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PLEATING ATTACHMENT FOR SEWING MACHINES

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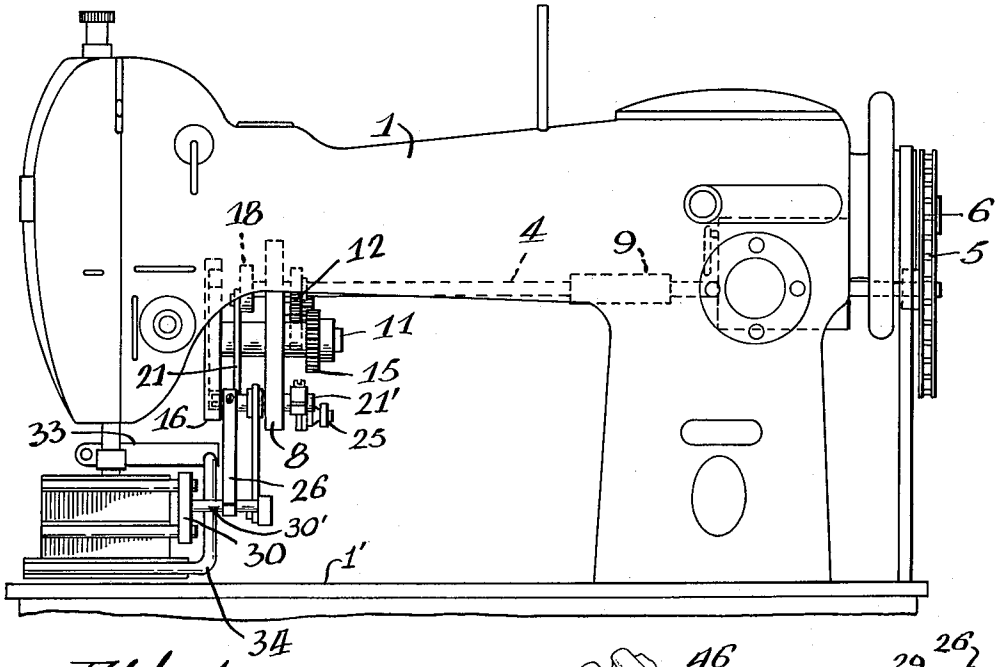


