CONTINUOUS FEED NEEDLE FEED SEWING MACHINE

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This invention relates to high speed industrial sewing machines and more particularly to machines of the cup feed type, such as are used in the seaming of hosiery and the like. Machines of the character indicated are usually provided with a pair of feed cups arranged to be turned about vertical axes to advance the work past a stitch forming point while suitable stitch forming devices serve to form each new stitch or a three-thread overedge stitch over the juxtaposed free edges of the work.

Machines of the foregoing type have usually been so constructed, heretofore, that the feed cups are advanced step by step at increments equal to the desired stitch length. In accordance with the present invention the feed cups are driven continuously and a reciprocating needle forming one of the stitch forming elements is advanced along the line of feed so long as it is engaged with the work and thus advances with the work and, in fact, assists in the feeding of the work. In this respect and in its general mode of operation the machine is similar to that disclosed in the pending application of Albert M. Schweda et al., Serial No. 312,454, filed October 1, 1952, now Patent No. 2,759,442, granted August 21, 1956. However, the machine of the present invention embodies a number of important improvements over the construction disclosed in said pending application.

The primary object of the invention has been to provide an overedge stitch forming machine, especially one of the type indicated, which is of simple and compact construction, requires a minimum of servicing and attention, and is adapted to perform the desired overedge seaming operation at a relatively high speed with uniform results.

An important feature of the invention is the provision of a simple and efficient mechanism for reciprocating a needle bar and simultaneously swinging the same in a direction transverse to its longitudinal axis for the purpose of imparting a needle feed action to the work as the needle is engaged with the work. The arrangement is such that the driving connections for imparting the several movements to the needle bar are enclosed in a lubricant retaining housing, while the needle carrying portion of the bar extends outwardly through a wall of the housing permitting reciprocation and swinging of the needle in a horizontal plane in a region directly above the tops of the feed cups. The means for supporting and guiding the needle bar in its various movements is such that relatively few parts are required and bodily sliding movement of any of the parts is eliminated. Moreover, the arrangement is such that an effective seal is provided in the region in which the needle bar carrier passes through the wall of the frame so as to prevent the escape of lubricant from within the housing. More specifically the needle bar is mounted for reciprocation in a sleeve-like bearing member which is arranged to swing in a horizontal plane about an axis provided in the wall of the housing by means of a knuckle or head on the member seated in said wall and through which the needle bar extends. For this purpose the needle bar carrying sleeve is preferably provided with a spherical portion which cooperates with a spherical seat in the wall of the housing in a region adjacent one of the feed cups. Connections are provided within the housing from a shaft therein for imparting reciprocatory movements to the needle bar and for swinging the bearing sleeve about the vertical axis of the seat.

A further feature of the invention is the adaptability of the driving connections for the feed cups to a simple interchange of parts for varying the rate of rotation of the feed cups and thus varying the stitch length. In conjunction with the foregoing there is provided, in accordance with the invention, an adjustable eccentric within the enclosed housing for varying the extent of the swinging or needle feed movement of the feed bar so that this may be adjusted to correspond with the desired stitch length.

Other objects, features, and advantages of the invention will appear from the detailed description of an illustrative embodiment of the same which will now be given in conjunction with the accompanying drawings, in which:

Fig. 1 is a front elevational view of the upper portion of the machine, with parts of the frame broken away to disclose some of the interior mechanism;
Fig. 2 is a vertical sectional view through the upper portion of the machine;
Fig. 3 is a plan view of the machine with a portion of the top cover broken away;
Fig. 4 is a horizontal sectional view through the machine, different parts of this view being taken at different elevations;
Fig. 5 is a rear elevational view of the machine with portions of the frame broken away to show certain of the enclosed mechanism;
Fig. 6 is a detail view showing in elevation the feed cups and related parts;
Fig. 7 is a transverse vertical sectional view through the machine, different portions being taken along different vertical planes;
Fig. 8 is a transverse vertical sectional view through a portion of the frame of a machine embodying a modified arrangement of certain bolt driving connections;
Fig. 9 is a plan view of the feed cups and related parts;
Fig. 10 is a detail view in axial section through an adjustable eccentric embodied in the machine;
Fig. 11 is an enlarged detail view showing a device employed in effecting adjustment of the eccentric;
Fig. 12 is an end view of a split bushing provided between a crank element on the main shaft of the machine and the strap of a cooperating pitman;
Fig. 13 is a detail view showing the crank element and strap incorporating the bushing of Fig. 12;
Fig. 14 is a detail view, partly in plan and partly in horizontal section, showing the needle bar and associated devices;
Fig. 15 is a plan view of certain of the parts shown in Fig. 14, but in reversed position, with a portion of the needle bar broken away;
Fig. 16 is an elevational view of the parts shown in Fig. 15 with a guide member shown in section;
Fig. 17 is a detail view showing the connections for imparting a swinging movement to the needle bar;
Fig. 18 is an enlarged detail view in vertical section along the line 18—18 of Fig. 16;
Fig. 19 is a detail view of a looper and spreader together with associated devices adapted to form a two-thread overedge stitch in conjunction with the needle;
Fig. 20 is a view similar to Fig. 19 showing a pair of thread carrying loopers adapted for use in forming a three-thread overedge stitch; and
Fig. 21 is an elevational view of a key element associated with the overedge looper and arranged to cause the same to oscillate as it is reciprocated.

