June 26, 1962 R. E. SAYLES 3,040,683

PLEATING ATTACHMENT FOR SEWING MACHINES

Filed Feb. 10, 1958 2 Sheets-Sheet 1

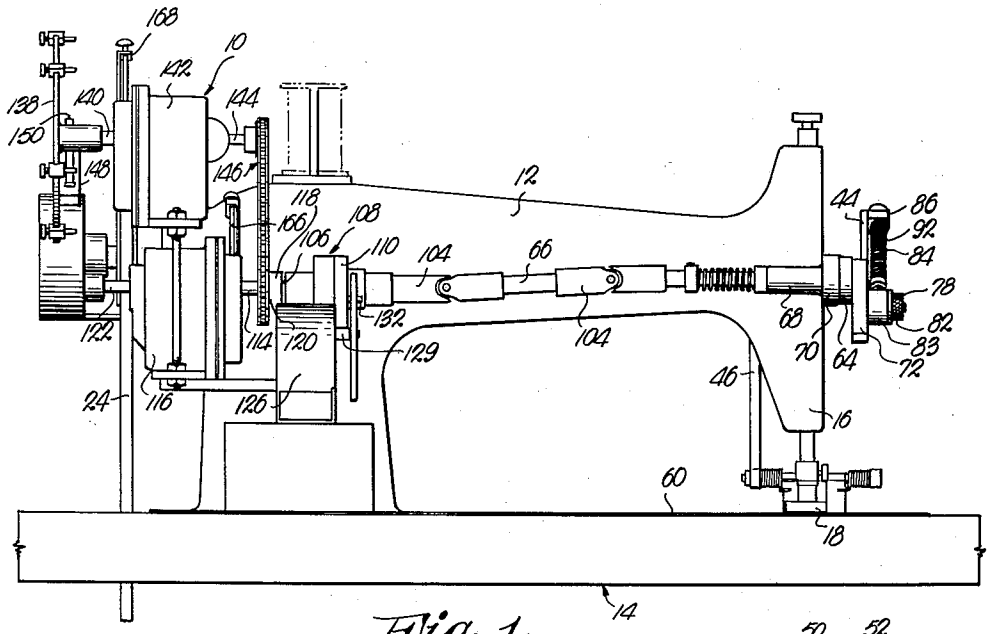


Fig. 1.

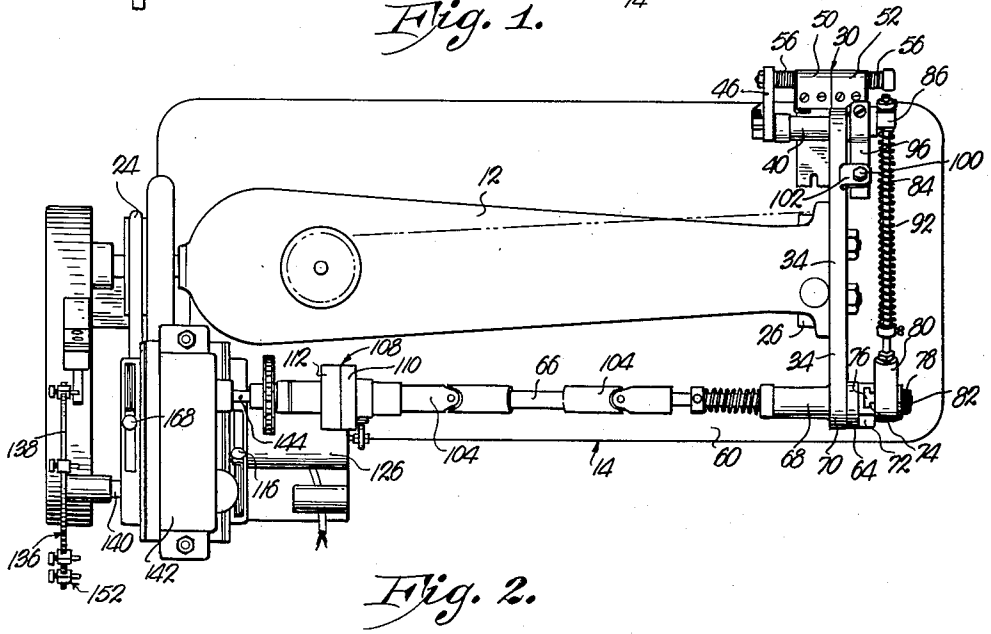


Fig. 2.

