July 29, 1969 L. J. WEAVER 3,457,884

CARPET SEWING MECHANISM

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FIG. 1.

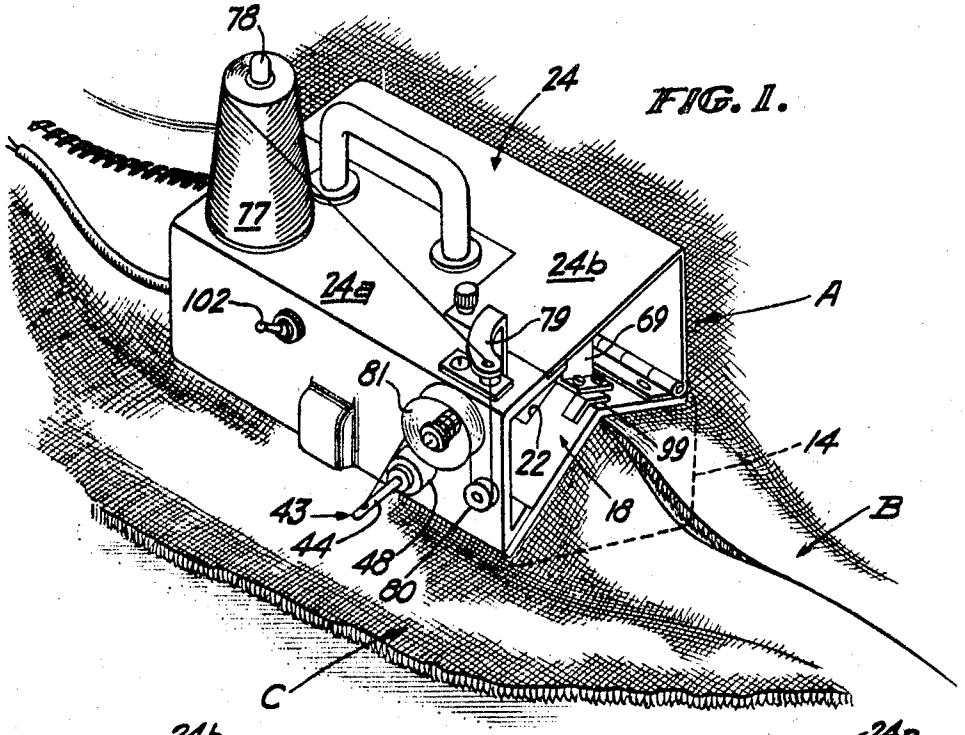
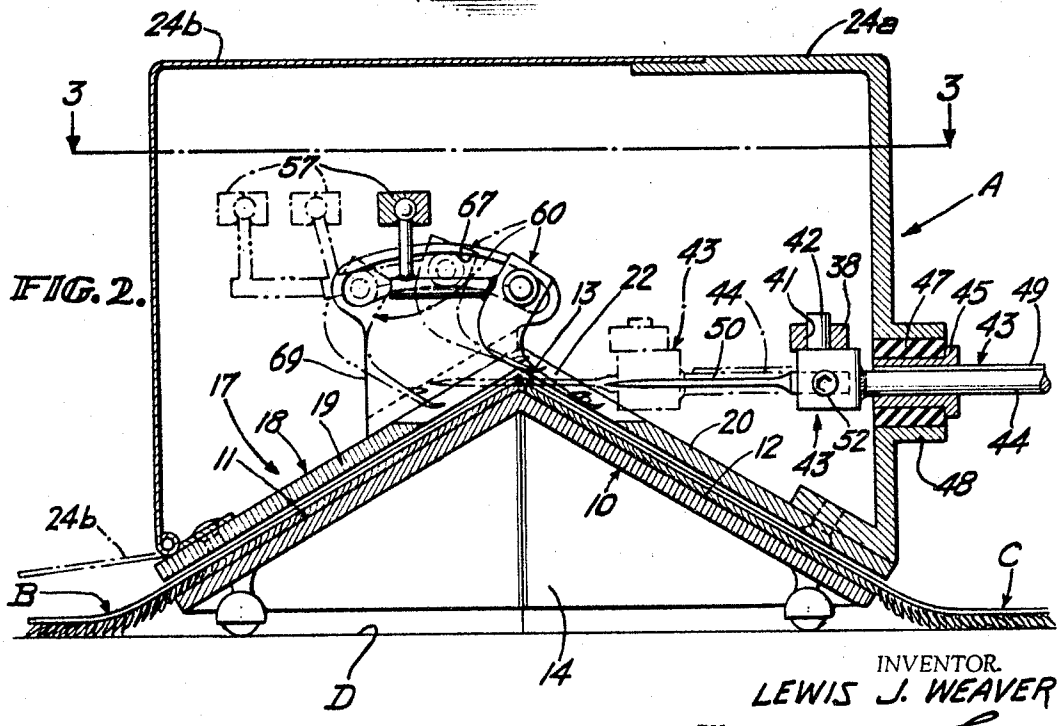


