Aug. 15, 1933. K. HEIDEL 1,922,131

MACHINE FOR DARNING FAULTY PLACES IN PLUSH AND LIKE FABRICS

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Fig. 2

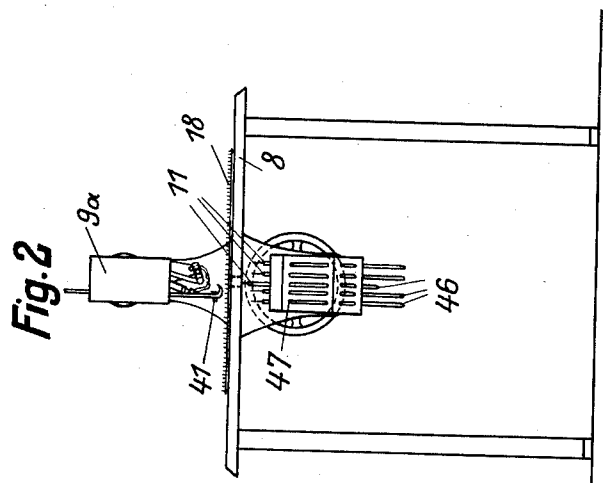
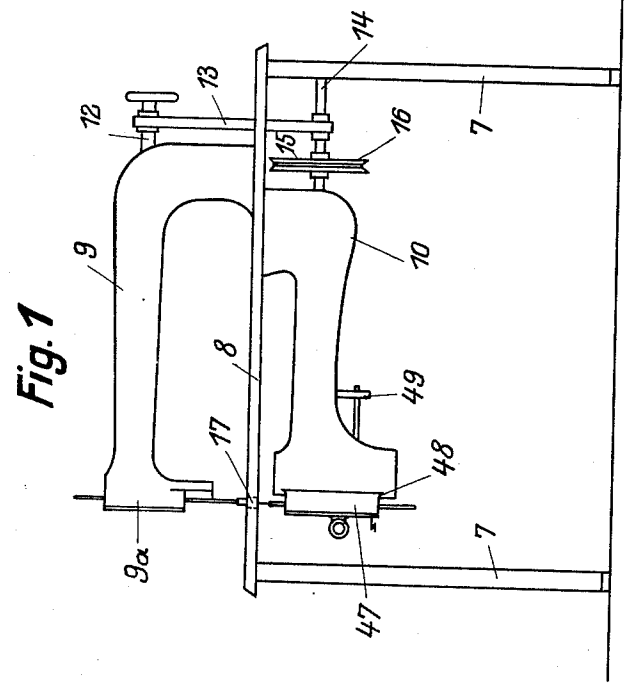


Fig. 1



Inventor:
KURT HEIDEL
By N. T. Cuffe Cuni
Att'y.