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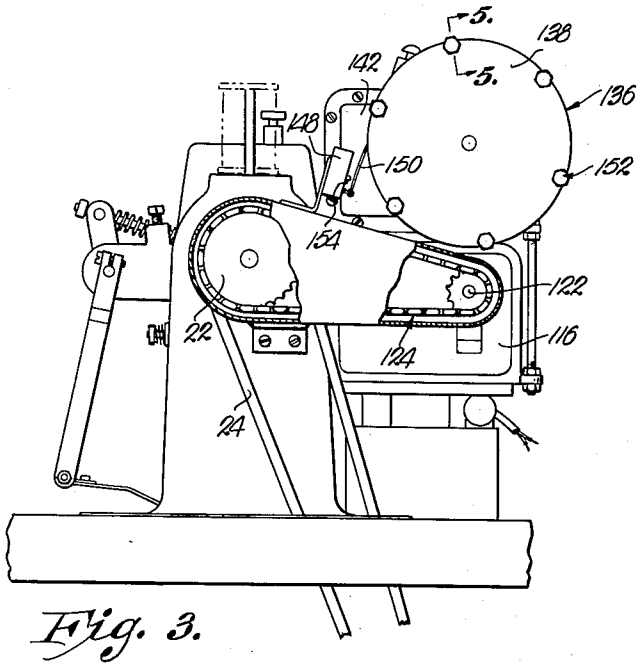


Fig. 3.

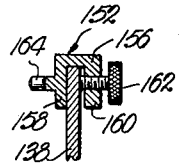


Fig. 5.

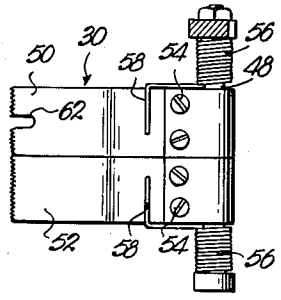


Fig. 6.

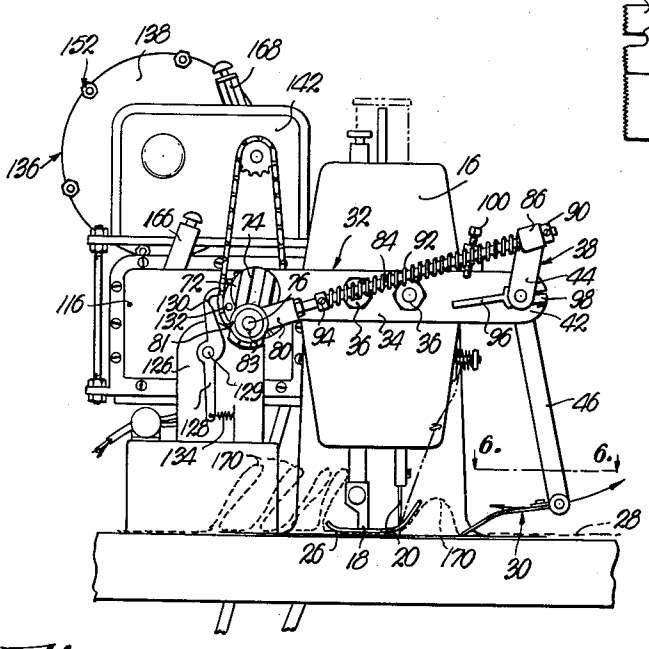


Fig. 4.

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3,040,683
PLEATING ATTACHMENT FOR SEWING MACHINES

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Filed Feb. 10, 1958, Ser. No. 714,396
17 Claims. (Cl. 112—134)

This invention relates to sewing equipment and more particularly, to an improved pleating attachment for power operated sewing machines.

It is the primary object of this invention to provide an attachment for a power operated sewing machine which is particularly adapted for pleating material being advanced through the machine completely independent of reciprocation of the needle of the sewing machine, to the end that pleats of virtually any size and any number for a selected length of the material may be formed as the pleats are sewn in place by the needle.

Another very important object of the invention is to provide a pleating attachment which includes a substantially horizontally reciprocable pusher element disposed adjacent the needle for engaging and pleating the material as the element is moved in a direction toward the needle, and wherein is provided power operated means coupled with the pusher element for reciprocating the latter at infinitely variable speeds within a preselected range so that the width of pleats formed in the material may be greatly varied.

Also an additional important aim of the invention is to provide a pleating attachment which includes cam actuated means associated with the power means operably driving the pleat forming pusher element for interrupting reciprocation of the latter at preselected intervals, so that the number of pleats formed in a designated length of the material may be varied.

Another important object relates to the provision of cam actuated means as described which is driven by infinitely variable power means within a predetermined range so that interruption of reciprocation of the pleat forming pusher element may be varied within a wide number of intervals.

