Oct. 23, 1962 BUNSAKU TAKETOMI 3,059,599

FABRIC ROTATING DEVICE FOR SEWING MACHINES

Filed Feb. 14, 1961

Fig. 1

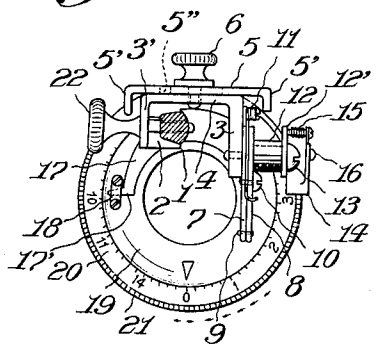


Fig. 2

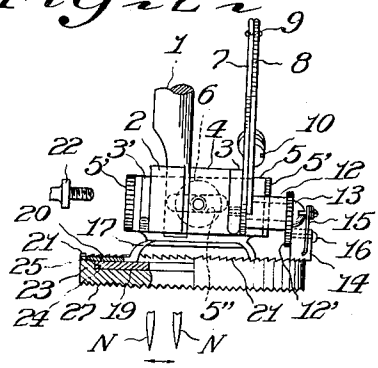


Fig. 3

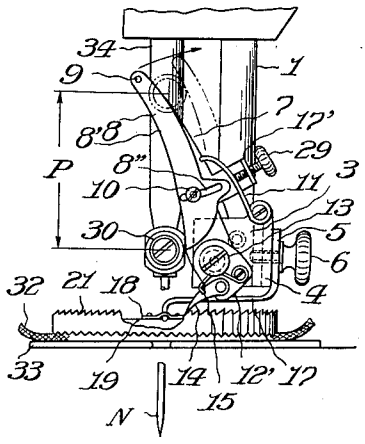


Fig. 4

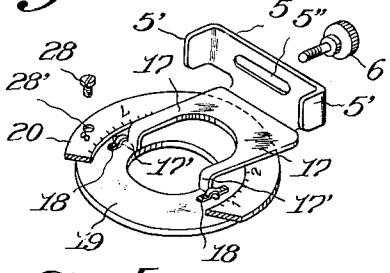


Fig. 5

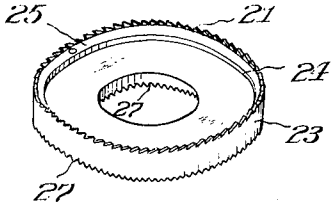


Fig. 7

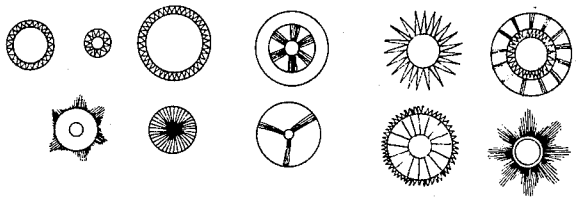
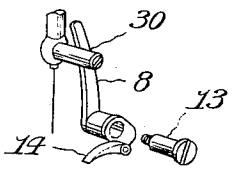


Fig. 6



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FABRIC ROTATING DEVICE FOR SEWING MACHINES

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1 Claim. (Cl. 112—102)

This invention relates to sewing machines, and more particularly it relates to a fabric rotating device to be attached to the lower end of the presser rod of a known sewing machine, particularly a known zigzag sewing machine, by means of which various kinds of stitch patterns based on circular or star-shaped design, such as decorative designs and eyelets, can be sewn automatically.

While, as is well known, zigzag sewing machines have recently come to be widely used and, with their automatization, have become capable, through the use of cams, of sewing many beautiful patterns, these patterns, in general, have been confined to merely patterns based on straight-line bands within a range of width of approximately 5 millimetres.

It is an object of the invention to provide a novel fabric rotating device through the use of which on a known zigzag sewing machine various stitch patterns based on polar elements, as illustrated by the examples shown in FIG. 7, can be automatically sewn in addition to the above-said patterns obtainable by means of conventional zigzag sewing machines.

It is another object of the invention to provide a fabric rotating device as stated above which is simple in construction and operation; is easily attached to, operated on, and detached from a known zigzag sewing machine; and performs its automatic function without the use of a guide frame.

The foregoing objects, other objects, and advantages have been achieved by the device of the present invention, which in the representative embodiment described herein is an attachment attached to the lower end of the presser rod of a known zigzag sewing machine. The details of the device will be best understood by reference to the following description when taken in conjunction with the accompanying drawing in which the same and equivalent parts are designated by the same reference numerals and letter, and in which:

FIG. 1 is a top plan view of the device according to the invention with some parts deleted for clarity;

FIG. 2 is a front elevational view, partly in section, as viewed from the operator's side, of the device of FIG. 1;

FIG. 3 is a side elevational view, with a part cut away, from the right of FIG. 2;

FIGS. 4 and 5 are exploded perspective views showing the presser disk for pressing and rotating the fabric, the presser bracket and its arms, and intervening ring and disk of the device of FIGS. 1, 2 and 3;

FIG. 6 is a perspective view diagrammatically indicating the transmission of driving power derived from the vertical, reciprocating motion of a known needle bar to produce reciprocating motion of a pawl for driving the presser disk of FIG. 5; and

FIG. 7 illustrates some examples of decorative and eyelet patterns that can be sewn by the use of the present device in conjunction with a zigzag sewing machine.

