

[54] **APPARATUS FOR PRODUCING STITCHING PATTERNS WITH ADJUSTABLE WORKCLAMP APERTURES**

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 [22] Filed: **May 17, 1972**
 [21] Appl. No.: **254,245**

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[30] **Foreign Application Priority Data**
 June 19, 1971 Italy..... 26081 A/71

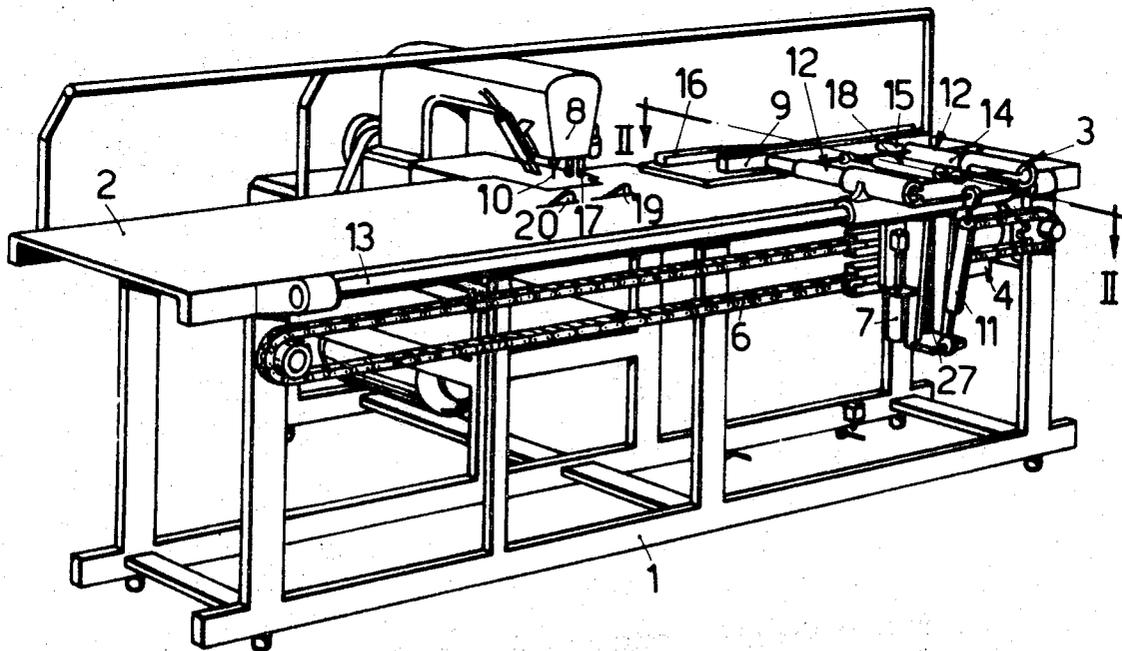
[52] U.S. Cl..... **112/121.15, 112/207, 92/66**
 [51] Int. Cl..... **D05b 21/00, F01b 15/00**
 [58] **Field of Search** 112/2, 70, 76, 103,
 112/114, 119, 121.11, 121.12, 121.15, 207;
 38/41; 91/217; 92/61, 66, 117

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[57] **ABSTRACT**

A clamping device for moving a fabric workpiece along a supporting surface and through a sewing area in an apparatus for producing stitching patterns in the fabric. The clamping device being provided with control elements for varying the distance between the fabric engaging surface thereof and the supporting surface to effect insertion, adjustment, clamping and release of the fabric as well as return of the clamping device to its initial position for repeating the cycle.

