Nov. 12, 1957 F. A. RICHARDS 2,812,734

TUFTING METHOD AND MACHINE

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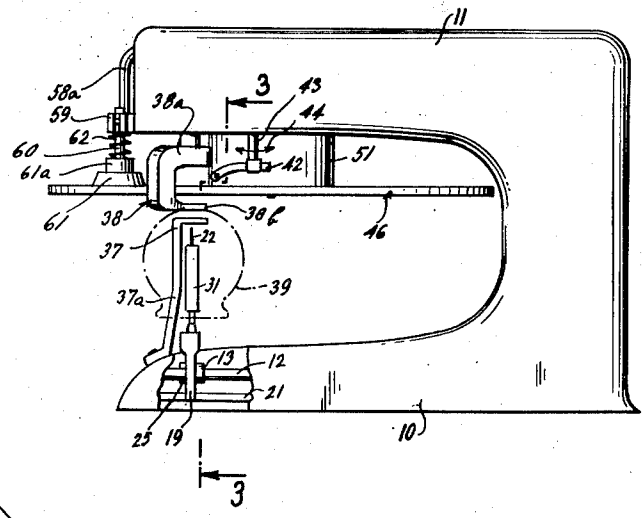


FIG. 1.

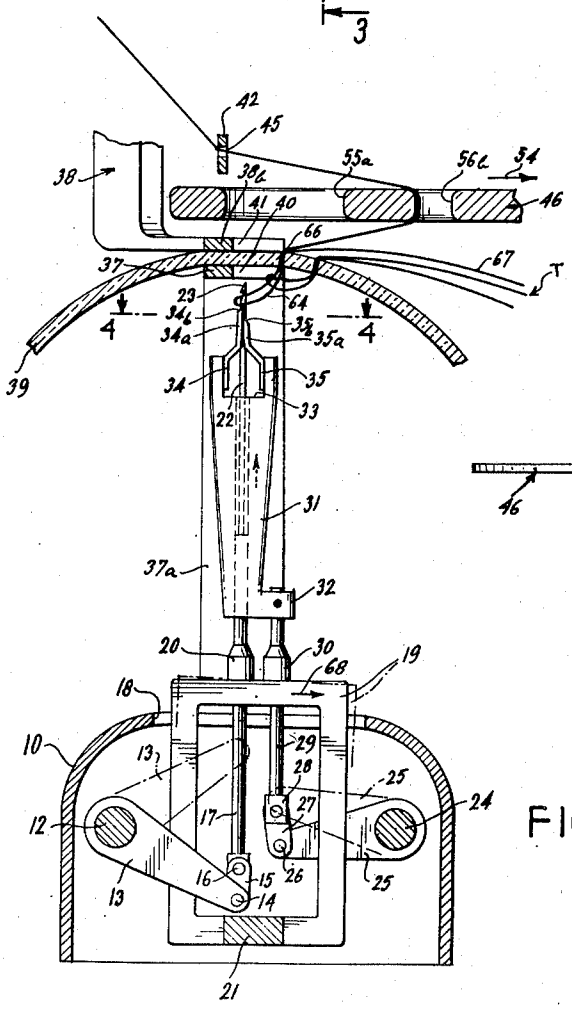


FIG. 3.

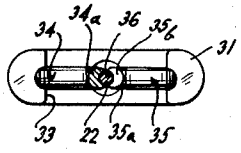


FIG. 4.

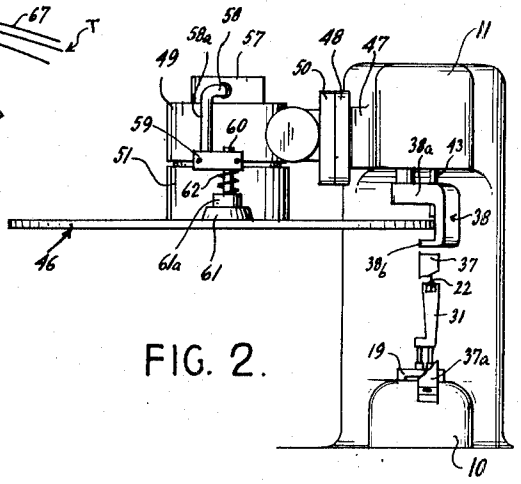


FIG. 2.

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TUFTING METHOD AND MACHINE

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FIG. 8

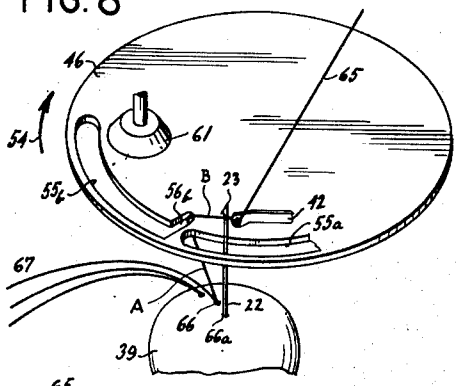
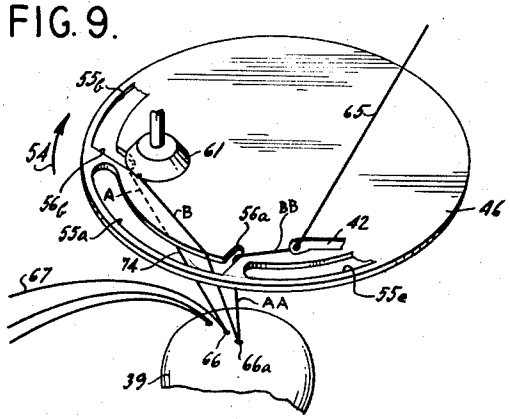


FIG. 9.