Other important objects of the invention relate to the provision of single revolution clutch means interconnecting the shaft for reciprocating the pusher element and the power shaft rotatable at an infinitely variable rate within a preselected range, so that by providing means for preventing rotation of the clutch disk connected to the drive shaft coupled with the pusher element, reciprocation of the pusher element may be interrupted at preselected intervals to thereby permit variation of the number of pleats formed as the material is advanced through the machine; to the provision of solenoid means having an arm thereon releasably engageable with the clutch disk connected to the drive shaft coupled with the pusher element, so that rotation of the specified clutch disk may be stopped upon energization of the solenoid; to the provision of cam actuated switch means for energizing the rotary solenoid to the end that rotation of the clutch disk attached to the drive shaft coupled with the pusher element may be interrupted by suitable cam mechanism; to the provision of a cam wheel having a plurality of cams on the periphery thereof disposed to actuate the solenoid switch referred to above, so that interruption of reciprocation of the pusher element and thereby the number of pleats formed may be selectively controlled; to the provision of power means coupled with said cam wheel for rotating the same and infinitely variable within a preselected number of r.p.m. so that discontinuance of reciprocation of the pleat forming pusher element may be suitably controlled within a substantially infinite range; to the provision of structure reciprocably mounting the pleat forming pusher element on the head of the machine and which includes means for varying the length of the stroke of the pusher element so that the width of each pleat may also be selectively changed in this manner; to the provision of stop means on the structure for limiting movement of the pusher element toward the needle to prevent binding of the material as the same is pleated and advanced through the machine and to assure that the needle engages the pleat; to the provision of structure especially adapted for use on commercial type sewing machines and which may be constructed of readily available components without need for special machining and costly fabricating operations; and to other lesser objects and details of construction which will become obvious or be explained more fully as the following specification progresses.

In the drawings:

FIGURE 1 is a side elevational view of a pleating attachment embodying the principles of the present invention and showing the components thereof mounted in correct disposition on the head of a standard commercial sewing machine;

FIG. 2 is a plan view of the structure illustrated in FIG. 1;

FIG. 3 is an end elevational view of the pleating attachment mounted on the sewing machine head with certain components of the mechanism being broken away to illustrate details of construction;

FIG. 4 is an end elevational view of the opposite extremity of the machine and illustrating in phantom the manner in which the pusher element of the attachment forms pleats in material being advanced through the machine;

FIG. 5 is a cross-sectional view taken substantially on the line 5—5 of FIG. 3 and illustrating details of one of the cams forming a part of the mechanism; and

FIG. 6 is a horizontal, cross-sectional view taken substantially on the line 6—6 of FIG. 4 and looking in the direction of the arrows.

A pleating attachment broadly designated by the numeral 10 and illustrated in the drawings in its preferred embodiment is shown mounted in position on the head 12 of a standard commercial sewing machine 14. Head 12 includes a substantially upright housing 16 at one end thereof operably supporting a shiftable presser foot 18 and a vertically reciprocable needle 20 driven by suitable gear and linkage structure housed within head 12 and driven by a power pulley 22, suitably rotated by an endless belt 24 coupled with a prime mover in the nature of an electric motor (not shown). Machine 14 also includes material advancing mechanism 26 disposed beneath the needle 20, suitably driven by the power pulley 22 through parts within head 12 and the base of machine 14 and operably correlated with reciprocation of needle 20 to advance material 28 through machine 14 at a speed dependent upon the rate of reciprocation of needle 20.

Pleating attachment 10 includes a pusher element broadly designated by the numeral 30 reciprocably mounted on head 12 adjacent needle 20 and disposed for movement in a direction in alignment with movement of material 28 through machine 14. Structure broadly numerated 32 is provided for reciprocably mounting pusher element 30 on head 16 and includes an elongated mounting bar 34 secured to the outer vertical face of upright housing 16 by a pair of horizontally spaced fasteners 36. A crank 38 is mounted on structure 32 and has an elongated, substantially horizontal shaft 40 rotatably journalled in end 42 of mounting bar 34 and provided with a connecting link 44 rigidly secured to the end thereof

away from head 12 and spaced from the outer face of mounting bar 34.

An elongated, substantially upright rocker arm 46 is provided with a horizontal cross shaft 48 secured to the lowermost end of arm 46, it being noted that pusher element 30 is mounted on shaft 48 for reciprocation therewith. The uppermost end of rocker arm 46 is rigidly attached to the end of shaft 40 opposite to link 44 so that, as shaft 40 is rotated back and forth, rocker arm 46 and thereby pusher element 30 are reciprocated therewith.

