

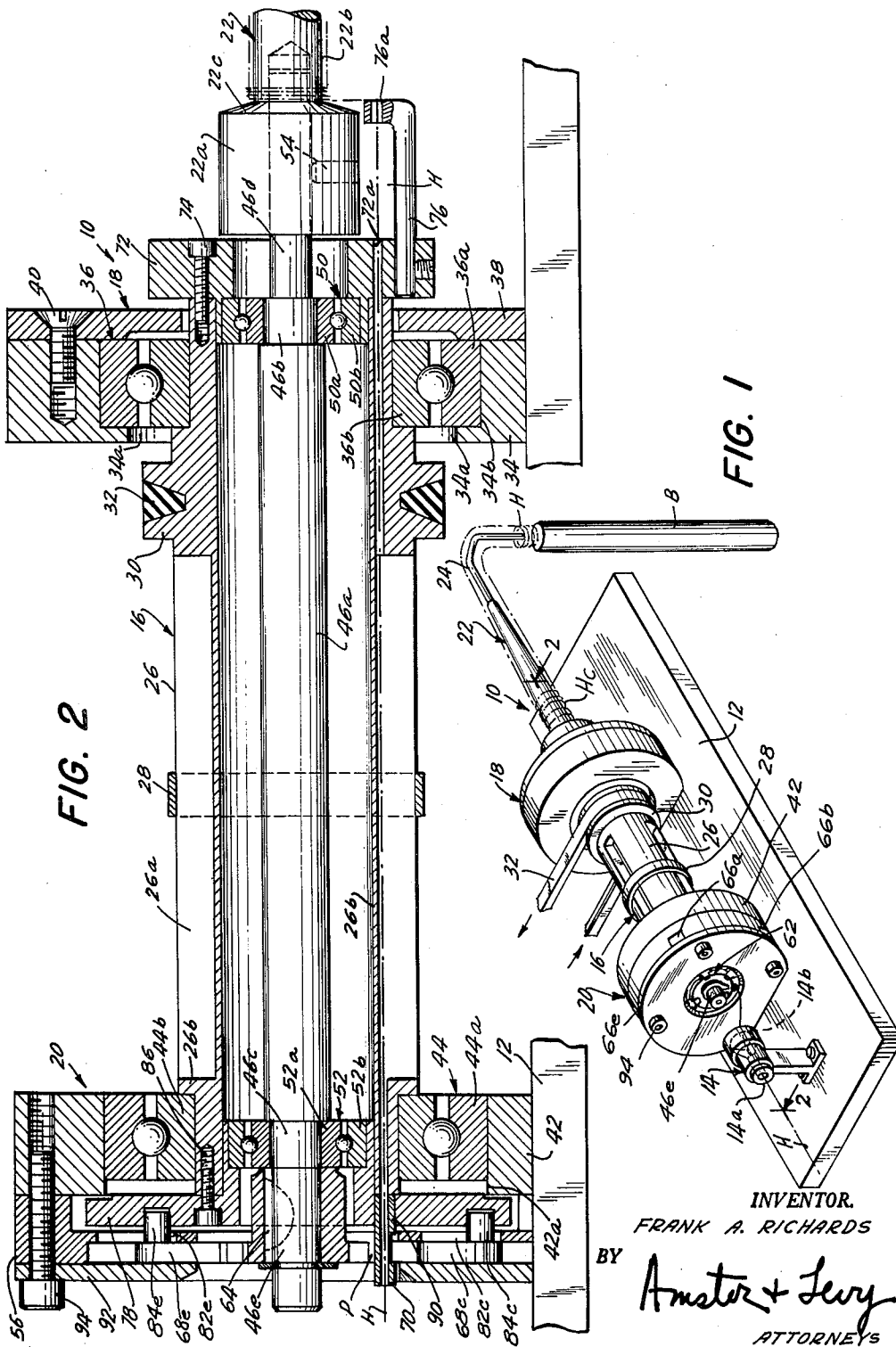
Sept. 25, 1962

F. A. RICHARDS  
HAIR CURLING MACHINE

3,055,165

Filed March 20, 1961

2 Sheets-Sheet 1



INVENTOR.  
FRANK A. RICHARDS  
BY *Amster & Levy*  
ATTORNEYS

Sept. 25, 1962

F. A. RICHARDS  
HAIR CURLING MACHINE

3,055,165

Filed March 20, 1961

2 Sheets-Sheet 2

FIG. 3

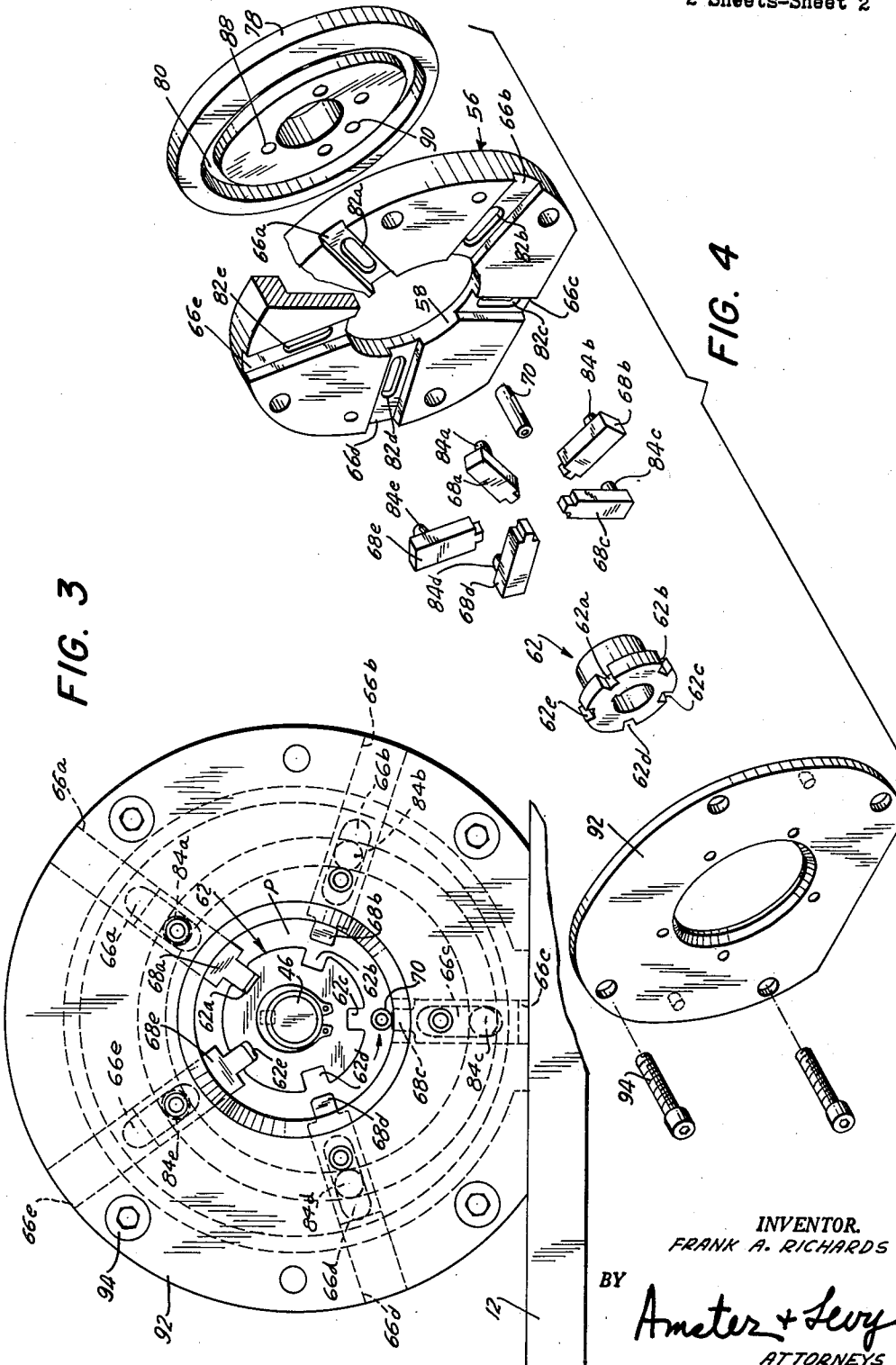


FIG. 4

INVENTOR.  
FRANK A. RICHARDS

BY

*Ameter + Levy*  
ATTORNEYS

1

3,055,165

## HAIR CURLING MACHINE

Frank A. Richards, Hollis, N.Y., assignor to Ideal Toy Corporation, Hollis, N.Y., a corporation of New York  
Filed Mar. 20, 1961, Ser. No. 97,036  
10 Claims. (Cl. 57-29)

The present invention relates generally to filament winding equipment, and in particular to a machine for curling yarns, threads and like filaments for the manufacture of artificial hair which is to be incorporated into the wig or hair piece of a doll.

