May 1, 1956 F. PARRY 2,743,688

BLINDSTITCH SEWING MACHINE RIDGE FORMER MECHANISMS

Filed Oct. 22, 1954 3 Sheets-Sheet 1

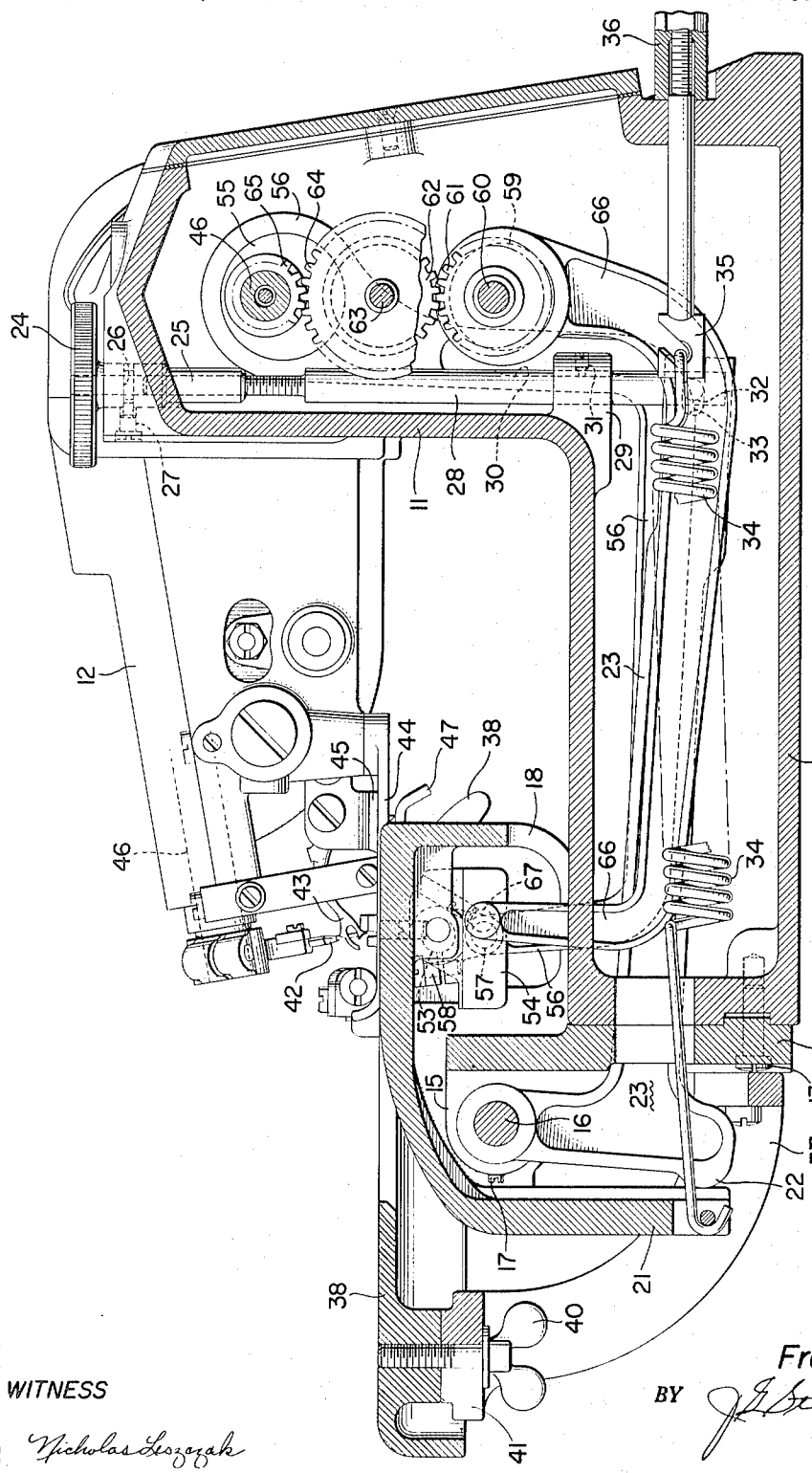

Fig. 1.