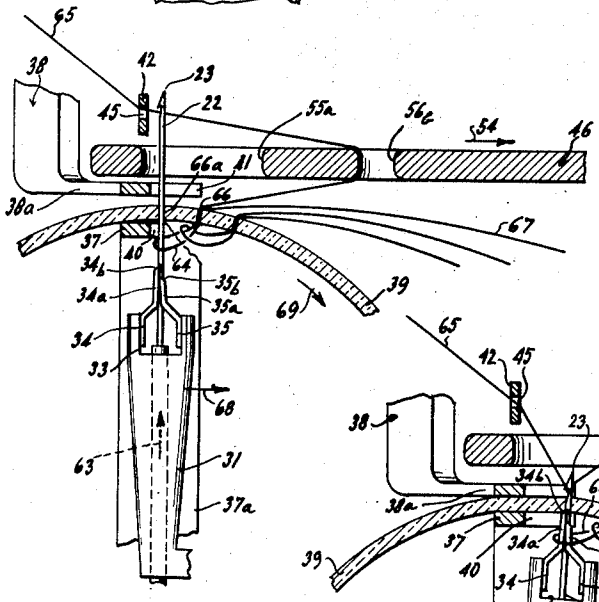
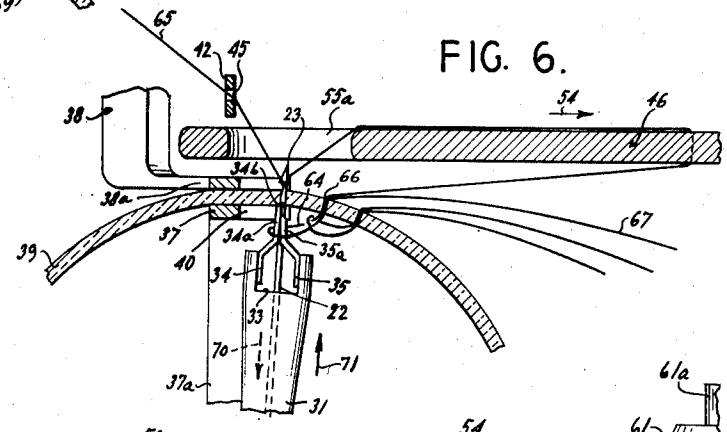


FIG. 5.

FIG. 6.



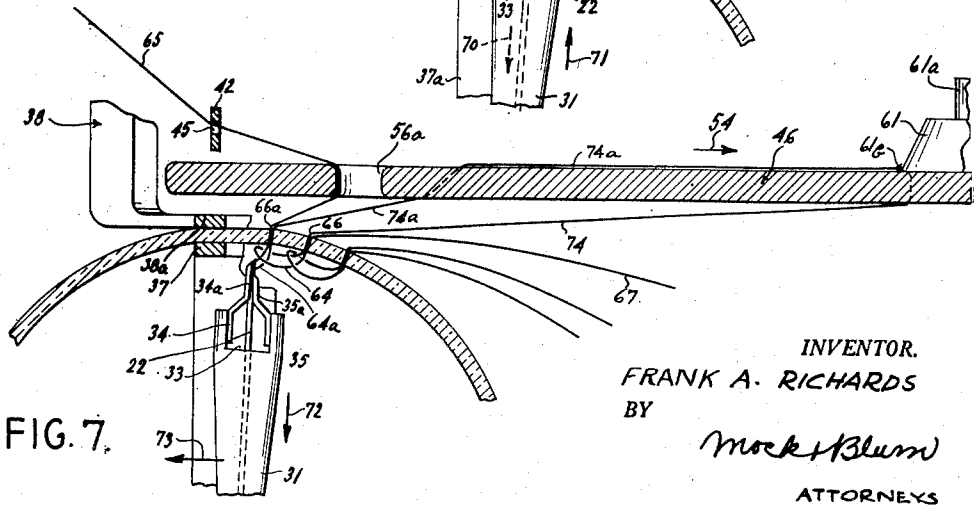


FIG. 7.

