March 10, 1970 W. PUGACH ET AL 3,499,402

SEWING DEVICE

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FIG. 1

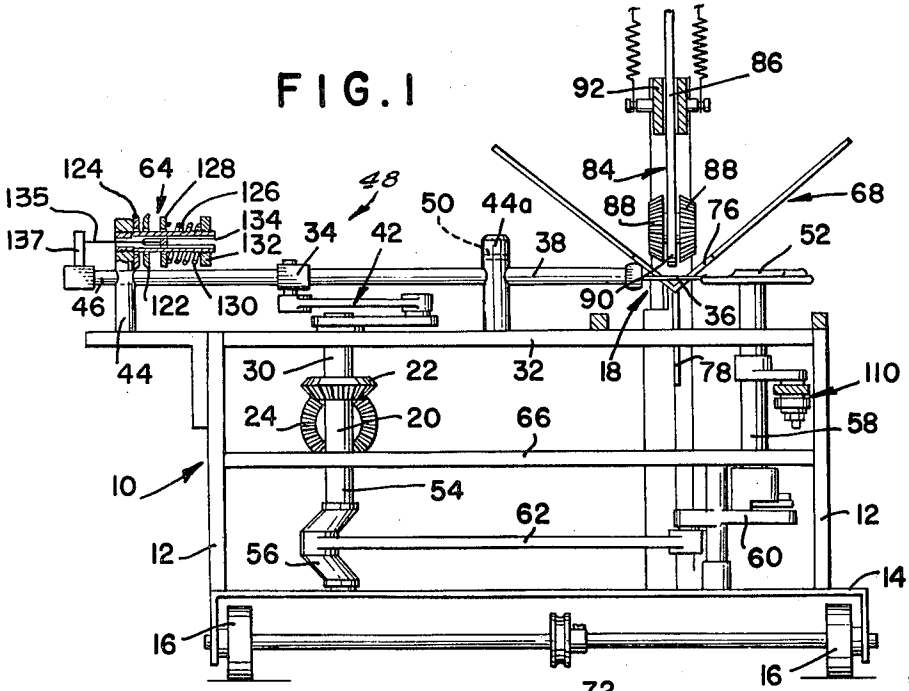
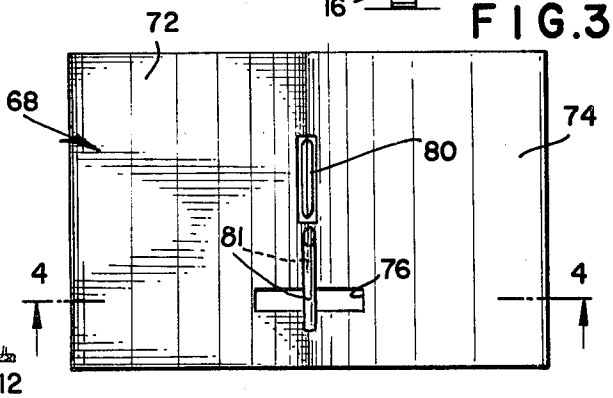


FIG. 3



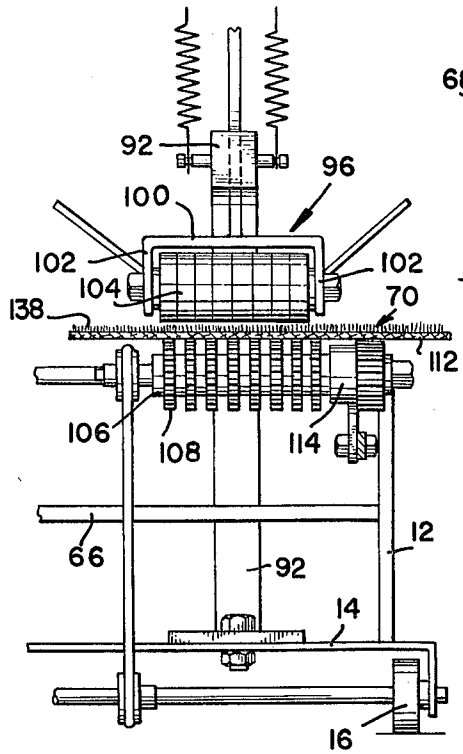


FIG. 5

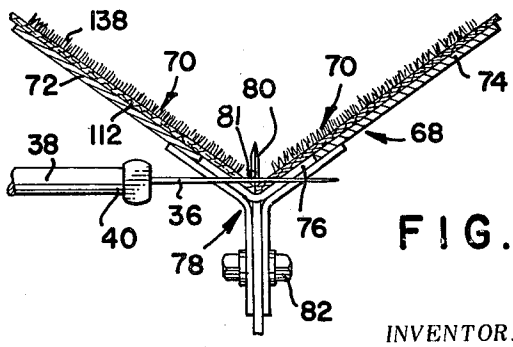


FIG. 4

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March 10, 1970 W. PUGACH ET AL 3,499,402

