

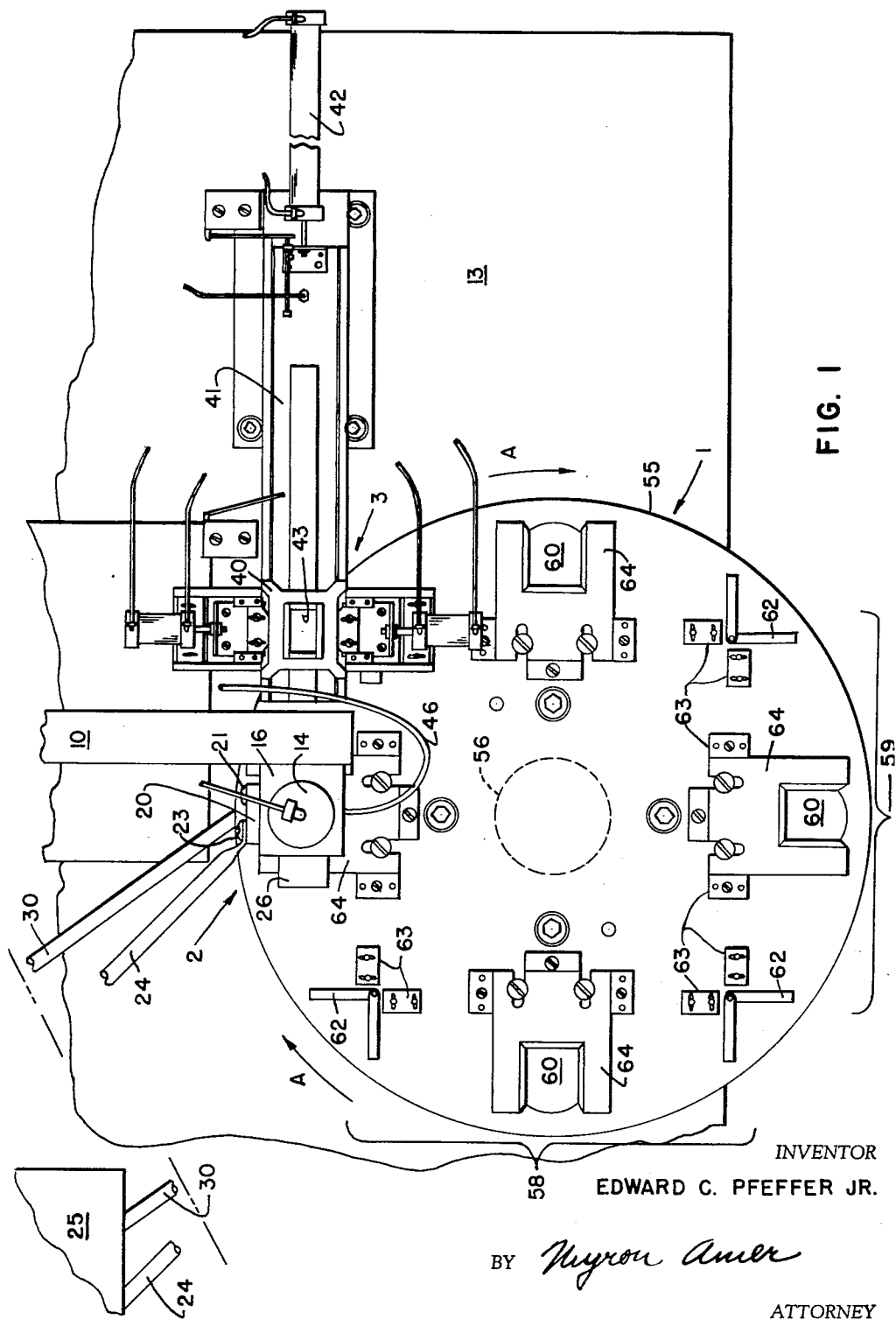
Oct. 31, 1961

E. C. PFEFFER, JR
POSITIONED FUSING MACHINERY

3,006,801

Filed Nov. 1, 1960

3 Sheets-Sheet 1



