Feb. 28, 1939. E. M. ARENTZEN 2,148,672

METHOD OF MAKING FASTENER ELEMENTS

Original Filed Dec. 7, 1936

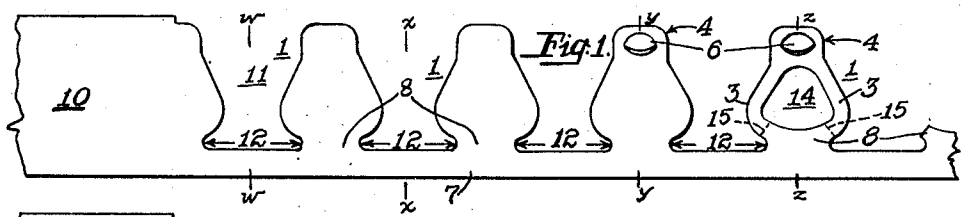

Fig. 1.

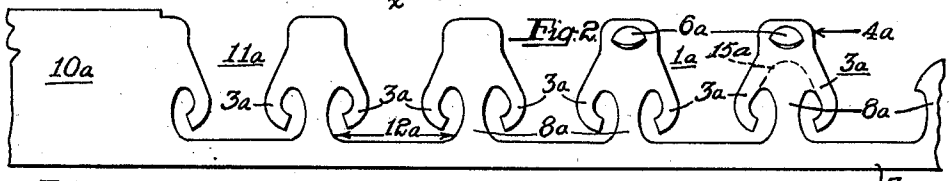

Fig. 2.

Fig. 3.

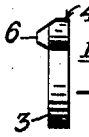

Fig. 4.

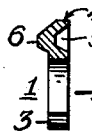

Fig. 5.

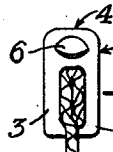

Fig. 6.

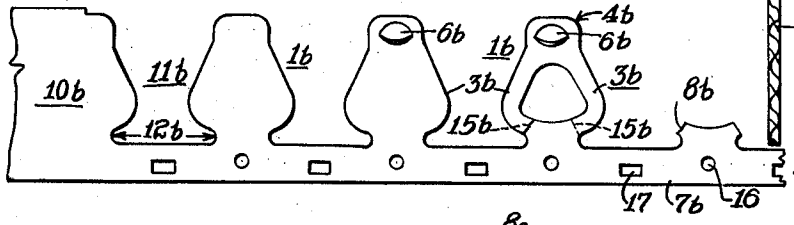

Fig. 7.

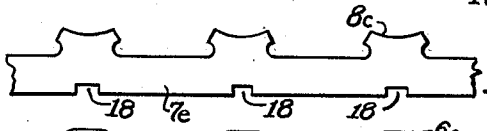

Fig. 8.

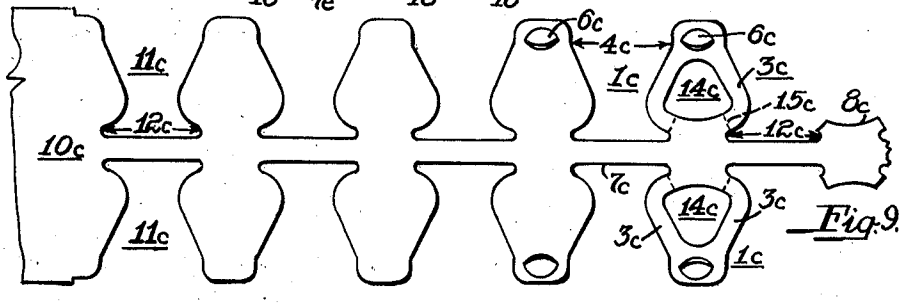

Fig. 9.

