tool. The mounting and arrangement of the pair of rollers 93 (Figure 3) for the tool strip 84, in the lower frame member 81b, may be substantially the same as the above-described mounting and holding arrangement of rollers 97 (see Figures 5 and 6).

By such a preferred arrangement, therefore, as the material of the strips 83 and 84 becomes spent by its operation upon the hat body, both strip materials may be advanced throughout suitable lengths to present new or unused portions of the strip material for action upon the hat body. Also, it will be noted that the supply rolls of the luring material may be readily replenished.

The tool frame structure 81, in the above-described illustrative form, thus presents two faces of luring material 83 and 84, each substantially vertical and the two making an angle of substantially 90° to each other; between the upper and lower frame parts 81a and 81b and in the angle thus formed by the luring strips 83 and 84, I provide a suitable means for heating the luring tools to a suitable temperature and preferably and conveniently I employ an electric heater element 101 (Figures 2 and 3) of any suitable construction, mounted as by a bracket 102 secured to the upright frame part 81c so as to be positioned substantially to the rear of the operative portion of the luring strip 83 and substantially similarly positioned with respect to the companion luring strip 84; preferably I employ a reflector 103 of any suitable material, such as sheet metal, and preferably also carried by the mounting bracket 102 to extend about so much of the heater element 101 as faces away from the luring strips 83, 84, and thereby to reflect and direct heat toward and onto both strips without material loss. Where the luring strips 83, 84 are made of a material like glass fiber, as in the preferred form above described, the material is noninflammable and, moreover, can withstand operating temperatures materially greater, where desired, than it has heretofore been possible to employ in the luring of hat bodies. In luring hat bodies the latter have applied to them in any suitable way substances which, under the action of heat and the polishing effect of the luring cloth, contribute to the desired polish or sheen imparted to the felt and the fibers thereof and aid also in laying the fibers down uniformly in the desired direction or directions. Substances heretofore employed for this purpose have been limited in composition and in character of result, largely due to the relatively low temperatures of operation imposed by the use of inflammable luring materials but by the employment of glass fiber or similar mineral fiber cloth luring may be carried on at higher temperatures and a wider range of choice of materials to apply to the hat bodies prior to the luring is made available.

From the heater element 101 suitable flexible conductors 104, 105 lead to any suitable source of electrical energy but preferably I make provision for varying the energy supplied to the heater element 101 and for thereby controlling its heating effect upon the luring tools.

A convenient and preferred arrangement may comprise a control device, such as a switch, generally indicated at 106 in Figures 3, 4 and 1, having an operating member 107 which in one position gives maximum flow of energy to the heater element 101 and hence maximum heating effect and which in another position cuts down the flow of energy and correspondingly diminishes the heating effect.

For example, I may employ a power circuit (Figure 4) of the three-wire type having therefore three conductors 108, 109 and 110 with the voltage across conductors 108 and 110 being 220 volts and the voltage across any other pair being 110 volts. In such case, the heater element 101 has characteristics to suit it for maximum heat energization when energized at 220 volts, and accordingly I arrange control device or switch 106 so that in one position of its operating part 107 the circuit 104—105 of heater 101 is connected across conductors 108 and 110 and hence energized by a current of 220 volts while in its other position switch 106 connects the circuit 104—105 across a 110-volt pair of the circuit conductors, such as conductors 108—109; in the former case maximum heating effect is achieved and in the latter a lesser heating effect results. A possible switch and circuit arrangement of this character is diagrammatically shown in Figure 4.

Switch structure 106 I preferably place under the control of a peripheral cam 111 (Figures 1 and 3) on the cam shaft 28 with which one arm of a bell crank lever 112 is in engagement, lever 112 being pivoted as at 113 to a suitable point on the frame 25, while switch 106 is suitably mounted on the frame to position its movable or operating member 107 appropriately for actution by the free arm of the lever 112, preferably as by an adjustable threaded stud 114 threaded into the lever 112.

Cam 111, as seen in Figure 3, therefore has several portions corresponding to two different

radii for correspondingly holding the adjustable operating stud 114 and hence the switch-operating member 107, in coaction with a suitable spring operating upon the latter, in either lowermost position for maximum heating effect or upper position for lesser heating effect.

With a hat body 15 carried and rotated by shaft 17 and by the latter presented in operating position, as shown in Figures 1, 2 and 3, a control member 115 for clutch 33—32 is actuated, thus connecting the cam shaft 28 to the driven worm wheel 34 to commence rotary movement of the shaft 28 and its cams throughout a single revolution, the clutch being disengaged at the conclusion of the desired 360° rotary movement preferably automatically and in an illustrative manner later described. At the moment of commencement of the drive of the cam shaft, arm 42 finds itself in substantially the position shown in Figure 1, at substantially its extreme limit of swing in counter-clockwise direction, due to cam follower 50 (Figure 2) being in engagement with that portion of the cam 51 that is of minimum radius; cam follower 78 (Figure 2), however, is preferably in engagement with such a portion of cam 77 as will give the cam 68 (Figure 1) such a position that the tool frame 81, with lure strip 83 facing toward the tip of the crown of the hat body, is spaced somewhat to the left of the position shown in Figure 1, such spacing being achieved by the action of cam 68, in its just mentioned position, limiting the swing of tool-carrying arm 58 in clockwise direction to a corresponding extent. Thereby, by this spaced or withdrawn position of the tool frame 81, the tool frame is held in an out-of-the-way position with respect to the movement or positioning of the hat body into the position shown in Figures 1, 2 and 3.

The various positions of the various parts, as just described, are virtually their positions of rest also; at the same time cam 111 is in such a position that, through its follower bell crank 112 (Figure 3), switch 106 conditions the circuit of heater element 101 for low energization and hence in the arrangement of Figure 4 for energization from a 110-volt pair of power circuit conductors, cam 111 permitting the switch member 107 to assume its uppermost position for that purpose. During positions of rest, therefore, and hence with the luring tool 83 out of contact with the hat body, a lesser supply of energy flows to the heater 101 and preferably sufficient simply to maintain the luring tools at or near the desired operating temperature.

As the cam shaft 28 commences to rotate, cam 77 (Figure 2) moves its high or long radius portion, which is relatively short peripherally, out of engagement with the cam follower 78, thus, through the bell crank lever 76—73, the rack bar 72 and rack 71 and pinion 70, to swing the cam 68 to move its high or long radius portion out of engagement with the arm 58 (see Figure 1), thus permitting spring 60 to swing arm 58 in clockwise direction relative to arm 42 and thus to bring lure sheet or tool 83 flatwise into engagement with the tip T of the rotating hat body 15 (Figures 2 and 3), the lure strip 83 being pressed against the hat by the full force of the action of spring 60. Spring 89 (Figure 1) is of sufficient tension or strength to poise or hold the tool frame 81, during the above-described action, in such a position about the axis of its pivoting stud 81e (Figure 3) relative to the arm 58 as to hold the lure strip 83 with its plane substantially parallel to the plane of the top or tip T of the hat, thereby insuring flatwise engagement of the lure cloth 83 with the tip T of the hat body.

The luring action thus proceeds, the increased energy supply to the heater element 101 insuring the supply of sufficient heat to the lure cloth 83 and to the portions of the hat body with which it engages to achieve the luring action at the desired temperature. A superior luring action results, particularly if, as in the preferred form, the luring tool 83 is made of glass fiber cloth. The latter, I have found, has a greatly improved polishing action on the felt of the hat body, and due to its capacity to withstand high temperatures, luring may be carried out at higher temperatures than has heretofore been possible.

But the continued rotation of the cam shaft 28 causes other portions of cam 51 to become effective upon the cam follower 50, moving the latter and the rack bar 45 to the left, as viewed in Figures 1 and 2, and thus effecting a rotary movement, through rack 44 and pinion 43, of the arm 42, swinging the latter in clockwise direction, as viewed in Figure 1, thereby displacing the tool frame 81 with its lure tool 83 more and more toward the square of the hat, thence about the square of the hat, and to the side S of the hat, all while the hat body is rotating, and causing also a steady traverse of the luring tool 83 in a direction toward the brim B of the hat. During this swinging movement of the arm 42 in clockwise direction (Figure 1) to traverse or shift the tool 83 from the tip toward and over the square of the hat and thence along the side of the hat toward the brim, arm 58 may vary its angular relationship to the arm 42 and tool frame 81 may vary its angular relationship about the axis of the pivoting stud 81e, all according to the configuration or curvature of the particular portion of the hat crown C with which the luring tool 83 is in engagement under the yielding pressure of spring 60, the articulated and yielding connections being such as permit the tool frame 81 always to assume such a position that the luring tool 83 is always substantially tangential to whatever portion of the crown C that it happens to be in engagement with. Also, where the crown C is oval, the just described structural arrangements permit the tool frame 81 and the luring cloth 83 to assume positions of various lengths of radial distances from the axis of rotation of the hat, according to the degree or extent of oval of the hat crown.

By the time that the arm 42 (Figure 1) has swung in clockwise direction sufficiently to bring the lure tool 83 with its one vertical edge substantially closely adjacent to the brim B, the tool frame 81 will have partaken, with the shape of hat shown in Figures 2 and 3, of substantially a 90° turn in clockwise direction, as viewed in Figure 1, about its pivoting stud 81e, thus bringing the companion lure strip or tool 84 into parallelism with the plane of the brim B, the traverse of lure tool 83 along the side S of the hat crown being of sufficient extent in a direction toward the brim B to bring the lure tool 84 into engagement flatwise with the lefthand face of brim B, as viewed in Figure 2, the lure strip 84 being preferably of a width equal to or greater than the radial dimension of the brim B. Lure tool 84, being kept in heated condition by the heater element 101, is now positioned and is in readiness to effect a luring operation upon the above-mentioned side or face of the brim B.

But by the time lure tool 84 is brought into engagement with the just stated face of the brim B, termed the "upper" side of the brim, I bring into juxtaposition thereto but on the other or "under" side of the brim B a luring tool or strip 116 preferably made of a material like the luring tools 83 and 84 above described.

Lure cloth or strip 116 (see Figures 1 and 3) is carried by a suitable frame structure 117 mounted upon the end of an arm 118 that is pivotally mounted by a stud shaft 120 at the right-hand end of the frame 25, as viewed in Figures 1 and 2, thus to be swingable in a vertical plane transverse to the axis of rotation of the hat 15.