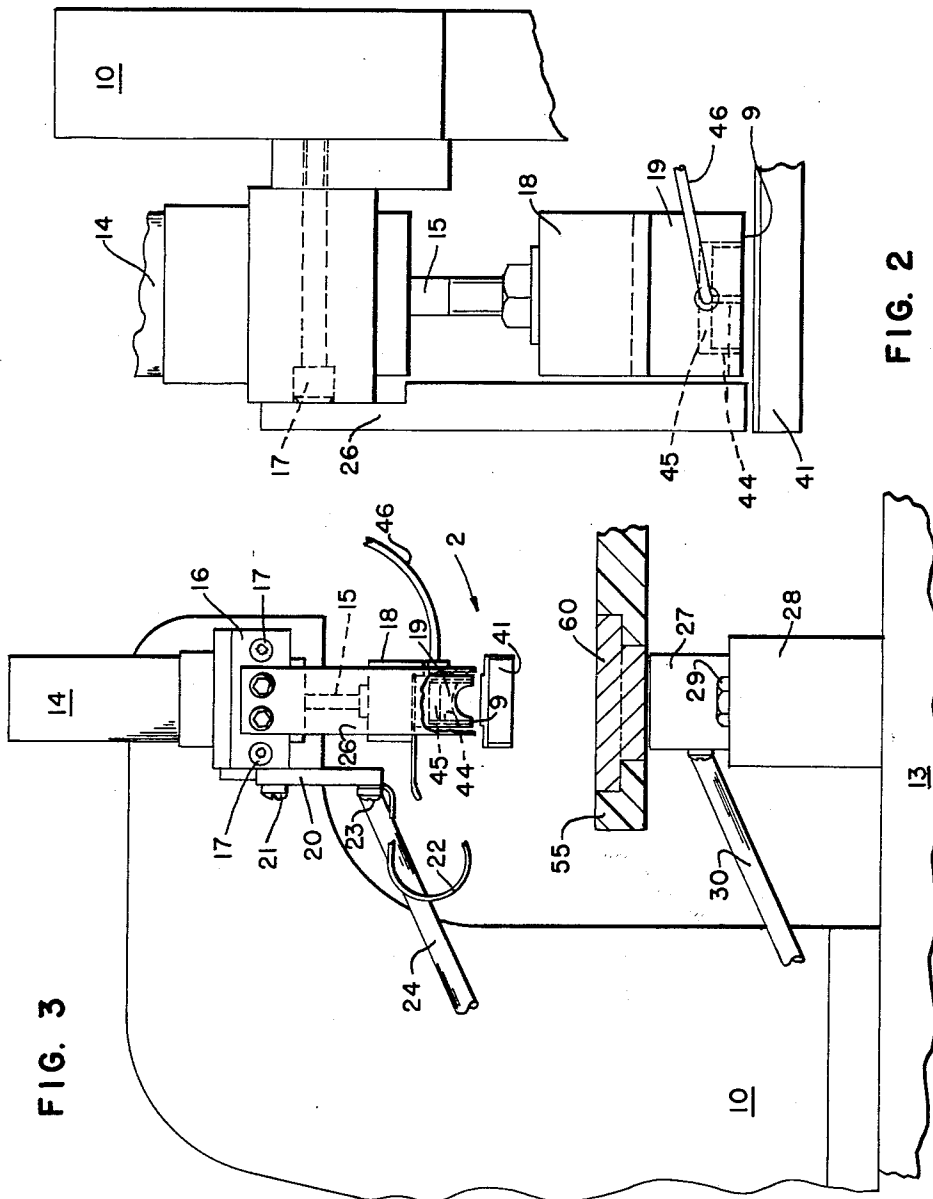
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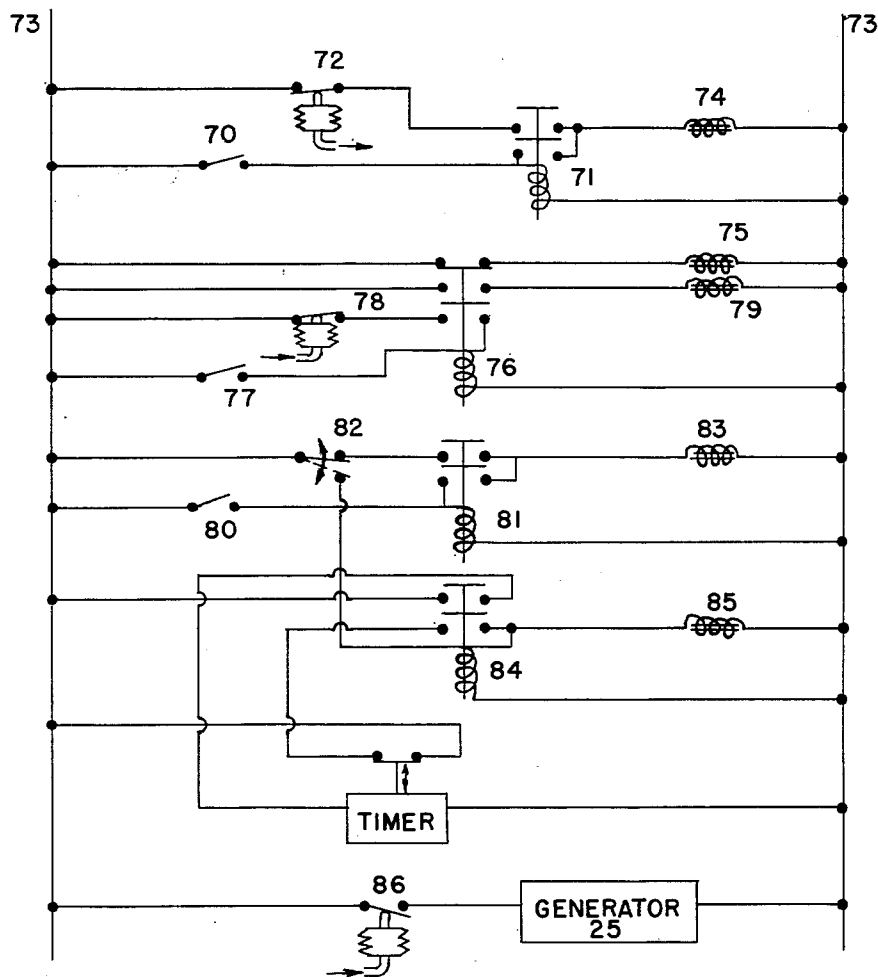