With the advent of life-like and realistic dolls, a great deal of effort has gone into provision of coiffure which are appropriate to the sex and age of the doll. The practice has developed of stitching or rooting artificial hair of a cellulosic or thermoplastic material (i.e. Saran) into the skull region of the doll's head to achieve a permanent attachment of the artificial hair thereto. Thereupon, the hair is trimmed and styled to impart a desired appearance to the doll. In many instances, the desired hair style is to have a curl. Accordingly, equipment has been developed for the curling of the artificial hair preliminary to the rooting thereof into the skull piece of the doll's head. During the curling operation, permanent set is imparted to the curled yarn, as by subjecting the same to heat or steam under processing conditions which are generally understood and determined in the first instance by the properties of the material from which the artificial or simulated hair is fabricated.

Broadly, it is an object of the present invention to provide an improved machine for curling artificial or simulated hair. Specifically, it is within the contemplation of the present invention to provide a machine for the high speed curling of synthetic filaments which is capable of use over prolonged periods of time, with minimum requirements for servicing and supervisory attendance.

In accordance with an illustrative embodiment demonstrating objects and features of the present invention there is provided a hair-curling machine which comprises a support, an elongated winding head, and bearing means on the support external to the winding head and mounting the winding head on the support for rotation about its longitudinal axis. A stationary mandrel projects axially of and from one end of the winding head and mandrel-mountings means extend through the winding head and are operatively connected to the mandrel for mounting the same on the support. The mandrel-mounting means includes a mounting member operatively connected to the support and a keeper member operatively connected to the mandrel. A plurality of locking members are movably mounted on the mounting member and adapted to successively engage the keeper member to provide a stationary mount for the mandrel and at the same time to provide an unobstructed path about the mandrel for feed to the winding head of the artificial hair to be curled. Provision is made for moving the locking members into successive engagement with the keeper member in response to rotation of the winding head. An appropriate drive is connected to the winding head for rotating the same. Accordingly, it is possible to tightly curl the artificial hair about the stationary mandrel at a relatively high speed, with the hair being fed to the winding head from an external source which may take the form of one or more cones of hair filaments, threads, or yarns. The artificial hair, while tightly curled about the stationary mandrel, may be advanced through an appropriate steaming and/or heating chamber which imparts a permanent set to the curled yarn preliminary to use in hair-rooting equipment.

The above brief description as well as further objects,

2

features and advantages of the present invention will be more fully appreciated by reference to the following detailed description of presently preferred, but nonetheless illustrative embodiment, in accordance with the present invention, when taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective view of a hair-cutting machine embodying features of the present invention;

FIG. 2 is a longitudinal section taken substantially along the line 2-2 of FIG. 1 and looking in the direction of the arrows;

FIG. 3 is an end elevational view taken from the left of FIGS. 1 and 2; and

FIG. 4 is an exploded perspective view of the components of the shaft-mounting and aligning mechanisms incorporated in the hair-curling machine.

Referring now specifically to the drawings, there is shown a hair-curling machine embodying features of the present invention, generally designated by the reference numeral 10, which comprises a horizontal base or support 12 mounted in any appropriate fashion at a location spaced above the floor. Curled hair Hc (see FIG. 1) may be delivered from the machine 10 to an appropriate receptacle, such as the bag B. The curled hair Hc may be removed to further equipment for rooting the curled hair Hc into the wig or skull piece of the doll's head, as is generally understood. Mounted on the support or base 12 are the several components of the machine which in general include a hair guide 14 which receives the uncurled simulated hair H from an appropriated source and guides the same into the input end of a high speed rotary winding head 16 which is mounted on the support 12 by the upright mounts 18, 20. The winding head 16 receives and guides the uncurled hair H along its length to its output end where it wraps or curls the hair about a tapered stationary mandrel 22. The curled hair Hc proceeds through heating and/or steaming chambers or zones (not shown) and thence to an L-shaped take-off 24 which leads into the bag or receptacle B.