SEWING DEVICE

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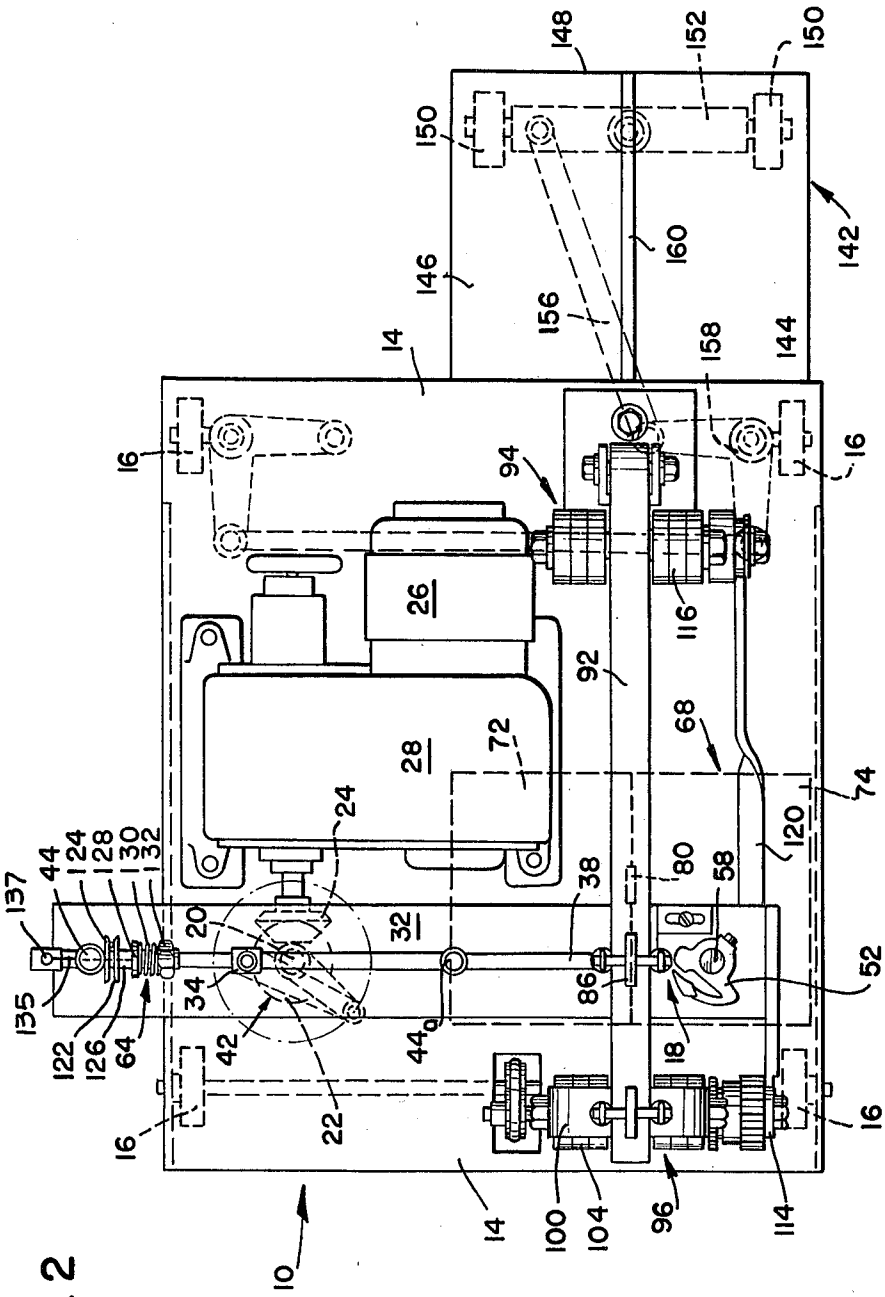