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TUFTING METHOD AND MACHINE

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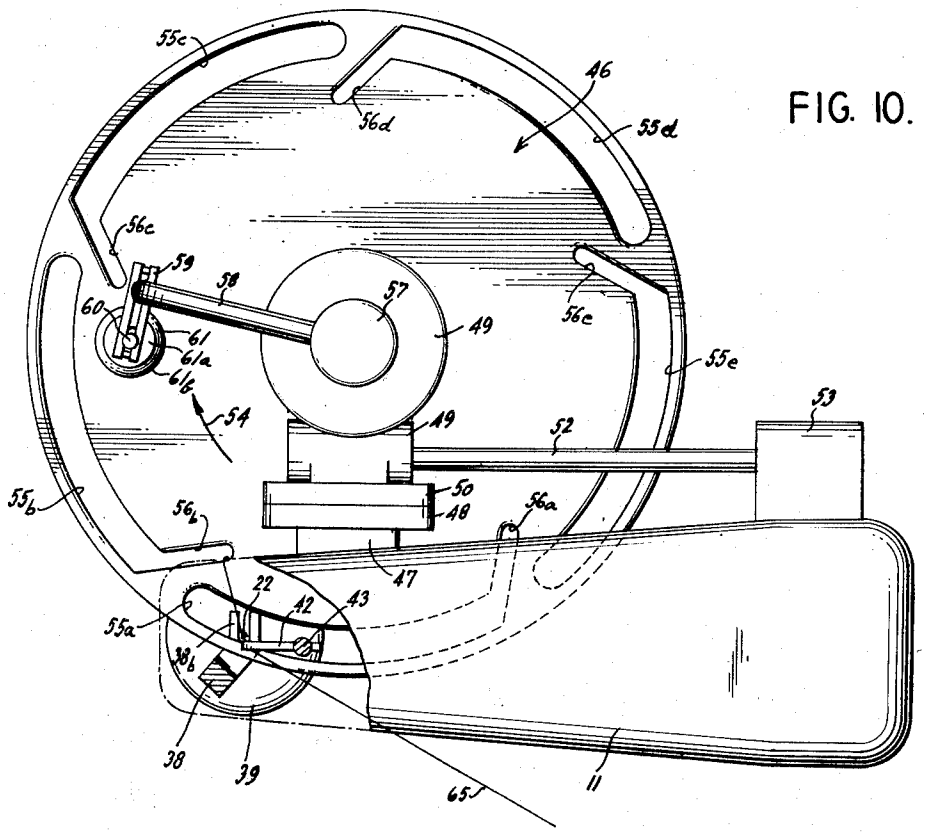


FIG. 10.

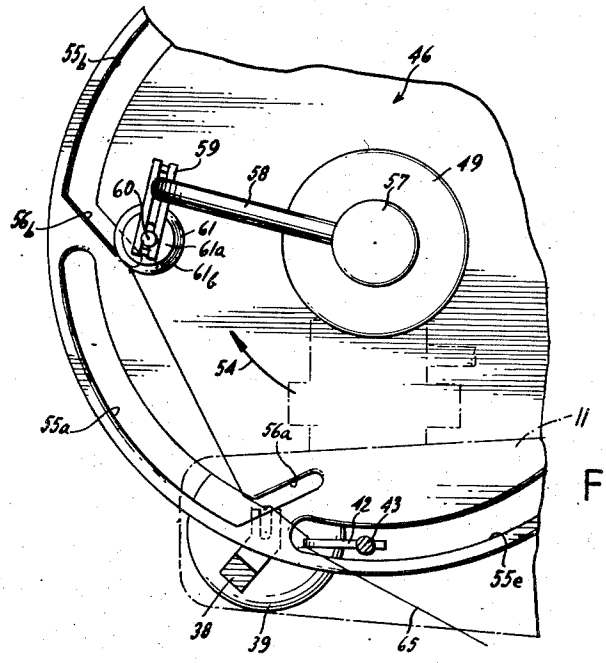


FIG. 11.

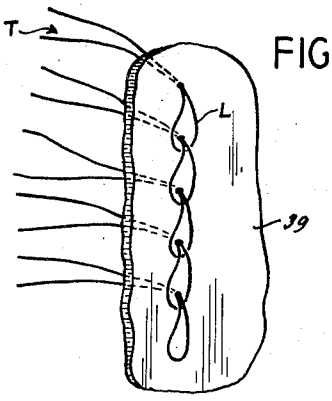


FIG. 12.

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United States Patent Office 2,812,734 Patented Nov. 12, 1957

2,812,734

TUFTING METHOD AND MACHINE

Frank A. Richards, Hollis, N. Y., assignor to Ideal Toy Corporation, New York, N. Y., a corporation of New York

Application July 22, 1955, Serial No. 523,837

4 Claims. (Cl. 112—79.5)

My invention relates to a new and improved method of fixing looped tufts to a work-piece, and to a new and improved machine for this purpose.

As one example, the work-piece may be a hollow doll-head, which is made of resilient material, which can be easily penertated by a well-known type of sewing needle, used in a well-known type of chain-stitch sewing machine. This doll-head may be made of rubber, a vinyl plastic or resin, or other well-known materials. When a small hole is made in the doll-head by the needle, and the needle-thread is passed by the needle through said hole, said hole contracts by the resilience of the rubber or other resilient material to firmly grip the needle-thread at the edge of the hole.

The sewing machine may be of a well-known type known as Puritan Sewing Mach., made by Puritan Mfg. Co., Boston, Mass.

This well-known sewing machine uses a single needle-thread and forms the usual chain stitch, whose loops are enchained at the inner face of the doll-head. In this well-known sewing machine, the work-piece is supported on a fixed work-support, and the needle is passed upwardly through the doll-head or other work-piece in an upward, vertical penetrating stroke, without engaging the needle-thread. During said penetrating stroke and at the end thereof, the needle is in vertical position.

During said penetrating stroke, an automatically operated presser-foot is in its lower clamping position and holds the work-piece stationary in the work-support.

