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PATENT SPECIFICATION

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DRAWINGS ATTACHED.



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COMPLETE SPECIFICATION.

Improvements relating to the Manufacture of Sliding Clasp Fasteners.

1. TADAO YOSHIDA, of 339, 2-chome, Suwadacho, Ichikawa-shi, Chiba-ken, Japan, a Japanese Citizen, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to an improvement in apparatus for applying reinforcement to that area of a sliding clasp fastener stringer tape to which the end stop is to be attached.

Hitherto sliding clasp fasteners have had the end stop attached direct on to the stringer tape which, when used is often doubled over or folded and, as a result of repeated use, the part on which the end stop is attached becomes split or torn.

It has been found that this disadvantage can be eliminated by providing a reinforcement on the stringer tape at the point where the end stop is to be attached and the present invention provides an apparatus for attaching such reinforcement to the stringer tape.

The reinforcement is firstly temporarily attached to the tape using as the adhesive a layer of nylon softened in alcohol and then the apparatus of the invention is used to weld the reinforcement to the tape.

The apparatus provided by the invention comprises an apparatus for welding reinforcement to sliding clasp fastener stringer tape and for cutting off lengths of tape with teeth, which comprises an air motor secured on a frame, a hose connecting the air motor by way of a foot operated valve with a source of compressed air, the air motor comprising a piston loaded by a spring and movable in a cylinder, a stamping and cutting punch driven by the piston which punch is provided internally with electric heating means, which punch is provided with a return spring,

a support on which the punch is adapted to act and provided with means for positioning tape to be cut and provided with a welded reinforcement, which support is positioned above a sole plate and separated therefrom by a spring, electric heating means within the support and means for heating the position at which the reinforcement is to be applied.

Embodiments of the apparatus of the invention and the formation of the reinforced stringer tape are shown in the accompanying drawing in which:—

Figure 1 of the drawings shows a sliding clasp fastener and indicates the position at which a reinforcement is applied thereto.

Figure 2 shows the manner of placing the reinforcement over the part of the fastener where the end stop is to be fixed.

Figure 3 shows a tape provided with a reinforcement welded thereto.

Figure 4 is a cross section on line A—A of Figure 3.

Figure 5 is a view illustrating the working of the apparatus of the invention.

Figure 6 shows the structure of the reinforcement nylon and stringer tape.

Figure 7 is a side view illustrating the general arrangement of the apparatus.

Figure 8 is a side view of a stamping and cutting part of the apparatus.

Figure 9 is a front view of a portion of the apparatus, partly in section.

Figure 10 is a sectional side view taken on line A—A of Figure 9.

Figure 11 is a side view of an air motor in an elevated position.

Figure 12 is a view illustrating a valve when compressed air is directed to the air motor.

Figure 13 is a view showing conditions of

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a support when the stringer tape with teeth is in position.

Figure 14 is a view showing a punch being lowered to the support from the position of Figure 13 to weld on the reinforcement.

Figure 15 is a view looking in the direction of arrows A—A in Figure 14.

Figure 16 is a wiring diagram of an electric heating device of the apparatus.

Referring now to the drawings, Figures 5 and 7 are general views of an apparatus for welding on the reinforcement and cutting the stringer tape of a sliding clasp fastener. The apparatus comprises an air motor M bolted on the upper part of a C-shaped frame 34. The motor M is connected with a pedal-operated air valve 1 at the lower part of the apparatus which valve is connected by hose to a source of compressed air, a rubber hose 2 linking the valve 1 with a nipple 3 of the air motor. A piston 11 (Figure 11) and a piston rod 12 of the air motor will be pressed downward by means of the air pressure supplied to a cylinder 13 of the air motor, movement of the piston being opposed by a spring 14 in the cylinder 13 and return movement of the piston being effected by the action of the spring 14 as the air pressure decreases. When the piston rod 12 is pressed downwards, it compresses a spring 24 (Figure 9) to depress a cutting and stamping punch 37 inside which is an electric heating device 19. The punch 37 also compresses a spring 25 until it contacts a sole plate 29. The punch 37 is returned to its inoperative position by the action of the spring 25 and has a member 28 which locates the cutting position of a tape T of the fastener, the member 28 associated with a stamping support 17 and a cutter 18 mounted on the frame 34. A locating bracket 35 is fixed upon a stand 36 for the apparatus to locate the position at which reinforcement TA (Figure 2) of the stringer tape is fitted. The locating bracket 35 is operated by hand.

