FILLER TOOL FOR A BRUSHMAKING MACHINE
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ABSTRACT OF THE DISCLOSURE

Filler tool of brushmaking machine comprises two tool slides having surfaces defining a tuft receiving slot which is opened and closed by relative movement of the slides, a cropping tool cuts off slugs from a metal strip and delivers it into a channel to be driven by a driver onto an inserted tuft and insert it into a hole in a brush stock.

BACKGROUND OF THE INVENTION

This invention relates to a filler tool for a brush making machine.

Filler tools generally comprises a body provided with a longitudinal channel in which a driver blade is adapted to reciprocate, a transverse slot being formed opening on to one side of the body into which tufts of bristles are adapted to be fed so as to extend across the said channel to be picked up by the driver as it makes its working stroke and be driven into a preformed hole in a brush stock. In order to anchor the tuft it is the known practice to feed wire staples into the above mentioned channel at a position spaced from the tuft receiving slot so that on its working stroke the driver blade pushes the staple along the channel towards the tuft and then drives both the staple and tuft into the hole in the brush stock.

Difficulties are involved in the use of an anchor slug as distinct from a staple, as being very small the slug is difficult to feed past the tuft receiving slot without jamming. Previously it has only been possible to use a driver of that section with slugs; this has limited the application of the slug in automatic machines, wherein the slug is made from relatively flat stock as the driver tends to slip off the slug when the edges of the hole are not presented squarely to the slug. The arrangement according to the present invention permits the use of other sections of driver, for example, one having a groove formed in the end to grip the slug.

It is an object of the present invention to provide a filler tool which overcomes these difficulties.

The present invention provides a filler tool for a brush making machine comprising a pair of tool slide elements slidably mounted in a tool body, the tool slide elements having surfaces which when the elements are in one position relative to the tool body define a slot through which tufts of bristles are insertable so as to be positioned in transversely extending relation to a channel extending longitudinally of the said elements, a driver blade mounted for reciprocating movement within said channel, a recess formed in the tool body and extending on to said channel means for feeding metal strip to said recess, means for cropping off tuft anchoring slugs from said strip for delivery into said channel so as to be picked up by the driver blade as it moves toward an inserted tuft, means operative during each tuft inserting cycle to impart a sliding movement to the tool slide elements relatively to the tool body and to one another in one direction to close the said slot after a tuft has been inserted, feed wire strip to said recess and operate the cropping tool to crop off a tuft anchoring slug from the wire strip and deliver it into said channel, impart a sliding movement to the driver blade within said channel so as to drive the slug along the channel to the inserted tuft and drive the slug and tuft into a hole in a brush stock and impart a sliding movement to the tool slide elements relative to the tool body and to one another in an opposite direction so that the said surfaces are spaced apart to define the tuft-receiving slot ready for the insertion of another tuft.

To enable the invention to be fully understood, it will now be described, by way of example, with reference to the accompanying drawings in which:

FIG. 1 is a front view of a filler tool according to one embodiment of the invention;
FIG. 2 is a side view thereof;
FIG. 3 is a sectional view on line A—A of FIG. 1;
FIG. 4 is a view similar to FIG. 1 but illustrating a modification of the invention;
FIG. 5 is a side view of the modification according to FIG. 4;
FIG. 6 is a sectional view on the line B—B of FIG. 4;
FIG. 7 is a fragmentary view of a strip feed channel and cropping means on an enlarged scale to that of FIG. 6;
FIG. 8 is a view similar to FIG. 1 but with the lower portions shown partially in section so as to indicate the position of the means for forming the anchor slug and the position of the slugs being fed into the driver channel;
FIG. 9 is a view similar to FIG. 8, but showing the position of the parts after movement of the tool slide elements to close the tuft-receiving slot, the slug S being shown on its way towards an inserted tuft of bristles T under the action of the driver 7;
FIG. 10 is a fragmentary sectional view illustrating the position of the tool slide elements in their forward condition, a slug and a tuft of bristles being shown as being driven by the driver 7 through the nose of the tool slide elements; and
FIG. 11 is a section on the line XI—XI of FIG. 9 illustrating the position of the cropping tool 10 in cropping off a slug from the strip fed between the plates 11, 12.

As shown in FIGS. 1 to 3 of the drawings, the filler tool comprises two tool slide elements 1, 2, slidably mounted on a tool body 3, the element 1 being capable of a limited amount of sliding axial movement relative to the element 2. The tool slide 1, 2, are formed with opposed transverse surfaces 1a, 2a, which in the position shown in FIG. 1 define a slot 4 into which tufts of bristles are adapted to be fed in known manner by a picker.

