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Heiler et al.

[11] **3,808,993**

[45] **May 7, 1974**

[54] **AUTOMATIC UNIT FOR OVERCASTING OR ASSEMBLING PIECES OF FABRIC ALONG SEAM LINES OF DIFFERENT FORMS**

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[21] Appl. No.: **258,048**

[30] **Foreign Application Priority Data**

June 9, 1971 France 71.21760

[52] **U.S. Cl.** **112/155**, 112/121.29, 112/153, 112/203

[51] **Int. Cl.** **D05b 25/00**

[58] **Field of Search** 112/2, 20, 78, 121.11, 112/121.12, 121.14, 121.15, 121.29, 155, 203, 206, 217.2; 271/84

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Primary Examiner—Werner H. Schroeder
Attorney, Agent, or Firm—Young & Thompson

[57] **ABSTRACT**

The disclosure is of a unit permitting the overcasting or assembling of pieces of fabric along seam lines of different forms, characterised in that it is constituted by a table, three machines, two transport devices, blowing mechanisms, a brake cylinder, a stacker and detectors.

7 Claims, 14 Drawing Figures

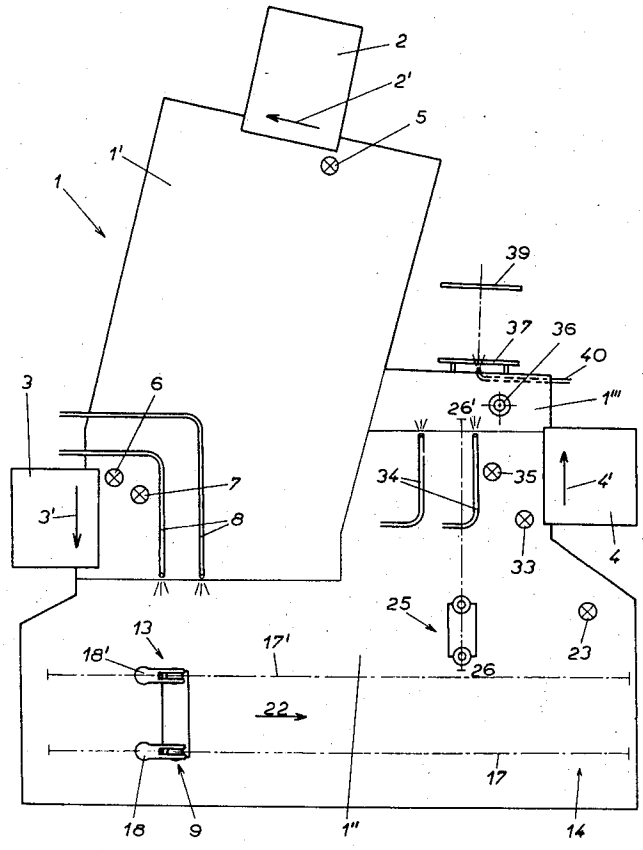


Fig. 1

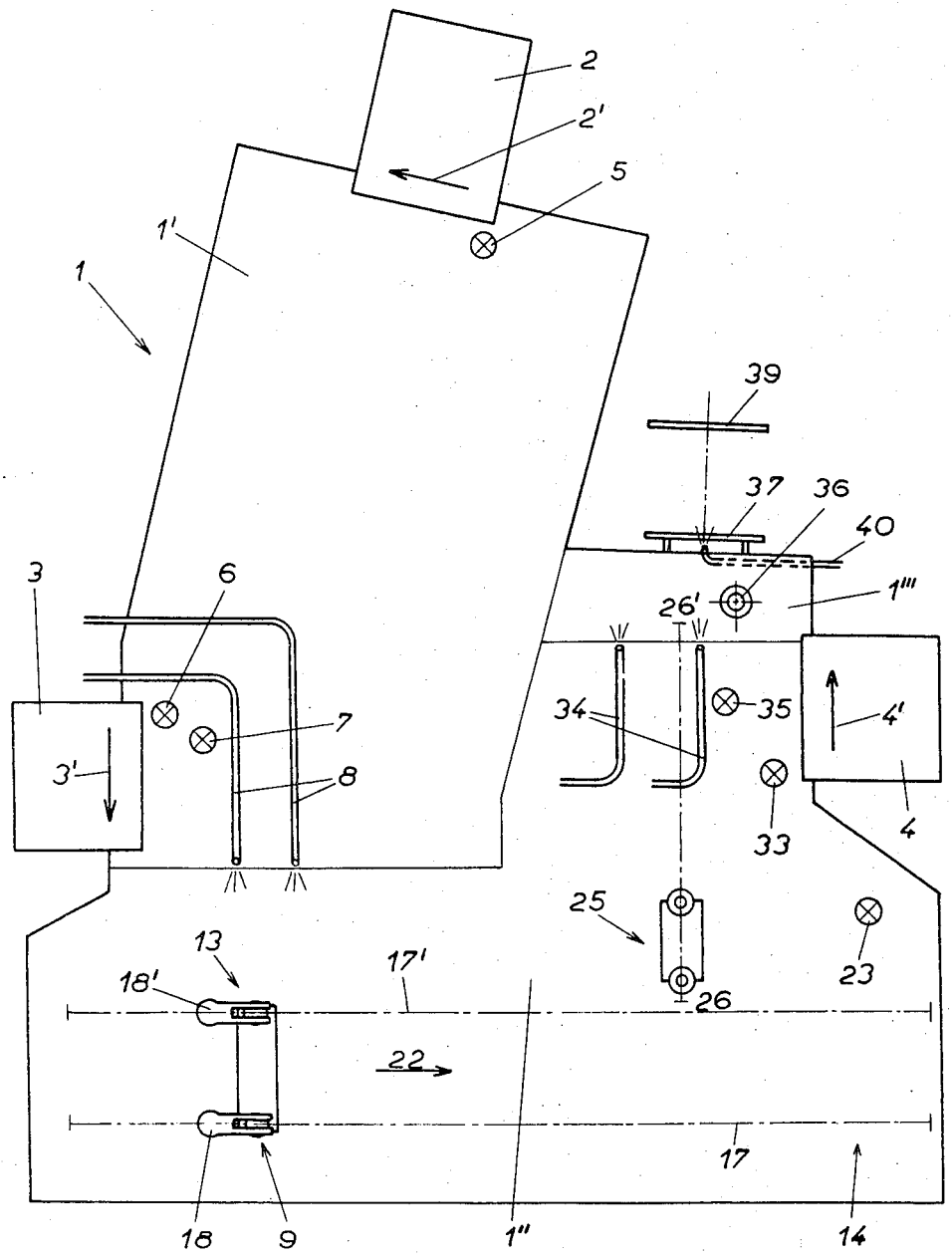

2
2'
5
1'
1
39
37
36
40
1'''
26'
3
6
7
8
3'
34
35
4'
4
33
25
23
26
13
18'
17'
22
17
18
9
1''
14

