July 17, 1934. E. PRAZAK 1,966,519

SEWING MACHINE

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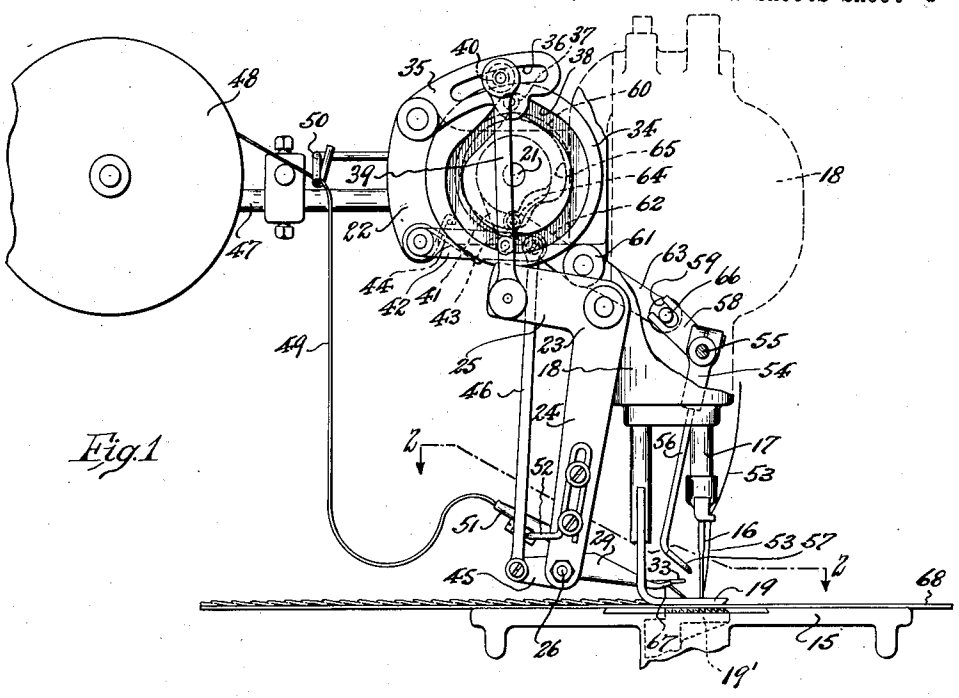