Lure cloth 116 is, like lure strips 83, 84, preferably in strip form, being led off of a supply roll 121 thereof, thence about the lower edge of the frame 117, over the front face of a pad 122, preferably of any suitable yielding material, thence over the upper edge of frame 117 where it passes through a pair of fluted feed rollers 123 mounted, supported and adjusted in the frame 117 in a manner substantially the same as rollers 97 of Figure 5. The supply roll 121 is carried on a pin 124 in a roll carriage or frame 125 pivotally supported in the frame 117 by a shaft 126 and having a cross-piece 125a that presses and holds the strip material 116 against a part of the frame 117 under the action of an adjustable spring 127. By this arrangement, therefore, the feed rollers 123 may be rotated as by a wrench or screw driver to advance a sufficient length of the luring strip to bring a fresh portion of the material over the front face of the pad-like support 122, the action and operation being generally the same as was above-described in connection with the luring strips 83 and 84.

During the time of traverse of the lure frame 81 from the tip of the crown to the brim, as above described, the under brim luring tool 116 preferably remains out of operative relation to the under face of the brim B, and this I preferably achieve by holding the luring tool supporting arm 118 in a correspondingly suitable position, illustratively in a position substantially horizontal, as shown in Figure 1, that being the position of rest of the luring tool 116; when luring tool 84 is about to engage the upper face of the brim B, under-brim luring tool 116 is brought into operative position, by swinging the arm 118 upwardly into substantially the positions shown in Figures 2 and 3.

Control of the arm 118, in timed relation to the movement of other parts, as above described, I preferably achieve from the cam shaft 28, by way of a cam structure 130—131 (Figures 1 and 2) on the cam shaft 28. Cooperating with this cam structure is a cam roller or follower 132 mounted in the bifurcated end of a lever 133 whose lower end is secured to one end of a shaft 134 that extends lengthwise of the frame 25 and is suitably journaled therein. The other end of shaft 134 has secured to it an arm 135 whose free end is connected to lure-carrying arm 118 by a link 136 preferably of adjustable length as by a trunbuckle 137 (Figure 1).

The cam structure 130—131 comprises in effect a disk 130 substantially plane throughout a substantial portion of its side face excepting for the cam portion 131 (Figures 1 and 2). The relationship of the various parts is preferably such that the range of swing of the arm 118 and of the tool structure carried at its end is preferably always to one side of the vertical plane through the axis of its supporting stud 120, and hence the weight of these swingable parts is always effective, through the connecting linkages, to press the cam follower 132 against the side face of the cam structure 130—131, thereby insuring change in position of arm 118 and its luring tool 116 in accordance with the cam structure itself.

During the time that the tool frame 81 traverses from the tip of the crown to the brim, a portion of the flat face of cam disk 130 is traversed or rotated relative to the cam follower 132, thus leaving arm 118 and tool 116 in their lowermost position.

While in such lowermost and substantially horizontal position, luring tool 116 is held juxtaposed to a heater element 140 suitably mounted in a lateral extension 25a (Figures 1 and 3) of the frame 25 and provided with a reflector 141 to direct its heat on to the front face of the luring tool 116, thus heating the latter and in effect storing heat into it and its backing pad 122, so that when swung upwardly into engagement with the under face of brim B, it will have a sufficient heat content for coaction upon the hat and with the companion luring tool 84. Just about the time that the luring tool 84 is to be brought into engagement with the upper face of brim B, the cam portion 131 comes into action upon the cam follower 132 to swing the arm 118 upwardly about its stud 120, the swing being completed to bring the now adequately heated luring tool 116 into engagement with the under face of the brim B just about concurrently with the engagement of luring tool 84 with the upper face of brim B. Luring tool 116 thus also forms a suitable backing or support for the brim B against which the luring tool 84 continues to be pressed by the action of spring 60, as the brim is traversed between the two tools 116 and 84 during the continued rotation of the hat body.

Luring of the brim on both sides thus continues, whence, substantially simultaneously, cam 51 (Figure 2) permits movement of cam follower to take place in a direction toward the right under the action of spring 54 and cam part 131 of the cam structure 130–131 is rotated to a point where cam follower 132 rides off of it and onto the disk part 130; by the former action and through the corresponding linkages or mechanisms between the cam follower 50 and the arm 42, the latter commences to swing in clockwise direction, as viewed in Figure 1, to cause first the withdrawal of the luring tool 84 from the upper face of the brim B and then to cause the luring tool 83 in effect to retrace its path of traverse and hence move along the side S of the crown, about the square of the hat and ultimately back to the tip T, to the position shown in Figures 2 and 3, spring 60 during all this time applying sufficient force to press the heated luring tool 83 against the hat body. As the luring tool 84 is withdrawn from the upper face of brim B, the transition of engagement of cam follower 132 (Figure 1) from the cam part 131 to the disk part 130 effects a swinging, downwardly, of the arm 118 and the luring tool 116 again to resume the substantially horizontal position of rest earlier above described, whence it becomes juxtaposed again to the heater 140 to become heated thereby for its next cycle of operation.

Depending upon the action or results desired to be achieved on the hat brim, the latter may also, during such operations as are described above, have in action on the brim and preferably also on both sides additional or other tools or if desired the motions of the two above-described luring

tools 84 and 116 may be omitted, and in view of the relative movement, as later described in detail, between the bed 19 with the hat-supporting and rotating devices carried thereby and the mechanism or machine related to the base or frame 25, I may provide two suitably spaced and relatively stationary tools for operating upon the respective faces of the brim, effecting interrelation therebetween and the hat brim by the just stated relative movement. Thus, referring to Figures 2, 3 and 10, I may provide two tools generally indicated by the reference characters 145 and 146 positioned with their operating faces facing toward each other and with the plane of the two faces or the median plane therebetween (depending upon the magnitude of spacing therebetween) in line with the plane or path of a suitable portion, such as the upper portion, of the brim B, so that, when such relative movement takes place, as is later described in detail, the brim and the two opposed tools become operatively related to each other and upon a subsequent relative movement become disassociated from each other. In Figures 2, 3 and 10 the two tools 145, 146 and the hat brim B are shown in operative relation; relative movement therebetween in the general direction of the plane of the brim, illustratively as by giving the bed 19 a rotary movement, as viewed in Figure 10, effects bringing the hat brim into or out of operative relation to the two tools.

Tools 145, 146 are preferably mounted in juxtaposition to each other upon the inner faces of two preferably parallel arms 147, 148 of a yoke or inverted U-shaped member 150 (Figure 2), being of sufficient vertical extent to accommodate tools likewise of sufficient vertical extent to engage the full radial dimension of the brim B as the hat body rotates.

Yoke 150 is preferably mounted for movement toward and away from the axis of rotation of the hat body and for this purpose and illustratively the yoke 150 (see Figures 10 and 11) has an arm 151 preferably integral therewith, arm 151 being pivoted at its outer end on a stud or pin 152 which is suitably fixed in the upper end of an upright bracket or column 153 which at its lower end is suitably secured to the frame 25.

Column 153 is provided with a stop in the form of an upwardly extending lug 154 and shaped to be juxtaposed to lug 154 is a lug 155 on the arm 151; lug 155 has threaded into it a stop screw 156 which may be locked in adjusted position by lock nut 157, thereby to adjust the permissible swing in counter-clockwise direction and downward movement of the yoke 150 with its two tools, as, for example, in the absence of a hat body to be operated upon.

Arm 147 of yoke 150 has secured to it, as at 158, a shoe 160 of suitable width to rest against the band portion of the crown C of the hat (see Figure 2), being made of metal preferably highly polished. It is elongated, as shown in Figure 11, preferably to a substantial extent in a direction toward the left, as at 160a, and preferably also curved upwardly. At its right-hand end it is also preferably curved upwardly as at 160b.

Thus, with a hat body and block out of operative relation to the operating tools, the two tools 145, 146 and their carrying yoke 150 assume a position of rest somewhat downwardly of the position shown in Figure 11 and to the extent permitted by the adjustable stop 156 and the fixed stop 154. As movement takes place to operatively relate the hat body and the tools, the arm 118, as later described, being then in substantially horizontal position, and thus with its tools out of the way, and tools 83 and 84 being substantially in the position shown in Figure 1 and likewise also out of the way, and such movement preferably is a movement of the hat body in a direction to the right, as viewed in Figure 11, and into the full line position as there shown, the band portion of the crown C engages in under the upwardly curved end 160a of the guide or shoe 160 while the brim B enters in between the two tools 145, 146. As the hat body continues to move toward the right to its full line position in Figure 11, the tool-carrying frame 150 is cammed upwardly and thus proper entry into operative relationship between the tools and the brim is assured.

As the hat body continues to rotate about its axis, the weight of the tool frame 150 maintains engagement of shoe 160 with the side of the hat crown C and, regardless of the width of the brim or of variations in the radius of the crown or of the brim, insures that the tools operative throughout the entire width of the brim. Where the hat body is oval, these actions dependably take place, the tool frame or yoke 150 partaking of a cyclic up and down movement as the oval hat body rotates.

Upon completion of the operation, whence relative movement again takes place in a direction to disassociate hat body and tools, the shoe 160 again acts as a cam to assure nicety of disengagement between tools and brim. Preferably, this movement is a continued movement of the hat body toward the right, as viewed in Figure 11, and in such case the other curved end 160b of the shoe 160 functions to let the hat body cam itself out of relationship with the tools, the tool frame 150 being by that action cammed downwardly or in counter-clockwise direction, again to assume a position of rest in a lowermost position, as determined by the stops 154, 156.

Preferably, the hat body is maintained in rotation not only while the tools are operating upon the hat body or its parts but also during movements to bring the hat body and the tools both into and out of operative relation to each other, thus insuring also nicety of entry of hat brim in between the two tools 145 and 146 and nicety of exit movement.

The two tools 145, 146 may be of any suitable character or construction according to the action desired upon the brim. Thus, for example, where tools 84 and 116 are present in the form of luring tools to operate on the two faces of the brim B, tools 145 and 146 may be in the form of brushes, the bristles of which are of suitable texture and where in the form of brushes the bristles are preferably relatively long and are arranged to slope toward each other, as better appears in Figure 10, and in such case it is preferred that the inner faces of the arms 147, 148, preferably provided with T-slots, as better appears in Figure 10, for the reception of the backs or supports of the brushes, are at an angle to each other, forming virtually a dihedral angle, thus to bring the bristles of the brushes likewise at an angle to each other, into the apex of which the hat brim moves as the brim and tools are brought into operative relation to each other.