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WITNESS

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Filed Oct. 22, 1954 3 Sheets-Sheet 2

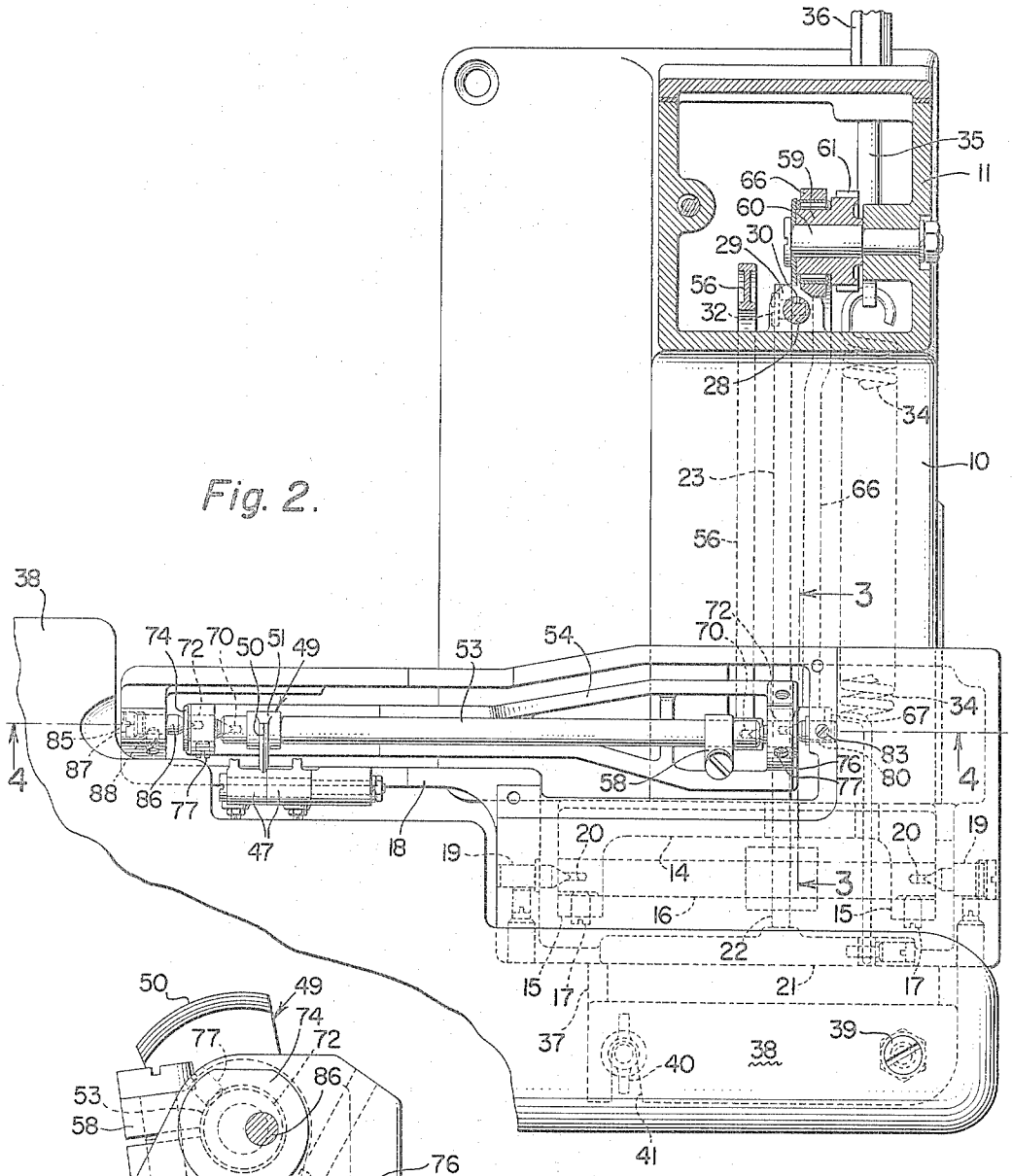

Fig. 2.