FIG. 4

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POSITIONED FUSING MACHINERY

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6 Claims. (Cl. 156—380)

This invention generally relates to machinery for automating the process of fusing labels to garment parts, and more specifically relates to machinery for feeding and accurately positioning labels and garment parts in relation to each other and to high frequency fusing equipment.

When attaching a label to a garment part, such as for example the yoke of a shirt, for appearance and uniformity sake it is necessary that the attachment be made at a specific location on the garment part. In addition to accurate positioning of the label on the garment part, where attachment is to be made using high frequency fusing equipment, accurate positioning of both the label and garment part between the fusing electrodes of this equipment is also required in order to obtain a strong and reliable bond.

Having in mind these positioning requirements, an essential feature of the machinery of the present invention is the operative arrangement of the two fusing electrodes of the fusing equipment. More specifically, in their installation, these electrodes are set in accurate registration with each other, the one of the electrodes being stationarily mounted on a table, and the other electrode being mounted for reciprocating movement towards and away from said stationary electrode along a straight line path. Using feed devices, a label and a garment part is then accurately positioned on a separate one of these two electrodes, and in the accomplishment of this, the desired location of the label on the garment part is also automatically assured.

Thus a prime object of the present invention is to provide relatively simple feed and positioning machinery for automating the process of fusing labels to garment parts.

In providing this machinery it is a more specific object to utilize the orientated condition of the fusing electrodes of the fusing equipment to achieve accurate positioned fusing of a label to a garment part.

Other objects and advantages of the machinery of the present invention will be better understood from the specification which follows and the drawings forming a part thereof in which:

FIG. 1 is a top view of the automatic feed and positioning machinery of the present invention;

FIG. 2 is a front view, projected from FIG. 1, of the movable electrode of the machinery;

FIG. 3 is a side view, partly in section, projected from FIG. 1, of both the movable and stationary electrodes of the machinery; and

FIG. 4 is a circuit diagram of the controls for operating the machinery of FIG. 1.

In FIG. 1 there is shown the general location and relationship of the various component parts of the machine of the present invention. These component parts more particularly consist of a cloth feed device 1, a fusing device 2 and a label feed device 3. As will be more fully explained subsequently, an essential feature of the invention resides in coordinating the operation of these component devices so that except for positioning a cloth garment part on the cloth feed device 1 and removing a finished product of garment part and fused label therefrom, all other handling and feeding steps in the fusing process are entirely automated.