7 Claims, 5 Drawing Figures



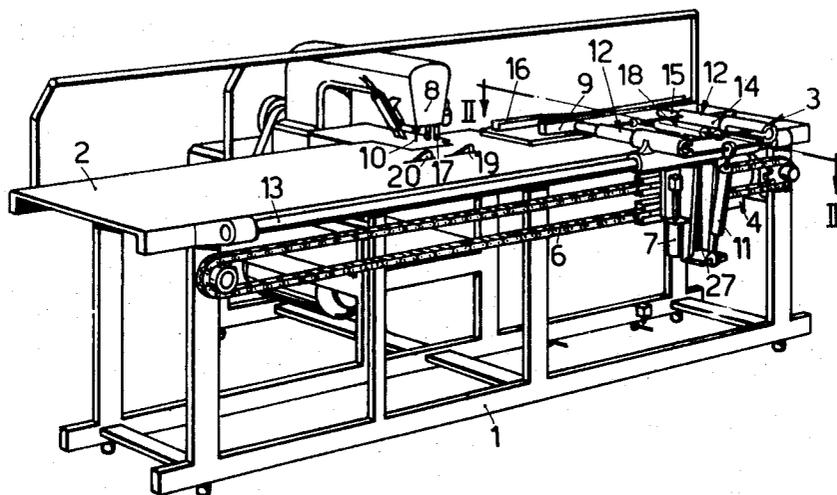


Fig. 1

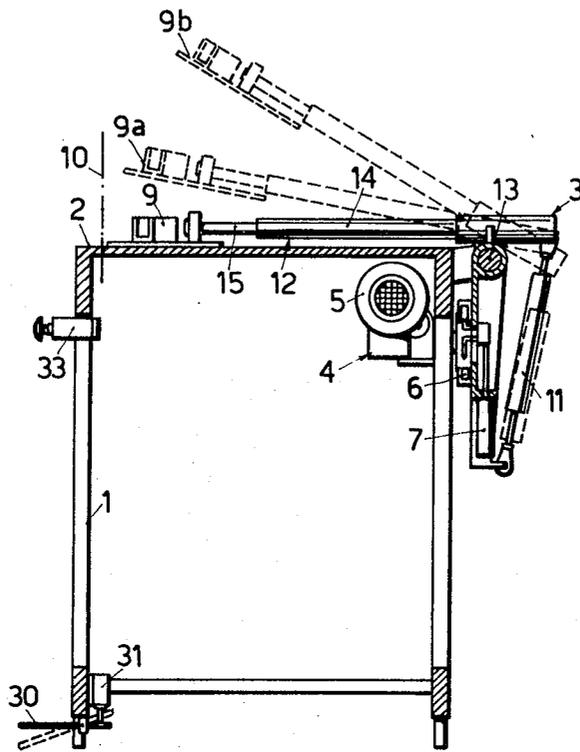


Fig. 2

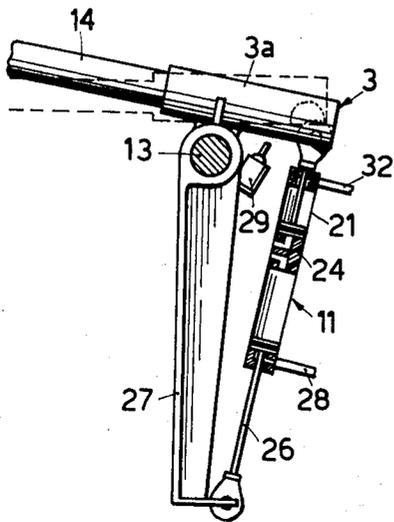


Fig. 3

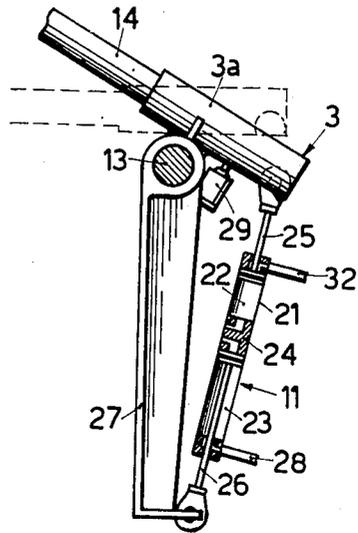


Fig. 4

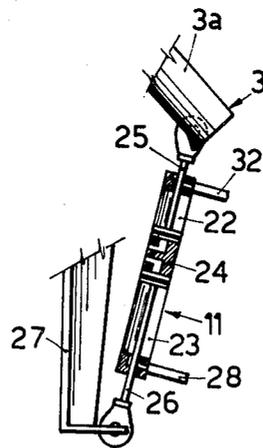


Fig. 5

APPARATUS FOR PRODUCING STITCHING PATTERNS WITH ADJUSTABLE WORKCLAMP APERTURES

BACKGROUND OF THE DISCLOSURE

The present invention relates to an apparatus for producing stitching patterns in fabric by means of an adjustable workclamp device adapted to move said fabric along a work supporting surface and through a sewing area for performing the stitching function.