Fig.2

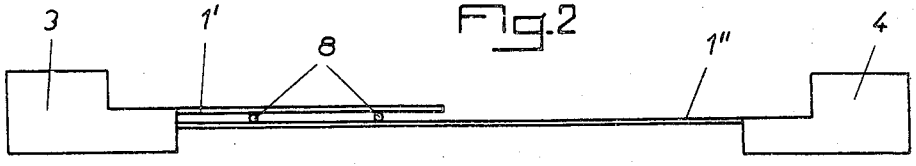


Fig.3

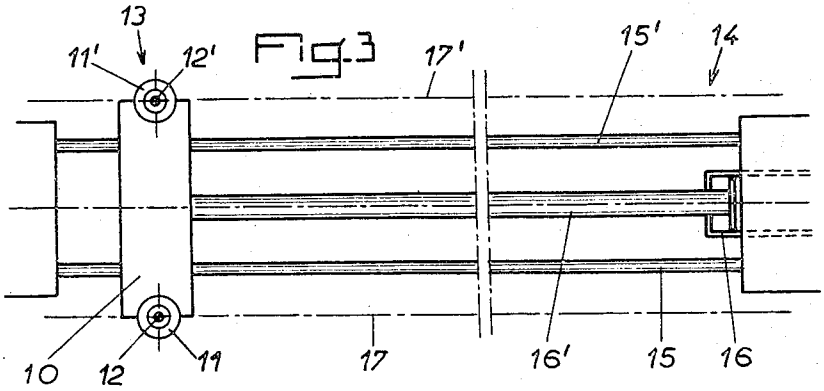


Fig.4

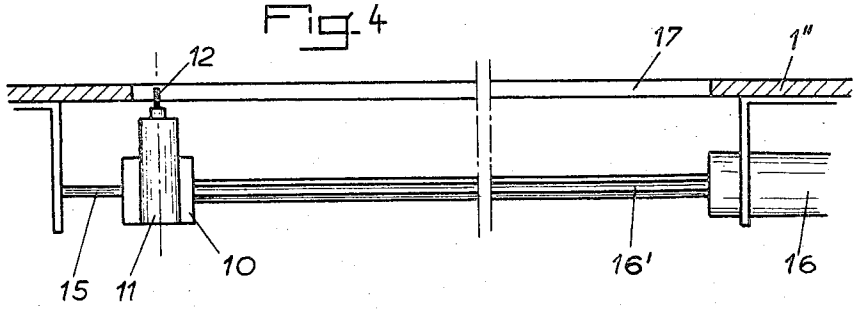


Fig.5

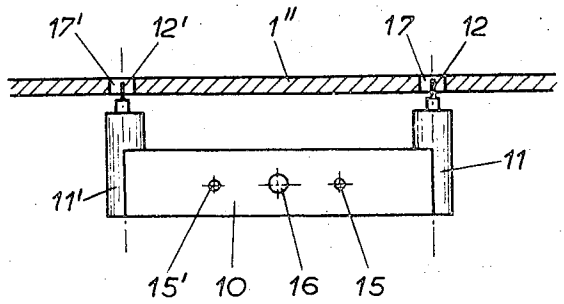


Fig. 6

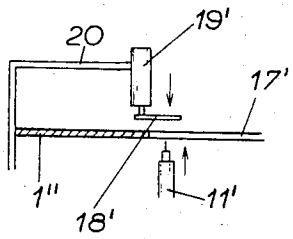


Fig. 7

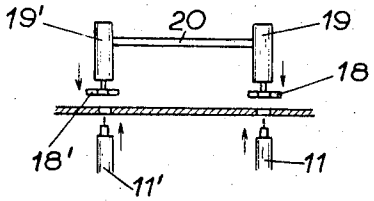


