April 29, 1969 R. M. MARINOFF 3,440,981

CARPET SEWING MACHINE

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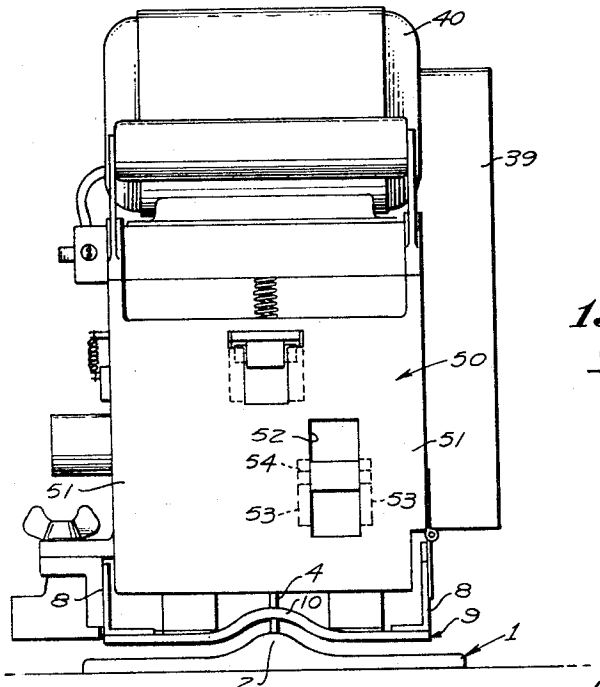