The hair guide 14 includes a guiding bore extending axially of the winding head 16 and having a cylinder section 14a opening into an outwardly flaring conical section 14b which allows the hair or thread to whip about (as illustrated in FIG. 1) incident to the high-speed turning of the winding head 16.

The winding head 16 includes an elongated horizontally extending cylindrical body 26 which is longitudinally slotted as at 26a, to lighten the weight thereof. The cylindrical body 26 is encircled by a bracing band 28. To the right of the bracing band 28 and integral with the cylindrical body 26 is a drive pulley 30 which is engaged by a substantially V-shaped drive belt 32 coupled to an appropriate drive motor or the like. The drive pulley 30 turns the winding head 16 on the longitudinally extending horizontal axis provided by the bearing mounts 18, 20, as will now be described.

The bearing mount 18 includes an upstanding mounting standard 34 which is fixed to the base or supports 12 and is formed centrally thereof with a through opening 34a and a circular seat 34b. The circular seat 34b receives a main bearing 36 which externally engages the output end of the cylindrical body 26 of the winding head 16. Specifically, the outer race 36a of the main bearing 36 is appropriately secured in the seat 34b in the mounting standard 34 and remains stationary, while the inner race 36b is appropriately secured to the cylindrical body 26 of the winding head 16 and turns at the high speed thereof. The main bearing 36 is locked within the seat 34b by a coverplate 38 which is secured to adjacent outer facing of the mounting standard 34 by one or more machine bolts 40.

3

The bearing mount 20 which engages the left or input end of the cylindrical body 26 of the winding head 16 similarly includes a mounting standard 42 having a through opening 42a which provides a seat for a second main bearing 44. The outer race 44a of the main bearing 44 is secured to the mounting standard 42 in any appropriate fashion to maintain the same stationary and the inner race 44b, is secured to the cylindrical body 16, as by being seated up against the adjacent shoulder 26b. The further components of the bearing mount 20 will be subsequently described.

The stationary winding mandrel 22 which is seen best in FIGS. 1 and 2 includes a large-diameter mounting section 22a, a tapered smaller-diameter takeoff section 22b, and a conical intermediate section 22c which interconnects the mounting and takeoff sections 22a, 22b. The stationary mandrel 22 is secured in its projecting position in relation to the winding head 16 by a stationary mandrel-supporting shaft 46 which extends through the cylindrical body 26 axially thereof. The mandrel-supporting shaft 46 includes a main section 46a, stepped-down bearing mounting sections 46b, 46c and further stepped-down terminal sections 46d, 46e.

The respective bearing mounting sections 46b, 46c carry internal bearings 50, 52 having their inner races 50a, 52a appropriately secured to the shaft 46 and their outer races 50b, 52b appropriately to the cylindrical body 26. The terminal section 46d is externally threaded and received within an axial threaded bore in the stationary mandrel 22 and is rigidly connected thereto by the provision of a locking bolt 54. The opposite terminal section 46e projects through mandrel-supporting means adjacent the other end of the winding head 16 which provides a stationary mount for the mandrel supporting shaft 46 and enables the unobstructed feed of hair H to the winding head 16.

The mandrel-supporting means, seen best in FIGS. 3 and 4, includes a stationary mounting member 56 having a central opening or bore 58 through which the terminal section 46e of the mandrel-supporting shaft 46 extends. Disposed within the central opening 58 of the mounting member 56 is a shaft-keeper member 62 which is mounted on the terminal section 46e of the mandrel-supporting shaft 46 by an appropriate mounting key 64 (see FIG. 1). The keeper member 62 cooperates with the mounting member 56 to define an annular winding path for the introduction of the hair H to the winding head 16, such annular winding path being best seen in FIGS. 1 and 3 and being designated by the letter P.

The mounting member 56 is further provided with a plurality of radial slideways designated respectively by the reference characters 66a, 66b, 66c, 66d, and 66e. The radial slideways 66 are at circumferentially spaced locations and open at their respective inner ends into the central bore 58. The slideways receive corresponding radially movable locking and mounting members, designated respectively by the reference characters 68a, 68b, 68c, 68d and 68e. The respective locking and mounting members 68 are provided at their inner ends with locking dogs which are successively moved from retracted positions wherein the angular winding path P is free of obstruction to advanced positions bridging the winding path P and engaged within corresponding keeper notches 62a, 62b, 62c, 62d and 62e provided in the keeper member 62 fixed to the stationary mandrel-supporting shaft 46.