FIG. 2

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SEWING DEVICE

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FIG.6

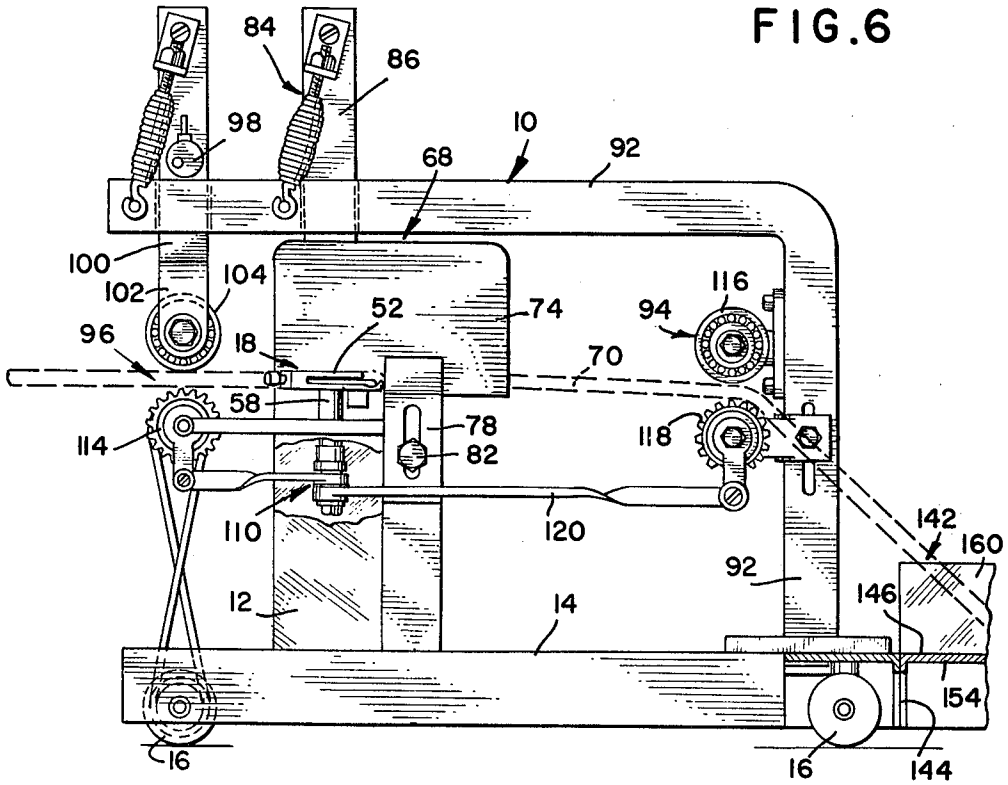
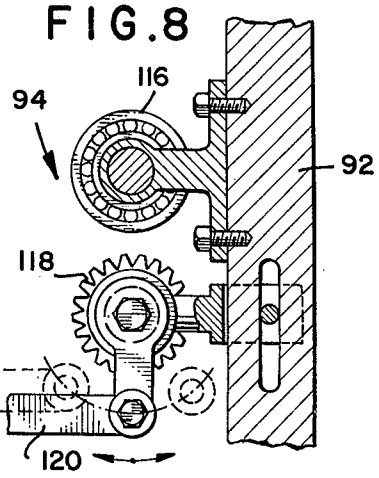


FIG.8



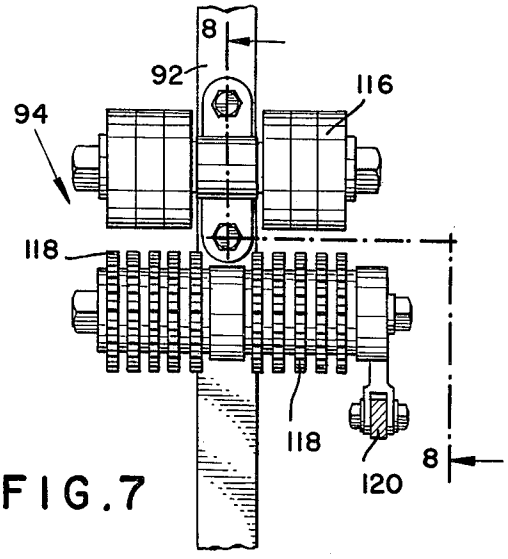


FIG.7

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3,499,402

Patented Mar. 10, 1970

3,499,402

SEWING DEVICE

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Int. Cl. D05b *23/00*

U.S. Cl. 112—7 7 Claims

ABSTRACT OF THE DISCLOSURE

A mobile carpet sewing device having powered means to feed the carpet to and from a sewing mechanism and to propel the device along the floor as the sewing progresses.