FIG. 1

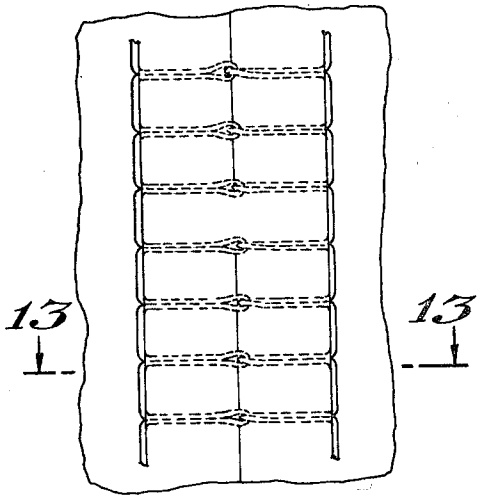


FIG. 12

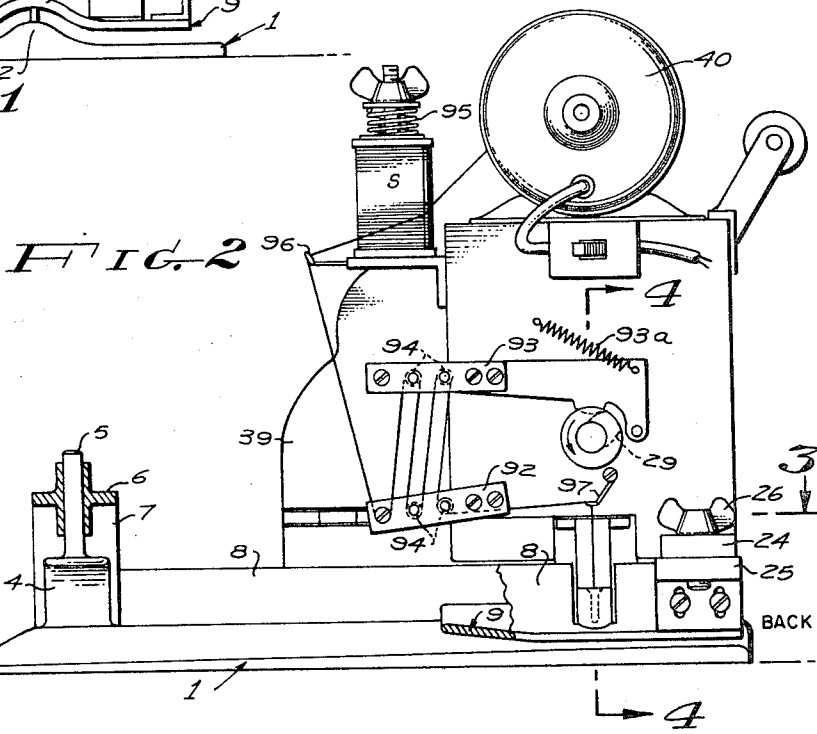


FIG. 2

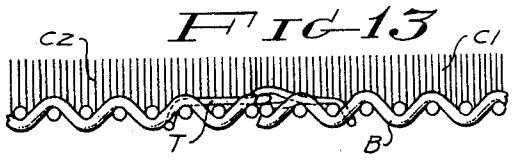


FIG. 13

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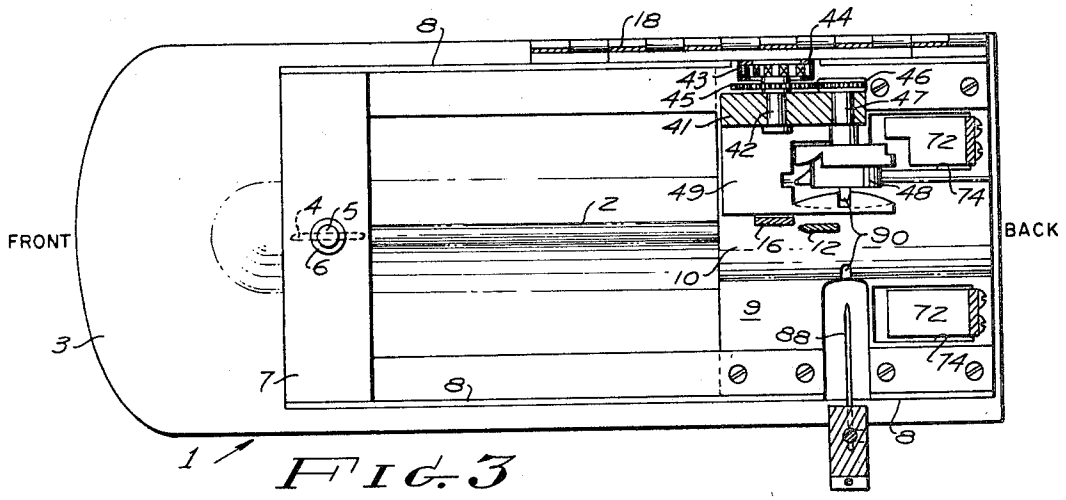


