Jan. 28, 1941. G. T. BIRDSALL 2,229,791

HAT-MAKING MACHINE

Filed March 9, 1939 7 Sheets-Sheet 1

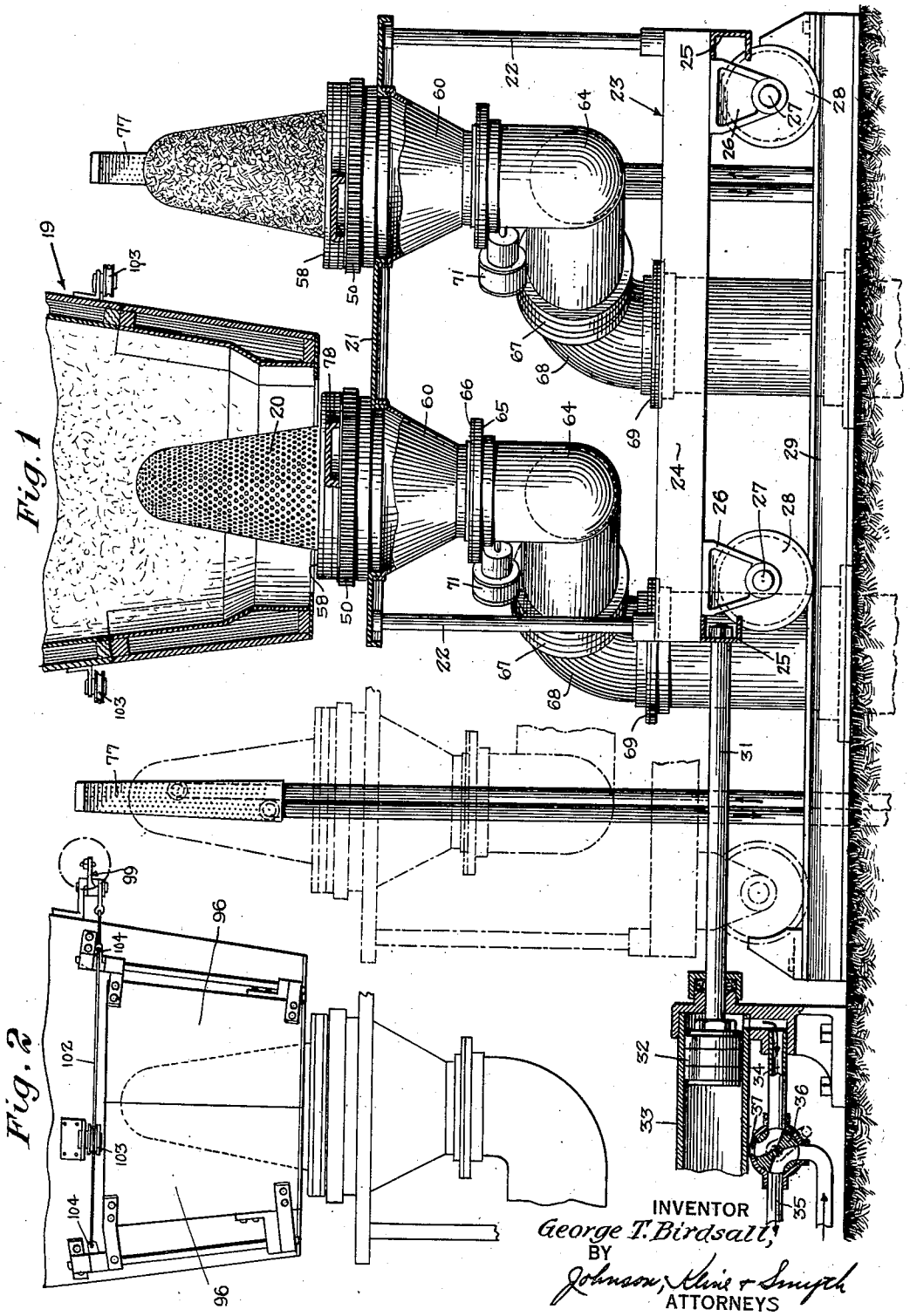


Fig. 1

Fig. 2

INVENTOR
George T. Birdsall,
BY
Johnson, Kline & Smyth
ATTORNEYS

Jan. 28, 1941. G. T. BIRDSALL 2,229,791

HAT-MAKING MACHINE

Filed March 9, 1939 7 Sheets-Sheet 2

Fig. 3

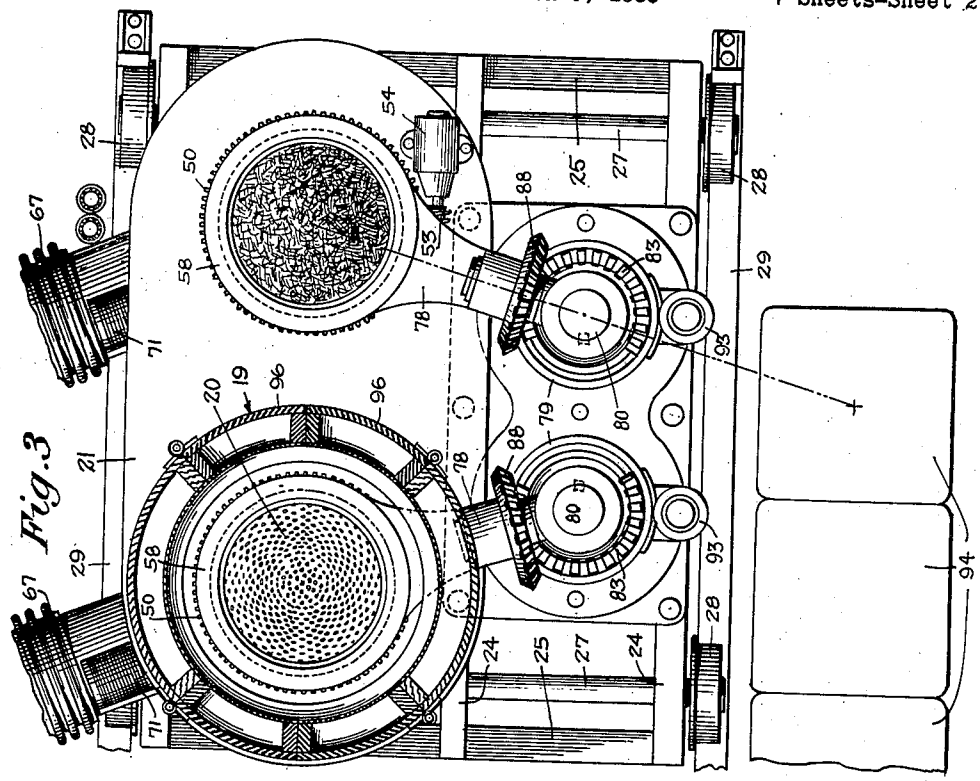
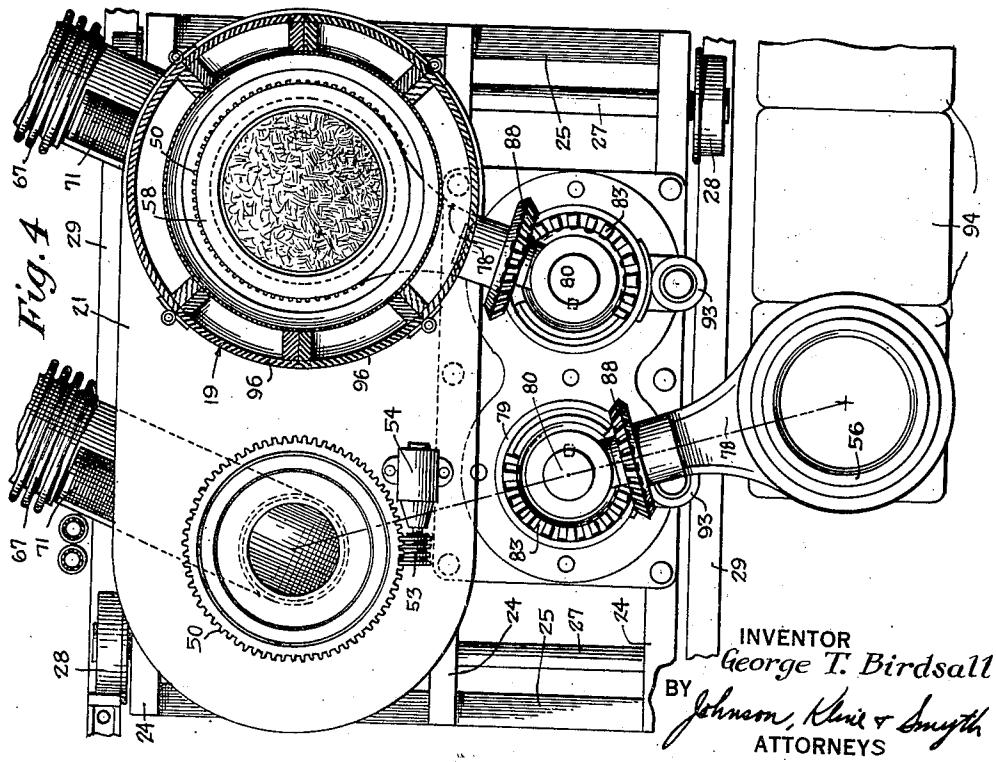