FIG. 2.



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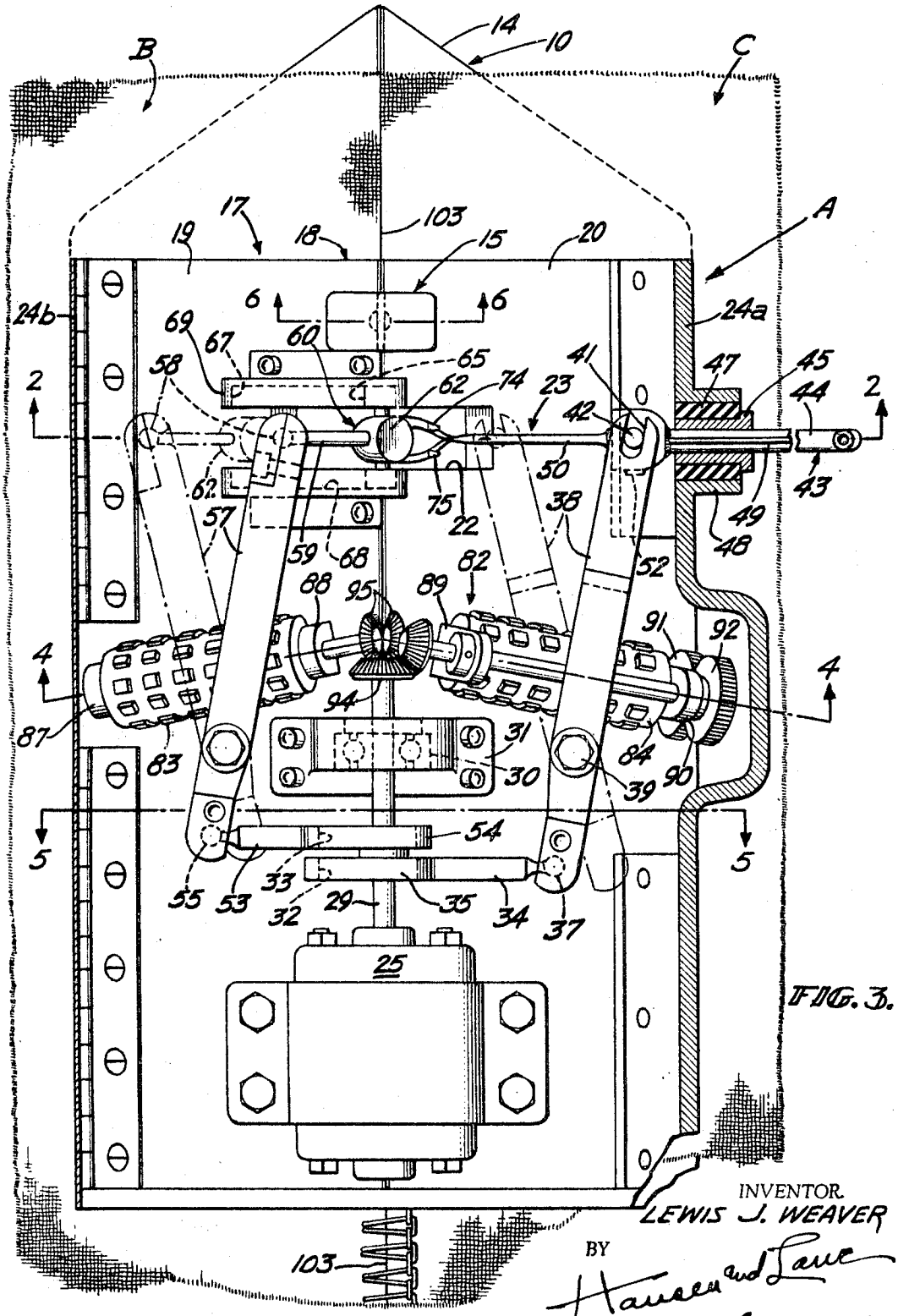


FIG. 3.