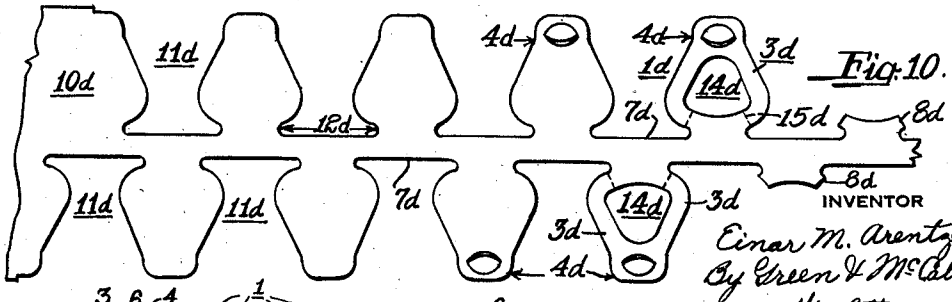

Fig. 10.

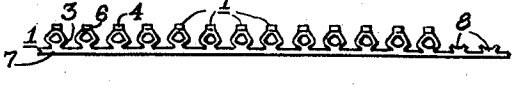

Fig. 11.

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METHOD OF MAKING FASTENER ELEMENTS

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Original application December 7, 1936, Serial No. 114,605. Divided and this application January 4, 1937, Serial No. 119,019

2 Claims. (Cl. 29—148)

This invention relates to slide fasteners of a well-known type commonly referred to as zippers, and more particularly to a method of producing an article of manufacture involving a multitude of unitarily connected fastener elements, each completely formed and/or finished so far as superficial or exposed surface is concerned, before attachment to a stringer or tape; this application being a division of my application Serial No. 114,605, filed December 7, 1936, and assigned to Joy Manufacturing Company.

An object of this invention is to provide an improved method of manufacture of fastener elements of the type having at one end spaced jaws for gripping a tape and a head at the other end provided with interlocking surfaces, for example, a projection and a recess.

Other objects of the invention will, in part, be apparent and will, in part, be obvious from the following description taken in conjunction with the accompanying drawing, in which:

Figure 1 is an enlarged fragmentary view in elevation of an article of manufacture illustrating one form of the invention, this view also illustrating the procedure or steps of a method of forming and shaping the fastener elements of the article in accordance with the invention;

Fig. 2 is a view similar to Fig. 1, showing a modified form of article, and a modification of the method of forming and shaping elements embodied in the article;

Figs. 3 and 4 are views in front and edge elevation, respectively, of one of the individual fastener elements after it has been severed from the article of either Figs. 1 and 2;

Fig. 5 is a view of an element in section taken on line V—V of Fig. 3;

Fig. 6 is a view of a fastener element after it has been attached or affixed to a flexible stringer or tape;

Fig. 7 is a view similar to Fig. 1 but showing a modified form of fastener element connecting portion or belt;

Fig. 8 is a view of an element connecting portion after the elements have been severed therefrom, this being different from the connecting or belt portions associated with any of the articles of Figs. 1, 2, and 3;

Figs. 9 and 10 are views similar to Fig. 1 but showing a row of fastener elements disposed one on each side of the connecting portion or belt, the elements of one row in Fig. 9 being opposite to the elements of the other row, whereas in Fig. 10, the elements of the opposite rows are staggered or offset with respect to each other; and

Fig. 11 is a view to substantially full scale of an article of manufacture embodying the invention and made in accordance with the invention in its finished form and ready for use in the manufacture of zipper fastener assemblies.

Throughout the drawing and the specification, like reference characters indicate like parts.

The ultimate objective to be accomplished by the invention herein disclosed is the production of separable fasteners commonly referred to as "zippers", and comprising a pair of flexible stringers or tapes having a plurality of spaced elements fixed or secured to the adjacent edges of the tapes and disposed in such manner that the elements may be brought into interlocking relationship, or out of such relationship, by means well known in the art.

In Figs. 3, 4, and 5, a fastener element employed in separable fasteners of the type referred to above is designated by the numeral 1 and in Fig. 6 such an element is shown fixed or attached to the edge portion of a flexible stringer or tape 2. Element 1 is formed at one end with spaced jaws or legs 3, and a scoop or head 4 at the other, the scoop or head having on one face thereof a recess or socket 5, and a projection 6 occupying the same relative position as the recess but on the opposite face of the head.