FIG. 3

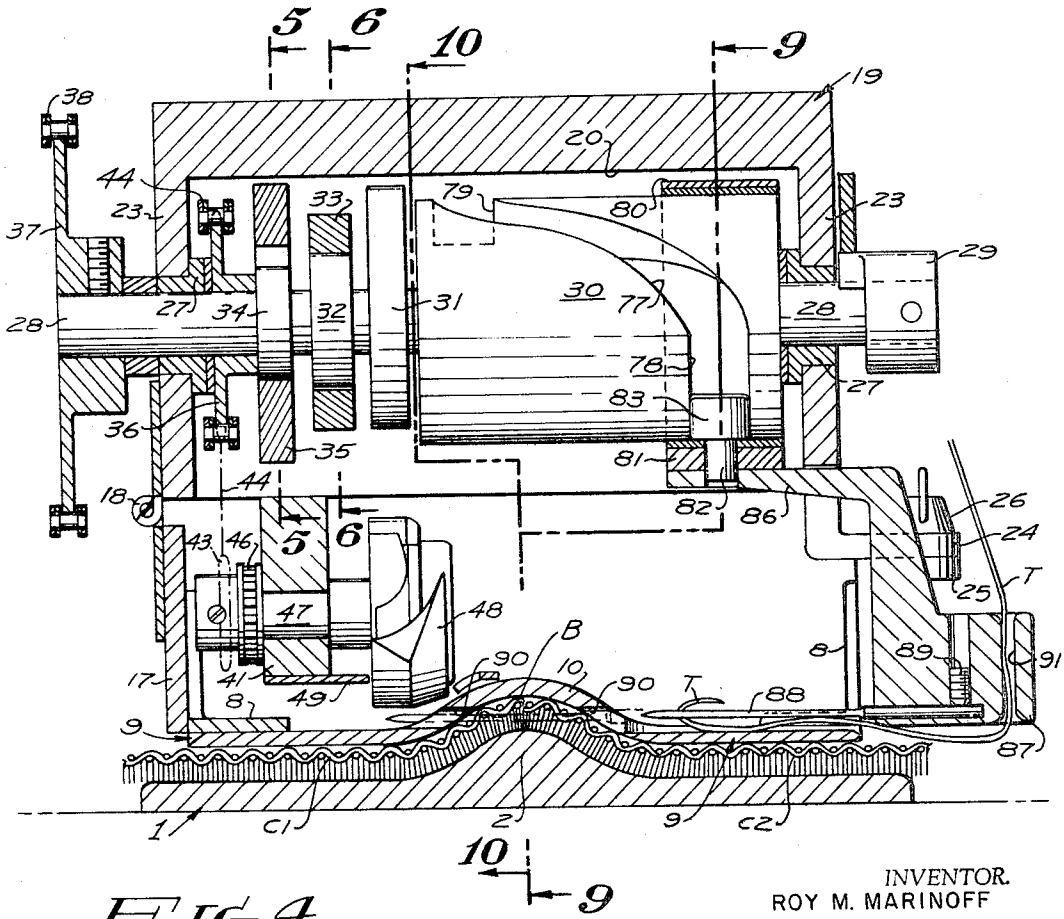


FIG. 4

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FIG. 5

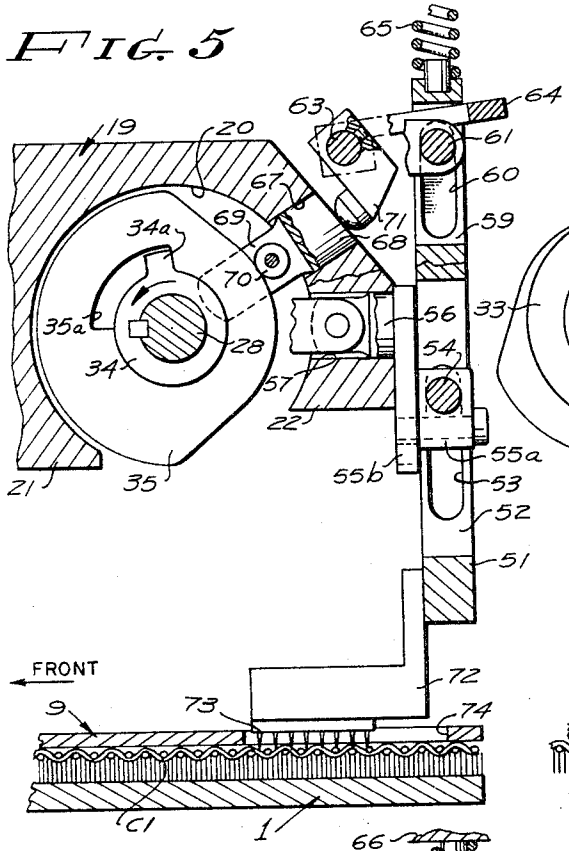


FIG. 6

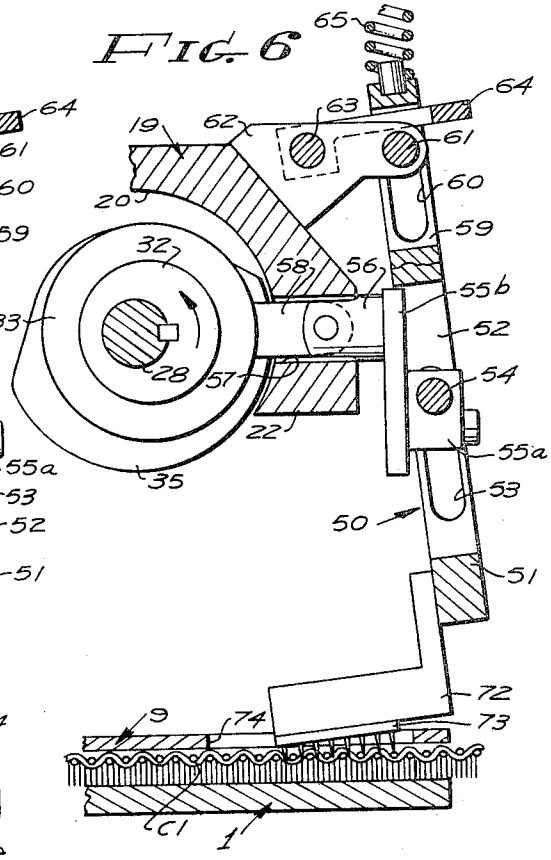


FIG. 7

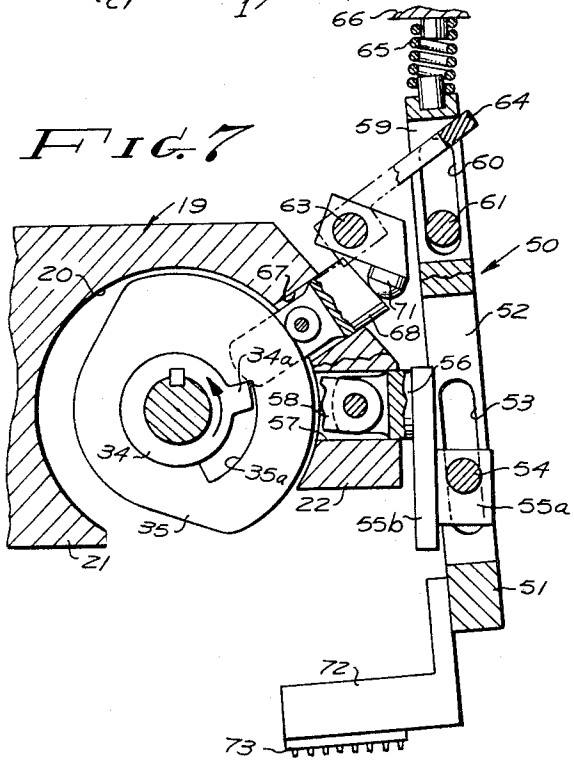
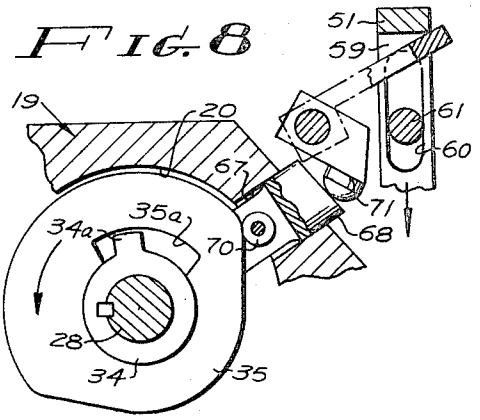


