

Dec. 14, 1965

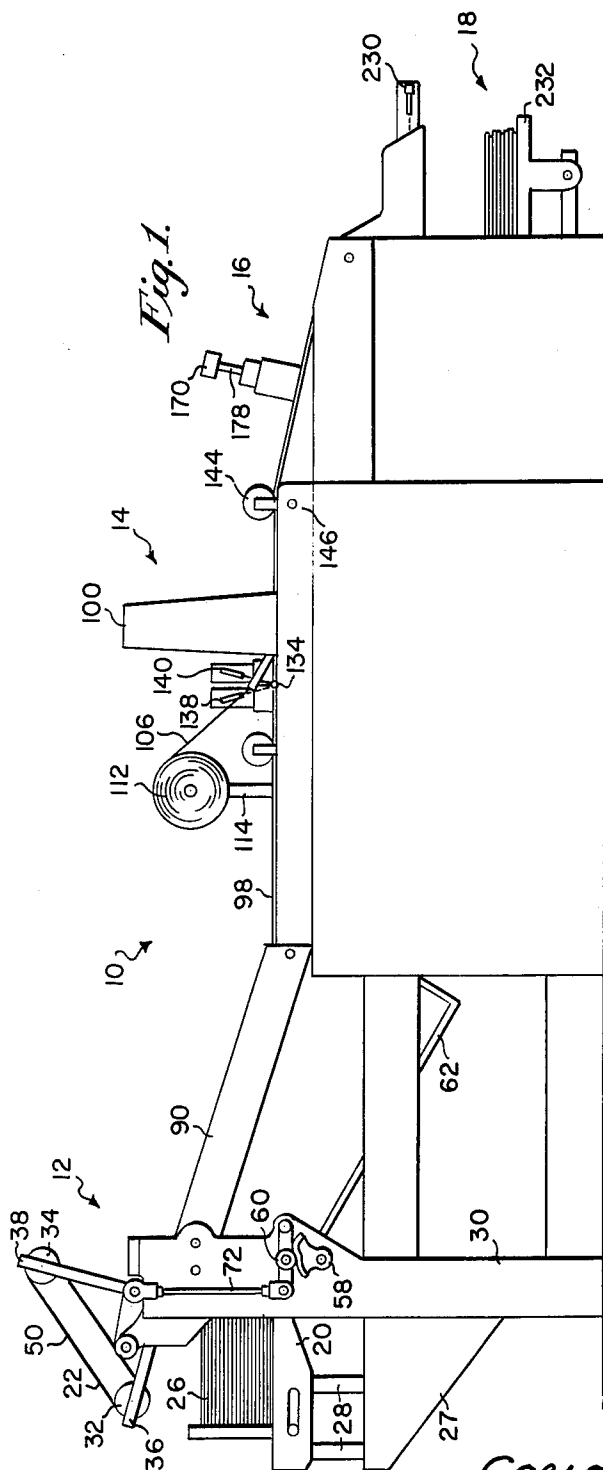
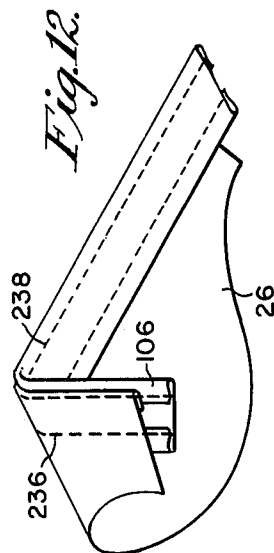
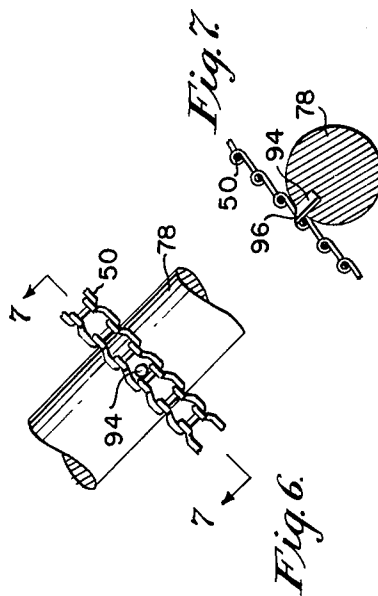
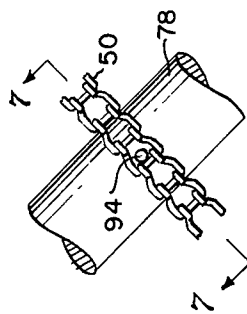
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3,223,059

AUTOMATIC FEEDING, SEWING, CUTTING AND STACKING APPARATUS

Filed March 1, 1962

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

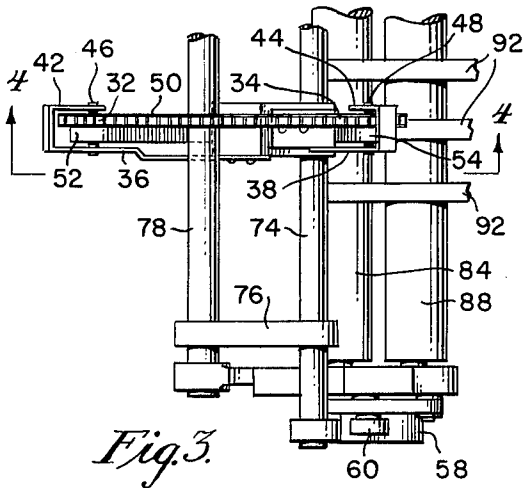


Fig. 3.