DESCRIPTION OF INVENTION

The carpet sewing machine of the present invention provides for a frame having thereon a V-shaped plate. A carpet feeding device feeds carpet to be sewn to the V-shaped plate where a sewing needle and associated stitch forming apparatus sews the carpet through the web of the carpet. A carpet holding means holds the unsewn carpet on the V-shaped plate in proper position for the sewing needle and associated stitch forming apparatus to perform the sewing operation. A carpet removal means is provided to automatically remove the sewn carpet from the V-shaped plate. The machine is also provided with a guide means so that the sewing machine will follow automatically, the cut in the carpet and the machine is driven and automatically follows, feeds, sews and removes the sewn carpet.

The present invention relates to a carpet sewing machine and more particularly to self propelled carpet sewing device.

Heretofore it has been known in the prior art that the stitching of carpeting was one of the tedious and time consuming jobs in putting in or laying commercial or home consumed carpet. The only commercially acceptable manner of stitching or sewing carpeting is by hand because great care has to be taken in avoiding bulky seams and the destruction of the pile when sewing. In many instances, even in the hand sewing it was difficult to conceal the stitches. Other means such as gluing and taping of carpet is in use for joining pieces of carpet, however, these means are generally unsatisfactory from the wear standpoint as well as being time consuming.

Of course the time involved in hand stitching of the carpet makes the cost of installation extremely high and the number of man hours lost is enormous. Gluing and taping relieve little of this time consumption and further complicate the acceptability because of the lack of durability of the seam created.

It is the general object of the present invention to avoid and overcome the foregoing and other difficulties in the prior art by the provision of an inexpensive, portable carpet sewing machine which is self propelling and which will mechanically sew the seams of a carpet.

Another object of the present invention is to mechanically sew two pieces of carpeting together without leaving a bulky seam, having properly tensioned stitches to provide a strong flexible bond between the contiguously sewn carpet pieces.

A further object of the present invention is to provide a mechanical carpet sewing device which will eliminate the necessity of hand stitching.

Yet another object of the present invention is to provide a carpet sewing machine which may sew straight or curved seams in either case following the line or curve automatically.

Still another object of the present invention is to provide a carpet sewing machine which can sew carpet of different thickness, backing materials, and qualities without leaving a bulky seam.

Yet a further object of the present invention is to provide a carpet sewing machine which will automatically sew two pieces of carpeting together without sewing down the pile and without showing of the stitches.

Still a further object of the present invention is to provide a carpet sewing machine which will automatically guide itself to any contour to be sewn.

Another object of the present invention is to provide a carpet sewing machine wherein the length of the stitches used may be varied as required.

The above objects of the present invention and other objects, which will become apparent as the description proceeds are achieved by providing a carpet sewing device comprising a frame means, a drive motor mounted on said frame means, a sewing mechanism in communication with said drive motor, carpet retaining means mounted on said frame for retaining carpet to be sewn in position relative to said sewing mechanism, a feed mechanism mounted on said frame for feeding carpet to be sewn to said sewing mechanism, a removal mechanism also mounted on said frame for removing sewn carpeting from said carpet retaining means, and means for driving said frame means.

For a better understanding of the present invention reference should be had to the accompanying drawings wherein like numerals of reference indicate similar parts throughout the several views and wherein:

FIGURE 1 is a front view of the present invention,

FIGURE 2 is an elevational view of the invention,

FIGURE 3 is a top elevational view of the carpet retaining means,

FIGURE 4 is a cross sectional view taken along the lines 4—4 of FIGURE 3,

FIGURE 5 is a front view of the removal means,

FIGURE 6 is a side elevational view,

FIGURE 7 is an exploded view of the removal means,

FIGURE 8 is a cross sectional view of the feeding means.

Although the principles of the present invention may be broadly applicable to other areas of sewing machinery and devices it is particularly understood that the present invention is well adapted to the sewing of carpeting, whether fabric backed, plastic back, rubber back or any other type of carpet in use and hence it has been illustrated and will so be described.

Referring now to FIGURE 1, a carpet sewing device may be seen and may be referred to generally by reference numeral **10**. The carpet sewing device **10** may be provided with a frame **12** wherefrom the majority of working elements may depend and are supported thereon.

The frame **12** may be fixedly connected to a platform **14**, beneath which there may be provided a plurality of wheels **16** whereby the frame **12** may be automatically or hand moved from one position to another, either manually or automatically in accordance with the seam to be sewn in the carpeting. As previously stated, the carpet sewing device **10** is and may be adapted to sew straight seams or curved, and in its fully automated form as hereinafter described may perform this operation at a very high rate of speed.