Fig. 4



INVENTOR
George T. Birdsall
BY Johnson, Kline & Smyth
ATTORNEYS

Jan. 28, 1941. G. T. BIRDSALL 2,229,791

HAT-MAKING MACHINE

Filed March 9, 1939 7 Sheets-Sheet 3

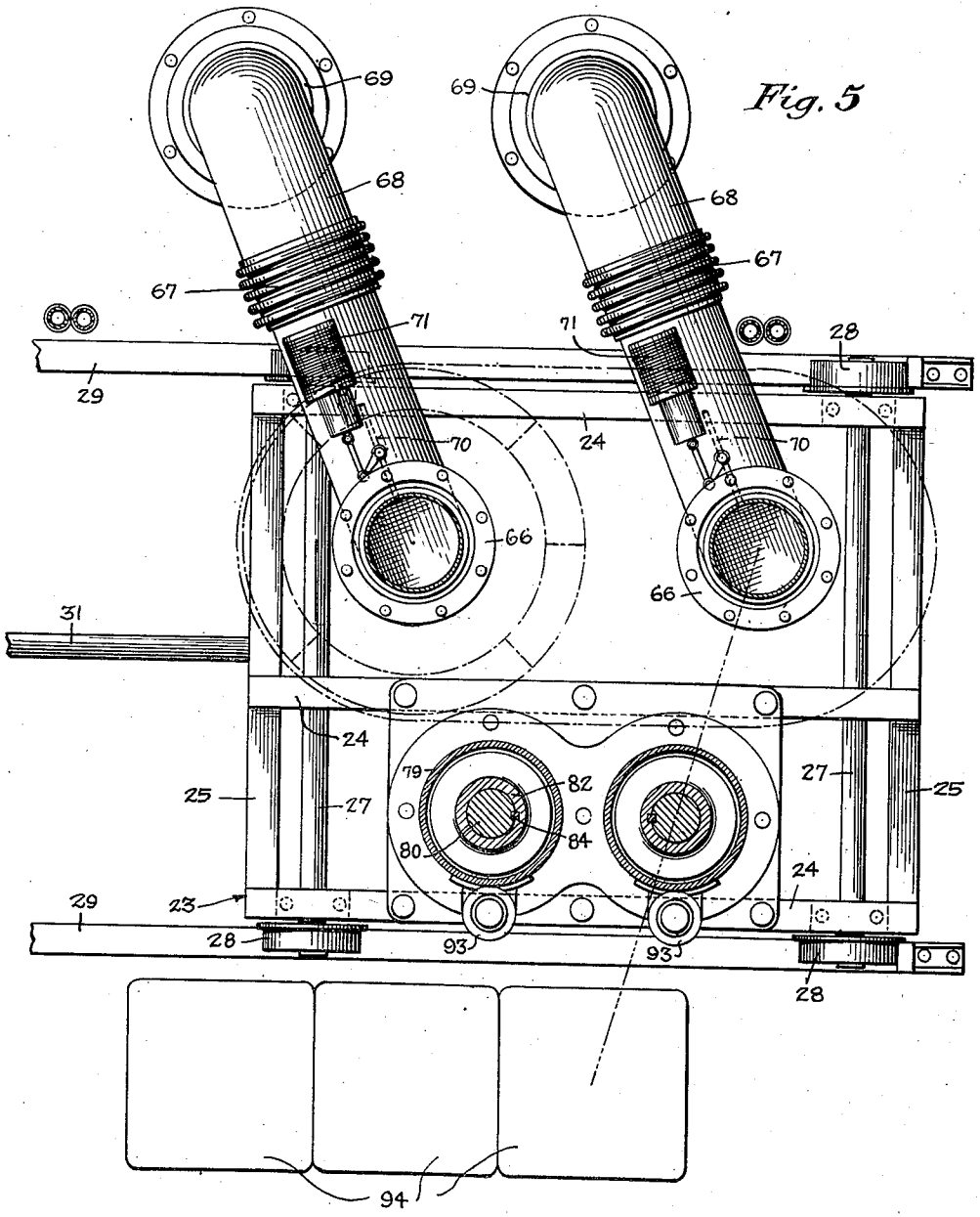


Fig. 5

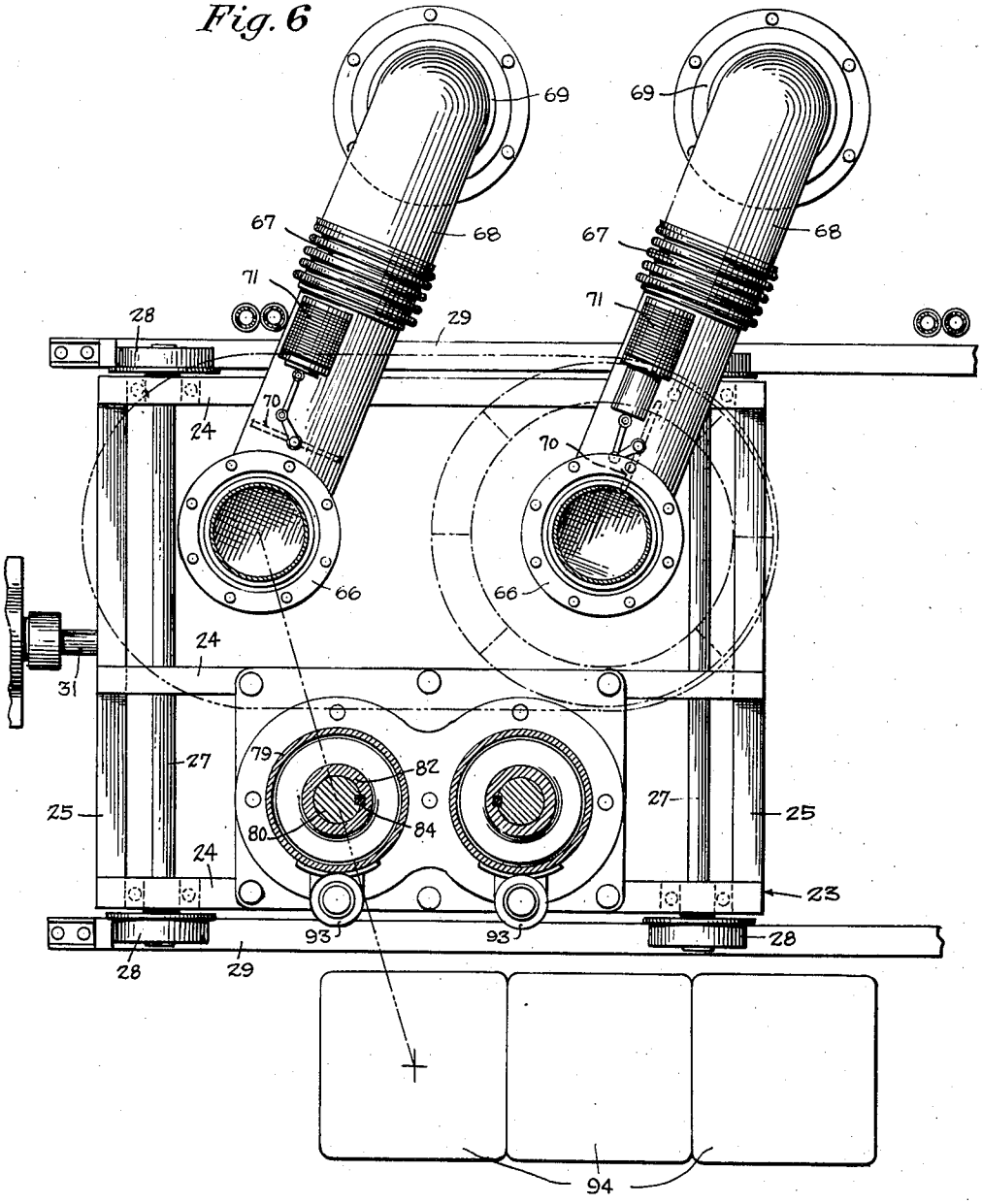
INVENTOR
George T. Birdsall,
BY
Johnson, Kline & Smyth
ATTORNEYS

