United States Patent

Frost

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[54] **GARMENT RETRIEVER AND STACKER**

[72] Inventor: **Wade W. Frost,** Vidalia, Ga.

[73] Assignee: **Oxford Industries, Inc.,** Atlanta, Ga.

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[52] **U.S. Cl.** .....**112/121.29,** 271/1, 214/1 BD

[51] **Int. Cl.** **D05b 33/00**

[58] **Field of Search**.....112/121.29, 262, 121.11, 121.12, 112/121.15, 10; 271/1, 63, 84, 85; 270/68, 78, 86; 214/1 BD, 1 BDS, 1 L, 8.5 C

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Primary Examiner—James R. Boler
Attorney—Jones & Thomas

[57] **ABSTRACT**

A garment retriever and stacker for use in the manufacture of shirts or the like wherein the collar portion of a shirt is grasped and lifted away from a sewing machine so that the remaining portion of the shirt tails in a downward direction, the shirt collar portion is released, and the shirt is urged in a downward arc and packed into a stack of shirts in a generally horizontal attitude.

4 Claims, 7 Drawing Figures

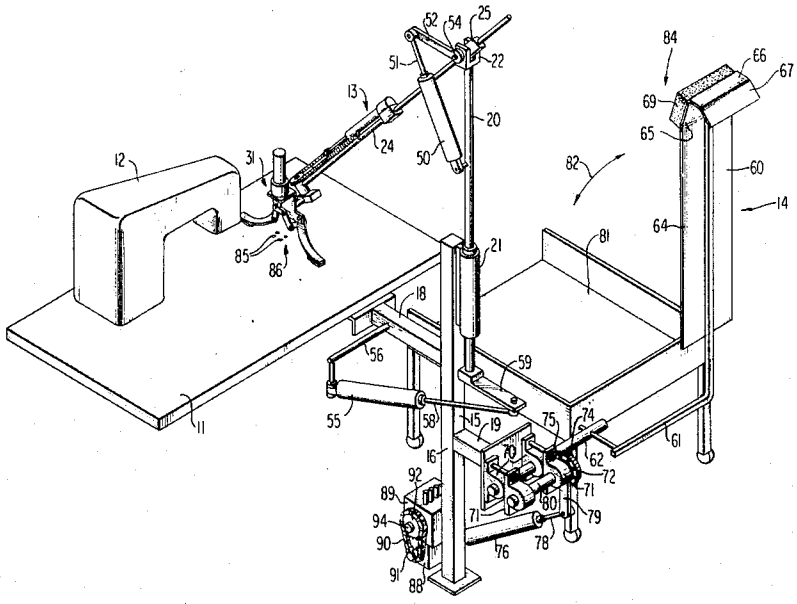
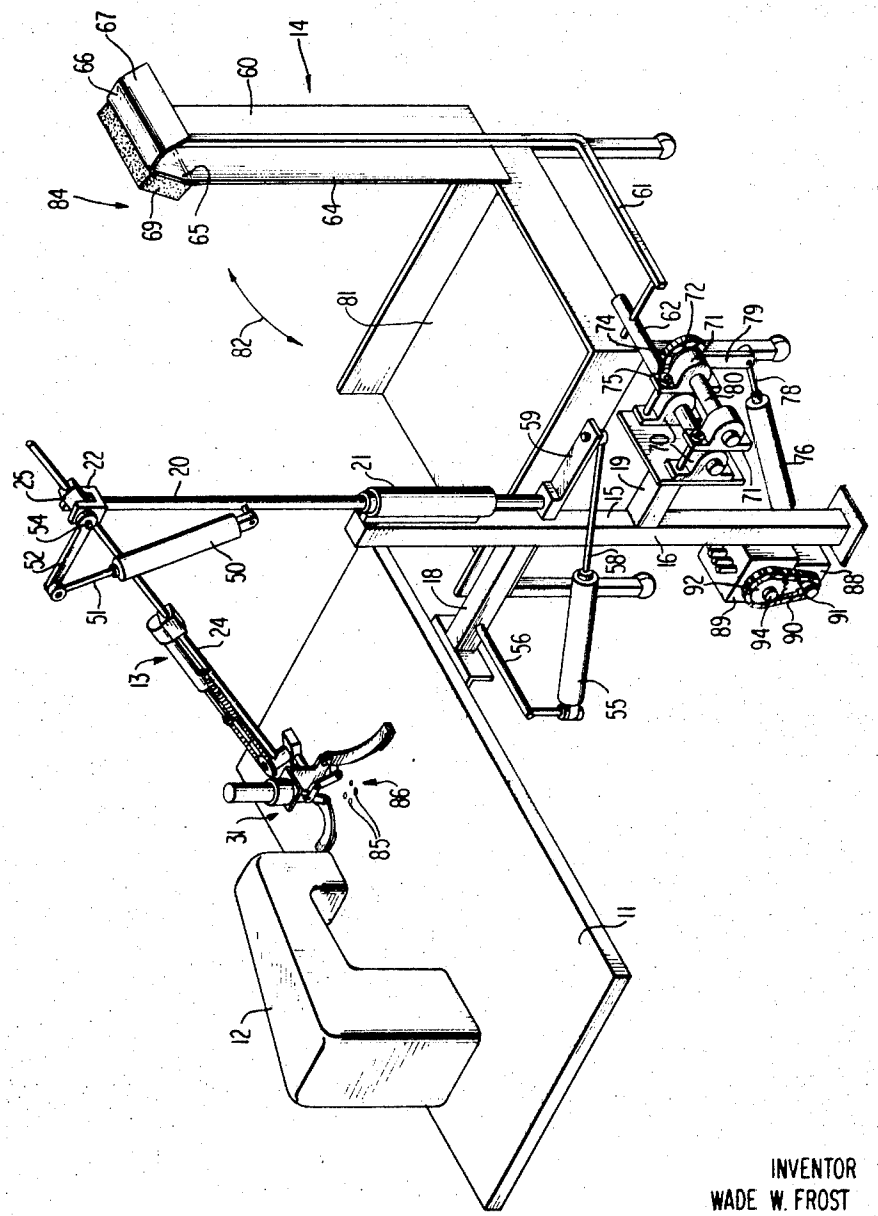