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Fig. 3

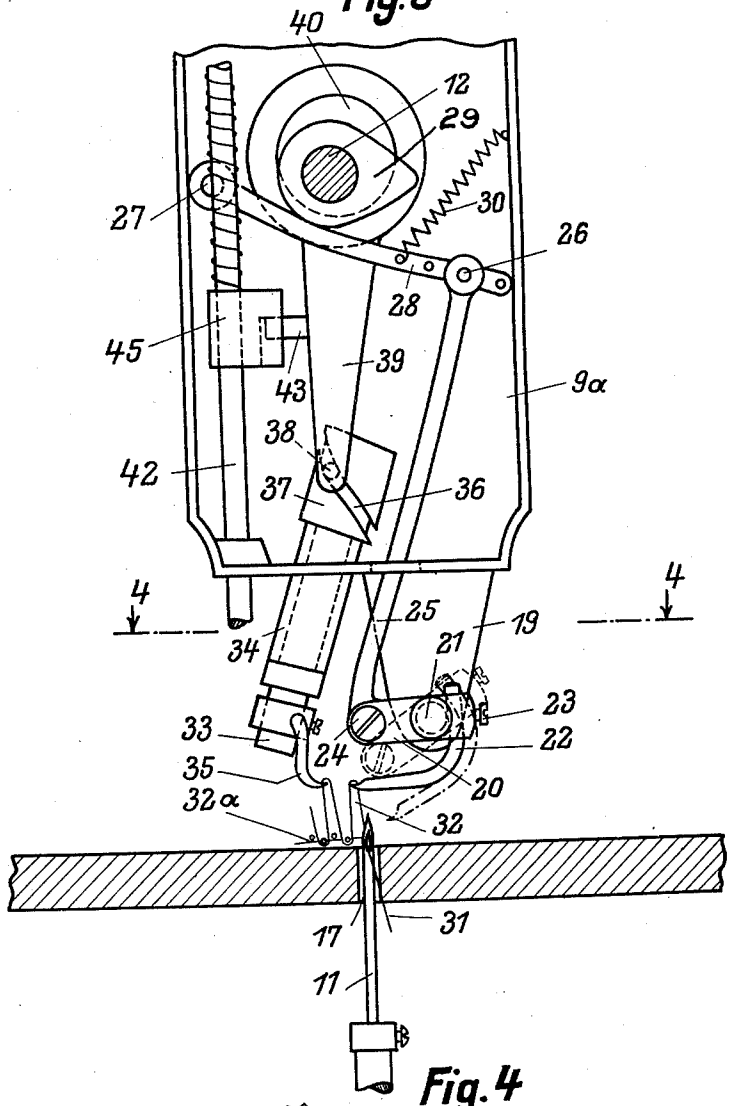
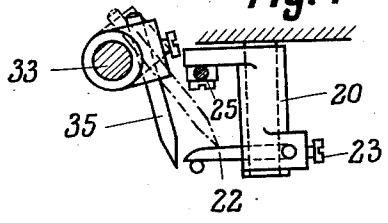


Fig. 4



Inventor:
KURT HEIDEL.
BY W. T. Cuff & Cuff
ATT'Y.

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Fig. 6

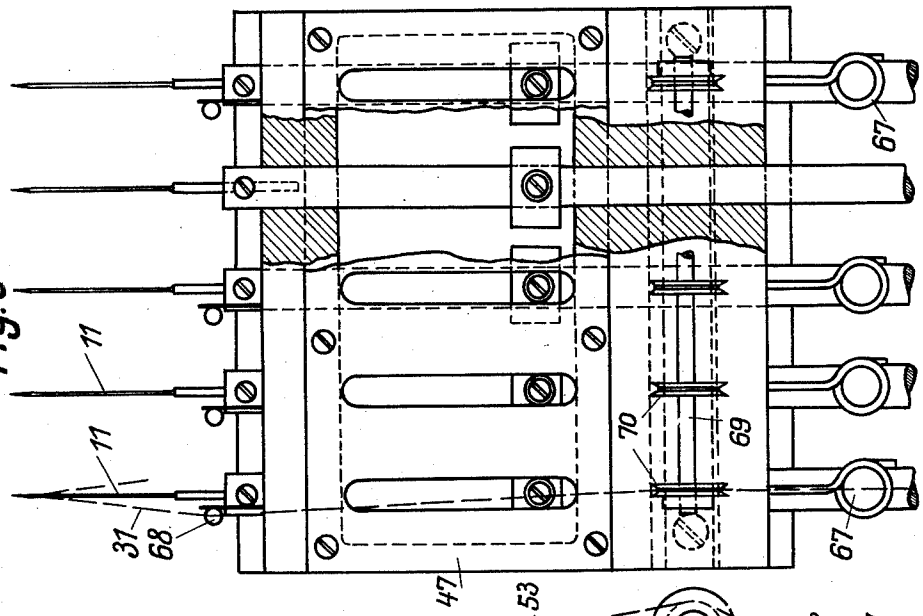
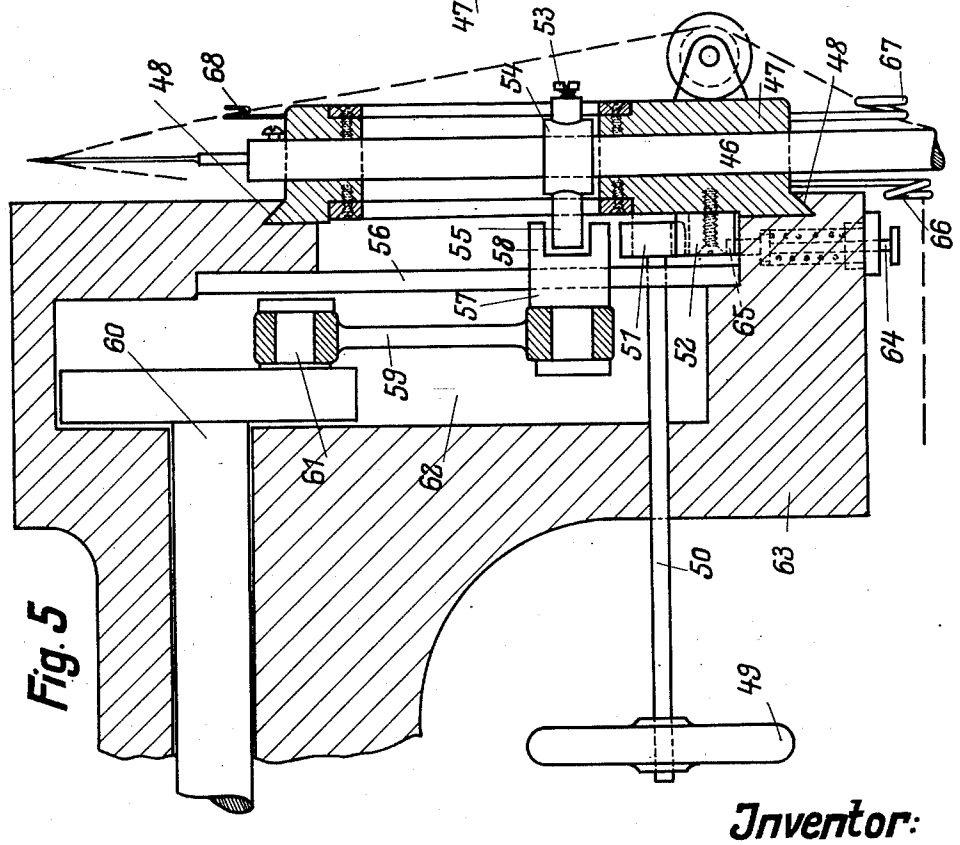