Fig. 8

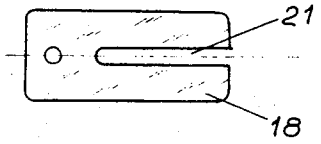


Fig. 9

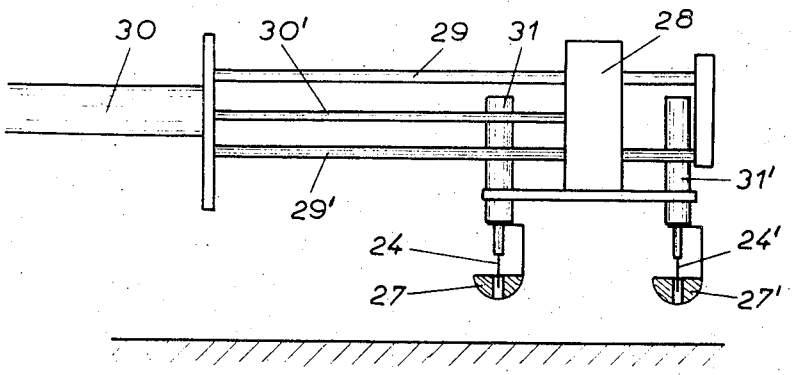


Fig. 10

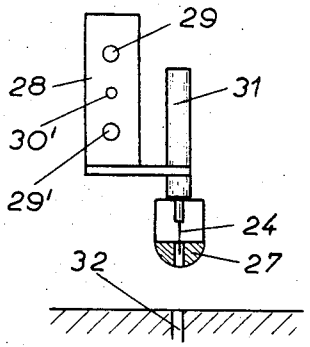
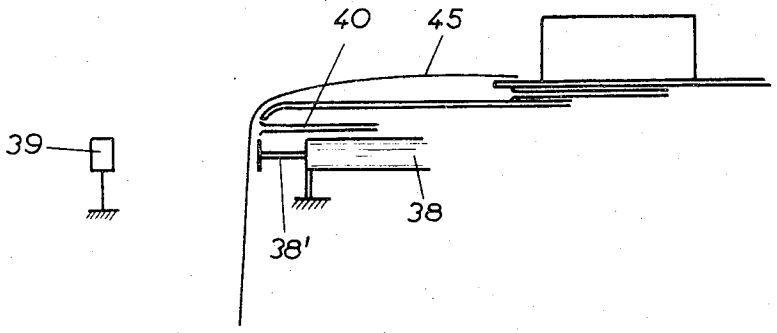


Fig. 11



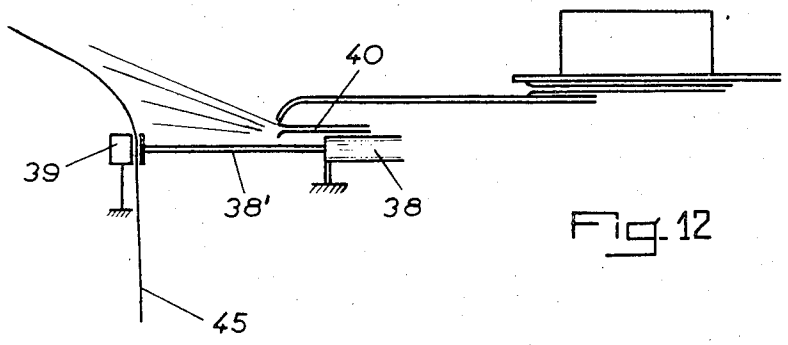
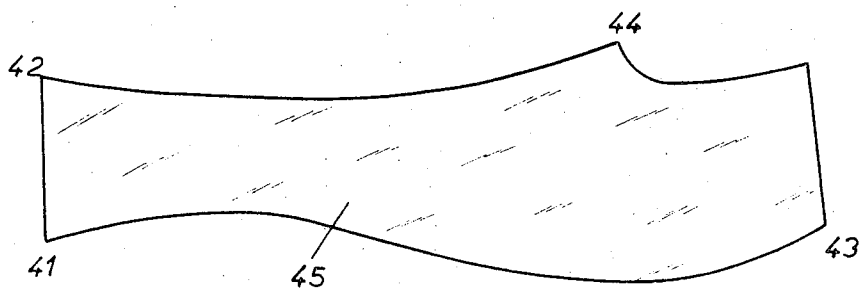