FIG. 1



INVENTOR
WADE W. FROST

BY Jones & Thomas
ATTORNEYS

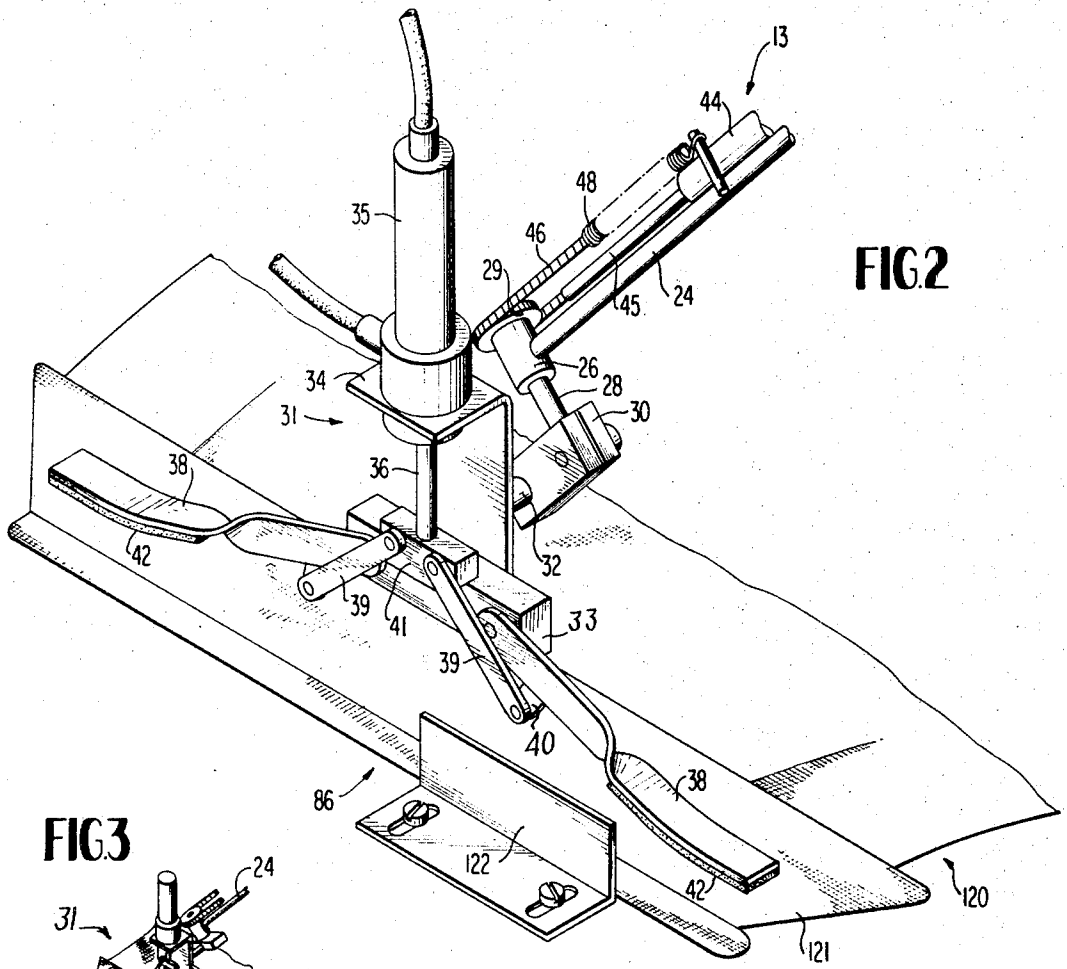


FIG.2

FIG.3

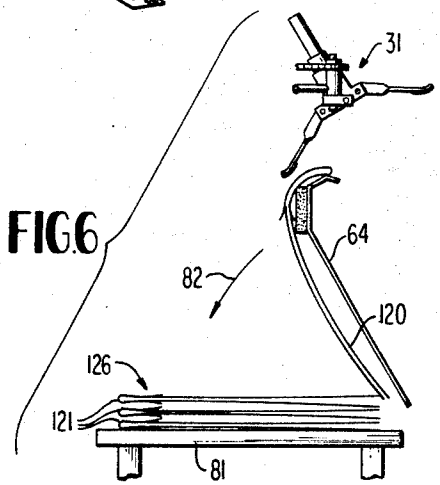


FIG.6

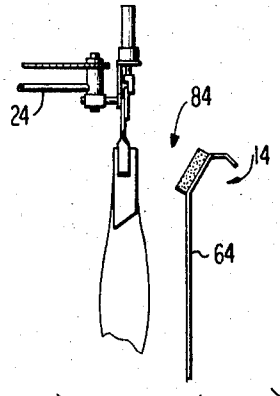


FIG.4

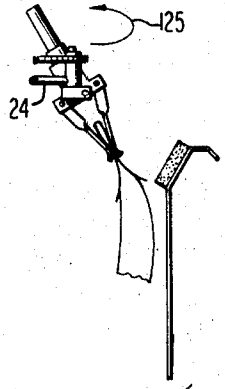


FIG.5

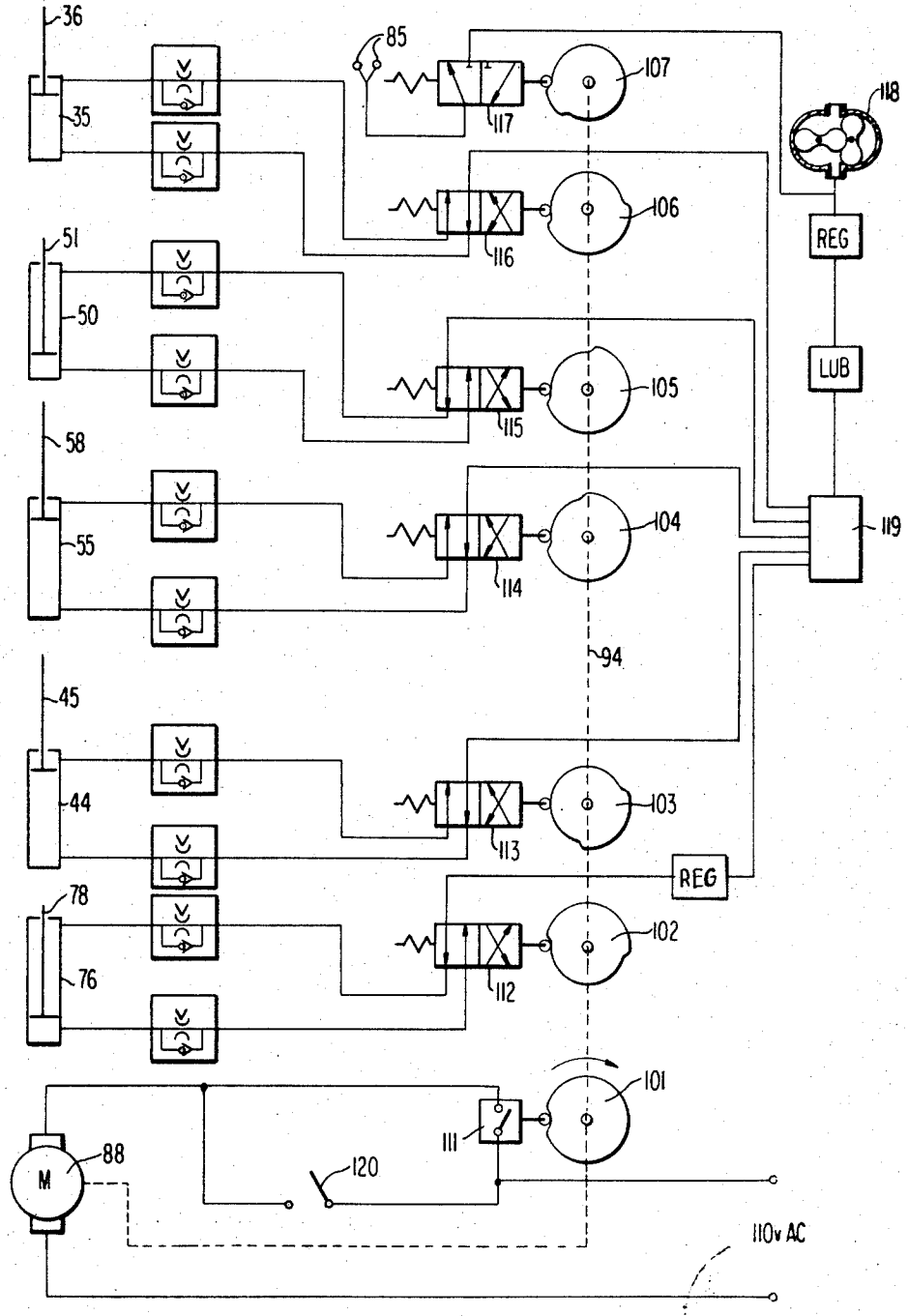

36
35
85
107
117
118
106
116
REG
51
50
LUB
105
115
58
55
104
114
119
94
45
44
103
113
REG
78
76
102
112
101
111
88
M
120
110v AC

FIG.7

GARMENT RETRIEVER AND STACKER

BACKGROUND OF THE DISCLOSURE

In the manufacture of shirts and other garments, it is important that the shirts be assembled from the same ply or layer of material received from the cutting room of the manufacturing plant in order to assure uniformity of color and other features of the shirt. The garment parts are usually marked with identifying bunch and ply numbers in the cutting room, so that when the garment parts are distributed to the various different sewing stations, the various parts can be identified and brought back together.