Referring to the drawings, the principal structural body of the embodiment illustrated is a base bracket 4 having flanges 3 and 3' forming a channel-shaped cross section, which is held clamped to the lower end of the presser bar 1 of a known zigzag sewing machine by a screw 22. A sleeve 12 is supported pivotally by a pivot screw 13 on the flange 3 of the said base bracket, and a lever 7 is fixed to the end of the sleeve 12 which is adjacent to the

flange 3. A slide plate 8 is disposed flat against the lever 7 and is held thereto by a pivot pin 9 at the upper end and by a screw 10 engaged within an arcuate slot 8'' formed through the slide plate 8, said screw being screwed into a tapped hole in the lever 7. The angular position of the slide plate 8 relative to the lever 7 about the pivot pin 9 is adjusted by means of an adjusting screw 29 screwed into a tapped through hole in one portion of the lever 7. The slide plate 8 has a curved surface 8' of such a configuration that it slidingly contacts the outer surface of a transverse stud 30 protruding horizontally from the needle holder, or needle chuck, of the needle bar 34 of the known sewing machine and, receiving driving motion from the vertical, straightline, reciprocating motion of the said stud 30, said motion being transmitted as an angular oscillation to the lever 7, hence to the sleeve 12. Accordingly, a crank arm 12' fixed rigidly to the end of the sleeve 12 opposite the end of the lever 7 is also caused to undergo the same angular oscillation and thereby drives a pawl 14 supported pivotally thereon.

On one hand, a presser bracket 5 having a horizontal slot 5'' and arms 17 bent at right angle to the body of the said bracket 5 is clamped to the back of the base bracket 4 by a screw 6 which passes through the said slot 5'' and is screwed into a tapped hole in the base bracket 4. The extreme ends 17' of the said arms 17 are connected to an annular disk 19 by such means as fasteners 18 in such a manner that the said disk 19 is free to rotate, through a small angle, about an axis passing through the extreme ends 17'. This disk 19 rotatably supports and holds a presser disk 23, for pressing down on and rotating the fabric to be sewn, in the following manner.

The upper face of the presser disk 23 has two, concentric, counterbored, circular recesses 24 and 25. In assembled state, the smaller recess 24 closely, yet slideably, encompasses the aforesaid annular disk 19, the thickness of which is slightly less than the depth of the circular recess 24. A calibrated ring 20 closely, yet slideably, fits into the larger recess 25, over the said annular disk 19, and is fixed rigidly to the presser disk 23 by screws 28 which screw 28' into tapped holes in the presser disk 23. Thus the annular disk 19 is contained closely, yet slideably, between the ring 20 and the presser disk 23, which are joined integrally and are able to rotate freely as they are supported by the annular disk 19.

The pressure disk 23 is provided on the extreme outer portion of its upper surface with ratchet teeth 21, which are engageable by the afore-mentioned pawl 14 in driving action as will be described later in this disclosure. The presser disk 23 is, furthermore, knurled over its entire lower surface 27 so as to present a large number of sharp projections which, when the fabric to be sewn is pressed down by the said surface, prevent the said fabric from slipping horizontally.

Since the presser disk 23 is assembled rotatably in this manner and supported by a structure which is attached to the lower end of the presser rod 1 of the sewing machine, it can be made at will to press down on or lift off of the fabric 32 by manipulation of the known presser rod control lever (not shown) of the sewing machine. Accordingly, there is no need for a frame or any other accessory, and it is possible to cause the presser disk to press down on any desired position of the fabric.

The reason for providing the horizontal slot 5'' in the bracket 5 for fastening to the base bracket 4 by means of a single screw 6 is that this fastening arrangement is necessary for the purpose of varying the magnitude of the diameter of the stitch pattern circle with respect to the positions NN (FIGS. 2, 3) of the needle of the known sewing machine by shifting the entire presser disk to the left or right. Furthermore, this fastening arrange-

ment affords automatic self-alignment of the parallelism between the needle plate **33** of the sewing machine and the lower face **27** of the presser disk **23** (by self-aligning rotation about the screw **6** as a center), whereby the said arrangement affords uniform pressing action on the fabric.