Referring now to the drawings, the illustrative machine is provided with a main frame which, as best shown in Fig. 5, involves a vertical standard 10 arranged to be supported from the top of the table. The upper portion of the shaft 28 is enclosed and provides a lubricant reservoir 11 and a mechanism housing 12. Each of these is adapted to be fitted with a lubricant mist upon the operation of the machine.

At the top of the standard a laterally extending portion 12 of the frame provides in effect an overhanging arm the major portion of which is hollow and forms a continuation of the enclosed chamber. A removable cover plate 13 closes the top of the standard and overhanging arm. Extending from front to rear of the vertical standard of the frame, and passing through the enclosed chamber, is a main shaft 14 which, as best shown in Figs. 4 and 7, is journaled in bearing sleeves 15 carried by the opposite walls of the frame. The bearing sleeves are retained by bushings 16 having radially extending flanges at their outer ends by which the bushings may be secured by screws or the like to the walls of the frame. At its right end (Fig. 7) the shaft 14 carries a combined handwheel and pulley 17, while at its left end it carries a handwheel 18. Adjacent the shaft 14 is secured the shaft a belt sprocket 19 having a hub portion 19a provided with a series of annular grooves to create oil slinging ribs or projections within a recess in the adjacent bushing 16. This serves to return to the reservoir within the frame any lubricant which may pass outwardly along the shaft 14. Belt sprocket 19 is connected by a toothed or ribbed belt 20 with a larger belt sprocket 21. The two sprockets and the belt are enclosed within a cover element 22 secured to the outer face of the wall of the frame by means of one or more screws 23. The arrangement is such that the cover 22 may be readily removed for replacement of the belt or for replacement of one or both of the belt sprockets to change the relative sizes thereof. This enables variation in the stitch length since, as will be explained, the belt and sprocket wheels form a part of the connection for continuously rotating the feed cups. Normally, in the use of the machine for seaming hosiery, it is desirable to provide a stitch range of between 16 and 22 stitches per inch. To change the stitch length either one or both of the belt sprockets 19 and 21 may be changed to vary their relative diameters. Generally it is sufficient to change the upper sprocket and substitute one having one or two less teeth or more teeth, as desired. The desired tension in the belt may be maintained with different belt sprockets by adjustment of an idler roller 26 mounted by an adjustable bracket 26b (Fig. 5).