The garment manufacturing process is expedited if the partially completed garments are maintained in numerical order by ply numbers and each bunch is maintained in an identifiable stack as the bunches are transferred between sewing stations. Moreover, each sewing station operator can conveniently retrieve the individual garments for processing through her sewing machine if the stack from which the garments are retrieved is formed in an orderly manner, as with all of the collar portions, etc., oriented toward one end of the stack and all of the garments facing in one direction. For example, when a sewing function is to be performed on a shirt or similar bulky shapeless garment, it is highly convenient to have the shirts stacked with their collars oriented toward one end of the stack and with the shirt fronts all facing one side of the stack. The operator can then reach for the collar portion of the shirt and conveniently lift one or more shirts to her sewing station from a stack of shirts to begin the sewing function to be performed at her sewing station.

In the past, when the operator of a sewing machine at a sewing station completed the sewing function on a shirt or similar garment, she usually cut the thread extending back to her sewing machine and swung the shirt to an awaiting portable basket or pallet, and the stack of shirts formed by the sewing station operator was haphazardly formed and the sewing station operator that subsequently performed a sewing step on the shirts in the stack had to orient each shirt with respect to her machine before the subsequent sewing function could begin. This caused the subsequent operator to lose a significant amount of production time and occasionally caused her to incorrectly perform her sewing function.