Jan. 28, 1941. G. T. BIRDSALL 2,229,791

HAT-MAKING MACHINE

Filed March 9, 1939 7 Sheets-Sheet 4

Fig. 6



INVENTOR
George T. Birdsall,
BY Johnson, Kline & Smyth
ATTORNEYS

Jan. 28, 1941. G. T. BIRDSALL 2,229,791

HAT-MAKING MACHINE

Filed March 9, 1939 7 Sheets-Sheet 5

Fig. 8

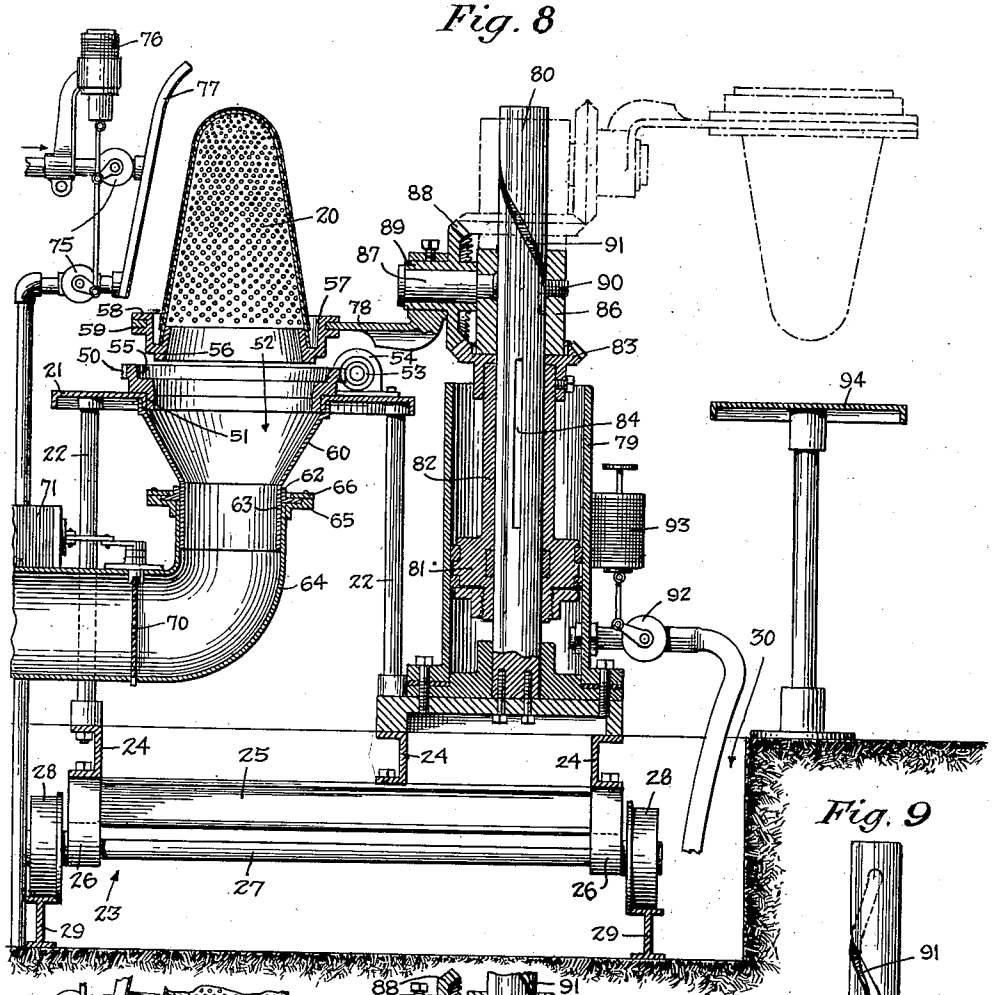


Fig. 9

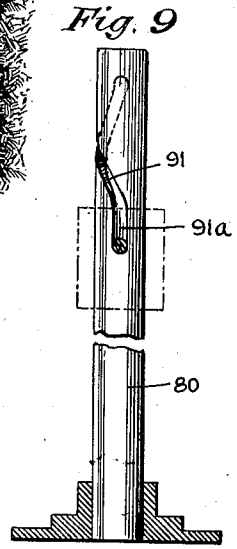
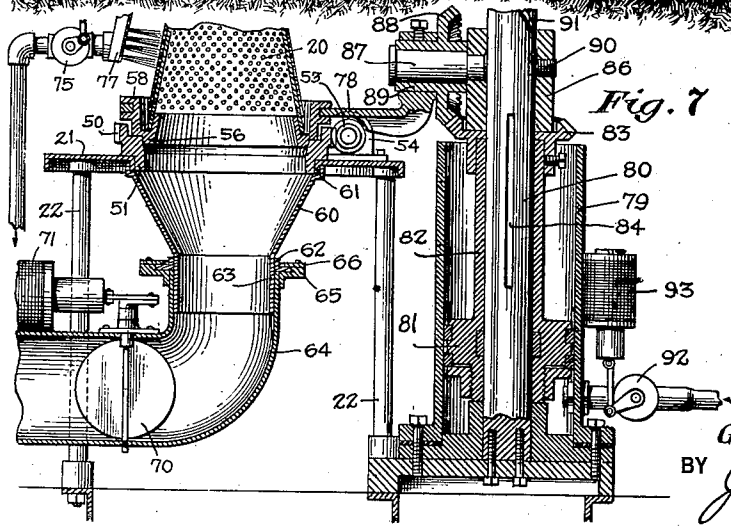