This invention has to do with an article of manufacture and more particularly to the method of making same. Such article comprises in general a plurality of individual fastener elements 1 which are unitarily connected, (preferably in fixed spaced relation to each other), to an edge of a continuous rib, spine, or backbone which, for convenience, may be called a band or ribbon. With reference to Figs. 1 and 11, the fastener elements are designated by numeral 1 and the band or ribbon by numeral 7; in Fig. 2 the fastener elements and the band or ribbon are designated by characters 1*a* and 7*a*, respectively; and, in Figs. 7, 9, and 10, the fastener elements are designated by characters 1*b*, 1*c*, and 1*d*, respectively, and the band or ribbon by the characters 7*b*, 7*c*, and 7*d*, respectively.

With reference to Fig. 1, the article of manufacture may be made or formed by so removing metal, preferably at definitely spaced locations, from a long flat strip of metal and so forming the metal remaining between the portions so removed, that the band or ribbon 7 and the elements 1 are shaped and formed but still unitarily connected to one edge of the band or ribbon. As shown in Figs. 1 and 11, legs 3 of elements 1

are unitarily connected to the band or ribbon 7 by a neck portion 8.

The manner of removing metal and of forming the element heads or scoops (interlocking heads) 4 may be performed in many ways, but I prefer to carry out these operations in definite steps by means of a punch press provided with suitable dies (not shown), the nature and construction of which will be readily apparent and obvious to those skilled in this art.

As the first step of the preferred procedure, a portion of metal is blanked out of a strip 10 as at 11 to form substantially one-half of the outer contour of two elements 1. This blanking is confined to such a location with reference to the longitudinal edges of strip 10 that all the stock between elements and extending from one edge of the strip to one edge of the band or ribbon portion 7 is removed and that a notch 12 is formed between adjacent elements. The strip is then advanced (to the right as seen in Fig. 1) and another portion 11 is removed whereby two partially formed elements 1 are obtained. When strip 10 is advanced again, another portion 11 is removed and the recess and projection of the interlocking head 4 are formed in a heading or drawing die; and when advanced again, the first partially formed element 1 is pierced to provide an opening 14 between legs 3 of an element 1. With each succeeding advance of strip 10, a completely formed element 1 is produced, save that it is connected by legs 3 to the band or ribbon 7.

Strip stock 10 is fed intermittently through a punch press to form and shape the elements as above described to produce a stock strip of indefinite length having precisely formed and evenly spaced fastener elements 1 unitarily connected to one edge of the band portion. Such a stock strip is shown in part by Fig. 11 to substantially full scale.

From the above it will be seen that a blanking die, a drawing die, and a piercing die are required to form and shape fastener elements 1 and band or ribbon 7. When it is considered that all of these dies work simultaneously, it will be appreciated that each element 1 must line up precisely with the line of action of each of the dies that work on it. This therefore requires that each advance must be exact and that the strip must be held exactly in position, and to accomplish such precision, a locator punch would be employed. The moving portion of the punch press will therefore carry a blanking die, a locator punch, a heading die and piercing die and these would have median lines of action indicated by lines W—W, X—X, Y—Y, and Z—Z, respectively. This procedure therefore results in precise and uniform spacing of elements 1 along the length of band or ribbon 7. Also, this procedure results in precise and uniform spacing of notches 12 which become important in subsequent operations, i. e., when the article is fed to a machine for cutting off elements 1 and stitching them on a tape in that these notches can cooperate with the teeth of a sprocket type feed wheel.