SUMMARY OF THE INVENTION

Briefly described, the present invention comprises a garment retriever and stacker which functions to retrieve a shirt or similar garment by its collar from a sewing machine after a sewing step has been performed on the collar, move the shirt in an upward and lateral direction away from the sewing machine so that the remaining portion of the shirt trails below the collar, and release the shirt in an upright attitude. As the shirt is released, a stacker arm engages the side of the shirt and pushes the shirt through a downward arc toward an awaiting basket or pallet, whereupon the shirt is reoriented from a generally upright attitude to a generally horizontal attitude. The movements of the mechanism are uniform so that the shirts are uniformly stacked with their collars placed at one end of the stack and with the shirt front facing one side of the stack. The shirts are pulled away from the sewing machine with

enough force to break the thread extending back to the following shirt, and the sewing machine operator does not have to perform any stacking function of the shirt leaving her machine.

Thus, it is an object of this invention to provide a garment retriever and stacker which speeds up the sewing function at a sewing station, and which uniformly stacks the garment at the sewing station.

Another object of this invention is to provide a garment retriever and stacker which is inexpensive to construct, which is easy to operate, which is reliable, and which relieves the sewing machine operator from having to stack garments leaving her sewing machine.

Other objects, features and advantages of the present invention will become apparent upon reading the following specification when taken in conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of the garment retriever and stacker.

FIG. 2 is a detailed illustration of the grasping member and one end of the support arm, and the manner in which the grasping member first engages a shirt.

FIGS. 3, 4, 5 and 6 are progressive schematic illustrations of the grasping member and stacking member, showing how the collar is first grasped, lifted toward the stacker, the shirt is turned so that the collar is flat with respect to the stacker member, and the shirt is released and moved in a downward arc by the stacker member toward a portable trolley.

FIG. 7 is a schematic flow diagram which illustrates the control system of the garment retriever and stacker.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in more detail to the drawing, in which like numerals indicate like parts throughout the several views, FIG. 1 shows a work station or sewing station **10** which includes a work table **11**, sewing machine **12**, garment grasping means **13**, and stacker member **14**. Sewing machine **12** is operated in the conventional manner, as by an air motor and clutch arrangement located beneath work table **11**, (not shown).

Garment grasping means **13** includes support frame **15** which includes upright stanchion **16**, horizontal brace bar **18** extending between upright stanchion **16** and work table **11**, and lateral support bar **19**. Support rod **20** is rotatably supported in an upright attitude by means of bearing **21** which is connected to the upper end of upright stanchion **16**. Yoke **22** is formed at the upper end of support rod **20**, and transfer arm or support arm **24** is pivotally connected to yoke **22** by means of pivot block **25**. Transfer arm **24** is adjustably connected to pivot block **25** so that the effective length of transfer arm **24** from support rod **20** can be adjusted, when desired.

The distal end of transfer arm **24** includes open ended socket **26**, and grasping member pivot axle **28** is received and extends through socket **26**. The upper end of pivot axle **28** is surrounded by sprocket **29**, while the lower end is inserted in grasping member support clamp **30**. Grasping member **31** includes support pin **32**

which is rigidly connected at one of its ends to support clamp **30** and at its other end to support block **33**, support bracket **34**, grasping member ram **35**, ram rod **36**, grasping fingers **38**, and links **39**. The upper ends of grasping fingers **38** are pivotally connected to support block **33** and the lower ends of links **39** are connected to grasping fingers **38** by means of connecting tabs **40** which are rigidly connected to grasping fingers **38** intermediate their ends. The upper ends of links **39** are connected to actuating block **41**, and the actuating block **41** is rigidly connected to ram rod **36** of grasping member ram **35**. The arrangement is such that when grasping member ram is actuated to urge ram rod **36** in an outward or downward direction, links **39** cause grasping fingers **38** to open. When grasping member ram **35** causes its ram rod **36** to retract, grasping fingers **38** will come together and grasp any objects positioned there between.

Grasping fingers **38** are curved at their lower ends and pads of resilient material **42** are applied to the convex or inner surfaces of the grasping fingers, so that when the grasping fingers are brought together at the work table, they tend to gather the flexible garment material up from the table and then grasp or grip the material until the fingers are subsequently opened.