Fig. 5



Inventor:
KURT HEIDEL.
BY
ATT'Y.

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UNITED STATES PATENT OFFICE

1,922,131

MACHINE FOR DARNING FAULTY PLACES IN PLUSH AND LIKE FABRICS

Kurt Heidel, Breyell, Germany, assignor to the Firm Pluschweberei Grefrath Aktiengesellschaft, Grefrath near Crefeld, Germany

Application April 5, 1930, Serial No. 441,953, and in Germany June 24, 1929

1 Claim. (Cl. 112—79)

The invention refers to a machine, for darning faulty places in plush and the like fabrics, by which, as a substitute for the loops which have been left out in the manufacture of the fabric, yarn loops are sewn in by means of a darning needle and are afterwards cut off to the height of the pile. Hitherto, the sewing in of the yarn loops has been carried out mostly by hand. It has also previously been recommended to attach a darning device to a sewing machine, working in such a way that the darning needle introduced from above into the fabric to be darned, forms the yarn loops under the fabric, while a movable gripping mechanism is used to hold fast the yarn loops. In this case it is necessary that the fabric should be laid on the work table with the pile downwards. In order to obtain a uniform repair of the faulty places of the plush fabric, the faulty places must therefore be carefully marked on the back of the fabric beforehand. A further disadvantage of this already known darning machine consists in the fact that the yarn loops can only be worked loosely into the fabric, so that the pile formed by the yarn loops is much less firmly held than that already existing.

It is especially troublesome to repair figured plush fabrics with known darning machines as the marking of the figuring on the back of the fabric is very trying and tedious, and different coloured yarns corresponding to the figuring must be threaded in succession into the darning needle.

The invention has in view, improvements by which the before referred to disadvantages are removed. The most essential feature of the invention consists in the darning needle being arranged under the work table, and the gripping mechanism for holding fast the yarn loops above the table, so that the yarn loops are formed on the pile side, which is on the upper side of the fabric to be repaired. In this case marking of the faulty places, and of the figuring, on the back of the fabric is no longer necessary.