Pusher element 30 includes a pair of substantially J-shaped members 50 and 52, it being pointed out that ends of members 50 and 52 adjacent shaft 48 are looped over the latter with the extremities of members 50 and 52 being secured to proximal parts of respective intermediate portions thereof by screws 54. A pair of coil springs 56 are disposed in opposed relationship over shaft 48 on opposite sides of members 50 and 52, each of the springs 56 being provided with an L-shaped extension 58 positioned over corresponding members 50 and 52 in a manner to bias the same downwardly into engagement with the uppermost face of the base plate 60 of machine 14. Member 50 is provided with a longitudinally extending, medianly disposed slot 62 in the extremity thereof away from shaft 48 to clear needle 20 when pusher element 30 is reciprocated toward presser foot 18.

Means for reciprocating link 44 of crank 38 to in turn reciprocate rocker 46 and pusher element 30 includes a disk 64 mounted on the outermost end of and rotatable with a drive shaft 66 journalled within a bearing 68 secured to the end 70 of mounting bar 34 and aligned with a shaft opening (not shown) within bar 34. An elongated, eccentric mounting plate 72 is secured to the outer face of disk 64 for rotation therewith and has an elongated T-shaped slot 74 therein which receives a complementally headed pin 76, as illustrated in FIG. 2. Knurled nut 78 threaded on the outermost end of pin 76 maintains connector 80 in position between mounting plate 72 and nut 78. As shown in FIG. 4, connector 80 has a sleeve portion 81 rotatably receiving an internal, annular collar 83. A washer 82 between nut 78 and collar 83 permits the latter to rotate with respect to nut 78. Collar 83 projects outwardly from the face of connector 80 proximal to mounting plate 72 so that connector 80 clears plate 72 and is free to rotate about collar 83.

A connecting rod 84 secured to connector 80 is also joined to the outermost end of link 44 by a head 86 slidably mounted on connecting rod 84 and pivotally connected to the outermost end of link 44. A stop sleeve 90 disposed on the outermost end of rod 84 proximal to crank 38 prevents head 86 from sliding off of rod 84, and a coil spring 92 interposed between stop sleeve 94 and head 86 maintains the latter in engagement with stop sleeve 90.

An elongated limiter 96 having a U-shaped portion 98 on one end thereof and disposed over and secured to shaft 40 is positioned to limit reciprocation of element 30 toward needle 20. As illustrated in FIG. 4, limiter 96 extends inwardly from shaft 40 toward fasteners 36 of mounting bar 34 in a manner to engage a vertically movable stop screw 100 threaded into a bracket 102 joined to mounting bar 34.

A pair of universal joints 104 are interposed in drive shaft 66 and the end of shaft 66 away from structure 32 is connected to a power shaft 106 through a single revolution clutch broadly numerated 108. Clutch 108 is preferably of the single revolution type, an example being the Hilliard clutch, manufactured by the Hilliard Corporation, Elmira, New York, and which includes a pair of disk elements 110 and 112 secured to drive shaft 66 and power shaft 106 respectively. Such a clutch is illustrated and described in U.S. Letters Patent No. 2,140,737, entitled "Clutch," Serial No. 116,275, issued December 20, 1938, to R. G. Dickens.

Power shaft 106 is connected to the output shaft 114 of a speed reducer 116 through a coupling 118 having a sprocket wheel 120 forming an integral part thereof. The input shaft 122 of speed reducer 116 is operably coupled with power pulley 22 through suitable sprocket and chain means 124. Means is provided for preventing rotation of disk 110 at preselected intervals and includes a rotary solenoid 126 having an elongated arm 128 connected intermediate its ends to the armature 129 thereof for rotation therewith. Details of rotary solenoid 126 are not shown but a solenoid sold under the trademark "Ledex" by the G. H. Leland Company, Dayton, Ohio, designated Model No. 5, is given by way of example to illustrate a suitable device. The normally uppermost end of arm 128 is substantially hook-shaped and provided with a recess 130 adapted to receive a pin 132 attached to the outer face of disk 110 away from solenoid 126. A coil spring 134 interconnecting the lowermost end of arm 128 and machine 14 normally biases the upper end of arm 128 away from disk 110 and pin 132. However, upon actuation of solenoid 126 to rotate the armature 129 thereof, arm 128 is rotated to a position with the hook-shaped uppermost end thereof disposed in a position for recess 130 to receive pin 132 and thereby prevent rotation of disk 110 with respect to disk 112.