When the needle is moved downwardly in its return stroke, to a position below the work-support, the presser-foot is automatically raised prior to the beginning of the return stroke, and the needle is also automatically rocked in a selected direction, while the needle extends through the work-piece, so that the work-piece is automatically shifted in unison with the rocking needle, in the direction of feed. For this purpose, the needle extends through a guide which is fixed to a rock-frame, which is automatically rocked. The needle is in its extreme rocked position at the end of its return stroke and the new loop is engaged on the top-part of the needle. The frame is then rocked reversely to its initial position while the needle is below the work-support, while the automatically depressed presser-foot clamps the work-piece. When the rock-frame is reversely rocked to its initial position, the needle is restored to its initial vertical position and it is again operated as previously described, thus forming a new loop of the needle-thread at the inner face of the work-piece, and drawing said new loop through the previously formed old loop of the needle thread to form the usual chain-stitch.

According to this invention, I provide a horizontal disc which is revoluble about a vertical axis. This disc is revolved continuously, at constant selected angular velocity. The disc may be revolved by any drive means, which may be the main shaft of the well-known sewing machine.

This disc is located above the work-support and below the thread-guide for the needle-thread. The edge of this

disc has circumferential slots or other clearances, to permit the point of the needle and the upper part of the shank of the needle to remain clear of the edge of said disc, while the sewing machine is operated in the usual way. This disc also has notches which are directed inwardly towards the center of the disc.

At the time that the needle is moved upwardly in its piercing stroke, the needle-thread extends through a respective notch which is anterior the vertical penetrating path of the needle, in the direction of revolution of the disc, and the thread guide is located rearwardly of said respective notch, and the needle-thread extends from said thread-guide through said notch, in slidable engagement with the rear wall of said notch, and from said notch to and through the last-formed hole in the doll-head, in which two legs of the needle-thread are firmly gripped by the edge of said last-formed hold. Hence, while the sewing machine is operated to operate the needle in the usual manner, the revolving disc draws the single-needle thread through the thread-guide from the spool or reel of needle-thread, to form a bight of gradually increasing length of the needle thread between said rear wall of the respective thread-engaging notch and the last-formed hole. The loop of this bight is advanced by the revolving disc to a cutting station which is in circumferential registration with said notcher. Said cutting station has a cutting wheel which which is operated frictionally by the disc.

By successively forming these elongated bights of the needle-thread by the revolving disc and cutting the loops of these elongated bights, I form a series of tufts of the needle-thread, which provide a wig for the doll-head.

Each tuft consists of two legs of the needle-thread, which are joined to form an integral loop at the inner face of the doll-head and these loops are enchained at the inner face of the doll-head to form the usual chain stitch. The tips of these legs of the tuft represent points of the needle-thread which are at the cut end of the respective bight of the needle-thread which is formed by the disc.

Of course, it has been known for several hundred years to form tufts in carpets, rugs, and other work-pieces by sewing tuft-yarns thereto by means of chain-stitches and other stitches, using supplemental needles, so that the novelty herein is solely to form elongated disc-bights of the needle-thread by a turnable disc and to cut said disc-bights at their loop-ends by a revolving cutting wheel whose cutting surface abuts the top planar edge of the disc, as later described. This invention makes it unnecessary to pre-cut the thread into selected lengths, as described in Hall U. S. Patent No. 2,686,305, dated August 10, 1954.

It is unnecessary to describe the automatic mechanism of the well-known sewing machine. The parts can be operated by hand, so that a method is disclosed herein.

The invention is further explained in the following description and annexed drawings, which disclose a preferred embodiment of the attachment, as supplied to said old chain-stitch sewing machine.

Figure 1 is a front elevation of the improved machine.

Fig. 2 is an end elevation, at the left end of Fig. 1.

Fig. 3 is a horizontal section on the line 3—3 of Fig. 1.

Fig. 4 is a horizontal section, on the line 4—4 of Fig. 3.

Fig. 5 is a horizontal section which shows the needle at the top of its piercing stroke.

Fig. 6 is a horizontal section which shows the needle below the top of its piercing stroke and above the bottom position of the needle. It also shows the needle in its inclined or rocked position.

Fig. 7 is a horizontal section which shows the needle in a part of its return stroke in which the needle is wholly below the work.

Fig. 8 is a perspective detail view which corresponds to Fig. 5. It shows the needle in vertical position at the

top of its piercing stroke and it shows the needle thread engaged by the notch which is anterior the circumferential slot which then is in vertical registration with the needle.

Fig. 9 is a perspective detail view, which corresponds to Fig. 7. It shows how the revolution of the disc from its position of Fig. 8, to its position of Fig. 9, has pulled needle thread out of the needle guide in the form of a bight which is at the cutting station.

Fig. 10 is a detail view, in which the complete disc is shown in top plan view. The illustrated parts are shown in their positions of Fig. 5.

Fig. 11 is a detail top plan view, which corresponds generally to Fig. 7 and Fig. 9.

Fig. 12 is a detail view, partly in section, which shows wig-tufts and their inner enchained looped ends.

The essential parts of the standard sewing machine which are necessary to explain this invention, are shown in the drawings.

