This invention relates to apparatus for sewing the open mouths of bags, such as bags for carrying wheat or other materials.

Referring to the accompanying drawings in which the invention is illustrated, Fig. 1 is a perspective view of the apparatus; Fig. 2 is a plan view; Fig. 3 is an end view looking in the direction of the arrow A of Fig. 2; Fig. 4 is a cross section on line B—C of Fig. 2; Fig. 5 is a plan view of ratchet mechanism for advancing the bag-sewing apparatus for stitch forming operations; Fig. 6 is a broken plan view similar to Fig. 5, showing the ratchet mechanism set just prior to an advancing movement of the sewing apparatus; Fig. 7 is a fragmentary section on line D—E of Fig. 3; Fig. 8 is a detail view of a crank-pin for reciprocating the needle block of the sewing apparatus; Fig. 9 is a sectional plan on line F—G of Fig. 4; Fig. 10 is a part sectional elevation showing a twine severing knife; Fig. 11 is a fragmentary perspective view showing alternative means for reciprocating the needle block; Fig. 12 is a section on line H—I of Fig. 11; Fig. 13 is a perspective view of clamp means for the open mouth of a bag to be sewn; Fig. 14 is a perspective view of the clamp in Fig. 13 clamped to the mouth of a bag; Fig. 15 is a plan of the hinged end of the clamp shown in Fig. 13; and Figs. 16, 17, 18 and 19 are diagrammatic views illustrating the formation of stitches through operations of the bag sewing apparatus.

Said bag-sewing apparatus is provided with a frame or body 20 which is formed within a U-shaped channel 21 of suitable dimensions to pass longitudinally over the open mouth 22 of a bag 23 to be sewn. A needle block 24 is slidably mounted in a guide-way 25 and is adapted to be reciprocated therein radially of the mouth 22 of the bag 23. There is a slotted opening 26 in the guideway 25 to receive therein a slidable distance piece 27 which, together with the end 28 of a cross shaped member 29, is secured to the needle block 24 by the screws 30. A needle 31, having a hook 32 and a swinging tang 33 associated with said hook, is secured to the needle block 24 by a screw 34; openings 35 in the walls of the U-shaped channel 21 allow the needle 31 to pass therethrough.

A roller fitted crank pin 36 is mounted on the extension 37 of an arm 38 and it is alternately adapted to engage in the opposite disposed slots 39 of the cross-shaped member 29 to reciprocate said member and the needle block 24 when the arm 38 is manually rotated through its handle 41. Alternatively, a crank disc 42 (see Figs. 11 and 12) may be used to reciprocate the needle block 24 by turning a handle 43 attached to an arm 44; the latter is tightly fitted to the square portion 45 of a stud 46 which is secured to the crank disc 42. A link 47 is pivoted at 48 to the needle block 24 and to the crank disc 42 by the stud 48. A lock nut 49 fits the stud 48 to enable the link 47 and the arm 44 to be attached in relation to the stud 46.

The cross shaped member 29 during reciprocation thereof, is adapted through its slots 40 to slidably engage a middle shouldered portion 50 of a tracked cam 51 which latter is rotatable about a stud 52 which is secured to the body 20; the operating arm 38 with its extension 37 is also secured by a screwed lock nut 53 to an upper reduced portion 54 of the said cam 51; the latter and the arm 38 are retained on the stud 52 by a nut 55. Should the alternative crank disc 42 be used to reciprocate the needle block 24, the said disc is rotatably fitted on the stud 52 and is retained thereon by the screwed nut 55, the tracked cam 51 being then formed integral with the crank disc 42.

To ensure that the arm 38 may be rotatable only in one direction the cam 51 is formed interiorly with tapering slots 56 (see Figs. 4 and 9) in which a number of rollers 57 are furnished to engage and firmly lock against the stud 52 to prevent rotation of the arm 38 in a direction opposite to the direction indicated by the arrows in Fig. 6. The cam 51 has formed around its circumference a grooved cam track 58 in which a crank pin 59 of an oscillating twine looper 60 is adapted to engage to enable oscillation of the looper during sewing operations of the apparatus. The looper 60 is pivoted about the screwed stud 61 which is secured to a lug 62 on the channel 21; the free end of the looper is curved and it is formed with an eye 63.