The two slide elements are adapted to be reciprocated together relative to the body 3 to feed tufts of bristles into a brush stock mounted on a workholder positioned below the cheek plates 5, 6, carried by the tool slide elements. The reciprocation may be effected by any suitable means operated from the main camshaft of the brush making machine.

A driver 7 is adapted to be reciprocated in a vertically extending channel 8 provided in the tool slide elements, the channel bisecting the slot 4 so that tufts of bristles fed into the slot will be positioned transversely of the channel in the path of the driver 7.

As more particularly illustrated in FIG. 3, the tool slide element 2 is formed with a recess 9 in which is mounted a reciprocating cropping tool 10. Strip metal adapted to be cropped into anchor slugs is adapted to be intermittently fed into the body 3 between guide plates 11, 12. At each feed movement the strip is fed to cause a portion equivalent to a slug length to project from the inner ends of the guide plates and on the cropping being actuated this is cropped off and lies on a yieldable plate like member 13. The latter extends from the inner ends of the guide plates 11, 12, to the driver channel 8 and has
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a length equal to that of one or more, for example, three slug lengths.

The slug lengths cropped off are fed over the plate 13 by the succeeding feeding of the wire strip into the body 3, the leading slug being pushed over the plate 13 into the channel 8.

The cropping tool is intermittently actuated by link mechanism generally indicated by 14 in timed sequence with the reciprocation of the driver 7, the insertion of tufts into the slot 4 and the movement of the tool slide elements 1, 2, towards a brush stock to be filled.

As shown, the ends of the link 14 are respectively pivotally connected at 14a, 14b to an actuating member Z and a block 14c pivoted at 14d to the tool body 3, the block having a curved face 14e engaging the sloping face of a member 14f slidably mounted on the tool body and connected with the cropping tool. As the slide tool element 2 moves upwardly relative to the tool body 3 the member Z is actuated and, the block 14c is pivoted by the link 14 in an anticlockwise direction, as viewed in FIG. 2, so that the curved face 14e moves downwardly over the sloping face of the member 14f so as to cause it to slide inwardly of the tool body to actuate the cropping tool.

The upward movement of the tool elements is limited by an abutment 15 on the slide tool element 2 engaging an adjustable stop 16 on a lug 17 attached to the body 3. A block 18 is provided on the tool slide 1 housing a coil spring 19 having one end extending into a recess in the abutment 15 and the other end abutting an adjusting screw 20.

When the apparatus is in operation the tool slide elements 1, 2, are reciprocated by means controlled by the main cam of the machine so as to be moved downwardly together to insert a tuft into a brush stock and retracted for receiving the next tuft. As shown in FIGS. 1 and 2, the parts are in the tuft receiving position and a tuft is fed into the slot 4 so as to be disposed at the inner end thereof wherein it lies in the slot extension 4a transversely of the driver channel 8.

In timed sequence to the feeding of the tuft into the slot 4 a strip is fed by a small increment between the guide plates 11, 12. Assuming that the full length of the plate 13 is filled with cropped anchor slugs, the feeding of the strip pushes the slugs along the plate 13 so that the leading slug is pushed into the channel 8.

The end of the strip which projects over the inner ends of the guide plates 11, 12, is cropped off by the cropping tool and the plate 13 is again completely filled by cropped anchor slugs.

The driver 7 is actuated and moves downwardly in its channel 8 and abuts and carries downwardly the above mentioned leading slug.

At a predetermined time after the feeding of the tuft into the extension 4a, the tool slide element 1 is moved upwardly. The element 2 cannot move as the abutment 15 is in engagement with the stop 16 but the element 1 has a permitted relative movement by compressing the spring 19. The upward movement of the element 1 is sufficient to close or substantially close the slot 4.

The driver 7 forces the slug downwardly on to the tuft located in the slot extension 4a and the tuft and anchor are driven downwardly between the cheek plates 5, 6, and fed into one of the holes in a brush stock. It will be understood that at this step in the cycle the tool slide elements will have been moved downwardly as a unit close to the brush stock.

As the tool elements 1, 2, are moved downwardly they are moved apart by the spring 19 into the position indicated in FIG. 1 so that the slot is again open.

In practice the tool elements will remain in slot open position as they are raised after inserting a tuft and after a short dwell in the tuft feeding position, indicated in FIGS. 1 and 2, the element 1 is raised a further small amount to close the slot.