The cylindrical body 26 carries a hair-guiding means in the form of a guide tube 70 which is fixed to the cylindrical body 16 at a location spaced from the longitudinal axis thereof such that the guide tube 70 will move along the annular path P in response to rotation of the winding head 16. The guide tube 70 leads into a guide bore 26b extending longitudinally of the cylindrical body 26. The guide bore 26b is aligned with a further guide bore 72a provided in an end plate 72 which is fixed to the

4

cylindrical body 26 adjacent the stationary mandrel 22 by one or more mounting bolts 74. The end plate 72 carries a winding arm 76 which is provided with a guide bore 76a aligned with the guide bore 26b. Accordingly, the artificial hair H may be introduced to the guide tube 70 at the input end of the winding head 16, and may be fed along the guide bore 26b in the cylindrical body 26 through the guide bore 72a in the end plate 72 and then through the guide bore 76a in the arm 76. Thus as the winding head 16 turns at high speed, there will be provided an unobstructed feed of the artificial hair H to the guide tube 70 which traverses the annular path P. The hair H is advanced along the winding head and by the action of the winding arm 76 in wrapping the hair about the tapered section 22b of the stationary mandrel 22. As the hair H is wound about the mandrel 22, there is a tendency for the hair H to advance along the mandrel 22 toward the takeoff 24 which continues to pull hair into the guide tube 70 and maintains a continuous feed from the supply source.

Provision is made for successively moving the locking members 68 between the retracted and advanced positions in time relation to rotation of the guide tube 70 to permit the unobstructed movement of the guide tube 70 along the winding path P with at least one of the locking members 60 always in engagement with the keeper member 62. This is achieved in this illustrative embodiment by the provision of a control cam 78 which is in the form of a disc having a cam track 80 in one end face thereof. The cam track 80 is of a development appropriate to achieve the successive actuation of the locking and mounting members 68. Specifically, and as seen best in FIG. 4, the mounting member 56 is formed with follower clearance slots 82, 82b, 82c, 82d and 82e in the base or bottom wall of the respective radial slideways 66a to 66e inclusive. The locking and mounting members in turn are provided with follower pins 84a, 84b, 84c, 84d and 84e which projects through the respective follower clearance slots 82a to 82e inclusive and are engaged in the cam track 80 of the control cam 78. The control cam 78 is fixed to the cylindrical body 26 of the winding head 16 by four mounting bolts 86 which are received in appropriate bolt holes 88 provided through the control cam 78 at four spaced locations. Additionally, the control cam is provided with a mounting bore 90 receiving the guide tube 70 which projects forwardly through the central opening 58 in the mounting member 56 along the annular path P outwardly of the keeper member 62. The assembly is completed by the provision of a cover plate 92 which is secured by bolts 94 extending through the mounting member 56 and into the adjacent mounting standard 42 such as to fixedly secure the cover plate 92 and the mounting member 56 to the standard 42 (see FIG. 1).

In this illustrative embodiment, and as seen best in FIG. 3, it is presumed that the guide tube 70 is moving in the counterclockwise direction in response to a corresponding rotation of the winding head 16. The machine 10 is illustrated in the momentary position which occurs when the guide tube 70 is approximately at the 6 o'clock position and moving in the direction of the arrow. It is to be observed at this instant in time, that the mandrel-supporting shaft 46 is held in a stationary position by the locking and mounting members 68a, 68e which are engaged in the keeper notches 62a, 62e of the keeper member 62. The locking and mounting member 68c at the 6 o'clock position is fully withdrawn. The next locking and mounting member 68b along the annular winding path P is being withdrawn to provide the necessary clearance for the guide tube 70 while the locking and mounting member 68d is moving radially and inwardly into the engaged position with the adjacent keeper notch 62d. It will be appreciated that at subsequent times and with the guide tube 70 at different points along the annular path P, successive ones of the locking and mounting members 68 will be engaged with the keeper member 62 at locations

5

substantially removed from the location of the guide tube at such times.