Fig. 12

Fig. 13



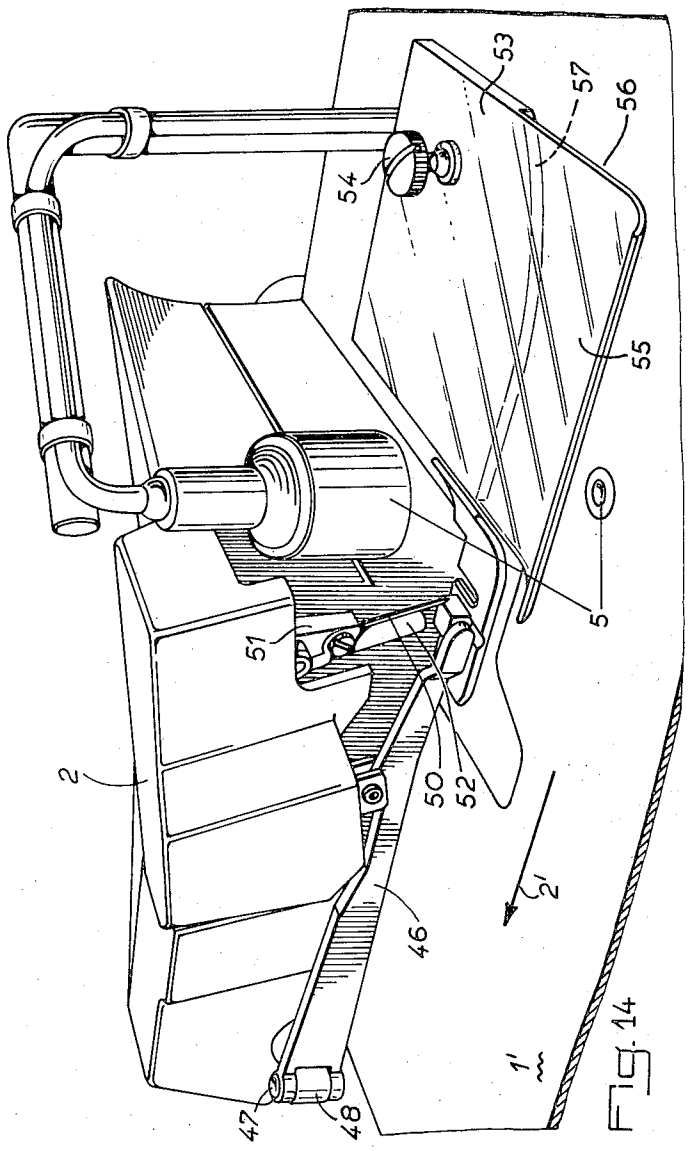


FIG. 14

AUTOMATIC UNIT FOR OVERCASTING OR ASSEMBLING PIECES OF FABRIC ALONG SEAM LINES OF DIFFERENT FORMS

INTRODUCTION AND BACKGROUND OF THE INVENTION

The present invention concerns the execution of the operations of overcasting or assembling of pieces of fabric along several edges.

At present these operations are carried out either manually or by a machine head which pivots so that it is always perpendicular to the seam line, or by a machine which utilises the above principle and permits the sewing or overcasting of a sequence of angular seams.

The operations carried out by these known means however possess numerous drawbacks such inter alia as relatively expensive training of the worker in the case of manual execution, necessity of several positionings and handlings of the pieces of fabric for a sequence of angular seams, and high manufacturing cost.

The device according to the invention permits of avoiding these drawbacks. It is in fact constituted by a unit by means of which it is possible to stitch or overcast three successive sides of one or more pieces of fabric.

BRIEF SUMMARY OF THE INVENTION

The unit according to the invention is constituted essentially by three machines disposed on a flat surface at slightly different levels, the transport direction of the first machine forming an angle slightly less than a right angle, about 80°, with the transport direction of the second machine, while the transport direction of the third machine is parallel but opposite to the transport direction of the second machine, by two devices for the transport of the fabric pieces, by a stacker situated at the exit from the third machine, by two blowing mechanisms serving to assist the transport of the fabric when the latter passes beneath the head of the second and the head of the third machine, by a brake cylinder, by a blowing mechanism assisting the operation of stacking of the fabric pieces on the central support of the stacker and by various detectors which start and stop the machine heads, the blowing mechanisms, the transport devices and the stacker on passage of the fabric.

FURTHER DESCRIPTION OF THE INVENTION

The invention will moreover be clearly understood with the aid of the following description and the accompanying drawings which represent by way of example a form of embodiment of the object of the invention.

BRIEF DESCRIPTION OF THE VIEWS IN THE DRAWINGS

In the drawings:

FIG. 1 is a diagrammatic plan view of the unit according to the invention showing more especially the arrangement of the various elements;

FIG. 2 is a diagrammatic sectional view showing the offsetting of the table plates between the second and third machines;

FIGS. 3, 4 and 5 are diagrammatic views respectively representing a plan view, a lateral elevation and a front elevation of the first system for transport of the fabric from the second machine to the third machine;

FIGS. 6 and 7 represent diagrammatically the stop feet cooperating with the needles of the first transport system, in a lateral view and a front view;

FIG. 8 is a plan view of a stop foot on a larger scale;

FIGS. 9 and 10 are diagrammatic views of the second transport system in a lateral view and a front view;