Pivot ram **44** has one of its ends connected to transfer arm **24** and its ram rod **45** is connected to one end of chain **46**. Chain **46** is wrapped around sprocket **29** and the other end of the chain is connected to tension spring **48**. The arrangement is such that tension spring **48** normally maintains grasping member **31** in the position shown in FIG. **1**. When pivot ram **44** is energized, it causes its ram rod **45** to retract and link chain **46** is pulled about sprocket **29** against the tension applied by spring **48**, causing pivot axle **28** to rotate and to rotate or oscillate grasping member **31** about the end of transfer arm **24** through an arc of approximately 90° to the position illustrated in FIG. **5**.

Elevating ram **50** is connected at one of its ends to upright support rod **20**, and its ram rod **51** is pivotally connected to lever **52**. Lever **52** is rigidly connected at its other end to pivot block **25** by means of pivot pin **54** so that when ram rod **51** of elevating ram **50** is extended, transfer arm **24** is lifted in an upward direction about yoke **22** at the upper end of support rod **20**.

Turning ram **55** is connected at one of its ends to extension arm **56** of brace bar **18** and its ram rod **58** is pivotally connected to the outer end of lever **59**. The inner end of lever **59** is rigidly connected to the lower end of upright support rod **20**, so that the extension and contraction of ram rod **58** of turning ram **55** causes upright support rod **20** to pivot or oscillate and move transfer arm **24** between the position shown in FIG. **1** and a position above and in front of stacker member **14**, through an arc of approximately 90°.

Stacker member **14** comprises pivotable stacking element **60**, support rod **61**, and crank **62**. Stacking element **60** comprises a relatively flat packing plate **64** which is normally maintained in a generally upright attitude by support rod **61** and packing plate **64** includes backward folds **65**, **66** and **67** which form a upper shield. Resilient pad **69** is attached to fold **65**.

Crank **62** of stacker member **14** is rotatably supported by bearing blocks **70** at the outer end of lateral support bar **19** of the support frame **15**. Bearing blocks **71** are spaced outwardly from bearing blocks **70** and function to rotatably support sprocket **72**. A continuous chain **74** is extended around sprocket **72** and sprocket **75** which is rigidly attached to crank **62**. Packing plate ram **76** is connected at one of its ends to upright stanchion **16** and its ram rod **18** is pivotally connected to one end of lever **79**. The other end of lever **79** is rigidly connected to the axle **80** of sprocket **72**, so that when the ram rod **78** of stacking plate ram **76** reciprocates, axle **80** oscillates sprockets **72** and **75** and crank **62** oscillates, causing packing plate **64** to oscillate. Usually a portable basket, pallet or trolley **81** is placed at the bottom of the arc **82** through which packing plate **64** oscillates. The area **84** immediately in front of packing plate **64** is a garment release area **84** for grasping member **31**, and packing plate **64** is arranged to engage the side of a garment released by grasping member **31** and move the garment from an upright attitude through arc **82** to a generally horizontal attitude on to trolley **81**, as will be explained hereinafter.

Air ducts **85** are located in the surface of work table **11** behind sewing machine **12** at the grasping area **86** of grasping member **31**. Air intermittently flows through air ducts **85** so as to cause the garment in the grasping area to pucker up or lift in an upward direction into the grasping fingers **38** as they move together.

Electric motor **88** is supported at the lower end of upright stanchion **15** and is connected to cam box **89** by means of endless chain **90** extending around sprockets **91** and **92**. Cam box **89** houses a plurality of cams (FIG. **7**) which are rigidly connected to axle **94**. A plurality of valves and switches are connected to cam box **89** and open and close in response to the movement of the cam in the cam box in a conventional manner. The valves are connected between a source of air pressure and rams **35**, **44**, **50**, **55** and **76** as will be more fully illustrated by referring to FIG. **7**.

As is illustrated in FIG. **7**, cams **101**, **102**, **103**, **104**, **105**, **106** and **107** are rigidly connected to axle **94** and rotate in unison. Switch **111** and valves **112**, **113**, **114**, **115**, **116** and **117** are spring urged into engagement with their respective cams. Air supply **118** pressurizes manifold **119**, and various air ducts communicate between manifold **119** and valves **112–117**. Foot switch **120** is located at the sewing machine operator's position at sewing station **10** and functions to close an electrical circuit to electric motor **88**. When motor **88** is energized, axle **94** is rotated, and cam **101** closes switch **111**. Switch **111** functions as a holding switch so that when the machine operator releases foot switch **120**, motor **88** will continue to operate, causing axle **94** to continue to rotate until the indentation of cam **101** returns to the position of switch **111**, whereupon the holding circuit is broken and axle **94** and the cams carried thereby no longer rotate.