FIG. 8



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FIG. 9

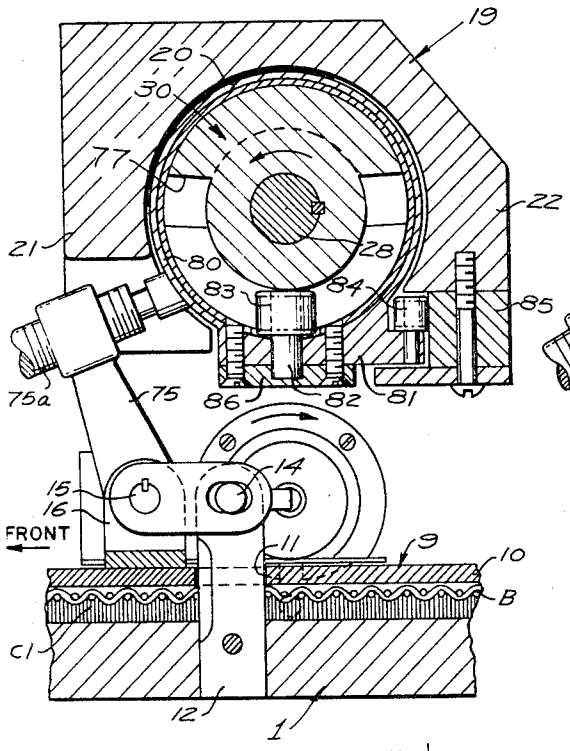
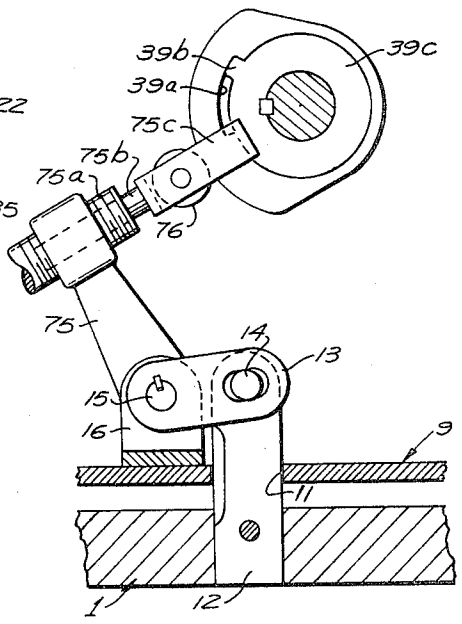


FIG. 10



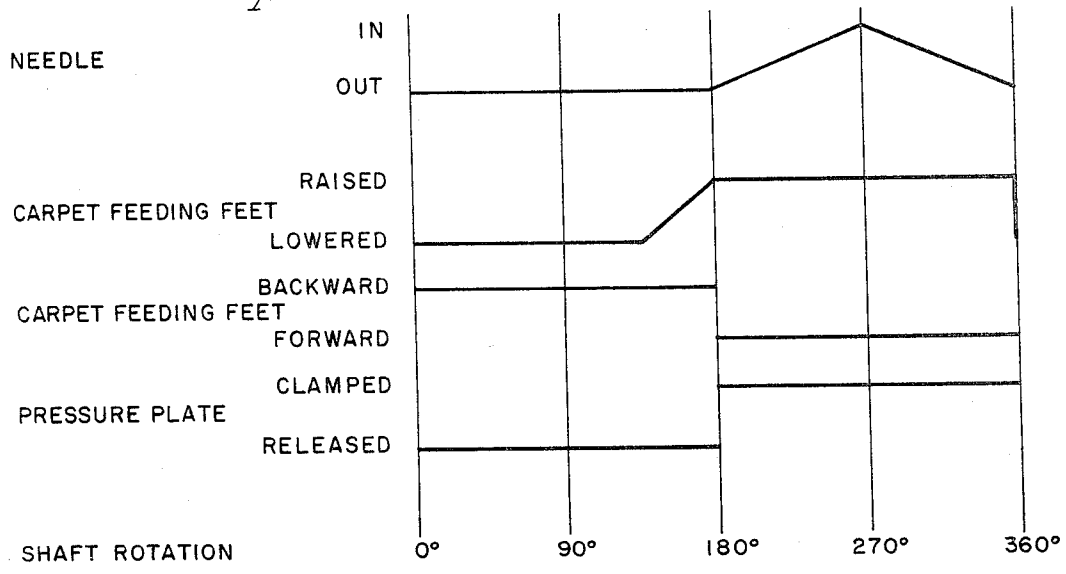


FIG. 11

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United States Patent Office 3,440,981 Patented Apr. 29, 1969

3,440,981

CARPET SEWING MACHINE

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Filed Aug. 25, 1966, Ser. No. 575,087
Int. Cl. D05b 23/00
U.S. Cl. 112—7 9 Claims

ABSTRACT OF THE DISCLOSURE

A carpet sewing machine arranged to support carpet sections to be joined in a pile-side-down position and in a continuous contiguous relation, within the region of the machine, by reason of a web of knife blade thickness providing the sole means of connection between the parts of the machine underlying and overlying the carpet sections; underlying and overlying parts of the machine having conforming portions which raise the confronting edges of the carpet sections so as to permit insertion of a sewing needle and the forming of stitches.