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CARPET SEWING MECHANISM

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FIG. 4.

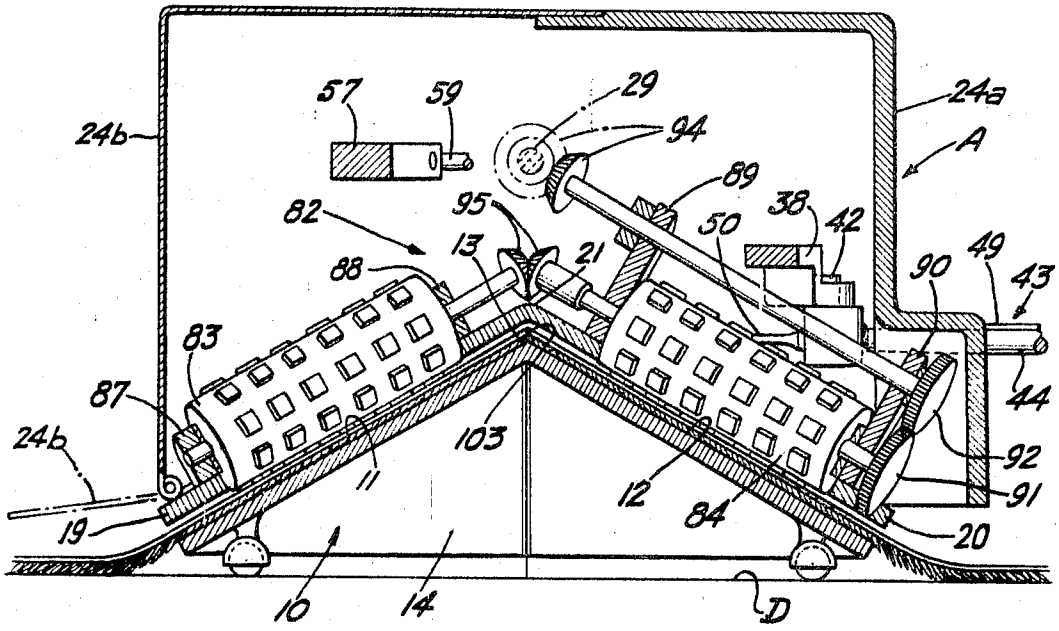


FIG. 5.

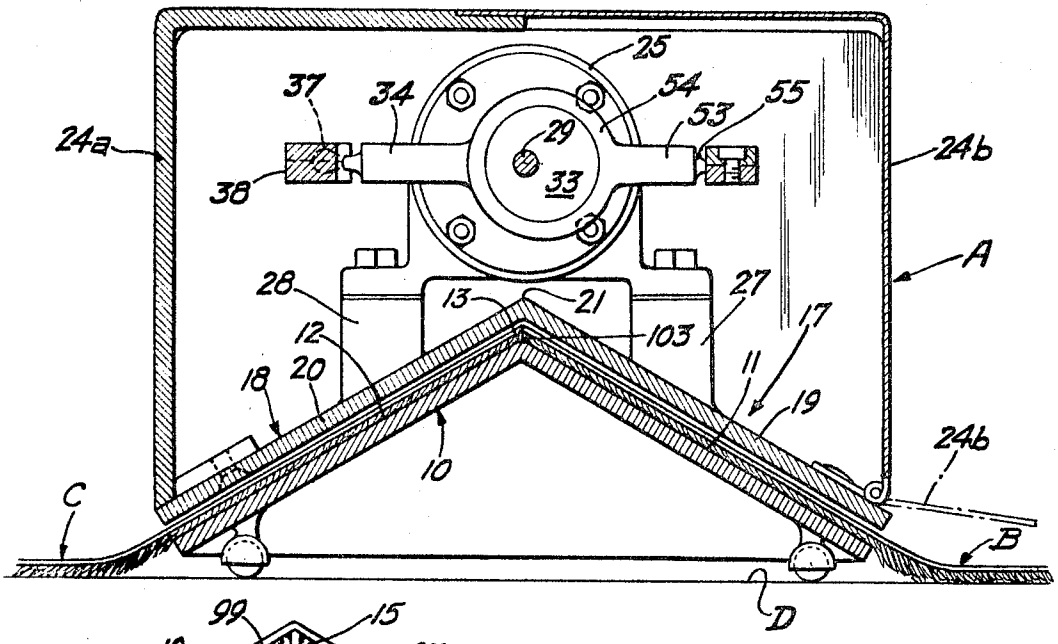
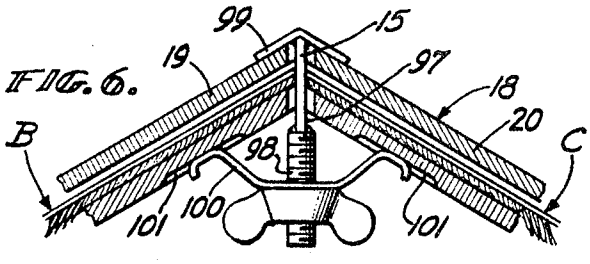