Fig. 1

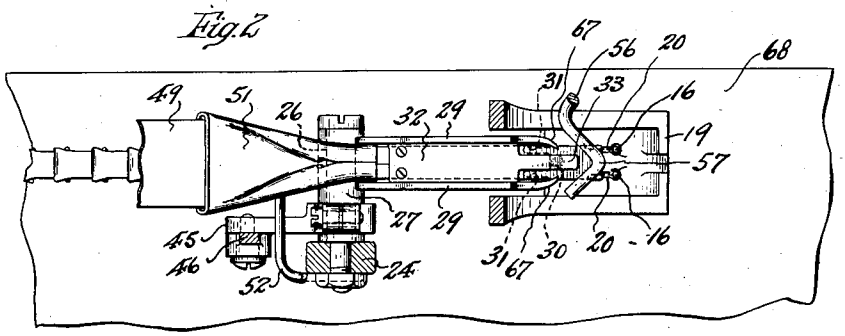


Fig. 2

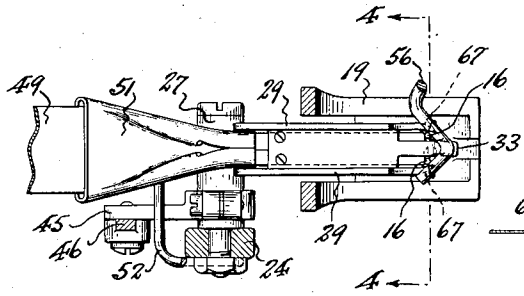


Fig. 3

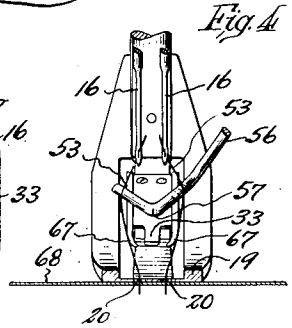


Fig. 4

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SEWING MACHINE

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Fig. 5

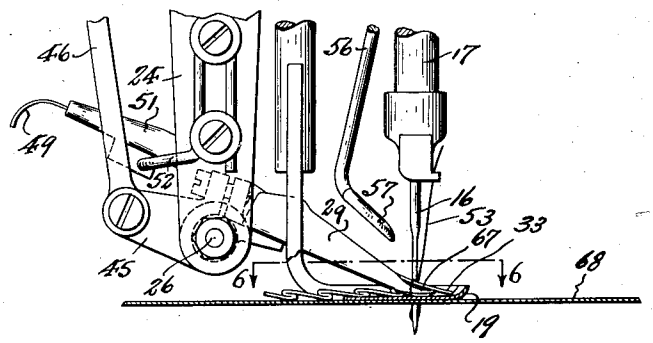


Fig. 6

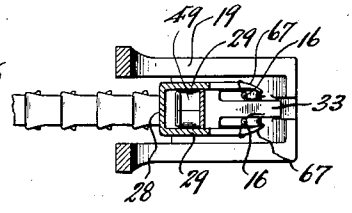


Fig. 7

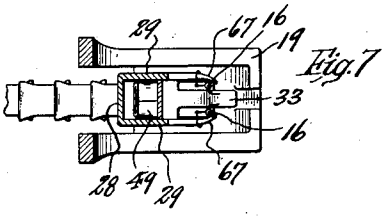


Fig. 8

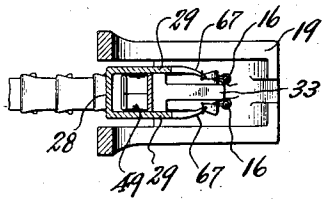


Fig. 9

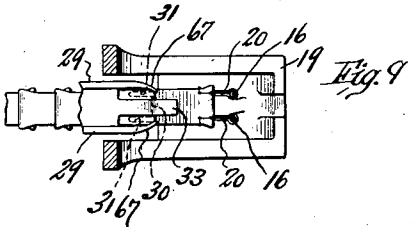


Fig. 10

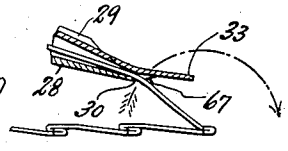
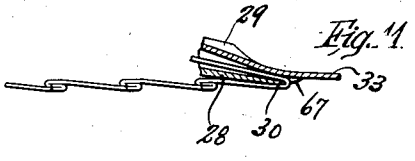


Fig. 11



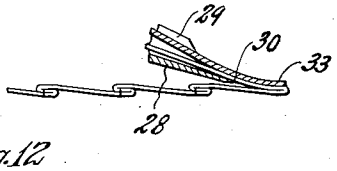


Fig. 12

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SEWING MACHINE

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Application December 13, 1933, Serial No. 702,105

12 Claims. (Cl. 112—134)

This invention relates to attachments for sewing machines to adapt the same for plaiting ruching, trimmings, appliqués and similar work; and the invention has reference, more particularly, to a novel arrangement for feeding and controlling the movement of material to the sewing mechanism of the machine, whereby said material is formed into successive pleats or folds, and thereupon stitched in such manner as to transversely constrict portions of the formed pleats, so as to produce a ruching, trimming or appliqué having fancy serrate side edges.

The invention has for its principal object to provide a novel automatic material feeding and control means in combination with the stitching mechanism of a sewing machine, together with means for so controlling the thread actuated by the sewing needles of the latter, as to produce laterally laid or looped stitches adapted to both transversely constrict the pleated material, as well as to form a fulcrum point from which the pleat folds are initiated.

Other objects of this invention, not at this time more particularly enumerated, will become apparent in the following detailed description of the same.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which:—

Fig. 1 is an end elevation of a sewing machine equipped with the novel plaiting mechanism according to this invention, portions of the sewing machine arm being broken away, but being indicated in dotted outline; Fig. 2 is a fragmentary horizontal section, taken on line 2—2 in Fig. 1; Fig. 3 is a view similar to that of Fig. 2, but showing the operation of the means for spreading the thread actuated by the sewing needles preparatory to forming the laterally laid or looped stitches for determining and anchoring the folds of successive pleats; and Fig. 4 is a transverse section, taken on line 4—4 in Fig. 3.