PARTS OF THE STANDARD SEWING MACHINE

The hollow casing **10** has a hollow longitudinal arm **11**. A work-support **37** is fixed to the base of casing **10** by a bracket **37***a*. This work-support **37** has a needle-slot **40**. The needle **22** has a top wedge-shaped point **23**, which has a hook-shape at its base, at the shank of needle **22**. The presser-foot **38** is U-shaped. It has a vertical arm, a top horizontal arm **38***a* and a bottom horizontal clamping arm **38***b*, which has a needle-slot **41**. This presser-foot **38** is supported movably from arm **11**, so that presser-foot **38** can be raised to release position, and can be lowered to clamp the work **39** against work-support **37**. The work or work-piece **39** may be the scalp part of a doll-head which is made of latex rubber or a suitable plastic or resin which is resilient and easily penetrated by the needle-point **23** in the upward piercing stroke of needle **22**. The cylindrical shank of needle **22** is fixed to a cylindrical needle-rod **17**.

At its lower end, said needle-rod **17** is connected by a pivot **16** to a link **15**, which is connected by a pivot **14** to an arm **13** which is fixed to a rock-shaft **12**. This rock-shaft **12** is oscillated in the usual manner from the main shaft of the sewing machine, in order to oscillate the rock-arm **13** between its full-line and broken-line positions of Fig. 3.

The lower full-line position of arm **13** in Fig. 3 corresponds to the bottom position of needle **22**. The upper broken-line position of arm **13** in Fig. 3 corresponds to the top position of needle **22**, namely, at the top of the piercing stroke of needle **22**.

A bracket **19** is fixed to the rock-bar **21**, which is oscillated in the usual manner around an axis which is perpendicular to the plane of Fig. 3.

Said bracket **19** is oscillated between a normal or initial position in which the needle is vertical, and a rocked position in which the needle is in its inclined position. The arrow **68** in Fig. 3 indicates one direction of the rocking movement of frame **19**.

Said bracket **19** extends upwardly through an opening **18** which is provided in the base-part of the hollow casing **10**.

Bushings **20** and **30** are fixed to the top bar of bracket **19**, which has the shape of a rectangular frame. These bushings **20** and **30** have cylindrical bores.

A sleeve **31** has an extension **32**, which is fixed to a cylindrical rod **29**, which fits slidably in the cylindrical bore of bushing **30**. At its lower end, said rod **29** is connected by a pivot **28** to a link **27**, which is connected by a pivot **26** to an arm **25**, which is fixed to a rock-shaft **24**. Said rock-shaft **24** is oscillated in the usual manner from the main shaft of the sewing machine, to oscillate the rock-arm **25** between its lower full-line position and its upper broken-line position of Fig. 3. The full-line and broken-line positions of arm **25** correspond to the full-line and broken-line positions of arm **13**.

The cylindrical needle-rod **17** fits slidably in the cylindrical bore of bushing **20** and in a cylindrical bore of sleeve **31**. Said sleeve **31** has a rectangular recess **33** at its upper end. Said recess **33** has planar upstanding and parallel walls, which are perpendicular to the plane of Fig. 3.

Needle-guides **34** and **35** are fixed to said upstanding and parallel walls of recess **33**.

Said needle-guides **34** and **35** have extensions **34***a* and **35***a*, which have tips **34***b*, **35***b*. The tip **34***b* is above tip **35***b*.

The adjacent faces of said extensions **34***a* and **35***a* have half-cylindrical bores, to provide a cylindrical guide-sleeve in which the cylindrical shank of needle **22** fits slidably.

The needle thread or yarn **65** is led from a suitable spool or reel through a thread-guide **42**, which has an eye **45**. Said thread **65** is maintained under suitable tension in the conventional manner.

As shown in Fig. 1, the thread-guide **42** is connected to an arm **43**, which is movably or adjustably connected to arm **11**, so that the thread-guide **42** can be shifted back-and-forth, as indicated by the double-pointed arrow **44** in Fig. 1. The arm **43** may be pivoted to arm **11**.

Fig. 1 shows a hollow doll-head **39** in broken lines, and shows that the work-support **37** and its bracket **37***a* and the associated parts can extend upwardly through the neck opening of said hollow doll-head **39**.

Without the cutting attachment, this standard machine forms a standard and continuous chain stitch which has enchained loops **64** at the inner face of the work **39**.

THE CUTTING ATTACHMENT

A horizontal disc **46** is turnable about a vertical axis. This disc **46** extends between the horizontal legs **38***a* and **38***b* of the presser foot **38**, in both the upper and lower positions of said presser-foot **38**.

In Fig. 3, it is assumed that the observer is in front of the edge of disc **46**, so that the motion of said edge is from right to left.

As shown in Fig. 2, the hollow arm **11** has a hollow extension **47**, which has a vertical and annular flange **48**. A conventional drive, such as a conventional worm-drive or other speed-reducing drive, is located in a hollow casing **49**, whose annular flange **50** is fixed to flange **48** by any conventional means. The worm-drive is not illustrated, since it is well-known. This worm-drive has an input shaft **52** which is continuously revolved in the same direction by the continuously revolving main shaft of the sewing machine. The connecting driving means between said main-shaft and the input shaft **52**, are located in a casing **53**, which is fixed to the arm **11**, in which said longitudinal main-shaft of the sewing machine is located in the usual manner.

Said disc **46** has a vertical hollow hub **51**, which is fixed to the output shaft of the worm-drive which is provided in casing **49**, so that disc **46** is continuously revolved in a single direction, at regulated and constant angular velocity.