The tools 145, 146 may also be provided with heater elements, such as electric heater units 161, 162, respectively (Figure 10) suitably supported in bracket-like extensions 147a and 148a of the yoke arms 147 and 148 (Figures 10 and 11). Depending upon various factors, such as the nature of the tools employed or, according to desire,

these heater elements may be arranged to direct their heat on the tools or onto the hat brim or on both, and illustratively I have shown them as provided with reflectors 163 and 164, respectively, positioned to reflect the radiant heat therefrom onto the brim faces and thus to protect the brush bristles against becoming overheated. The heater elements may be connected in parallel, as is better shown in Figure 3, and by conductors 165 and 166 may be connected to the circuit conductors 108, 109 to be energized therefrom.

As is better shown in Figure 10, the extended portion 160a of the shoe 160 is preferably made in as small dimension horizontally as possible so as to present as little obstruction as possible to the lure tool 83 (Figure 2) when the latter reaches or approaches the end of that stroke of its traversing movement that brings it edgewise adjacent the upper face of the brim B.

As above indicated, I prefer to effect the relative movement between the rotatably supported hat body or hat bodies and the machine or machines to operate upon them, for bringing them into or out of operative relationship to each other, by effecting a step-by-step rotary movement of the bed 19, thus to present any one hat body rotatably carried thereby successively to any desired number of machines or hat operating mechanisms, of which the above described machine may be considered one. Thus, the bed 19 may be mounted for rotation about a vertical axis, in any suitable way; thus, it may be integrally formed at its under part to provide a cylindrical boss 170 having a concentric reduced portion extending downwardly in the form of a heavy shaft 171 journaled appropriately, as in a suitably heavy central base or support 172, for rotation, suitable provision being made, as by thrust bearings, and the like, for the base to take up the weight of the rotary bed 19 and the parts carried by it.

As appears better from Figures 1, 10 and 17, the selected number of frames 18, each carrying a shaft 17 with a chuck 20, are preferably grouped about the axis of rotation of the bed 19, with the axes of the shafts 17 extending radially of the rotary bed 19 and also and preferably equiangularly spaced about the axis of rotation; thus, the angular spacing between any two successive hat block supporting shafts 17 may be, as indicated in these figures, 45°, so that, for example, eight frames 18 with hat-supporting chucks may be carried by the bed 19.

The under face of the bed 19, as viewed in Figure 12 and as better shown in Figure 13, is provided with as many radial slots 173 as there are hat supports, and they are correspondingly equiangularly spaced, being open-ended peripherally of the bed 19. Preferably, also, the under face of the bed 19 is provided with arcuate cutouts or recesses 174, one between each successive two open-ended slots 173.

Coacting with these slots and recesses I provide suitable mechanism for effecting periodic rotary movements of the bed 19 throughout an angle of 45° where there are eight hat-supporting frames 18, and for locking and holding the bed in position for a suitable time interval following each rotary movement.

Thus, extending upwardly from a suitable case 175 (Figures 12, 15 and 17) underneath the rotary bed 19 and with which the bearing support 172 may be mechanically associated, is a shaft 176, being provided with suitable bearings, both at the top and the bottom of the case 175, and at its upper end shaft 176 has keyed to it a hub 177 that has preferably integrally formed with it a segment-shaped part 178 and a crank arm 179 angularly related to each other, as is better shown in Figure 13.

Crank arm 179 carries at its outer end a roller 180 journaled on a suitable stud 181. These parts and the above-described slots and recesses of the bed 19 are so proportioned and related to each other, as is better shown in Figure 13, so that, with the crank 179 and segment 178 at rest in the dotted line position shown in Figure 13, a sufficient portion of the arcuate periphery of member 178 is mated with the recess 174 to act as a lock to hold the bed 19 against rotary movement. But upon shaft 176 commencing to rotate in clockwise direction, as viewed in Figure 13, roller 180 moves into position to enter slot 173, thereby also effecting a sufficient rotary displacement of the part 178 relative to the recess 174 as to break the above-mentioned locking action and free the bed 19 for rotary movement in counterclockwise direction. Continued rotation of shaft 176 enters the roller 180 further into the slot 173, commencing the rotary movement of bed 19 and continuing it until roller 180 is ready to emerge from that slot 173, thereby effecting a 45° rotary movement of bed 19. But these same actions have been effective to enter the segment-shaped part 178 into the next succeeding arcuate recess 174, thus effecting a new locking relation between the member 178 and the bed 19 and holding the latter against rotation. That side or edge of the segment-shaped part 178 that faces toward the roller 180 is, furthermore, shaped, somewhat as indicated in Figure 13, so as not to interfere with the rotary movement of the bed 19 and so as to permit the peripheral parts of the bed 19 and the part 178 to by-pass each other during the stroke of rotary movement of the bed 19.

Suitable means are provided for effecting cyclic or periodic actuation of the just described bed-advancing means and actuation of the hat-operating machine and its tools, all in proper timed relationship and in the preferred arrangement the above-described clutch 32—33 (Figure 1) related as above-described to the main shaft 28 takes part. As above pointed out, this clutch construction is preferably constructed, and controlled, to cause it to effect rotation of the main shaft 28, for example throughout one revolution, sufficient to put the various tools and mechanisms operating upon the hat body through one complete cycle of operations. To better understand and to illustrate one form which this clutch may be given, reference may now be made to Figures 8 and 9, and also to Figure 17 where certain parts of the clutch structure are shown schematically.

The movable clutch part 32 is arranged to be movable axially of the shaft 28 by means of a lever 183 which at its middle part is provided with a yoke 184 where, by means of studs or pins 185, 186 there is pivotally connected to it a collar or ring-like member 187 connected to the movable clutch part 32. This latter connection may be arranged as shown in Figure 8 where the connection is effected preferably by means of a combined radial and thrust antifriction bearing 190 whose outer race is fitted and secured within the ring 187 and whose inner face is fitted or secured to a hub portion of the clutch part 32. Thus, clutch part 32 may freely rotate relative to the ring 187 and by actuation of the latter through

the lever 183 the clutch part may be moved axially into or out of engagement with the clutch part 33, part 32 being splined to shaft 28 as at 189.

Also rotatable with the clutch part 32 is a cam member generally indicated at 191 having a peripheral cam portion 192 for coaction with one end of a latch member 193 and its side face, having a recess 194, functions with the latter also as a cam for coaction with the left-hand end of a lever 195 which is held in the position shown in Figure 9 by the said face but whose end may enter the recess 194 when the latter becomes juxtaposed to it, thus to shift the position of the lever 195.

Lever 195 is pivoted by a stud or pin 196 to a fixed or stationary bracket or part 197 carried by the frame 25 and latch member 193 is also pivoted in part 197 as by the stud or pin 198, being biased to swing in counter-clockwise direction by a spring 200. The right-hand end of lever 195 is connected with the lever 183 by a pivotal connection 201 preferably adjustable and carried in a lug extension of lever 183 as an adjustable stop 202 with which the latch 193 may be selectively engaged, either by its extreme end portion 193a or by a notch 193b.

The left-hand end of lever 183 is pivoted in a block 203 which is slidably mounted in suitable ways 204 formed in a bracket-like part 205 carried by the frame 25 (see Figures 1 and 8). Block 203 is biased toward the frame 25 by a spring 206 interposed between the block and an adjustable abutment 207 by which the resistance to movement in outward direction of the block 203 may be adjusted.

In Figure 8 clutch parts 32 and 33 are shown in engagement, thus effecting drive of the operating or cam shaft 28 from the motor driven worm wheel 34 and clutch part 33, through the clutch part 32. Its cycle of operations is substantially like this:—When the clutch is disengaged, latch 193 is in a position where its notch 193b engages the stop 202 and lever 195 has its end 195a engaged in the recess 194 in the side face of the cam member 191, the fulcrum block 203 of control lever 183 being, under the urge of spring 203, in its innermost or bottoming position in the ways 204 of bracket 205. To engage the clutch lever 183 is swung in clockwise direction, thus tending to move the clutch part 32 into engagement with the driving clutch part 33, but should the juxtaposed toothed members of these parts be out of alinement at that moment, spring 206 yields and fulcrum block 203 slides outwardly along the ways 204; this swinging of the lever 183 also swings the lock lever 195 clockwise to withdraw its end 195a from the recess 194, thus unlocking the otherwise locked clutch part 32, and stop 202 is moved out of engagement with the notch 193b and becomes latched by the end latch portion 193a which is swung into latching position by the spring 200. An angular rotary movement approximating the width of a tooth suffices to bring the teeth of the driving clutch part 33 into mating relation with the teeth on the movable clutch part 32, the latter moving axially to achieve such interengagement, now under the action of spring 206 which thrusts the fulcrum block 203 and hence the left-hand end of lever 183 in a direction to achieve such interengagement. The rotation and drive of shaft 28 and the parts related to it as above-described thus commence, whence disengagement of the clutch can take place only when recess 194 is again brought opposite lock-lever part 195a.

Prior to the end of the desired extent of rotary movement, say 360°, the cam part 192, shaped substantially as is better shown in Figure 8, rides into engagement with the short arm of the latch 193 and swings the latch clockwise to trip the latch part 193a out of engagement with the lever stop 202; subsequently recess 194 comes opposite lock-lever 195a and thus permits lever 183 to swing in counter-clockwise direction to disengage the clutch part 32 from clutch part 33 and to become engaged through its stop 202, with the notch 193b of the latch 193; while this is taking place, the movement of lever 183 in clutch-disengaging direction, also moves the lever 195 in counter-clockwise direction to enter its end 195a into the side face recess 194 of the movable clutch unit 32—191, thus locking that unit and shaft 28 in halted position, and in readiness for a repetition of the cycle.

As is better shown in Figure 17, I prefer to achieve actuation of lever 183 in clutch-engaging direction by electromagnetic means which may comprise a solenoid winding 210 and a movable core 211 having connected to it an actuating bar 212 provided with an elongated notch 213 for engaging a suitable end or lug portion of the lever 183, bar 212 being preferably pivotally connected to the core 211 for better permitting a spring 214 to bias the bar 212 into engagement with the lever 183.