First, to provide a carpet sewing machine which is arranged to sew carpet sections in essentially the same manner commonly employed to sew carpets by hand; more particularly, to provide a machine arranged to join two contiguous carpet sections which are positioned with their backing sides uppermost.

Second, to provide a carpet sewing machine wherein, except for a guide plate located under the margins of a pair of carpet sections, the entire operating mechanism is located above the carpet sections and readily accessible.

Third, to provide a carpet sewing machine wherein the contiguous margins of the carpet sections are held in an elevated position whereby a straight needle, when moved along a horizontal axis, is forced into and through the backing of one of the carpet sections then outwardly through the contiguous carpet section for cooperation with a bobbin.

Fourth, to provide a carpet sewing machine which incorporates novel needle and bobbin drive means and is arranged to use the needle and bobbin of a conventional heavy duty sewing machine.

Fifth, to provide a carpet sewing machine which includes novelly arranged feeding means which advances the machine relative to the carpet sections.

Sixth, to provide a carpet sewing machine wherein a novelly arranged pressure plate overlies a large area of each carpet section including the region in which the stitching action takes place, the pressure plate being operative to clamp the carpet sections, thereby to prevent any movement of the carpet sections while the stitching operation is being performed, and to be periodically released so that the machine may be advanced a predetermined distance prior to the next stitching operation.

With the above and other objects in view, as may appear hereinafter, reference is directed to the accompanying drawings in which:

FIGURE 1 is a back view of the carpet sewing machine.

FIGURE 2 is a side view thereof, with a portion of the base frame shown in section.

FIGURE 3 is a sectional view of the machine, taken substantially through 3—3 of FIGURE 2.

FIGURE 4 is an enlarged transverse sectional view, taken through 4—4 of FIGURE 2.

FIGURE 5 is a fragmentary transverse sectional view taken through 5—5 of FIGURE 4, showing a portion of the carpet feeding mechanism, including one carpet feeding foot, the foot being shown as it moves into initial engagement with an underlying carpet.

FIGURE 6 is a fragmentary transverse sectional view taken through 6—6 of FIGURE 4, showing other portions of the carpet feeding mechanism, and showing a carpet feeding foot at the conclusion of its carpet feeding movement.

FIGURE 7 is a fragmentary sectional view, similar to FIGURE 5, showing the carpet feeding foot in its raised position following the position shown in FIGURE 6.

FIGURE 8 is a fragmentary sectional view, similar to FIGURES 5 and 6, showing the relationship of the parts when the carpet engaging feet have been raised and moved forward for re-engagement with the carpet.

FIGURE 9 is a fragmentary sectional view, taken through 9—9 of FIGURE 4, showing the needle operating mechanism, and also showing the pressure plate control mechanism as it appears when the pressure plate is in its raised condition.

FIGURE 10 is a fragmentary sectional view, taken through 10—10 of FIGURE 4, showing the condition of the pressure plate control mechanism when the pressure plate is depressed.

FIGURE 11 is a chart showing the timing relationship of the various operating parts of the carpet sewing machine.

FIGURE 12 is a fragmentary view of a pair of carpet sections disposed backing side up and illustrating a series of completed stitches.

FIGURE 13 is a fragmentary sectional view, showing two adjacent carpet sections, nap side up, and illustrating one of the completed stitches, the section being taken through 13—13 of FIGURE 12.

The carpet sewing machine includes a base plate 1, which is flat except for a central longitudinally extending ridge or rib 2. The base plate tapers toward its forward end, and extends beyond the ridge to form a thin flat portion 3, capable of sliding freely under a carpet or rug. The base plate is intended to pass under a pair of carpet sections C1 and C2, which are positioned backing side up, with their edges abutting along the median line of the ridge 2. The apex of the ridge is semicircular in cross section and merges laterally by semicircular portions into the surface of the base plate 1, as shown best in FIGURE 4.

Extending upwardly from the median line of the ridge 2, near the forward end of the base plate, is a forward web 4. Extending upwardly from the forward web is a guide pin 5. A sleeve 6 is slidably mounted on the guide pin. The sleeve is located at the central portion of a cross frame member 7, the lateral extremities of which are joined to a pair of longitudinally extending frame members 8.