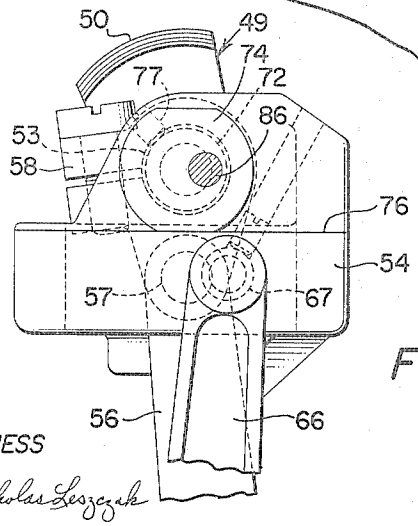

Fig. 3.

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BLINDSTITCH SEWING MACHINE RIDGE FORMER MECHANISMS

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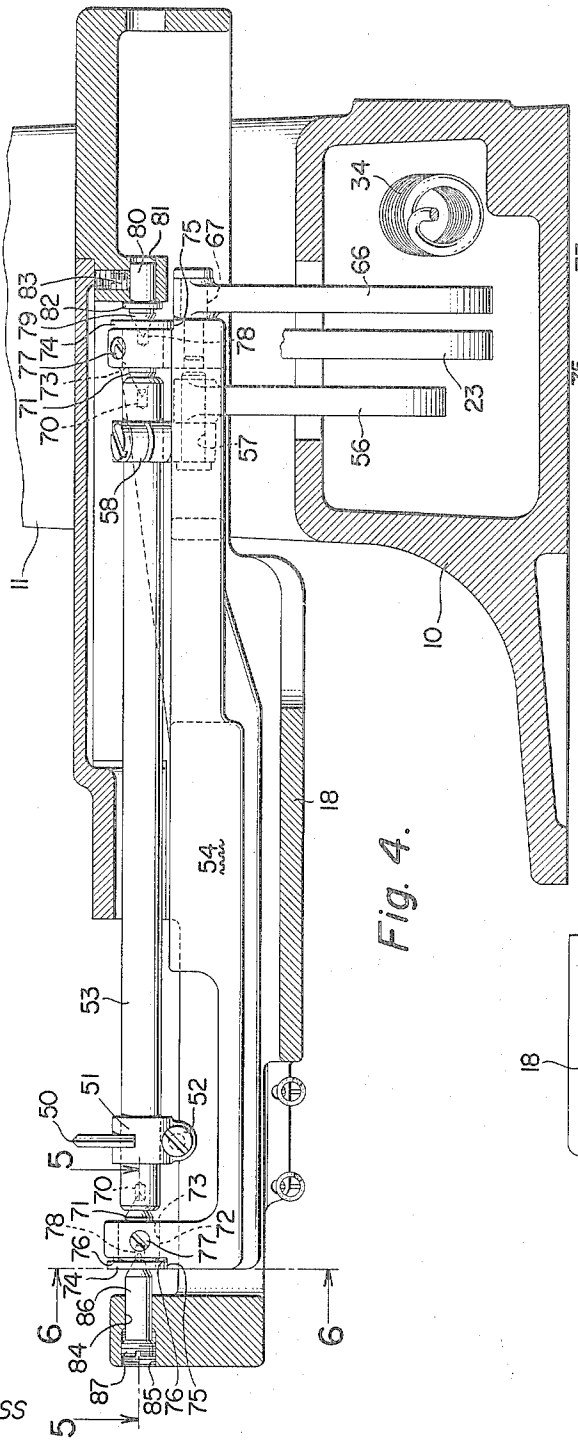

Fig. 4.

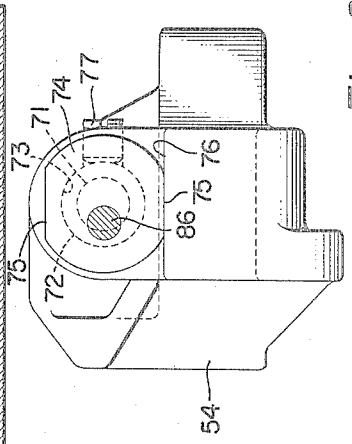

Fig. 6.