Fig. 5 is an enlarged side elevation of the plaiting and stitching mechanism as disposed during the formation of the laterally laid or looped stitches; Fig. 6 is a fragmentary horizontal section, taken on line 6—6 in Fig. 5; and Figs. 7, 8 and 9 are respectively views similar to that of Fig. 6 but showing progressive steps of the fold or pleat stitching operations.

Figs. 10 to 12 inclusive are fragmentary sectional views showing the plaiting in side elevation, and respectively illustrating the operations of turning and laying the material to form the pleats or folds.

Similar characters of reference are employed in the above described views, to illustrate corresponding parts.

Referring to said drawings, the reference character 15 indicates the sewing table or bed plate of any suitable type of sewing machine, preferably of the two needle type, wherein the needles 16 are carried by the reciprocating bar 17 movable in the arm 18 of the machine; reciprocation of said bar and needles being effected in any known manner. The sewing needles cooperate with any well known form of shuttle or sewing hook mechanism (not shown) located in the usual manner beneath the bed plate 15 of the machine. Also associated with the arm 18 is a spring tensioned presser foot 19 which cooperates with any well known form of feed-dog mechanism 19', the latter being also located in the usual manner beneath the bed-plate 15 of the machine. Said presser foot 19 is provided with slots 20 through which the needles 16 reciprocate for cooperation with the stitch forming shuttle or sewing hook mechanism aforesaid.

Suitably mounted to extend along and parallel to the machine arm 18 is a cam-shaft 21, which is driven from an operative shaft of the sewing machine (not shown) by suitable transmission means (not shown) at a proper speed ratio. The forward end of said cam-shaft is journaled in a bearing bracket 22 suitably supported from the arm 18. Pivotally supported from the machine arm 18 is a reciprocator bell-crank lever 23, having a depending arm 24 and a lateral arm 25. Carried by the lower or free end of the depending arm of said reciprocator bell-crank lever 23, is a fulcrum stud 26 upon which is pivotally mounted the fulcrum knuckle 27 of a plaiting member. Said plaiting member comprises a trough-like or channeled body having a bottom 28 and sides 29, the forward end of said bottom providing a fold or pleat forming abutment or edge 30. The forward end portion of said bottom 28 of the plaiting member is provided with rearwardly indented longitudinal slots 31 to allow the needles 16 to operate therethrough at proper times. Suitably secured in connection with the plaiting member, between the sides 29 thereof and spaced over the bottom 28 thereof, is a plate 32 having at its free end a forwardly projecting narrow yieldable presser finger 33. Means are provided for producing forward and backward longitudinal reciprocation of said plaiting member by means of swinging movements imparted to said reciprocator bell-crank lever 23, such reciprocation being toward and from the needles 16 of the sewing mech-

anism in properly timed relation to the sewing operations thereof. This means comprises a plaiting member reciprocator cam 34 which is fixed upon and driven by the cam-shaft 21. Pivotally connected with the bearing bracket 22 is a slotted lever arm 35 having a longitudinal slot 36. This lever arm 35 overhangs the face of said reciprocator cam 34, and is further provided with a laterally projecting roller stud 37 which engages in the race 38 of said cam. Pivotally connected with the lateral arm 25 of said bell-crank 23 is a link 39, the opposite or upper end of which is adjustably pivoted in connection with said lever arm 35 by a pivot connection 40 adjustable along the slot 36, and capable of being fixed in desired adjusted position toward or from the pivot of said lever arm 35, according to the amplitude of movement desired to be transmitted to the bell-crank lever 23 and the consequent amplitude of longitudinal reciprocation desired with respect to the plaiting member which governs the dimensions of the fold or pleat produced by the latter. Means are also provided for producing vertical oscillations of the plaiting member in timed relation to the longitudinal reciprocation thereof for lifting and turning over the fold or pleat desired to be produced. This latter means comprises a plaiting member oscillator cam 41, which is also fixed upon and driven by the cam-shaft 21. Pivotally connected with the bearing bracket 22 is a lever arm 42 having a laterally projecting roller stud 43 to engage said oscillator cam. Spring means 44 are provided to compel said lever arm 42 and its roller stud 43 to cooperate with said oscillator cam. Fixed on the knuckle 27 of the plaiting member is an arm 45, and interconnecting said arm 45 with said lever arm 42 is a link 46.