The rear portions of the frame members 8 are joined by a pressure plate 9, which conforms to the transverse profile of the base plate 1; that is, the pressure plate is provided with a central hollow ridge 10, the underside of which conforms to the curvature of the ridge 2, as shown best in FIGURE 4.

As shown in FIGURES 9 and 10, the pressure plate 9 is provided with a slot 11, through which extends a rearward web 12, secured to the base plate 1 at the median line of the ridge 2. The upper end of the rearward web 12 is joined to a short lever 13 by a pin and slot connection 14. The lever 13 is joined to a shaft 15 capable of rocking movement and supported by a bracket 16, secured to the pressure plate. The lever 13 is employed to move the pressure plate a short distance to and from the base plate 1, as will be described more fully hereinafter.

Secured to the left longitudinal frame member 8, as viewed in FIGURE 4, is a reinforcing plate 17 to which is secured one side of a hinge 18. The other side of the hinge is secured to a cam housing 19, which overlies and is spaced upwardly from the pressure plate 9. The cam housing forms a cylindrical cam chamber 20, extending

transversely with respect to the base plate **1**, the cam chamber being bounded by a forward wall **21**, a rearward wall **22**, and end walls **23**. Extending from the end wall, remote from the hinge **18**, is a bracket **24** which is connected to an adjustable bracket **25**, mounted on the right longitudinal frame member **8**, as viewed in FIGURE 4, by means of a wing bolt or nut **26**.

The end walls **23** are provided with bearings **27**, which journal a cam shaft **28**. The cam shaft is provided with a series of cams, including a thread feeding cam **29**, mounted at the extended right end of the shaft as viewed in FIGURE 4. Within the housing, starting at the right side of the cam chamber **20**, and progressing to the left as viewed in FIGURE 4, is a needle reciprocating cam **30**, a pressure plate operating cam **31**, a feeding foot eccentric cam **32**, on which is mounted a drive ring **33**, and a feed foot elevating collar **34**, on which is mounted a feed foot elevating cam **35**. A bobbin drive sprocket **36** is mounted adjacent the elevating collar **34**.

The cam shaft **28** extends from the left end of the housing as viewed in FIGURE 4, and its outboard end is provided with a sprocket **37**, which is connected by a chain drive **38**, contained in a housing **39**, and driven by a motor **40**, mounted on the top of the cam housing **19**.

Depending from the cam housing **19**, and traversing the underside of the cam chamber **20**, is a mounting bar **41**, which supports a forward shaft **42**, having a sprocket **43**, connected by a chain **44** to the bobbin drive sprocket **36**.

The forward shaft **42** is also provided with a gear **45** which engages a second gear **46**, mounted on a rearward shaft **47**. A rotary bobbin **48**, of conventional construction, is mounted on the rearward shaft **47**, in such a position as to confront the hollow ridge **10**, as shown in FIGURE 4. A conventional guard plate **49** is also supported by the mounting bar in position for cooperation with the bobbin **48**.

Mounted at the rear side of the cam housing **19** is a carpet feeding mechanism **50**. The carpet feeding mechanism is shown best in FIGURES 5 through 8 and includes a vertically disposed transversely extending plate **51**, having a vertical aperture **52**, which in turn is provided with opposed side slots **53**, which receive the extremities of a cross pin **54**.

The cross pin **54** is connected by a block **55***a*, adjustably connected to an upwardly extending arm **55***b* which, in turn, is connected to a reciprocating shaft **56**, slidable in a guide bore **57**, formed in the back wall **22** of the cam housing **19**. The shaft **56** is pivotally connected to a tongue **58**, projecting rearwardly from drive ring **33**.

The plate **51** is provided with a second vertically extending aperture **59**, having side slots **60**, which receive a cross pin **61**. The cross pin extends laterally from the extremities of a fixed bracket **62**, extending rearwardly from the cam housing **19**. The bracket **62** journals a rocker shaft **63**, to which is secured a slotted lever arm **64**, which straddles the bracket **62** and extends into the aperture **59**. The lever arm **64** is intended to exert an upward force on the plate **51** which is opposed by a depressing spring **65** engaging the upper end of the plate **51**. The opposite end of the spring bears against a suitable abutment **66** supported from the cam housing.

The cam housing is provided with an upwardly and rearwardly directed cam follower guide bore **67**, which slidably receives a cam follower **68**. The cam follower extends into the cam chamber **20** and is provided with a bifurcated end **69**, which straddles the cam **35** and its collar **34**, and serves to hold the cam **35** on its collar **34**. The collar is provided with a drive lug **34***a* and the cam is provided with an arcuate slot **35***a* so as to provide a lost motion correction. A cam engaging roller **70** is supported between the sides of the bifurcated end **69**. The rocker shaft **63** is provided with a rocker arm **71**, which engages the extended end of the cam follower **68**.

Secured to the lower end of the plate **51** is a pair of

brackets **72**, which extend over the pressure plate **9**. The underside of each bracket is provided with a carpet feeding foot **73** which is adapted to engage the carpet sections through clearance slots **74**, provided in the pressure plate **9**.