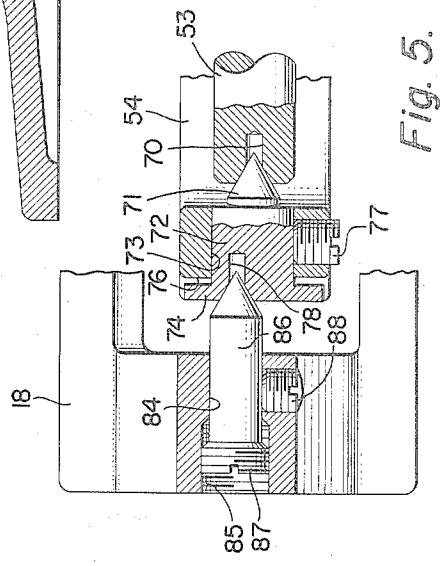

Fig. 5.

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BLINDSTITCH SEWING MACHINE RIDGE FORMER MECHANISMS

Frank Parry, Trumbull, Conn., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

Application October 22, 1954, Serial No. 463,915

9 Claims. (Cl. 112—176)

This invention relates to sewing machines and more particularly to a ridge former mechanism for a blindstitch sewing machine.

It is an object of this invention to provide a ridge former mechanism by which a fine degree of control may be exercised over the movements of the work-fabric toward and away from the needle.

It is another object to provide a ridge former mechanism in which the movements of the ridge forming member will remain of substantially constant amplitude despite changes in the speed of operation of the sewing machine.

This invention also has for an object the provision of a ridge former mechanism in which the effect of objectionable inertia or overthrow of the parts during high speed operation thereof will be substantially eliminated at the fabric-engaging ridge forming element.

With the above and other objects and advantages in view as will hereinafter appear, this invention comprises the devices, combinations and arrangements of parts hereinafter described and illustrated in the accompanying drawings of a preferred embodiment in which:

Fig. 1 represents a vertical sectional view of a blindstitch sewing machine having my invention applied thereto.

Fig. 2 is a top plan view of the work supporting portion of the sewing machine having the work supporting cover plate removed to more clearly illustrate the ridge former mechanism of this invention and showing the standard in a cross section.

Fig. 3 is an enlarged cross sectional view of the ridge former rocking frame and fragments of the actuating levers for the frame and for the ridge former taken substantially along line 3—3 of Fig. 2.

Fig. 4 is a vertical cross sectional view of the sewing machine taken substantially along line 4—4 of Fig. 2.

Fig. 5 is an enlarged cross sectional view of the pintles taken substantially along line 5—5 of Fig. 4.

Fig. 6 is an enlarged cross sectional view taken substantially along line 6—6 of Fig. 4.

Referring to the drawings, Figs. 1 and 2 best illustrate the general arrangement of the blindstitch sewing machine to which this invention is preferably applied. The sewing machine comprises a frame including a base portion 10 from which rises a hollow standard 11 which supports a forwardly extending sewing head 12. Fixed to the front of the base portion 10, by screws 13, is a bracket 14 formed with spaced flanges 15—15 between which flanges a cylindrical bar 16 is fixed as by set screws 17. A work supporting arm 18 which extends to a position beneath the sewing head 12 is pivotally mounted upon the cylindrical bar 16 by means of pintle members 19—19 which are seated in apertures 20—20 formed one in each end of the bar 16.

The work supporting arm 18 is formed with a depending front wall or skirt 21 engaged by a projection 22 of a stop lever 23 which is freely journaled on the cylindrical bar 16 and is controlled by means of an adjusting knob

24 which protrudes through the machine standard. This adjusting means for the position of the work supporting arm forms the subject of my copending patent application Serial No. 525,970, filed August 2, 1955, to which a reference is made for the complete description and details of construction thereof. For the purpose of comprehending the present invention, it will be sufficient to understand that the knob 24 is formed with a threaded shank 25 which is journaled in the standard for turning movements and which is formed with a radial slot 26 into which extends a pin 27 threaded through the standard to constrain the knob against axial movement. The threadedknob shank 25 cooperates with a threaded slide bar 28 which is journaled in a lug 29 in the standard and which is slotted lengthwise, as at 30, to accommodate a guide pin 31 which prevents the bar 28 from turning. At its lower extremity the bar 28 is provided with a transverse pin 32 which enters and is engaged by the opposite sides of a slot 33 formed in the stop lever 23. By this construction the knob 24 controls the angular position of the stop lever 23 and, therefore, the normal working position of the work supporting arm 18. The arm 18 is biased tightly against the stop lever projection 22 by means of a coil spring 34 which is maintained in tension by a hooked rod 35 which is adjustable in the base portion of the machine frame by means of a nut 36.