Cam actuated means broadly designated by the numeral 136 is provided for controlling operation of solenoid 126 and includes a circular cam wheel 138 mounted on the output shaft 140 of a speed reducer 142 for rotation therewith. The input shaft 144 of speed reducer 142 is operably driven by chain and sprocket means 146. A solenoid control switch 148 is mounted on head 12 in a position so that the switch blade 150 thereof is adapted to be engaged by a plurality of cams broadly designated 152 and mounted on the periphery of wheel 138. Engagement of one of the cams 152 with blade 150 moves the same to a position shifting contact pin 154 to a location closing switch 148. Switch 148 is electrically connected (not shown) with solenoid 126 so that upon closing of switch 148, solenoid 126 is energized to cause the armature 129 thereof to be rotated and thereby shift arm 128 to a position with the hook portion thereof positioned in a location to cause pin 132 to move into recess 130.

Each of the cams 152 includes a substantially U-shaped main body portion 156 adapted to be positioned over the outer peripheral edge of wheel 138, as clearly illustrated in FIG. 5, with legs 158 and 160 located on opposite sides of wheel 138. A screw 162 is threaded into leg 160 for securing cam 152 to wheel 138, and a projection 164 integral with and extending laterally from the outer face of leg 158 serves as means for engaging blade 150 to move the latter into a position causing contact pin 154 to be moved to a location closing switch 148. Speed reducers 116 and 142 are preferably of the infinitely variable type wherein the output shafts 114 and 140 thereof may be operated at infinitely changeable speeds within a predetermined range. An example of a preferred type of speed reducer is the "Zero-Max" power transmission manufactured by Revco, Incorporated, Minneapolis, Minnesota, the preferred model 142X having an output speed range infinitely variable from zero to one-fourth of the input speed. Such a speed reducer is illustrated and described in U.S. Letters Patent No. 2,691,896, entitled "Variable Speed Power Transmission," Serial No. 121,264 issued October 19, 1954, to S. O. Stageberg. Control handles 166 and 168 on reducers 116 and 142 respectively permit the speed of output shafts 114 and 140 to be varied within the range of the reducers.

In operation, presser foot 18 of machine 14 is raised through suitable mechanism (not shown) to permit the end of material 28 to be placed in position beneath presser foot 18 and needle 20 and over material advancing mechanism 26. Then, presser foot 18 is lowered into engagement with material 28 whereupon material 28 is in position for sewing and pleating. Assuming

that control handles 166 and 168 of speed reducers 116 and 142 respectively are set at predetermined positions, and that power pulley 22 of machine 14 is to be driven at a preselected, constant speed, the electric prime mover (not shown) of machine 14 is energized to actuate needle 20, advancing mechanism 26 and pleating attachment 10. As the material advancing mechanism 26 moves material 28 through machine 14 in a line perpendicular to the longitudinal length of head 12, needle 20 is reciprocated to form a line of stitching in material 28, as is well understood.

Rotation of power pulley 22 causes the input shaft 122 of speed reducer 116 to be driven at a speed somewhat lower than the shaft of pulley 22, thereby rotating output shaft 114 at a preselected speed with respect to input shaft 122. Inasmuch as power shaft 106 is directly coupled with output shaft 114, drive shaft 66 is rotated at the same speed as power shaft 106 through the interconnected disks 110 and 112 of clutch 108. Rotation of drive shaft 66 causes mounting plate 72 to be rotated and thereby turning connector 80 in a circular path of travel about the axis of disk 64. It can be seen that because of the eccentric disposition of sleeve 81 of connector 80 with respect to the axis of disk 64, rotation of the latter causes connector 80 to be rotated in a circular arc disposed in spaced relationship to the axis of disk 64.

Circular movement of connector 80 reciprocates connecting rod 84 substantially horizontally to thereby rock arm 46 about the axis of shaft 40 as link 44 of crank 38 is reciprocated by rod 84. Rocking movement of arm 46 moves pusher element 30 toward and away from needle 20 and, inasmuch as springs 56 bias members 50 and 52 downwardly into engagement with material 28, it can be seen that members 50 and 52 frictionally engage material 28 as pusher element 30 is reciprocated toward needle 20 to thereby overlap a portion of material 28, as illustrated in FIG. 4, and form a pleat 170. It can be appreciated that shaft 66 is driven at a sufficient rate through speed reducer 116 to form pleats 170 as material 28 is advanced by mechanism 26 through machine 14. The width of pleats 170 which are formed of course depends upon the speed of rotation of drive shaft 66 and thereby the rate at which pusher element 30 is reciprocated toward needle 20 as material 28 is advanced by mechanism 26. It can be appreciated that if pusher element 30 is reciprocated toward needle 20 at a substantially faster rate than the speed of advancement of material 28 by mechanism 26, a relatively wide pleat 170 will be formed, while if the speed of reciprocation of pusher element 30 is slowed down considerably, a relatively narrow pleat will be formed in material 28.