The upper belt sprocket 21 is secured to a shaft 24 journaled in bearings sleeves 25 carried by the opposite walls of the frame. As in the case of the lower belt sprocket, the hub of sprocket 21 is preferably provided with a grooved portion 21a forming oil slinging projections within a recess in the wall of the frame adapted to return to the lubricant reservoir, through a passage 21b in the frame, any lubricant which escapes along the shaft 24. Within the enclosed housing the shaft 24 is provided with a worm 26 (Figs. 2, 4 and 7) arranged to mesh with a worm wheel 27 secured to a vertically disposed shaft 28. The latter is suitably journaled in a bearing sleeve 26a extending through the bottom wall of the overhanging arm 12 of the frame. Adjacent its upper end the shaft 28 carries a gear 29, preferably a fiber gear, which meshes with a gear 30, also preferably a fiber gear, secured to the upper end of a shaft 31 journaled in a sleeve 32 carried by the overhanging arm. At its lower end the shaft 31 is connected by a universal coupling 33 with the upper end of a shaft 34 journaled in a sleeve 35. This sleeve is carried by a sleeve portion 36 of a member secured to a rock shaft 37. Shaft 28 has secured to its lower end a feed cup 38 while shaft 34 has similarly secured a feed cup 39. These feed cups are adapted to cooperate with a spherical seat 40 and advance the same continuously as the shafts 28 and 34 are driven through the connections described above from the main shaft 14. Feed cup 39 is urged cylindrically against the feed cup 38, or the work passing between the two feed cups, by spring means serving to rock the shaft 37 in a counterclockwise direction as shown. As best shown in Fig. 5, involving a lever 40 secured to the shaft 37 and having a horizontally extending arm, the outer end of which is forked to straddle a groove provided adjacent the upper end of a rod 41. This rod is mounted for axial movement within a sleeve 42a providing screw threaded engagement with a portion of the frame 10 which permits vertical adjustment of the sleeve. Surrounding the rod 41 is a spring 41b which bears at its upper end against the under surface of the horizontal arm of rock member 40. At its lower end the spring 41b engages the top surface of a C-shaped bracket 41c, the arms of which surround the rod 41. Bracket 41c is mounted on the upper end of the sleeve 41a so that its vertical position is varied by adjustment of the sleeve 41a thereby varying the force of the spring 41b. Another eccentric 43 serves to limit the extent of rocking of the member 40 against the action of the spring. Such rocking, it will be understood, is brought about by means of a treadle or knee-press having a slot which is connected with the lower end of the rod 41.

The stitch forming devices include a needle 44 arranged to extend horizontally just above the tops of the feed cups 38 and 39. Needle 44 is carried by a block 45 secured by screws or the like to a head 46 (Figs. 2 and 14) carried by the outer end of a needle bar 47. The latter is arranged for reciprocation in a sleeve member 48 having a spherical formation 49 at its outer end. This spherical formation cooperates with a spherical seat provided by a member 50 secured to the outer face of the frame by means of screws 51. To permit reciprocal movement of the spherical formation 49 in the bearing member 50, the latter is formed in two parts, as best shown in Figs. 1, 2, 6 and 7, the two parts being secured together by screws 50a and being assembled on the machine frame by means of the screws 51. As best shown with the member 50 is an opening 52 (Fig. 14) in the lower end thereof, this being fully closed by member 50. Adequate clearance is provided between member 48 and the opening 52 to permit the lateral swinging movements of member 48. A portion of the sleeve member 48 is provided with flattened surfaces (Fig. 18) arranged for sliding movement in relation to a forked guide element 53 extending inwardly from the front wall of the frame. A pin 54 carried by the needle bar 47 has an enlarged head 55 arranged to cooperate with an outwardly flaring slot 56 (Figs. 2 and 16) extending through the wall of the sleeve member 48. This serves to prevent turning of the needle bar about its axis in the course of its reciprocation. The means for reciprocating the needle bar comprises an extension 57 of the latter carrying a ball pin 58 arranged to cooperate with a spherical strap provided at the end of a pin 59, the opposite end of which has a semi-cylindrical formation 60 surrounding a crack 61 on the main shaft 14. Strap 60 has a removable cap to permit assembly. As best shown in Figs. 12 and 13, the crack is provided with a split spherical bushing 61a mounted on the cylindrical crack portion of the shaft. The pitman 59 is provided with a spherical seat and a spherical strap which opposite walls parallel with the axis of the pitman. The latter is held in proper cooperation with the bushing 61a by means of a key or disc 62 fitting in the slot 59a and cooperating with an arcuate groove 63 extending in a
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5 generally axial direction in the outer face of the bushing 61a. The arrangement is such that the parts are retained in proper cooperation and the pitman 59 is permitted to rock upon the spherical bushing 61a in the manner required to provide for the swinging movements of the needle bar in the course of its reciprocation. Key 62, however, prevents undue movements of the pitman in relation to the crank 55. The arrangement is such that bushing 61a turns relative to crank 61 but is held against turning relative to the pitman by the key 62.