Cams **106** and **107** are arranged to shift their respective valves **116** and **117** immediately after motor **88** is energized. Air is taken from a position immediately downstream of the air supply **118** through valve **117** to air ducts **85** at the grasping area of work table **11**. Air from manifold **119** passes through valve **116** and causes grasping member ram **35** to retract its ram rod **36**, thereby causing grasping member **31** to move its grasping fingers **38** together or to close or grip or grasp a garment at grasping area **86**.

As axle 94 continues to rotate, cams 104 and 105 shift their respective valves 114 and 115, causing pressurized air to flow from manifold 119 to elevating ram 50 and turning ram 55. Elevating ram extends its ram rod 51 while turning ram retracts its ram rod 58, thus causing transfer arm to move in an upward and lateral direction, generally through an arc from the grasping area 86 of work table 11 toward garment release area 84 at stacker member 14.

As axle 94 continues to rotate, cam 107 shifts its valve 117 to terminate the flow of air through air ducts 85 in the grasping area of the work table, and cam 103 shifts its valve 113. Air then flows from manifold 119 through valve 113 to pivot ram 44 causing ram rod 45 to retract and pivot grasping member 31 about socket 26 at the end of transfer arm 24.

As axle 94 continues to rotate, cam 106 allows its valve 116 to return to its original position and cam 102 shifts its valve 112. These valves are shifted simultaneously so that grasping member ram 35 causes grasping member 31 to release the garment as packing plate ram extends its ram rod 78, causing packing plate 64 to move in a downward arc 82 through garment release area 84 and carry the released garment with it. An additional air flow regulator is placed in the line upstream from valve 112 so that both the speed and force of the packing plate in its upward and downward movements can be regulated.

As axle 94 continues to rotate, cams 104, 105 and 103 cause their respective valves 114, 115 and 113 to shift back to their original positions, thus reversing elevating ram 50, turning rams 55 and pivot ram 44, causing transfer arm 24 to begin its movement back toward its original position at grasping area 86 of work table 11 and grasping member to pivot back to its ready position. Shortly thereafter, cam 102 shifts its valve 112 and causes ram 76 to oscillate packing plate 64 back to its upright position. By the time axle 94 has rotated through 360° the cycle of all the movements will have been completed, and cam 101 of micro switch 111 will cause the micro switch to open, thereby opening the holding circuit made to electric motor 88. The system then rests until the sewing machine operator presses her foot switch 120 to start the cycle again.

As is illustrated in the sequence of operation in FIGS. 2, 3, 4, 5 and 6, grasping member 31 is normally positioned immediately above the grasping area 86 on the work table, so that when the sewing machine operator finishes the sewing function on the collar 121 of a shirt 120, the grasping member 31 will be located just above the collar and its grasping fingers 38 will be in alignment with the collar. Guide shield 122 is attached to the work table and is located so that when the sewing machine operator pushes the tail and body portion of the shirt out of her way toward the rear edge of the work table, the collar 121 will generally remain beneath grasping member 31.

When the sewing machine operator closes her foot switch 120 to actuate garment grasping member 13, grasping fingers 38 will pivot toward each other through downward arcs and their pads 42 will engage the collar 121 on opposite sides of the center of the collar while air ducts 85 direct a stream of air in an upward direction intermediate the ends of the collar, causing the collar to fold upwardly. As the grasping fingers continue to close, the collar is lifted as illustrated in FIG. 3 and grasped as illustrated in FIG. 4.

As is illustrated in FIG. 4, transfer arm 24 moves in an upward and lateral direction, generally through an arc about upright support rod 20, (FIG. 1) toward garment release area 84 at packing plate 64 of stacker member 14. In order that the shirts be stacked with their collars oriented with the folds extending in a generally horizontal plane, or in a generally flate configuration, the shirt which is hanging from its collar is pivoted about the end of transfer arm 24 as illustrated by arrow 125 in FIG. 5.