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The type of label contemplated for use with the machinery of the present invention is one which has portions of its surfaces overlaid with threads of thermoplastic material, and because of this thermoplastic material the label is adapted to be fused to the garment part. Details as to the type of plastic material used and the manner of incorporating the same as an integral part of the label are fully described in U.S. Patent 2,765,814.

In fusing a label to a garment part, use is made of a high frequency generator, the operation of which in the art of high frequency heating is well understood. Preferably this generator should have a 120 megacycle output and a capability of generating sufficient dielectric heat to soften thermoplastic material in the relatively short period of between $\frac{1}{2}$ to 3 seconds, and as a result during the fusing operation, neither the label nor the cloth garment part is scorched.

Fusing Device

Referring now to the machinery of the present invention, the fusing device 2, as best shown in FIG. 3, includes a frame 10 bolted in an upright position on a table 13. The upper end of the frame 10 is bent to extend laterally over the table 13 and a mounting plate 16 connected by screws 17 to the frame 10 supports an air motor 14 on the laterally extending end of the frame 10 so that the stroke of its piston arm 15 is along a straight line towards and away from the table 13. Connected to the end of the piston arm 15 is an electrically insulated holder 18 which carries an electrode 19 of the fusing device. The electrical connection to the electrode 19 is made through an electrically conductive jumper 22 which has one end disposed between the holder 18 and the electrode 19 and thus in contact against the electrode 19. The other end of the jumper 22 is connected by a screw 23 to an electrically insulated plate 20 connected by screws 21 to the mounting plate 16. A line 24 from a high frequency generator 25 (FIG. 1) is connected in a suitable manner to the end of the jumper 22 supported on the plate 20 for transmitting the electrical signal of the generator 25 to the electrode 19. Jumper 22 has sufficient flexibility and is of sufficient length to permit lowering of the electrode 19 as will occur upon operation of the air motor 14. Suspended from another side of the mounting plate 16 and extending a slight distance below the electrode 19 in its retracted or raised position as shown in FIG. 3, is a plate 26, the function of which will soon be apparent.

Completing the fusing device 2 is an electrode 27 stationarily mounted on the table 13 directly below and in accurate alignment with the electrode 19. Electrode 27 is mounted in a base member 28 connected by bolts 29 to the table 13. A second line 30 from the high frequency generator 25 is connected directly to the electrode 27.

In accordance with the present invention, individual labels are fed by the label feed device 3 to the movable electrode 19 and means are provided on said electrode to support this label. This means consists of a vacuum applied through passageways 44 spaced along the fusing surfaces 9 of the electrode 19. A flexible hose 46, which will be understood to be connected to a vacuum producing means (not shown), communicates through a channel 45 with the passageways 44. Thus, a label fed to the electrode 19 is adapted to be supported thereon by a vacuum applied through the flexible hose 46, the channel 45 and through the passageways 44 against this label.

Label feed device

To feed labels to the electrode 19 any one of a number of mechanical feed devices may be used, but the one

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preferred is that which is the subject of applicant's pending U.S. application Serial No. 39,067, filed June 27, 1960. As best shown in FIG. 1, this feed device, generally designated 3 therein, is located to the right of the fusing device 2.

In the operation of the label feed device 3, a stack of labels 43 is loaded in an upstanding magazine 40, and individual labels are then gravity fed from this stack onto a slide 41. Slide 41 is powered by an air motor 42 which reciprocates the slide 41 with a label thereon from a retracted position as shown in FIG. 1 to an extended position as shown in FIG. 2 which positions the label directly below the then retracted electrode 19. In this regard, the lower extremity of the plate 26 is arranged to engage the label carried by the slide 41 and thus accurately position this label beneath the electrode 19. A vacuum which is applied through the slide 41 to securely hold the label on this slide is then transferred to the electrode 19 and is applied through the passageways 44. Subjected to this vacuum, the label is lifted off the slide 41 against the underside of fusing surfaces 9 of the electrode 19 and is held against this electrode. The slide 41 is then retracted by operation of the air motor 42 clear of the electrode 19.