Lateral movements are imparted to the sleeve 48 by connections now to be described. These lateral movements serve to swing the sleeve about the vertical axis of the bell form 44 and this imparts the needle feed swinging movements to the needle bar and needle. The guide member 53, as best shown in Figs. 17 and 18, is of such form as to permit the lateral movements of the sleeve 48. For the purpose of imparting such movements the sleeve is provided with a transversely extending tang or arm 64 which is straddled by a forked end of an link 65 that is pivotally connected with the arm 64 by means of a pin 66. The opposite end of link 65 is also forked and straddles an arm 67 which projects laterally from a sleeve 68 mounted for oscillation about a stationary shaft or rod 99. The lower end of arm 67 is provided with a boss 70 extending upwardly from the bottom of the lubricant reservoir and is retained by means of a screw 71. At its upper end the shaft 69 is held by an extension 72 from one wall of the frame of the machine. Spiral grooving 73 on the inner face of the sleeve 68 serves to deliver lubricant to the bearing surfaces between the sleeve and shaft 69. Also extending laterally from the sleeve 68 is an arm 74 which carries at its outer end a ball pin 75. Arm 74 is of split construction at its outer end and provided with a screw 76 for clamping the shank of the ball pin 75. Cooperating with the latter is a spherical strap at one end of a pitman 77, the opposite end of which has a similar strap cooperating with a spherical eccentric 78. It will be understood that the straps at the two ends of pitman 77 are provided with removable cap elements for assembly purposes. Eccentric 78, as best shown in Fig. 10, forms part of an adjustable eccentric mounted telescopically on an inner eccentric 79 mounted on the shaft 14. By relative turning of the two eccentrics 78 and 79 the overall eccentricity of the unit may be varied. Outer eccentric 78 is connected for rotation with the shaft 14 through a disc 80 that is a milled boss engaging and keying the disc to the eccentric. A spring 82 having one end seated against a surface on the eccentric 78 and the other end seated against a flange 83 on the eccentric 79 serves to urge these eccentrics axially in opposite directions. The flanged portion of eccentric 79 carries a friction element 84 which is urged by the spring against the inner surface of the disc 80. The friction element augments the friction between the cylindrical surfaces of the two eccentrics so that they normally turn together. They are maintained in the relative axial position indicated in Fig. 10 by means of a housing 85 secured to the disc 80 and having a flange 85a extending over a shoulder provided on the eccentric 78. Projecting radially from the flange 83 is an arm 86 which extends through a circumferential slot in the housing 85, this slot extending through a sufficient arc to permit a desired adjustment of the eccentric unit. A spring clip 87, the ends of which abut against opposite sides of the arm 86 covers the portions of the slot which are not occupied by the arm 86.

When it is desired to change the adjustment of the eccentric, a plunger 88 is pressed inwardly into cooperation with a notch 89 in the outer end of the arm 86. This will serve to retain the inner eccentric against rotation, while the outer eccentric may be turned by rotation of the handwheel to change the relative angular position of the two eccentric elements. Plunger 88 is provided with a cap 90 (Fig. 2) accessible from the right side of the frame and adapted to be pressed inwardly to engage the plunger 88 with the notch 89. A spring 91 normally holds the cap and plunger in the position indicated in Fig. 2. A collar 92 secured to the plunger prevents further outward movement of the latter. When it is desired to adjust the eccentric, the cap 90 is pressed inwardly until the nose of the plunger 88 engages the spring clip 87. The handwheel is then turned until the notch 89 is brought in line with the end of the plunger at which time the latter may be forced inwardly into the position indicated in Fig. 11. Appropriate turning of the handwheel at this time will bring about the desired adjustment of the eccentric. If desired an indication of the setting of the eccentric unit may be afforded by providing an appropriate scale 93 on the handwheel 17 arranged to cooperate with an index 94 on a flange of the bushing 16 (Fig. 4). For further details as to the construction of the adjustable eccentric, reference may be had to the pending application of Arthur N. Hale, Serial No. 347,677, filed April 9, 1953, now Patent No. 2,718,780, dated Sept. 27, 1955.

Cooperating with the needle in stitch formation is an overedge looper element 95 (Figs. 2 and 19). Associated with the looper element is a needle guard 96. The overedge looper is carried by the lower end of a lever 97 which is inclined upwardly at a suitable angle and extends through a wall of the housing into the interior of the enclosed chamber. The rod is mounted for reciprocatory and oscillatory movements in a sleeve 98 carried by the wall of the frame. Mounted on the rod 97 for turning movement in relation thereto is a collar 100 which is retained against axial movement in relation to the rod by means of collars 101 and 102. The collar 100 has a laterally extending pin on which is pivotally mounted one end of a link 103. At its opposite end this link is pivotally connected with the upper end of an arm 104 extending from a hub or sleeve 105 mounted on a fixed rod or shaft 106. Sleeve 105 has a downwardly extending arm 107 which carries a pin 108 cooperating with a strap at one end of a pitman 109. At its opposite end this pitman has a strap surrounding a crank portion 110 of the main shaft 14. As will be apparent, rotation of the shaft 14 will serve to rock the arm 107, sleeve 105, and arm 104 and through the latter will impart longitudinal reciprocations to the looper rod 97. Oscillatory movements are imparted to the latter by the cooperation of a key 111, carried by the lower end of a spiral groove 112 provided in the shoulder of the bearing sleeve 98. A set screw 113 cooperating with the radially extending shank of the key element 111 serves to retain the latter in fixed relation to the looper rod. By virtue of the reciprocatory and oscillatory movements imparted to the looper rod 97, through the mechanism described, the looper 95 will be carried back and forth between a point in the region of the outer feed cup 39, substantially in the path of a further stitch forming element to be described.