The shaft **15**, which is journaled in the bracket **16**, secured to the pressure plate **9**, is attached to a lever **75**. The lever **75** carries a transversely extending screw-threaded adjustment bolt **75***a*, having a socket which receives a stem **75***b*, carrying a yoke **75***c*. The yoke straddles the pressure plate operating cam **31** and is provided with a cam wheel **76**.

The needle reciprocating cam **30** is in the form of a cylinder in which is formed a cam slot **77**, which extends helically between an arcuate dwell portion **78** and a peak **79**. Journaled on the cam **30** is a sleeve **80**, shown in FIGURES 4 and 9. The sleeve is provided with an extension **81**, which extends downwardly as well as rearwardly. The extension receives the stem **82** of a cam roller **83**, which rides in the cam slot **77**. The extension **81** journals at its rearward side a thrust roller **84**, which bears against a bar **85**, supported under the rearward wall **22** of the cam housing **19**.

Secured to the underside of the extension **81**, and extending past the right side of the housing, as viewed in FIGURE 4, is a needle bracket **86**, having a depending portion which forms a needle holder **87**. The needle holder is provided with a horizontal socket which receives a conventional needle **88**, held in place by a set screw **89**.

The needle is disposed in a vertical plane common to the axis of the bobbin shaft and the pressure plate **9** is provided with a clearance bore **90** which pierces the hollow ridge **10** so that the needle may pierce the backing B at the adjacent margins of the two carpet sections, as indicated in FIGURE 4.

The needle bracket **86** is provided with a vertically extending thread guide bore **91** so that an end of a thread T may extend under the bracket **86** and be threaded through the needle eyelet.

As shown in FIGURE 2, the right side of the cam housing, when viewed from the front, is provided with a fixed bar **92** and a lever **93**. The lever is held against a thread feeding cam **29** by a spring **93***a*. The fixed bar **92** and the lever **93** are provided with rollers **94** around which the thread is extended. The thread is provided from a spool S mounted on a spool holder **95**, supported from the cam housing **19**. The thread extends from the spool S through a first guide loop **96** to the rollers **94**, then from the rollers through a second guide loop **97** into the guide bore **91**.

Operation of the carpet sewing machine is as follows:

It is customary when hand sewing a carpet to cut and fit at least a pair of carpet sections, then fold one carpet section upon itself, so as to place it backing side up, and then place the other carpet section on the first section with its backing side up, and then bring the edges of the two carpet sections into proper registry. The same procedure is followed in the use of the carpet sewing machine.

With the pressure plate in its released condition, the base plate is placed on the floor or on the nap side of one of the carpet sections and the adjacent margins of the carpet sections are slipped under the pressure plate and brought into contiguous relation. The webs **4** and **12** are relatively thin so that they offer no obstruction to placement of the carpet sections in close proximity. If convenient, the macine is placed adjacent one extremity of the pair of carpet sections, although this is not necessarily the case. Often, it is more convenient to place the machine at the mid-portion of the carpet sections, then sew toward one extemity, then replace the machine at the mid-portion and sew toward the other extemity.

Once the machine and the carpet sections are in position, the machine is started and moves forward, the carpet sections remaining essentially fixed in position. As each stitch is formed, the carpet sections are drawn together so that their edges are in firm abutment. During

the interaction of the needle and bobbin, to form a stitch, the pressure plate is pressed against the carpet sections to prevent any movement. As the needle clears the hollow rib of the pressure plate, the pressure plate is released and the feeding feet are brought into engagement with the carpet sections, as shown in FIGURE 5. While the pressure plate remains in its released condition, the feeding feet move from the position shown in FIGURE 5 to the position shown in FIGURE 6, advancing the machine up along the carpet sections. The feeding feet then move upwardly, as indicated in FIGURE 7, and are moved forwardly, as suggested in FIGURE 8. During this movement, the second stitching operation takes place. As the needle completes its retraction movement, and while the pressure plate is released, the thread is drawn snug so that the two carpet sections are brought firmly together.

The sequence of operations is illustrated in the chart, FIGURE 11.

The last motion provided by the key **34***a* and slot **35***a* has the same effect as a sharp cut-off at the sloping end of the cam **35**, which permits radially inward movement of the wheel **70**, as represented at the 180° line of the chart, FIGURE 11. This permits the cam to be driven in either direction so that the machine may sew either backward or forward.

Similarly, the pressure plate operating cam **39** may include a slot **39***a*, key **39***b* and collar **39***c* to permit either backward or forward sewing and still provide the sharp cut-off effect.

It is desirable to adjust the spacing between the pressure plate and the base plate in order to accommodate rugs of different thickness. This is accomplished by the screw adjustment **75***a*.

The adjustment afforded by the block **55***a* and arm **55***b* permits adjustment of the distance between stitches.