Fig. 7



INVENTOR
George T. Birdsall,
BY *Johnson, Kline & Smyth*
ATTORNEYS

Jan. 28, 1941. G. T. BIRDSALL 2,229,791

HAT-MAKING MACHINE

Filed March 9, 1939 7 Sheets-Sheet 6

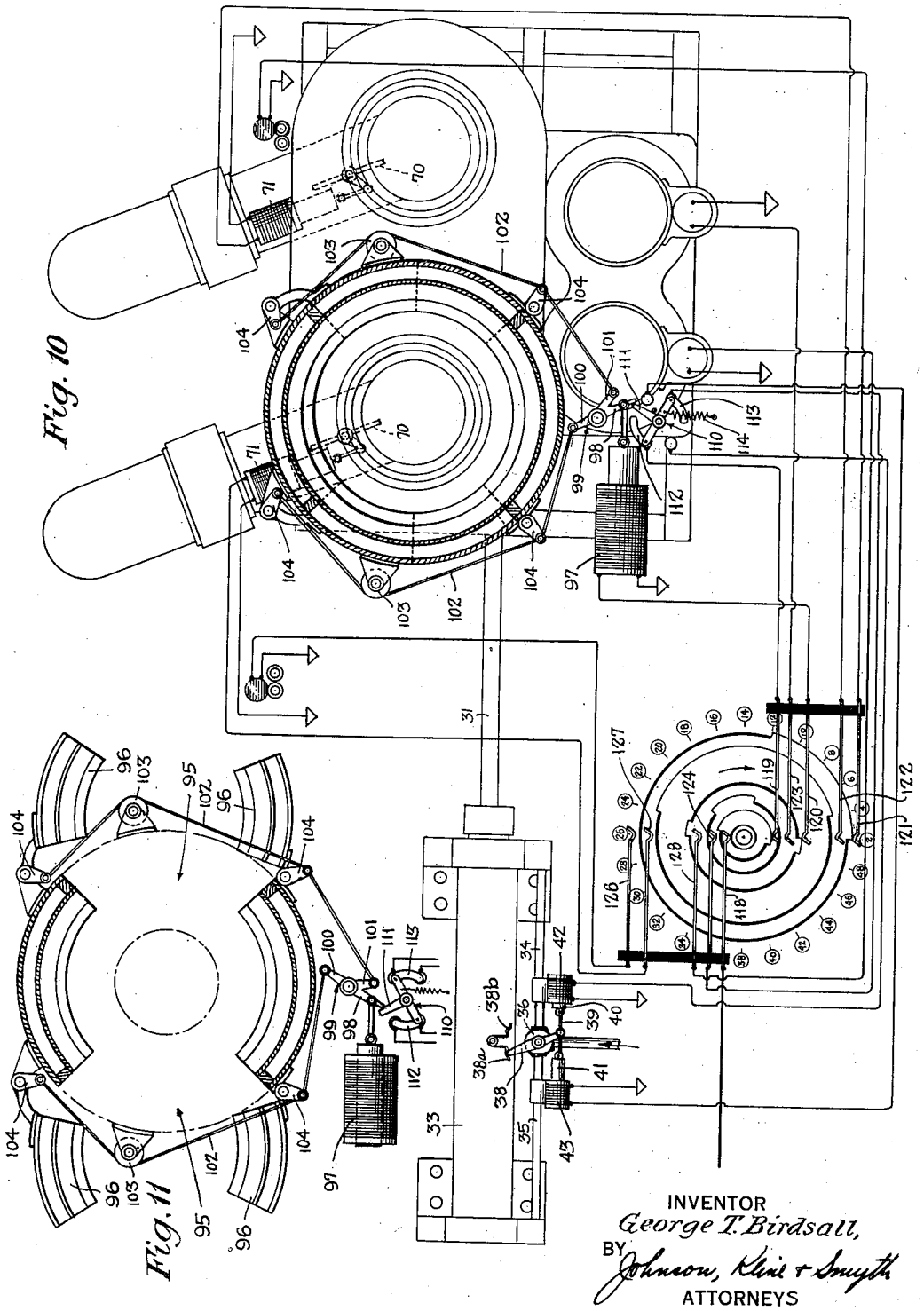


Fig. 10

Fig. 11

INVENTOR
George T. Birdsall,
BY Johnson, Kline & Smyth
ATTORNEYS

Jan. 28, 1941. G. T. BIRDSALL 2,229,791

HAT-MAKING MACHINE

Filed March 9, 1939 7 Sheets-Sheet 7

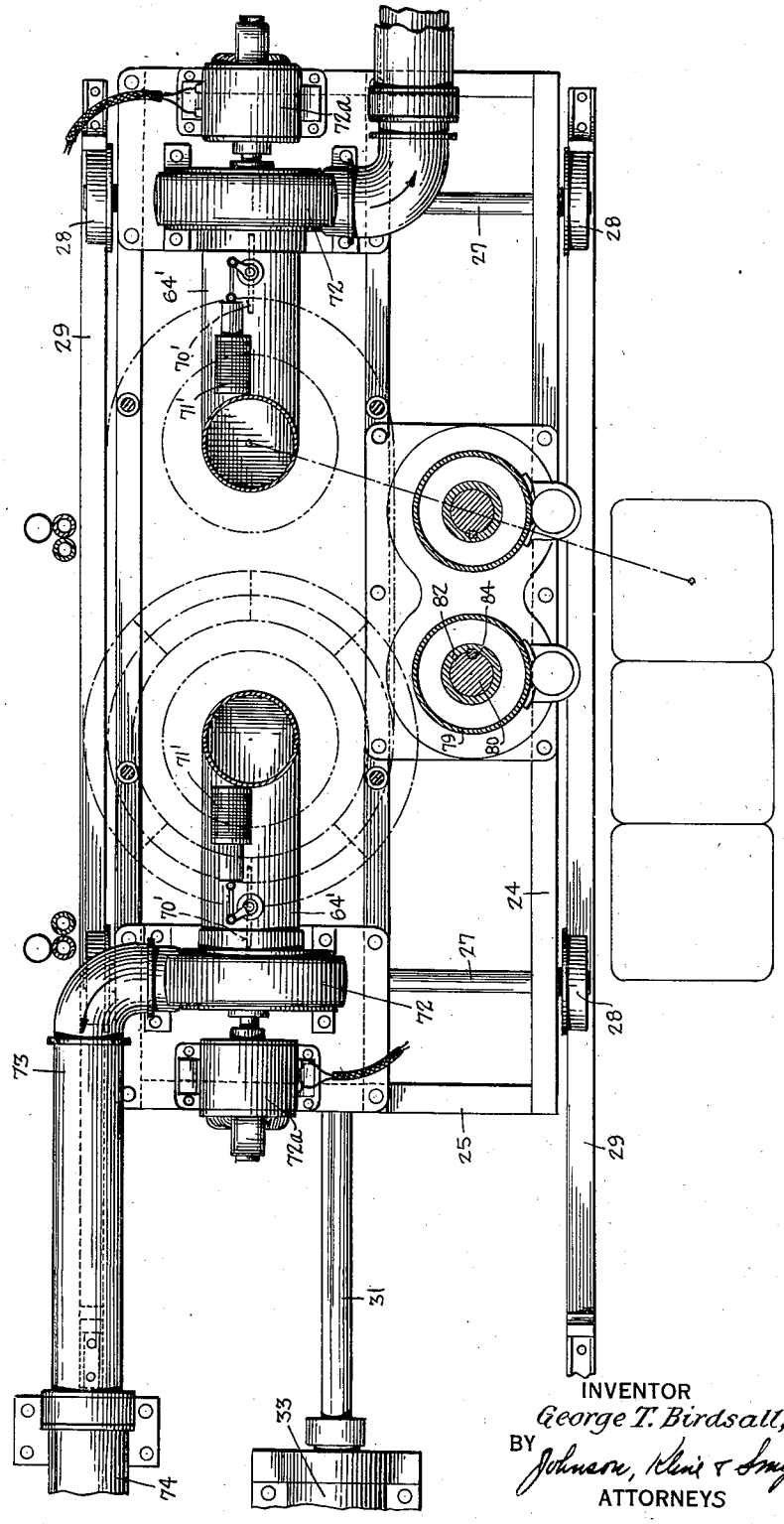


Fig. 12

INVENTOR
George T. Birdsall,
BY Johnson, Klein & Smyth
ATTORNEYS

Patented Jan. 28, 1941 2,229,791

UNITED STATES PATENT OFFICE

2,229,791

HAT-MAKING MACHINE

George T. Birdsall, Danbury, Conn.

Application March 9, 1939, Serial No. 260,755

33 Claims. (Cl. 19—148)

The invention relates to the manufacture of felt hats, and more particularly to the first stage involved therein, namely, making the bats.

Heretofore, when a plurality of cones have been used with a single hopper, it has been proposed to place them on a pivoted table so that the cones are swung about the pivot and are each associated with the hopper in succession, and, when moved from the hopper, are wetted down at a single wetting station. The cones are then removed and the bats formed thereon are stripped therefrom.

According to the present invention, a multiple bat-forming machine is provided in which the swinging action of the cones is entirely eliminated.

The device of the present invention includes two bat-forming cones mounted on a table which is reciprocated and moved in a straight line from either of two positions. In one position, one cone is in the fur-depositing hopper, and the other is in its individual wetting station and vice versa.