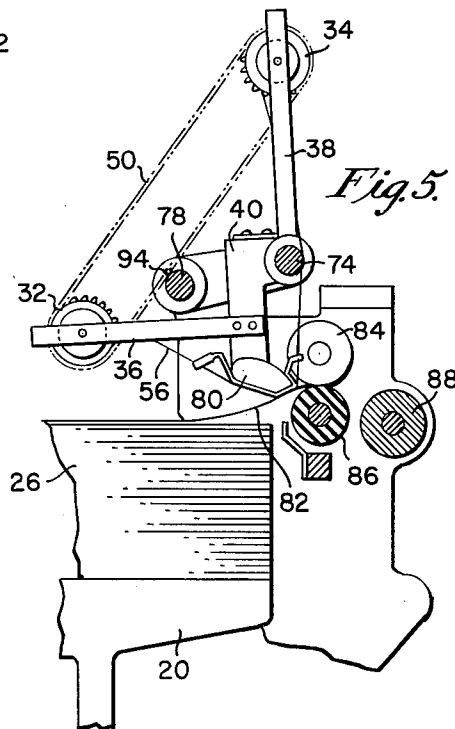


Fig. 5.

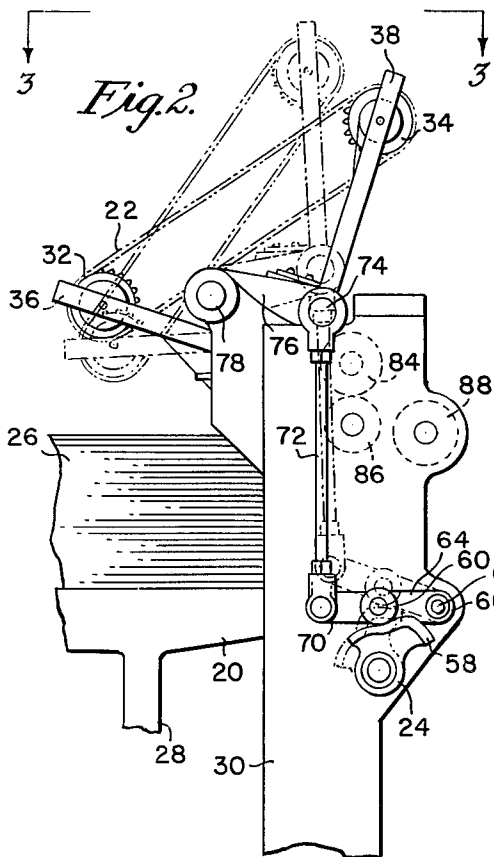


Fig. 2.

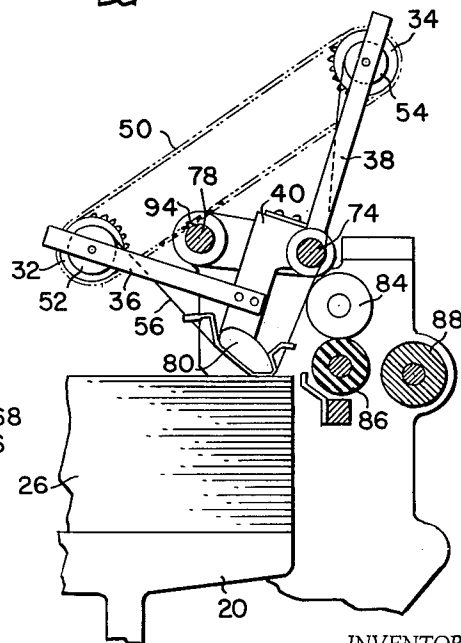


Fig. 4.

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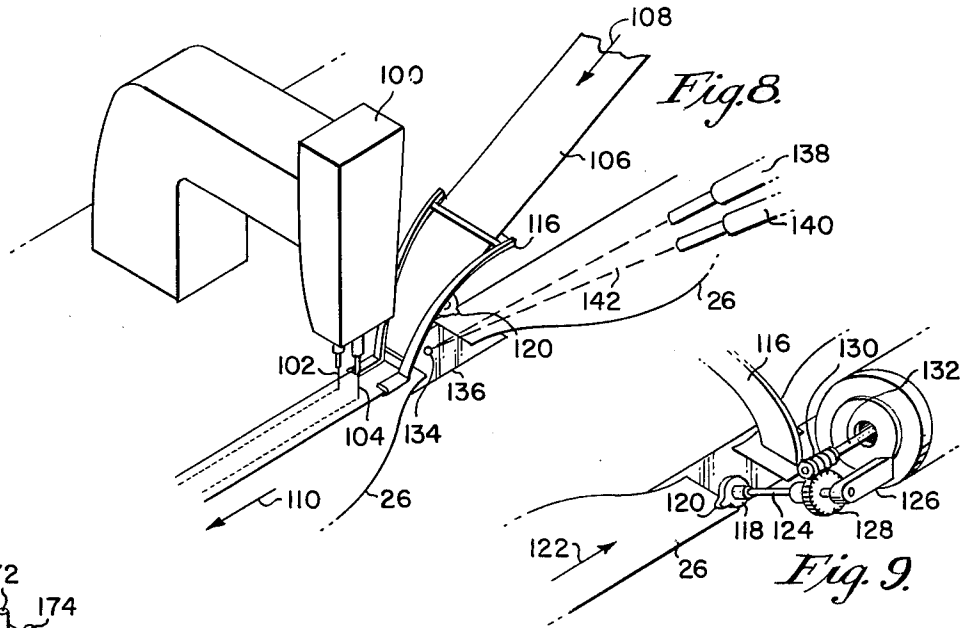
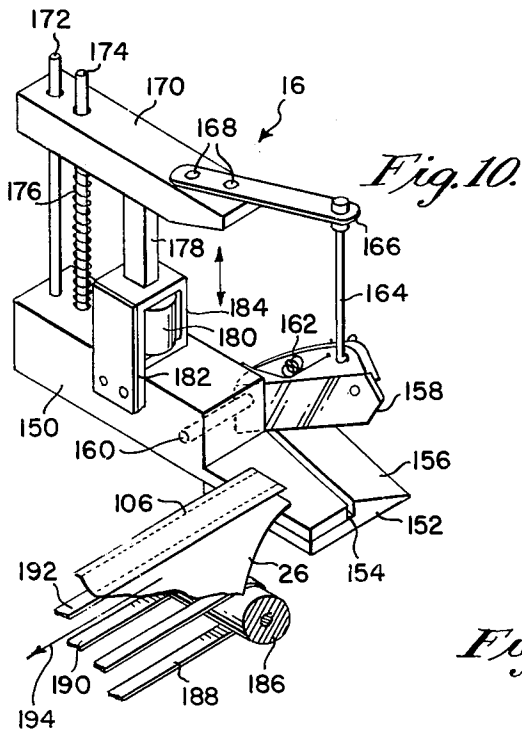
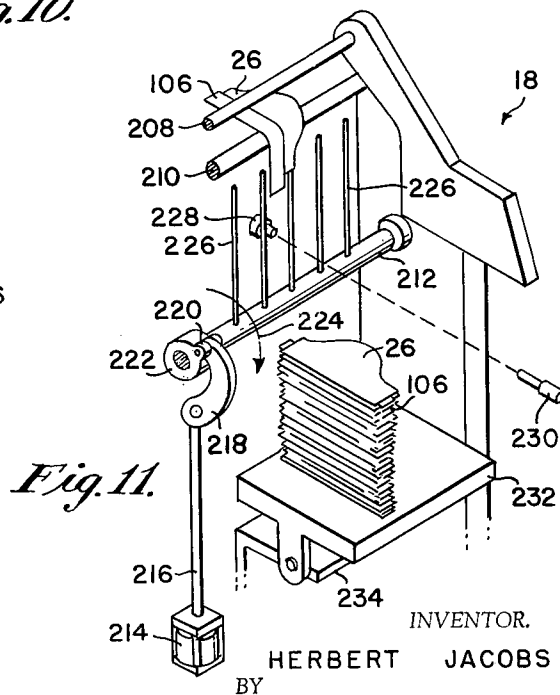
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AUTOMATIC FEEDING, SEWING, CUTTING AND STACKING APPARATUS

