ABSTRACT

A broom stitching machine having a movable vise assembly including movable jaws for clamping the broom in sewing position wherein reciprocating needles move through the broom straws at substantially 70° to 80° to the plane of the vise jaws for binding the strands together, including improved means for moving the broom vise a predetermined distance between each stitch by providing an intermittent rotating shaft to which the movable vise assembly is connected including means for adjusting the amount of the shaft rotation for regulating the length of the stitch.

5 Claims, 6 Drawing Figures
STITCH SPACER FOR BROOM STITCHING MACHINE

The present invention relates to a semi-automatic broom stitching machine in which a broom, after being partly assembled, is clamped into a vise assembly and moved into the path of the sewing mechanism for providing one or more rows of stitching through the body portion of the broom for binding together the broom strands.

More particularly the invention relates to the mechanism for moving the broom assembly intermittently a predetermined distance between each stitch after the needles have cleared the broom strands after each stitch.

In the past this stitch spacing mechanism has been quite clumsy requiring a number of machine parts and considerable maintenance.

One object of the present invention is to provide a simple and reliable mechanism for stitch spacing operation which requires very little maintenance and is a great deal more economical to manufacture.

Another object of the invention is that the adjustments for lengthening and shortening the stitch has been made a great deal simpler and one that may be performed by personnel of less mechanical knowledge than previously required.

A further object of the invention is that the time of assembling the machine has been greatly reduced.

While the above objects have been pointed out, other objects, uses and advantages will become apparent as the nature of the machine is more fully disclosed when reference is had to the accompanying drawings forming a part of this specification.

In the drawings:

FIG. 1 is a schematic rear view in elevation of a broom stitching machine in which certain parts have been eliminated to better show the present new features of the machine.

FIG. 2 is an enlarged fragmentary view in elevation of the principal elements utilized in the stitch spacing operation.

FIG. 3 is a view in elevation of the cam element 44 taken at right angles to the view shown in FIG. 2.

FIG. 4 is a fragmentary view taken on the line 4—4 of FIG. 2 showing another element partly in section and partly in elevation.

FIG. 5 is a fragmentary view taken on the line 5—5 of FIG. 2 showing still another element partly in section and partly in elevation.

FIG. 6 is a fragmentary view taken on the line 6—6 of FIG. 2 showing another element partly in section and partly in elevation together with a schematic view in elevation showing one form of connection used in connecting the stitch spacing mechanism with the movable vise assembly.

Referring to the drawings in more detail and first to FIG. 1, which is a schematic rear view of the machine as a whole showing in general the pertinent moving parts, the machine A is provided with a frame having side walls 1 and 1', a base 2, a top portion 3, and central supporting members 4 and 4'. These central supporting members 4 and 4' are primarily for supporting the main drive shaft 5 on which is fixed to one end thereof a pulley wheel 6 and adjacent its opposite end a second wheel 8. Pivotally attached to the wheel 8 are arms 10 and 12. These arms are preferably connected to the wheel 8 by a single spindle 11 for giving the arms 14 and 16 an alternate reciprocating motion. The arms 10 and 12 are pivotally connected to the arms 14 and 16 by pivot bearings 10' and 12'. The arms are hinged adjacent the base of the frame as shown at 15 and 15' respectively. The needles 18 and 20 are secured to needle supporting members 19 and 23 which slide along guide members 22 and 24. The needle supporting members are pivotally attached to the upper end of the arms 14 and 16 which slide the needle members back and forth along the guides 22 and 24 to move the needles through the broom 17. The machine is operated by a suitable motor 25 preferably by belt 26 extending about the main drive wheel 6 and a motor pulley 28; however, any suitable power means may be employed.

Extending horizontally of the frame and perpendicularly to the main shaft 5 is a shaft 30 rotatably supported in bearings 32 and 34. On this shaft 30 there is supported, along with other elements, a pair of looper actuating arms 36 and 38. The arms extend outwardly from the shaft 30 in two directions as shown at 36', 38', 36'' and 38'', and are freely rotatably supported on the shaft 30 by bearings 40 and 41.