An additional bracket 37 secured to the front of the base portion 10 of the machine frame serves to support an auxiliary work supporting plate 38 which is pivoted, as at 39, to the bracket 37 and provided with a thumb screw 40 which cooperates with a slot 41 formed in the bracket 37 to lock the supporting plate 38 in place and to permit it to be swung out forwardly and away from the work supporting arm 18.

In the sewing machine illustrated in the drawings, the stitch forming instrumentalities including a curved needle 42 and a looper 43 are carried in the sewing head 12 and are adapted to operate above a work-engaging plate 44 which is rigidly secured to the sewing head. A four-motion work-feeding dog 45 is also carried in the sewing head, and operates through suitable openings in the work-engaging plate 44 in the well known manner of four-motion feed dogs in the sewing machine art. The needle, looper and feed dog are actuated in conventional fashion from a rotary main shaft 46 which is journaled in the machine frame.

The work-supporting arm 18 which is pivotally mounted with respect to the machine base, is provided beneath the sewing head with a work-engaging presser device 47, portions of which are illustrated in Figs. 1, 2 and 4. The presser device in these figures has been broken away better to expose the mechanism to which the present invention pertains. The presser device, however, is of the type which is fully disclosed in my prior U. S. Patent No. 2,678,619, May 18, 1954, to which reference may be had for a more complete description.

In a blindstitch sewing machine of the type described generally above, the work fabrics are directed between the work-engaging plate 44 of the sewing head and the presser device 47 of the work-supporting arm 18. At each stitch, a ridge or fold of the work fabric must be forced upwardly through a suitable aperture in the work-engaging plate 44 for penetration by the curved needle. The mechanism for performing this function is termed ridge-forming mechanism in the art and it is this ridge-forming mechanism and its arrangement in the sewing machine with which this invention is concerned.

In addition to the stitch-by-stitch movements of the ridge former into engagement with the work fabric to form a ridge and out of engagement therewith to free the fabric so that the same can be fed between stitches, the ridge-forming mechanism of this invention is of the

type in which the height to which the ridge former moves is automatically varied between stitches in a predetermined pattern so that only at certain intervals does the needle make a deep penetration of all of the plies of fabric, while at the intervening stitches certain of the plies are skipped and the needle makes only a shallow penetration of the uppermost ply of fabric. This mechanism in the art is termed the skip-stitch mechanism.

It will be readily understood that the action of the ridge former mechanism upon the fabric will have a direct bearing upon the appearance of the finished seam and, therefore, the degree of consistency which is obtainable with the ridge-forming mechanism of the present invention and the minimized effect of inertia overthrow of the parts thereof contributes in large measure to the successful operation of the sewing machine.

Referring more particularly to Figs. 1, 2 and 4, which disclose the general organization of the ridge-forming mechanism, a work-engaging ridge-forming element 49 having a work-engaging peripheral edge 50 is clamped, as by a split collar 51 and a fastening screw 52, to a rock shaft 53 which is journaled for turning movement in a rock frame 54 which in turn is journaled in the work-supporting arm 18.

The rock shaft 53 is oscillated in a one-to-one timed relation with the needle and looper mechanisms by means of an eccentric 55 which is fast on the main shaft 46 of the sewing machine. The eccentric 55 is embraced by a pitman 56 which extends through the hollow standard 11 and base portion 10 of the frame and is pivotally connected by means of a pin 57 with a rock arm 58 which is fast on the rock shaft 53.