FIGS. 11 and 12 show diagrammatically the operation of the stacker; and

FIG. 13 is a plan view of a piece of fabric, for example a front quarter piece of a pair of trousers; and

FIG. 14 is a view in perspective of one of the sewing stations.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As represented in the various Figures of the accompanying drawings, the unit permitting the overcasting or assembling of fabric pieces along three seam lines, according to the invention, is composed essentially of a workplane **1** formed by a plate **1''** which is situated slightly below a plate **1'** and slightly above a plate **1'''**, and of three machines **2, 3** and **4.**

The first machine **2** is disposed around the table **1** in relation to the second machine **3** in such manner that the respective transport directions **2', 3'** form an angle between them slightly less than a right angle and preferably an angle between 75° and 85°.

The third machine **4** is situated opposite to the machine **3** and slightly offset towards the machine **2** and its transport direction **4'** is parallel but opposite to the direction **3'**.

Close to and before the head of the machine **2,** considered in the transport direction, a detector **5** is provided which causes the starting of the machine **2** by means of a rod and a cylinder connected to the coupling bar of the motor, on passage of a piece of fabric, and its stopping, by known means (not shown) upon pressing a piece of fabric, and its stopping when a piece of fabric has again cleared the detector **5.**

The starting and delayed stopping of the machine **3** are controlled automatically, as for the machine **2,** by the passage of the fabric beneath the detector **6.**

Beside this detector **6** a detector **7** is provided which, on passage of the fabric, switches on the blowing mechanism **8** situated between the plates **1'** and **1''** of the table, which serves to assist the transport of the said fabric.

The transport device **9** is mounted beneath the plate **1''** of the table. This device is constituted by a support **10** to which two jacks **11, 11'** are fixed each of the rods of which comprises a needle **12, 12'.**

The support **10** is displaceable from the point **13** to the point **14** on two spindles **15, 15'** by means of a rod **16'** of a jack **16,** the two jacks **11, 11'** and the two needles **12, 12'** sliding this displacement in two grooves **17, 17'** machined in the plate **1''.**

Above the needles **12, 12',** when these are at the point **13,** there are fixed two stop feet **18, 18'** operated by two jacks **19, 19'** mounted on a support **20.** Each of the stop feet **18, 18'** has a groove **21, 21'** permitting the passage of the needles **12, 12'.**

The rapid ascent of the needles **12, 12',** the descent of the stop feet **18, 18',** the stopping of the blowing mechanism **8** and the displacement of the support **10**

by means of the jack rod 16' from the point 13 to the point 14 are caused when the fabric piece has cleared the detector 7.

Slightly before the point 14, in the direction of movement 22, a detector 23 is provided which, when it is set in action by the transported piece of fabric, causes the needles 12, 12' to descend beneath the table, reverses the displacement movement 22 of the support 10 from the point 14 towards the point 13 and lowers the needles 24, 24' of the transport device 25, which by displacement from 26 to 26' effects the transport of the fabric to beneath the machine 4.

This transport device is constituted by the needles 24, 24' equipped with protectors 27, 27' and connected to a support 28 which is moved on two spindles 29, 29' by a rod 30' of a jack 30, each of the needles being equipped with a jack 31, 31'.

To permit the needles 24, 24' to pierce the fabric the table is equipped with a groove 32.

The two protectors 27, 27' advantageously possess the form of a hemisphere which is pierced to permit the passage of the needles, in order to prevent the fabric from ascending on withdrawal of the needles and to permit the free passage of the folds of the fabric beneath the needles.

In the vicinity of the machine 4 there is fixed a detector 33, which, when actuated by the fabric, operates a blowing mechanism 34 establishing an air cushion between the fabric and the plate 1''' of the table, and starts up the machine 4 by a system identical with that of the machines 2 and 3.

Another detector 35, situated substantially at the level of the head of the machine 4, is actuated by the fabric supplied by the transport device 25. This actuation has the effect of withdrawing the needles 24, 24' from the fabric and reversing the transport direction of these needles, the transport of the fabric then being effected by the head of the machine 4.

The detector 33 likewise has the task, after the complete passage of the fabric, of stopping the machine 4 after a delay, of cutting off the blowing mechanism 34 and lowering the brake cylinder 36.