FIG. 6.



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CARPET SEWING MECHANISM

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FIG. 7.

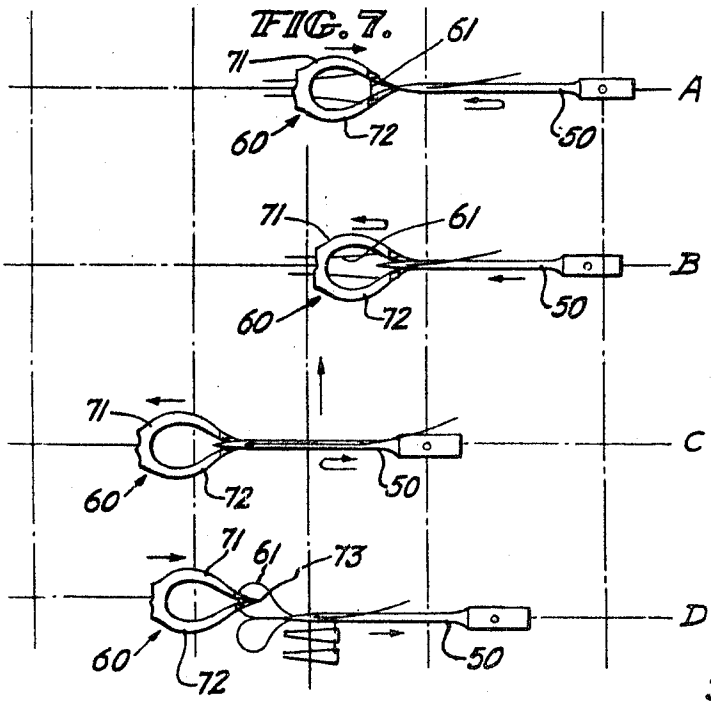


FIG. 10.

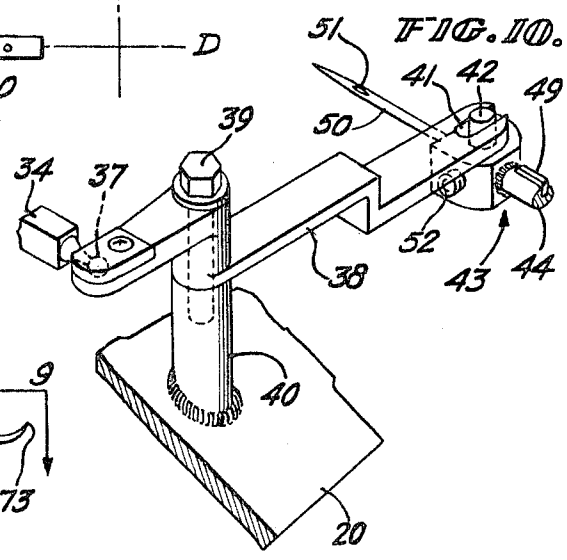


FIG. 8.