Inasmuch as the two cones are each provided with a wetting station, the device can be operated in such a manner that no time is lost in the preparation of the bats, for, while the fur is being deposited on one of the cones, the bat on the other cone is being wetted and stripped therefrom so that the then empty cone is ready to be moved into the hopper by the time that the cone in the hopper is completely deposited with fur.

The moving of the cones into and out of the hopper and wetting stations is automatically controlled so that manual labor of an operator is not required. Also, inasmuch as a plurality of cones are used with a single hopper, a smaller number of machines are required for producing the same number of hats.

With the machine of the present invention if one of the cone-carrying units becomes disabled, or if, for some reason, it be desired to discontinue the operation of one of the units, it would not necessitate the stopping of the machine, since the units are entirely independent of each other.

Each of the units has its own suction device for imposing suction on the cone when the fur is being deposited thereon, and for maintaining the suction on the cone until after the initial wetting operation, at which time an automatic control operates to reduce the suction. This control can completely shut off the suction during the stripping operation if desired.

According to the present invention, each of the cones has permanently associated therewith a stripper which is carried by the reciprocating carriage. After the bat has been thoroughly wetted in the wetting station, operation of the stripping mechanism is initiated automatically, and the cone with the bat thereon is carried around and inverted so that the bat can be readily removed therefrom.

The doors of the hopper of the present invention are normally urged into closed position, but are opened when it is desired to move the cones into and out of the hopper. In order to prevent the cone from being unintentionally moved into the hopper while the doors are closed, thus damaging the machine, a novel interlock has been provided which insures that the doors must be open before the carriage-moving mechanism can operate to move the carriage from one position to the other.

If desired, the suction means for each of the cones can be mounted on the carriage to move therewith, or, the suction means can be fixed with respect to the carriage and connection made thereto through an expansible and contractible connector.

Other features and advantages will be apparent from the specification and claims when taken in connection with the drawings, in which:

Figure 1 is a longitudinal sectional view of the machine showing the carriage at the extreme right end of its motion, and showing in dotted lines the position the left-hand cone assumes when the carriage is in its extreme left position.

Fig. 2 shows a fragmentary side view of the hopper, showing one pair of doors and the operating connections therefor and their relations to the cone.

Fig. 3 shows a plan view of the carriage in the position shown in Fig. 1.

Fig. 4 is a plan view of the carriage in its extreme left position.

Fig. 5 shows the carriage frame and suction pipes, with the carriage in its right-hand position.

Fig. 6 is a view similar to Fig. 5, showing the carriage in the left position.

Fig. 7 shows a fragmentary sectional view of the carriage and cone showing the details of the flipper.

Fig. 8 is a sectional view showing the cone in wetting station and the cone in inverted position being shown in dotted lines.

Fig. 9 is a detail of the portion of the flipper device.

Fig. 10 is a wiring diagram showing the elec-

trically operated devices and the commutator for controlling the same.

Fig. 11 shows a plan view, partly in section, of the hopper with the doors in open position.

Fig. 12 is a transverse sectional view of the carriage showing the suction means carried by the carriage as in another form of the invention.

According to the present invention, felt hat bodies are made on forming cones **20**, which are usually made of metal and have a rounded apex, the cones being perforated throughout their fur-receiving area.

While any number of these cones can be used, the present preferred form of the invention utilizes merely two cones for each machine. These cones are movable alternately into a common hopper **19** to have fur deposited thereon by a suction applied to the cones, and are then moved to their respective wetting stations to have the bat of fur wetted and then removed therefrom.

In the illustrated form of the present invention, two of the cones are mounted on a table **21** in predetermined fixed relation to one another. The table is supported by means of posts **22** on a carriage **23** which is reciprocated in a straight line.

As shown in Fig. 1, the carriage **23** comprises a pair of longitudinal channel members **24** secured to a pair of transverse channel members **25** to form a rectangular support for the table. The channel members **24** have a plurality of pairs of depending bearing brackets **26** extending from their undersurface to receive axles **27** having flanged wheels **28** thereon which are adapted to run on a pair of straight tracks **29** located in a pit **30** in the floor of the shop.

The carriage **23**, carrying the cones **20**, may be reciprocated from one extreme position to the other by any suitable means. In the preferred form of the invention, this is accomplished by a means employing fluid pressure.

As shown in Fig. 1, a connecting rod **31** connected at one end to the channel member **25**, and at its other end is connected to a piston **32** operating in a cylinder **33**. The two ends of the cylinder are adapted to be alternately connected to a source of compressed air through passages **34**, **35** and an electrically operated control valve **36**. The valve has an exhaust port **37** opening to the atmosphere so that while one of the ends of the cylinder is connected to a source of compressed air, the other is connected to the exhaust port and vice versa. The valve is provided with an operating arm **38** which is normally held in either of its extreme positions by yieldable latches **38***a* and **38***b*. The arm is connected to a rod **39** attached to the cores **40**, **41** to be operated by a pair of solenoids **42**, **43** connected in the control circuit. When either solenoid is energized, the valve will be moved to connect the corresponding end of the cylinder to the source of fluid pressure, causing the carriage carrying the cones to be moved from one position to the other as will be explained.

To insure that the carriage will be positively limited at a predetermined point in its movement in either direction, the tracks are provided adjacent each end with a pair of stop brackets **45**, which are secured thereto and against which the wheels are pressed when the carriage is in either of its extreme positions.

To prevent the carriage from hitting the stops with an undue force, the present invention retards the movement of the carriage as it nears the end of each reciprocation. This is accomplished by making the area of the exhaust port **37** a little smaller than the area of the supply pipes **34**, **35**, so that when one end of the cylinder receives a full supply of air pressure, the resulting initial movement toward the opposite end will be rapid and it will gradually slow down as it approaches the end of its movement due to the compression of the exhausting air in the other cylinder.

In making a bat on the cone, the cone has a high suction applied thereto and is continuously rotated so that the fur will be evenly deposited thereon and uniformly wetted.

Inasmuch as the operating mechanism for each cone is the same, only one of the cones will be described in detail.

As is shown in Figs. 7 and 8, the cone is supported on a ring gear **50** which is provided with a dependent flange **51** located in a circular opening **52** in the table. The ring gear is driven by a worm **53** operated by an individual electric motor **54**. The upper face of the ring is recessed as at **55** to receive a dependent flange **56** of a cone support **57** which is secured to the open end of the cone **20**. The cone support is provided with a flange **58** having a groove **59** therein to receive the flipper mechanism for moving the cone into inverted position, as will be later described.

In order to deposit fur on the cone and to harden the bat, it is necessary that suction be applied to the interior of the cone while the cone is in the hopper or fur-depositing station to draw the fur thereon and to hold the fur in place and cause the water to penetrate through the fur during the wetting operation.

According to the present invention, a thimble **60** is secured to a flange **61** extending around the opening **52** and depending from the undersurface of the table. The thimble has an L-shaped ring **62** secured thereto on the outer cylindrical surface **63** of the lower end thereof, with the leg of the L projecting outwardly. A conduit or supply pipe **64** is rotatably supported on the portion **63** and is provided with a Z-shaped ring **65** having a locking plate **66** secured to the upper surface so as to enclose the outwardly projecting leg of the L-shaped ring **62** and forms a rotatable connection therewith.

The conduit leads **64** from the carriage, as shown in Figs. 1, 5 and 6, is connected through a suitable expansible and contractible connector **67**, with a pipe **68** connected to a rotatably mounted section **69** leading to a source of suction which is fixed with respect to the carriage. Thus, as the carriage is reciprocated back and forth, connection to the source of suction will be maintained through the conduit and the flexible connection therein.

During the formation of the bat, it is necessary to control and vary the suction on the cone. This is accomplished by proviidng each pipe with a damper **70** which is operated by a solenoid **71**. The solenoid is automatically controlled to regulate the suction on the cone as desired.