Filed March 1, 1962

4 Sheets-Sheet 3



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4 Sheets-Sheet 4

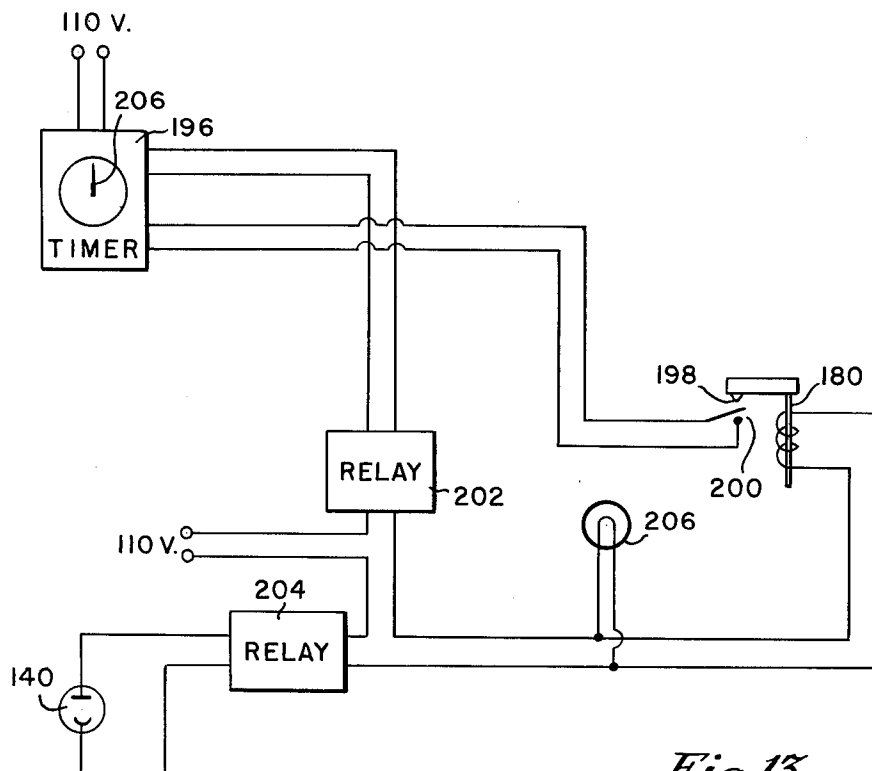


Fig. 13.

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3,223,059

AUTOMATIC FEEDING, SEWING, CUTTING AND STACKING APPARATUS

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Filed Mar. 1, 1962, Ser. No. 176,593
6 Claims. (Cl. 112—2)

This invention relates to a sewing apparatus and has as its objective the provision of the automatic sewing machine assembly.

With the rise of foreign competition in the textile field, it has become incumbent upon domestic manufacturers to increase productivity in order to overcome a financially unfavorable wage differential. Therefore, many attempts have been made in the past years to automate the various sewing processes. Such prior attempts have been successful to some degree, but the ultimate goal, namely, to achieve a sewing apparatus which is fully automatic is yet unachieved.

It is, accordingly, a prime objective of the present invention to provide a sewing assembly which is substantially fully automatic.

A further object of the present invention is to provide an automatic sewing machine with complementary feeding means, cutting means and stacking means.

A still further object of the present invention is to provide an automatic sewing machine and an automatic cutting device which are synchronized with respect to each other.

Yet a further object of the present invention is to associate timing means with respect to the solenoid-actuated cutting means in order to increase the useful life of the solenoid which actuates the cutting means.

A still further object of the present invention is to provide a novel feeder belt assembly in conjunction with the feeding means.

The foregoing as well as other objectives of the invention are achieved by providing an automatic sewing apparatus which basically comprises a feeder station, a sewing station, a cutting station and a stacking station.

In the specific embodiment to be detailed hereinafter, a continuous binding is automatically sewn to a piece of shoulder goods, but it should be understood that many other sewing variations will be obvious to those skilled in the art.

The feeding station basically comprises a platform for holding the stacked shoulder goods, and a reciprocating feeder belt assembly including a feeding belt for moving the shoulder goods, one by one, on to a conveyor belt to the sewing machine.