The number of pleats 170 which are formed in a selected length of material 28 is controlled by speed reducer 142 and the relative positions of cams 152 on cam wheel 138. With handle 168 of speed reducer 142 disposed at a position permitting the output shaft 140 thereof to be driven at a reduced speed with respect to input shaft 144 thereof, it can be seen that cam wheel 138 is rotated with and at the same speed as output shaft 140. Rotation of output shaft 140 causes cams 152 to be rotated in a manner so that the same successively engage blade 150 of switch 148 to in turn reciprocate contact pin 154, thereby alternately opening and closing the switch mechanism within control switch 148.

It is understood that as the switching mechanism within control switch 148 is closed, rotary solenoid 126 is energized to cause the armature 129 thereof to be rotated to in turn rotate arm 128 against the action of spring 134 and move the uppermost hook portion of arm 128 into a position where pin 132 is moved into recess 130. Inasmuch as clutch 108 is of the single revolution type, engagement of the hook portion of arm 128 with pin 132 prevents disk 110 and thereby, drive shaft 66, from rotating while disk 112 and power shaft 106 continue to rotate with output shaft 114 of speed reducer 116. So long as solenoid 126 is energized and arm 128 is maintained in engagement with pin 132, rotation of shaft 66 is interrupted and reciprocation of pusher element 30 is prevented. Immediately upon disengagement of one of the cams 152 from switch blade 150, the switch mechanism within control switch 148 is opened to de-energize solenoid 126, whereupon spring 134 biases arm 128 out of engagement with pin 132, permitting drive shaft 66 to rotate. With a plurality of cams 152 disposed on cam wheel 138 at equally spaced positions, as illustrated in FIG. 3, rotation of drive shaft 66 and reciprocation of pusher element 30 is intermittently interrupted to thereby control the number of pleats 170 which are formed in material 28. Speeding up rotation of cam wheel 138 decreases the number of pleats formed, while slowing wheel 138 down has the opposite effect.

It is to be pointed out that if it is desired to prevent rotation of drive shaft 66 and thereby, reciprocation of pusher element 30, for an extended period of time, this may be accomplished by disposing several or all of the cams 152 in proximal relationship so that solenoid 126 is energized for an appreciable period of time. Furthermore, one or two of the cams 152 may be disposed in proximal relationship while the remaining cams 152 are positioned in a manner as illustrated in FIG. 3, which permits the pleating operation to be varied unequally to the end that unpleated areas in material 28 are formed at selected intervals.

By utilization of speed reducers such as 116 and 142 wherein the speed of the output shafts 114 and 140 thereof may be infinitely varied within a preselected range, it can be seen that the number and width of pleats 170 which are formed in material 28 as the same is advanced may be substantially infinitely changed and also, such pleating may be interrupted at preselected intervals which also may be infinitely changed within selected limits.

The length of the stroke of pusher element 30 as the same is reciprocated may also be changed by varying the position of sleeve 83 of connector 80 with respect to plate 72. It can be seen that by loosening screw 82, sleeve 83 may be shifted in slot 74 to thereby change the degree of eccentricity of connector 80 with respect to disk 64. In this manner, the width of pleats 170 may be changed to the desired dimension.

When limiter 96 engages stop screw 100, it can be seen that pusher element 30 is maintained in proximal relationship to needle 20 before being moved back as rocker arm 46 is reciprocated and thus, needle 20 is depressed two or more times before pusher element 30 moves backwardly so that formation of a line of stitching in the pleat 170 is assured before members 50 and 52 are retracted from a position proximal to needle 20. In this manner, there is no danger of return of pusher element 30 from a position adjacent needle 20 pulling the material 28 backwardly and thus changing the size of pleat 170. As limiter 96 engages stop screw 100, reciprocation of crank link 44 is stopped while connecting rod 84 continues to move with respect to head 86 against the action of spring 92. In this manner, positive engagement of connecting rod 84 with crank link 44 is assured.