In actual use, it is but a relatively simple matter for the machine operator to thread the uncured artificial hair H through the axial hair guide 14, into the guide tube 70, along the guide bore 26b, through the guide bore 72a and then finally through the guide bore 76a on the winding arm 76. The hair or yarn H is wrapped several times about the tapered section 22b of the stationary mandrel 22 and then the machine is placed into operation by imparting drive to the belt 32 which will rotate the winding head 16 about the axis of the stationary mandrel-supporting shaft 46 at a relatively high speed. Incident to this winding, the hair H is formed into plural adjacent turns or curls to form curled hair Hc which passes along the takeoff section 22b of the mandrel 22 to the L-shaped takeoff 24 which leads into the bag or receptacle B. As previously pointed out, it is but a simple matter to permanently set the curled artificial hair Hc by passing the same through steaming and/or heating chambers which may be disposed along the tapered takeoff section 22b. Experience indicates that the subjecting of the curled artificial hair Hc to steam while curled about the mandrel 22, followed by passing the same through a heating chamber or oven imparts the required set to the artificial hair Hc such that the desired curl is permanently maintained and will be imparted to the doll's wig when the hair is rooted into the scalp or skull piece of the doll's head.

A latitude of modification, change and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the invention herein.

What I claim is:

1. A hair-curling machine comprising a support, an elongated winding head, bearing means on said support mounting said winding head on said support for rotation about its longitudinal axis, a stationary mandrel projecting from one end of said winding head, and mandrel mounting means extending through said winding head and operatively connected to said mandrel for mounting said mandrel on said support, said mandrel-mounting means including a mounting member operatively connected to said support, a keeper member operatively connected to said mandrel, a plurality of locking members movably mounted on said mounting member and adapted to successively engage said keeper member to provide a mount for said mandrel and to provide an unobstructed winding path about said mandrel for the feed to said winding head of hair filaments to be curled, and means operatively connected to said locking members for moving said locking members into engagement with said keeper member.

2. A hair-curling machine comprising a support, an elongated winding head, bearing means on said support external to said winding head and mounting said winding head on said support for rotation about its longitudinal axis, a stationary mandrel projecting axially of and from one end of said winding head, mandrel mounting means extending through said winding head and operatively connected to said mandrel for mounting said mandrel on said support, said mandrel-mounting means including a mounting member operatively connected to said support, a keeper member operatively connected to said mandrel, a plurality of locking members movably mounted on said mounting member and adapted to successively engage said keeper member to provide a mount for said mandrel and to successively provide an unobstructed winding path about said mandrel for the feed to said winding head of hair filaments to be curled, and means operatively connected to said locking members for moving said locking members into successive engagement with said keeper member in response to rotation of said winding head, and a drive for rotating said winding head.

6

3. A hair-curling machine comprising a support, an elongated horizontally extending winding head, bearing means on said support external to said winding head and mounting said winding head on said support for rotation about its longitudinal axis, a stationary horizontally extending mandrel projecting axially of and from one end of said winding head, mandrel mounting means extending through said winding head and operatively connected to said mandrel for mounting said mandrel on said support, said mandrel-mounting means including a mounting member operatively connected to said support, a keeper member operatively connected to said mandrel, a plurality of locking members mounted on said mounting member for radial movement and adapted to successively engage said keeper member to provide a stationary mount for said mandrel and to provide an unobstructed winding path about said mandrel for the feed to said winding head of hair filaments to be curled, and means operatively connected to said locking members for moving said locking members into successive engagement with said keeper member in response to rotation of said winding head, and a drive for rotating said winding head.

4. A hair-curling machine comprising a support, an elongated winding head, bearing means on said support external to said winding head and mounting said winding head on said support for rotation about its longitudinal axis, means for rotating said winding head, a stationary mandrel projecting axially of and from one end of said winding head, mandrel mounting means extending through said winding head and operatively connected to said mandrel for mounting said mandrel on said support, said mandrel-mounting means including a mounting member operatively connected to said support, a keeper member operatively connected to said mandrel, a plurality of locking members movably mounted on said mounting member and adapted to successively engage said keeper member to provide a mount for said mandrel and to provide an unobstructed winding path about said mandrel for the feed to said winding head of hair filaments to be curled, and means operatively connected to said locking members for moving said locking members into successive engagement with said keeper member in response to rotation of said winding head, and guide means at the other end of said winding head for guiding hair filaments to said winding head and along said unobstructed winding path.