According to the invention, means are also provided by which, when the darning needle is drawn out after the formation of each yarn loop, the previous yarn loop is held fast so that the darned yarn loops can be drawn into the base of the fabric at least as firmly as the actual pile. In order, in the darning of figured plush fabrics, to avoid the previously necessary threading of the differently coloured darning yarns in succession in the same darning needle, in a further development of the invention, a number of adjacent darning needles are provided, moving independently of one another and interchangeably capable of being coupled with the same operating member.

An example of the carrying out of the invention is shown in the diagrams.

Figs. 1 and 2 show, diagrammatically, side and front end views of the darning machine.

Figs. 3 and 4 show, in elevation and in section, on the line 4—4 of Fig. 3, the parts of the darning machine above the work table, with their driving members.

Fig. 5 shows in vertical section, the frame under the work table, with the darning needle and the members for driving the latter and for displacing the frame.

Fig. 6 shows the movable frame with the darning needles, partly in elevation, partly in longitudinal section.

As may be seen from Figs. 1 and 2, the darning machine consists of the work table 8 resting on stands 7, and of brackets 9 or 10, respectively above or below this work table, for the members used for the formation and holding fast of the yarn loops and for their operation, and for the darning needles 11 and for their operation. The main driving shaft 12, placed in the upper bracket 9, is driven by means of a belt 13 from the shaft 14 situated in the lower bracket 10. On the shaft 14, there is a pulley 15, which is driven, by means of a belt 16, by an electric motor or the like, which is not shown. Of the darning needles 11, there is always only one in action. This moves, through an opening 17 of the work table 8, up and down, and carries the darning yarn from below up into the fabric 18 to be repaired, which is laid on the work table 8 with the pile side up.

The members for forming and holding fast the yarn loops are shown in detail in Figs. 3 and 4. The head 9a of the upper carrier 9 carries a flap 19, on which a double-armed swinging lever 20 is borne on the axis 21. In the one arm of this double-armed swinging lever 20, is held the hook-shaped gripping device 22, which is held fast by means of a clamping screw 23. The other arm of the lever 20 is attached, by means of a pin 24, to a rod 25, projecting upwards, which is connected at its upper end by means of a pin 26 to a lever 28 which can oscillate round a pivot 27. A disc cam 29, carried by the driving shaft 12, works together with the lever 28, the oscillating lever 28 being held in contact with the circumferential surface of the cam 29 by means of a tension spring 30. By rotation of the cam 29, the lever 28 obtains a swinging pendulous movement which is imparted, through the rod 25, to the double-armed lever 20. On the upward

movement of the rod 25, the gripping mechanism 22, carried by the double-armed lever 20, grips under the thread 31 led by the darning needle 11 at the highest position of this darning needle, so that the loop 32 is formed on the downward movement of the needle 11.

On the shaft 33, arranged above at an angle, and borne in a shell 34, there is placed at the left, beside the gripping mechanism 22, a hook 35, which serves to hold fast the previous loop 32*a* on the formation of a loop 32. For this purpose, the shaft 33 with the hook 35 oscillates and moves longitudinally in the cycle of the upward and downward movement of the darning needle 11. In order to produce this oscillating longitudinal movement, there is a cylinder 37, placed on the upper end of the shaft 33 and provided with a screw-shaped groove 36, and a pin 38 engaging in the screw-formed groove 36 and carried by a rod 39 which itself moves up and down to cause the shaft 33 to move longitudinally. The rod 39 obtains its drive by means of an eccentric 40 on the shaft 12. The rod 39 also serves, at the same time, for the drive of the rod 42 which moves up and down in a vertical direction and carries the presser 41 (Fig. 2) for the material. For this purpose the rod 39 is provided with a side attachment 43, which engages in a slit-shaped cutting 44 of a member 45 on the rod 42. The presser 41 for the material is not shown in Figs. 3 and 4 for the sake of clearness. It will thus be seen that as the drive shaft 12, is operated, the rod 38, through the eccentric 40, will be operated to engage with the groove 36, in the cylinder or cap 37, on the shaft 33, causing the latter to oscillate and move longitudinally at the same time and imparting to the holder or hook 35, an oscillating movement.