Twine 64 for sewing purposes is fed to the needle 31 from a reel 65 carried on a bracket 66; the latter together with a guide plate 67 are secured to the channel 21 by screws 68. The twine reel 65 is supported upon the cones 69 which are freely rotatable about a pin 70. A wing nut 71 screwed on the pin 70 may be adjusted to apply more or less tension on the twine reel 65 by a spring 72 which is interposed between the outer cone 69 and the wing nut 71.

Twine is fed to the needle 31 through an opening 73 in the bracket 66 to an opening 74 in a stud 75 on the channel 21; it is then fed between the circular tension plates 76 which are mounted upon a stud 77 projecting from the body 20.
20. The stud 77 is screwed to receive a nut 78 which is adjustable to press the plates 76 together with varying tension through a spring 79 which is disposed between the nut 78 and the outer one of the plates 76. The twine 64 is then passed from between the tension plates 76 to the eye 63 of the looper 65; then it is passed through one of the openings 35 of the channel 21 and inside such channel; in such position of the twine 64 sewing operations of the apparatus may then be commenced.

On the completion of sewing operations the twine 64 may be cut by a swine cutter 80 which is swingable on a pivot 81 attached to one wall of the channel 21. The cutter 80 is adapted to pass over the opening 35 through which the twine 64 enters the channel 21 by drawing on the end of the cover plate 88 on a stud 99 having a fork 92 at one end adapted to be engaged by the downwardly projecting pin 85 of the needle block 24. Associated with the lever 91 is a link 93 which is pivotally connected to the cover plate 88 and at 95 to an arm 99. Also associated with the pivot 95 is a gathering ratchet pawl 97 which is actuated by a fixed spring 98. The pawl 97 is adapted to engage with the teeth 99 of and to impel a ratchet wheel 100 which is firmly secured to a gear wheel 101. The ratchet wheel 100 and the gear wheel 101 are rotatable about a pivot 102 which is secured to the cover plate 88. Also associated with the pivot 90 of the lever 91 is a locking pawl 103 which is actuated by a fixed spring 104. The pawl 103 is adapted to engage with and lock the ratchet wheel 100 against reverse rotation. A locking pawl 105 rockable about a pin 106 secured to the cover plate 88 is actuated by a pin 107 in one arm of the fork 92. The pin 107 is operable in a crescent shaped opening 108 in the cover plate 88 so that a tooth 109 of the latter may engage or disengage with the teeth 110 and lock or unlock the gear wheel 101. A stop pin 111 ensures sufficient movement of the pawl 105 to lock the gear wheel 101. Independent movement of the lever 91 is resisted by a fixed spring 112 which is adapted to engage the inclined surface 113 of an extension of the pivot 94 (see Fig. 4).

Gear wheel 101 is adapted to engage with a rack 114 which is secured to one member 115 of a bag clamp. The member 115 with rack 114 is slidably engaged in the body 20 by a wall of the housing 87 and the upturned edge 90 of the cover plate 88. The other clamping member 116 is slidably engaged to the body 20 by the guide plate 67. The member 116 of the bag clamp is rigidly secured at one end to a plate 117 and the other member 115 of the clamp is pivotally disposed at 118 to the plate 117. The member 116 may be opened from the member 116 to engage the open mouth 22 of a bag 23 to be sewn. A bent anchoring pin 119 is pivotally mounted on the plate 117 and is adapted to be moved by an abutment 120 on the member 115 of the clamp as the latter is opened (see dotted lines, Figs. 13 and 15). Such movement of the pin 119 ensures easy engagement of said pin with the bag 23. The pin 119 is adapted to be placed in one end of the open mouth 22 of the bag 23 to be sewn, whereby said mouth of the bag 23 may be stretched before the members 115 and 116 are finally closed upon it.