The sewing machine is automatically activated by photo-sensitive means tied in with a solenoid-switch arrangement. The cutting means are also activated by photo-sensitive means. A timer is associated with the cutting means in order to extend the useful life of the cutter solenoid which actuates the cutting means.

A stacking station is provided to automatically stack the product after the sewing and cutting operations have been completed.

Automatic stopping controls are associated with both the feeder platform and the stacking means for emergency purposes as when the feed supply is exhausted. Also, the feeder belt assembly has a safety stop associated therewith should the feeder belt break.

Finally, a warning light is provided to become operative should the feeder means fail to feed goods to the sewing machine.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

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FIG. 1 is a partly diagrammatic side elevational view of the entire apparatus embodying the present invention;

FIG. 2 is an enlarged side elevational view of the feeding station, showing in phantom an intermediate operative position of the feeder belt assembly;

FIG. 3 is a sectional view taken along the lines 3—3 of FIG. 2;

FIG. 4 is a sectional view taken along the lines 4—4 of FIG. 3 showing the feeder belt picking up a piece of shoulder goods;

FIG. 5 is a sectional view similar to FIG. 4 but showing the feeder belt discharging the shoulder goods;

FIG. 6 is an enlarged detailed view of a chain associated with the feeder belt assembly;

FIG. 7 is a sectional view taken along the lines 7—7 of FIG. 6;

FIG. 8 is an enlarged perspective view of the sewing station taken from one side thereof;

FIG. 9 is a perspective view similar to FIG. 8, but taken from the other side thereof;

FIG. 10 is an enlarged perspective view of the cutting station;

FIG. 11 is an enlarged perspective view of the stacking station;

FIG. 12 is a perspective view of a typical completed piece of work; and

FIG. 13 is a wiring diagram showing the association of the timer with the cutter solenoid.

Referring now in greater detail to the various figures of the drawings wherein similar reference characters refer to similar parts, an automatic sewing apparatus embodying the present invention is generally shown at 10 in FIG. 1.

The automatic sewing apparatus basically comprises a feeder station 12, a sewing station 14, a cutting station 16 and a stacking station 18.

The feeder station 12 is shown in considerable detail in FIGS. 2 to 5 and basically comprises a platform 20, a feeder belt assembly 22 and actuating means 24.

The shoulder goods 26 to be sewn are stacked upon the platform 20 which is adjustable to present the topmost piece of goods at a desirable fixed height with respect to the feeder belt assembly 22 as will be discussed in detail hereinafter. The feeder belt assembly 22 is adapted to move in a cycle (see the phantom position of FIG. 2).

Such cyclical movement causes a corresponding actuation of gearing (not shown) which is associated with the standards 28 of the platform 20 mounted in support 27. This overall arrangement is well known in the printing and duplicating machine arts and has the net effect of moving the platform 20 upwardly a distance corresponding to the thickness of one of the pieces of shoulder goods 26 so that the uppermost piece of shoulder goods is always at the same height with respect to the feeder belt assembly 22. Attention is referred to United States Patents No. 1,963,694, No. 2,083,296, and Re. 20,581.

The feeder belt assembly 22 is mounted on frame 30 of apparatus 10 and is best shown in FIGS. 2 to 5. The feeder belt assembly basically comprises a pair of ratchet wheels 32 and 34 which are rotatively mounted respectively on arms 36 and 38. As shown in FIGS. 4 and 5, the lower ends of the arms 36 and 38 are secured to a pivotable block 40 whose movement will be discussed in greater detail hereinafter. The upper ends of the arms 36 and 38 are bent in a U-shaped configuration to furnish respectively parallel spaced tabs 42 and 44. An axle 46 is suspended between arm 36 and tab 42 and an axle 48 is suspended between arm 38 and tab 44. The wheel 32 is rotatively mounted on axle 46 and the wheel 34 is rotatively mounted on axle 48. Appropriate bearings or spacers may be used where necessary. An endless chain 50 extends about peripheral portions of the

wheels 32 and 34 for purposes which will be discussed hereinafter.

It is to be noted that a reel 52 is rotatively mounted on axle 46 so as to be coaxial with wheel 32. In a similar way, a reel 54 is coaxially mounted on axle 48. Adhesive means, such as, adhesive tape 56 or other adhesive means is provided in roll form on one of the reels 52 or 54, is unwound therefrom and is then re-wound on the other of the reels 52 or 54 for purposes as will be discussed hereinafter.

The adhesive tape 56 plays an important function in the feeding of the stacked pieces 26 from the platform 20 toward the sewing machine as will now be described. As previously mentioned, the feeder belt assembly 22 is adapted to move in a cycle as indicated by the phantom position of FIG. 2. A similar movement or cycle is shown in the United States Patent No. 1,963,694, No. 2,083,296, and Re. 20,581.

The foregoing movement is caused by the action of actuating means 24 including cam 58 upon a cam follower 60 (FIG. 2). The cam 58 is caused to rock back and forth between the full line and phantom position of FIG. 2 by means of a crank 62 generally illustrated in FIG. 1. The crank 62 is appropriately connected to a motor (not shown).

The cam follower 60 is mounted on a lever 64 which has one end 66 pivoted at 68. The free end 70 of the lever 64 has an appropriately secured rod 72 rising therefrom.

Secured to the upper end of rod 72 is a horizontal bar 74 which extends across the width of the entire apparatus as indicated in FIG. 3 and is held in appropriate supports. As shown in FIG. 3, an arcuate cam 76 is secured to the bar 74 and has a free end which rests or is biased to rest on a second horizontal bar 78 which acts as a follower for the cam 76 as will be discussed hereinafter.

The pivotable block 40, to which the arms 36 and 38 are secured, is secured to the bar 74 so that the rocking movement of the bar 74 between the full line and phantom position of FIG. 2 is conveyed to the block 40 and is in turn conveyed to the entire feeder belt assembly as indicated in FIG. 2.