Structurally, the purpose of the frame **12** is primarily to support the sewing mechanism **18**, as may be seen in FIGURES 1, 2 and 6. As shown in FIGURE 1, the sewing mechanism **18** may be provided with a main power shaft **20** which may have thereon a driven gear **22**. The driven gear **22** may be in communication with a driving gear **24** which is connected to a driving motor **26** through a variable speed gear box **28**. The variable speed gear box **28** may be adjusted such that the rotation of the power shaft

20 may be regulated to operate at a very high speed or low speed and at varying speeds therebetween.

Although the above drive arrangement is contemplated other forms of driving the power shaft 20 may be utilized. For example, the power shaft 20 may be belt driven (not shown) from the driving motor 26 and the speed of the motor may be controlled in any well known manner such as a remote foot control or rheostat.

The upper end 30 of the power shaft 20 may be supported by a first cross member 32, which in turn supports the sewing needle, the structure 34 and its complementary components, or the sewing means hereinafter described. In order to provide the sewing needle 36 with a horizontally reciprocative motion, a needle rod 38, which holds the needle 36 on one end 40, may be connected to the rotating power shaft 20 through a translation device 42 which is adapted to convert the rotative motion of the power shaft 20 to the horizontally reciprocative motion of the needle rod 38, thereby providing the sewing needle 36 with its horizontally required reciprocating sewing motion.

As further shown in FIGURE 1, the needle rod 38 may be supported by a plurality of posts 44 and 44A. Although it will be recognized by those skilled in the art that other compatible support means may be utilized to support the needle rod 38, without departing from the essence of the invention. At the remote end 46 of the needle rod 38, there may be provided a thread or yarn feeding arrangement 48, which is adapted to provide the necessary yarn (not shown) to be fed to the sewing needle 36. The type of yarn support and feed mechanism 48, although necessary for the operation of the carpet sewing device 10, may be of any well known feeding structure, which is convenient and which lends itself to the particular motion of the needle rod 38, however a preferred construction will be independently considered. The yarn may be fed from the yarn feeding arrangement through an eyelet 50 in the support post 44*a*, to the sewing needle 36.

Manifestly, the sewing needle 36 must be used in conjunction with a loop forming element 52. As is well known to those skilled in the art, the needle 36 and loop forming element 52 and their motion must be coordinated to form the required stitches. To this end and structurally, the lower portion 54 of the power shaft 20 may be connected to a bell crank lever 56. The loop forming element 52, which is mounted on the first cross member 32, may be provided with a downwardly projecting shaft 58 to a second motion translating device 60. A tie rod 62 connects the bell crank lever 56 to the second motion translating device 60. The second motion translating device 60 creates the coordinated rocking motion of the loop forming element 52 to form the necessary stitch forming motion in cooperation with the sewing needle 36. Since the same power shaft 20 imparts the motion to the needle 36 and loop forming element 52, their motion is automatically coordinated.

It will be recognized by those skilled in the art that although we provide in this preferred embodiment for the formation of a loop stitch, other forms of stitches may be utilized in sewing carpeting together and it is within the contemplation of this invention to use other types of stitches and their forming elements without departing from the essence of this invention. In any of these cases a yarn tensioning device 64, may be provided at the remote end 46 of the needle rod 38 so that the tension on the yarn which is being fed to the sewing needle 36 may be adjusted in accordance with the requirements and varying types of carpeting to be sewn.

As shown in FIGURE 1, a second cross member 66 may be provided in parallel spaced relationship with the cross member 32 to provide not only support for the power shaft 20 but further to support elements of the second motion translating device 60, as well as other purposes, which will become more apparent as the description proceeds.

In order for the carpeting 70 to be sewn, the two pieces that require the stitching may be fed to a carpet retaining means or V-shaped plate 68, shown in FIGURE 1. The carpet retaining means 68 may be comprised of a relatively large flat member depressed at its middle portion to form a first inclined surface 72 and a second inclined surface 74. In the alternative, each of the first and second inclined surfaces may be of two separate members joined together along their longitudinal lower edges thereby to form V-shaped plate or carpet retaining means 68. As shown in FIGURES 3 and 4, the carpet retaining means 68 may be provided with a slot 76 such that the sewing needle 36 may pass through the power portion of the V-shaped plate 68 and come into sewing contact with the carpet 70 placed in the carpet retaining means 68. It may be seen therefore that the carpet retaining means 68 is held in position above the cross member 32 by a bracket arrangement 78, such that the sewing needle 36, in its horizontally reciprocating motion, will pass back and forth through the slot 76 so that it may contact the loop forming element 52. Disposed on the carpet retaining means 68, at the junction of the first and second inclined surfaces 72, 74, there may be provided a protruberance 80, which may be in the form of an extension of the bracket 78 which protrudes through the V-shaped plate 68 or may be a separate element removably positioned thereat. Functionally the purpose of the protuberanue 80 is to maintain the proper alignment of the carpeting as the carpet 70 is fed to the carpet retaining means 68, by the movement of the carpet sewing device 10 itself. Also provided is a needle deflecting rod 81 which maintains and guides the proper movement of the needle 36 as well as the carpet 70 to be sewn.