Cloth feed device

During transfer of a label from the feed device 3 to the electrode 19 as described above, means are provided to carry a cloth garment part, such as the yoke of the shirt, into fusing position between the electrodes 19 and 27. As best shown in FIG. 1, this means includes a turntable 55 supported on a shaft 56 rotatably mounted in the table 13. Turntable 55 is of sufficient dimension that in its mounted position on the table 13 its peripheral portion extends beyond and between the electrodes 27 and 19. An air powered device (not shown) is operatively connected to the shaft 56 and is adapted to rotate the turntable 55. This air powered device is of the type such as an Allen Air Unit Model 11E sold by the A. K. Allen Company of New York, and in response to an appropriate signal and using air as a powering fluid will be understood to cause incremental rotation of the turntable 55 in the direction of the arrow A. More particularly, turntable 55 is adapted to be rotated one quarter revolution in response to each transmitted signal operating the air powered drive device.

As best seen in FIG. 1, the top surface of the turntable 55 is divided into four equal segments, and in each segment there are identical garment part positioning fixtures, collectively designated in one segment by the reference numeral 58. These fixtures 58 are provided for the convenience of an operator hand positioning garment parts on the turntable 55 preferably at a work station 59. In carrying out this operation, the operator places the ends and center of a garment part under the clamps 62 and fixture 64 respectively, while aligning an edge of this garment part against spaced guide blocks 63. Thus each garment part is positioned in an orientated condition on the turntable 55. This assures fusing of a label in a desired predetermined location on each garment part.

In addition to the fixtures 58, in each quarter segment of the turntable 55 there is an electrically conductive fusing block or insert 60 forming an integral part of said turntable. As best seen in FIG. 3, each of these fusing blocks 60 is suitably embedded or disposed in the turntable 55 so that it extends the full thickness of the turntable. That is, the upper and lower surfaces of each fusing block 60 are adapted to at least be flush with the top and underside surfaces of the turntable respectively. Each fusing block 60 is accurately located in a segment of the turntable 55 so that when this segment is rotated between the electrodes 19 and 27, the fusing block 60 lies in the same vertical line as the electrodes 19 and 27. Additionally, only a minimum running clearance exists between the bottom of the fusing block 60 and the top

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of the stationary electrode 27. Thus, when a label is brought in contact against a garment part in position on the turntable 55 through downward movement of the electrode 19, despite the presence of the turntable 55 preventing closer movement of electrode 19 towards electrode 27 and thus physical reduction of the space gap therebetween, this gap is nevertheless at a desirable minimum because the energizing circuit for the electrodes is completed through the fusing block 60. In other words, each fusing block 60 in turn functions as an extension of the electrode 27 and thereby lowers the power consumption of the generator 25.

Operation

Except for minor manual positioning operations, the just described cloth feed device 1, fusing device 2, and label feed device 3 constitute a single apparatus automating the process of fusing labels to garment parts. This coordinated automated cycle of operation now to be described will be assumed to start with the start of the cycle of operation of the label feed device 3. The operation of this device is initiated by an air signal transmitted to the air motor 42, which air motor in response to this signal then moves the slide 41 into its extended position thereby locating the forward end of the slide beneath and in close proximity to the movable electrode 19 which at this time is in its raised or retracted position. As the slide 41 moves beneath electrode 19, the lower end of the label stop or plate 26 will engage and position a label being carried on this slide surface directly below the electrode 19. To this end, the stroke of the slide 41 is of sufficient length to bring the label in contact against the plate 26 whether the label passes from the magazine 40 to the slide 41 either to the left or the right of its desired position on the slide 41. Thus in all instances the plate 26 functions to positively orientate the label relative to the electrode 19. A vacuum which is utilized to hold the label on the slide 41 is then expeditiously transferred to the electrode 19, with the result that the label is lifted off the slide 41 and held against this electrode. After transfer of the label to the electrode 19, the slide 41 is retracted clear of this electrode and back beneath the magazine 40, in position to receive another label and to repeat its cycle of operation as just described.

After retraction of the slide 41 the cycle of operation of the cloth feed device 1 commences. Prior to operation of this device, however, it will be understood that a garment part (not shown) will be manually positioned on the turntable segment at station 59 and also on the preceding turntable segment. Thus, when an appropriate air signal is transmitted to the turntable drive device to operate this device and cause the turntable 55 to be rotated one quarter revolution, a garment part is carried by the turntable into fusing position between the electrodes 19 and 27.