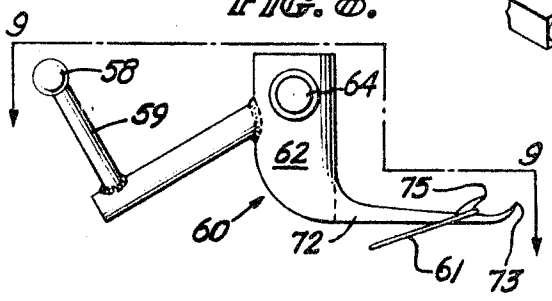
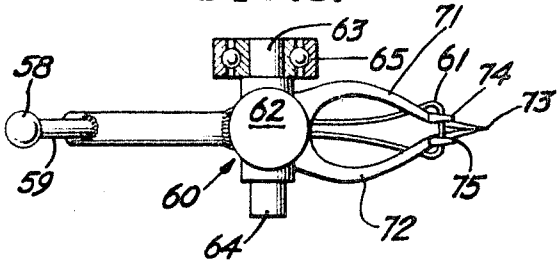


FIG. 9.



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United States Patent Office 3,457,884 Patented July 29, 1969

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CARPET SEWING MECHANISM

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Filed Feb. 9, 1967, Ser. No. 614,861
Int. Cl. D05b 23/00
U.S. Cl. 112—7 2 Claims

ABSTRACT OF THE DISCLOSURE

A carpet sewing mechanism comprises a domed base which travels on casters along a floor beneath adjacent marginal portions of two pieces of carpeting spread nap-side down in edge-to-edge abutting relation and supports an upper portion which houses a drive motor operatively connected to sewing and propelling mechanisms. The upper portion is connected to the base by narrow connecting means which rides along between the two pieces of carpeting and guides the mechanism along the line of juncture thereof during a carpet sewing operation.

Background of invention

In recent years the use of overall or "wall-to-wall" carpeting in residences as well as in offices and commercial and industrial buildings has increased greatly. The laying of such carpeting is a job for a professional, and professional carpet layers are highly paid, skilled artisans. The most difficult, arduous and time-consuming part of their work is the sewing together of the various pieces of carpeting material used in a carpet laying operation.

In the past, attempts have been made to provide carpet sewing machines, and even to provide machines which, like the present invention, will sew together two pieces of carpeting spread on a floor. However, such prior machines have not proven entirely satisfactory, and as a result few if any of them are in use today.

Summary of the invention

A self-propelled carpet sewing mechanism wherein a domed base moves along beneath adjacent marginal portions of two edgewise abutting strips of carpeting material spread nap side down on a supporting surface thereby elevating the adjacent marginal portions of the strips, connecting means being provided for guiding the mechanism along the line of juncture of the two strips and for connecting the base to an upper portion whereon a drive motor is operably connected to a sewing mechanism which sews the abutting edges of the two strips together, and is also operably connected to mechanism which propels the carpet sewing mechanism forwardly along said line of juncture.

The invention will be apparent from the following description and the accompanying drawings, consisting of four sheets, wherein:

FIG. 1 is a perspective view showing an illustrative carpet sewing mechanism embodying the invention as it appears in use.

FIG. 2 is an enlarged, transverse, sectional view through the mechanism shown in FIG. 1 taken along line 2—2 of FIG. 3, the broken lines showing the needle and thread loop pickup mechanism in different stages of operation.

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2 portions being broken away. The broken lines showing the needle and thread loops pickup elements in a different stage of operation.

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3.

FIG. 5 is a sectional view taken along line 5—5 of FIG. 3.

FIG. 6 is a further enlarged, fragmentary, sectional view taken along line 6—6 of FIG. 3.

FIG. 7 is a sequential series of enlarged, diagrammatic views showing various stages in the cycle of operation of the needle and thread loop pickup mechanism of the machine shown in FIGS. 1–6.

FIG. 8 is an enlarged, side elevational view of the thread loop pickup and transport mechanism shown in FIGS. 1, 2 and 7.

FIG. 9 is a top plan view of FIG. 8.

FIG. 10 is a fragmentary perspective view of the needle actuating lever and associated parts.

Referring to the drawings in detail, a carpet sewing mechanism A embodying the invention comprises a domed, caster-supported base **10** of any suitable material, for example, plastic or aluminum, with flat upper side surfaces **11** and **12** which slope inwardly and upwardly and intersect in a center ridge **13**. The upper surfaces of the forward portion of the base slope forwardly and downwardly to form a plow-like nose portion **14**, which travels beneath and elevates adjacent marginal portion of two pieces B and C of carpeting to be sewed together.