It should be noted that the relative position of the carpet retaining means 68 and the first cross member 32 may be adjusted in accordance with the thickness of the carpeting to be sewn. To this end an adjusting screw 82 holds the carpet retaining means 68 to the bracket arrangement 73, such that the bracket arrangement 78 will permit the vertical position of the carpet retaining means 68 to be changed as needed.

In order to hold two pieces of carpeting in position on the carpet retaining means 68 so that they may be sewn together a presser arm or carpet holding means 84 may be provided. The carpet holding means 84 may be comprised on an arm 86 having a pair of beveled wheels 88 rotatably connected to the lower end 90 of the arm 86. The bevel of each wheel is made to conform to the incline of the first and second inclined surfaces 72, 74 of the carpet retaining means 68. Each of the beveled wheels 88 being mounted for rotation on opposite sides of the lower portion 90 of the arm 86, as shown in FIGURE 1. With this structural arrangement one wheel 88 will be in holding relationship to the piece of carpeting 70 placed on the first inclined surface 72 of the carpet retaining means 68 and the other wheel 88 will be in holding relationship to the piece of carpeting held on the second inclined surface 74 of the carpet holding means 68. Since the wheels are mounted for rotation, the carpet may be readily moved forwardly through the carpet retaining means 68, even with the presser arm 84 in its downward or holding position.

As shown in FIGURE 6, the presser arm or carpet or carpet holding means 84 may be spring loaded and may depend from a bracket 92 which may be supported from the platform 14. It should be noted that the presser arm 84 has two general positions, that of a raised position (non-holding position) and a lowered position (holding position where the wheels 88 are in holding contact with two pieces of carpeting 70 in the carpet holding means 68), which is the spring loaded position.

In order that the carpeting 70 may properly be fed to the carpet retaining means 68 and to further insure that the sewn carpet is properly removed from the sewing area, a feed mechanism 94 and removal mechanism 96 may be provided. Yet another purpose of insuring the

proper feeding and removal of the carpeting to the sewing area is to insure the smooth movement of the carpet sewing device **10** in its self-propelling motion. It will be recognized by those skilled in the art that the feed mechanism **94** may be disposed at a point prior to the position of the sewing needle **36** whereas the removal mechanism **96** is positioned just after the sewing needle **36**. However since the feeding and removal involve the same movement requirements, both mechanisms may be the same in construction (as hereinafter shown), or they may take different forms depending on the carpet requirements. This also may be seen in the respect that the feed mechanism **94** is feeding two separate pieces of carpeting and the removal mechanism **96** is removing only one piece of carpeting (the two pieces having been joined into one).

In this respect and referring to FIGURES 1, 6 and 7, the removal mechanism **96** is comprised of an arm **100** which may adjustably depend (through adjustment notch **98**) from the bracket **92**, which may be spring loaded. At the lower end **102** of the arm **100** a smooth surfaced wheel **104** may be rotatably mounted. The lowermost portion of the smooth wheel **104** is or may be approximately on the same level as the raised pile of the carpet **70** that has been sewn. Positioned below the smooth wheel **104** is a pin wheel **106** having gripping surfaces **108** thereon for gripping communication with the web **112** of the carpeting. In order that the pin wheel **106** may force the sewn carpet to move and thereby be removed from the carpet retaining means **68** the pin wheel **106** may be connected to the downwardly projecting shaft **58** which provides the rocking movement for the loop forming element **52**. A coupling means **110** may be provided between the downwardly projecting shaft **58** and the pin wheel **106** in the form of a ratchet arrangement **114**. When the downwardly projecting shaft **58** is operating in its circular reciprocating motion the coupling means **110** will provide that motion to the pin wheel **106** which is only capable of moving in the direction of the arrow shown in FIGURE 6. With this positioning on the spring loaded smooth wheel **104** and the pin wheel **106** the downward pressure of the smooth wheel **104** will force the sewn carpeting downward such that the gripping surface **108** of the pin wheel **106** will force the web **112** of the carpeting to move thereby moving the carpeting away from the sewing area at a constant rate of speed in accordance with the speed of rotation of the driven shaft **20**. It will be recognized by those skilled in the art that all of the moving and rotatable parts are related to the driven shaft **20** such that if the speed of that shaft **20** changes, the respective speeds of the elements depending thereon will change at the same rate.