Referring particularly to Figs. 2, 3, 4, 7, 19, and 20, there is shown the arrangement of and the means for operating the third stitch forming element. This may either be in the form of a spreader 114 (Fig. 19) or a thread carrying looper 115 (Fig. 20). The spreader or looper is mounted in the lower end of an oscillatory rod 116 which extends through and is journaled in a bearing sleeve 117 that passes through the lower end of the housing through which the sleeve 98 extends. Sleeves 98 and 117 are disposed in parallel relation, sleeve 117 being below and to one side of the sleeve 98. Axial movement of the rod 116 is prevented by a collar 118 secured to the rod adjacent the lower end of sleeve 117 and by a block 118a secured to the rod at a position adjacent the upper end of the sleeve 117. This block carries a laterally extending ball pin 119 which cooperates with a strap 120 at the upper end of a pitman 121. At its lower end this pitman is provided with a strap 122 which cooperates with
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a spherical eccentric 123 carried by the shaft 14. The ar-

rangement is such that upon the revolution of the shaft

14 the eccentric 123 will oscillate the rod 116 and there-

by oscillate the spreader 114 or looper 115. The timing is

such that the spreader, when this is used, will pick up

the thread loop of the looper 95 as the latter is above

the feed cup 38 and will carry this loop downwardly

into the path of the needle 44. When a thread carrying

looper 115 is used, this will be passed through the loop of

thread carried by looper 95 and will present its own loop

in the path of the needle 44. It will be apparent from

the foregoing that the needled 44, the overedge looper 95,

and the spreader 114 or looper 115 will provide either a

two-thread or a three-thread overedge line of stitching

along the edges of the work which project above the

feed cups 38 and 39.

Means are provided adjacent the forward wall of the

frame and within the enclosed housing for oscillating a

counterweight in appropriately timed relation to the vari-

ous operating devices of the machine to offset vibrations

likely to be induced by these operating devices.

For this purpose there is secured to the shaft 14 an ec-

centric 125 which cooperates with the wrap portion of a

pitman 126 having pivotal connection with a down-

wardly extending arm 127 on a member rockedly mounted

on the shaft 106. An upwardly extending arm 128 of this

member carries a counterweight 129. Through the

mechanism described the counterweight will be shifted

back and forth or oscillated about the shaft 106 for the

purposes indicated.

As previously mentioned, the machine is provided with

means for creating a lubricant mist within the enclosed

hollow frame. For this purpose a saucer like disc 130

is secured to the shaft 14 and provided with one or more

projecting pins 131 or the like adapted to be carried

through the lubricant within the reservoir. Oil splaying

and returning means have been described in connection

with various parts mounted on revolving shafts which

extend through the wall of the frame for insuring return

to the reservoir of any lubricant which seeks to escape

along certain bearings. The pulley 17 is provided with

similar annular projections 132 on the inwardly extending

portion of the hub to sling oil tending to escape along

the shaft toward the pulley 17 into the pocket shown in

the bushing 16 from which it is returned through the

passage 133 to the lubricant reservoir.

In Figs. 7 and 8 there is shown a modified arrangement of

the belt which connects the main drive shaft with the

continuously rotating shaft at the top of the machine

from which the feed cups are driven. In the modified

arrangement, the belt and its associated sprockets are

mounted within the enclosed housing of the frame. The

standard 10 of the frame is modified slightly to provide

an outwardly extending boss 16a at the left side of the

frame (Fig. 8) in lieu of the inwardly extending boss

provided in the first embodiment. The bearing for the

left end of the main shaft is carried by a bushing 135

which is similar to the bushing 16 of Fig. 7. Outwardly

of the enclosed housing there is secured to the shaft 14

a combined handwheel and pulley 136 similar to the

member 17 of Fig. 7. Within the enclosed housing and

adjacent the left wall of the same there is mounted on

the shaft 14 a belt sprocket 137 connected by a belt 138

with a belt sprocket 139 carried by the shaft 24 adjacent

the top of the frame. Aside from the changes indicated

the construction of the modified machine is the same as

described in relation to the first embodiment. It should

be noted that the first embodiment is preferred since it

simplifies the problem of replacing the belt or changing

the sprockets to vary the stitch length. However, the

enclosure of the belt and the sprockets within the hollow

frame of the machine has the advantage of insuring

lubrication of the belt sprockets and the like.