5. A curling machine for artificial hair comprising a support, an elongated winding head, means operatively connected to and rotatably mounting said winding head on said support for rotation about its longitudinal axis, drive means operatively connected to said winding head for rotating the same, a stationary mandrel about which said hair is to be curled projecting axially from one end of said winding head, a stationary mandrel-supporting shaft extending axially of and within said winding head and operatively connected at one end to said mandrel, and shaft-mounting and aligning means on said support adjacent the other end of said winding head and operatively connected to the other end of said mandrel-supporting shaft and arranged to progressively provide an annular winding path thereabout along which hair may be fed to said winding head during rotation thereof, said shaft-aligning and mounting means including a stationary mounting member having a central opening, a stationary keeper member disposed within said central opening and operatively connected to said mandrel-supporting shaft, said mounting and keeper members defining said annular winding path, hair-guiding means on said winding head projecting into said annular winding path and adapted to receive hair from a source, said guiding means moving about said winding path in response to rotation of said winding head, locking members mounted on said mounting member for radial movement into and out of engagement with said keeper member and across said winding path, and means operatively connected to said winding head and to said locking members for moving said locking

members in timed relation to each other and to rotation of said guiding means such that said locking members are progressively retracted from engagement with said keeper member to provide an unobstructed winding path for rotation of said guiding means about said mandrel-supporting shaft.

6. A curling machine for artificial hair comprising a support, an elongated winding head, means operatively connected to and rotatably mounting said winding head on said support for rotation about its longitudinal axis, drive means operatively connected to said winding head for rotating the same, a stationary mandrel about which said hair is to be curled projecting axially from one end of said winding head, a stationary mandrel-supporting shaft extending axially of and within said winding head and operatively connected at one end to said mandrel, shaft-mounting and aligning means on said support adjacent the other end of said winding head and operatively connected to the other end of said mandrel-supporting shaft and arranged to progressively provide an annular winding path thereabout along which hair may be fed to said winding head during rotation thereof, said shaft-aligning and mounting means including a stationary mounting member having a central opening, a stationary keeper member disposed within said central opening and operatively connected to said mandrel-supporting shaft, said mounting and keeper members defining said annular winding path, hair-guiding means on said winding head including a guiding tube projecting into said annular winding path and adapted to receive hair from a source, said guiding tube moving about said winding path in response to rotation of said winding head, locking members mounted on said mounting member for radial movement into and out of engagement with said keeper member and across said winding path, and means operatively connected to said winding head and to said locking members for moving said locking members in timed relation to each other and to rotation of said guiding tube such that said locking members are progressively retracted from engagement with said keeper member to provide an unobstructed winding path for rotation of said guiding tube about said mandrel-supporting shaft.

7. A curling machine for artificial hair comprising a support, an elongated winding head, means operatively connected to and rotatably mounting said winding head on said support for rotation about its longitudinal axis, drive means operatively connected to said winding head for rotating the same, a stationary mandrel about which said hair is to be curled projecting axially from one end of said winding head, a stationary mandrel-supporting shaft extending axially of and within said winding head and operatively connected at one end to said mandrel, and shaft-mounting and aligning means on said support adjacent the other end of said winding head and operatively connected to the other end of said mandrel-supporting shaft and arranged to progressively provide an annular winding path thereabout along which hair may be fed to said winding head during rotation thereof, said shaft-aligning and mounting means including a stationary mounting member having a central opening, a stationary keeper member disposed within said central opening and operatively connected to said mandrel-supporting shaft, said mounting and keeper members defining said annular winding path, hair-guiding means on said winding head including a guiding tube projecting into said annular winding path and adapted to receive hair from a source, said guiding tube moving about said winding path in response to rotation of said winding head, locking members mounted on said mounting member for radial movement into and out of engagement with said keeper member and across said winding path, and means operatively connected to said winding head and to said locking members for moving said locking member in timed relation to each other and to rotation of said guiding tube such that said locking members are progressively retracted

from engagement with said keeper member to provide an unobstructed winding path for rotation of said guiding tube about said mandrel-supporting shaft, said last-named means including a cam operatively connected to said winding head and followers for each of said locking members engaging and under the control of said cam.

