Dec. 17, 1935. G. SUNDBACK 2,024,310

TUMBLING METHOD AND APPARATUS

Original Filed June 16, 1931

Fig. 1.

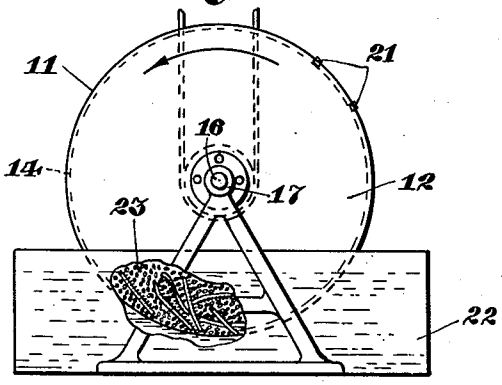


Fig. 2.

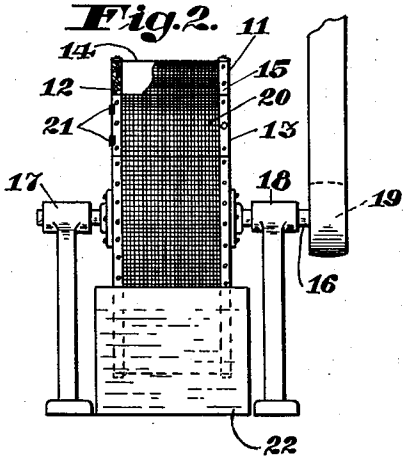


Fig. 4.

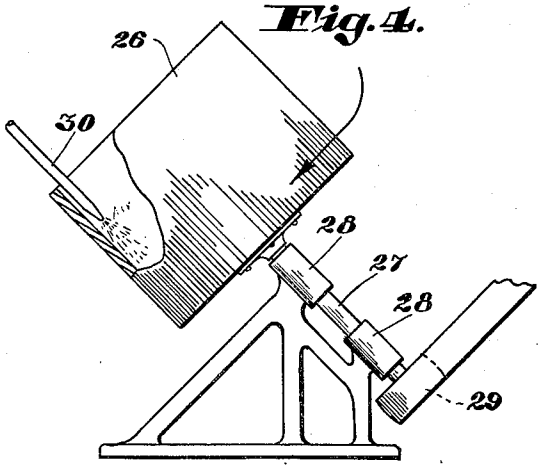


Fig. 3.

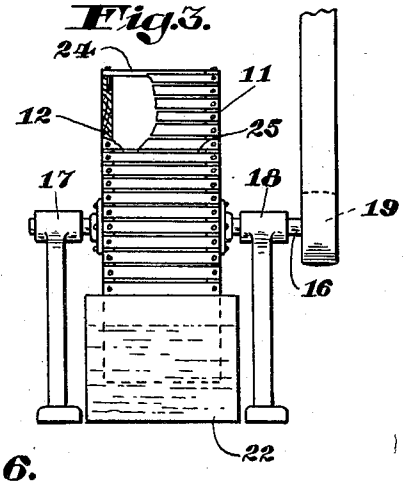


Fig. 6.

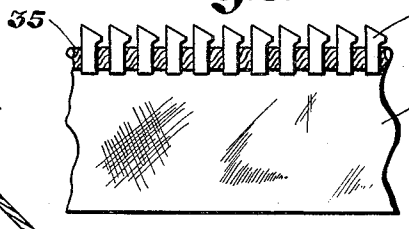


Fig. 5.

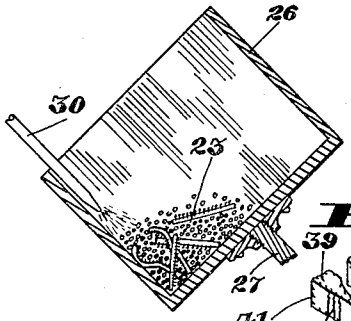


Fig. 8.

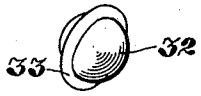


Fig. 9.



Fig. 7.



Fig. 10.

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TUMBLING METHOD AND APPARATUS

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6 Claims. (Cl. 51—278)

This invention relates to methods of treating slide fasteners of the type having a pair of stringers including flexible tapes or carriers provided along their adjacent edges with rows of interlocking elements which may be interlocked or disengaged by the movement of a slider.

One example of such fasteners is shown in my Patent 1,219,881, in which metal interlocking elements are clamped to the edges of the tapes in definite spaced relation. To facilitate the secure anchoring of the interlocking elements, the edge of the tape may be provided with a bead, which may be formed as shown in said patent by stitching one or more cords to the edge of the tape. The forming and clamping of the interlocking elements may be done by machines similar to those shown in my Patents Nos. 1,331,884 and 1,467,015. In some machines, as in Patent No. 1,331,884, the elements are punched from a flat strip and in other machines, they are sliced from the end of a formed wire. In either case, the elements are attached directly to the fabric one at a time immediately after being cut and formed. The elements are so small and of such shape that it is difficult to let go of them after forming, tumble them smooth, and later, arrange them in order for feeding to an assembling machine except by a considerable amount of work. Furthermore, the complete manufacture of the stringers in one machine has certain advantages over forming the elements in one machine and applying them in another machine.