It should be understood that the machine is equipped

with various accessory devices, such as thread tensioning,
ously rotating said elements, stitch forming devices arranged to cooperate with the work adjacent the point at which it is engaged by said work feeding elements, said devices including a reciprocatory needle carrying bar extending from a region within said frame to a region external thereof and a plurality of cooperating thread engaging members adapted to form overedge stitches along the free edge of the work, connections from said shaft to said devices for operating the same in coordinated relation, a carrier having a longitudinal bore to receive said needle bar and adapted to support and guide the same, a knuckle formation on said carrier engaging the bore thereof and arranged to provide a pivotal axis transverse to the axis of said carrier about which said carrier may be swung, an immovable spherical seat in a wall of said frame in which said knuckle formation is journaled and which forms a lubricant seal therewith, and means comprising connections from said shaft within said hollow frame to said carrier for oscillating the same about the immovable axis provided by said spherical seat and shifting the needle in the direction of feed whenever it is engaged with the work.

4. In a sewing machine having an enclosed frame and a rotary drive shaft disposed at least in part within said enclosed frame, means for creating a lubricant mist throughout said enclosed frame, a pair of rotary work feeding elements external of said enclosed frame adapted to engage and feed work in a manner to present a free edge, connections from said shaft at a point within said frame for continuously rotating said elements, stitch forming devices arranged to cooperate with the work adjacent the point at which it is engaged by said work feeding elements, said devices including a reciprocatory needle carrying bar extending from a region within said frame to a region external thereof and a plurality of cooperating thread engaging members adapted to form overedge stitches along the free edge of the work, connections from said shaft for reciprocating said needle bar and operating said members in coordinated relation, a carrier having a longitudinal bore to receive said needle bar and adapted to support and guide the same, a knuckle formation on said carrier engaging the bore thereof and arranged to provide a pivotal axis transverse to the axis of said carrier about which said carrier may be swung, an immovable spherical seat in a wall of said frame in which said knuckle formation is journaled for swinging movement of said carrier about said axis which is held in fixed position by said seat, and means including an adjustable eccentric on said shaft within said hollow frame for oscillating said carrier about the pivot provided by said spherical seat and shifting the needle in the direction of feed whenever it is engaged with the work.

5. In a sewing machine having an enclosed frame and a rotary drive shaft disposed at least in part within said enclosed frame, means for creating a lubricant mist throughout said enclosed frame, a pair of rotary work feeding elements external of said enclosed frame adapted to engage and feed work in a manner to present a free edge, connections from said shaft at a point within said frame for continuously rotating said elements, stitch forming devices arranged to cooperate with the work adjacent the point at which it is engaged by said work feeding elements, said devices including a reciprocatory needle carrying bar extending from a region within said frame to a region external thereof and a plurality of cooperating thread engaging members adapted to form overedge stitches along the free edge of the work, connections from said shaft for reciprocating said needle bar and operating said members in coordinated relation, a carrier having a longitudinal bore to receive said needle bar and adapted to support and guide the same, a knuckle formation on said carrier engaging the bore thereof and arranged to provide a pivotal axis transverse to the axis of said carrier about which said carrier may be swung, an immovable spherical seat in a wall of said frame in which said knuckle formation is journaled for swinging movement of said carrier about said axis which is held in fixed position by said seat, and means including an adjustable eccentric on said shaft within said hollow frame for oscillating said carrier about the pivot provided by said spherical seat and shifting the needle in the direction of feed whenever it is engaged with the work.