Bar 212 I preferably also arrange to be tripped out of engagement with the lever 183, thus to permit movement thereof that accompanies disengagement of the clutch, and for this purpose I preferably employ a cam 215 (Figure 17) mounted on the shaft 28 and having related to it and suitably guided for sliding movement a cam follower 216 with the end of which the operating bar 212 may engage. Cam 215 is suitably shaped to shift the operating bar 212 toward the right or in clockwise direction, as viewed in Figure 17, just about concurrently with the tripping of the latch 193 by the cam 192 (Figure 8) to effect disengagement of the clutch, so that certainty of clutch disengagement is assured, a spring 183 (Figure 17) shifting the lever finally to disengage the clutch parts.

Preferably, also, I provide a switch 217 (Figure 17) arranged to be actuated in timed relation with clutch engagement and clutch disengagement and for that purpose the switch 217 may be connected as by a link 218 to the lever 195 for actuation into open or closed position according to the position assumed by the lever 195. And preferably, also, shaft 28 is provided with another cam 220 which through a spring biasing follower 221 controls the position of a switch 222, for a purpose later described in greater detail.

Referring now again to Figures 12 and 17, shaft 176, which drives the bed-advancing and locking parts 180 and 178 (Figure 13) is arranged to be driven preferably by means of an electric motor 225, preferably positioned externally of the casing 175, the drive being effected preferably through a clutch comprising clutch parts 226 and 227 (Figure 17). Thus, the shaft 228 of motor 225 may extend into the casing 172 by way of a suitable bearing, as shown, and on its end has mounted the clutch part 227 which, where the clutch is of the cone type, is in the form of the cup-like part of the clutch. The companion clutch part, being the cone 226, is splined onto a shaft 230 rotatably mounted within the casing

175 preferably by a bearing structure 231 which may be formed in or supported by an internal pillar of the casing 175 and by an end bearing 232 through which one end of the shaft extends externally of the casing 175 where it has mounted on it a brake drum 233. The other end of shaft 230 preferably extends, as shown in Figure 17, into the cup 227, thus giving it some bearing support and also aiding in maintaining coaxial alinement between the two clutch parts.

Clutch part 226 is arranged to be shifted into or out of engagement with its companion clutch part 227 and such an arrangement may comprise a collar 234 suitably held against axial movement relative to the clutch part 226 but to permit relative rotary motion therebetween, collar 234 being pivotally connected as by suitable trunnions to the yoke portion of a lever 235, one end of which is pivoted to a fulcrum block 236 slidably guided in suitable guides 237 provided within the casing 175 and biased by a spring 238 in a direction to tend to disengage movable clutch part 226 from the companion clutch part 227.

The other end of the lever is provided with an adjustable stop 240 for coaction with a movable abutment 241 which conveniently takes the form of a bell crank lever pivoted within the casing as by a shaft 242 and connected at one of its arms by a link 243 to the core 244 of an externally positioned solenoid having a winding 245. Accordingly, abutment 241 is movable into or out of operative relation to the stop 240. A spring 246 connected to clutch lever 235 and anchored within the casing 175 biases the lever in a direction of clutch interengagement.

On shaft 230 (Figure 17) is a worm 250 which meshes with a worm wheel 251 on the upright shaft 176, the latter actuating as above noted the bed-controlling and locking means 180 and 178 (Figure 13). Accordingly, with the motor 225 running, the drive of shaft 176 may be effected and halted during such time intervals as are determined by the engagement and disengagement of the clutch 226, 227.

As above described, fulcrum block 236 (Figure 17) is shiftable along the guide 237. Its position is preferably controlled, in coaction with the spring 238, by a cam 252 within the casing 175 and mounted on the shaft 176, by way of a cam follower preferably taking the form of a bell crank lever 253 pivoted within the casing as at 254, one arm engaging the cam 252 and the other engaging the fulcrum block 236 through a member 255, such as a cap screw with lock nut, of adjustable length, spring 238 thus acting through the block 236 to urge and hold the cam follower 253 in engagement with the cam 252.

The various hat supporting chucks and shafts carried by the table 19, each, as earlier described, being arranged in a frame 18 (Figures 1 and 17, for example), are preferably continuously driven, each preferably by its own motor 257, suitably embodied into the frame 18 and suitably geared to the chuck shaft. The motors 257 of the frames 18 on the movable bed 19 are for this purpose preferably connected in parallel, as by the circuit conductors 258 (Figures 1 and 17), which may be and preferably are three in number (according to the electrical characteristics of the motors) and for each circuit conductor there is provided, on the boss 170 that is at the under side of the bed 19, a suitably insulated slip ring 260, as is better shown in Figure 12, suitable brushes 261 (Figure 17) bearing against the slip ring 260 and connected to conductors 262, 263 and 264 that lead to the power circuit. Thus, electrical energy to the motors 257 may be continuously supplied.

Coacting with the bed 19 (Figure 17) is also a switch structure generally indicated by the reference character 265, comprising an actuating member like a rod 266 suitably guided as at 267 for movement in a direction along a radius to the center of the bed 19; at its end it is provided with a cam-like member 268 illustratively in the form of a half sphere for coaction with the cylindrical periphery 19a of the bed 19 and suitably spaced cam recesses 270, there being one cam recess 270 for each hat supporting structure 18 carried by the bed 19, illustratively eight, as above indicated, and being also equiangularly spaced about the bed periphery 19a. A spring 271 urges the rod and its cam 268 in a direction toward the bed periphery 19a. These parts are so located relative to the bed moving and locking mechanisms (Figures 13 and 14) that, when the bed 19 is brought to a halt, a cam recess 270 is brought into juxtaposition to the switch cam 268 which thus enters it and alters the circuit in which the contacts of the switch are connected. During movement of the bed 19, switch cam 268 being cammed out of a cam recess 270 at the commencement of such movement, is held in outwardly projected position by the bed periphery 19a, entering the next succeeding cam recess 270 when the movement stops.

Rod 266 of the bed-controlled switch structure 265 may control several circuits, illustratively two, having, therefore, two contact bridging parts 272 and 273. The contacts associated with switch member 272 are connected to control the solenoid winding 210 (Figure 17) that controls the clutch 32, 33 of the hat-operating mechanism, and since the latter may be duplicated at other stations or such other stations may be provided with mechanisms performing other operations upon a hat body, such other mechanisms, therefore, preferably embody a duplication of the clutch and cam shaft arrangement shown in Figure 17, including the switches 217 and 222 and solenoid 210—211. Thus, where the bed 19 carries eight hat-supporting and rotating devices, hat-operating mechanisms may be variously arranged or grouped about the bed 19 according to the sequences of operations desired on the hat bodies or according to other circumstances. For example, with eight hat supports on the bed 19, each hat support progressing through eight successive stations or positions of rest during a single rotation of the bed 19 one station might be a discharge and loading station where hat bodies are replaced, and the remaining seven could have positioned thereat seven machines, including the luring machine above described for performing on the same hat body successive and usually different operations thereon. Or other arrangements might be made; thus, every other of the eight stations could be a loading or hat-replacing station and at each of the remaining stations the machine could be a luring machine like that above described, whereby four such machines could be simultaneously and synchronously operated. Or, the eight stations could be subdivided into groups, say two groups of four successive stations each, where the first of each group is a loading or replacing station and at the next three stations are positioned three machines for performing different operations on the hat body, including the luring machine above described.

Because of various such possible arrangements, I have not shown in the drawings any one of them in detail and in Figure 17 I have diagrammatically indicated at 275 only one of such additional or other machines of a group or series of which the above described luring machine is, of course, one. Machine 275, as is the case of all of the machines related to the rotatable bed 19, has embodied in it, like the luring machine, an individual motor drive with a cam and operating shaft 28 and clutch, like the clutch 32—33 described above in detail, together with the related clutch and switch controls, such as those above described and shown at the left in Figure 17; to show certain features of interrelationship or of interdependence of all of the machines, I have, as to the diagrammatically shown machine 275, reproduced in Figure 17 only the solenoid winding 210b, the switch 217b, and switch 222b corresponding respectively to the parts 211, 217 and 222 related to the luring machine. A preferred circuit arrangement for interrelating the various parts is also shown diagrammatically in Figure 17.

Assuming that motor 225 (Figure 17) has just concluded the positioning of the bed 19 to advance the hat rotating devices thereon to the extent of one step, bed 19 becomes locked in that position, roller 180 assuming the dotted line position of Figure 13 and the segment part 178 locking the bed 19 due to its interfitting with a recess 174; clutch 226—227 (Figure 17) is disengaged, cam 252 and its follower 253 is in the position shown in Figure 17, and switch 272 of switch structure 265 is closed by the movement resulting from entry of cam 268 into recess 270.

Closure of switch 272 energizes solenoid winding 210, solenoid winding 210b, and also the similar solenoid windings on all of the other machines.

This energizing circuit extends from conductor 262, conductor 276, switch 272, conductor 277, conductor 278, solenoid 210, switch 280, and by way of conductor 281 to line 263 of the power circuit; by way of conductors 282 and 283 the clutch solenoids of all the remaining machines are connected in parallel to the clutch solenoid 210, each through a hand switch, such as the switch 280b, in the branch circuit of clutch solenoid 210b of machine 275.

Thus, the clutch solenoids of the various machines are all energized and each moves its operating bar 212 in a direction to move clutch lever 183 in clutch-engaging direction, whence clutch parts 33 and 32 become engaged in the manner above described, latch 193 holding the clutch lever 183, in coaction with spring 206, in clutch-engaging position. Thus, all of the machines commence operation substantially simultaneously, the main control and cam shafts 28 of all of them starting to rotate at substantially the same time.

Should it be desired to maintain any one machine of the series or group out of operation, the switch in the clutch solenoid branch circuit, such as switch 280 or switch 280b, is opened, thus preventing energization of the clutch solenoid of the corresponding machine.