When grasping member 31 releases shirt 120, packing plate 64 moves in the direction indicated by arrow 82 through an arc of approximately 90° from a generally upright attitude toward a generally horizontal attitude, and engages the side of the shirt and urges the shirt from its upright attitude to the horizontal attitude illustrated in FIG. 6. As a shirt moves through the arc 82, it will move toward trolley 81, and as subsequent shirts are handled in this manner they are arranged in a stack 126 that has all of the collars 121 folded intermediate their ends, arranged flat at one end of the stack and facing in the proper direction. Under normal circumstances, the stack 126 will be neatly formed and all of the shirts will be in the predetermined position which is proper for retrieval by the operator at a subsequent sewing station.

While this particular stacker member 14 and garment grasping member 13 have been illustrated as being used at a sewing station where the "collar connect" function in a shirt making processing is performed, it will be understood that the garment grasping means and stacker member can be utilized at the "collar finish" sewing station, or at virtually any sewing station where a sewing function is performed on a collar. The grasping member 31 has been constructed so as to specifically grasp shirt collars and the movement of garment grasping member 13 has been arranged so as to trail the lower portion of the shirt in a downward direction generally behind the collar as the shirt is lifted or moved away from grasping area 86 toward release area 84. This is so the shirt will be properly oriented for lateral and downward engagement by stacker member 14. The arrangement is desirable for rather long garments, such as shirts, trousers or ladies' dresses, etc. These larger garments are somewhat shapeless and cumbersome to handle at the various garment parts connecting stages in the garment manufacturing process, and it is highly desirable to have the garments properly stacked for subsequent sewing operation.

While the garment grasping means 13 and stacker member 14 have been specifically disclosed as being used in connection with shirt making steps, it will be understood that the grasping member 31 can be adjusted or modified to grasp other garments, particularly pants, by changing the shape of grasping fingers 38. Moreover, stacker member 14 can be used without modification to move pants through the downward arc 82 to a stack 126 if desired. Of course, packing plate 64 not only functions to move the garment through the arc 82, but also functions to pack the garment in the stack, which is a desirable feature for the lighter material which might be used in shirts, etc.

While the invention has been described in detail with particular reference to preferred embodiments thereof, it will be understood that variations and modifications can be effected within the spirit and scope of the inven-

tion as described hereinbefore and as defined in the appended claims.

I claim:

1. In a method of manufacturing shirts or the like, the steps of performing a sewing function on the collar of the shirt with a sewing machine, gathering the ends of the collar downwardly together about the neck portion of the shirt, lifting the collar in an upwardly inclined direction away from the sewing machine while trailing the remaining portion of the shirt in a downward direction, and orienting the shirt in a general horizontal attitude with the collar folded intermediate its ends.

2 In a method of manufacturing shirts or the like having collars attached thereto, the steps of:

performing a sewing function on the collar of a shirt,

sequentially grasping and moving the collar of the shirt away from the sewing machine while trailing the remaining portion of the shirt in an approximately vertical attitude below the collar, releasing the shirt, and engaging and moving the shirt in a downward arc to an approximately horizontal attitude in a stack of shirts.

3. Apparatus for stacking garment parts or the like at a sewing machine comprising a garment grasping member, a support arm connected at one of its ends to said grasping member and arranged to move said grasping member between said sewing machine and a garment release area, a stacking member movable between the garment release area and stacking area, fluid powered control means comprising a first ram member for closing and opening said grasping member, a second ram member for moving said support arm in an upward direction, a third ram member for moving said support arm laterally away from said sewing machine, and a fourth ram member for moving said stacking member between the garment release area and the stacking area, said first, second, third and fourth ram members being constructed and arranged for sequentially causing said grasping member to grasp a garment at the sewing machine, causing said support arm, grasping member and garment to move to the release area, causing said grasping member to release the garment and causing said stacking member to move the garment from the release area to the stacking area.

4. The apparatus for stacking shirts or the like received from a sewing machine comprising a garment grasping member for grasping the collar portion of a shirt, a support member connected to said grasping member and arranged to move said grasping member and the shirt grasped by said grasping member away from the sewing machine to a garment release area while trailing the portion of the shirt below the collar portion downwardly below the collar portion, a stacking member movable through a downward arc between the garment release area and a stacking area below the garment release area, control means connected to said grasping member, support member and stacking member for sequentially causing said grasping member to grasp a garment at the sewing machine, moving the support arm, grasping member and garment to the release area, and then simultaneously causing said grasping member to release the garment in the release area and causing said stacking member to engage the garment and move the garment from the release area through a downward arc to the stacking area.

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