6. In a sewing machine having an enclosed frame and a rotary drive shaft disposed at least in part within said enclosed frame, a pair of rotary work feeding elements adapted to engage and feed work in a manner to present a free edge, connections from said shaft for continuously rotating said elements, stitch forming devices arranged to cooperate with the work adjacent the point at which it is engaged by said work feeding elements, said devices including a reciprocatory needle carrying bar extending from a region within said frame to a region external thereof and a plurality of cooperating thread engaging members adapted to form overedge stitches along the free edge of the work, connections from said shaft for reciprocating said needle bar and operating said members in coordinated relation, a carrier having a longitudinal bore to receive said needle bar and adapted to support and guide the same, a knuckle formation on said carrier engaging the bore thereof and arranged to provide a pivotal axis transverse to the axis of said carrier about which said carrier may be swung, an immovable spherical seat in a wall of said frame in which said knuckle formation is journaled for swinging movement of said carrier about said axis which is held in fixed position by said seat, and means including an adjustable eccentric on said shaft within said hollow frame for oscillating said carrier about the pivot provided by said spherical seat and shifting the needle in the direction of feed whenever it is engaged with the work.

7. A cup feed sewing machine having a hollow frame comprising a vertical standard and an overhanging arm, a main drive shaft journaled in said frame, a pair of feed cups disposed outwardly of said frame and beneath said arm arranged to grip and advance work to be stitched, a vertically disposed shaft for carrying and driving each of said feed cups, connections from said main drive shaft to said vertically disposed shafts for continuously rotating the latter, stitch forming devices including at least one looper for forming overedge stitches along an edge of the work adjacent the upper surface of said feed cups, and connections from said main drive shaft to said devices for operating the same in coordinated relation, said last mentioned connections including a reciprocatory needle bar disposed horizontally in a plane above said feed cups, a carrier for said needle bar, said carrier extending through a wall of said frame and having a spherical formation therewith cooperating with an immovable spherical seat in said wall about which said carrier is adapted to swing, and means within said frame for reciprocating said needle bar and simultaneously swinging said carrier in a horizontal plane about the immovable axis provided by said spherical seat.

8. A cup feed sewing machine having a hollow frame comprising a vertical standard and an overhanging arm, a main drive shaft journaled in said frame, a pair of feed cups disposed outwardly of said frame and beneath said arm arranged to grip and advance work to be stitched, a vertically disposed shaft for carrying and driving each of said feed cups, connections from said main drive shaft to said vertically disposed shafts for continuously rotating the latter, stitch forming devices including at least one looper for forming overedge stitches along an edge of the work adjacent the upper surface of said feed cups, and connections from said main drive shaft to said devices for operating the same in coordinated relation, said last mentioned connections including a reciprocatory needle bar disposed horizontally in a plane above said feed cups, a carrier for said needle bar, said carrier extending through a wall of said frame and having a spherical formation therewith cooperating with an immovable spherical seat in said wall about which said carrier is adapted to swing, and means within said frame for reciprocating said needle bar and simultaneously swinging said carrier in a horizontal plane about the immovable axis provided by said spherical seat.
11. Including a reciprocable needle bar disposed horizontally in a plane above said feed cups, a carrier for said needle bar, said carrier extending through a wall of said frame and having a journal formation thereon cooperating with an immovable complementary seat fixedly mounted in said wall to provide a fixed vertical axis pivot, said carrier being adapted to be swung about said fixed axis said needle bar passing through said journal formation, and means within said frame for reciprocating said needle bar and simultaneously swinging said carrier in a horizontal plane about the pivot provided by said seat.

9. A cup feed sewing machine having a hollow frame comprising a vertical standard and an overhanging arm, a main drive shaft journaled in said frame, a pair of feed cups disposed outwardly of said frame and beneath said arm arranged to grip and advance work to be stitched, a vertically disposed shaft for carrying and driving each of said feed cups, connections from said main drive shaft to said vertically disposed shafts for continuously rotating the latter, said connections including readily interchange-able parts for varying the speed of rotation of said ele-

ments, stitch forming devices including a needle for forming stitches along an edge of the work adjacent the upper surface of said feed cups, and connections from said main drive shaft to said devices for operating the same, said last mentioned connections including a reciprocable needle bar disposed horizontally in a plane above said feed cups, a carrier for said needle bar, said carrier extending through a wall of said frame and having a spherical formation thereon cooperating with a spherical seat immovably mounted in said wall, said carrier being adapted to be swung about a fixed axis provided by said seat and means within said frame for reciprocating said needle bar and simultaneously swinging said carrier in a horizontal plane about the fixed pivot provided by said spherical seat, said means comprising an adjustable eccentric mounted on said drive shaft.