With shaft 28 (Figures 1, 2 and 3) thus set into rotation, the various operations on the crown and two faces of the brim, as above described, now proceed, the luring tool 83 partaking of a traverse relative to the top T of the crown, thence about the square thereof, and thence along the side, partaking also of a shift to present luring tool 84 to the upper face of the brim B whence, all as earlier above described, arm 118 is swung from its substantially horizontal position upwardly to present the luring tool 116 to the under side of the brim B, substantially opposed to the tool 84 operating upon the upper face of the brim. During the continued rotation of the hat body the tools 145, 146 (Figures 2 and 10), illustratively in the form of brushes, are also operative upon the two faces of the brim B which has been presented therebetween upon the conclusion of the movement of the bed 19 into the above-mentioned position which effects closure of the clutch-solenoid controlling switch 272. These operations continue under the control of the shaft 28, all in the manner described in detail above, and by the time the shaft 28 has been brought to a halt, luring tool 84 has been withdrawn from the upper face of the brim and together with luring tool 83 has been restored to the starting position substantially as shown in Figure 1, while luring tool 116 under the control of arm 118 has been moved downwardly and out of operative relation to the under face of the brim, thus clearing these tools away from the hat body and its hat-supporting and rotating means and thereby conditioning the latter for subsequent movement away from or out of operative relation to the luring machine; in this latter connection and as above pointed out, it will be noted that the two tools 145, 146 (Figures 2 and 10) are mounted in such position that their adjacent or juxtaposed operative surfaces lie in the plane of general movement of the brim B of the hat so that even if these two tools are not given a movement to shift them away from the hat or its support, the hat brim is freely movable out of or into relationship to the two faces of the two tools, preferably, however, under the control of the guide shoe 160 (Figure 11), as above described.

Just prior to the tripping of the latch 193 and actuation of the lock lever 195 to disconnect the clutch and to halt the shaft 28, cam 215 (Figure 17) actuates cam follower 216 momentarily to swing the clutch-operating bar 212 in clockwise direction, thus to disengage bar 212 from lever 183, the continued energization of winding 210 pulling the solenoid core and bar 212 somewhat downwardly, thus to hold the upper end of the notch 213 below the upper edge of the end of lever 183 and thus freeing the latter for swinging in counter-clockwise direction when the clutch disengagement finally takes place under the control of latch 193 and lock lever 195.

Thus, the machine and operations on the hat body are brought to a halt and by similar actions at all the remaining machines of the groups or series, their operations are likewise brought to a halt.

But such actuation of the clutch into disengaged position, at each machine, has effected, through the swinging movement of the lock lever 195 as the latter moves to project its lock end 195a (Figures 8, 9 and 17) into the recess 194 of the movable clutch part 33, a movement of switch 217 (Figure 17) into circuit-closing position, a similar action taking place at the remaining machines, such as a closure of switch 217b at the machine 275. When all these switches are closed, the energizing circuit of solenoid winding 245 (Figure 17) is closed through a circuit, as follows:

Thus, from line 263, conductor 285, winding 245, conductor 286, switch 217, conductor 287, switch 217b, conductor 288 to the corresponding

switches of such other machines as may be in the group or series, then conductor 290 to line 262.

Solenoid 244—245 which initiates the next step in the advance of the bed 19 thus cannot become effective until all the machines, as determined by the switches 217, 217b, etc., are in readiness or are prepared for the next step of movement. Any machine that is cut out of the group or series preferably has its corresponding switch short-circuited as by a hand switch 292.

Energization of solenoid 244—245 swings the member 241 in clockwise direction, as viewed in Figure 17, and hence in effect removes the support for the right-hand end of clutch lever 235 which thereupon swings clockwise under the pull of spring 246 to engage clutch parts 226, 227, thus initiating the drive of shaft 176 and of the crank arm 179 and segment member 178 (Figures 12, 13 and 14), whence the shift of the bed 19 in counter-clockwise direction commences, thus causing switch cam 268 (Figure 17) to ride out of the cam recess 270 and to remain in engagement with the bed periphery 19a, thereby maintaining switches 272 and 273 opened, until the next succeeding cam recess 70 is brought to the switch cam 268.

With the opening of switch 272, the clutch solenoid winding 210 becomes deenergized, permitting the solenoid core and operating bar 212 to move upwardly under the urge of suitable springs, such as spring 214 or spring 291, or both, this upward movement of bar 212 being sufficient to bring the upper edge of notch 213 above the end of clutch lever 183 which thus becomes engaged in the notch 213 under the biasing action of spring 214 on the bar 212, and thus preparing these parts for subsequent actuation of lever 183 by the clutch solenoid in clutch-engaging direction.

Shaft 176 (Figures 17, 13 and 14) rotates in clockwise direction to advance bed 19 throughout its intended extent, such as 45°, such advance being halted by the withdrawal of crank roller from its slot 173 in the bed; cam 252 (Figure 17), during the latter portion of this advance of bed 19, swings and holds bell crank lever 253 in counter-clockwise direction, thus depressing the fulcrum block 236 along its guideway 237 and against the action of spring 238, thereby also raising the right-hand end of clutch lever 235 to prepare it for the return movement thereunder of the solenoid-controlled abutment 241.

As the cam follower 268 of the switch structure 265 enters the cam recess 270 that is brought into juxtaposition to it at the end of the advance of bed 19, switch 272 closes, thus energizing the clutch solenoids 210, 210b, etc., whence the cycle of operations to effect engagement of the clutches 32—33 in all of the machines recommences, thereby also effecting opening of the switches 217, 217b, etc., and thus deenergizing winding 245 (Figure 17) and permitting member 241 to be swung in counter-clockwise direction under the urge of spring 293 to restore it to position underneath the right-hand end of clutch lever 235 which is still held in suitable or raised position by cam 252 and lever 253. Member 241 being thus restored, shaft 176, continuing its rotation in clockwise direction, moves the crank roller 180 to the dotted line or starting position shown in Figure 13 and moves also segment member 178 into locking relation to the newly positioned recess 174 in the bed 19, whence cam 252 (Figure 17) permits the cam follower 253 to drop off of the steepest part of the cam and to assume the position shown in Figure 17, thus permitting spring 238 to shift the fulcrum block 236 upwardly along its ways 237 and thus through clutch lever 235 to disengage clutch part 226 from the motor driven clutch part 227, these actions taking place just as shaft 176 is positioning the crank arm roller 180 at its starting point, indicated in broken lines in Figure 13 and being accompanied by a braking action upon brake-drum 233 as is later described in detail.

During the above-described step of advance of the bed 19, the tools 83, 84 and 116 remain out of the way, as above described, the path being thus cleared for the movement of the hat body with its supporting and rotating means, out of operative relation to the machine and to replace the hat body by another carried in the next succeeding hat-supporting and rotating means on the bed 19. The hat body that is in course of removal from the machine or apparatus, moving toward the right as viewed in Figure 11, cams itself, by engagement with the side of its crown with the curved part 160b of the shoe or guide 160 out from in under the tool-supporting frame 150, the brim B passing neatly out from in between the two opposed tools 145, 146, these actions being aided by the continued rotation of the parts of the latter with which the shoe 160 and the two opposed tools 145, 146 engage during this movement.

The next succeeding hat body, also moving toward the right, as viewed in Figure 11, cams itself into position, the rotary movement of the brim aiding in neatly entering it in between the two tools 145, 146 while the curved shoe extension 160a coacts during this movement with the side of the rotating crown, all as earlier above described in detail.

The operations of the tools 145, 146 on the brim B of the hat may thus commence immediately that the hat becomes operatively related thereto; but, as above noted, the clutch-controlling solenoids are actuated to initiate again the operations of the various machines of the group or series, whence the cycle of operations above described is repeated.

Referring to Figures 15, 16 and 17, it will be noted that shaft 230, which is driven whenever clutch 226—227 is in engagement, extends out of the casing 175 where it carries, as earlier noted, a brake drum 233; about brake drum 233 is a brake band 294, one end of which is adjustably anchored as at 295 (Figure 15) and the other end of which is secured to a threaded rod 296 whose upper end passes through a pin 297 carried in the bifurcated end of one arm of a bell cranklever 298, a nut 300 at the upper end of threaded rod 296 serves with the adjustment at the anchorage 295 to suitably adjust the brake band to respond to actuation of bell crank lever 298.

Lever 298 is pivoted to swing about a horizontal axis provided by a stud or pin 301 suitably supported in a lug on the upper side of the casing 175 and by means of a universal type of pivotal connection 302 lever 298 (Figures 15 and 16) is pivotally connected to a link 303 whose right-hand end (Figure 15) is shaped to provide an elongated eye 304 extending transversely of the link 303 to receive therein one end of a lever arm 305 secured to the shaft 242 to which is secured, within the casing 175, the abutment 241 (Figure 17) that coacts with the clutch lever 235, so that actuation of the abutment 241 by the solenoid 244—245 causes arm 305 to be similarly actu-

ated. A spring 306 biases link 303 in clockwise direction about the axis of its left-hand pivotal connection and hence toward the upper end of a lever 307 pivoted externally on the upper side of casing 175 as by stud 308 and whose lower end is provided with a cam follower in the form of a roller 310 to coact with a cam 311 on the vertically extending shaft 176, a spring 312 biasing lever 307 in a direction to hold the roller 310 in engagement with the cam periphery of cam 311. The free end of lever 307 coacts with the link 303 which is provided with a notch or seat 313 with which lever 307 becomes engaged or disengaged according to the action of cam 311 and the lever arm 305.

When solenoid winding 245 becomes deenergized, as above described, to permit abutment 241 to be moved in under the right-hand end of the clutch lever 235 (Figure 17), this taking place in the manner above described, arm 305 (Figure 15) moves in counter-clockwise direction and hence to the position shown in Figure 15, permitting link 303 under the urge of spring 306 to move clockwise into the position shown in Figure 15, thus positioning the notch 313 in the path of movement of the upper end of lever 307, the latter being held in a position displaced clockwise several degrees from that shown in Figure 15 due to the portion 311a of the periphery of cam 311.

But as the shaft 176 approaches a position where the crank roller 180 is at the starting point (the broken line position shown in Figure 13), a relatively steep portion 311b of the cam 311 swings the lever 307 counter-clockwise to engage its upper end into the notch 313 and thus to thrust link 303 to the left and swing bell crank lever 298 clockwise (Figure 16) to tighten the brake band 294, thus to prevent overstepping of the drive of shaft 176 and related parts following the disengagement of clutch parts 226—227 under the control of cam 252 (Figure 17).

With the halting of shaft 176, the brake-controlling parts remain in the position just described and as shown in Figure 15, but upon the subsequent energization of solenoid 244—245 under the control of machine switches 217, 217b, etc., as above described, the withdrawal of the clutch lever abutment 241 (Figure 17) that follows is accompanied by a clockwise movement of arm 305 (Figure 15) to swing link 303 upwardly and thus to trip its notched part 313 out of engagement with the cam lever 307, thus releasing the tension on the brake band 294 and freeing the drive of shaft 230, commenced when clutch parts 226, 227 are engaged, from the action of the brake.