Again viewing FIGURE 6, the feed mechanism **94** may be of similar construction to the removal mechanism **96** except that its smooth wheel **116** may be fixedly mounted to the upright portion of the bracket **92** and its pin wheel **118** may be fixedly mounted just below the smooth wheel **116**. A tie rod **120** may be connected between the coupling means **110** and the pin wheel **118** so that the exact same movement is transmitted to both pin wheels **106** and **118** of the removal mechanism **96** and the feed mechanism **94**.

Thus far the discussion has centered on the actual carpet sewing device **10** and the interaction between the various working elements connected thereon. Plainly, based on this discussion the relative ease of feeding the carpeting to the sewing needle **36** and the removal therefrom, as well as the coordinated movements of the various elements have been clearly shown thereby lending a vivid reinforcement of the objects of the present invention.

As previously indicated, the carpet sewing device **10** is a self propelling device so that the movement of the driving gear **24** or driven gear **22** may be transmitted to the plurality of wheels **16**. In the instance shown in FIGURE 5, a pulley arrangement may connect the movement of the removal pin wheel **106**, such that the movement of the frame **12** of the carpet sewing device **10** is governed by the rate at which the sewn carpet is removed from the carpet sewing device.

Referring now to FIGURE 1, wherein, the yarn feeding arrangement **48** is shown, it has been found that the yarn must be fed in proper sequence to the sewing needle **36** or the yarn itself will tear. Further proper yarn tension must be maintained. Structurally the feeding arrangement may be provided with a first disc **122** and a separate second disc **124** movably mounted on a shaft **126**. Mounted on the shaft **126** is a holding member **128** (which is contiguous to the second disc **124**). A spring or resilient member **130** is urged against the holding member **128** by the spring member **130** which has one end thereof held in position by an abutment element **132**, the other end of the spring being in contact with the holding member **128**. The shaft **126** may be provided with a bore **134** having a movable plunger **135** therein which is internally connected to the abutment member **132** such that when the plunger is pressed inwardly the abutment element **132** will move away from the disc **122**, **124** permitting the loosening of yarn wound between the first and second discs **122**, **124**. A cam member **137** may be connected to the rear end **46** of the needle rod **38** such that when the needle rod **38** is in the forward position shown in FIGURE 1, which is the stitching position the cam member **137** pushes the movable plunger **135** separating the first and second discs **122**, **124** thereby loosening the thread on the sewing stroke. It will be seen that the yarn is alternately tightened and loosened during the sewing operation so that the yarn is not under continual stress which results in loosened stitches.

As shown in FIGURE 4 the carpet **70**, which is basically comprised of a pile **138** and web **112** is placed on the inclined surfaces **72**, **74** such that the web **112** of each piece of carpet **70** is contiguous to each other. The movement of the sewing needle **36** passes through the webs **112** of the pieces of carpet **70** and joins the webs and does not interfere with the pile **138** or disturb the same. In this manner no stitches will be shown or will be visible after the joining of the carpet **70** pieces and an extremely strong well founded stitch will hold the sewn carpet together.

In order to provide a means for the sewing device **10** to automatically follow a seam to be sewn, a guide means **142** may be provided. The guide means **142** may be connected to the front portion **144** of the frame **12** and platform **14**. Structurally the guide means **142** (shown in FIGURE 2) is comprised of a small platform **146** pivotably connected to the plaform **14**. The front end **148** of the small platform **146** may be provided with a pair of guide wheels **150** and axle **152** pivotably joined to the bottom **154** of the small plaform **146**. A turning arm **156** may be connected between the axle **152** and the pivot point **158** in such a convenient manner to permit the turning of the guide wheels **150** to follow the line or curvature of the carpet seam to be sewn. As shown in FIGURE 6 an upright guide member **160** may be provided at the small platform **146** and may be in communication with the turning arm **156**, in a convenient and well known manner such that the upright guide member **160** responding to the angular pressure of a curved seam will transmit the pressure to the guide wheels **150** thereby causing them to turn and resulting in the self propelled sewing device to respond to and follow the turning thereof. Although one form of guide means is herein described it should be particularly understood that other types of guiding means may be provided without departing from the essence of the invention.

As previously described and as shown the sewing device **10** being self propelled is guided in a straight line or curved path by the guide means **142** thereby providing a carpet sewing machine which is completely automated to sew straight or curved seams.