As illustrated in Figure 7, when the air valve 1 is opened, air from a compressor passes through the rubber hose 2 and operates the air motor M. As shown in Figures 11 and 12, compressed air passes through the hose 2, to a nipple 3, valve 4 and ring 5 of the air motor, and closes a rubber valve 6 of the air motor on to an exhaust opening and, at the same time, passes through to a nipple 8 and union 9 into the cylinder 3. The pressure of the air overcomes the spring 14 and pushes the piston rod 12 downwards. When valve 1 is pressed down, the piston 11 will remain in the lower position but when the valve is released, the rubber valve 6 opens the exhaust opening and the spring 14 restores the parts to the original positions as shown in Figure 11. The return movement of piston 11 causes the compressed air to pass through the exhaust opening. Up-

ward movement of the piston is adjusted and restricted by an adjustable collar 15.

The punch 37 is fixed on the lower bed of the C-shaped frame 34 and the driven head 38 of the punch is moved down when the piston rod 12 of the air motor M moves down subsequently to overcome the spring 24 so that the punch 37 is guided down by members 16a, 16b. As shown in Figure 13, the punch 37 contacts and presses the stringer tape T of the fastener located on the stamping support 17. At this moment, the punch 37 having a reciprocal relation with the cutter 18, cuts the stringer tape T as shown in Figure 14 and continues to move down. The support 17 moves down against the spring 25, but will come to a halt when the bottom of the support 17 contact the sole plate 29. When the piston rod 12 rises, the punch support 17 also moves upward under the action of the spring 25.

The tape T is cut by the cutter 18 and pressed to shape. The protective cover TA, which has been secured to the tape T by nylon tape applied with alcohol, is welded to the tape by the nylon which liquefies on heating, and hardens on cooling.

Heaters 19 and 20 are respectively arranged in the punch 37 and support 17.

The heater 19 is just placed inside a cavity in the punch 37 (Figure 10) but the heater 20 is placed inside a case 23 and supported by a pin 27 on the support 17 so that it will not fall. In order to maintain temperature at a predetermined level, a thermostat 31 is fixed on the back of a punch guide 30, the temperature being set by a switch 32; the operation of the thermostat 31 is indicated by a pilot lamp PL and the temperature can be read from a thermometer 33. The wiring system of the electric heater and thermostat is shown in Figure 16.

The position of the reinforcement TA of every finished article in relation to the teeth must always be the same. For this purpose, there is provided the locating bracket 35. As Figure 1 shows, the distances between the teeth E of each stringer and the dotted lines differ, one being indicated as A and the other as B. For this reason, the locating bracket 35 is provided with spacings A¹ and B¹ as shown in Figure 6. The reinforcement TA and the nylon tape NF are placed over the tape by the fingers of an operative as shown in Figure 2 in the drawings to stick them together temporarily and the tape T is placed on the bracket 35 as shown in Figure 2 and Figure 5. Using the apparatus of the invention the head and the tail of the blocks of teeth on the stringer will have to be separated to provide a gap to accommodate the reinforcement as shown in Figure 3. The locating member 28 is shown in Figures 14 and 15; the drawings show only the locating member set to the dimension A, 130



but if member 28 is unbolted and removed the apparatus will be ready for use with dimension B.

The use of the air motor M makes it possible to maintain pressure continuously as long as is required and this pressure in conjunction with the operation of the electric heating device enables the nylon to weld the reinforcement to the tape.

10 WHAT I CLAIM IS:—

1. An apparatus for welding reinforcement to sliding clasp fastener stringer tape and for cutting off lengths of tape with teeth, which comprises an air motor secured on a frame, a hose connecting the air motor by way of a foot operated valve with a source of compressed air, the air motor comprising a piston loaded by a spring and movable in a cylinder, a stamping and cutting punch driven by the piston which punch is provided internally with electric heating means, which punch is provided with a return spring, a support on which the punch is adapted to act and provided with means for positioning tape to be cut and provided with a welded reinforcement, which support is positioned above a sole plate and separated therefrom by a spring, electric heating means within the support and means for locating the posi-

tion at which the reinforcement is to be applied.

2. An apparatus according to the preceding claim, wherein compressed air is supplied through the foot operated valve to a nipple, valve, and ring of the air motor and acts to close a valve of an exhaust opening of the air motor and then enters the cylinder to displace the piston in opposition to its spring loading.

3. An apparatus as claimed in any preceding claim, wherein the movement of the punch reciprocates with that of the cutter.

4. An apparatus according to any preceding claim wherein the temperature of the heater in the cutting and stamping support is controlled by a thermostat the operation of which is indicated by a pilot lamp.

5. An apparatus for welding reinforcement to sliding clasp fastener stringer tape and for cutting off lengths of tape with teeth substantially as described with reference to the accompanying drawings.

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