Extending outwardly from said bearing bracket 22 is an extension 47 for supporting a supply reel or spool 48 upon which the material 49 to be plaited is wound. This material may be led through a guide eye 50 to enter the rear end and extend operatively through the plaiting member, as shown more particularly in Fig. 1 of the drawings. The material 49 to be plaited may comprise a strip of fabric or like material of desired width which, prior to delivery through the plaiting member, may have its longitudinal margins turned or folded inwardly to conceal the raw edges thereof. In such case, a suitable margin turn-over guide or folder member 51 is operatively related to the receiving end of the plaiting member, through which the material is caused to pass before entering the latter. The turn-over guide or folder member 51 may be supported from the depending arm 24 of the reciprocator bell-crank lever 23 by means of a suitable carrying bracket 52 secured to the latter. Where the material to be plaited is in the form of a braid or tape having finished or selveged longitudinal margins, so that inturning of such margins is not necessary, the turn-over guide or folder member 51 may be omitted, and such material led directly from the source of supply to the plaiting member. The arrangement and mounting of the supply of material to be plaited, as shown in the drawings and hereinabove described, is merely illustrative of one arrangement thereof, and it will be understood that any other suitable arrangement of means for supporting the supply of material to be plaited subject to delivery to the plaiting member may be adopted.

In the operation of the plaiting member, relative to the sewing needles 16, in the laying of the folds or pleats, and preparatory to stitching the latter in the manner hereinafter more fully explained, it is necessary, during certain phases of the plaiting member actuation, to spread the sewing threads 53, which are carried by the needles 16, so that the plaiting member, with the material to be plaited, may be moved between the threads preparatory to the formation of lateral stitches which anchor the turns of the folds or pleats. Means are provided to accomplish this purpose, such means being adapted to operate in timed relation to the movements of the sewing needles 16 and the plaiting member. This means comprises an oscillatable member 54 pivoted on a stud 55 carried by the machine arm 18. Affixed to and projecting downwardly from said member 54 is an extension 56 at the free end of which is provided a laterally off-set substantially V-shaped spreader member 57, normally disposed between the needles 16 and the operative end of the plaiting member, and in a plane of movement above that of the latter. The apex of said spreader member is aligned with a medial line passing substantially midway between the vertical paths of movement of the needles 16. Connected with said oscillatable member 54 is a laterally projecting rocker-arm 58 having a bifurcated free end 59. The means for actuating the thread spreading devices comprises a cam 60, which is fixed upon and driven by the cam-shaft 21. Pivotally mounted in connection with the bearing bracket 22 is a lever 61 having oppositely extending arms 62 and 63. The arm 62 is provided with a laterally projecting roller stud 64 which engages in the race 65 of said cam 60. The arm 63 is provided with a laterally projecting stud 66 which engages in the bifurcated free end 59 of the rocker arm 58. The plaiting member is provided in connection with the sides 29 thereof, at the free forward ends of the latter, with somewhat in-turned spread thread supporting fingers or horns 67.

In the operation of the machine, the fabric or material 68, upon which the material 49 is to be plaited and applied, is engaged beneath the presser foot 19 so as to be fed by the usual feed dog mechanism which cooperates with the latter. As the fabric or material 68 is fed onward subject to the sewing operations, the material 49 is simultaneously fed, plaited and stitched to the fabric or material 68 by operation of the novel plaiting mechanism acting in conjunction with said sewing mechanism. Upon completion of one pleat of the material 49, the plaiting member has receded to a retracted position ready to fold over and lay a succeeding pleat, as shown in Figs. 1 and 2, in which position the reciprocator cam 34 has actuated the bell-crank lever 23 to swing back the arm 24 thereof to its rearmost position. As the cam 34 continues to turn, the race 38 thereof acts upon the lever arm 35, link 39 and bell-crank lever 23 to actuate the latter so as to swing forward the arm 24 thereof, thus moving the plaiting member longitudinally toward the needles 16. In the meantime the oscillator cam 41, acting upon the lever arm 42, link 46 and arm 45, functions to turn the plaiting member upon its pivotal connection provided by the stud 26 and knuckle 27 in such direction as to induce an upswinging movement of the forward end of the plaiting member, whereby the material 49 issuing from the latter is engaged by the fold forming edge 30 thereof, and raised upwardly to swing over the material during the advance of the plaiting member (see Fig. 10). As the plaiting member is advancing toward the needles