Superposed over the base **10** and joined thereto by a bolt-like connecting member **15** is an upper portion **17**, comprising an angle frame **18** which may, like the base **10**, be of any suitable material. The upper frame portion **18** comprises a pair of rigid frame plates **19** and **20** which slope inwardly and upwardly to conform with the upper side surfaces of the base, and are integrally interconnected to each other along their line of intersection to define a ridge **21** overlying that of **13** of the base **10**. An opening **22** (FIGS. 2 and 3) is provided in the upper portion **17** to provide operating clearance for the sewing mechanism **23** to be described later herein.

A housing **24** is mounted on the upper portion **17** and comprises a fixed portion **24***a* secured to the right hand plate **20** and a hinged portion **24***b* which is hingedly connected to the outer edge of the other plate **19** so it can be swung open for access to the drive motor, and the sewing and propelling mechanism which is housed therein.

The drive motor **25** is an electric motor mounted on standards **27** and **28** (FIG. 5) secured to the side plates **19** and **20**, respectively, and drives a shaft **29** at a desired rate of speed. A ball bearing **30** for rotatably supporting a forward portion of the shaft **29** is mounted in a standard **31** on the upper frame portion **18**.

The sewing mechanism **23** is driven by a pair of circular eccentrics **32** and **33** mounted on the shaft **29** and rotating therewith. A first connecting rod **34** has a bearing ring **35** on its inward end which is rotatably mounted on the first or rearward eccentric **32**. The outward end of the first connecting rod **34** has ball-and-socket connection **37** with a needle actuating lever **38** which is pivotally mounted at a selected point intermediately of its length on a pivot bolt **39**. The latter is screwed into a threaded hole provided therefor in a standard **40** (FIG. 10) on the side plate **20**. The forward end of the needle actuating lever **38** has a notch **41** therein, which receives a stud **42** on a needle support member **43** for reciprocally driving the latter.

The needle support member **43** comprises a shaft **44** which is mounted for axial slidable movement in a slide bushing **45** mounted in a rubber sleeve **47** which in turn is mounted in a drilled boss **48** on the side of the fixed housing portion **24***a*. A key **49** on the shaft **44** rides in a keyway in the slide bushing **45** to prevent rotative displacement of the needle support member **43** while the rubber sleeve **47** permits limited wobble movement of the needle to compensate for forward movement of the mechanism during the forming of a stitch.

A sewing machine type needle 5, having its eye 51 near its point, is retained by a set screw 52 in a socket provided therefore in the inner end of the needle support member 43. At each axial advance of the needle support member 43 the point of the needle 50 pierces the elevated, abutting edges of the two pieces B and C of carpeting, the needle eye 51 being carried well beyond the farther piece B; while when the needle is withdrawn its point is retracted clear of the carpeting.

A second connecting rod 53 has a bearing ring 54 on its inward end which is journaled on the other eccentric 33, and has ball-and-socket connection 55 at its outer end with a second lever 57. The latter lever also has ball-and-socket connection 58 at its forward end with an extension 59 of a thread loop-pick-up-and-carry-over foot 60 which picks up a loop 61 of thread (FIGS. 7D and 9) during the formation of each stitch of a sewing operation, carries the loop over the raised, abutting edges of the two carpeting strips, and presents the loop in open condition for penetration by the needle 50 at the beginning of each successive stitch-forming operation.

The foot 60 comprises, in addition to the extension 59, a body portion 62 having a pair of trunnion studs 63 and 64 extending in opposite directions therefrom. A pair of ball bearings 65 (FIG. 9) one on each of the studs 63 and 64 ride in a pair of similar but opposite arched cam tracks 67 and 68 provided therefor in a pair of standards 69 and 70, respectively. The standards 69 and 70 are secured to the side plate 19 as shown in FIGS. 2 and 3.

From the body portion 62 a pair of outwardly curved, springy tapered arms 71 and 72 extend toward the needle 50, the free ends of these curved arms meeting to form an upturned point 73. Inclined prongs 74 and 75 extend upwardly from the arms 71 and 72, respectively, to prevent a thread loop 61 pickup by the point 73 from slipping along the arms 71 and 72 toward the body 62.