Fixed to the drive shaft 5 inwardly from the drive wheel 6 is a cam member 44 (see FIGS. 1, 2 and 3). The lower ends 36'' and 38'' of the arms 36 and 38 are provided with cam rollers 46 and 48 which extend outwardly and downwardly from the shaft 30 and in operating position with the cam 44 for oscillating the arm on the shaft 30. The operation of the cam is best shown in FIG. 3. The opposite ends 36' and 38' of the arms 36 and 38 extend upwardly and substantially opposite the vise jaws 37 and 39. Hinged to the upper ends 36' and 38' of each of the arms 36 and 38 by hinges 50 and 52 is a pair of loopers 54 and 56. The function of these loopers is to cooperate with the needle by threading the thread into the needle eye so that the thread or other securing material may be drawn through the broom strands. This detail operation is old in the Art and detail illustration and description are not deemed necessary as this is not a feature of this invention.

The invention resides in particular in the utilization of the shaft 30 and the looper actuating arms 36 and 38 along with other elements associated therewith for moving the vise assembly a predetermined distance after each stitch and after the needle has cleared the broom strands.

FIGS. 2 and 3 show the cam 44 for oscillating the arms 36 and 38 associated with the hubs 40 and 41 of the arm members 36 and 38 in a free rotating bearing (not shown) and one-way clutches 60 and 62. These clutches 60 and 62 are arranged to rotate the shaft 30 in one direction. The arms are provided with pins 64 and 66 which are adapted to engage the clutch elements 62 and 64 for rotating the same. The clutch elements are returned to an adjusted pre-set location by the spring 67. The return of both clutch members is limited by a stop 68 shown in FIGS. 2 and 5. The pins 64 and 66 operate in only one direction, therefore, the clutches may be stopped at any point along their return movement. For example, if the stitch is to be of greater spacing, the stop 68 is adjusted to give the clutch a greater travel as shown at 71 in FIG. 5, and if it is desired to shorten the stitch, the screw 68 is extended as shown at 68' which will allow the clutch to return to the point 71'. Wherever the clutch is located the pins 64
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and 66 will pick up the clutch and rotate it to a predetermined point.

The broom vise assembly is automatically moved by means connecting the shaft 30 to the vise assembly. The preferred way to do this is to provide an arm 70 hingedly attached to the vise assembly by a suitable pin 72. The vise operating arm being hinged on the frame by a bearing 74 will be movable by the arm 70. The arm 70 is moved mechanically by frictional contact with the shaft 30. The arm 70 is brought into operating engagement with the shaft 30 by means of a bracket 76, idler roll 78, and moving element B for the bracket. The bracket 76 is hinged about the shaft 30. This moving element may be of any conventional construction and may be operated either electrically, by fluid, or by the combination thereof, or by any other suitable means. The element B is secured to the frame element 4 as shown at 80 having a movable plunger 82 which is connected to the bracket 76 by a pin 84. The bracket 76 is normally in the position as shown at 86. In this position the arm 70 will move freely between the shaft 30 and the idler roll 78. When the sewing operation begins the moving element B will operate to move the bracket 76 about the shaft 30 to the position as shown at 88. In this position the idler roll 78 will press the arm 70 tightly against the shaft 30 which will cause the arm 70 to be moved by the rotation of the shaft 30. With this arrangement it is readily seen that if the shaft 30 is rotated between each stitch for a predetermined distance, it will move the vise assembly 90 into position for the next stitch and will continue this step by step movement of the vise assembly until the broom has been completely sewed. When the moving unit B operates to move the bracket 76 to the location 86 it will free the movement of the arm 70 between the shaft 30 and the idler roll 78. It will also be obvious that the greater the rotation of the shaft 30 the greater the distance there will be between the several stitches taken on the broom, and the reverse is also true, the lesser the rotation of the shaft 30 the shorter will be the distance between stitches.