The darning needles 11 are set in the needle holders 46, which are arranged in series beside one another in a common frame 47, so as to be displaceable in a vertical direction. The frame 47 is guided in a sidewise direction at the lower bracket 10 by means of dovetail guides 48, so that by displacement of the frame the darning needles can be brought in succession under the opening 17 of the work table 8. For the displacement of the frame 47 there is a shaft 50 and a toothed wheel 51, rotatable by means of a handwheel 49, which engages with a toothed rod 52 attached to the frame 47 (Fig. 5). Each needle holder 46 carries a ring 54, adjustable by means of a clamping screw 53, and provided with an attachment 55 projecting in a radial direction. A driver 57, movable on a vertical guide 56, has a cut-out portion 58, with which, by means of sidewise displacement of the frame 47, the attachments 55 of all the rings 54 on the needle holders 46 can be brought into engagement in succession. The guide 56 with the driver 57 is so arranged that always that needle holder 46 which is vertically under the opening 17 of the work table 8 is driven by the driver. The driver 57 obtains its up-and-down motion by means of a crank arm 59 from a crank shaft 60. The guide 56, the driver 57, the crank arm 59, and the end of the crank shaft 60 carrying the crank pin 61, are arranged in a cut-out portion 62 of the head 63 of the lower bracket 10.

In order to lock the frame 47 in the working position of each darning needle 11, a pin 64, movable in a vertical direction against the action of a spring, is placed in the bracket 63, and can be brought into engagement with corresponding depressions 65 of the toothed rod 52 connected with the frame 47. The threads of darning yarn 31 are led to the single darning needles 11 each through a number of loops 66, 67, 68 arranged on the frame 47 and through a loop carried by the lower end—not shown—of each needle holder 46, so that each thread can be led over a roller 70 which is rotatable round the axis 69 and arranged on the frame.

Instead of being in a movable frame, the needle holders can also be placed in a rotatable cylinder, in which case the driver 57, which serves as the driving member, must be arranged inside this cylinder.

The operation of the machine is as follows:— After that darning needle, which carries the yarn thread of the colour desired at any moment, has been adjusted under the opening 17 of the work table 8 by side movement of the frame 47, the electric motor driving the shaft 14 is started. Then the darning needle 11 moves up and down through the fabric which is to be repaired, and which is laid on the work table 8 with the pile side upwards. At the highest position of the darning needle 11, the thread 31 is held by the gripping mechanism 22, so that on the following downward movement of the darning needle 11 the loop 32 is formed (Fig. 3). Before the needle 11 again moves downwards from its highest position, the hook 35, carried by the shaft 33, grips in the previous loop 32*a*. In this way the result is attained that the already formed loops are held fast in spite of the tension exerted on the thread by the needle. In consequence, the yarn loops can be drawn into the fabric at least as firmly as the already existing pile threads. As soon as the pattern of the plush fabric to be repaired makes another colour necessary for the darning yarn, the machine is stopped for a moment and, by turning the handle wheel 49, the frame 47 is moved so far in a sideways direction that the needle 11, which carries the thread of the desired colour, is brought under the opening 17 of the work table. With the aid of the machine according to the invention, the faulty places of plush fabrics can be conveniently and quickly repaired in such a way that the repair is subsequently not recognizable.

What I claim as my invention and desire to secure by Letters Patent of the United States, is:—

Machine for darning faulty places in plush and like fabrics by sewing in yarn loops, comprising, in combination, a work table, a darning needle mechanism arranged beneath said work table, a gripping mechanism arranged above said work table and adapted to hold the yarn loops, said gripping mechanism comprising a double armed swinging lever, a gripping member thereon, an oscillating lever adjustably connected to the double armed lever, a drive shaft, a cam on said shaft and flexible means retaining the oscillating lever in contact with said cam, whereby on the drive shaft being operated, the gripping member is operated to form yarn loops on the upwardly directed pile side of the plush fabric, and a holder co-operative with said member and adapted to grip in the previous yarn loop during the formation of each yarn loop, said holder being arranged beside said gripping mechanism, and an actuating shaft carrying said holder and adapted to oscillate and move longitudinally simultaneously.

KURT HEIDEL.