16, the movement thereof is timed to occur during the rising movement of the needles 16, and as the plaiting member approaches the path of movement of the needles, the thread spreading devices function, through the timed operation of the cam 60 to swing forward the V-shaped spreader member 57, which is caused to swing beneath the raised needles 16 whereby the same enters between the sewing threads 53 carried by needles so as to spread said threads laterally apart (see Figs. 3 and 4). After the threads 53 are thus spread apart, continued advance of the plaiting member moves the forward end thereof and the pleat of material carried thereby between the spread apart threads, whereby the fingers or horns 67 engage the latter to hold the same spread while the spreader member 57 is retracted by its cam actuated operating means preparatory to descent of the needles 16. Prior to descent of said needles 16, the plaiting member completes its forward motion, during the last phase of which the operation of the oscillator cam 41 is effective to lower the forward end of the plaiting member and the presser finger 33 to engage and hold the folded pleat down upon the floor of the presser foot 19 during the stitch forming operation of the sewing mechanism which is initiated by the down stroke of the needles 16 (see Figs. 5, 6 and 11). As the needles 16 descend, they pass through the fold of the pleat inwardly of the turned edge thereof to carry the threads 53 through the latter, thus laterally looping the threads around the fingers or horns 67 (see Figs. 5 and 6), thus producing lateral stitches to be drawn with constricting effect transversely over and around the longitudinal margins of the pleat. During the next rise and descent of the needles 16, the plaiting member starts to withdraw while remaining in downswung position so as to maintain the position of the presser finger 33 engaged upon the pleat to hold the same against vertical displacement during stitch forming operations of the sewing needles and cooperating stitch forming mechanism. This and succeeding operations of the sewing mechanism (see Figs. 7 and 8) accompanied by withdrawing movement of the plaiting member produce successive longitudinal or running stitches, which cross the turn of the pleat and continue through the foundation fabric or material 68 until the material 68 is advanced sufficiently to initiate a succeeding pleat of predetermined length. As the plaiting member is retracted, the fingers or horns 67 are withdrawn out of the initial laterally looped stitches, which are tightened home, with constricting effect, around the longitudinal margins of the folded material 49. As the last of the longitudinal running stitches is made, the withdrawing movement of the plaiting member is accelerated (the cam 34 being suitably shaped to effect such action), until the plaiting member returns to fully retracted position (see Fig. 9) ready to initiate and produce a succeeding pleat, whereupon the cycle of operations above described is repeated.

It is of advantage to have the retracting movement of the plaiting member take place in timed relation to the feed of the work during the formation of the longitudinal stitches, and accordingly the race 38 of the cam 34 may be shaped to effect a step by step retractive movement of the plaiting member if it be so desired.

From the above description it will be understood that the invention provides a novel automatic mechanism in conjunction with a sewing machine for plaiting ruching, trimming or appliqués of one material upon another; or the mechanism can be employed to produce the plaiting of the material without applying the same to a foundation fabric, if this is desirable.

I am aware that changes may be made in the general arrangements and combinations of the several devices and parts, as well as in the details of the construction of the same, without departing from the scope of this invention as described in the foregoing specification and as defined in the appended claims. Hence, I do not limit the invention to the exact arrangements and combinations of the various devices and parts as set forth in the foregoing specification, nor do I confine myself to the exact details of the construction of said parts as illustrated in the accompanying drawings.

I claim:

1. In combination, a sewing mechanism including laterally spaced vertically reciprocable sewing needles, material plaiting means operative to lay folds of said material in the path of needle movement while the needles are raised, and means to laterally spread the threads controlled by said needles to permit laying of a fold therebetween by said plaiting means, whereby initial fold securing stitches will be laterally looped over and about the longitudinal margins of the laid fold by a stitching operation of the needles.

2. In combination, a sewing mechanism including laterally spaced vertically reciprocable sewing needles, material plaiting means comprising a plaiting member through which said material is led from a source of supply, means for imparting timed longitudinal reciprocatory and vertical oscillatory movements to said plaiting member operative to form folds of said material with portions thereof deposited in the path of needle movement while the needles are raised, means to laterally spread the threads controlled by said needles preparatory to deposit of a fold in the path of needle movement, means to effect timed actuation of said spreader means, and means connected with said plaiting member to engage and hold the spread threads whereby initial fold securing stitches will be laterally looped to extend over and about the longitudinal margins of the deposited fold by a stitching operation of the needles.