The linear speed of descent of the rod of this brake cylinder 36 is regulatable.

At the end of the table there is mounted a stacker device 37. This is constituted by a jack 38 equipped with a rod 38', by a central support 39 and by a blowing mechanism 40.

The operation of the jack and the blowing mechanism is caused by the return of the rod of the brake cylinder 36.

By way of example, to sew the seams 41–42, 43–41 and 42–44 of the forward quarter piece of a pair of trousers 45 as represented in FIG. 13, with the aid of the unit according to the invention, the following procedure is adopted:

The piece 45 is introduced manually by an operator with the point 41 beneath the head of the machine 2. The passage of the piece 45 over the detector 5 starts up the machine and the transport of the fabric and its guidance are effected automatically respectively by the machine head and by a known guide mounted in the vicinity thereof.

In FIG. 14 is illustrated an example of the machine head 2 comprising a presser arm 46 fulcrumed on a pin 47 of a support which is in its turn pivoted on said machine head 2. At its free extremity, the presser arm 46 is fitted with the usual presser foot which cooperates with the machine head feed means for moving the work 45 forward along the plate 1' in the transport direction 2'. During its displacement through the machine head 2 the piece 45 is sewn by a needle 50 mounted on a suitable needle clamp 51 of the needle bar 52 and it is guided by a guide 53 positioned in advance of the presser foot 49 and fastened by a screw 49 on the plate 1'. Said guide 53 comprises a hold-down member 55 spaced below plate 1' so to define a recess 56 within which the work 45 passes. The recess 56 is delimited by an upright wall 57 against which the work 45 is pushed and slid by the feed means of the machine head, the workpiece guiding action being done without an operator's manual assistance. The edge of fabric piece is controlled by the upright wall to guide it in a direction toward the body of said fabric piece, while the feed dog of the machine is driven at an effective rate of advance in opposition the resistance offered by said body. This causes the piece edge to move and to turn so that at each instant it is moving tangentially to said upright wall.

The guide 53 can be of the type illustrated in copending application Ser. No. 242,619, filed Apr. 10, 1972.

The stopping of the machine head takes place with a slight delay when the piece 45 has completely passed the detector 5, the chain end being cut by a thread-cutter device incorporated in the machine head.

The piece 45 is then introduced manually by an operator with the point 43 beneath the head of the machine 3, which has the effect of starting the latter under the action of the detector 6, the seam being effected automatically by means of a known guide fixed in the vicinity of the machine head.

As soon as the piece 45 passes over the detector 7, the latter actuates a blowing mechanism 8 which establishes an air cushion between the plate 1'' of the table and the piece 45, this blowing mechanism serving to assist the transport of the said piece.

At the end of the seam 43–41 the detector 7 is returned to rest, causing the delayed stopping of the machine 3, the stopping of the blowing mechanism 8, the rapid ascent of the needles 12, 12' and the descent of the stop feet 18, 18' very slightly above the piece 45.

By these operations the piece 45 is stopped and the chain end is cut by a thread-cutter device incorporated in the head of the machine 3.

The transport device 9 then moves the piece 45 from the point 13 to the point 14, which piece before the end of this travel sets the detector 23 in action, causing the following simultaneous operations:

The needles 12, 12' descend beneath the table;

The transport movement from the point 13 to the point 14 is reversed;

The needles 24, 24' situated above the piece 45 descend, piercing the piece and engaging with it;

The transport device 25 brings the piece 45 to beneath the head of the machine 4.

By virtue of the interconnection of these various operations the piece 45 is always held in a perfect manner, despite the sudden change of the transport direction.

When the piece 45 passes over the detector 33, the latter operates the blowing mechanism 34 assisting the transport of the fabric and starts up the machine 4.

The piece 45 being transported by the needles 24, 24' and by the head of the machine 4, it passes with its edge 41, 42 over the detector 35, actuating the withdrawal of the needles 24, 24' from the piece 45 and the reversal of the transport direction from 26 to 26' of the needles 24, 24'.