Switches 222, 222b, etc., of the various machines (Figure 17), each controlled by a cam 220 on the cam shaft 28 of each machine, are connected in series by conductors 315, 316, etc., and by way of conductors 317 and 318 are bridged across or connected in parallel to the contacts of switch 273 which by conductors 320 and 321 is connected in circuit with one pair of the conductors 108, 109, 110 of the main power line but through the winding 322 of a control switch generally indicated by the reference character 323 which is interposed between the line conductors 108—109—110 and the circuit conductors 262—263—264, respectively. Switch 323 is so constructed that energization of winding 322 holds the switch 323 closed and deenergization thereof effects opening of the switch. Cam 220 of the luring machine, and likewise the same cam on the other machine or machines of the group or series, are shaped to have a portion of small angular extent for moving the cam follower in switch-closing direction just prior to the halting of the cam shaft 28 which, as above described, takes place when the part 195a of the lock lever 105 enters the recess 194 in the slidable clutch member 33 and for releasing it from switch-closing position only after a small subsequent angular or rotary movement of shaft 28 takes place in response to a subsequent engagement of clutch parts 33, 32.

During the interval between movement of switch 222 (and also of the corresponding switches, such as switch 222b of the other machine or machines) into closing position and its movement into open position, switch 273 (Figure 17) is open, for it is during that interval that the advancing movement of bed 19 takes place. Switches 222, 222b, etc., thus maintain the circuit of control winding 322 closed while switch 273 is open, and vice versa, thus holding the safety switch 323 closed. But should any action take place during the operation of the apparatus to open switch 273 (as would happen if a rotary movement of bed 19 took place accidentally, or otherwise) while switches 222, 222b, etc., are open (and the machines corresponding to the latter switches operating), control winding 322 is immediately deenergized and safety switch 323 opens, halting motor 225 and open-circuiting other parts connected to the main circuit; should anything happen to any one of the machines, such as a jamming of any part, a breakage, or the like, such as, for example, a condition in which any one of these switches remains open or becomes opened during the commencement or continuatoin of an advancing step of movement of the bed 19, the latter being accompanied by opening of switch 273, control winding 322 becomes deenergized and safety switch 323 opens.

Thus, it will be seen that there has been provided in this invention a method and apparatus in which the various objects hereinbefore noted, together with many thoroughly practical advantages, are successfully achieved. It will be seen that the apparatus is of thoroughly dependable action and control, is efficient in operation and is thoroughly safe and dependable in action.

As many possible embodiments may be made of the mechanical features of the above invention and as the art herein described might be varied in various parts, all without departing from the scope of the invention, it is to be understood that all matter hereinabove set forth, or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. An apparatus for operating upon the crown and the two sides of the brim of a hat body, comprising a frame carrying means for supporting and rotating a hat body, a frame movably supporting three operating tools, one for the crown, one for the upper brim side, and one for the under brim side, means operating in repeated cycles to effect relative movement between said two frames into successive relative positions in one of which said hat supporting and rotating means with a hat body supported thereby and said tools are operatively related and in the other of which they are out of operative relation, means operating in repeated cycles to traverse said crown tool from the tip of the crown to the band portion thereof and thereby to move said

second tool into position to operate upon the upper side of the brim and to move said third tool into position juxtaposed to said second tool to operate upon the under side of said brim, whereby said two brim tools mutually support said brim for each other, and then to return said tools to their respective starting positions, and control means for insuring synchronization of said two cyclically operating means.

2. An apparatus for operating upon a hat body comprising a frame carrying means for supporting and rotating a hat body about an axis substantially at right angles to the general plane of the brim, a frame supporting a tool for operation upon a hat body, means mounting said frames for relative movement therebetween into successive relative positions in one of which said hat-supporting and rotating means with a hat body supported thereby and said tool are operatively related and in the other of which they are out of operative relation, means constructed and operating, when made effective, to cause said tool, in a single cycle, to be operative to perform an operation upon a hat body and to be inoperative, said last-mentioned means comprising a train of mechanism including a clutch according to the condition of which said tool performs an operation or is inoperative, with means altering the condition of the clutch in response to the performance of the desired operation upon the hat body, means for effecting relative movement between said frames, and means responsive to the condition of said clutch for controlling said last-mentioned means.

3. An apparatus for operating upon a hat body comprising a frame carrying means for supporting and rotating a hat body about an axis substantially at right angles to the general plane of the brim, a frame supporting a tool for operation upon a hat body, means mounting said frames for relative movement therebetween into successive relative positions in one of which said hat-supporting and rotating means with a hat body supported thereby and said tool are operatively related and in the other of which they are out of operative relation, means including a clutch for controlling a function of the operation of said tool on a hat body with means interrupting said clutch substantially upon the completion of said function, means for effecting relative movement between said two frames and means operating in timed relation thereto for actuating said clutch in engaging direction.

4. An apparatus for operating upon hat bodies comprising a group of mechanisms each comprising a hat operating tool and means including a clutch for controlling the operation of the tool with means for disengaging the clutch following a certain operation of the tool, a group of devices each for supporting and rotating a hat body, means supporting said two groups for relative movement therebetween to effect relative progression between the hat-supporting devices of one group and the operating mechanisms of the other group into and out of operative relation to each other, means operating, when made effective, to cause relative movement between said two groups by an amount sufficient to progress said hat-supporting devices of said one group out of operative relation to respective mechanisms of the other group and into operative relation to respectively succeeding mechanisms of said group, and means dependent upon the disengagement of all of said clutches for controlling the effectiveness of said movement-effecting means.

5. An apparatus for operating upon hat bodies comprising a group of mechanisms each comprising a hat operating tool and means including a clutch for controlling the operation of the tool with means for disengaging the clutch following a certain operation of the tool, a group of devices each for supporting and rotating a hat body, means supporting said two groups for relative movement therebetween to effect relative progression between the hat-supporting devices of one group and the operating mechanisms of the other group into and out of operative relation to each other, means operating, when made effective, to cause relative movement between said two groups by an amount sufficient to progress said hat-supporting devices of said one group out of operative relation to respective mechanisms of the other group and into operative relation to respectively succeeding mechanisms of said group, means dependent upon the disengagement of all of said clutches for controlling the effectiveness of said movement-effecting means, and means responsive to completion of a step of relative movement by said movement-effecting means for reengaging all of said clutches.

6. An apparatus for operating upon hat bodies comprising a group of mechanisms each comprising a hat operating tool, a group of devices each for supporting and rotating a hat body, means supporting said two groups for relative movement therebetwen to effect relative progression between the hat-supporting devices of one group and the operating mechanisms of the other group into and out of operative relation to each other, means operating to cause relative movement between said two groups by an amount sufficient to progress said hat-supporting devices of said one group out of operative relation to respective mechanisms of the other group and into operative relation to respectively succeeding mechanisms of said group, said movement-effecting means including a clutch having means for disengaging it following the completion of a step of movement as aforesaid, and means dependent upon the completion of the respective operations of all of said tools of said group of tools for reengaging said clutch.

7. An apparatus for operating upon hat bodies comprising a group of mechanisms each comprising a hat operating tool, a group of devices each for supporting and rotating a hat body, means supporting said two groups for relative movement therebetween to effect relative progression between the hat-supporting devices of one group and the operating mechanisms of the other group into and out of operative relation to each other, means operating to cause relative movement between said two groups by an amount sufficient to progress said hat-supporting devices of said one group out of operative relation to respective mechanisms of the other group and into operative relation to respectively succeeding mechanisms of said group, said movement-effecting means including a clutch having means for disengaging it following the completion of a step of movement as aforesaid, means operating in timed relation to the disengagement of said clutch for initiating the operation of tools of said group of tools upon the respective hat bodies operatively related thereto, and means responsive to the completion of certain functioning of all of said tools upon the respective hat bodies operatively related thereto for reengaging said clutch.

8. An apparatus for operating upon hat bodies

comprising a group of mechanisms each comprising a clutch and a hat operating tool, a group of devices each for supporting and rotating a hat body, means supporting said two groups for relative movement therebetween to effect relative progression between the hat-supporting devices of one group and the operating mechanisms of the other group into and out of operative relation to each other, means operating, when made effective, to cause relative movement between said two groups by an amount sufficient to progress said hat-supporting devices of said one group out of operative relation to respective mechanisms of the other group and into operative relation to respectively succeeding mechanisms of said group, said movement-effecting means comprising a clutch with means for disengaging it following the completion of relative movement as aforesaid, means dependent upon completion of said relative movement for engaging all of the clutches of said tools, and means dependent upon disengagement of the clutches of all of said tools for engaging the clutch of said movement-effecting means.

9. An apparatus for operating upon hat bodies comprising a group of mechanisms each comprising a hat operating tool at least one of said mechanisms having a movably mounted tool, a group of devices each for supporting a hat body, means supporting said two groups for relative movement therebetween to effect relative progression between the hat-supporting devices of one group and the operating mechanisms of the other group into and out of operative relation to each other, means for effecting relative movement between said two groups to achieve one step of relative progression, means including clutch means for making the tools of said mechanisms operative upon hat bodies respectively presented thereto and for effecting movement of said movable tool of said one mechanism to traverse it relative to the hat body presented to it when said clutch means are in one condition, with means responsive to completion of the operations of said tools upon the hat bodies to alter the condition of said clutch means and thereby halt the operations of said tools, said means for effecting relative movement between said two groups including clutch means operative when in one condition to effect said relative movement and means responsive to the completion of a step of relative progression to alter the condition of said second mentioned clutch means, and means dependent upon the achievement of the said altered condition of one of said clutch means for putting the other of said clutch means in said first-mentioned condition.

10. An apparatus for operating upon hat bodies comprising a group of mechanisms each comprising a hat operating tool at least one of said mechanisms having a movably mounted tool, a group of devices each for supporting a hat body, means supporting said two groups for relative movement therebetween to effect relative progression between the hat-supporting devices of one group and the operating mechanisms of the other group into and out of operative relation to each other, means including clutch means for effecting relative movement between said two groups to achieve relative progression when said clutch means is in one condition, with means altering the condition of said clutch means to halt said relative movement and thereby complete one step of relative progression, means for making the tools of said mechanisms operative upon hat bodies respectively presented thereto and for effecting movement of said movable tool of said one mechanism to traverse it relative to the hat body presented to it, means for restoring said clutch means to its first above-mentioned condition, and means dependent upon the position of said traversing tool of said mechanism for controlling said clutch-restoring means of said movement-effecting means and thereby acting to prevent a movement of progression between said two groups only after said traversing tool assumes a position where it is not in the path of relative movement of progression between a hat body and a hat-supporting device moved into or out of operative relation thereto.