When the cam 58 rocks between the full line and phantom position of FIG. 2, the cam follower 60 and its associated lever 64 are forced upwardly at one end to the phantom position of FIG. 2. This in turn forces the rod 72 upwardly to the phantom position of FIG. 2. Because the cam 76 is urged against the bar 78, the upward movement of the bar 74 is guided thereby to the phantom position of FIG. 2. Such upward movement gives rise to a gentle tilting action of the bar 74. Inasmuch as the block 40 is secured to the bar 74, the block 40 is likewise induced to tilt. This causes a counterclockwise movement of the arms 36 and 38 as viewed in FIG. 2 to the phantom position of FIG. 2.

It, thus, follows that the adhesive means 56 extending from reels 52 and 54 undergo a similar movement as illustrated in more detail in FIGS. 4 and 5. As shown in FIGS. 4 and 5, the adhesive tape 56 is threaded about feeding means, such as, a feeder foot 80 which is secured to the block 40. Thus, when the block 40 is moved from the position of FIG. 4 to the position of FIG. 5, the foot 80 is thrust forwardly. Because the adhesive means 56 positioned about the foot 80 was in contact with the topmost piece 82 of shoulder goods 26, said topmost sheet 82 is carried forward with the foot 80, as shown in FIG. 5, to rollers 84 and 86. The rollers then pull the piece of goods 82 away from the foot 80 onto idler roller 88 and then down an inclined rolling guideway 90 toward sewing station 14.

When the cam 58 returns to the full line position of FIG. 2, the foot 80 returns to the position of FIG. 4 against a new topmost piece of goods. Where desired, the foot 80 may be spring biased or floatingly held against the topmost piece of goods. Belts 92 may ex-

tend down the incline 90 in order to facilitate the transport of the shoulder goods to the sewing area.

In order that a fresh adhesive surface may be presented by adhesive tape 56 after each cycle of foot 80, there is provided on bar 78, as best shown in FIGS. 6 and 7, a pin 94 having a wedge-shaped tip 96. With each slight upward movement of the platform 20 upon the feeding of a piece of shoulder goods, gearing associated with the means for raising the platform 20 as previously discussed, cause the bar 78 to pivot counterclockwise against the link of the chain 50 to move the chain 50 the length of a link. The wedge-shape of the tip 96 enables the pin 94 to slip past the link which has been moved and to enter a new link. Such movement of the chain 40 causes a corresponding rotation of wheels 32 and 34. This in turn induces a corresponding rotation of reels 52 and 54 which in turn causes a slight movement of the adhesive tape 56. Thus, a fresh adhesive surface is presented to the uppermost piece of the shoulder goods 26.

It is preferred that the movement of the adhesive tape 56 to provide a fresh adhesive surface as previously described be timed to occur after the topmost sheet 82 has been withdrawn from the foot 80 and before the foot 80 returns to the position of FIG. 4 in contact with a new uppermost sheet 26.

When the adhesive tape has been completely transferred from one of the wheels 52 or 54 to the other wheel, either a new roll of adhesive tape may be employed or the wound roll of tape may be replaced to its initial position to be used again. Also, an automatically reversing mechanism such as that employed in a typewriter, may be employed to eliminate the need for replacing the re-wound roll of tape to its initial position.

Of course, the adhesive tape 56 is merely illustrative of one type of carrying means to move the stacked pieces of shoulder goods 26 or other material, one by one, toward the sewing station 14. The adhesive tape may be replaced by other holding means, such as, mechanical tacks or a suction device. In addition, other timed or sequential feeding devices will be apparent to those skilled in the art.

It is to be further noted that the tension applied to adhesive tape 56 as it is being held and moved between the reels 52 and 54, holds a switch (not shown) in a closed position. Should the adhesive means break, such a switch would automatically open to stop further progress of the machine inasmuch as a breaking of the adhesive tape 56 will prevent the feeder foot 80 from carrying out its normal function.

As previously discussed, the pieces of shoulder goods 26 are moved, one by one, toward the sewing station 14. Towards this end, appropriate rollers or conveyors are provided along the sewing station platform 98.

The details of the sewing station 14 are best shown in FIGS. 1, 8 and 9. The sewing machine 100 is of a type well known to the art and, as shown in FIG. 8, includes a pair of spaced sewing needles 102 and 104 which stitch a relative narrow binding 106 to a piece of shoulder goods 26. The path of travel of the binding 106 and the shoulder goods 26 is indicated by the arrows 108 and 110. As shown in FIG. 1, the binding 106 is held in roll form 112 supported by standard 114. The binding 106 is led to a converging former and placer 116 which positions the binding 106 in desired relationship with respect to a piece of shoulder goods 26 as shown in FIG. 8.

The piece of goods 26 is carried past the sewing needle by virtue of the action of a disk 118 (FIG. 9) which is positioned immediately before the sewing needles 102 and 104. The disk 118 includes a finger 120 which urges the goods 26 in the direction of arrow 122 as the disk 118 is rotated. The disk 118 is secured to a shaft 124, the other end of which is secured to a bracket 126. A gear 128 is secured on the shaft 124 as shown in FIG. 9 and

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is operatively engaged by a worm gear 130 secured to a shaft 132 which is driven by a motor (not shown). Thus, rotation of the shaft 132 causes a corresponding rotation of gear 128 which in turn causes a corresponding rotation of disk 118 to carry a piece of goods 26 to sewing needles 102 and 104.

It should be noted that the binding 106 is merely drawn from roll form 112 by virtue of the action of disk 118 and the other rollers which move the shoulder goods through the sewing station. Of course, driving means may be associated with the binding 106 if so desired.

As shown schematically in FIG. 1, a light source 134 is positioned beneath a clear plastic plate 136. As indicated in FIG. 8, the shoulder goods 26 pass over the clear plastic plate 136 immediately before arriving at needles 102 and 104. The light source 134, accordingly, shines through the clear plastic plate 136 and is intercepted by photosensitive cells 138 and 140 positioned above plate 136. Both photosensitive cells 138 and 140 are of the microminiature type, are manufactured by the General Electric Company of Schenectady, New York, and are identified as part number 3S7505PH106.