The seam 42–44 is effected automatically by the head of the machine 4 with the aid of a guide fixed in the vicinity thereof.

After the passage of the point 44 over the detector 35, the latter is returned to rest, which action stops the head of the machine 4 after a delay, shuts off the blowing mechanism 34 and lowers the brake cylinder 36 on to the piece 45, the chain end then being cut off by a device incorporated in the head of the machine 4.

The piece 45 is stopped by the cylinder 36 in such manner that its middle part is placed before the rod 38' of the jack 38 of the stacker 37.

The return of the rod of the cylinder 36 into its initial position causes the displacement of the rod 38' of the jack 38 and thus of the piece 45 towards the central support 39 and the actuation of the blowing mechanism 40.

The interconnection of these two operations, which are halted after a regulatable time, has the effect of projecting the piece 45 over the central support 39 of the stacker 37.

According to another characteristic of the invention the distance between the machine 3 and the machine 4 is such that two pairs of trousers sewn simultaneously on the two machines do not interfere with one another in their movement in opposite directions.

The device according to the invention can be utilised as an automatic unit for overcasting or assembling, especially of three sides of fabric pieces having straight or curved lines of different forms.

What is claimed is:

1. A unit for the overcasting or assembling of fabric pieces each along three seam lines of different forms, comprising a first machine having fabric guiding means to produce the first of said seam lines; a second machine having fabric guiding means to produce the second of said seam lines and the transport direction of fabric of which forms an angle slightly less than a right angle with respect to the transport direction of said first machine; a third machine having fabric guiding means to produce the third of said seam lines and having a transport direction which is parallel but opposite to the transport direction of the second machine; and two fabric transport devices situated between the second and third machines and forming a right angle between them.

2. A unit as claimed in claim 1, a first of said transport devices comprising a pair of vertically disposed needles, a common support for said needles, means for moving said needles vertically relative to said support, horizontal guide spindles on which said support is movable in a direction substantially perpendicular to the transport direction of said second machine, a jack for moving said support along said spindles, a work table adjacent said second and third machines and on which said fabric pieces slide, and two grooves in said work table parallel to said spindles and in which said needles move when said needles are raised and said jack moves said support.

3. A unit as claimed in claim 2, and a pair of stop feet disposed above said needles when said needles are in their position nearest said second machine, and means for moving said stop feet vertically, said stop feet having grooves therein to receive said needles in a lower position of said stop feet.

4. A unit as claimed in claim 1, in which the first of said transport devices delivers fabric pieces to the second of said transport devices, said second transport device comprising two vertical needles, a common support for said needles, means for moving said needles vertically relative to said support, two horizontal spindles on which said support is mounted for horizontal movement in the direction of transport of said second transport device, a jack for moving said support on said spindles, hemispherical protectors having downwardly convex surfaces, each needle passing through a said protector, and means fixedly mounting said protectors on said support in a position such that said needles reciprocate vertically relative to said protectors between a raised position in which said needles are above said convex surfaces and a lowered position in which said needles pass through said convex surfaces.

5. A unit as claimed in claim 1, and a brake cylinder disposed at the exit from said third machine for releasably retaining said fabric pieces, and a stacker for receiving said fabric pieces when said brake cylinder releases said fabric pieces.

6. A unit as claimed in claim 1, and a stacker for fabric pieces emerging from said third machine, said stacker comprising a fixed support, a push rod for pressing said fabric pieces against said fixed support, a jack for operating said push rod, and a blowing mechanism for blowing a portion of a said fabric piece over the fixed support of the stacker when the push rod holds another portion of the fabric piece against said fixed support.

7. A unit as claimed in claim 1, and a work table for slidably supporting said fabric pieces thereon as said fabric pieces emerge from and move between said machines, said work table comprising three horizontal surfaces disposed at different levels comprising an upper surface, a middle surface and a lower surface, a first blowing mechanism for assisting movement of the fabric pieces between said upper and middle surfaces during transfer of the fabric pieces from said second machine to said third machine, and a second blowing mechanism for assisting the movement of the fabric pieces from said middle surface to said lower surface after the fabric pieces emerge from said third machine.

* * * * *