The eccentric 33, actuating lever 57, extension 59, foot 60 and cam tracks 67 and 68 are proportioned and arranged to move the thread loop pick-up-and-carry-over foot 60 in recurring cycles between its left hand dash-two-dot position of FIG. 2, into the thread loop 61 and up over the raised, abutting edges of the two pieces of carpeting to tauten the previous stitch and to present the thread loop in open position as shown in FIGS. 7A and B, for penetration by the needle 50 in its subsequent carpet piercing stroke.

A ball 77 of carpet sewing thread is mounted on a spindle 78 provided on top the fixed housing portion 24*a*. Thread from the ball 77 is led through a hole in the outer end of the arm 79 mounted on the fixed housing member 24*a*, around an idler sheave 80 and betweeen a pair of conventional, spring-pressed convavo-convex tensioning discs 81, through a hole in the outer end of the needle support shaft 44 and thence along the latter shaft and through the needle eye 51.

Propelling mechanism 82 for advancing the carpet sewing mechanism A along a seam being sewed comprises a pair of power driven rollers 83 and 84, each studded or otherwise provided with a suitable carpet gripping peripheral surface, and journaled in bearings provided therefor in standards 87, 88, 89 and 90 mounted on the uper frame plates 19 and 20. The roller 84 has a gear 91 on its outer end which meshes with a gear 92 on a shaft 93 journaled in bearings on the upper ends of the standards 89 and 90. The shaft 93 is driven by bevel gearing 94 from the motor driven shaft 29.

Bevel gearing 95 operatively interconnects the inner ends of the propelling rollers 83 and 84 so that the rollers are rotatively driven in the same rotative direction at the same speed. The axes of the rollers 83 and 84 are parallel to the side plates 19 and 20 which they respectively overlie, and are inclined rearwardly from their inner ends in order to urge the two carpeting pieces B and C toward each other and prevent their separation.

The upper surfaces of the side plates 19 and 20 directly beneath the propelling rollers 83 and 84 are of hard, long-wearing material, for example, tool steel or chrome plate, and are highly polished for minimal frictional engagement with the carpet. These surfaces may, if desired, be provided with idler rollers or coated with a suitable low friction material such as Teflon. Since such modification would be obvious to an ordinarily skilled mechanic or designer they are omitted from the present disclosure.

The member 15 (FIGS. 3 and 6) which interconnects the base 10 and the upper framee portion 18 comprises a thin, plate-like portion 97 with a threaded shank 98 extending downwardly therefrom. An angle plate 99 is affixed to the upper end of the plate portion 97 and overlies and conforms to the ridge 21 of the upper frame portion 18. A bow spring 100 (FIG .6) is mounted beneath the ridge 21 and the threaded shank 99 extends through a central hole therein. The ends of the bow spring 100 are seated in shallow recesses 101 provided therefor in the under side of the ridge 21. A thumb-screw screwed onto the threaded shank porion 98 bears against the under side of the bow spring 100 to bias the upper portion 17 toward the base 10.

Operation

The operation of the mechanism is as follows: Two pieces B and C of carpeting material to be sewed together are laid nap side down in edge-to-edge abutting relation on a flat surface D, such as a floor. The ends of the marginal portions of the two pieces B and C at which the seam is to be started is fed into the forward end of the sewing mechanism A between the base 10 and upper portion 17 a sufficient distance so that the rollers 83 and 84 will grip the pieces B and C between the feed rollers and the base portion 10. The small unsewed portion which is left at the beginning and end of the seam by this procedure is later sewed by hand.

With the needle 50 threaded, the thread led from the ball of thread 70 as shown in FIG. 1, and a suitable length of thread drawn through the eye 51 of the needle to prevent unthreading during the first stitch, the drive motor 25 is energized by means of a control switch 102. Thereupon the sewing mechanism begins to sew the two pieces B and C together and the propelling rollers 83 and 84 are simultaneously energized to urge the carpeting strips rearwardly and thereby advance the sewing mechanism A along the line of juncture 103 of the two pieces of carpeting, being guided in its advance by the stud 15 riding along between the two pieces of carpeting.

The sequence of operation of the sewing mechanism, shown diagrammatically in FIG. 7A–D is as follows: the small arrows alongside the needle 50 and foot 60 at each state of the sequence showing the direction of movement of these members, while the large arrow shows the direction of travel of the entire mechanism.