Piercing pins 121 are fitted in each member 115 and 116 of the clamp to ensure firm engagement of such members with the portions of the open mouth 22 of the bag 23; the "ears" of the latter are accommodated by recessed portions 122 in the members 115 and 116. A swinging stirrup 123 which is pivotally disposed at 124 to the member 115 is adapted to engage the other member 115 when both the latter are closed over the mouth 22 of a 15 bag 23.

The sewing operations of the apparatus will now be described with reference to the diagrammatic views shown in Figs. 16 to 19 of the drawings. The twine 64 having been threaded through the eye 63 of the looper 60 and through one of the openings 35 of the channel 21, the needle 31 is moved forward (see arrow, Fig. 16) by operating either the arm 36 or the arm 44 to pierce the mouth 22 of the bag 23. The tracked cam 51 has now been rotated and the looper 60 is also moved at the completion of the forward stroke of the needle 31 to draw the twine 64 across the hook 32 of the needle 31, (see Fig. 17) which hook is uncovered by the tang 33, the said uncoupling taking place in the forward movement of the needle 31 through the mouth 22 of the bag 23. The needle 31 is now moved rearwardly (see arrow, Fig. 18) to draw the twine 64 in a loop 125 which is now covered by the tang 33 through the mouth 22 of the bag 23, and at the completion of this rearward stroke, the cam 51 rotates to move the looper 60 again to the position in Fig. 16. On repeating the forward movement of the needle 31 (see Fig. 19) the latter passes through the loop 126 and the mouth 22 of the bag 23 to draw the twine 64 through the loop 125 to form another similar loop to the latter. On the commencement of each forward stroke of the needle 31 the downwardly projecting pin 85 of the needle 45 block 24 operates to move the sewing apparatus step by step along the bag clamp members 115 and 116 to form chain stitches (see Fig. 19).

During the piercing and looping operations (see Figs. 16, 17 and 19) the pin 119 is adapted to lock the sewing apparatus upon the clamp members 115 and 116 until such operations are completed.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a bag-sewing apparatus of the character described, a needle, a looper, a needle-carrying block, a slotted cross-shaped member attached thereto, a one-way rotatable crank-like handle cooperating with said member to reciprocate said needle and block and positively to actuate said looper in operative relation with said needle, means for maintaining said needle stationary during the looping of twine thereby, a bag-mouth clamping means comprising a toothed rack, and means for operating said sewing apparatus step by step with respect to said rack.

2. Bag-sewing apparatus according to claim 1, in which the rotatable handle is provided with an extension on one end, the latter carrying a roller fitted crank pin which is adapted to cooperate with a slotted cross shaped member which is attached to the needle block to enable reciprocation of the said block through rotation of said handle.
and the said cross-shaped member being also reciprocable through said crank pin and cooperating to operate the looper means during sewing operations of the apparatus.

3. Bag sewing apparatus according to claim 1, in which the rotatable handle is attached to a rotatable crank disc, the latter being pivotally connected to the needle block whereby the said block is reciprocated through rotation of said handle, and the said crank disc is also adapted to cooperate for the purpose of operating the looper means during sewing operations of the apparatus.

4. Bag sewing apparatus according to claim 1, in which the means associated with the rotatable handle for reciprocating the needle block are associated with a one-way rotatable tracked cam which is mounted on a fixed pin, and a pin on the twine looper is adapted to cooperate with the track of said cam to enable operation of said looper during sewing operations of the apparatus.

5. Bag sewing apparatus according to claim 1, in which the means for permitting travel of the sewing apparatus step-by-step in relation to the rack teeth of the bag clamp comprise a projecting pin from the bottom of the needle block, such pin cooperating with a pivoted forked lever carrying a pivoted link which is linked to a pivot for a toothed wheel engageable with said rack teeth, the said wheel carrying a ratchet, a spring controlled pawl for driving said wheel through said ratchet, a spring controlled pivoted pawl for said ratchet associated with the pivot for said forked lever adapted to lock said ratchet against reverse rotation, and a slotted pivoted pawl controlled through a fixed stop adapted to be moved through a projecting pin in the forked lever to lock or unlock the gear wheel cooperating with the said rack teeth.

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