In the form of the invention shown in Fig. 12, the means for producing a suction on each cone is carried by the carriage and comprises a blower **72** driven by an electric motor **72***a*. The intake side of the blower is connected by a conduit **64'** to the cone. The output side of the blower is connected by means of an L-shaped pipe **73** or conduit having the leg thereof extending from the carriage in a direction parallel to the move-

ment of the carriage, with its outer end slidably received in a fixed exhaust pipe 74 so that, as the carriage is reciprocated, the sliding connection between the fixed pipe 74 and the conduit will maintain the connection therebetween. The conduit 64' leading from the cone is provided with a damper 76' operated by a solenoid 71' as in the previous form of the invention. The damper is operated in the manner as heretofore described, and controls the suction applied to the cone during the formation of the bat.

When the cone is moved into the hopper, the damper will be opened and the cone will be subjected to a high suction. The fur is fed into the hopper and is drawn to and deposited on the perforated cone by the suction, the cone revolving slowly during this period to insure proper distribution of the fur over the cone.

After the proper amount of fur has been deposited on the cone, it is moved to its wetting station and the other cone moved into the fur-depositing station or hopper. During movement of the cone, the high suction is maintained on the cone. As soon as the cone reaches the fur-wetting station, a combined valve 75 on the wetting means is automatically operated by means of a solenoid 76 to cause a fine spray of hot water to issue from a nozzle 77 and be sprayed over the exterior of the deposited fur while the cone is rotated so that an even distribution of the water will be had.

After the initial wetting operation has been completed, the solenoid 71 operating the damper 76 in the conduit is actuated to move the damper to reduce the suction. This is done to avoid the high suction from drawing the water through the bat too rapidly. If the water is drawn through too rapidly, the bat will not be properly and thoroughly saturated.

After the wetting operation has been completed, the solenoid for the damper can be further actuated to completely close the conduit and eliminate the suction if desired. However, this is not necessary, as the reduction in suction during the wetting period will be sufficient to permit the cone to be removed for stripping the bat therefrom.

The cone is now ready to have the bat stripped therefrom, and, according to the present invention, a novel stripping means is provided which, as previously indicated, is permanently secured to the cone and is mounted on the carriage to move with the cone. As shown in Figs. 7 and 9, the stripper mechanism includes an arm 78 located in the groove 59 in the flange of the cone support, the cone being encircled thereby, but free to rotate with respect thereto. The arm is adapted to be moved to invert the cone for stripping. In order to so move the arm, a cylinder 79 is secured to the carriage and surrounds an upstanding post 89 disposed at the center thereof. Slidable on the post is a piston 81 having a sleeve 82 to which is secured a miter gear 83. The piston 81 has a key-and-slot connection 84 with the post so that it can slide along the post but cannot rotate with respect thereto.

On the upper end of the post a sleeve 86 is mounted so as to be supported on the end of the piston, the sleeve being free to slide along and being rotatable with respect to the post. The sleeve has a stud shaft 87 projecting therefrom on which is rotatably mounted a miter gear 88 adapted to mesh with the gear 83. The gear 88 has a hub 89 projecting therefrom to which is secured the arm 78 for movement therewith.

On the opposite side of the sleeve from the arm, a follower pin 90 is inserted so as to engage a cam slot 91 on the post to actuate the sleeve during the stripping operation. As shown in Fig. 9, the cam slot, at its lower end, is provided with a straight portion 91a and then the slot becomes helically disposed around the post for 180°.

The piston is raised in the cylinder by compressed air admitted by a valve 92 which is actuated by a solenoid 93 controlled from the master control as will be explained. During the initial movement of the piston, the sleeve will have merely a vertical sliding movement and will raise the supporting means for the cone out of the ring gear as shown in Fig. 8.

Continued movement of the piston will cause the follower pin 90 to engage the helical cam 91 and will cause the sleeve to rotate with respect to the piston. As it rotates with respect to the piston, the miter gear 88 will be moved over the fixed gear 83 and be caused to rotate and move the cone-carrying arm through a helical path to the dotted position as shown in Fig. 8, wherein the cone is inverted over a bat-receiving table 94 and the bat can be readily stripped therefrom to the table.

As shown in Figs. 2, 10 and 11, the hopper 19, into which the cones are moved to have the fur deposited thereon, is provided with a pair of openings 95, one at each side thereof, through which the cones can pass, and each of these openings is closed by a pair of normally closed doors 96.

The normally closed doors are opened in unison when it is desired to move the cones into and out of the hopper. To accomplish this, the door operator comprises a solenoid 97 connected to one arm 98 of a three-arm lever 99. The other two arms of the lever 100, 101, as shown in Figs. 10 and 11, are connected through flexible connectors 102, which are carried by pulleys 103 mounted on the hopper, to operating levers 104 for the doors so that, upon energization of the solenoid, the doors are simultaneously opened.

When the cones are moved into and out of the hopper, it is essential that the doors be so controlled that there will not be any interference with the passage of the cone. Accordingly, the present invention provides a novel interlock between the door-opening mechanism and the carrier-moving mechanism, whereby the carriage cannot be moved until the doors have been completely opened.

This mechanism is shown in Figs. 10 and 11 and comprises a switch having a T-shaped arm 110 pivotally mounted, with the staff of the T 111 projecting into the path of movement of one of the arms of the three-armed lever 99. The ends of the arms of the T are provided with bridging contacts 112 and 113, which close a circuit to a pair of contacts in the circuits for the solenoids 42, 43 for operating the valve 36 for controlling the operation of the carriage. The T-shaped switch arm is biased by a spring 114 into a position in which the bridging contacts leave a gap in the circuit to the solenoids, which gap is only closed upon the operation of the lever 99 which moves the T switching member through engagement with the staff 111 to the position shown in Fig. 11 wherein the contacts 112 and 113 simultaneously bridge the contacts in the circuits to both of the solenoids 42 and 43, but only that circuit which is completed by the master controller will function. Thus it will be seen that the solenoids for operating the mechanism

for shifting the carriage and moving the cones cannot be energized until the doors have opened and the contacts 112 and 113 bridge the gaps in the circuits to the controlling solenoids 42, 43.

If desired, however, the switch for completing the circuit and controlling the solenoids 42 and 43, so that they cannot operate to shift the carriage until the doors are opened, can be actuated by the doors themselves upon moving to a completely open position.

The sequence of operations of the various elements of the device is controlled by a master controller which comprises a rotating commutator, which rotates in the direction of the arrow as shown in Fig. 10. The commutator is connected to a source of energy by a contact 118 and has segments or commutator bars at various positions and of various lengths cooperating with other contacts which are connected to the various solenoids, the numerals in circles around the controller indicating the part each rotation utilizes to control the various operations.

In the position shown in Fig. 10, the carriage has completed its movement to the extreme right. Contact 119, connected to solenoid 42 for controlling the valve, engages its segment, but contact 120, which is connected to the solenoid 97, has just passed off the cooperating segment so that the doors to the hopper have been closed and the circuit opened to the solenoid 42. Contact 121, which is connected to the solenoid controlling the right-hand spray, is in engagement with the commutator bar so that the solenoid controlling the spray valve will be energized and the spray actuated to wet the bat.

Immediately after the initial wetting operation, contact 122, which is connected to the right-hand damper solenoid, will engage its cooperating segment and actuate the damper to reduce the suction on the cone. Continued rotation of the controller will cause the contact 121 to pass its cooperating segment and deenergize the right-hand spray controlling solenoid so that the spray is stopped. At this time, contact 123, which is connected to the solenoid for controlling the flipper mechanism, will engage its cooperating contact segment and close the energizing circuit for operating the solenoid and opening the valve to admit air into the cylinder 81 and cause the piston 82 to raise and move the cone into inverted position whereupon the bat can be stripped therefrom.

By this time, the contact 123 will have left its cooperating segment so that the solenoid will become deenergized and the flipper mechanism returned to normal position. When the cone is returned into this position, the contact 122 will leave its cooperating contact and will open the damper again to apply full suction to the cone.

The cone is now ready to be shifted into the hopper to have fur deposited thereon and the cone in the hopper will have had sufficient time for the fur to be deposited thereon and it will be ready to be moved into the left-hand wetting station. Continued rotation of the controller will now close the circuit through the engagement of contact 120 of the door-opening mechanism with the opposite cooperating contact and will open the doors.