The rock frame 54 is oscillated independently of the rock shaft 53 and preferably at a frequency which differs from that of the rock shaft in an inverse proportion to a small whole integer. In the preferred embodiment of the drawings, the rock frame 54 is oscillated at one-half the frequency of the rock shaft 53 by means of an eccentric 59 which is carried by a stud shaft 60 journaled in the standard. The stud shaft 60 also carries a driven gear 61 which meshes with a gear 62 on an idler shaft 63 which has fast thereon a driven gear 64 meshing with a gear 65 on the main shaft 46. It will be appreciated that the gearing 61, 62, 64 and 65 may be selected so as to drive the eccentric 59 at one-third, one-fourth etc. of the speed of the rock shaft driving eccentric 55. The eccentric 59 is embraced by a pitman 66 which extends through the hollow standard 11 and the base portion 10 and is pivotally connected to a pin 67 which extends from the rock frame 54.

The manner in which the rock shaft 53 and the rock frame 54 are journaled within the work-supporting arm 18 will now be described. With reference to Figs. 2 and 4 in which the entire assembly is illustrated, the rock shaft 53 is formed at each extremity with axially arranged conical journals 70—70, into each of which extends a conical rock shaft pintle portion 71 of a bearing member 72. The bearing members 72 are fitted one at each extremity of the rock frame 54 in axially aligned bores 73—73 therein. The bearing members are formed with enlarged head portions 74—74 which are slabbed, as at 75, so as to seat within recessed portions 76 of the rock frame 54, thereby locking the bearing members 72—72 against rotation. The bearing members 72—72 are secured in place in the bores 73—73 by means of set screws 77—77.

Each of the bearing members 72—72 is formed in its head portion 74 with a conical journal 78, these journals being offset axially to one side of the pintle portion 71 of each respective bearing member 72, as is clearly illustrated in Fig. 5. As will appear from Fig. 2, the bearing members 72 are arranged at each side, such that the journals 78 will be offset both on the same side of the axis of the rock shaft 53. Each of the journals 78 is adapted, in turn, to accommodate conical rock frame pintle members which extend from the work-supporting arm 18. A rock frame pintle member 79 which is formed with a straight cylindrical shank 80 is seated in a suitable bore 81 formed at the inboard extremity of the work-supporting arm. The pintle member 79 is shouldered, as at 82, so that it may be located with respect to the bore 81 and is secured in place by means of a set screw 83.

At the outboard extremity, the work-supporting arm is formed with a pintle accommodating bore 84 which is counter-bored and threaded, as at 85, to receive a rock frame pintle 86 which is formed with an enlarged and threaded head 87. The pintle 86 may be secured in place in the bore 84 by means of a set screw 88.

The ridge former 49, as illustrated in Fig. 3, is shaped in the form of a sector and its peripheral edge 50 is disposed on an arc of a circle having its center coincident with the axis of the rock shaft 53. Apart from adjustments of elevation of the operating position of the work-supporting arm, the height of the ridge in the work fabric which will result from the oscillation of the ridge former itself, remains the same from one stitch to the next. Furthermore, inertia or overthrow in the train of ridge former oscillation mechanism, i. e. the eccentric 55, pitman 56, pin 57 and the rock shaft 53 will not result in a variation of the height of the ridge which is formed in the fabric by the ridge former, but instead will act only to advance or retard the timing of the ridge former slightly, a factor which will not be apparent in the finished product. The objectionable effects of overthrow and inertia in a ridge former mechanism of the type described above are most apt to occur in the skip-stitch mechanism. Since oscillation of the rock frame 54 by the skip-stitch mechanism carries the ridge former 49 bodily with it, any variation in the movement of the skip-stitch mechanism will vary the height to which the work fabric will be urged by the skip-stitch mechanism. As viewed in Fig. 1, many places exist in the skip-stitch mechanism in which a looseness of parts may develop which could be transferred to the skip-stitch mechanism, i. e. the gearing 64, 65, or gearing 61, 62, the eccentric 59 and the rock frame pintles 79, 86 are loose or slack to a degree. Bending of certain parts such as lever 66 under the stress of high speed operation also contributes to a variation in the height of the ridge which is formed as a result of the skip-stitch mechanism.