In fasteners formed as above described the interlocking elements may be undesirably rough due to sharp corners or burrs formed in the punching or shearing operations, or tool marks formed in clamping the elements to the fabric tape. Furthermore, the stringers when assembled into a complete fastener may be undesirably stiff due partly to the roughness of the interlocking elements, which causes excessive friction in sliding over one another when the fastener is bent, and partly to stiffness of the tape caused by the bead, particularly where this is formed by stitching the cords to the edge, and partly by the bunching of the bead between the interlocking elements in the clamping operation.

It is among the objects of my invention to provide convenient and economical method and apparatus for smoothing the individual interlocking elements, and for flexing the stringer after the interlocking elements have been clamped thereto for the purpose of rendering it more pliable.

It has already been proposed to increase the pliability of fasteners by repeated flexing of the stringers after the interlocking elements have been clamped to the tapes. One apparatus for accomplishing this operation is shown in my Patent 1,857,669, dated May 10, 1932. While this apparatus satisfactorily accomplishes its purpose, it is somewhat expensive and to be economically operated, requires that the fastener be run through it in continuous lengths, effectually preventing the operation upon short lengths of assembled fasteners.

I have discovered that fastener stringers can be tumbled in a mass of heavy particles, such as steel balls or other suitable abrasive material, for example in the usual tumbling barrel, without injuring the fabric. By suitably selecting the size and nature of the abrasive material, the metal interlocking elements can be successfully smoothed, even those surfaces facing the minute spaces between adjacent interlocking elements. I have also discovered that the repeated flexing occurring when fastener stringers are tumbled in a suitable mass of heavy particles, such as steel balls, renders the stringers pliable. This is probably due partly to the smoothing action which subsequently allows each interlocking element to slide more easily over adjacent elements when the stringers of an assembled fastener are bent, and partly to the repeated flexing which removes the stiffness of the tape and bead.

In carrying out the invention, I place the fasteners with steel balls in a tumbling barrel of any suitable or usual form and rotate the barrel to agitate the mass. This agitation produces a very flexible and pliable fastener.

The smoothing action is caused by the abrasion or removal of small particles of metal from the surface of the interlocking elements. Such particles would ordinarily become embedded in the fabric and objectionally soil white and light colored tape. In order to prevent this, I continuously remove such particles from the tumbling apparatus, and particularly remove them from the tape as fast as they are deposited, preferably by flowing through the tape, water or other suitable liquid, such as soap solution. This may be most conveniently accomplished by placing the tumbling barrel in a body of the liquid. The moving of the tape through the body of the liquid causes the liquid to flow through the fibers of the tape and carry out of the fibers the small particles deposited by the abrading action.

In the accompanying drawing, I have shown for purposes of illustration one principal embodiment and a few modifications thereof which

the invention may assume in practice. In the drawing:

Fig. 1 is a diagrammatic illustration in side elevation of one form of apparatus employed;

Fig. 2 is an end elevation of the same apparatus;

Fig. 3 is an end elevation of a modified form of apparatus;

Fig. 4 is a side elevation of another modified form of apparatus;

Fig. 5 is a central sectional view through a part of Fig. 4;

Fig. 6 is a fragmentary view of a portion of a fastener stringer to be tumbled;

Figs. 7 and 8 are forms of balls useful as tumbling abrasives;

Fig. 9 is a cross-sectional view of a fastener stringer, and

Fig. 10 is a perspective view of an individual fastener element, the rough edges and tool marks being shown in exaggerated condition.

The tumbling apparatus shown in Figs. 1 and 2 comprises a tumbling barrel 11 made up of two circular end pieces 12 and 13 and a fine wire screen 14 of cylindrical form extending around the periphery of the barrel and attached securely to the circular end pieces by tacks 15. The barrel is supported on shaft 16 journaled in bearings 17 and 18 and adapted to be belt-driven by a pulley 19 from a suitable source of power. A door 20 supported on hinges 21 may be provided for putting in or taking out material. In cases where it is desired to tumble the fasteners in a cleansing solution a tub 22 is placed under the barrel so that the screened periphery extends into the solution. Ordinary soap and water has been found very satisfactory for a cleansing solution. The mass of fastener stringers intermingle with the abrasive material as shown in Fig. 1 at 23.

Instead of the wire screen around the periphery of the barrel, a suitable construction might be to connect the two solid end pieces by means of bars or slats 24 spaced apart to provide openings 25 through which the dirt may pass from the barrel during the tumbling operations. In other respects, the device of Fig. 3 is similar to that shown in Figs. 1 and 2.

In Fig. 4 the tumbling barrel 26 is mounted to rotate on an inclined shaft 27 turning in bearings 28 and driven by a pulley 29. This barrel is preferably open at the top so that a blast of air can be introduced through suitable nozzles 30 preferably along one side of the barrel, the dirt being carried upwardly and out of the barrel by the blasts of air.