In this embodiment, the disc **46** has five circumferential slots **55***a*, **55***b*, **55***c*, **55***d*, **55***e*. For convenience, these five slots are respectively designated as the first slot, second slot, third slot, fourth slot and fifth slot.

Each said circumferential slot has outer and inner arcuate walls which are concentric with the vertical axis of disc **46**.

At its rear end, each said circumferential slot has an inward extension or notch, namely, the notches **56***a*, **56***b*, **56***c*, **56***d*, **56***e*. The notch **56***a* is designated as the first notch, the notch **56***b* is designated at the second notch, etc.

Each said notch has parallel and planar walls, which form acuate angles with the respective radii of disc **46** to the respective rear ends of the circumferential notches **55***a*—**55***e*.

As shown in Fig. 2 and Fig. 10, the worm-drive casing **49** has an upstanding extension **57**. As shown in Fig. 10, a radial arm **58** is fixed at one end to extension **57**. As shown in Fig. 1, the other end of arm **58** has a depending vertical leg **58***a*, to which a clamp **59** is fixed releasably and adjustably. This clamp **59** grips and supports a vertical stud-shaft or rod **60**, in which a compression coil spring **62** is mounted. As shown in Figs. 1 and 10, said stud-shaft or rod **60** extends into the hollow hub-extension **61***a* of a cutting wheel **61**, which has a frusto-conical vertical shape, and which has a bottom planar and circular cutting edge. Said cutting wheel **61** is vertically movable and also rotatable relative to its stud-shaft or rod **60**.

The planar and circular cutting edge of wheel **61** frictionally abuts the top planar face of disc **46**.

As shown in Figs. 10 and 11, the cutting wheel **61** is positioned anterior the sewing station which is provided at the needle **22**.

This cutting station is located inwardly of the circumferential slots and it is located intermediate the outer and inner ends of the inward notches, in circumferential registration with said notches.

The sharp bottom circular cutting edge of wheel **61** bears frictionally against the top planar face of disc **46** by the action of the compression spring **62**, so that the rotating disc **46** rotates the cutting wheel around the vertical axis of the stud-shaft **60**. As viewed in Figs. 10 and 11, the cutting wheel **61** is rotated in the clockwise direction, so that its outer periphery, which is adjacent the circumferential slots **55***a*—**55***e*, is turned in the direction of arrow **54**.

OPERATION OF THE SEWING MACHINE AND ITS CUTTING ATTACHMENT

As viewed at the center of disc **46** in Fig. 10, the edge of disc **46** has an apparent linear movement from left to right. As viewed from a point external to the edge of disc **46**, said edge has an apparent linear movement from right to left.

As viewed in Fig. 3, the apparent linear movement of the edge of disc **46**, with reference to the plane of Fig. 3, is from right to left because the viewing station is external to the edge of disc **46**. In Figs. 5, 6 and 7, the apparent direction of linear movement of the edge of disc **46** is from left to right, because the viewing station is at the axis of disc **46**. In each of Figs. 3, 5, 6 and 7 the disc **46** is turned clockwise, as viewed at the top of disc **46**, and as indicated by arrow **54** in Figs. 8, 9, 10, 11.

Fig. 3 shows the positions of the parts at the beginning of a cycle.

Two holes **66** have previously been pierced in head **39**, and the previously-formed loops of needle-thread have been cut at the cutting station to provide tuft-strands **67**. A new hole **66***a* is pierced in this cycle.

The needle **22** is in its bottom position in Fig. 3. Said needle **22** now extends through and above the last-formed loop **64** of the needle thread **65**. The needle **22** vertically registers with the anterior or front end of the first circumferential slot **55***a*. The needle-thread **65** now extends, under usual tension, through the second notch **56***b*, which is anterior and directly adjacent the front end of the first circumferential notch **55***a*. The bight of the needle thread **65** is slidably engaged at the rear wall of said second notch **56***b*. The needle thread **65** extends through said second notch **56***b*, through the last-formed hole **66**; thus forming a thread-part which has a top leg B and a bottom leg A.

The resilient material of head **39** grips the needle-thread **65** at the last-formed hole **66**, so that the needle thread **65** is held taut between the second notch **56***b* and the last-formed hole **66**, in the general position shown in Fig. 8.

At this time, the rock-frame **19** is in its normal or initial

full-line position of Fig. 3; and arms **13** and **25** are in their initial full-line positions of Fig. 3, and needle **22** is vertical.

The parts of the sewing machine are operated in the usual manner.

First period

The rock-frame **19** is maintained in its initial, full-line position of Fig. 3. The rock-arm **25** is maintained in its initial full-line position of Fig. 3, so that sleeve **31** remains in its lower position of Fig. 3. The presser-foot **38** is maintained in its lower clamping position. The arm **13** is turned from its initial full-line position of Fig. 3 to its upper broken-line position of Fig. 3.

The needle **22** is thus raised relative to sleeve **31** and its guides **34***a* and **35***a* in its piercing stroke, in the direction of the vertical arrow **63**, while needle **22** is kept in vertical position, to pass the needle-head **23** successively through slot **40**, the work-piece **39**, slot **41**, and through the first circumferential slot **55***a* at its front or anterior end. During this period, the needle-head **23** slips past the part B of needle-thread **65** which is intermediate the eye **45** of needle guide **42** and the second notch **56***b*. The continuous revolution of the disc **46** advances the second notch **56***b* towards the cutting station at cutting wheel **61**, thus pulling needle-thread **65** through eye **45**, and elongating the part A—B of thread **65**, while part A remains fixed to head **39** and keeping said part A—B under tension. At the end of this period, the needle **23** is in the position of Fig. 5.