The contact 124 will engage its cooperating contact for energizing the solenoid 43. However, the solenoid will not be energized until the door-opening means has established the circuits to the solenoids upon the doors being completely opened. As soon as the doors are opened, the solenoid 43 will operate the valve 36 to cause the carriage to move the cones into their proper positions.

By the time the cones have reached their proper positions, the contact 120 will have passed off its cooperating contact, and the contact 126, which is connected to the solenoid controlling the left-hand spray, will have engaged its cooperating contact and cause the fur on the cone to be wetted. After the initial wetting operation, contact 127, which is connected to the solenoid controlling the left-hand damper, will engage its cooperating segment and energize the solenoid to reduce the suction on the cone.

Continued movement of the controller will cause the contact 126 controlling the spray to leave its segment, and contact 128, which is connected to the solenoid of the left-hand flipper mechanism, will engage its segment and energize the solenoid to actuate the valve to admit air into the cylinder and move the cone into inverted position.

After the stripping operation, the cone is then moved back into its normal position, upon contact 128 leaving its cooperating segment, and the damper contact 127 then leaves its segment and applies a full suction on the cone in readiness for its movement into the hopper.

The contact 120 will again engage its cooperating contact and the contact 119, which is connected to the solenoid 42 for operating the valve to move the cone into the right-hand position, will have engaged its contact preparatory to energizing the solenoid upon the closing of the gap in the circuit by the door-opening mechanism, and the sequence of operation will be repeated throughout the operation of the machine, with first the left and then the right-hand mechanism being controlled by the master controller.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. In a hat-making machine, a fur-depositing station; a plurality of forming cones; means including the table for supporting the cones; a wetting station for each of the cones; and means for reciprocating the supporting means in a straight line to alternately move one of the cones from the fur-depositing station to its wetting station while the other cone is moved from its wetting station to the fur-depositing station.

2. In a hat-making machine, a fur-depositing station; a plurality of forming cones; means including the table for supporting the cones; a wetting station for each of the cones; means for reciprocating the supporting means in a straight line to alternately move one of the cones from the fur-depositing station to its wetting station while the other cone is moved from its wetting station to the fur-depositing station; and means for positively limiting the movement of the table at the end of each reciprocation to properly locate the cones in the fur-depositing and wetting stations.

3. In a hat-making machine, a fur-depositing station; a plurality of forming cones; means including the table for supporting the cones; a wetting station for each of the cones; means for reciprocating the supporting means in a straight line to alternately move one of the cones from the fur-depositing station to its wetting station while the other cone is moved from its wetting station to the fur-depositing station; means for positively limiting the movement of the table at

the end of each reciprocation to properly locate the cones in the fur-depositing and wetting stations; and means for retarding the movement of the table adjacent each of the limiting means whereby a sudden stop is avoided.

4. In a hat-making machine, a fur-depositing station; a plurality of forming cones; means including a table for supporting the forming cones; a wetting station for each of the forming cones; means for reciprocating the table in a straight line for moving the cones into a fur-depositing station and into the wetting station; means for applying a large suction to the cone when in fur-depositing position; and means for reducing the suction after the initial wetting operation.

5. In a hat-making machine, a fur-depositing station; a plurality of forming cones; means including a table for supporting the forming cones; a wetting station for each of the forming cones; means for reciprocating the table in a straight line for moving the cones into the fur-depositing station and into the wetting station; means for applying a large suction to the cones, including an extensible and contractible connection operable to permit reciprocation of the table; and means for reducing the suction after the initial wetting operation.

6. In a hat-making machine, a fur-depositing station; a plurality of forming cones; means for supporting the forming cones; a wetting station for each of the forming cones; means for reciprocating the supporting means for the cones in a straight line for alternately moving the cones into the fur-depositing station and to the wetting station; means for applying a large suction to the cone, including a conduit connected to the cones and having an extensible and contractible bellows connection with a pivotally mounted conduit connected to a source of suction; and means in the conduit for regulating the suction as desired.

7. In a hat-making machine, a fur-depositing station; a plurality of forming cones; means including a table for supporting the forming cones; a wetting station for each of the forming cones; means for reciprocating the table in a straight line for moving the cones into a fur-depositing station and into the wetting station; separate means for each of the cones carried by the table for producing a large suction to the cone; and means for controlling the suction during the formation of the bat.

8. In a hat-making machine, a fur-depositing station; a plurality of forming cones; means for supporting the forming cones; a wetting station for each of the forming cones; means for reciprocating the supporting means for the cones in a straight line for alternately moving the cones into the fur-depositing station and to the wetting station; means for applying a large suction to each of the cones including a suction-producing means mounted on the supporting means and having its intake connected with the cone; means including a slidable connection for connecting the output of the suction-producing means with a stationary exhaust means; and means disposed between the suction-producing means on the cone for controlling the suction on the cone.

9. In a hat-making machine, a fur-depositing station comprising a hopper having a plurality of normally closed doors; means interconnecting the doors, whereby they are operated in unison; a forming cone; means for supporting the forming cone; a wetting station for the forming cone; and means for reciprocating the supporting means for alternately moving the cone from the hopper to the wetting station and vice versa, said means for operating the doors controlling the means for reciprocating the carriage whereby the doors are opened before the carriage can be moved.

10. In a hat-making machine, a fur-depositing station comprising a hopper having a plurality of doors hinged thereon and normally biased into closed position; means for interconnecting the doors for movement in unison; a plurality of forming cones; means for supporting the forming cones; a wetting station for each forming cone; electrically controlled means for reciprocating the supporting means for alternately moving the cones from the hopper to the wetting station and vice versa; means for opening the doors; means associated with said door-opening means and operated upon completion of movement of the door-opening means for establishing a control circuit for the means for reciprocating the supporting means whereby the carriage is prevented from being reciprocated until the doors are in open position.

11. In a hat-making machine, a fur-depositing station; a wetting station; a cone supported for movement into the said stations; and means connected to the cone and movable therewith for automatically moving the cone into an inverted position while at the wetting station and after the bat on the cone has been thoroughly wetted, whereby the bat can be stripped from the cone.

12. In a hat-making machine, a fur-depositing station; a wetting station spaced therefrom; a forming cone; a movable table for supporting the cone for movement alternately into fur-depositing station and wetting station; and stripping means carried by the table and permanently associated with the cone for moving the cone through a helical path and into an inverted position for stripping the completed bat therefrom.

13. In a hat-making machine, a fur-depositing station; a plurality of forming cones; means for supporting said cones; a wetting station for each of the forming cones; means for reciprocating the table to alternately move the cones into fur-depositing station and into the wetting station; a stripper mechanism for each of the cones carried by said supporting means and permanently associated with each cone; and means for operating the stripper mechanism after the bat has been wetted at the wetting station.

14. In a hat-making machine, a fur-depositing station; a wetting station; a forming cone; a movable table for supporting the cone; and a stripping device carried by the table and permanently associated with the cone for moving the cone into an inverted position for stripping a completed bat therefrom.

15. In a hat-making machine a forming cone; and means for moving the forming cone with the bat thereon to an inverted position from which the bat can be stripped therefrom, said means comprising a post, a sleeve slidably and rotatably mounted on the post, an arm carried by the sleeve and connected to the cone, and means responsive to the rotary movement of the sleeve for rotating the arm with respect to the sleeve about an axis perpendicular to the sleeve whereby the cone carried thereby is inverted.

16. In a hat-making machine a forming cone; and means for moving the forming cone with the bat thereon to an inverted position from which the bat can be stripped therefrom, said means comprising a post, a sleeve slidably and rotatably

mounted on the post, a gear slidable on the post but held against rotation with respect thereto, a gear carried by the sleeve and movable over the fixed gear upon rotation of the sleeve to be rotated thereby, and an arm connected to the cone and secured to the rotatable gear and moved thereby for inverting the cone carried by the arm whereby the bat thereon can be stripped therefrom.