3. In combination, a sewing mechanism including work-feeding means and cooperating laterally spaced vertically reciprocable sewing needles, means to plait and apply material to be stitched to the work fed through the sewing mechanism, said means comprising a trough-like plaiting member through which said material passes from a source of supply, said plaiting member being disposed beyond the sewing needles, means to effect timed actuation of said plaiting member toward and from said needles to form and deposit pleat folds of the material in the path of needle movement, and means to laterally spread the threads controlled by said needles preparatory to deposit of a fold intermediate said threads and in the path of needle movement whereby initial fold securing stitches will be laterally looped over and about the longitudinal margins of the deposited fold by a stitching operation of the needles.

4. In combination, a sewing mechanism including work-feeding means and cooperating laterally spaced vertically reciprocable sewing needles, means to plait and apply material to be stitched to the work fed through the sewing mechanism, said means comprising a trough-like plait-

ing member through which said material passes from a source of supply, said plaiting member being disposed beyond the sewing needles, means for imparting combined longitudinal reciprocatory and vertical oscillatory movements to said plaiting member operative to form and deposit pleat folds of the material in the path of needle movement, means to laterally spread the threads controlled by said needles preparatory to deposit of a fold in the path of needle movement and between said threads, means to effect actuation of said spreader means in timed relation to operative movements of said plaiting member and the sewing needles, and means connected with said plaiting member to engage and hold the spread threads whereby initial fold securing stitches will be laterally looped to extend over and about the longitudinal margins of the deposited fold by a stitching operation of the needles.

5. In combination, a sewing mechanism including work-feeding means and cooperating laterally spaced vertically reciprocable sewing needles, means to plait and apply material to be stitched to the work fed through the sewing mechanism, said means comprising a trough-like plaiting member through which said material passes from a source of supply, said plaiting member being disposed beyond the sewing needles, means for imparting combined longitudinal reciprocatory and vertical oscillatory movements to said plaiting member operative to form and deposit pleat folds of the material in the path of needle movement, means to laterally spread the threads controlled by said needles preparatory to deposit of a fold in the path of needle movement and between said threads, means to effect actuation of said spreader means in timed relation to operative movements of said plaiting member and the sewing needles, and means connected with said plaiting member to engage and hold the spread threads whereby initial fold securing stitches will be laterally looped to extend over and about the longitudinal margins of the deposited fold by a stitching operation of the needles, said plaiting member having a presser finger to hold down the deposited fold subject to the stitching operations of the needles.

6. In combination with the sewing mechanism of a sewing machine, material plaiting means operative to deposit pleat folds subject to stitching operations of the sewing mechanism, and means to laterally spread sewing thread controlled by said sewing mechanism preparatory to deposit of a pleat fold ready to be stitched, whereby a stitch formation laterally looped about a longitudinal margin of the deposited pleat fold will be formed in the course of the stitching operations.

7. In combination with the sewing mechanism of a sewing machine having a pair of laterally spaced needles, material plaiting means operative to deposit pleat folds subject to stitching operations of the sewing mechanism, and means to enter between and spread laterally apart the sewing threads carried by said needles preparatory to deposit of a pleat fold ready to be stitched, whereby laterally constrictive stitch formations are looped about longitudinal margins of a deposited pleat fold during the stitching operations.

8. In a sewing machine, a sewing mechanism including laterally spaced vertically reciprocable sewing needles, a work-feeding means including a tensioned presser foot, means to plait material to be stitched to the work passed through the machine, said plaiting means comprising a trough-like plaiting member through which said material passes from a source of supply, said plaiting member being disposed beyond the sewing needles for movement toward and from the latter, a bell-crank lever to a depending arm of which said plaiting member is pivoted, a reciprocator cam for actuating said bell-crank lever to produce timed longitudinal reciprocatory movement of said plaiting member, means to produce timed vertical oscillatory movement of said plaiting member in conjunction with reciprocatory movement thereof, said latter means including an oscillator cam, a thread spreader means operative to spread laterally apart the sewing threads carried by said needles preparatory to deposit of a pleat fold between said threads and in the path of movement of said needles, and means to produce timed operation of said thread spreader means including an actuating cam.