Returning now to the mechanism for driving the presser disk **23**, the previously mentioned pawl **14** is caused by a spring **15** to be in light, yet positive, contact with the ratchet teeth **21** of the presser disk **23**. Accordingly, when the lever **7** is caused to oscillate in the direction of the arrow, the pawl **14** is driven in oscillatory motion as was described before. The pawl **14**, being in contact with ratchet teeth **21**, drives the presser disk **23** in the direction of its forward stroke, whereby the presser disk **23** is caused to rotate intermittently with the fabric **32** constantly pressed by it.

Since the transverse stud **30** of the needle chuck of the needle bar **34** of the sewing machine undergoes vertical reciprocating motion between the space interval P (FIG. 3) together with the operation of the sewing machine, the slide plate **8** is caused to oscillate in the direction of the arrow (FIG. 3) in accordance with its curved surface **8'**, which is caused by a spring **11** to be in light, yet positive, sliding contact with the outer periphery of the said stud **30**, whereby the lever **7**, to which the slide plate **8** is integrally held, undergoes the same oscillatory motion, which is transmitted to drive the presser disk as afore-described. Accordingly, by varying the curve of the curved surfaces **8'** of this slide plate **8** with respect to the vertical, straight line of motion of the needle bar **34**, the amplitude of the oscillatory motion of the lever **7** can be varied, whereby it is possible to vary, at will, the rotational velocity (rotational angle per stroke) of the presser disk to one tooth, two teeth, three teeth, etc., per stroke of the pawl **14**, that is, per cycle of oscillation of the lever **7**. This varying of the curve of the slide plate **8** can be accomplished by loosening the screw **10**, adjusting the angle of the slide plate **8** relative to the lever **7** as desired by means of the adjusting screw **29**, then retightening the screw **10**.

By this construction of the embodiment of the present invention as described above, the slide plate **8** is prevented from breaking contact with the stud **30** even if the needle bar **34** moves to the left and right through a distance of approximately 12 millimetres in the longitudinal direction of the stud **30**, yet, since the stud **30** and the plate **8** are constantly in contact, no chattering or rattling occurs, whereby, as a unique advantage, extremely quiet operation is afforded.

In order to accomplish stitching as indicated in FIG. 7 by the use of the device of this invention, the initial positioning procedure merely comprises lowering the feed teeth (not shown) of the sewing machine below the top surface of the needle plate, positioning the fabric to be sewn suitably on the needle plate, and lowering the presser disk to press down on the upper surface of the said fabric. Then, by operating the sewing machine with fixed amplitude of the zigzag system, eyelet stitching is accomplished; and by varying the zigzag amplitude, stitching of a decorative design is accomplished. Furthermore, by varying the shapes of the cams in the case of an automatic zigzag sewing machine, and suitably combining their rotational speeds, the number of the rays or petals of the flower-like pattern and their sizes are automatically determined, and it is possible to produce esthetically pleasing patterns in a few seconds without any high degree of artistic skill on the part of the operator.

Another advantage of the device of this invention lies in its unique manner of taking off driving power from the vertical, reciprocating motion of the needle bar **34** by means of a slide plate **8** in positive contact on only one side of the stud **30** of the needle bar **34**. This method affords facility in attachment and adjustment and is in advantageous contrast to a known method of power takeoff from the stud **30** wherein a fork or yoke at the end of a lever is adapted to embrace the said stud **30** so as to derive driving power therefrom.

The above described advantages of the device of the invention, together with the facility with which the device can be attached to known and existing zigzag sewing machines, affords great utility of the device in a vast range of uses, which will be quite obvious.

While I have described a particular embodiment of my invention, it will be understood by those skilled in the art upon the study of this disclosure that my invention permits various modifications without departing from the essence of the invention and within the scope of the appended claim.

I claim:

A fabric rotating device for sewing machines of the type having a presser rod; a base bracket adapted to be attached to the lower end of said presser rod; a needle bar; a needle holder disposed on said needle bar; a needle removably inserted in said needle holder; a needle plate disposed horizontally below said needle; a horizontal stud extending out of the lower end of said needle bar; a presser bracket which, in operational state, is fixed to said base bracket but is horizontally shiftable with respect thereto for adjustment; an annular disk supported horizontally by said presser bracket; a presser disk having ratchet teeth on the outer peripheral portion of its top surface and a knurled lower surface, said presser disk being supported rotatably and concentrically below said annular disk and, when the presser rod is lowered, pressing down on and securely holding the fabric to be sewn; and a power transmission mechanism being supported by the aforesaid base bracket and comprising a lever, a slide plate having a curved surface, a spring and a ratchet pawl, said slide plate being supported by said lever and said spring adapted to maintain said curved surface in sliding contact with said stud, thereby deriving oscillatory motion from the vertical, reciprocating motion of said stud, said ratchet pawl being pivotally mounted on said lever and adapted to impart intermittent, rotational motion to said presser disk, which thereby is caused to rotate the said fabric in a predetermined manner while holding said fabric down on the needle plate of the sewing machine.

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