According to the modification illustrated in FIGS. 4 to 7, parts which are identical to those in FIGS. 1 to 3 have been given like reference numerals with the addition of the suffix x. As shown more particularly in FIG. 4, the tuft receiving slot is defined by sloping surfaces 21a, 21a of the tool slide elements 1x, 2x. The slot is shown in FIG. 4 in the closed position but it will be understood that the slot will be opened and closed on relative movement of the tool slide elements in a manner as described with reference to FIGS. 1 to 3.

The principal difference in the modification over the embodiment illustrated in FIGS. 1 to 3 is the mounting and operation of the cropping tool. In the embodiment of FIGS. 1 to 3, the cropping tool is reciprocated with the tool slide element 2, but in the modified arrangement the means for cropping the strip to form anchoring slugs is mounted on the tool body 3x.

As shown more particularly in FIGS. 6 and 7, the means for cropping off lengths of the metal strip to form anchor slugs comprises a plate 23 which with the plate 23a defines the channel c through which the wire strip is fed.

A lever 24 is pivoted to the tool slide body 3x at 25 and provided at its lower end with an inwardly extending arm 26 having an adjustable stop 27 abutting a plate 28 capable of a limited sliding movement relative to the tool slide body against the action of springs 29. The upper end of the lever 24 has a cam surface 24a engaged by a roller 30 mounted on a support, the lever being urged into engagement with the roller by a spring 31 having its opposite ends attached to the lever 24 and slide body 3x.

A block 28a is attached to the plate 28 and the plates 23, 23c are attached to the block 28a.

In operation, as the tool slide element 2x moves downwardly relatively to the body 3x, the roller 30 will engage the cam surface 24a of the lever and cause the latter to pivot in a clockwise direction as viewed in FIG. 5 so that the stop 27 will displace the plate 28 inwardly and impart corresponding movement to the block 28a and plates 23, 23c. Previous to the movement of these parts wire strip will have been fed along the channel c so that its free end projects into a slot receiving portion 23a of the channel 8x in which the driver 7x reciprocates.

On the said movement of the plate 28, the plates 23 and 23c will be moved relatively to the end of the inner edge of the plate 23 in moving relatively to the adjacent edge of the plate 23a will cut off the end portion of the wire strip which projects into the slot receiving portion 23a of the driver channel 8x. The plate 28 will be returned by the springs 29 when the lever 24 pivots in reverse direction due to the roller 30 leaving the cam surface 24a. It will be understood that the operation of the lever to actuate the cropping tool is effected in timed sequence to the feeding of the wire strip through the feed channel c.

As shown in FIG. 5, an adjustable stud 32 is mounted on a bracket 32a for the purpose of limiting the outward movement of the plate 28 by the springs 29. This is to ensure that the strip feed channel c is re-aligned with the slug receiving portion 28d of the driver channel 8x.

A lock nut 32b is provided for locking the stud 32 in adjusted position.

As explained with reference to the first embodiment of the invention, the slug is engaged by the driver 7x as it moves downwardly in the slug receiving portion 23a and carried to the tuft of bristles which has been fed into the slot defined by the surfaces 21a, 22a, the slug and tuft then being driven by the driver into a hole in a brush stock.

I claim:
1. In a tuft filling tool for a brushing machine of the class described, a tool body and a filling tool comprising a pair of relatively movable tool slide elements
slidably mounted in said body, a transverse surface on each said tool slide element, said surfaces being in opposed relation, means operative during each tuft filling operation to move said tool elements relatively to one another within said tool body into a first position wherein said transverse surfaces are in spaced relation to define a tuft-receiving slot and after a said tuft has been inserted into said slot, into a second position wherein said surfaces are in abutment so that no slot is defined and means for limiting the movement of said tool slide elements as they move into said first position comprising a stop on said tool body and a co-operating abutment on one of said tool slide elements.

2. A filling tool as claimed in claim 1, wherein the stop is adjustable.

3. A filling tool as claimed in claim 1, wherein said abutment on said one tool slide element is engageable by spring means mounted on the other tool slide element so that after the movement of said one tool slide element has been halted by engagement of the stop by the said abutment, the other tool slide element is permitted a limited amount of movement relative to said one tool slide element on compression of the spring means.

References Cited

UNITED STATES PATENTS

1,664,420 4/1928 Jobst 300—8
1,936,743 11/1933 Zahoransky 300—8
2,084,345 6/1937 Jobst 300—8

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