There are well known apparatuses for stitching patterns in which a workclamp holds the workpiece to effect movement thereof from a starting or charging station through a sewing area in correspondence with a fixed sewing machine to a position for removal of the sewn workpiece.

It is also well known that such apparatuses, at the end of the seaming cycle, include automatic means for opening the workclamp so as to allow the release of the workpiece from the clamp. Moreover, in the case of some apparatuses, the return movement of the clamp to the starting station occurs automatically and in an opened position in order to avoid interference of the clamp with the fixed elements of the apparatus, for example, the sewing machine, as well as to reduce the delay which would occur if the clamp had to be opened in the charging station. There has been noticed that there are different requirements of the clamp opening of aperture for the insertion of the workpiece as well as to avoid an interference with the fixed elements. In particular, as to the latter purpose it is necessary to have the aperture of the clamp as large as possible, while as to the charging or clamping of the workpiece it is preferable to have the aperture of the clamp of a size to adequately clamp the particular thickness of the workpiece to be sewn. Moreover it should be remembered that, once the workpiece is inserted and the clamp closed a slight re-locating of the said workpiece is often required necessitating re-opening of the clamp and the subsequent re-closing thereof. In the known apparatuses the width of the aperture is always the same; however it would be sufficient and preferable, in the case of a required slight re-locating of the workpiece, for the size of the aperture to be substantially less than the fully opened aperture, which is necessary during return of the clamp to its initial position to avoid the aforementioned interferences. To fully open the clamp for a slight re-locating of the workpiece during repeated cycles produces over a period of time what is considered an excessive amount of lost time as a power waste.

SUMMARY OF THE INVENTION

The present invention provides an apparatus for producing stitching patterns, in which the aperture of the work-clamp is adjustable which has overcome the above mentioned problems.

According to the present invention the clamp aperture is automatic and at the end of the seaming cycle to free workpieces even of a complicated kind and permits the clamp to return to its initial position without interference with the fixed elements of the sewing machine. Once the clamp is back to the starting station, suitable manual controls make it possible to close the clamp on the next workpiece and to re-open it only slightly if location adjustment is required of the workpiece.

When only a slight amount of repositioning of simple or small-sized workpieces is required, the clamp is opened only a sufficient amount to perform this function, thereby, reducing the time delay ordinarily required to open the clamp fully. This feature is especially advantageous when this operation is to be repeated many times, and also avoids a power waste.

Another advantage is that the mentioned repositioning of the workpiece is extremely facilitated, because it is easier to sight the proper position of the workpiece through the edge of the clamp taken as a reference line, in the case of partial openings rather than when the clamp is completely opened.

The apparatus for producing stitching patterns automatically according to the present invention includes a clamp for moving a workpiece along a sewing path on a work supporting surface with control means for controlling the width of the aperture of said clamp. It is characterized by the fact that it also includes control means suitable to automatically control the said opening so that the clamp will open fully at the end of the seaming cycle. Further aims, advantages and characteristics of the apparatus for producing stitching patterns according to the present invention will be clear to the people in the field from the following detailed description of a preferred embodiment which is referred to in the accompanying drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a prospective view of a preferred embodiment of the apparatus according to the present invention;

FIG. 2 shows a section view along the line II—II of the FIG. 1;

FIG. 3 is a view inside elevation of a portion of the device in FIG. 2 illustrating the supporting parts of the clamp in a position which provides a partial opening of the clamp;

FIG. 4 is a view similar to FIG. 2 showing the same particular as in FIG. 3 in a position to provide a greater width opening of the clamp,

and FIG. 5 shows a fragmentary view of the particular in FIGS. 3 and 4 in a position showing a means for obtaining a larger width opening of the clamp than that shown in FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings and particularly to FIG. 1, it is noted that the apparatus for producing stitching patterns with adjustable workclamp aperture according to the present invention is usually formed by a supporting frame 1 fitted above with a work supporting surface 2 on which a carriage 3 is slidable by a driving means 4. The driving means includes an electric motor 5, a driving chain 6 and a coupling means 7 connecting the carriage 3 to one or the other branch of the chain 6.