9. In a sewing machine, a sewing mechanism including laterally spaced vertically reciprocable sewing needles, a work-feeding means including a tensioned presser foot, means to plait material to be stitched to the work passed through the machine, said plaiting means comprising a trough-like plaiting member through which said material passes from a source of supply, said plaiting member being disposed beyond the sewing needles for movement toward and from the latter, a bell-crank lever to a depending arm of which said plaiting member is pivoted, a reciprocator cam for actuating said bell-crank lever to produce timed longitudinal reciprocatory movement of said plaiting member, means to produce timed vertical oscillatory movement of said plaiting member in conjunction with reciprocatory movement thereof, said latter means including an oscillator cam, a thread spreader means operative to spread laterally apart the sewing threads carried by said needles preparatory to deposit of a pleat fold between said threads and in the path of movement of said needles, means to produce timed operation of said thread spreader means including an actuating cam, and said plaiting member having at its free end spread thread engaging horns for the purposes described.

10. In a sewing machine, a sewing mechanism including laterally spaced vertically reciprocable sewing needles, a work-feeding means including a tensioned presser foot, means to plait material to be stitched to the work passed through the machine. said plaiting means comprising a trough-like plaiting member through which said material passes from a source of supply, said plaiting member being disposed beyond the sewing needles for movement toward and from the latter, a bell-crank lever to a depending arm of which said plaiting member is pivoted, a reciprocator cam for actuating said bell-crank lever to produce timed longitudinal reciprocatory movement of said plaiting member, means to produce timed vertical oscillatory movement of said plaiting member in conjunction with reciprocatory movement thereof, said latter means including an oscillator cam, a thread spreader means operative to spread laterally apart the sewing threads carried by said needles preparatory to deposit of a pleat fold between said threads and in the path of movement of said needles, means to produce timed operation of said thread spreader means including an actuating cam, said plaiting member having at its free end spread thread engaging horns for the purposes described, and a presser finger projecting from the free

end of said plaiting member to overlie and hold deposited pleat folds subject to stitching operations of said sewing needles.

11. In a sewing machine, a sewing mechanism including laterally spaced vertically reciprocable sewing needles, a work-feeding means including a tensioned presser foot, a material plaiting member through which the material passes from a source of supply, a bell-crank lever, means to pivotally mount said plaiting member on an arm of said bell-crank lever, said plaiting member having a lever arm for oscillating the same upon its pivotal connection with said bell-crank lever arm, a driven cam shaft, a reciprocator cam on said cam shaft, means cooperative with said reciprocator cam for actuating said bell-crank to impart longitudinal reciprocatory movement to said plaiting member, an oscillator cam on said cam shaft, means connected with said plaiting member oscillating arm and cooperative with said oscillator cam for imparting vertical oscillatory movement to said plaiting member in conjunction with its longitudinal reciprocatory movement, a thread spreader means operative to spread laterally apart the sewing threads carried by said needles preparatory to the deposit of a pleat fold between said threads and in the path of movement of said needles, a spreader cam on said cam shaft, and means cooperative with said spreader cam for actuating said spreader means.

12. In a sewing machine, a sewing mechanism including laterally spaced vertically reciprocable sewing needles, a work-feeding means including a tensioned presser foot, a material plaiting member through which the material passes from a source of supply, a bell-crank lever, means to pivotally mount said plaiting member on an arm of said bell-crank lever, said plaiting member having a lever arm for oscillating the same upon its pivotal connection with said bell-crank lever arm, a driven cam shaft, a reciprocator cam on said cam shaft, means cooperative with said reciprocator cam for actuating said bell-crank lever to impart longitudinal reciprocatory movement to said plaiting member, an oscillator cam on said cam shaft, means connected with said plaiting member oscillating arm and cooperative with said oscillator cam for imparting vertical oscillatory movement to said plaiting member in conjunction with its longitudinal reciprocatory movement, a thread spreader means operative to spread laterally apart the sewing threads carried by said needles preparatory to the deposit of a pleat fold between said threads and in the path of movement of said needles, a spreader cam on said shaft, means cooperative with said spreader cam for actuating said spreader means, said plaiting member having spread thread engaging elements to hold the threads laterally looped preparatory to a stitching operation of said needles, and said plaiting member having a resilient presser finger to overlie and hold a pleat fold subject to stitching operations of said needles.

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