Although universal joints 104 could be eliminated in drive shaft 66, provision of the same has been found advantageous because it is not necessary to absolutely align drive shaft 66 and output 114 of speed reducer 116.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. In combination with a sewing machine provided with a reciprocable needle, a drive unit and material advancing mechanism, an attachment for said machine and including a pusher element; structure reciprocably mounting said pusher element adjacent said needle for movement

toward and away from the latter, said element being disposed in a position to frictionally engage the material as the element is reciprocated in a direction toward the needle and to push the pleated material beneath said needle for engagement thereby; and linkage means interconnecting said structure with said drive unit for operably coupling said drive unit with said element for reciprocating the latter at a varibale speed relative to reciprocation of the needle and sufficient to pleat the material as the latter is advanced through the machine by said mechanism.

2. In combination with a sewing machine provided with a reciprocable needle, a drive unit and material advancing mechanism, an attachment for said machine and including a pusher element; structure reciprocably mounting said pusher element adjacent said needle for movement toward and away from the latter, said element being disposed in a position to frictionally engage the material as the element is reciprocated in a direction toward the needle and to push the pleated material beneath said needle for engagement thereby; power means including an elongated, rotatable linkage for operably coupling said drive unit with said element for reciprocating the latter at a variable speed relative to reciprocation of the needle and sufficient to pleat the material as the latter is advanced through the machine by said mechanism; and means associated with said power means for selectively interrupting the rotation of said linkage and thereby the reciprocation of said pusher element as the material is advanced to thereby permit variation of the number of pleats formed in a designated length of material.

3. In combination with a sewing machine provided with a reciprocable needle, a drive unit and material advancing mechanism, an attachment for said machine and including a pusher element; structure reciprocably mounting said pusher element adjacent said needle for movement toward and away from the latter, said element being disposed in a position to frictionally engage the material as the element is reciprocated in a direction toward the needle and to push the pleated material beneath said needle for engagement thereby; means including an elongated, rotatable linkage interconnecting said structure with said drive unit for operably coupling said drive unit with said element for reciprocating the latter at a variable speed relative to reciprocation of the needle and sufficient to pleat the material as the latter is advanced through the machine by said mechanism; and means associated with said structure for varying the length of the stroke of the pusher element in said direction whereby the width of each pleat may be selectively varied.

4. In combination with a sewing machine provided with a reciprocable needle, a drive unit and material advancing mechanism, an attachment for said machine and including a pusher element; structure reciprocably mounting said pusher element adjacent said needle for movement toward and away from the latter, said element being disposed in a position to frictionally engage the material as the element is reciprocated in a direction toward the needle and to push the pleated material beneath said needle for engagement thereby; power means including an elongated, rotatable linkage interconnecting said structure with said drive unit for operably coupling said drive unit with said element for reciprocating the latter at a variable speed relative to reciprocation of the needle and sufficient to pleat the material as the latter is advanced through the machine by said mechanism; and cam actuated means associated with said power means for interrupting the rotation of said linkage and thereby the reciprocation of said pusher element and thereby pleating of the material at predetermined intervals as the material is advanced to permit variation of the number of pleats formed in a designated length of material.

5. In combination with a sewing machine provided with a reciprocable needle, a drive unit and material advancing mechanism, an attachment for said machine and including a pusher element; structure reciprocably mounting said pusher element adjacent said needle for movement toward and away from the latter, said element being disposed in a position to frictionally engage the material as the element is reciprocated in a direction toward the needle and to push the pleated material beneath said needle for engagement thereby; power means including an elongated, rotatable linkage interconnecting said structure with said drive unit for operably coupling said drive unit with said element for reciprocating the latter at a variable speed relative to reciprocation of the needle and sufficient to pleat the material as the latter is advanced through the machine by said mechanism; and control means associated with said power means for selectively varying the speed of rotation of said linkage and thereby the rate of reciprocation of said pusher element as the material is advanced to permit variation of the width of each pleat.

6. In combination with a sewing machine provided with a reciprocable needle, a drive unit and material advancing mechanism, an attachment for said machine and including a pusher element; structure reciprocably mounting said pusher element adjacent said needle for movement toward and away from the latter, said element being disposed in a position to frictionally engage the material as the element is reciprocated in a direction toward the needle and to push the pleated material beneath said needle for engagement thereby; and power means including an elongated, rotatable linkage interconnecting said structure with said drive unit for operably coupling said drive unit with said element for reciprocating the latter as a variable speed relative to reciprocation of the needle and sufficient to pleat the material as the latter is advanced through the machine by said mechanism, said power means including parts for permitting infinite variation of the speed of rotation of said linkage and thereby the speed of reciprocation of said element within a preselected range.