Along the sliding path of the carriage 3 there is mounted a fixed sewing machine 8 formed by a sewing head, disposed so as to sew along the edge of a workpiece (not shown) moved by a plate member or clamp 9 fixed to the carriage 3. The clamp during the working cycle moves from a starting station or charging station, where it is shown in FIG. 1, to a position beyond the sewing machine 8. During this movement the clamp moves the workpiece through a seaming area formed by a conventional needle 10 of the sewing machine.

Both at the beginning of the working cycle and at its end, the clamp 9 must be pivoted to a position above the work supporting surface 2 to allow the insertion and respectively the taking away of the workpiece. The opening or upward movement of the clamp is effected by pneumatic means 11 which pivots the clamp 9 and its supporting frame or driving means 12 to the proper location for the transversal movements on a cylinder-like guide rod 13 which represents the sliding rail of the carriage 3. This carriage as shown in FIGS. 3-5 also includes a tubular support 3a which, besides being movable along the rail; 13 as part of the carriage 3, it is adapted to pivot on said rail, to which it is attached.

The driving means 12 includes a pair of the tube members 14 fixed to the tubular support 3a of the carriage 3 and a pair of rods 15 which are telescopically mounted in the tubes 14.

On the free end of each rod 15 there is mounted the clamp 9 which includes a plate whose outer edge facing the needle 10 reproduces the contour of the seam to be formed in the workpiece. The distance of this outer edge from the needle 10 is maintained by a guide means 16 disposed so as to be engaged by a fixed locator 17, to form the seam only along the exposed free edge of the workpiece. The initial aligning of the guiding means 16 with the locator 17 is assured by a pneumatic member 18 which as shown in FIG. 1 has one end attached to the clamp 9 and its opposite end to the carriage 3. The locating alignment of the clamp 9 by the pneumatic member 18 is discontinued when its front edge makes contact with a first control element 19 carried on the work supporting surface 2 adjacent the sewing machine 8.

Control element 19 when contacted by clamp 9 is effective in stopping the flow of compressed air to the pneumatic member 18 and continued movement of the clamp is guided by the engagement of the guide means 16 with the fixed locator 17.

After clamp 9 has moved the workpiece through the seaming area, its trailing edge acts upon a control valve element 20 (FIG. 1), disposed in series with the first control element 19, to again bring said clamp under the influence of the pneumatic member 18.

In addition to again bringing clamp 9 under the influence of the pneumatic member 18, the control valve 20 also activates a pneumatic member 11, which is effective in tilting the tubular support 3a upwardly and lift the clamp 9 to its fully open position.

On the bracket 27 there is mounted a pneumatic control switch 29, which is, disposed so as to be actuated by a mobile part of the carriage 3 to effect a complete opening of clamp 9 and the return of the latter to its initial or charging position by means of the movement of the coupling 7 on the branch of the chain 6 opposite to that on which it was first engaged during the movement thereof. Once the carriage 3 has returned to the starting or charging station, the closure of the clamp 9 can be obtained by operating a suitable control 30 (FIG. 2) connected with a pneumatic valve member 31 through which the air contained in the chamber 23 can be discharged and permit the clamp 9 to pivot to its closed position under the influence of its own weight. To operate the control 30 it must be moved to the position indicated by dotted lines in FIG. 2 and then be released. As heretofore described, after inserting the new workpiece to be sewn and causing the closure of the clamp 9, the latter can be partially re-opened for the purpose of ad-

justing the location of the workpiece. To partially lift the clamp 9 to the position 9a of FIG. 2, it is necessary to move control 30 again to the position shown by dotted lines in this figure thus causing an inflow of air into the chamber 22 but of a lesser amount through a suitable duct 32 connected with a distributing valve (not shown) which is controlled by the pneumatic valve member 31 and whose operation is apparent from the above description. The release of the control 30 after actuation as described above causes the closure of the clamp 9.