Fig. 1

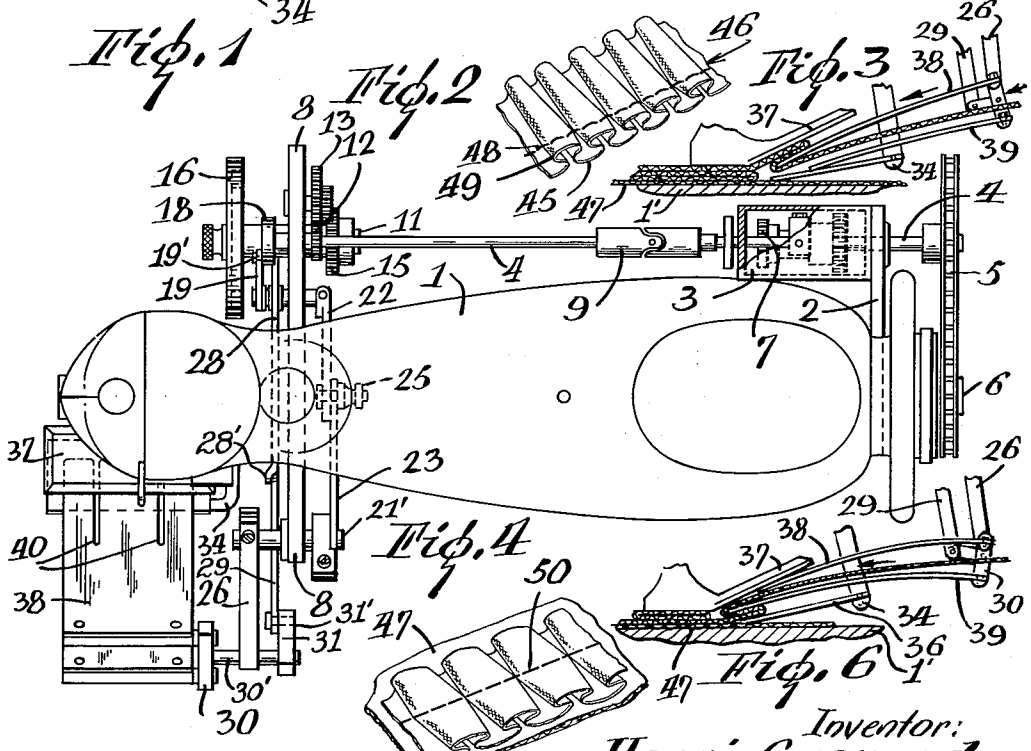


Fig. 2

Fig. 3

Fig. 6

Fig. 5

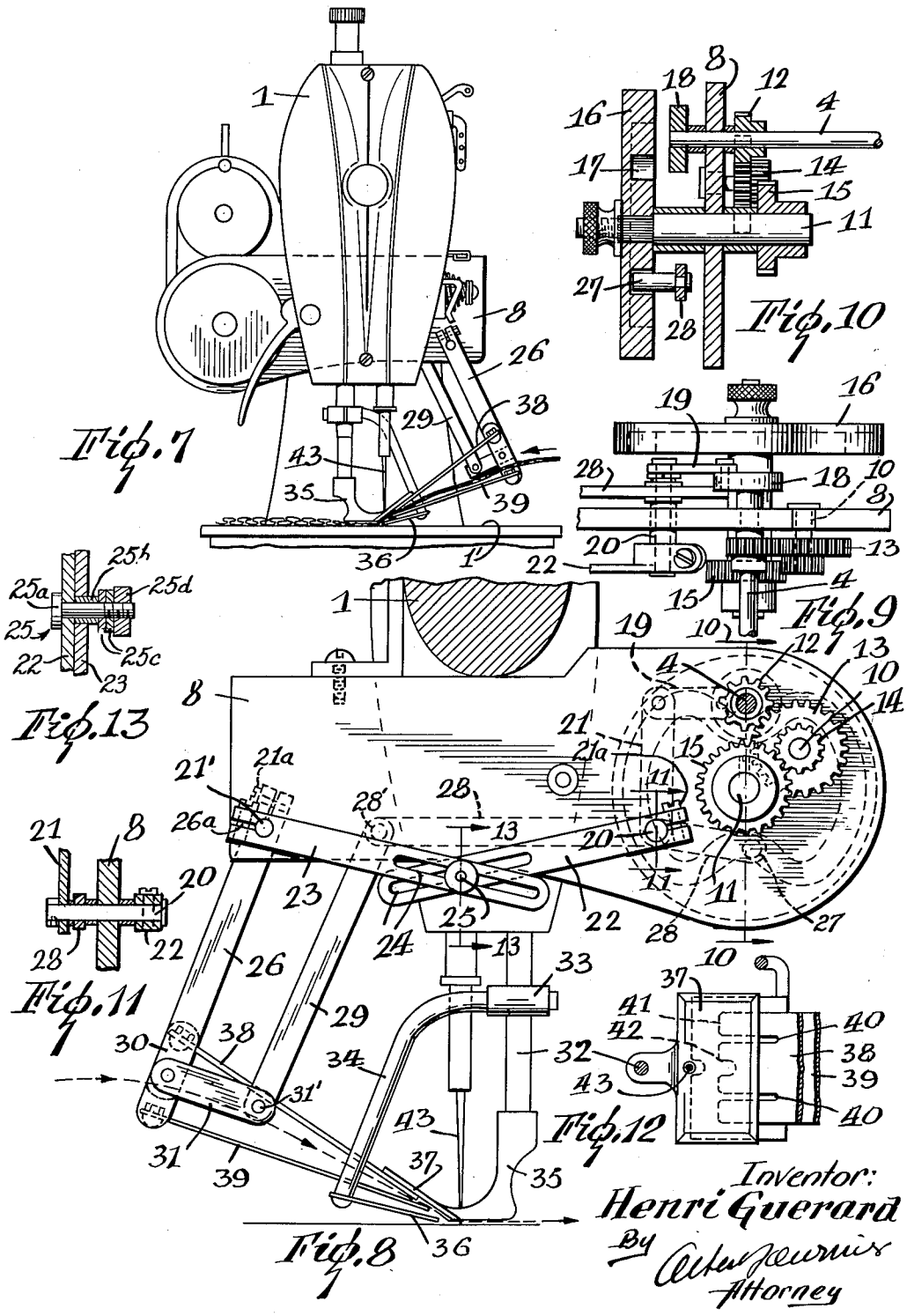
Fig. 4

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PLEATING ATTACHMENT FOR SEWING MACHINES

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The present invention pertains to a novel mechanism attachable to ordinary sewing machines to perform pleating.

At present, pleating is accomplished by means of large, expensive machines built solely for that purpose. Some factories working on fabrics require pleating from time to time but not to such an extent as to warrant the purchase of special machinery. In such cases, work must either be refused or turned over to special shops.

The principal object of this invention is to provide a pleating mechanism that can readily be applied to a conventional commercial or domestic sewing machine. In the accomplishment of this object, a pair of bearing plates is mounted on the head of the machine to support an auxiliary shaft geared to the main shaft of the machine. These shafts operate two parts of the mechanism which, through suitable connections, reciprocate two pusher blades oppositely to each other and adjacent to the sewing machine needle. These plates form the folds or pleats and also advance the work while the needle either stitches the folds in place or stitches the folds in place and simultaneously sews the pleating to the base fabric.

The invention is fully disclosed by way of example in the following description and in the accompanying drawings in which:

FIGURE 1 is a side elevation of a sewing machine equipped with the device of the present invention;

FIGURE 2 is a perspective view of a piece of the pleating;

FIGURE 3 is a detail section illustrating the operation;

FIGURE 4 is a plan view of the machine shown in FIGURE 1;

FIGURE 5 is a perspective view of the pleating applied to the base fabric;

FIGURE 6 is another detail section showing another stage in the operation;

FIGURE 7 is an end view of the machine with the attachment applied thereto;

FIGURE 8 is an opposite end view, enlarged and showing the attachment applied to a machine;

FIGURE 9 is a detail plan view of the attachment and its drive;

FIGURE 10 is a section on the line 10—10 of FIGURE 8;

FIGURE 11 is a section on the line 11—11 of FIGURE 8;

FIGURE 12 is a detail plan view of the shoes and pusher blades; and

FIGURE 13 is a section on the line 13—13 of FIGURE 8.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

In FIGURES 1 and 4 is shown a sewing machine head **1** to which the pleating attachment of the invention is applied. A bearing plate **2** (FIGURE 4) is attached to one end of the head and carries a gear box **3**. A shaft **4** is journaled in the plate **2** and is connected by a chain **5** to the usual shaft **6** of the machine. Reduction gearing **7** is mounted in the box **3**, and the shaft **4** extends to another bearing plate **8** fixed at the other end of the machine. A swivel joint **9** is preferably inserted in the shaft **4**, as shown in FIGURE 4.

Journalled in the plate **8** are shafts **10** and **11** parallel to the shaft **4**, the shaft **11** being directly below the shaft **4** as shown in FIGURE 8. The shaft **4** carries a pinion **12** meshing with a gear **13** fast on the shaft **10**; the shaft **10** also carries a pinion **14** which meshes with a gear **15** fast on the shaft **11**. The shaft **11** also carries a cam disk on the opposite side of the plate **8**, as shown in FIGURE 8 in dotted lines. The cam action is derived from a groove **17** in the disk **16**, the groove being somewhat in the shape of a figure eight, as may be seen in broken lines in FIGURE 8.

Between the plate **8** and disk **16**, the shaft **4** carries a crank disk **18** (FIGURES 9 and 10) to actuate a link **19** which has one end **19'** pivoted to the disk (FIGURES 4, 8 and 9). A rock shaft **20** (FIGURES 8 and 11) is rotatably mounted in the plate **8**. A lever **21** has one end pivotally suspended from the free end of the link **19** and its other end keyed to the rock shaft **20**, whereby the shaft **20** is oscillated as the crank disk **18** rotates. A stub shaft **21'** is rotatably mounted in the plate **8** at a distance forwardly from the shaft **20**. Slotted cross levers **22** and **23** are secured fixedly by suitable clamping means **21*a*** respectively to the shafts **20** and **21'**. Lever sections **22** and **23** cross each other at the slots **24** thereof, where they are pivotally and adjustably connected together by a suitable clamp **25**. The effective leverage of this device for oscillating the shaft **21'** to the desired degree is regulated by adjustment of the clamp **25** in the slots **24**. This known type of clamp **25** consists as shown in FIGURE 13, of the flanged bolt **25*a***, bushing **25*b***, washer **25*c*** and nut **25*d***. The clamp **25** is fixed in any adjusted position on lever **22** by tightening nut **25*d***, while bushing **25*b*** permits free pivotal movement of lever **23** relative to lever **22**.

A lever **26** is fixedly secured by a clamp **26*a*** to and suspended from shaft **21'**.

Lever **26** oscillates forwardly and rearwardly of the sewing machine, as a pendulum, through crank disk **18**, link **19**, lever **21**, shaft **20**, levers **22** and **23** and shaft **21'**. A pin **27** fits in the groove **17** (FIGURE 10) and projects from the free end of a rocking arm **28** which is freely pivoted on shaft **20** intermediate its ends (see FIGURE 11). From the other free end of this arm **28** is pivotally suspended at **28'** a link **29**. A lever **31** is pivotally attached at its end **31'** to the lower end of link **29** and has its other end fast on a shaft **30'** which is freely rotatably mounted on the lower end of lever **26** as shown in FIGURES 1 and 4. A link **30** has its center portion secured to shaft **30'**.

The reciprocating presser bar **32** of the machine carries a laterally extending bracket **33** (FIGURES 1 and 10) in which is mounted an L-shaped rod **34** having its horizontal portion lying in front of the presser foot **35** on the presser bar **32**. This portion of the rod carries a shoe **36** sloping downward toward the foot **35**. The foot **35** carries another shoe **37** sloping upward over the shoe **36** and forming a V therewith.

A resilient pusher blade **38** is fixed to the upper end of the link **30** in a plane at right angles thereto and extends under the shoe **37**. Another resilient pusher blade **39** is secured to the lower end of the link **30** and extends between the blade **38** and the shoe **36**, as shown in FIGURE 8.

As shown in FIGURE 12, the pusher blades **38** and **39** are in the nature of flat plates slotted lengthwise at **40** to form fingers **41** at the pushing end. The middle finger is notched at **42** to accommodate the usual sewing needle **43**.

The operation of the device may be understood from an examination of FIGURES 3, 6, and 8. The linkage extending from the crank disk **18** oscillates the lever **26** and with it the entire assembly of pusher blades **38** and

9. The cam 16 acting on the pin 27 through its cam groove 17 actuates the members 28, 29, 30 and 31 and with them the two pusher blades 38 and 39 in an up and down movement. It will be appreciated from the relative diameters of the gears 12, 13, 14 and 15 that the cam 17 rotates at one quarter the speed of the crank disk 18. Because the cam groove 17 has two symmetrical parts the rock arm 28 will make two complete cycles for each rotation of cam 16 or one cycle for every two cycles of swinging arm 26. When pin 27 is in the radially recessed portion of the cam groove 17, as shown in FIGURE 8, the link 29 is in lowered position corresponding to a position of link 30 in which the pusher blades are downwardly inclined with the lower pusher blade 39 contacting lower shoe 36 as shown in FIGURE 8. On the other hand when pin 27 rides in either one of the circular portions of the cam groove 17, double-armed lever 28 is swung to such a position as to rotate the link 30 and consequently raise the pusher blades which take a smaller downward inclination with the upper pusher blade adapted to contact the upper shoe 37.

Thus the crank and the cam are so related to each other that during a first inward movement or active stroke of the assembly of the pusher blades toward the sewing needle 43, the pusher blades 38 and 39 remain in their lower inclination whereas in the next active stroke of the assembly of pusher blades the latter remain in their upper inclination.

From the foregoing it will be understood that inward movement of the assembly of pusher blades through the action of lever 26, with the pusher blades in downwardly inclined position, will cause the upper pusher blade 38 to engage the top surface of the fabric 46 fed between the two pusher blades as indicated in FIGURE 3. The fabric will be pushed by blade 38 at a faster speed than the rate of feed of the sewing machine and consequently the fold illustrated in FIGURE 3 will be formed and will be held against the upper shoe 37 until engaged between the presser foot 35 and the table or work support 1' of the sewing machine, where it will be stitched in the regular manner by the sewing needle 43 as indicated by the line of stitching 48 in FIGURE 2. The next pleat will be formed on the successive inward movement or active stroke of the assembly of pusher blades with the pusher blades in less inclined position as shown in FIGURE 6, in which case the lower pusher blade 39 will engage the under face of the fabric 46 and push the engaged portion of the fabric at a faster speed than the rate of feed of the sewing machine. Thus the pleat shown in FIGURE 6 will be formed and again engaged between the table 1' and the presser foot 35. Thus the box pleat shown in FIGURE 2 will be automatically obtained. In accordance with the present invention it is also possible to simultaneously form the pleats and stitch them to a base fabric 47. In this case, the base fabric 47 is fed into the sewing machine in the usual manner directly on top of the table 1' under the inclined lower shoe 36 as clearly shown in FIGURES 3 and 6 and the pleating is formed on top of the fabric 47 and stitched thereto by line of stitching 50 which corresponds to line of stitching 48. Upon lifting of the presser foot bar 32, the lower shoe 36 raises the free ends of the resilient pusher blades 38 and 39 to thereby make a free passage for the base fabric 47.

Although a specific embodiment of the present invention has been illustrated and described, it is understood that various modifications may be made without departing from the scope of the invention as indicated by the appended claims.

I claim:

1. In a pleating device for a sewing machine having a work-plate, a needle, a presser foot, and a vertically reciprocable presser foot bar to which said presser foot is secured, a pair of superposed converging shoes adapted to be positioned in front of the needle in alignment with the line of feed of the machine the lower one of said shoes being downwardly inclined from front to back above said work plate, said converging shoes being supported by said presser foot bar to be vertically reciprocable therewith, a link, a pair of pusher blades of resilient material arranged in spaced relation one on top of the other and each having one end fixedly secured to one end of said link and having its other end engaging between the said converging shoes and liftable by the lower one of said shoes upon raising movement of the latter, a lever pivotally supported about a rotation axis disposed well above the said shoes for swinging movement towards and away from said converging shoes, said link being pivotally mounted intermediate its ends on the lower end of said lever, said link and lower end of said lever being spaced from said work-plate means for swinging said lever about its axis and means for oscillating said link with respect to said lever in timed relation to the swinging of said lever about its axis.

2. In a pleating device as claimed in claim 1, wherein the upper one of said converging shoes is adapted to be rigidly connected to the presser foot of the sewing machine and the lower one of the said converging surfaces is maintained in position by a bracket adapted to be secured to the presser foot bar of said sewing machine.

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