The photosensitive cell 138 is of the light decreasing type and is, accordingly, activated when the beam of light 142 emanating from light source 134 is cut off by virtue of the passage of a piece of shoulder goods 26.

The photosensitive cell 140 is of the light increasing type and is activated whenever it is struck by the beam of light 142. The photosensitive cell 138 actuates the sewing machine and the photosensitive cell 140 actuates the cutter as will be discussed hereinafter.

Thus, when a piece of goods 26 passes over transparent plate 136, light beam 142 no longer strikes photosensitive cell 138. As the photosensitive cell 138 is of the light decreasing type, it is thereby activated to close a switch in the sewing machine circuit. Therefore, whenever the beam of light beam 142 is cut off by a piece of goods 26 advancing toward the sewing machine, the sewing machine is automatically turned on and will begin to sew the binding 106 to the piece of shoulder goods 26.

After the binding 106 has been sewn to a piece of goods 26, the sewn piece of goods is carried on by means of rollers, such as opposed rollers 144 and 146 toward the cutting station 16. Of course, once a piece of shoulder goods 26 has entirely passed the transparent plate 136, the beam of light 142 again strikes the photosensitive cell 138 which automatically turns the sewing machine off. However, the sewing machine will still sew the trailing portion of the piece of goods 26 by virtue of its rotational inertia. Furthermore, the disk 118 rotates at all times and so will feed another piece of goods 26 to the sewing area as soon as the same is received from the feeding station 12.

Although, rolls beneath the sewn goods 26 continue to turn to move the goods 26 toward the cutting station 16, the fact that the binding 106 is a continuous web extending back to a point before the sewing machine and the fact that the binding is held at the sewing machine by the needles 102 and 104, prevents travel of the sewn shoulder goods 26 toward the cutting station 16 whenever the sewing machine is turned off. Of course, as soon as the sewing machine is turned on, the goods will again continue their travel toward the cutting station.

The cutting station 16 is detailed in FIG. 10 and comprises a base 150 and an extending cutting block 152 with a knife receiving slot 154 and a downwardly tapering receiving ramp 156. A knife 158 is pivotally held in support 150 by means of a cylindrical bar 160 passing through a complementary opening in the base 150 and knife 158. A coil spring 162 has one end secured to the knife 158 and has the other end secured to the base 150. The function of the coil spring 162 is to hold the knife in the open position of FIG. 10. The knife 158 is also held in position by means of an upwardly extending rod 164 which is fixedly engaged in a horizontal

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support bar 166. The bar 166 is secured at 168 to a vertically movable platen 170. The platen 170 is movably spaced from the base 150 by means of guide rods 172 and 174 secured in base 150 which slidably pass therethrough. A coil spring 176 is provided about the rod 174 in order to urge the platen 170 upwardly and thereby assist the coil spring 162 in holding the knife 158 in the open position of FIG. 10. Also depending downwardly from the platen 170 is a solenoid plunger 178 which extends into solenoid 180 which is held on the base 150 by means of bracket 182 and housing 184.

It is, thus, seen that when solenoid 180 is actuated, the plunger 178 is pulled into the solenoid 180 in a downward direction. This in turn forces the platen 170 in a downward direction as guided by the bars 172 and 174 against the force of coil spring 176. As the platen 170 travels downwardly, the horizontal support bar 166 is carried with it. This in turn causes the knife 158 to pivot downwardly about pin 160 against the force of spring 162. Thus, when the platen 170 has reached its lowermost position, the knife 158 is positioned in the slot 154 and has cut through a piece of shoulder goods 26 with binding 106 if the same had been positioned over the slot 154. The cut goods are then carried toward stacking station 18 by means of rollers, such as rollers 186, and associated belts 188, 190 and 192 in the direction of arrow 192. When solenoid 180 is no longer actuated, the plate 170 immediately returns to its upper position of FIG. 10 under the force of springs 162 and 176 thereby opening knife 158.

As previously discussed, photosensitive cell 140 is of the light increasing type and is connected to actuate the solenoid 180 of the knife. Thus, whenever the transparent plate 136 is not covered by a piece of goods 26, the light beam 142 may strike the photosensitive cell 140 and thereby cause the knife 158 to cut or to hold the same down until the beam of light 142 is covered by another piece of advancing goods 26. With such an arrangement, the solenoid would be actuated for a considerable proportion of the time of machine operation inasmuch as plate 136 is uncovered for a considerable period of time and, thus, might require frequent replacement.

In order to lengthen the usable life of the solenoid and also to have the knife held in the open position most of the time to allow a new piece of goods 26 to pass thereunder into cutting position, a timer 196 is inserted in the knife solenoid circuit as shown in FIG. 13. As shown in FIG. 13, the solenoid 180 has a contact 198 associated therewith which will close a microswitch 200. This closes the circuit back to timer 196 which in turn permits relay 202 to move to the off position thereby causing the circuit leading to relay 204 to be opened.

The relay 202 is manufactured by the General Electric Company and is identified as part number 3S7505GP108A1. The relay 204 is an all-purpose relay manufactured by the Guardian Electric Company. Moreover, all of the solenoids used in connection with the present invention are manufactured by the Guardian Electric Company and are identified as part number 18A.C.-117-1.

The timer 196 is of a type well known in the field and possesses an indicator hand 206 which may be set at a predetermined time interval from the twelve o'clock position of FIG. 13. When the timer has been set and then activated by an appropriate electrical signal, the indicator hand 206 will move to the zero reading of twelve o'clock. When the zero reading is attained, the indicator hand 206 is automatically reset to its previous setting.

As shown in FIG. 13, when solenoid 180 is actuated, contact 198 causes microswitch 200 to be thrown thereby closing the circuit to the timer 196 which in turn causes relay 202 to move to the off position thereby opening the circuit through relay 204 from photosensitive cell 140.