In the present invention the bearing members 72 serve to define the eccentricity of the rock shaft 53 with respect to that of the rock frame 54. Since this is accomplished by the arrangement of both a pintle 71 and a journal 78 in opposite ends of the bearing member 72, the eccentricity may be made at any desired amount and, in particular, this eccentricity may be arranged to be exceedingly small, far smaller than in prior constructions of which I am aware. An advantage of a small eccentricity of the axis of the rock shaft 53 with respect to that of the rock frame 54 is that the effect of inertia or of overthrow of the parts is minimized. This advantageous reduction of overthrow results from an increased leverage in the skip-stitch mechanism whereby a greater throw of the skip-stitch eccentric 59 will be required to produce the same rise and fall of the ridge former rock shaft 53. By the same token, the ridge former will, therefore, be rendered less sensitive not only to the action of the eccentric 59 but also to such extraneous effects as overthrow, looseness or play in the skip-stitch mechanism, etc.

The bearing arrangement of the present invention also provides for convenient adjustability of the fit or clearance between the parts of both the rock shaft 53 and for the rock frame 54. The pintles at the right hand or inboard extremity, as viewed in Figs. 2 and 4, are intended to be set or adjusted upon initial assembly and not thereafter, all subsequent endwise adjustments of the bearings being made available at the outboard extrem-

ity. With the set screws **83** and **77** of the inboard pintles being tightened, the bearings may be adjusted from the outboard extremity in the following manner. The set screws **77** and **88** at the outboard extremity are both loosened. A screw driver or similar instrument is then utilized to turn the threaded head **87** of the pintle **86** until the rock shaft **53** is adjusted properly upon its pintles **71—71**, no concern being had at this point for the condition of the bearing pintles **79, 86** of the rock frame **54**. When the shaft **53** rides properly upon the bearing pintles **71—71**, the set screw **77** is tightened so as to lock the pintles **71—71** in properly adjusted position. The pintle **86** is then readjusted by means of a screw driver or the like, this time with attention being given to the proper fit of the pintle bearings **79** and **86** of the rocking frame **54**. When these pintles are adjusted properly the set screw **88** is tightened to secure this position of adjustment.

Having thus described the nature of the invention, what I claim herein is:

1. In a blindstitch sewing machine having a base and a work-supporting arm carried by said base, a ridge-former mechanism carried by said work-supporting arm and comprising, a rock frame, axially spaced pintles secured in said work-supporting arm for pivotally mounting said rock frame, a pair of bearing members, a journal formed in each of said bearing members, means for securing said bearing members in said rock frame with said journals operatively embracing said pintles in the work-supporting arm, a pintle formed to project from each of said bearing members, a rock shaft formed at each extremity with pintle accommodating journals which are disposed to embrace the pintles of said bearing members, a ridge-forming element carried by said rock shaft, means driven by said sewing machine for imparting oscillatory movements to said rock frame about an axis defined by the pintles carried in said work-supporting arm, and means for imparting oscillatory movements to said rock shaft about an axis defined by the pintles projecting from said bearing members.

2. In a blindstitch sewing machine, a ridge-former mechanism comprising a work-engaging ridge-forming element, and means for oscillating said element about each of two parallel axes, said means comprising a pair of pintle members carried by said sewing machine to define a first axis for oscillation of said ridge-forming element, a rock frame having spaced axially aligned apertures formed therein, a replaceable bearing insert adapted to be positioned in each of said apertures, means for securing said bearing inserts in said apertures, said bearing inserts each being formed at one side with a bearing journal adapted to embrace a respective one of said pintle members and at the other side with a pintle which is offset radially from said bearing journal, the pintles of said bearing inserts defining a second axis for oscillation of said ridge-forming element, a rock shaft having a bearing journal formed at each extremity thereof adapted to embrace said offset pintles, means securing said ridge-forming element to said rock shaft, and means for oscillating said rock shaft and said rock frame.