11. An apparatus for operating upon a hat body comprising a device for supporting and rotating a hat body about an axis at right angles to the general plane of the brim, a mechanism having tool means for treatment of a hat body, said tool means comprising a frame supporting two tools facing toward each other for action upon the respective sides of said brim and comprising other tool means having means mounting it for movement relative to the hat body, means for moving said hat-supporting device to move a hat supported by it in a direction to carry a portion of the brim between said two facing tools for treatment by the latter of the two sides of the brim, and means controlled by said mechanism for effecting movement of said other tool means relative to the hat body to cause said other tool to be effective upon the hat body while said two facing tools are treating the two sides of said brim.

12. An apparatus for operating upon a hat body comprising a device for supporting and rotating a hat body about an axis at right angles to the general plane of the brim, a mechanism having tool means for treatment of a hat body, said tool means comprising a frame supporting two tools facing toward each other for action upon the respective sides of said brim, means mounting said device and said mechanism for relative movement therebetween to bring a portion of the brim of the hat body into or out of operative relation to said two tools, means mounting said frame for movement in a direction toward or away from said axis, and cam-like means associated with said frame and positioned to engage said hat body during said relative movement and thereby shift and position said frame and said two spaced tools to avoid collision with the crown of the hat body.

13. An apparatus for operating upon a hat body comprising a device for supporting and rotating a hat body about an axis at right angles to the general plane of the brim, a mechanism having tool means for treatment of a hat body, said tool means comprising a frame supporting two tools facing toward each other for action upon the respective sides of said brim, means mounting said frame for movement toward or away from the axis of the hat body, means mounting said device and said mechanism for relative movement to bring a hat body into or out of operative relation to said two tools, means limiting movement of said frame in a direction toward said axis and operative to limit such movement when said hat body and said two tools are out of operative relation to each other, and a shoe for said frame on the side thereof toward the crown of a hat body for engaging the crown of a hat body during relative movement between said devices and said mechanism to bring a hat body and said two tools into operative relation.

14. An apparatus as claimed in claim 13 in

which the said means mounting said device and said mechanism for relative movement is constructed to effect said relative movement in the general direction of a tangent to the side of the crown of the hat body, said shoe being extended in a direction of said relative movement to engage the side of the crown of a hat body and to cam said frame into or out of position as said relative movement takes place.

15. An apparatus for operating upon hat bodies comprising a group of mechanisms each comprising a hat operating tool at least one of said mechanisms having a movably mounted tool, a group of devices each for supporting a hat body, means supporting said two groups for relative movement therebetween to effect relative progression between the hat-supporting devices of one group and the operating mechanisms of the other group into and out of operative relation to each other, means for effecting relative movement between said two groups to achieve one step of relative progression, and means associated with said movably mounted tool to engage a part carried by that one of said devices related to said one mechanism during said relative movement between said two groups and acting to cam said tool into operative relation to the hat body supported by said device.

16. An apparatus for operating upon the crown and the two sides of the brim of a hat body comprising means for supporting and rotating a hat body, a frame movably supporting three operating tools, one for the crown, one for the upper brim side, and one for the under brim side, and means for traversing said crown tool from the tip of the crown to the band portion thereof and in response to said traversing of said crown tool, to move said second tool into position to operate upon the upper side of the brim, and means operating in timed relation thereto to move said third tool into position juxtaposed to said second tool to operate upon the under side of said brim, whereby said two brim tools mutually support said brim for each other, said traversing and moving means being effective thereafter to return said tools to their respective starting position.

17. An apparatus for operating upon a hat comprising means for supporting and rotating a hat, a tool for operating upon the hat as the latter rotates, means for effecting relative movement between said operating tool and said hat supporting means to bring said tool into or out of operative relation to the hat, said tool having means for heating it, means adapted to change the heating effect of said heating means, and means operating according to the position of said tool relative to the hat body for controlling said heating effect changing means.

18. An apparatus for operating upon the crown and the two sides of the brim of a hat body comprising means for supporting and rotating a hat body, a frame movably supporting three operating tools, one for the crown, one for the upper brim side, and one for the under brim side, there being means relating said first and second tools to each other at an angle approximating the angle between the brim and crown side of said hat body, means for traversing said first and second tools as a unit with the first tool contacting the crown and to bring said second tool into engagement with the upper side of said brim, and means for moving said third tool into position juxtaposed to said second tool to operate upon the under side of said brim whereby said two brim tools mutually support said brim for each other.

19. An apparatus for operating upon the crown and the two sides of the brim of a hat body comprising a frame carrying means for supporting and rotating a hat body, a frame having three operating tools, one for the crown, one for the upper brim side, and one for the under brim side, means movably supporting said first and second tools substantially as a unit and from said frame and with the two tools making an angle with each other commensurate with the angle between the brim and crown side of said hat body, mechanism for controlling movement of said tool unit to effect traverse of the crown by the crown tool thereof and to effect operation by the brim tool thereof upon the upper brim side when the tool unit is positioned in the angle between the crown side and brim and for retracting said tool unit, means operating in timed relation thereto for moving said third tool into operative relation to the under brim side and for retracting it, and means for effecting relative movement between said two frames in timed relation to the movements of said tools to bring said hat-supporting means and said tools into or out of operative relation to each other.

20. An apparatus for operating upon the crown and the two sides of the brim of a hat body comprising means for supporting and rotating a hat body, a frame having three operating tools, one for the crown, one for the upper brim side, and one for the under brim side, means movably supporting said first and second tools substantially as a unit and from said frame and with the two tools making an angle with each other commensurate with the angle between the brim and crown side of said hat body, mechanism for controlling movement of said tool unit to effect traverse of the crown by the crown tool thereof and to effect operation by the brim tool thereof upon the upper brim side when the tool unit is positioned in the angle between the crown side and brim and for retracting said tool unit, and means operating in timed relation thereto for moving said third tool into operative relation to the under brim side and for retracting it.

21. An apparatus as claimed in claim 20 in which there is means for heating at least one of said tools, means for changing the heating effect of said heating means upon said one tool, and control means operating upon said changing means and operating according to the position of said tool relative to the hat body.

22. An apparatus as claimed in claim 20 having heating means for at least one of said tools, said heating means having means supporting it adjacent that point in the path of movement of said tool which the latter reaches when in retracted position, whereby said tool is subjected to heating by said heating means while the tool is in retracted position.

23. An apparatus as claimed in claim 20 having heating means for at least one of said tools and means mounting said heating means for movement with its tool, means for altering the heating action of said heating means and means controlled in accordance with the position of said tool relative to the hat body for operating said altering means.

24. An apparatus for operating upon the crown and the two sides of the brim of a hat body comprising means for supporting and rotating a hat body, a frame having three operating tools, one for the crown, one for the upper brim side,

and one for the under brim side, means movably supporting said first and second tools substantially as a unit and from said frame and with the two tools making an angle with each other commensurate with the angle between the brim and crown side of said hat body, mechanism for controlling movement of said tool unit to effect traverse of the crown by the crown tool thereof and to effect operation by the brim tool thereof upon the upper brim side when the tool unit is positioned in the angle between the crown side and brim, and means mounting said third tool to operate upon the under brim side in substantial juxtaposition to said second tool.

25. An apparatus for operating upon the crown and the two sides of the brim of a hat body comprising means for supporting and rotating a hat body, a frame having three operating tools, one for the crown, one for the upper brim side, and one for the under brim side, means movably supporting said first and second tools substantially as a unit and from said frame and with the two tools making an angle with each other commensurate with the angle between the brim and crown side of said hat body, mechanism for controlling movement of said tool unit to effect traverse of the crown by the crown tool thereof and to effect operation by the brim tool thereof upon the upper brim side when the tool unit is positioned in the angle between the crown side and brim and for retracting said tool unit, means operating in timed relation thereto for moving said third tool into operative relation to the under brim side and for retracting it, and driving means for said tool-moving means and having means for halting the drive thereof upon completion of retraction of said tools.

26. An apparatus for operating upon the crown and the two sides of the brim of a hat body comprising a frame carrying means for supporting and rotating a hat body, a frame having three operating tools, one for the crown, one for the upper brim side, and one for the under brim side, means movably supporting said first and second tools substantially as a unit and from said frame and with the two tools making an angle with each other commensurate with the angle between the brim and crown side of said hat body, mechanism for controlling movement of said tool unit to effect traverse of the crown by the crown tool thereof and to effect operation by the brim tool thereof upon the upper brim side when the tool unit is positioned in the angle between the crown side and brim and for retracting said tool unit, means operating in timed relation thereto for moving said third tool into operative relation to the under brim side and for retracting it, means mounting said first frame for movement relative to said second frame to bring a hat body into or out of operative relation to said tools, and means controlling actuation of said tool-moving means in accordance with the position of said first frame relative to the second.

27. An apparatus for operating upon the crown and the two sides of the brim of a hat body comprising a frame carrying means for supporting and rotating a hat body, a frame having three operating tools, one for the crown, one for the upper brim side, and one for the under brim side, means movably supporting said first and second tools substantially as a unit and from said frame and with the two tools making an angle with each other commensurate with the angle between the brim and crown side of said hat body, mechanism for controlling movement of said tool unit to effect traverse of the crown by the crown tool thereof and to effect operation by the brim tool thereof upon the upper brim side when the tool unit is positioned in the angle between the crown side and brim and for retracting said tool unit, means operating in timed relation thereto for moving said third tool into operative relation to the under brim side and for retracting it, means mounting said first frame for movement relative to said second frame to bring a hat body into or out of operative relation to said tools, and means controlling movement of said first frame relative to said second frame in accordance with the positions of said tools.