Completion of the rotative movement of the turntable 55 signals the start of the cycle of operation of the fusing device 2. At this time air motor 14 is operated to lower the electrode 19 against the turntable 55 and thus brings the label supported on this electrode in contact against the garment part in position on the turntable 55. At the end of the stroke of the piston arm 15, appropriate switching is actuated to first transfer the vacuum being applied through the electrode 19 back to the slide 41, and second, to turn on the power of the generator 25 to thereby energize the electrodes 19 and 27. As previously indicated, despite the presence of the turntable 55 between the electrodes 19 and 27, the electrical circuit energizing these electrodes is completed through the fusing block 60 carried in each segment of the turntable. After a predetermined time which will be understood to be of sufficient duration to permit fusing of the label to the garment part, the power of the generator 25 automatically shuts off. The air motor 14 is then operated to move the electrode 19 into its raised or retracted position to

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complete both the cycle of operation of the fusing device 2 and also of the machinery of the present invention.

It will of course be appreciated that after two succeeding cycles of operation, a garment part with a fused label is eventually carried by the turntable 55 to the work station 59. This finished product is then manually removed from the turntable and another garment part manually positioned thereon, these minor manual operations being carried out during the time the fusing operation is being carried out at the fusing station.

In addition to the positioning of a garment part on the turntable 55 at station 59, provision is also made for the manual positioning of an unfused label at this station in the event that this becomes necessary due to mechanical failure of the feed device 2 and thus the loss of automated positioning of individual labels by this device on the electrode 19. Under these circumstances, the operator, after positioning a garment part on the turntable 55, will then position a label between the extending legs of the fixture 64, and in this manner achieve proper positioning of the label relative to this garment part. Following the positioning of both the label and garment part at the work station 59, the machinery then operates according to the sequence already described.

The electrical circuitry for obtaining proper sequential operation of the moving parts of the cloth feed device 1, the fusing device 2, and label feed device 3 will now be described with particular reference to FIG. 4. Utilized in this circuitry are conventional solenoid valves of the type having two operative positions and which under spring pressure are adapted to assume one of these positions unless pulsed into its other position. Each of these valves is associated with one of the air motors, and depending on which operative position it is in, admits high pressure air into the air motor to either cause extension or retraction of the piston arm of the air motor. Referring to FIG. 4 the switch designated 70 therein will be understood to be actuated by the electrode 19 as it moves into its raised position at the end of each cycle of operation. The momentary closing of switch 70 completes a circuit operating a relay 71, which relay is then held closed through a holding circuit including a normally closed vacuum switch 72. The closing of relay 71 completes a circuit from the electrical source 73 which pulses a solenoid valve 74 into its operative position in which it admits high pressure air into the air motor 42 causing extension of the slide 41 with a label thereon. At this time a solenoid valve 75 is energized through closed contacts on a relay 76 to apply a vacuum through the slide 41 to securely hold the label on this slide.

As slide 41 nears the end of its stroke, it is adapted to actuate and momentarily close a switch 77. When switch 77 closes this operates relay 76 which is then held closed through a holding circuit including a normally closed pressure switch 78. The closing of relay 76 breaks the circuit for the valve 75 and simultaneously completes a circuit energizing a valve 79. When energized, valve 79 redirects the vacuum through the electrode 19 instead of the slide 41. Responsive to the vacuum applied through the electrode 19, the label is lifted off the slide 41 and held against this electrode. When this occurs, there will be a build up of vacuum in the flexible hose 46 which is communicated to the vacuum switch 72. This causes switch 72 to open and break the holding circuit for the relay 71. The dropping out of relay 72 deenergizes valve 74, and as a result valve 74 moves to its operative position in which it admits high pressure air into the air motor 42 so as to retract slide 41 clear of the electrode 19.

At this time the operator will actuate a foot switch 80 which completes a circuit operating a relay 81. Relay 81 is then held closed through a holding circuit which includes a two position switch 82. The closing of the relay 81 completes a circuit energizing a valve 83. When energized, valve 83 admits high pressure air into the turntable drive device to cause 90 degree rotation of the

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turntable 55. At the end of rotative movement of the turntable 55, switch 82 is momentarily actuated into its second position and as a result relay 81 drops out and in turn causes valve 83 to be deenergized.