8. A curling machine for doll's hair comprising a support, an elongated horizontally extending winding head including a cylindrical body, first and second main bearings engaging said cylindrical body externally thereof and mounting said winding head on said support for rotation about a horizontal axis, an elongated horizontally extending stationary mandrel projecting from one end of said winding head axially of said cylindrical body, a stationary mandrel-supporting shaft extending axially of and within said cylindrical body and operatively connected at one end to said mandrel, bearing means on said mandrel-supporting shaft and engaging said cylindrical body internally thereof, a drive for rotating said winding head, and means adjacent the other end of said winding head providing a stationary mount for said mandrel supporting shaft and unobstructed feed of hair to said winding head, said means including a stationary mounting member having a central opening into which the other end of said mandrel-supporting shaft projects, a keeper member mounted in said other end of said mandrel-supporting shaft and cooperating with said mounting member to provide an annular winding path, hair guiding means on said cylindrical body for guiding hair to said winding head and including a guide member along said winding path adapted to receive hair from an external source and movable along said winding path in response to rotation of said winding head, plural locking members slidably mounted on said mounting member for radial movement between a retracted position wherein said winding path is free of obstruction to an advanced position bridging said winding path and engaging said keeper member, and means for successively moving said locking members between said retracted and advanced position in timed relation to rotation of said guide member to permit unobstructed movement of said guide member along said winding path with at least one locking member always in engagement with said keeper member.

9. A curling machine for doll's hair comprising a support, an elongated horizontally extending winding head including a cylindrical body, first and second main bearings engaging said cylindrical body externally thereof and mounting said winding head on said support for rotation about a horizontal axis, an elongated horizontally extending stationary mandrel projecting from one end of said winding head axially of said cylindrical body, a stationary mandrel-supporting shaft extending axially of and within said cylindrical body and operatively connected at one end to said mandrel, bearing means on said mandrel-supporting shaft and engaging said cylindrical body internally thereof, a winding arm projecting from said one end of said winding head and positioned in relation to said mandrel for guiding hair to said mandrel in response to rotation of said winding head, a drive for rotating said winding head, and means adjacent the other end of said winding head providing a stationary mount for said mandrel supporting shaft and unobstructed feed of hair to said winding head, said means including a stationary mounting member having a central opening into which the other end of said mandrel-supporting shaft projects, a keeper member mounted in said other end of said mandrel-supporting shaft and cooperating with said mounting member to provide an annular winding path, hair guiding means on said cylindrical body for guiding hair to said winding arm and including a guide member along said winding path adapted to receive hair from an external source and movable along said winding path in response to rotation of said winding head, plural locking members slidably mounted on said mounting member for radial movement between a retracted position wherein

said winding path is free of obstruction to an advanced position bridging said winding path and engaging said keeper member, and means for successively moving said locking members between said retracted and advanced position in timed relation to rotation of said guide member to permit unobstructed movement of said guide member along said winding path with at least one locking member always in engagement with said keeper member.

10. A curling machine for doll's hair comprising a support, an elongated horizontally extending winding head including a cylindrical body, first and second main bearings engaging said cylindrical body externally thereof and mounting said winding head on said support for rotation about a horizontal axis, an elongated horizontally extending stationary mandrel projecting from one end of said winding head axially of said cylindrical body, a stationary mandrel-supporting shaft extending axially of and within said cylindrical body and operatively connected at one end to said mandrel, bearing means on said mandrel-supporting shaft and engaging said cylindrical body internally thereof, a winding arm projecting from said one end of said winding head and positioned in relation to said mandrel for guiding hair to said mandrel in response to rotation of said winding head, a drive for rotating said winding head, and means adjacent the other end of said winding head providing a stationary mount for said mandrel supporting shaft and unobstructed feed of hair to said winding head, said means including a stationary mounting member having a central opening into which the other end of said mandrel-supporting shaft

projects, a keeper member mounted in said other end of said mandrel-supporting shaft and cooperating with said mounting member to provide an annular winding path, hair guiding means on said cylindrical body for guiding hair to said winding arm and including a guide member along said winding path adapted to receive hair from an external source and movable along said winding path in response to rotation of said winding head, plural locking members slidably mounted on said mounting member for radial movement between a retracted position wherein said winding path is free of obstruction to an advanced position bridging said winding path and engaging said keeper member, and means for successively moving said locking members between said retracted and advanced position in timed relation to rotation of said guide member to permit unobstructed movement of said guide member along said winding path with at least one locking member always in engagement with said keeper member, said last named means including a control cam having a cam track operatively connected to said cylindrical body, and respective cam followers operatively connected to each of said locking members and engaged in said cam track, the development of said cam track being such as to move said locking members into said advanced positions in succession and in a prescribed timed relationship.

#### References Cited in the file of this patent

#### UNITED STATES PATENTS

2,980,959 Genovese ----- Apr. 25, 1961