The moving means B for the bracket 76 may be automatically or manually operated. In practice, at the end of the sewing operation the bracket 76 is moved to its normal position 86 automatically to free the vise assembly for changing the stitched broom for an unstitched broom and to place the vise assembly in position to repeat the sewing operation, at which time the bracket is again moved to its position 88 to move the arm 70 into operating contact with the shaft 30.

While the present invention is shown in its simplest form, it is not intended as a limitation of the invention in many of these operations may be performed by other means than those specifically shown. It is also to be noted that only a schematic view of the machine in FIG. 1 is presented to show the manner in which the present stitch-spacing mechanism is associated with the overall operation of the machine. What is believed to be new and patentable is set forth in the appended claims.

I claim:

1. In a broom stitching machine having a stationary frame and a stitching head mounted thereon, a vise for gripping a plurality of broom straws to be stitched, a vise supporting frame pivotally supported on the stationary frame, means for moving said vise supporting frame in a step by step motion relative to the stationary frame, said moving means comprising:
   a. a rotatable shaft supported upon said stationary frame;
   b. means for rotating said shaft in step by step motion;
   c. an arm member having one end connected to the vise supporting frame and its opposite end extending outwardly and connectable to the rotating shaft;
   d. means for connecting the opposite end of the arm to the rotatable shaft for moving the vise supporting frame and the vise holding the broom straws a predetermined distance with each step by step movement of the shaft, thereby moving the broom vise and broom straws the length of a stitch with each movement of the rotating shaft.

2. In a broom stitching machine as claimed in claim 1 wherein the means for bringing the arm member in operable engagement with the rotatable shaft comprising means for supporting said shaft slightly out of frictional contact with the rotatable shaft means for applying pressure to the side of the arm opposite the side of the arm adjacent the rotatable shaft with sufficient pressure to cause the arm to be moved by the shaft when the shaft is rotated.

3. In a broom stitching machine as claimed in claim 2 wherein automatic means are provided for moving the arm in contact with the rotatable shaft when the broom straws are in a position to be stitched.

4. In a broom stitching machine as claimed in claim 1 wherein the means for moving the arm into operable engagement with the rotatable shaft comprises a roller 76, a bracket 78 having means for supporting the roller 76 on the opposite side of the arm from the rotatable shaft, said bracket having its opposite end pivoted at a point whereby when it is rotated about the said pivot the roller will move into engagement with the side of the arm opposite the side of the arm adjacent the rotatable shaft for moving the arm in and out of contact with the said shaft.

5. In a broom stitching machine having a stationary frame including a sewing head carried on said frame, a vise for gripping a plurality of broom straws, a second frame pivotally mounted on said first frame for supporting said vise and improved means for positively moving the vise supporting frame in a step by step motion relative to the stationary sewing head for moving the broom straws through the said stitching head, said improvement comprising:
   a. a rotatable shaft supported on said first frame;
   b. a pair of freely oscillatable arms mounted on said shaft adapted to oscillate through a fixed arc;
   c. a one-way oscillatable clutch element associated with each of the oscillatable arms and adapted to be oscillated by said arms;
   d. a driving member carried by each of the oscillatable arms for moving the one-way clutch elements in one direction only, and resilient means for moving the clutch elements in the opposite direction;
   e. means for limiting the movement of the clutch elements when moved in its opposite direction by said resilient means;
   f. a feeding arm member having one end connected to the vise supporting frame and its opposite end connectable to the said rotatable shaft;
means for moving the opposite end of the feeding arm in contact with the rotatable shaft for feeding the broom straws through the sewing head in a step by step motion and operatable after the sewing cycle to disconnect the feeding arm from the said shaft to allow free movement of the vise frame relative to the stationary frame.