7. In combination with a sewing machine provided with a reciprocable needle and material advancing mechanism, an attachment for said machine and including a pusher element; structure reciprocably mounting said pusher element adjacent said needle for movement toward and away from the latter, said element being disposed in a position to frictionally engage the material as the element is reciprocated in a direction toward the needle and to push the pleated material beneath said needle for engagement thereby; power means operably coupled with said element for reciprocating the latter at a variable speed relative to reciprocation of the needle and sufficient to pleat the material as the latter is advanced through the machine by said mechanism; cam means; and stop means actuated by said cam means and associated with said power means for interrupting reciprocation of said pusher element and thereby pleating of the material at predetermined intervals as the material is advanced to permit variation of the number of pleats formed in a designated length of material, said cam means including components for actuating said stop means and movable to an infinite number of positions to thereby permit infinite variation of interruption of reciprocation of said element within a range of preselected intervals.

8. In combination with a sewing machine provided with a reciprocable needle and material advancing mechanism, an attachment for said machine and including a pusher element; structure reciprocably mounting said pusher element adjacent said needle for movement toward and away from the latter, said element being disposed in a position to frictionally engage the material as the element is reciprocated in a direction toward the needle and to push the pleated material beneath said needle for engagement thereby; power means operably coupled with said element for reciprocating the latter at a variable speed relative to reciprocation of the needle

and sufficient to pleat the material as the latter is advanced through the machine by said mechanism; cam means; stop means actuated by said cam means and associated with said power means for interrupting reciprocation of said pusher element and thereby pleating of the material at predetermined intervals as the material is advanced to permit variation of the number of pleats formed in a designated length of material; and control means coupled with said power means for selectively varying the rate of reciprocation of said pusher element as the material is advanced to permit variation of the width of each pleat.

9. In combination with a sewing machine provided with a reciprocable needle and material advancing mechanism, an attachment for said machine and including a pusher element; structure reciprocably mounting said pusher element adjacent said needle for movement toward and away from the latter, said element being disposed in a position to frictionally engage the material as the element is reciprocated in a direction toward the needle and to push the pleated material beneath said needle for engagement thereby; a drive shaft operably connected to said structure for reciprocating said pusher element; a power shaft; a clutch interconnecting said shafts and including infinitely variable means coupled to the drive shaft and said power shaft respectively whereby upon operation of the power shaft, the element is reciprocated at a selectively variable predetermined speed relative to reciprocation of the needle and sufficient to pleat the material as the latter is advanced; cam means; and stop means actuated by said cam means and including an arm releasably engageable with said first member of the clutch for preventing rotation of the latter and thereby reciprocation of the element upon actuation of said means to thereby permit variation of the number of pleats formed in a selected length of material.

10. The combination as set forth in claim 9 wherein said cam actuated means includes a rotatable cam wheel having at least one cam on the periphery thereof, a switch adjacent the wheel and provided with a blade disposed in a position to close the switch when the blade is contacted by said cam and a rotary solenoid located proximal to said clutch, said arm being connected to the armature of said solenoid whereby upon engagement of the cam with said blade and closing of the switch to permit energization of the solenoid the arm is moved into restricting engagement with said first member.

11. The combination as set forth in claim 10 wherein is provided a plurality of cams removably positioned on the periphery of said cam wheel whereby pleating of the material is interrupted at preselected intervals.

12. The combination as set forth in claim 11 wherein the circumferential spacing of said cams around the periphery of said cam wheel may be infinitely varied.

13. The combination as set forth in claim 9 wherein said structure includes a rocker arm adapted to be swingably mounted on said head and supporting the pusher element in said position and adjustable stop means adapted to be positioned on said head in a location to engage means on said rocker arm for limiting movement of said pusher element toward the needle.

14. The combination as set forth in claim 13 wherein is provided eccentric means interconnecting said drive shaft and the rocker arm for reciprocating the latter and in turn said pusher element.

15. The combination as set forth in claim 14 wherein said eccentric means includes a crank secured to said rocker arm, a disk attached to said drive shaft for rotation therewith and a connecting rod rotatably joined to said crank and the disk respectively and positioned eccentrically with respect to the axis of rotation of said disk.

16. The combination as set forth in claim 15 wherein the degree of eccentricity of the rod with respect to the disk may be adjusted whereby the length of the stroke of said pusher element may be varied.

17. The combination as set forth in claim 9 wherein said element is provided with an inwardly extending slot in the edge thereof movable into proximity to said needle, said slot being disposed to clear the needle and thereby permit said edge of the element to slide past the needle as the element is reciprocated toward the same.

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