At the end of this period, the presser-bar **38** is raised to its release position of Fig. 5.

Second period

During this second period, the needle-head **23** is moved from its position of Fig. 5, to its position of Fig. 6.

During this second period, the continuous revolution of disc **46** additionally advances the second notch **56***b* towards the cutting station at cutting wheel **61**, so that the elongation of the thread-part A—B is continued.

As above noted, the presser-foot **38** is kept in its raised, non-clamping position of Fig. 5 during this period.

During this period, the arm **25** is also turned from its lower full-line position of Fig. 3 to its upper broken-line position of Fig. 3, and the frame **19** is also rocked in the direction of arrow **68** of Fig. 5, from its initial full-line position of Fig. 3 to its rocked broken-line position of Fig. 3. The needle **22** and the sleeve **31** are rocked in unison with the frame **19**, in the direction of arrow **68** and the head **39** is shifted in unison with the needle **22**, in the direction of arrow **69** of Fig. 5. Fig. 6 shows the top position of sleeve **31** and of its guides **34***a* and **35***a* at the end of this period, and it also shows the rocked positions of sleeve **31** and needle **22** at the end of this period. The arrows **70** and **71** are parallel to the axis of the cylindrical shank of needle **22** in Fig. 6.

At the end of this period the presser-foot **38** is lowered to clamping position.

When the presser-foot **38** is thus lowered at the end of this period, the needle-head **23** is in slot **41**, above the work-piece or head **39**.

During this period, the needle-head **23** engages the needle-thread **65** and pulls it from the spool or reel or other source of thread **65**, through the eye **45**.

Third period

During this period, the presser-foot **38** is maintained in its clamping position.

During this period, the needle-head **23** is moved by the standard mechanism of the sewing machine from its position of Fig. 6 to its position of Fig. 7. The downward movement of needle **22** is indicated by arrow **72** in Fig. 7. During this period, the frame **19** is also rocked back to its initial position by said standard mechanism, as indicated by arrow **73**, in Fig. 7. A new loop **64***a* of the needle-thread **65** is thus enchained with the previously-

formed loop 64 of said needle-thread 64*a*, according to said standard operation. At about the end of this period, the second notch 56*b* is at the cutting station and the tuft-forming bight 74*a*—74*b* is cut by wheel 61, to form two tuft-threads 67 of the wig. At the end of this period, the first notch 56 is close to vertical registry with needle 22.

It is clear that the same work can be performed by a disc which merely has the notches 56*a*, 56*b*, 56*c*, 56*d*, 56*e*, and which is merely recessed at the arcs of the circumferential slots 55*a*, 55*b*, 55*c*, 55*d*, 55*e*.

The circumferential slots 55*a*—55*e* merely provide clearances for the movement of the needle.

Thus, the disc 46 could have recesses which extend to the inner arcuate faces of the circumferential slots, thus omitting the outer walls of said discs at the arcuate slots 55*a*—55*e*.

THE METHOD OF OPERATION

For convenience, it is assumed that the hole marked "66" in Fig. 8 is the first hole which has been pierced in head 39, and that the hole 66*a* shown in Fig. 8 is the second hole.

After the needle 22 has been moved below the first hole 66, the thread 65 has a first bight which has two legs which extend through hole 66 to a first inner loop-end 64 of said first bight. These legs are gripped and held fixed to head 39 at the edge of first hole 66 by the resilient material of head 39, which contracts each hole after needle 22 has passed out of said hole. One leg of said first bight provides a strand 67 of a respective tuft T. The second leg of said first bight extends upwardly and forwardly in a thread-part A to and through the respective notch 56*b*, and then rearwardly and horizontally in a thread-part B to and through the eye 45 of guide 42, and then upwardly and rearwardly to the spool or reel or other source of thread 65. The thread 65 is taut and under tension between its source up to the point where it is gripped at the respective hole. The inner end of notch 56 is in sliding engagement with said second leg of said first bight.

The disc 46 is continuously revolved forwardly in the direction of arrow 54, thus pulling the thread 65 under tension from the thread-source through the eye 45, and elongating thread-part A under tension between hole 66 and notch 56*b*, and also elongating the thread-part B under tension between notch 56*b* and eye 45.

The head 39 is held fixed to work support 37, while needle 22 is moved upwardly through the first loop-end 64 of said first bight, to the position shown in Fig. 5, to pierce the second hole 66*a*. The head 39 is unclamped from support 37 after said second hole 66*a* has been pierced, and the needle 22 is moved downwardly from its position of Fig. 5 successively to the positions of Fig. 6 and Fig. 7 and Fig. 3. When needle 22 has been moved back to its position of Fig. 3, the notch 56*a* of the slot or clearance 55*a* has the position of notch 56*b* in Fig. 8, and the slot or clearance 55*e* has the position of slot 55*a* in Fig. 8.

This second downward stroke of needle 22 provides a second bight of the thread 65, and the two legs of said second bight are gripped and held fixed to head 39 at the edge of the second hole 66*a*, and the first loop-end 64 is passed, as drawn in Fig. 7, through the second loop-end 64*a* of the second bight.