3. In a blindstitch sewing machine having stitch-forming instrumentalities including a circularly moving needle, a ridge-forming mechanism adapted to force a ridge of work fabric into the path of the circularly moving needle, said ridge-forming mechanism comprising a work-engaging ridge former member, a rock shaft supporting said ridge former and being formed at each extremity with a bearing journal, means for oscillating said rock shaft about an axis defined by said bearing journals, a skip-stitch mechanism operative to oscillate said rock shaft about an axis parallel to that defined by said rock shaft bearing journals, said skip-stitch mechanism comprising a rock frame, spaced rock frame pintle members carried by said sewing machine, means for oscillating said rock frame about an axis defined by said rock frame pintle

members, a pair of bearing members carried by said rock frame, said bearing members each being formed with a journal adapted to embrace a respective one of said rock frame pintle members and with a rock shaft pintle adapted to be embraced by one of the bearing journals of said rock shaft, the rock shaft pintles of said bearing members being offset from the journals thereof to define an offset axis of oscillation of said rock shaft with respect to that of said rock frame.

4. In a blindstitch sewing machine having stitch-forming instrumentalities and a work-supporting arm, a ridge-forming mechanism carried by said work-supporting arm and comprising, a rock shaft, a work-engaging ridge-forming element carried by said rock shaft, a pair of bearing members arranged in operative engagement with said rock shaft to define a first axis of oscillation thereof, said bearing members each being formed at one side with a bearing journal, a rock shaft pintle formed at the opposite side of each of said bearing members, said rock shaft pintles being disposed to engage and define the first axis of oscillation of said rock shaft, and spaced pintles carried by said work-supporting arm for engagement with the bearing journals of said bearing members to define a second axis of oscillation which is parallel to said first axis of the rock shaft.

5. A blindstitch sewing machine having a frame, a rock shaft, a work-engaging ridge-forming element carried by said rock shaft, axially aligned bearing journals formed one in each extremity of said rock shaft, a pair of axially aligned bearing pintles carried in said frame, and a pair of bearing members interposed one between each extremity of said rock shaft and a respective one of said bearing pintles, a rock shaft pintle and a journal for said bearing pintle formed on parallel axes in each of said bearing members, said parallel axes being arranged both to extend within the projected area of said rock shaft.

6. A blindstitch sewing machine having a frame, a work-engaging ridge-forming element, means for supporting said element with respect to said frame for oscillation about two parallel axes, said means comprising, a rock shaft to which said ridge-forming element is secured, axially aligned bearing journals formed one in each extremity of said rock shaft, a pair of axially aligned bearing pintles carried in said frame, and a pair of bearing members interposed one between each extremity of said rock shaft and a respective one of said bearing pintles, said bearing members each being formed at one side with a rock shaft pintle adapted for operative engagement with one of the bearing journals formed in the extremities of said rock shaft, and being formed at the opposite side with a bearing journal adapted to receive one of said bearing pintles carried in the frame, the journal in said bearing member being formed on an axis disposed within the projected area of said rock shaft pintle at the opposite side of said bearing member.

7. A blindstitch sewing machine as in claim 6, a rock frame, means securing said pair of bearing members in said rock frame with said rock shaft pintles of the bearing members in axial alignment, and means for maintaining the bearing journals of the bearing members in axial alignment.

8. A blindstitch sewing machine as in claim 6, a rock frame, means securing said pair of bearing members in said rock frame with the rock shaft pintles and the bearing journals of said pair of bearing members being axially aligned each on parallel axes, and means driven from said sewing machine for oscillating said rock shaft and said rock frame each at a different frequency.

9. In a blindstich sewing machine having stitch-forming instrumentalities and a work-supporting arm, a ridge-forming mechanism carried by said work-supporting arm and comprising, a rock frame having a pair of axially aligned sockets, a pair of bearing inserts secured one in

each rock frame socket and arranged in spaced relation each presenting an inboard extremity facing one another, a rock shaft, a work-engaging ridge forming element carried by said rock shaft, first bearing means formed in the inboard extremity of each bearing insert and arranged in operative engagement one with each extremity of said rock shaft to define a first axis of oscillation thereof, second bearing means formed in the outboard extremity of each bearing insert, and means carried by said work-supporting arm and arranged in operative engagement with said second bearing means to define a second

axis which is parallel to the first axis of oscillation of said rock shaft and which is disposed within the axially projected area of said rock shaft.

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