5 Momentary actuation of switch 82 into its second position completes a circuit operating a relay 84, which relay is then held closed through a holding circuit including normally closed contacts on a timer. The closing of relay 84 has two results. The first is the completion of a circuit energizing a solenoid valve 85. When energized, valve 85 admits high pressure air into the air motor 14 so as to cause electrode 19 to be lowered against the turntable 55. Additionally, relay 84 completes a circuit starting the timing mechanism of the timer. At the end of travel of the electrode 19 there is a pressure build up in the line to the air motor 14, and this pressure build up is communicated to the pressure switch 78 causing this pressure switch to open and thus break the holding circuit for the relay 76. The dropping out of relay 76 deenergizes the valve 79 and simultaneously energizes the valve 75 with the result that the vacuum is transferred back to the slide 41.

The pressure build up in the line to the air motor 14 is also communicated to a second pressure switch 86 causing this switch to close and as a result complete the fusing circuit of the generator 25. Thus, generator 25 operates to fuse the label to the garment part. After a predetermined time, however, which will be understood to be sufficient to permit complete fusing of the label to the garment part, the normally closed contacts of the timer open and thus break the holding circuit for the relay 84. The dropping out of the relay 84 deenergizes valve 85 causing the electrode 19 to be moved into its raised position and also releases the pressure holding the switch 86 closed with the result that the energizing circuit for the generator 25 is opened. This completes one automated cycle of operation of the machinery of the present invention, and succeeding cycles are automatically started when the electrode 19 in being raised into its fully retracted position again actuates the switch 70.

It will be understood that the invention is not to be strictly limited to the structure described and illustrated herein but that various changes may be made thereto within the scope of the appended claims.

What is claimed is:

1. A device for the automatic positioned fusing of a label treated with thermoplastic material to a fabric garment part comprising a high frequency electrical source including a first stationarily mounted electrode and a second electrode mounted for reciprocating movement along a straight line path towards and away from said first electrode, means for positioning a label on said second electrode while in its raised position, rotatable means extending between said electrodes and adapted when rotated to carry a garment part into a position above said first electrode, and means operatively connected to said second electrode for lowering this electrode to bring said label thereon in contact against said garment part.

2. A device for the automatic positioned fusing of a label treated with thermoplastic material to a fabric garment part comprising a high frequency electrical source including a first stationarily mounted electrode and a second electrode mounted for reciprocating movement along a straight line path towards and away from said first electrode, means for positioning a label on said second electrode while in its raised position, a turntable extending between said electrodes and having circumferentially spaced positioning means thereon for positioning garment parts on the turntable in an orientated condition, means for rotating said turntable in increments to move said garment parts thereon, one by one, into a position above said first electrode, and means operatively connected to said second electrode for successively lowering this electrode to bring a label thereon in contact against each of the garment parts.

3. The device as claimed in claim 2 wherein the means

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for positioning a label on said second electrode includes a slide which when extended positions a label below said second electrode for transfer thereto responsive to a vacuum applied through the electrode.

4. The device as claimed in claim 2 wherein said turntable extends in close proximity above said first electrode and has electrically conductive circumferentially spaced inserts therein, each of which after a rotative movement of the turntable in turn serves as an extension of said first electrode.

5. A device for the automatic positioned fusing of a label treated with thermoplastic material to a fabric garment part comprising a high frequency electrical source including a first stationarily mounted electrode and a second electrode mounted for reciprocating movement along a straight line path towards and away from said first electrode, label feed means including a slide which is adapted to be extended while the second electrode is in its raised position for positioning a label below said second electrode for transfer thereto responsive to a vacuum applied through said electrode, a turntable extending be-

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tween said electrodes and having circumferentially spaced positioning means thereon for positioning garment parts on the turntable in an orientated condition, means for rotating said turntable in increments to move said garment parts thereon, one by one, into a position above said first electrode, and means operatively connected to said second electrode for successively lowering this electrode to bring a label thereon in contact against each of the garment parts.

6. The device as claimed in claim 5 wherein said turntable extends in close proximity above said first electrode and has electrically conductive circumferentially spaced inserts therein, each of which after a rotative movement of the turntable in turn serves as an extension of said first electrode.

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