Thus, the solenoid 180 will now not be actuated even though a beam of light 142 is being intercepted by photosensitive cell 140.

As soon as the microswitch 200 was closed, the closing of the circuit leading therefrom to the timer caused the indicator hand 206 of the timer 196 to move from its setting to the zero position. A preferred setting of the indicator hand 206 is for 15 seconds for reasons which will be related hereinafter. When the indicator hand 206 reaches the zero setting, two things happen. First, the timer automatically resets the indicator hand 206 at its previous setting of 15 seconds. Second, relay 202 is turned on thereby closing the circuit to solenoid 180. It is to be noted that the timer 196 is manufactured by the Industrial Timer Corp. of Newark, New Jersey, and is identified as type P-1M, 115 v., 60 cyc., A10 I4-040.

By this time, however, a piece of shoulder goods 26 is now covering light source 134 thereby preventing the light beam 142 from being intercepted by photosensitive cell 140. Hence, although the solenoid circuit is again closed by the turning on of relay 202, the solenoid 180 will not be actuated until light strikes the photosensitive cell 140. When this happens, the solenoid is actuated, the contact 198 strikes the microswitch 200 to close the timer circuit and thereby reinitiates the cycle which has just been described.

It is to be appreciated that the feeder station 12 should supply a piece of goods 26 at the transparent plate 136 immediately prior to the time when the indicator hand 206 reaches the zero setting. Unless, a piece of goods 26 is covering the light source 134, the solenoid will be actuated as soon as the indicator hand 206 reaches the zero setting. This may occur whenever the feeding station 12 for any reason whatsoever fails to feed the shoulder goods 26 in proper sequence toward the sewing machine 100. When such failure occurs, the solenoid 180 will be actuated at the instant the indicator hand 206 reaches the zero position. At such time, the timer will try to reset the indicator hand 206 to the 15-second reading, but it will be unable to do so because the contact 198 immediately strikes the microswitch 200 to cause the indicator hand to move toward the zero position. Thus, the circuit to the solenoid will be repeatedly opened and closed. Such malfunction will be indicated to the operator by means of a light 207, which will flash during such malfunction as it has been placed in parallel with the solenoid circuit.

It is to be further noted as previously discussed that a piece of shoulder goods 26 should cover the light source 134 immediately before the indicator hand 206 reaches the zero setting. Thus, the feeder station 12 must feed a piece of shoulder goods in a time sequence, such as every 15 seconds, as determined by the setting on the timer 196. Thus, if the timer 196 is set for 15 seconds, the feeder station must feed a piece of shoulder goods every 15 seconds. It should also be realized that the setting of the indicator hand 206 additionally automatically sets the production of the machine. Hence, a counter may be associated to the timer 196 in order to record the production of the machine.

As soon as the binding 106, which is associated with a piece of shoulder goods 26, has been cut as shown in FIGS. 10 and 11, it is immediately fed by rollers 186 and associated belts toward the rollers 208 and 210 immediately above the stacking station 18 as indicated in FIG. 11.

The stacking station 18 basically comprises a rotatively mounted horizontal rod 212 and a solenoid 214 which is adapted to urge the vertical rod 216 associated therewith downwardly. An arcuate finger 218 is secured to the upper end of the rod 216 and is also secured at 220 to a point on the circumference of a collar 222 which is in turn fixedly secured to a horizontal rod 212. Thus, when solenoid 214 is actuated, the vertical rod 216 is urged downwardly thereby causing the arcuate finger 218

to be pivoted downwardly as shown by arrow 224. As the arcuate finger 218 pivots downwardly it causes the horizontal rod 212 to rotate in a clockwise direction in the direction of arrow 224. Thus, spaced parallel fingers 226 which are stacking means and secured to the rod 212 are rotated from the vertical position of FIG. 11 to a horizontal position. In so doing, the piece of sewn goods which is draped over roller 210 is caused to be stacked in a neat pile.

Such a stacking will not occur until the leading edge of the sewn goods 26 covers light source 228. This occurs when a piece of the sewn goods 26 is substantially in a vertical position and is essentially beyond the roller 208. In such a position, the light source 228 is covered and the photocell 230 sends a signal to the solenoid 214 which causes the rod 212 to rotate the fingers 226 to the horizontal position as previously discussed.

Stacker photosensitive cell 230 is manufactured by General Electric Company and is identified as part number 3S7505PH105. A relay is employed in the circuit of the stacker photosensitive cell. This relay is manufactured by the General Electric Company and is identified as part number 3S7505GP107. A similar relay is employed in the sewing machine circuit.

It is to be noted that emergency controls may be associated with the stacker platform 232. This platform extends upwardly from a lower platform 234 which is movable downwardly as the height of the finished pieces of shoulder goods 26 increases. This is done in order that the topmost piece of goods may always be a constant height with respect to the spaced fingers 226 of the stacker assembly. Such constant height is achieved by gearing similar to that employed in the feeding station 12 wherein the platform 20 was raised the thickness of a sheet 26 each time a sheet 26 was fed toward the sewing station. At the stacking station 18, the platform 232 is lowered the thickness of a finished piece of goods 26 each time a new piece of goods 26 is placed thereon. When a predetermined weight of goods has been placed on the platform 232, the aggregate weight thereon is sufficient to throw a switch which will automatically stop the machine. Similarly at the feeding station 18, when the predetermined minimum weight is reached such that there is substantially a total absence of stacked goods 26 to be fed toward the sewing station, a switch will be opened to stop the operation of the machine.

The finished product is shown in perspective in FIG. 12 wherein two rows 236 and 238 of stitching have been sewn in order to affix binding 106 to the shoulder goods 26.