In operation, two pieces of carpeting **70** which are to be sewn together are placed, by hand, on the carpet retaining means **68** and are guided into the removal mechanism **96**. The frame **12** of the sewing device **10** may be placed in alignment with the seam to be sewn and the carpet **70** may be placed in the feed mechanism **94**, each piece of carpet straddling the bracket **92**. The upright guide member **160** is placed in position between the two pieces of carpet to be sewn so that when the sewing device is activated the upright guide member **160** will follow the line of curvature of the carpet to be sewn. At this point the sewing device **10** is underneath the carpet **70** to be sewn with the guide means **142** in position between the pieces of carpet. The pressure arm or carpet holding means **84** is then lowered into its holding position and the carpet in the carpet retaining means **68** is properly set on the respective inclined surfaces as shown in FIGURE 4 with a small lead portion of the carpet **70** unsewn extending through the removal mechanism **96**. The drive motor **26** is thereafter started through a control device (not shown) either remotely disposed or on the frame **12** itself. Through the gearing arrangement or belt arrangement (not shown) the power shaft **20** is rotated at a desired and controlled speed. The rotating power shaft **20** causes the sewing needle **36** through the translation device **42** and needle rod **38** to reciprocate in a horizontal plane. The sewing needle **36** passes through slot **76** in the carpet retaining means **68** and the yarn, in cooperation with the loop forming element **52** provides the stitch through the web **112** of the pieces of carpet **70**.

During the sequence of events the second translating device **60** is operating the loop forming element **52**, the removal mechanism **96** and feed mechanism **94** through the respective tie rods and motion transmitting elements. Simultaneously, the wheels **16** disposed beneath the platform **14** are being powered through a convenient pulley arrangement so that the entire sewing device is advanced in accordance with the speed of sewing, the guide means following the curvature of the seam to be sewn.

In this manner the sewing device **10** automatically travels underneath the carpeting, sewing during its excursion and providing a sewn seam which is automatically, rapidly sewn and which cannot be detected through the pile of the carpet. The objects of efficiency of time saving, smoothness of seam, strength of seams are achieved in a most expeditious manner without excessive manipulation of gadgets or controls.

We claim:

1. A movable carpet sewing device comprising a platform having a plurality of wheels rotatably mounted thereunder, a frame mounted on said platform, carpet retaining means disposed on said frame for receiving carpet to be sewn, carpet feed means remotely mounted on said platform for feeding carpeting to be sewn onto said carpet retaining means, sewing means in communication with said carpet retaining means for sewing the carpet as it is fed onto the carpet retaining means, carpet holding means mounted over said carpet retaining means for maintaining the carpet to be sewn in position, carpet removal mechanism disposed on said frame and in alignment with said carpet retaining means for removing sewn carpet, and a drive motor mounted on said platform and connected to said carpet feed means, said sewing means and said carpet removal mechanism, said feed means and removal means connected to said wheels to move said platform in the direction of the carpet to be sewn.

2. A carpet sewing device according to claim **1** wherein said sewing mechanism is comprised of a driven needle rod, said needle rod adapted to be reciprocated on a plane transverse to the seam to be sewn, a sewing needle connectable on one end of said needle rod and adapted to pass through the webs of the pieces of carpet to be sewn, a loop forming element disposed in alignment with said sewing needle for forming a stitch in the webs of the carpet to be sewn, and means for alternately loosening and tightening the feeding of yarn to the sewing needle, said loosening and tightening to the yarn permitting a well formed and durable stitch between the sewn pieces of carpet.

3. A carpet sewing device according to claim **2** wherein said carpet removal mechanism is disposed forwardly of said carpet retaining means and is adapted to remove sewn carpet from said carpet retaining means.

4. A carpet sewing device according to claim **3** wherein said carpet feeding mechanism and said carpet removal mechanism are in communication one with the other through a motion translation means for feeding and removing said carpet at the same rate of speed.

5. A carpet sewing device according to claim **4** wherein said carpet removal mechanism is comprised of a smooth wheel and a pin wheel disposed there beneath, said pin wheel having a gripping surface thereon for frictional contact with the web of the carpet sewn, said pin wheel being in communication with said drive motor for maintaining a continuance movement during the operation of said sewing mechanism.

6. A carpet sewing device according to claim **5** wherein a multiplicity of wheels are rotatably mounted on said platform, and means operatively connecting said wheels to said drive motor thereby providing a self propelled carpet sewing device.

7. A carpet sewing device according to claim **6** wherein a guide means is connectable to said platform for guiding the movement of the self propellel carpet sewing device along any curved or straight seam to be sewn.

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