While a particular embodiment of this invention has been shown and described, it is not intended to limit the same to the details of the construction set forth, but instead, the invention embraces such changes, modifications and equivalents of the various parts and their relationships as come within the purview of the appended claims.

I claim:

1. A carpet sewing machine, comprising:

(a) a base plate having a central rib contoured to support the margins of a pair of carpet sections, backing side uppermost, in abutting relationship and raised above adjacent portions of the carpet section;

(b) a pressure plate supported above said carpet sections and having downwardly diverging walls contoured to hold the carpet sections in conformity with said base plate and its rib, said walls being perforated horizontally to form a needle passage clearing said base plate rib;

(c) means for supporting a thread carrying needle for movement along the axis of said needle passage;

(d) means for supporting a thread carrying bobbin in position for cooperation with said needle upon reciprocation of said needle;

(e) drive means for causing stitch forming cooperation between said needle and bobbin;

(f) and a mounting structure for said drive means hinged to said pressure plate, and said needle and bobbin supporting means being suspended from said mounting structure, whereby on rotation of said mounting structure, said needle and bobbin are moved clear of said pressure plate and said pressure plate is exposed.

2. A rug sewing machine, according to claim **1**, wherein:

(a) said pressure plate is provided with a pair of apertures exposing said carpet sections;

(b) and a pair of rug feeding feet extend from said mounting structure into said apertures and connect with said drive means for engaging and moving said plates and mounting structure relative to said carpet sections between stitch forming operations of said needle and bobbin;

(c) said rug feeding feet being movable with said mounting structure to clear said pressure plate.

3. A carpet sewing machine, comprising:

(a) a relatively wide base plate having a central rib contoured to support the margins of a pair of inverted carpet sections, backing side uppermost, in abutting relationship and raised above adjacent portions of the carpet section;

(b) a relatively thin web extending upwardly from said rib between said carpet sections to minimize separation of said carpet section in the region of said web and facilitate maintenance of said carpet sections in abutting relation beyond said web;

(c) a relatively wide frame including a pressure plate supported by said web for movement toward and from said base plate and additionally supported by said carpet sections, said pressure plate conforming to said base plate including the region of said rib and having needle clearance apertures defining a horizontal axis passing through the abutting margins of said carpet sections;

(d) a stitching mechanism carried by said frame including means for suspending a thread carrying needle for movement along the axis of said needle apertures;

(e) and drive means carried by said frame for reciprocating said needle, operating said bobbin and pressing said pressure plate to secure said carpet sections thereby to produce a stitch joining said carpet sections.

4. A carpet sewing machine according to claim **3**, wherein:

(a) said frame supports a pair of carpet feeding feet having prongs for engaging said carpet sections;

(b) and said drive means manipulates said feet to advance said plates along said carpet sections between the forming of stitches therein.

5. A carpet sewing machine according to claim **4**, wherein:

(a) said drive means includes a horizontal shaft disposed above said stitching mechanism and in a plane common to the axis of movement of said needle, a series of cams are mounted on said shaft for effecting movement of said stitching mechanism, pressure plate and feeding feet, and a motor connected to said shaft and mounted above said shaft.

6. A carpet sewing machine according to claim **3**, wherein:

(a) said stitching mechanism, said feeding feet and said drive means form parts of a unitary structure hinged to said frame, said structure being tiltable to expose said frame and pressure plate.

7. A carpet sewing machine, comprising:

(a) a base plate having a longitudinally extending central rib and relatively flat lateral sides;

(b) a pressure plate having an underside conforming to said base plate including said rib and lateral sides;

(c) a relatively thin web extending upwardly from the crest of said rib to support said pressure plate;

(d) said base plate and pressure plate adapted to receive therebetween the margins of a pair of inverted carpet sections with their edges in mutual abutment along the crest of said rib except for the region occupied by said thin web;

(e) means for moving said pressure plate between a lower position clamping said carpet sections and an upper position permitting longitudinal movement of said plates relative to said carpet sections, while said carpet sections remain in mutually abutting relation;

(f) and stitching means for passing thread through the mutually abutting edges of said carpet sections over-

lying said rib while said pressure plate is in its lower, clamping position.

8. A carpet sewing machine, as defined in claim 7, wherein:

(a) a pair of carpet engaging feet extending through said pressure plate for moving said plates relative to said carpet sections when said pressure plate is in its raised position.

9. A carpet sewing machine, comprising:

(a) a base plate slidable under the margins of abutting inverted carpet sections;

(b) a pressure plate substantially coextensive with said base plate;

(c) a relatively thin web joining said plates and passing between the abutting margins of the rug sections, said pressure plate being laterally stabilized by said rug sections;

(d) means for raising said pressure plate to permit sliding of said plates relative to said rug sections, and

lowering said pressure plate to clamp said rug sections;

(e) means for advancing said plates relative to said carpet sections, when said pressure plate is raised;

(f) and mechanism for forming a stitch joining said rug sections when said rug sections are clamped between said plates.

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