To re-open the clamp 9 to the position of 9b in FIG. 2, which is required for example when the workpiece is rather complicated such as trousers to be assembled and already sewn with their pockets, is obtained by operating a special control 33 which, besides making the conditions determined by the operation of a control 30 void, again sends air into the chamber 23 of the cylinder 21 through the duct 28, as it was carried out before the release of the second control element 20.

We have up to now taken into consideration the case in which there can be a position of maximum aperture and a position of partial aperture of the clamp 9, obtained respectively by sending air into the one or the other of the two pneumatic chambers of a different length. FIG. 5 shows the maximum aperture of the clamp 9 which is obtained by means of the contemporary simultaneous input of air into both chambers 22 and 23, causing the piston 25 to descend in a downwardly direction within chamber 22 while piston 26 is caused to move upwardly within its respective chamber 23.

When the maximum aperture of the clamp 9 is selected as shown in FIG. 5 by the input of air into both chambers 22 and 23, the intermediate aperture positions are selected by allowing the input of air into chamber 22 only or chamber 23 only which correspond to the positions 9a and 9b respectively of the clamp 9.

It would also be possible to selectively obtain either position 9 or 9a by means of control 30 by arranging the latter to function at differentiated positions.

The operation of the apparatus can be varied without presenting any basic difficulty. For example, the pneumatic valve member 31, for actuating the control 30, can control a many-a-position distributing valve which can connect both chambers 22 and 23 with the atmosphere or can direct air into one of the said chambers leaving the other in connection with the atmosphere. It should be understood that when the maximum aperture of the clamp 9 is the one represented in FIG. 5, the position 9a of FIG. 2 is then an intermediate position of the said clamp 9.

Although the present invention has been described in connection with a preferred embodiment it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention as those skilled in the art will readily understand. Such modifications and variations are considered to be within the purview and scope of the invention and the appended claims. In particular there can be provided a different kind of clamp, formed, for example, by two twin elements hinged on the opposite ends, both operated at the same time by pneumatic means similar to the ones above described. The sewing cycle of the apparatus can be any cycle, for example with thickened stitches and so on. It is essential that at the end of the seaming cycle only, whatever the cycle

is, that the opening of the clamp be operated automatically and that by means of suitable controls it is possible to again effect the closure of the said clamp and additionally return the latter by operating suitable manual controls to its charging position in a fully open position with means for re-opening it to an intermediate position.

I claim:

1. In an apparatus for producing stitching patterns in a fabric workpiece having a work supporting surface and a sewing machine operatively associated therewith, the improvement comprising:

- a. clamping means for gripping the fabric workpiece;
- b. means for driving said clamping means along the work supporting surface for moving the fabric workpiece from a charging station through a stitching area;
- c. means for opening said clamping means for insertion and removal of the workpiece;
- d. control means for actuating said opening means to fully open said clamping means after moving the workpiece through the stitching area;
- e. traversing means for returning said clamping means to the charging station; and
- f. means for varying the width of the opening of said clamping means at the charging station for inserting, adjusting and clamping the fabric workpiece.

2. The apparatus according to claim 1 wherein said

clamping means comprises a pivotal plate member selectively movable to and from close proximity with the work supporting surface.

3. The apparatus according to claim 1 wherein said means for driving said clamping means includes a supporting frame operatively connected to a driven chain extending for substantially the longitudinal extent of the apparatus.

4. The apparatus according to claim 3 wherein said means for opening said clamping means includes a pneumatic cylinder operatively connected to said supporting frame.

5. The apparatus according to claim 4 wherein said control means for actuating said opening means includes a control valve connected to said pneumatic cylinder and disposed for actuation by said clamping means.

6. The apparatus according to claim 3 wherein said traversing means includes a guide rod on which said supporting frame is slidable and a control switch for reversing the direction of movement of said frame on said guide rod.

7. The apparatus according to claim 4 wherein said means for varying the width of the opening of said clamping means includes a manually operable valve member connected to said pneumatic cylinders.

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