The abrasive particles which have been found most satisfactory in this method of smoothing fasteners, are small metal balls 31 shown in Fig. 7, preferably $\frac{1}{16}$ to $\frac{3}{16}$ of an inch in diameter. It may be preferable in some instances to use balls similar to those shown in Fig. 8 at 32 which are provided with a ridge 33 extending around the same.

Figs. 6, 9 and 10 illustrate a fastener stringer, for the tumbling of which my improved method and apparatus are especially adapted. A stringer of this type comprises a flat fabric tape 34 having a corded edge 35 and a series of metal fastener elements 36 attached firmly in definite spaced relation along the corded edge. As shown in Fig. 10, each fastener element is of plate-like form having an interlocking pocket 37 and a correspondingly formed projection 38 at one end and at its other end, a pair of jaws 39 and 40 adapted to clinch around the corded edge 35. The corners 41 at the ends of the jaws as well as the side edges 42 may be sharp and scratchy as the stringers come from the machine. There may also be burrs along these edges as indicated and tool marks 43 along the sides of the elements.

The steps in my improved method of tumbling fasteners or the like, will be readily apparent in view of the above description of the apparatus. The fastener stringers as they come from the fastener-making machine are preferably cut apart into suitable lengths and placed in the tumbling barrel with a mass of small steel balls or shot. It has been found that good results are obtained by using twice as much balls by weight as fasteners. The barrel is then rotated, the balls and fastener stringers intermingling and the balls striking against the sharp edges of the metal elements on the fastener stringer. At the same time, the dirt and other fine particles drop out of the barrel through the wire screen or other apertures, or it may be blown out by a blast of air, or otherwise removed in any suitable manner during the tumbling operation. It has been found that good results are obtained after tumbling in this manner for about an hour although it is entirely possible that this time may be cut down by selecting the proper abrasive material for any particular work. The deterioration in tape after tumbling even for a much longer period of time is negligible and the dirt absorbed by the fabrics is not of a very considerable quantity. In the case of black tapes tumbled dry, there is no noticeable soiling. In the case of white tapes, it is preferable to tumble them in a solution of soap and water in which case they come out clean. In the case of lighter colored tapes, if they become slightly soiled they may be readily cleaned by passing through a washing machine for about five minutes.

It will be observed that by the use of my improved method, fastener elements or the like may be attached to their fabrics in the proper spaced relation and afterwards, tumbled to remove the sharp corners, tool marks and burrs without substantial deterioration of the fabrics.

While the size, shape and proportion of the balls in the mixture may be varied within certain limits, it is preferable to select a size of ball or other particle such that it will enter between the elements on the stringers. These elements may be spaced about $\frac{1}{8}$ inch apart more or less and the small balls will enter into the spaces and have a more effective wearing action than a much larger ball. It is entirely possible that cylindrical, conical or other shapes might be used instead of the balls, or even an entirely different kind of abrasive material.

While I have shown and described in this application one embodiment and several modifications which my invention may assume in practice, it will be understood that these embodiments are merely for the purposes of illustration and description and that various other forms may be devised within the scope of my invention as defined in the appended claims.

What I claim as my invention is:

1. The method of smoothing metal elements after their attachment to fabric strips comprising intermingling a mass of said strips and attached elements with suitable abrasive material, causing said intermingled mass to move about whereby said abrasive material can act on said metal elements, and simultaneously and continuously removing the dust produced by the

smoothing operation to prevent absorption thereof in substantial quantity by said fabric.

2. The method of tumbling fastener stringers each of which comprises a length of fabric having a series of metal elements attached thereto, comprising rotating a mass of such stringers in a tumbling barrel intermingled with a quantity of relatively small balls, and simultaneously conducting away from said tumbling barrel the dirt produced by the tumbling operation to prevent absorption of a substantial quantity thereof by the fabric stringers.

3. A method of rendering pliable and smoothing up fastener stringers of the type including a series of interlocking elements secured to a fabric carrier which consists in subjecting the stringer to the action of relatively heavy moving abrasive particles, and simultaneously flowing liquid through the carrier to remove therefrom particles formed by the abrasive action.

4. The method of rendering pliable fastener stringers of the type having a series of interlocking elements secured to a fabric carrier which consists in repeatedly flexing the stringer by tumbling in a loose mass of relatively heavy particles.

5. A method of rendering pliable fastener stringers of the type having closely spaced interlocking elements secured to a fabric tape, and of simultaneously smoothing said interlocking elements which consists in repeatedly flexing the stringer by tumbling in a loose mass of relatively heavy particles, simultaneously removing at least a part of the dust produced during the tumbling operation, and later washing the fabric tapes of said stringers.

6. The method of treating slide fastener stringers of the type having a series of metal interlocking elements clamped to the edge of a fabric tape in closely and uniformly spaced relation, which consists in placing said stringers in contact with a series of abrasive particles consisting of metal balls and the like, causing relative movement between said stringers and balls, and flowing cleansing fluid through said tape during such relative movement.

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