The second downward stroke of needle 22 provides a tuft-forming bight 74*a*—74, which has a closed end at notch 56*b*.

The lower leg 74 of said tuft-forming bight is an elongation of the thread-part A of the first bight. Said leg 74 is gripped and held fixed to head 39 at the edge of the first hole 66. The upper leg 74*a* of said tuft-forming bight is gripped and fixed to head 39 at the edge of the second hole 66*a*. Said upper leg 74*a* is an elongation of the thread-part B.

The thread 65 is stretchable and it may be elastic. Thus, as one example, the thread 65 may be a vinyl resin or plastic, such as "Saran," which is a thermoplastic resin produced by the polymerization of vinylidene chloride ($CH_2=Cl_2$) alone or with other monomers and other ingredients. This "Saran" filament is a well-known article of commerce and it is described in "The New Fibers" by Sherman & Sherman, published in 1946 by D. Van Nostrand Company, Inc. It is stretchable and elastic.

When the leg 74*a* is thus fixed to head 39 at the edge of the second hole 66*a*, the closed end of the tuft-forming loop 74*a*—74 is close to the cutting station, and said loop-forming tuft is then slightly extended by the revolution of disc 46 to bring its closed end at notch 56*b* to the cutting wheel, thus cutting said closed end at notch 56*b*, so that the severed legs 74*a* and 74 form two additional strands 67 of a respective tuft T.

When this cutting operation has been completed, the slot or clearance 55*e* has the position of the slot or clearance 55*a* in Fig. 8, and the notch 56*a* has the position of notch 56*b* in Fig. 8. Also, the thread 65 now has thread-parts AA and BB, which correspond respectively to the thread-parts A and B of Fig. 8.

By repeating said operations, a series of respective tufts T are provided. Each tuft T is a bight or loop of the thread 65. Each tuft T has two external strands 67. The inner loop-ends L of said finished tufts T are enchained as shown in Fig. 12.

It is clear that these operations may be performed by hand or by other machines, so that a method is disclosed herein.

The rotary cutting operation under pressure, between two surfaces which are revolved in the same direction and at the same linear velocity around respective vertical axes, provides a very efficient cutting action.

I have described a preferred embodiment of the method and machine, but numerous changes, omissions, additions and substitutions can be made without departing from the invention, which is further disclosed and defined in the appended claims.

It will be noted that in view of the fact that clamp 59 is fixed adjustably to leg 58*a*, it is possible to adjust the circumferential position of cutting wheel 61 relative to disc 46 and hence relative to the circumferential position of the needle. In this manner, it is possible to vary the length of the strands of hair which are cut by cutting wheel 61.

Also, it is possible to adjust the mounting of hub 51 of disc 46 upon the output shaft of the worm-drive which is provided in casing 49, so as to vary the length of the strands which are drawn prior to the cutting operation.

As a result of the adjustability of cutting-wheel 61 and of disc 46, it is possible to vary within relatively wide limits, the length of the strands of hair which are produced in the finished doll's head.

I claim:

1. A machine for sewing hair-like threads into the head of a doll comprising a support for the head of the doll, a presser-foot to secure the head to said support, said support and foot each having aligned needle slots, a reciprocable needle movable through said aligned slots and the doll head, means to reciprocate said needle, a reciprocable sleeve in which said needle reciprocates, means to reciprocate said needle and sleeve independently of each other, guide means on said sleeve and movable therewith along and relative to said needle, an oscillatable bracket cooperable with said needle and sleeve to oscillate the same between first and second positions, a rotating disc having a plurality of circumferentially disposed slots for mating alignment with said reciprocable needle to receive the same when the latter is in its first position, each of said slots having a notch directed at an acute angle to the radius of said disc to receive the hair-like threads and a circular rotatable frusto-conical cutting wheel positioned at a radius relative to said disc intermediate the ends of each of said notches, said wheel having a planar bottom in engagement with said disc for

rotation thereby to cut the hair-like threads that are received in the notches.

2. In a machine for sewing hair-like threads into the head of a doll, a reciprocable needle, a rotatable disc having a plurality of circumferentially disposed slots defined therein for reception of said needle, each of said slots terminating in a notch directed at an angle to the radius of said disc, thread guide means to guide the hair-like threads to said slots and notches, the threads moving into said notches as said disc rotates, and a circular cutting wheel rotatable about an axis positioned intermediate the ends of said notches, said wheel having a bottom surface in engagement with said rotatable disc whereby rotation of said disc will cause said wheel to rotate and the threads passing through said rotating notches will be cut thereby.

3. In a machine as in claim 2, means to adjust the axis of said rotatable wheel relative to said disc to cut said threads to desired pre-determined lengths.

4. In a machine for sewing hair-like threads into the head of a doll, a reciprocating needle, rotatable means having openings therein cooperable with said needle to accept the same and said hair-like threads to form loops from said threads, notches defined in said rotatable means as part of said openings at an acute angle to the radius of said rotatable means, circular cutting means rotatable about an axis adjustable relative to said openings and means to adjust the axis of said cutting means, said cutting means constantly engaging said rotatable disc for cutting rotation thereby to sever the threads of the loop formed by the cooperation of said needle and openings.

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