17. In a hat-making machine a forming cone; and means for moving the forming cone with the bat thereon to an inverted position from which the bat can be stripped therefrom, said stripping means comprising a post having a substantially helical cam slot therein, a sleeve slidably and rotatably mounted on the post and having a follower engaging the cam slot whereby movement of the sleeve along the post causes the sleeve to be rotated, an arm connected to the sleeve and permanently associated with the cone, and means responsive to the rotation of the sleeve for rotating the arm with respect to the sleeve whereby the cone is inverted.

18. In a hat-making machine a forming cone; and means for moving the forming cone with the bat thereon to an inverted position from which the bat can be stripped therefrom, said means comprising a post, a cylinder surrounding the post, a piston in the cylinder slidable along the post but held against rotation with respect thereto, a fixed gear secured to the piston, a sleeve supported by the piston and slidably and rotatably mounted on the post, the longitudinal movement of the piston causing the sleeve to be moved along the post, means for converting the longitudinal movement of the sleeve into rotary movement thereof, a stud shaft projecting from the sleeve, a gear rotatably mounted on the stud shaft and adapted to be moved over the fixed gear to be rotated thereby, said rotatable gear having a hub, a flipper arm connected to the hub and associated with the cone whereby the cone is moved through a helical path into an inverted position upon movement of the piston, and means for introducing fluid pressure into the cylinder to move the piston.

19. In a hat-making machine, fur-depositing means including a hopper having an opening therein; doors for closing the opening to the hopper; a forming cone; a support for the forming cone; means for moving said support for moving the cone into and out of the hopper; means for setting up a circuit for controlling the operation of the moving means; and means associated with the doors for completing said circuit upon movement of the doors into open position whereby the supporting means and cone is prevented from being moved until the doors are in open position.

20. In apparatus of the class described, the combination of, a forming tower having door means forming part of the walls thereof, a plurality of cones, a cone-positioning means to move said cones to and from said forming tower through space normally closed by said door means, and a control means having a switch means operated by the opening movement of said door means to complete a circuit to said cone-positioning means, whereby the opening of said door means initiates the movement of one cone from said forming tower.

21. In apparatus of the class described, the combination of, a forming tower having door means forming part of the walls thereof, a plurality of cones, positioning mechanism to cause relative movement between said cones and said forming tower whereby said cones are successively positioned within said forming tower to receive fur and when sufficient fur to form a bat has been deposited upon one cone the fur is then directed onto an empty cone, and control means having an actuating mechanism operated by the opening movement of said door means to cause said positioning mechanism to operate only after the opening of said door means.

22. In a hat-making machine, fur-depositing means including a hopper having door means forming part of the walls thereof, means to open the door means to provide open space in the walls, a forming cone, a cone supporting and moving structure including motive means to move said cone to and from said hopper through the open space occupied by said door means when closed, and control means controlling said motive means and including means rendering said motive means inactive upon the closing of said door means.

23. In hat-making apparatus, a forming cone, and means to support said cone at its base and to move said cone to and from its bat-stripping position comprising, means to rotate the cone about an axis passing transversely thereof and thereby invert said cone and means to raise the point of support of said cone during the rotating movement to thereby tend to maintain the center of said cone at substantially a constant level.

24. In hat-making apparatus of the character described, a forming cone, a cone-supporting structure to support said cone as fur is being deposited thereon to form a bat, and flipper mechanism comprising means to support said cone at its base and rotate said cone about a horizontal axis passing through the cone, said flipper means being adapted to move said horizontal axis during the rotating movement to thereby maintain the center of said cone in substantially the same horizontal plane.

25. In hat-making apparatus of the class described, a forming cone having a central axis; and cone-inverting means including, a bracket structure which is adapted to support said cone from the base thereof, means forming a pivot for said bracket structure to provide a horizontal axis intersecting the central axis and about which said bracket and said cone may be rotated, and means to rotate said cone about said horizontal axis and to simultaneously move said horizontal axis to tend to maintain said cone in substantially a confined zone.

26. In a hat-making machine, a forming cone; supporting means for said cone; and means for automatically moving the cone from said supporting means to a bat-stripping position comprising, a vertical pivot means, an arm including a horizontal pivot means which arm is pivotally mounted upon said vertical pivot means, and motive means to rotate the cone about said horizontal pivot means and to simultaneously rotate the horizontal pivot means and the cone about the vertical pivot means.

27. In a hat-making machine, a forming cone; an arm adapted to rigidly support said cone; and motive means to move said arm so that said cone is moved to its inverted position where a bat may be removed, said motive means comprising, a sleeve member mounted to be rotated about a vertical axis, pivotal means mounting said arm upon said sleeve member so that said arm may be rotated about a horizontal axis, and means to impart rotary movement to said pivotal means and to said sleeve member so that said arm and said cone are simultaneously swung about a vertical axis and rotated about a horizontal axis.

28. In a hat-making machine, a forming cone; an arm adapted to rigidly support said cone; and motive means to move said arm so that said cone is moved to its inverted position where a bat may be removed, said motive means comprising, a post, a sleeve slidably and rotatably mounted on said post, a gear slidable on said post but held against rotation with respect thereto, a gear carried by said sleeve and movable over the first-named of said gears upon rotation of said sleeve whereby the second-named of said gears is rotated, an arm connected to the second-named of said gears and adapted to support said cone, and means to slide the first-named of said gears and said sleeve upon said post and to rotate said sleeve about said post to thereby cause the second-named of said gears to be swung by said sleeve about the first-named of said gears, whereby said arm and the cone supported thereby are rotated about the axis of the second-named of said gears and are simultaneously swung about said post.

29. In hat-making apparatus of the class described, in which a forming cone is rotatably supported upon a supporting structure as fur is deposited upon the cone to form a bat, the combination with said supporting structure of means to disengage the cone from the supporting structure and then move the cone to a bat-stripping position comprising, means to first lift the cone away from the supporting structure and then impart swinging movement to the cone about a vertical axis and simultaneously impart swinging movement to the cone about a horizontal axis.

30. In hat-making apparatus of the class described, in which a forming cone is rotatably supported upon a supporting structure as fur is deposited upon the cone to form a bat, the combination with said cone of means to move said cone to its bat-stripping position comprising, an arm which is adapted to rigidly support said cone, an arm supporting and operating unit including a vertically extending raceway and a guide member adapted to ride in said raceway and cause said arm to swing bout a vertical axis as it moves upwardly, means to impart upward movement to said arm to make it swing about a vertical axis; and means responsive to the swinging movement of the arm to simultaneously rotate said cone about a horizontal axis, said raceway having an end portion which extends vertically and which permits said arm to be moved upwardly in the initial stage of its movement without swinging movement to thereby disengage the cone from the cone-supporting structure.

31. In hat-making apparatus of the character described, a forming cone; a cone-supporting structure to support said cone as fur is being deposited thereon to form a bat; and cone-moving mechanism to move said cone away from said cone-supporting structure comprising, a vertically extending shaft having a groove extending therealong, the lower portion of which groove extends parallel to the axis of the shaft and the upper portion of which groove is helical, a collar snugly receiving said shaft and rigidly carrying an interengaging member extending into said groove, an arm carried by said collar and adapted to support said cone, and means to move said collar upwardly along said shaft from the position where said inter-engaging member is received in the lower portion of said groove, whereby the initial movement of said collar lifts said cone from said cone-supporting structure and continued upward movement of said collar swings said cone about said shaft.

32. In hat-making apparatus of the character wherein a cone is supported above a floor by a frame construction, the combination of, a forming cone, a cone-supporting structure to support the cone while fur is being deposited thereon to form a bat, and flipper mechanism to invert the cone by rotating it while maintaining the center of the cone at substantially the same height above the floor throughout the entire inverting operation.

33. In hat-making apparatus of the character described, the combination of: a forming cone having a base; a cone-supporting structure to support the cone as fur is being deposited thereon to form a bat; and flipper mechanism to support said cone at its base and invert the cone by rotating it about an axis which is spaced from the center of the cone, said flipper mechanism including, a bracket which is attached to the base of said cone, a movable pivot which carries said bracket so that said bracket and said cone may be rotated about said axis, and means to move said pivot during the inverting operation to maintain the center of the cone substantially at the same height throughout the entire inverting operation.

GEORGE T. BIRDSALL.