10. A cup feed sewing machine having a hollow frame comprising a vertical standard and an overhanging arm, a main drive shaft journaled in said frame, a pair of feed cups disposed outwardly of said frame and beneath said arm arranged to grip and advance work to be stitched, a vertically disposed shaft for carrying and driving each of said feed cups, connections from said main drive shaft to said vertically disposed shafts for continuously rotating the latter, said connections including readily interchange-able parts for varying the speed of rotation of said feed cups, stitch forming devices including a needle and at least one looper for forming overedge stitches along an edge of the work adjacent the upper surface of said feed cups, and connections from said main drive shaft to said devices for operating the same, said last mentioned connections including a reciprocable needle bar disposed horizontally in a plane above said feed cups, a carrier for said needle bar, said carrier extending through a wall of said frame and having a spherical formation thereon cooperating with a spherical seat immovably mounted in said wall, said carrier being adapted to be swung about a fixed pivot provided by said immovable seat, and means within said frame for reciprocating said needle bar and simultaneously swinging said carrier in a horizontal plane about the fixed pivot provided by said spherical seat.

12. A cup feed sewing machine having a hollow frame comprising a vertical standard and an overhanging arm, a main drive shaft journaled in said frame, a pair of feed cups disposed outwardly of said frame and beneath said arm arranged to grip and advance work to be stitched, a vertically disposed shaft for carrying and driving each of said feed cups, connections from said main drive shaft to said vertically disposed shafts for rotating the latter, stitch forming devices including a needle for forming stitches along an edge of the work adjacent the upper surface of said feed cups, and connections from said main drive shaft to said devices for operating the same, said last mentioned connections including a reciprocable needle bar disposed horizontally in a plane above said feed cups, a carrier for said needle bar, said carrier extending through a wall of said frame and having a spherical formation thereon cooperating with a spherical seat immovably mounted in said wall, said carrier being adapted to be swung about a fixed pivot provided by said immovable seat, and means within said frame for reciprocating said needle bar and simultaneously swinging said carrier in a horizontal plane about the fixed pivot provided by said spherical seat.

13. A cup feed sewing machine having a hollow frame comprising a vertical standard and an overhanging arm, a main drive shaft journaled in said frame, a pair of feed cups disposed outwardly of said frame and beneath said arm arranged to grip and advance work to be stitched, a vertically disposed shaft for carrying and driving each of said feed cups, connections from said main drive shaft to said vertically disposed shafts for rotating the latter, stitch forming devices including a needle for forming stitches along an edge of the work adjacent the upper surface of said feed cups, and connections from said main drive shaft to said devices for operating the same, said last mentioned connections including a reciprocable needle bar disposed horizontally in a plane above said feed cups, a carrier for said needle bar, said carrier extending through a wall of said frame and having a spherical formation thereon cooperating with an immovable complementary seat in said wall to provide a fixed vertical axis pivot, said carrier being adapted to be swung about said pivot, said needle bar passing through said journal formation, and means within said frame for reciprocating said needle bar and simultaneously swinging said carrier in a horizontal plane about the pivot provided by said seat.

14. In a sewing machine having an enclosed frame and a rotary drive shaft disposed at least in part within said enclosed frame, a pair of rotary work feeding elements adapted to engage and feed work in a manner to present a free edge, connections from said shaft for rotating said elements, stitch forming devices arranged to cooperate with the work adjacent the point at which it is engaged by said work feeding elements, said devices including a reciprocatory needle bar extending from a region.
within said frame to a region external thereof and adapted to form stitches along the free edge of the work, connections from said shaft for reciprocating said needle bar, a hollow carrier for said needle bar adapted to support and guide the same, a spherical formation on said carrier through which said needle bar is reciprocated, an immovable spherical seat in a wall of said frame in which said spherical formation is journaled, said carrier being adapted to be swung about a fixed axis provided by said immovable seat, and means comprising connections from said shaft within said enclosed frame to said carrier for oscillating the same about the fixed pivot provided by said spherical seat and shifting the needle in the direction of feed whenever it is engaged with the work.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,844,113

Ned L. Wallenberg

July 22, 1958

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 15, for "feed bar" read -- needle bar --; column 4, line 29, after "eccentric" insert -- stop --; column 5, line 36, for "later" read -- latter --; column 7, line 12, for "needel" read -- needle --; column 9, line 75, for "throgh" read -- through --; column 11, line 24, for "sunrface" read -- surface --.

Signed and sealed this 28th day of October 1958.

(SEAL)
Attest:
KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents