

No. 645,911.

Patented Mar. 20, 1900.

O. M. CHAMBERLAIN.

SEWING AND PLAITING MACHINE.

Application filed Feb. 11, 1896. Renewed Feb. 28, 1899.)

(No Model.)

4 Sheets—Sheet 1.

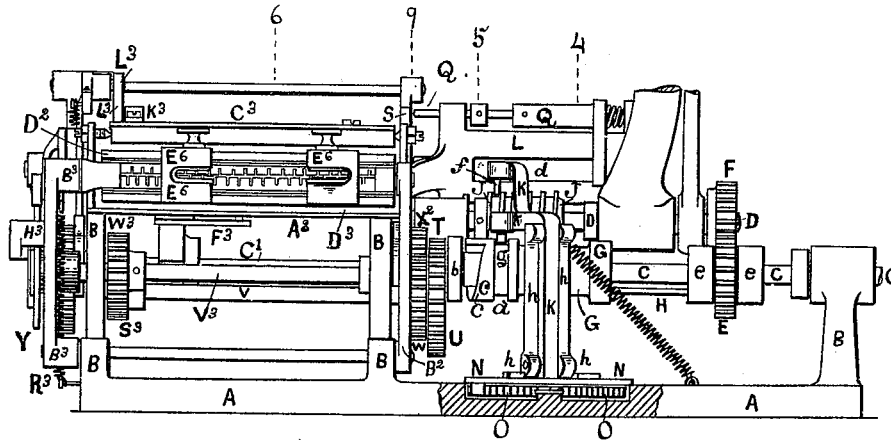


Fig. 1.

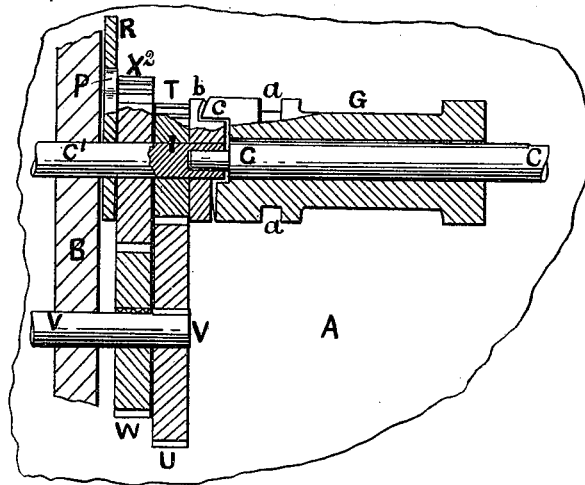


Fig. 2.

WITNESSES.

INVENTOR

Henry Boughton

E. S. Emanuel

Orange M. Chamberlain

By Sylvanus Walker

Attorney

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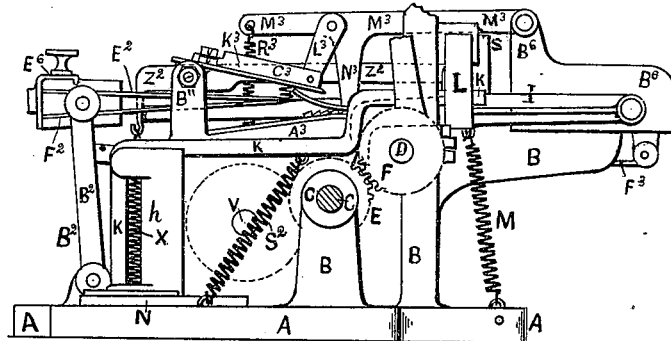


Fig. 3.

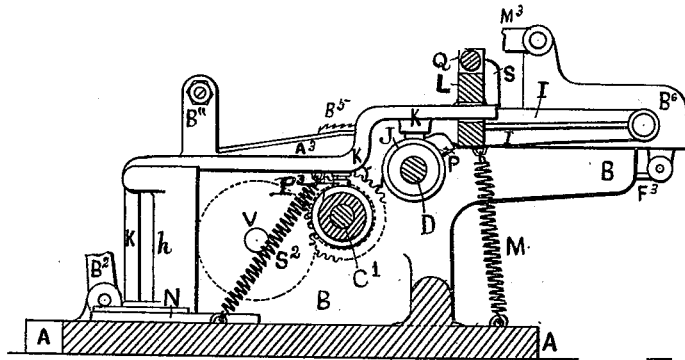


Fig. 4.

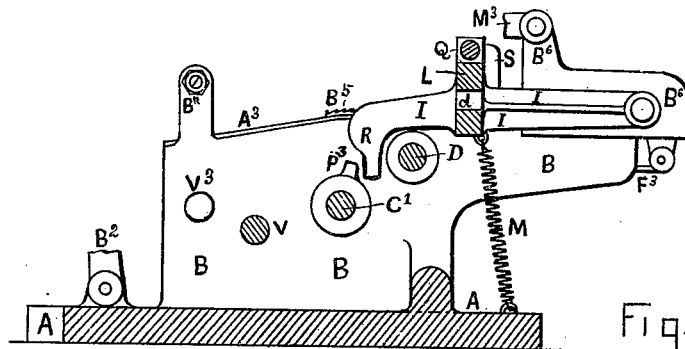


Fig. 5.

WITNESSES

INVENTOR

Henry Boughton

E. F. Emanuel

Orange M. Chamberlain

By Sylvester Walker
Attorney

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4 Sheets—Sheet 3

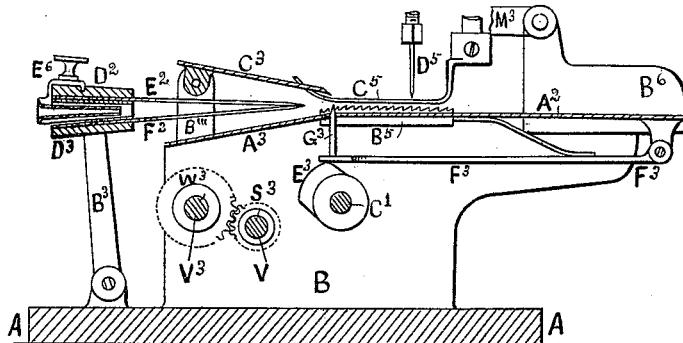


Fig. 6.

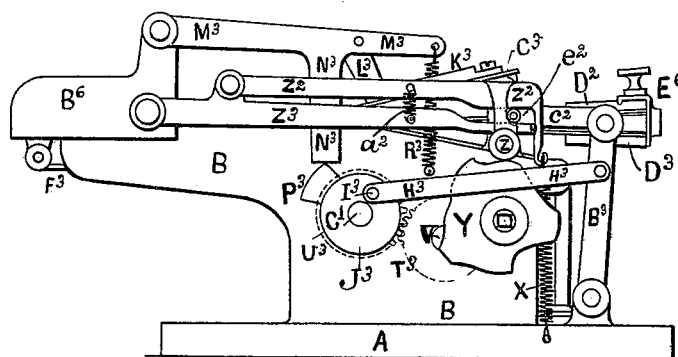


Fig. 7.

WITNESSES

INVENTOR

Henry Boughton

Orange M. Chamberlain

E. F. Emanuel

By Sylvester Walker

Attorney

Patented Mar. 20, 1900.

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4 Sheets—Sheet 4.

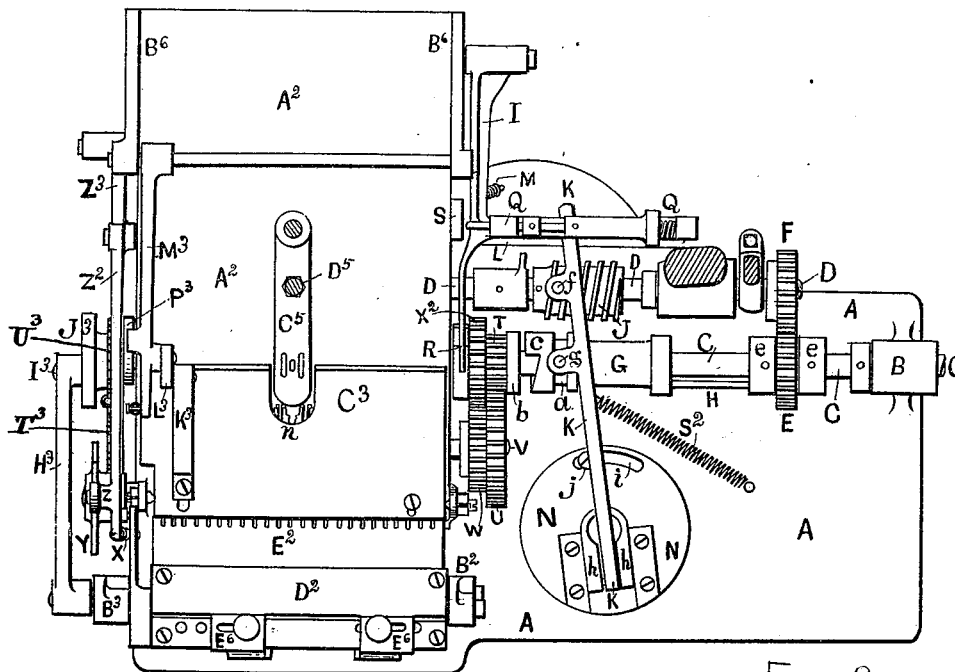


Fig. 8.

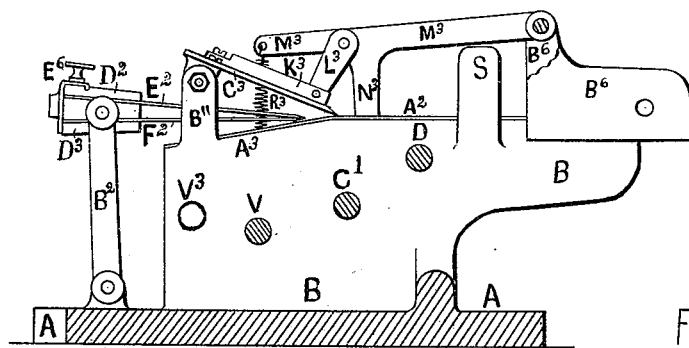


Fig. 9.

WITNESSES

INVENTOR

Henry Houghton

Orange M. Chamberlain

E. G. Enamel

B₄ Sylvester Walker

Attorney

UNITED STATES PATENT OFFICE.

ORANGE M. CHAMBERLAIN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO
JAMES E. WHITNEY, OF SAME PLACE.

SEWING AND PLAITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 645,911, dated March 20, 1900.

Application filed February 11, 1896. Renewed February 28, 1899. Serial No. 707,225. (No model.)

To all whom it may concern:

Be it known that I, ORANGE M. CHAMBERLAIN, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Box-Plait Sewing-Machines, of which the following is a specification.

The object of my invention is to provide a sewing-machine which will intermittently form box-plaits or form and fold a portion of a double box-plait and then stitch such portion formed in the strip of fabric, and thus alternately fold and stitch box-plaits in a very rapid manner, the folding and stitching devices acting automatically and in succession without stopping the machine or changing the speed thereof; and it consists in the construction, combination, and arrangement of the several parts or devices with a common single-thread sewing-machine or any suitable sewing devices heretofore in general use, as hereinafter more fully described, and specifically set forth in the claims.

In the drawings hereto annexed, which form a part of this specification, reference is made.
25 Figure 1 represents a front elevation showing a box-plait sewing-machine constructed according to my invention, the sewing-machine arm and needle-bar being omitted or broken away, as not essential to my present
30 invention. Fig. 2 represents a horizontal section showing a portion of clutch, shaft connections, and speed-gears, drawn on an enlarged scale, being a detail view. Fig. 3 represents a right-hand end elevation of the machine shown in Fig. 1 and drawn on the same
35 scale and looking toward the left hand of Fig. 1. Fig. 4 represents a vertical section taken through Fig. 1 at the point indicated by the dotted line 4. Fig. 5 represents a similar
40 vertical section taken through the same figure at the point indicated by the dotted line 5, each section, as seen, looking to the left. Fig. 6 represents a similar vertical section taken through the same figure at the
45 point indicated by the dotted line 6. Each of the above vertical sectional views are to the left hand. Figs. 4, 5, and 6 are somewhat in detail. Some of the parts are necessarily omitted from some of the figures, so as
50 not to obscure or confuse the parts shown. Fig. 7 represents an elevation of the left-hand

end of a box-plait machine made according to my invention, the stitching or sewing mechanism being omitted, as any single-thread machine will serve to attach to or connect
55 with the box-plait mechanism. Fig. 8 represents a top plan of a box-plait sewing-machine constructed, combined, and arranged according to my invention, the sewing-machine arm and needle-bar, with the thread-tension
60 devices, being broken away to show the operating devices beneath. Fig. 9 represents a sectional end elevation showing the folding devices for forming the box-plaits in one of their positions different from that shown in
65 Fig. 6, it being a vertical section at the point represented by the dotted line 9 in Fig. 1, looking to the left hand.

I prefer to employ the sewing devices as constructed in the well-known Willcox & Gibbs
70 single-thread sewing-machine to sew the box-plaits intermittently as a portion of the box-plait is folded and held beneath the elongated presser-foot, as hereinafter more fully described and shown in Fig. 8.

A represents the bed-plate or base of the machine, and B the vertical supports forming the main frame of the machine, to which the several operating devices are attached, and C represents the driving-shaft, to which power
80 and rotary motion are given in the usual manner heretofore employed for the purpose.

D represents a parallel shaft geared with the said shaft C, as hereinafter described, the said shafts having suitable journal-bearings
85 provided in the said vertical supports, as shown in the drawings. The extreme inward end of the said shaft D is provided with the common rotating thread-looping hook, (not shown,) as employed in all well-known single-
90 thread sewing-machines, and need not be further described, as the sewing devices are not embraced in my present invention and are only employed as auxiliaries thereto or in combination therewith. Now in order that the
95 shaft D may be rotated intermittently with the said shaft C, so as to operate the folding devices and then the sewing mechanisms alternately, the said driving-shaft C is formed in two sections C and C', the portion C being provided with a loose gear E, held in position
100 thereon between the collars e e, so as to mesh

with the gear F, rigid on the said shaft D, and in order to fasten the said loose gear E when desired to operate the mechanism connected and operated thereby, as hereinafter described, the shaft C is provided with a horizontal or longitudinal sliding clutch-sleeve G, made to rotate with the shaft C by means of a spline and groove, as shown in Fig. 2. Now in order to cause the said loose gear E to rotate with the said shaft C the outward end of the said sliding clutch-sleeve G is provided at one side of the shaft C with a parallel sliding pin H, which is at the proper time forced outward and through the rigid collar *e* and thence through a hole formed in the said loose gear E, adapted to receive the end of the said pin H and thereby cause the said gear E to drive the said gear F and operate the sewing devices alternately and intermittently with the folding devices, as hereinafter described. The inward end portion of the said sliding clutch-sleeve G is provided with a peripheral or concentric groove *a* and the extreme inward end with a clutch-face *c*, which is adapted to engage with a corresponding face *b* on the end of the said line-section of shaft C', so as to cause the said sectional shafts C and C' to rotate simultaneously when desired, as hereinafter described and as shown in Figs. 1, 2, and 8. Now in order to slide the said clutch-sleeve G back and forth on the said shaft C as desired I provide the said shaft D with a large coarse-threaded screw-sleeve J, secured rigidly thereon, as shown in Figs. 1 and 8. Then I provide a bent right-angle pivoted actuating-arm K, having a short downward-projecting pin *g*, which enters the said concentric or peripheral groove *a*, formed in the clutch-sleeve G, and a very short downward-projecting pin *f*, which enters the groove between the coarse screw-threads on the said sleeve J, as shown in the said views, Figs. 1 and 8. Now in order to so actuate the said bent arm K as to effect the desired result contemplated the said arm K is extended at its outward swinging end and enters through a long slot or opening *d*, formed in the right-angle actuating-frame L, provided with an arm I, which extends rearward and is pivoted to the said vertical support-frame B⁶, as shown in Figs. 3, 4, and 5. This pivoted actuating-frame L is drawn downward by means of the coiled spiral spring M, secured to the said frame L and to the bed-plate of the machine, as shown in Figs. 3, 4, and 5. Now the said bent actuating-arm K extends from the said projecting pin *g* horizontally a considerable distance in the opposite direction and then is bent at a right angle and extends downward to the bed-plate A of the machine, where the lower end is pivoted between or to the pivoted vertical guide-arms *h*, provided on the circular cap-plate N, one side of which plate has a segmental slot *i*, through which loosely passes a retaining-screw *j*, which permits the said plate N and arms *h* to rotate or move a short or limited distance about its axis and to which

one end of a common flat clock-spring O is secured in the cavity formed in the bed beneath the said plate N, and the opposite end of the spring is so secured to the bed-plate within the circular cavity as to be coiled up more closely as the extreme outward or opposite swinging end of the said right-angle or bent arm K is forced inwardly through the action of the said rotary screw-threaded sleeve J upon said pin *f*, extending from the swinging or vibrating arm or the said bent actuating-arm K into the screw-groove of the said rotary sleeve J, which forces the said arm against the action of the said spring O inwardly, as shown in Figs. 1 and 8, so that when the said pin *f* reaches the left-hand inward end of the screw J, above described, an eccentric cam P, provided on the said shaft C', rotates forward, so as to contact with the downward-extended end R of the said pivoted arm I, so as to force or raise the said pivoted arm I upward, which lifts upward the said connected frame L, having the elongated opening *d*, which receives the free swinging end of the said extended bent arm K, and thereby raises it up just sufficiently to draw upward the short projecting pin *f* from the thread of the said rotary sleeve J, when the action of the said flat spring O with that of the coiled spiral spring S², connected to the said arm K and bed-plate A of the machine, act together, so as to force the said arm K outward or to the right-hand end of the said screw-threaded sleeve J; but the act of raising and swinging the said bent arm K is not sufficient to withdraw the said projecting pin *g* from the peripheral groove *a*, formed in the said sliding clutch-sleeve G. Consequently the clutch-sleeve G is slid back or outward on the said driving-shaft C, and thus the sliding pin H enters the said loose gear E, and thereby causes it to rotate with the said shaft C, as shown in Fig. 1. To the top portion of the said right-angle frame there is provided a horizontal sliding spring pin-catch Q, which has a normal bearing at its inward end, when the said frame L is at its lowest position, against the vertical face of the catch-support S, as shown in Figs. 1 and 8, and when the said eccentric cam P has been rotated forward, so as to raise upward the pivoted arm I, vertical portion R, and right-angle-connected frame L, the said spring pin-catch Q has its contact end, with the said support S, forced upon the top end of the said support S a short distance. This action is produced in order that the said swinging arm K may be retained in its elevated position, with the said short pin *f* thereby removed and released from the screw-thread of the said sleeve J, while the said bent swinging arm K springs outward through the action of the said springs O and S², and the rear extreme end of the said bent swinging arm K strikes against the vertical end of the said elongated opening *d*, which end is formed by a vertical arm attached to the spring-catch Q, and thereby

knocks the said spring pin-catch Q off from the said support S, and thereby permits the bent swinging arm K to drop down freely into position, with the said screw-sleeve J at its outward or right-hand end in the proper position to be forced inwardly by such action of the said screw J, as above described and shown. To the right-hand end portion of the said driving-shaft section C' is rigidly secured a small gear T, which meshes with a larger gear U, rigid on the horizontal parallel shaft V, which has also a smaller gear W, also rigid on shaft V, which meshes with a corresponding gear X², loose on the said driving-shaft section C'. By means of gears T and U the revolutions of the said shaft V are reduced in relation to the said shafts C and D about four times; but the said speed-reducing gears may be varied relatively in size or connected in any other manner desired from that shown in Figs. 2 and 8. The cam P is connected to the gear X² in any suitable manner so that the two revolve together, and by a proper arrangement of the size of the gears T, U, W, and X² the cam and gear are timed to cooperate at proper intervals with the arm R. Now upon the tops of the said vertical supports B, I secure a thin horizontal plate, forming a work-table A², provided within a suitable slot or opening, and projecting slightly above the upper surface of the table at intervals is a well-known reciprocating toothed feed-dog B⁵, operating in the usual manner in conjunction with an elongated presser-foot C⁵ and a common sewing-needle D⁵, arranged and adapted to feed forward or inward the folded box-plait fabric and sew or stitch the same alternately with the folding of the fabric, as hereinafter described. These feed and sewing devices being old and well known need not be further described, being sufficiently shown in Figs. 6 and 8 to illustrate their purpose. Now in order to fold the fabric automatically as it is fed inwardly to the stitching mechanism of the machine, so as to form single or double box-plaits, as desired, the fabric is previously formed into the desired width of strips and hemmed on the edges, or as may be desired for the purpose. The said work-table A² is extended forward on an incline, forming a supporting or folding work-table A³, as shown in Figs. 4, 5, 6, and 9. At the front of the machine to the bed-plate A are pivoted the lower ends of two vertical vibrating arms B² and B³ and between the upper ends of which are pivoted two horizontal supporting guide-bars D² and D³, leaving a long narrow space between the top and bottom one, as shown in Figs. 3, 6, and 9. Now to the inward faces of the said guide-bars D² D³ are secured the outward ends of the upper and under thin spring sheet-steel folding-blades E² and F², the inward end portions of which are provided with a series of narrow parallel slots, leaving a number of long flexible narrow teeth the points of which are quite sharp,

and as the said folding-blades are secured in position so as to incline toward each other the extreme inward point ends of the teeth contact or meet with a slight yielding pressure, as shown in Figs. 3, 6, and 9. Now directly above the said incline folding-table A³ is pivoted between the vertical supports B'' and B''' the top or upper incline folding clamp-plate C³, the front or inward edge of which is provided with an opening n, surrounding the front curved end of the presser-foot C⁵, as shown in Figs. 8 and 9, with its front edge forced downward into contact with the fabric resting on the folding-table or work-table A² at the commencing-point of the incline portion A³, as shown in Figs. 8 and 9. Now in order to hold the folded or plaited fabric in position under the curved front end of the presser-foot C⁵, as hereinafter described, I provide the said shaft C' at a point in line with the sewing-needle D⁵, beneath the work-table A², with an eccentric cam E³, secured rigidly on the said shaft C', so that when rotated the eccentric cam E³ contacts with the free end of the pivoted or spring arm or bar F³, which is provided with a vertical projecting sharp-pointed pin G³, which is thereby forced upward through the fabric at the proper time, so as to hold the same when the said folding-blades E² and F² have formed a fold or plait in the fabric, as hereinafter described, so that the said folding-blades cannot draw the fabric backward as they are reciprocated or forced back and forth by the action of the horizontal reciprocating bar H³, one end of which is connected to the crank-pin I³ in the rotating disk J³, secured on the extreme opposite end or outward end of the said shaft C', the opposite end of the said reciprocating bar H³ being pivoted to the said vertical vibrating arm B³, as shown in Figs. 1 and 7. Now it will be seen and understood that in order to elevate and depress the front edge of the said folding or clamp plate C³ the left-hand end of the same has a support-piece K³ secured upon the upper surface and extending nearly to the front edge thereof and to which is pivoted the lower end of the short connecting-bar L³, the upper end of which is pivoted to the horizontal or spring actuating-arm M³, the rear end of which is pivoted to the vertical rear frame-support B⁶, as shown in Figs. 3, 7, and 9. This horizontal actuating-arm M³ has a vertical downward-projecting right-angle arm N³, the lower end of which is brought to contact with the rotary eccentric cam P³, loosely secured upon the outward left-hand end portion of the said horizontal shaft C' and secured to the inward face of the loose gear u³ and caused to rotate therewith at intervals. The extreme forward end of the said horizontal actuating-arm M³ has connected thereto the upper end of the vertical spiral spring R³, the lower end of which is secured to the said vertical support-frame B, whereby the said actuating-arm M³ and vertical extension N³ serve to operate the said connected mech-

anisms, as shown and above described. Now in order to produce the desired speed relatively in relation to the said intermittently-connected shaft C' with the said shaft V and the shaft V³, the said shaft V has rigidly secured thereon, near the left-hand end thereof beneath the incline folding-table, a small gear S³, and outside the frame a rigid gear T³, and the extreme outward left-hand end portion of the said shaft C' with a loose gear U³, which meshes with the said rigid gear T³, as indicated by the teeth and dotted lines in Fig. 7. Now there is provided a horizontal parallel shaft V³, having secured thereon beneath the incline table, near the end portion thereof, a larger gear W³, which meshes with the said small gear S³ on the said shaft V, and the extreme outward left-hand end of the said shaft V³ has secured thereon a removable irregular-curved eccentric variable-faced cam Y, as shown in Fig. 7. This peculiarly-shaped eccentric cam Y serves a most essential and important feature in my box-plait-folding mechanism in connection with the small friction-wheel Z, which has a yielding bearing on the irregular cam-eccentric actuating-face thereof through the action brought to bear by the vertical spiral spring X, the lower end of which is secured to the bed A of the machine and the upper end attached to the forward end of the upper horizontal actuating-arm Z², the rear end of which is pivoted directly to the lower parallel actuating-arm Z³, the rear end of which is pivoted to the vertical frame portion B⁶ of the machine, as shown in Fig. 7. Now the said compound pivoted parallel actuating and spring-yielding horizontal arms Z² and Z³ are connected together near their forward end portions by a short spiral spring d², so as to form a slight bearing on the guide-pin e², projecting outward from the short bar c², rigidly secured to the end of the said supporting guide-bars D² and D³, as shown in Fig. 7. The said guide-bars D² and D³ are provided with two adjustable guide-blocks E⁶ E⁶, between which the end of the strip of fabric to be formed into single, double, or triple box-plaits is placed and then carried between the toothed folding-blades forward into the machine to be drawn through by the action of the feed mechanism to the needle to be stitched intermittently with the forming of the box-plaits by the action of the reciprocating or folding blades, which act upon the fabric on the bottom incline, so as to fold the plates beneath, and then on the top incline, so as to fold the plaits above, the strip of fabric being folded and pressed into position beneath the upward-curved front end of the presser-foot prior to being carried by the feed-dog to

the sewing-needle. Now it will be seen and understood that the said irregular-curved variable eccentric-faced operating-cam Y may be removed and a different-faced cam substituted, so that the folding-blades may be reciprocated in various horizontal planes, whereby the fabric may be folded so as to form either single, double, or triple box-plaits or various other forms, as may be desired, the corresponding relative movements of the actuating mechanism being controlled so as to coincide therewith intermittently, as desired, so as to produce the result contemplated without departing from the essential features of my present invention, as hereinbefore described, and shown in the drawings hereto annexed.

Having thus described my invention, I claim—

1. The combination in a box-plait sewing-machine, of the shaft having a rigid gear and screw-thread, and the shaft having a loose gear and a sliding sleeve having a projecting pin at one end adapted to secure said loose gear to its shaft, and the opposite end having a clutch adapted to engage with a separate shaft in line therewith, the swinging arm having a pin connecting with the sliding sleeve, and a pin adapted to engage with the screw-thread, whereby the arm is moved in one direction, and the cam to release the pin from the screw-thread, and the spring to return the arm to its former position, and the connected folding and stitching devices, substantially as described.

2. The combination in a box-plait sewing-machine having folding and stitching devices, as described, of the shaft having a rigid gear and screw-thread, and the shaft having a loose gear and a sliding sleeve having a projecting pin at one end adapted to secure said loose gear to its shaft, and the opposite end having a clutch adapted to engage with a separate shaft in line therewith, the swinging arm having a pin connecting with the sliding sleeve and a pin adapted to engage with the screw-thread, the eccentric cam P, pivoted arm I having at a right angle the frame L, and the spring catch-pin Q adapted to rest upon the vertical support, whereby the pin of the said swinging arm is held out of connection with the screw-thread of the main shaft during the movement of the swinging arm over the screw-thread, and the connected spring to return the arm to its former position, substantially as described.

ORANGE M. CHAMBERLAIN.

Witnesses:

SYLVENUS WALKER,
HENRY HOUGHTON.