28. An apparatus for operating upon the crown and the two sides of the brim of a hat body comprising a frame carrying means for supporting and rotating a hat body, a frame having three operating tools, one for the crown, one for the upper brim side, and one for the under brim side, means movably supporting said first and second tools substantially as a unit and from said frame and with the two tools making an angle with each other commensurate with the angle between the brim and crown side of said hat body, mechanism for controlling movement of said tool unit to effect traverse of the crown by the crown tool thereof and to effect operation by the brim tool thereof upon the upper brim side when the tool unit is positioned in the angle between the crown side and brim and for retracting said tool unit, means operating in timed relation thereto for moving said third tool into operative relation to the under brim side and for retracting it, means mounting said first frame for movement relative to said second frame to bring a hat body into or out of operative relation to said tools, control means for said tool-moving means operating to effect movement thereof throughout a complete cycle ending in retracted positions of said tools, and means for controlling said control means in accordance with the position of said first frame relative to said second frame.

29. An apparatus for operating upon a hat body comprising a frame carrying means for supporting and rotating a hat body about an axis substantially at right angles to the general plane of the brim, a frame supporting a tool for operation upon a hat body, means mounting said frames for relative movement therebetween into successive relative positions in one of which said hat supporting and rotating means with a hat body supported thereby and said tool are operatively related and in the other of which they are out of operative relation, means constructed and operating, when made effective, to effect relative movement between said two frames, throughout a single cycle, into successive relative positions in one of which said hat-supporting and rotating means with a hat supported thereby and said tool are operatively related and in the other of which they are out of operative relation, means constructed and operating, when made effective, to effect, in a single cycle, operativeness of said tool upon the hat body and inoperativeness of said tool, locking means effective to lock one of said cyclic means against operation upon the completion of a single cycle, and means responsive to the action of said locking means for making the other of said cyclic means effective.

30. An apparatus for operating upon hat bodies comprising a group of mechanisms each comprising a hat operating tool and means including a clutch for controlling the operation of the tool with means for disengaging the clutch following

a certain operation of the tool, a group of devices each for supporting and rotating a hat body, means supporting said two groups for relative movement therebetween to effect relative progression between the hat-supporting devices of one group and the operating mechanisms of the other group into and out of operative relation to each other, means operating, when made effective, to cause relative movement between said two groups by an amount sufficient to progress said hat-supporting devices of said one group out of operative relation to respective mechanisms of the other group and into operative relation to respectively succeeding mechanisms of said group, electro-responsive means adapted upon actuation to make said movement-effecting means effective, and a plurality of means, one for each of said clutches, for conjointly controlling said electro-responsive means.

31. An apparatus for operating upon a hat body comprising means for supporting and rotating a hat body, tool means having two operative portions making an angle to each other substantially like the angle between the side and brim of the hat body, means movably supporting said tool means to traverse it to cause one of its portions to traverse a path including the tip and side of the crown and to bring the other tool portion into engagement with the upper side of the brim, said tool-supporting means comprising a supporting arm, means mounting said arm to swing about a pivot and means pivotally supporting said tool means on said arm to pivot relative thereto, and actuating means comprising means controlling the swing of said arm about its pivot and means controlling the pivoting of said tool means relative to said arm.

32. An apparatus as claimed in claim 31 in which said last-mentioned means includes operating connections coaxial with said first-mentioned pivot.

33. An apparatus for operating upon a hat body comprising means for supporting and rotating a hat body, two operating tool means, means movably supporting one of said tool means for movement relative to the hat body in a path to treat at least a portion of the hat body on the crown side of the plane through the brim, means mounting the other of said tool means to treat the under side of the brim, cam means for controlling the movement of said movable tool means and for controlling the operation of both of said tool means, driving means including a clutch for driving said cam means, means for disengaging said clutch upon completion of a certain treatment by said tool means of said hat body, means movably supporting said hat-supporting and rotating means for movement of the latter into or out of operative relation to said tool means, means for effecting engagement of said clutch, and means for controlling said clutch-engaging means according to the position of said hat-supporting means relative to said tool means.

34. An apparatus for operating upon a hat body having a brim comprising means for supporting and rotating a hat body, two brim tools, one for the upper side of the brim and the other for the under side of the brim, means mounting one of said brim tools for movement into or out of engagement with a side of the brim in a direction substantially at right angles to the plane of the brim, means mounting the other of said brim tools for movement into or out of engagement with the other side of the brim along a path substantially parallel to the plane of the brim, mechanism for actuating said two mounting means, mechanism for effecting movement of said hat-supporting means into or out of operative relation to said tools, and means for controlling the actuation of said two mechanisms in timed relation.

35. An apparatus for operating upon a hat body having a brim comprising means for supporting and rotating a hat body, two brim tools, one for the upper side of the brim and the other for the under side of the brim, means mounting one of said brim tools for movement into or out of engagement with a side of the brim in a direction substantially at right angles to the plane of the brim, means mounting the other of said brim tools for movement into or out of engagement with the other side of the brim along a path substantially parallel to the plane of the brim, whereby the paths of movement of said two tools into or out of operative relation to said brim are substantially at right angles to each other, actuating means for said first-mentioned mounting means to effect movement of the tool mounted thereby, actuating means for said second-mentioned mounting means to effect movement of the tool mounted thereby, and mechanism causing said two actuating means to operate in timed relation to each other.

36. An apparatus for operating upon a hat body comprising means for supporting a hat body, a tool for treating the hat body, means movably supporting said tool comprising a main support having means mounting it to pivot about an axis and an auxiliary support carrying said tool and having means mounting it for shifting relative to said main support, whereby the angular relationship of said tool to the hat body may be changed during movement of the tool in response to movement of the main support about its pivot, means carried by said main support adapted to shift said auxiliary support relative to the main support and including a toothed member extending adjacent said axis, means for actuating said main support to swing about said axis, and actuating means coaxial with said axis and having toothed means for operating said toothed member.

37. An apparatus as claimed in claim 36 in which said last-mentioned actuating means is non-rotatably slidable in the direction of said axis and its toothed member is in the form of a cylindrical rack, whereby said main support may move about its axis without having said toothed means actuate said toothed member, and means for controlling the sliding axial movement of said actuating means.

38. An apparatus for operating upon a hat body comprising a frame carrying means for supporting and rotating a hat body about an axis substantially at right angles to the general plane of the brim, a frame supporting a tool for operation upon a hat body, means mounting said frames for relative movement therebetween into successive relative positions in one of which said hat-supporting and rotating means with a hat body supported thereby and said tools are operatively related and in the other of which they are out of operative relation, means including driving means for effecting relative movement between said two frames with means making said driving means ineffective upon a certain relative movement having taken place, braking means for halting relative movement between said two frames, and means making said braking means effective to prevent overstepping in relative move-

ment upon said driving means being made ineffective.

39. An apparatus as claimed in claim 38 provided with means for making said driving means effective to commence a succeeding step of relative movement between said two frames, and means coacting therewith to effect release of said means.

40. An apparatus for operating upon hat bodies comprising a group of mechanisms each comprising a hat operating tool and driving means coacting with the latter with control means making said driving means ineffective following a certain operation of the tool, whereby each of said mechanisms determines the operating cycle of its tool, a group of devices each for supporting and rotating a hat body, means supporting said two groups for relative movement therebetween to effect relative progression between the hat-supporting devices of one group and the operating mechanisms of the other group into and out of operative relation to each other, means operating, when made effective, to cause relative movement between said two groups by an amount sufficient to progress said hat-supporting devices of said one group out of operative relation to respective mechanisms of the other group and into operative relation to successively succeeding mechanisms of said group, control means for said movement-effecting means, and means interlocking the control means of each of said mechanisms and said last-mentioned control means.

41. An apparatus as claimed in claim 40 in which each of said group of mechanisms has also control means for making said driving means effective, said interlocking means comprising also means actuating said last-mentioned control means in response to the completion by said movement-effecting means of the aforesaid amount of relative movement.

42. An apparatus as claimed in claim 40 in which said interlocking means comprises a pluarlity of switch means, one for each of said mechanisms, with means conditioning the switch means according as said driving means is effective or ineffective, an electro-responsive means controlled by said plurality of switches for controlling said control means for said movement-effecting means.

43. An apparatus as claimed in claim 40 in which said interlocking means comprises a plurality of elements, one for each of said mechanisms and actuated by their respective mechanisms at substantially the same points in the respective normal operating cycles of said mechanisms, whereby said elements are in actuated condition at the same time so long as said plurality of mechanisms operate with their cycles in substantial synchronism, and means operative upon the control means for said movement-effecting means and responding in accordance with whether or not said elements are in actuated condition at the same time and hence whether or not said plurality of mechanisms are operating in substantial synchronism.

44. An apparatus for operating upon hat bodies comprising a group of mechanisms each comprising a hat operating tool and driving means coacting with the latter with control means making said driving means ineffective following a certain operation of the tool, whereby each of said mechanisms determines the operating cycle of its tool, a group of devices each for supporting and rotating a hat body, means supporting said two groups for relative movement therebetween to effect relative progression between the hat-supporting devices of one group and the operating mechanisms of the other group into and out of operative relation to each other, means for effecting relative movement between said two groups, each of said mechanisms having a driven means operating substantially synchronously with the driving means of its mechanism, whereby the driven means of all of said mechanisms operate substantially synchronously as long as the said operating cycles of said mechanisms are substantially in step with one another, control means for said movement-effecting means, and means for controlling the latter including means controlled by said plurality of driven means and acting in accordance with whether or not the latter are in substantial synchronism.

45. An apparatus as claimed in claim 44 in which the control means for said movement-effecting means comprises electro-responsive means, said driven means of each of said mechanisms comprising switch means, said controlled means comprising circuit connections between said plurality of switch means and said electro-responsive means.

46. An apparatus for operating upon a hat body comprising means for supporting a hat body, a tool, means mounting said supporting means and said tool to effect relative traversing movement therebetween during the time that said tool performs an operation upon the hat and to effect movement of retraction of said tool relative to the hat, heating means, and means supporting said heating means adjacent that point in the path of movement of retraction of said tool which the latter reaches when in retracted position, whereby the tool becomes heated when in retracted position.

BURLING D. WELLS.

CERTIFICATE OF CORRECTION.

Patent No. 2,289,814. July 14, 1942.

BURLING D. WELLS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 26, for "are" read --and--; page 9, second column, line 2, for "295[a]" read --195[a]--; page 18, first column, line 32, claim 31, after "pivot" and before "and" insert a comma; and second column, line 66, claim 38, for "tools" read --tool--; page 19, first column, line 7, after "said" insert --braking--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of January, A. D. 1943.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.