In operation, the motors which drive the various transport rollers such as rollers 84, 86, 144, 146, 208 and 210 are turned on. The motor which drives the crank 62 is turned on in order to cause the cam 58 to pivot between the full line and phantom position of FIG. 2. The cam 58 is so shaped as to present a surface to the cam follower 60 which is first slowly increasing. Thus, the lever 64 is initially pivoted gently in the clockwise direction and then more rapidly to the phantom position of FIG. 2. When this occurs, the bar 74 is urged from the position of FIG. 4 to the position of FIG. 5. This causes a pivotable block 40 to be similarly urged resulting in the feeder foot 80 exerting a gentle and then rapid urging upon adhesive tape 56. The adhesive tape 56 may be "Scotch Brand" cellophane tape manufactured by the Minnesota Mining and Manufacturing Company of St. Paul, Minnesota.

Before the foot 80 is actuated, it presses an area of adhesive tape 56 against the topmost piece of goods 26. Thus, when the foot 80 is actuated to step forwardly and upwardly, as viewed in FIG. 5, it carries the topmost piece of goods with it. Said topmost piece of goods is carried forwardly so as to be caught between driven rollers 84 and 86 which initiate the journey of the sheet of goods toward the sewing station 14. Sub-

stantially, simultaneously, the platform 20 is moved upwardly the thickness of a piece of goods 26 in order to maintain the topmost piece of goods on a height identical with the piece of goods which was just fed toward the sewing station. At the same time the chain 50 is moved the length of a link by means of the action of bar 78 with pin 94. This causes a corresponding movement in adhesive tape 56 which is drawn between reels 52 and 54 that are mounted respectively coaxially with the wheels 32 and 34. As the piece of goods 26 approaches the sewing machine 100, it covers light source 134 and thereby actuates photosensitive cell 138 which is of the light decreasing type and thereby turns the sewing machine on. The binding 106 is fed from roll form 112 through the former 116 to be placed in desired position with respect to the goods 26 before the same is fed to the needles 102 and 104 of the sewing machine.

When the piece of goods 26 has been sewn and has passed entirely beyond the sewing machine, the light source 134 is no longer covered and, thus, may strike the photosensitive cell 138 to turn off the sewing machine. As soon as a new piece of goods 26 covers the light source 134, the sewing machine will be turned on again and the first piece of goods will be further advanced toward the cutting station 16.

When the light source 134 strikes the photosensitive cell 140, which is of the light increasing type, the solenoid 180 causes the pivotally positioned knife 158 to cut the continuous binding sewn to a piece of goods 26 as shown in FIG. 10. As the solenoid 180 is actuated, it causes a contact 198 associated therewith to close a microswitch 200 which in turn closes the circuit back to timer 196 and immediately starts indicator hand 206 which is set for 15 seconds to move toward the zero position. At the same time, the relay 202 moves to the off position thereby opening the circuit leading to the photosensitive cell 140.

When the indicator hand 206 reaches the zero setting, two things happen. First, the timer automatically resets the indicator hand 206 at its previous setting of 15 seconds. Second, relay 202 is turned on thereby closing the circuit to solenoid 180.

By this time, however, a piece of shoulder goods 26 covers the light source 134 thereby preventing the photosensitive cell 140 from being actuated. As soon as the light source 136 is permitted to strike the photosensitive cell 140, the solenoid 180 is actuated to repeat the aforementioned timing cycle while cutting the next piece of goods.

The goods leaving the cutting station are then fed toward rollers 208 and 210 immediately above the stacking station 18. When the leading edge of the sewn goods 26 covers light source 228, photosensitive cell 230 sends a signal to the solenoid 214 which causes rod 212 to rotate the fingers 226 to a horizontal position thereby forming the finished goods into a stack upon platform 232.

It is to be noted that many other types of goods, such as sleeve goods, may be sewn with the apparatus of the present invention. Also, should the thread leading to the sewing machine 100 be broken, a switch (not shown) associated therewith will automatically open to halt the operation of the sewing machine.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed as the invention is:

1. An automatic sewing apparatus for performing at least one sewing operation on a piece of goods, said apparatus comprising automatic feeding means including reciprocable and forward thrusting feeder foot means, a sewing station, cutting means and stacking means, said

feeding means being adapted to feed automatically pieces of goods intermittently toward said sewing station in a predetermined sequence, said feeding means including a feeder belt assembly including adhesive tape means adapted to be advanced in a stroke by said reciprocable and forward thrusting feeder foot means bearing against said goods, means for advancing said adhesive means after a stroke of said feeder foot means in a predetermined manner, said sewing station including a sewing machine and means to actuate the sewing machine in response to the feeding of said goods, means adapted to actuate said cutting means in response to the movement of said goods through said sewing station and means adapted to actuate said stacking means in response to the movement of said goods beyond said cutting means.

2. The invention of claim 1 wherein said apparatus includes solenoid means, and wherein said means to actuate said sewing machine, said means to actuate said cutting means and said means to actuate said stacking means are at least one photosensitive means operatively associated with said solenoid means.

3. The invention of claim 2 wherein said cutting means includes a microswitch associated therewith and a contact associated with said cutting means and adapted to close said microswitch when said cutting means are actuated, a timer circuit associated with said microswitch whereby the closing of said timer circuit actuates a timer, said timer circuit including said timer, a relay circuit associated with said timer, said relay circuit including a relay and said photosensitive means for actuating said cutting means, whereby when said timer is actuated by the closing of said timer circuit, said relay is opened for a period of time determined by said timer and whereby when said timer has operated, said relay is turned on to permit said last-named photosensitive means to actuate said cutting means.

4. The invention of claim 1 wherein said feeding means includes cam means, said feeder belt assembly includes a pivotable block with said reciprocable feeder foot means being rocked by said cam means.

5. The invention of claim 4 wherein said block has supporting arms associated therewith, each of said arms holding a co-axial ratchet wheel and reel, chain means drivingly supported by said ratchet wheels, said adhesive means being suspended between said reels and threaded about said feeder foot means.

6. The invention of claim 5 including drive means associated with said chain means whereby when said block is rocked, said feeder foot means is caused to advance said adhesive means against a piece of said goods and thereafter forwardly toward said sewing station and whereby when said chain means are moved by said drive means, said adhesive means are advanced about said reels.

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