In the top most view 7A the loop-pick-up-and-transporting foot 60 has the open thread loop 61 thereon and is almost at the end of its right hand or loop-carry-over stroke, while the needle 50 is just reversing from its fully withdrawn right hand position and is starting to move toward the left on its next carpet piercing stroke.

In the next lower view FIG. 7B the foot 60 is at the limit of its right hand stroke and the needle is entering the thread loop 61 which the foot 60 is holding open to receive the needle. The latter continues to the left, penetrating both carpeting strips B and C.

In the next lower view 7C the needle 50 is at its left hand limit of movement and is starting back on its withdrawing stroke, while at the same time the foot 60 is approaching its left hand limit of movement.

In the bottommost view FIG. 7D the needle 50 has drawn its eye 51 into the carpeting, and, due to the friction of the carpeting on the thread being greater than that of the needle, has opened up two thread loops 61 and 61*a* one on each side of the needle. At this same

time the upturned point **73** of the foot **60** is entering the thread loop **61** and will pick the latter up and carry it over the line of juncture of the two pieces of carpeting to complete the cycle at the position shown in the uppermost view FIG. 7A, thereby tautening the preceding stitch and placing the new loop in position to receive the needle as the parts enter their next cycle of operation.

During the entire stitching cycle shown by the four views of FIG. 7 the carpeting strips B and C are fed slowly rearwardly or downward as viewed in FIG. 7A–D so as to form the stitches spaced as shown in the lower view of FIG. 7, the slight angular position of the rollers tending to keep the two pieces of carpeting in edge-to-edge abutting relation.

If desired, instead of the continuously rotating feed rollers **83** and **84**, conventional step-by-step advancing means may be provided, for example, by means of a ratchet and pawl, or Geneva cam mechanism. Since the provision of such step-by-step advancing mechanism is well within the capabilities of any routine machine designer or skilled sewing machine artisan, and since the inclusion of such conventional mechanisms would unduly complicate the present disclosure, such mechanism is omitted.

The invention provides a carpet sewing mechanism which quickly and easily sews together two pieces of carpeting material and thus eliminates the need for tedious and expensive hand sewing. The use of the invention is easily and quickly learned. The stitching is concealed when the carpeting is inverted after sewing to nap-side-up condition for laying.

While I have illustrated and described a preferred embodiment of the present invention, it will be understood, however, that various changes and modifications may be made in the details thereof without departing from the scope of the invention as set forth in the appended claims.

I claim:

1. A carpet sewing mechanism for sewing together along their line of juncture two pieces of carpeting spread nap side down in edge-to-edge abutting relation on a floor, said mechanism comprising

(a) a base portion with its upper surfaces of ridge form for traveling along the floor beneath and elevating marginal portions of the two pieces of carpeting;

(b) an upper portion with its lower surfaces of complementary shape to the upper surfaces of the base portion fitted over and supported by the base and shaped and positioned to ride along on top of the marginal portions of the two pieces of carpeting elevated by the base portion;

(c) means comprising a narrow bolt-like member interconnecting the base and upper portion and positioned to ride between adjacent edges of the two pieces of carpeting for guiding the mechanism along the line of juncture, said bolt-like interconnecting member being provided with spring means to urge the base and the upper portion toward each other;

(d) a drive motor mounted on the upper portion;

(e) propelling means mounted on the upper portion and in driven engagement with the motor for propelling engagement with the two pieces of carpeting; and

(f) sewing mechanism mounted on the upper portion and in driven engagement with the motor to drive a needle in successive cycles in a sewing operation through adjacent edge portions of the two pieces of carpeting, the rate of the propelling mechanism being in timed relation with that of the sewing mechanism.

2. A carpet sewing mechanism as claimed in claim **1**, in which:

(a) said bolt-like interconnecting member comprises an angle plate overlying and conforming to the ridge of said upper portion and a thin plate-like portion extending through the base portion;

(b) a threaded shank extending from the lower end of the plate-like portion;

(c) a leaf spring mounted on said threaded shank with its ends in upwardly bearing relation on the underside of the base portion; and

(d) a nut screwed on the threaded shank to urge the spring upwardly for adjusting the force biasing the upper portion and the base toward each other.

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