To attach the individual fastener elements to a tape as shown in Fig. 6, legs 3 are severed along the dotted lines 15 of Fig. 1, placed astride the edge of the tape and squeezed together to firmly grip the same. The operation of severing and setting or stitching the elements on a tape can be effectively accomplished by feeding the stock strip to a machine which performs the severing and stitching operations automatically. Such a machine would make use of notches 12 as an aid to accurate and positive feeding of stock strip. For example, the feeding of the stock strip could be accomplished by means of a wheel having teeth spaced and shaped to register with notches 12 in the same fashion that the teeth of a sprocket wheel register with the links of a sprocket chain. The stitching of elements 1 to a tape can be done at the place where the article is formed or the article may be coiled on a reel and shipped to garment and clothing manufacturers who being supplied with a stitching machine would make their own fastener assemblies and make them to the various standard lengths or to any length desired, depending upon the requirements of the work at hand.

When the requisite metal is punched out of strip 10 to form fastener elements, burrs and wire edges are formed by reason of the shearing action of the dies, which must be removed in order to insure smooth operation of an assembled "zipper", and surfaces that are smooth to the touch. One important advantage in making the fastener elements in the manner above indicated, is that the elements may be subjected to finishing operations in which these burrs and wire edges are removed. Because of the arrangement of elements 1 of the stock strip the entire surface of each element that is exposed when affixed to a tape can be smoothed and freed of sharp edges and protuberances prior to the severing of these elements from the stock strip and attaching them to a tape. If desired, the stock strip may be given additional surface treatment before the fastener elements are severed and attached to a tape; for example, the elements may be plated, colored, buffed, or polished, and thereby provide a supply of fastener elements that are completely finished before they are attached to a stringer or tape. Having thus prepared the articles of manufacture, the same may be fed to a machine designed to sever and attach the elements to a tape and when so attached the stringers would not require further or additional finishing operations so far as the fastener elements themselves are concerned.

When a stock strip such as shown by Fig. 11 has been produced and the burrs or wire edges removed, the entire exposed surfaces of the individual elements will be free of such objectionable features even after an element has been severed and attached to a tape. While each element 1 must be severed along the lines indicated in Fig. 1 before it can be attached to a tape, nevertheless any burr or wire edge that would or might result from such severing does not appear in the finished article because such burr or edge is pressed into the tape and increases the grip on the same. To this extent the burr or wire edge is not objectionable but desirable.

The article illustrated in Fig. 2 of the drawing, differs somewhat in configuration from the article of Figs. 1 and 11. This difference resides chiefly in the fact that the blanking die which removes the metal corresponding to areas 11*a* is of different shape. In this case the blanking die partially shapes and severs the legs 3*a* of the elements 1*a* but leaves a somewhat elongated neck portion 8*a* by which elements 1*a* are maintained as an integral or unitary part of the band or ribbon portion 7*a*. The blanking die also forms notches 12*a* between elements 1*a* adjacent one edge of band 7*a* with which the protuberances or teeth of a sprocket-like feed wheel may register when advancing the stock strip to a stitching machine.

With the form shown in Fig. 2, the head portion 4*a* is formed in the same manner and se-

quence as head 4 is formed, but the piercing operation employed in Fig. 1 is omitted. The operation of severing an element 1a corresponds somewhat to the piercing operation employed in the article of Fig. 1, in that element 1a is severed by shearing along broken line 15a, and this, of course, would occur in the machine that stitches or secures the elements to a tape. The article of Fig. 2 has the same advantages as the article of Fig. 1 in that the elements 1a while unitary with band or ribbon 7a may be completely finished, or finished to any degree desired, and all burr or wire edges on exposed surfaces may be removed before the elements are secured to the tape. Any burr or wire edge that may result when an element is sheared along line 15a, is not objectionable because it would be pressed into the tape and not appear on an exposed surface.

The article shown in Fig. 7, as is apparent by inspection, is similar in all particulars to the article of Fig. 1, except in the form of the band or ribbon 7b to which the elements 1b are attached. The procedure or method of making would be the same except that a die would be provided to form the feed notches in the band portion 7b illustrated as a series of apertures formed along the longitudinal axis thereof. These apertures are preferably uniformly spaced and may be of the same shape although I have illustrated these apertures as comprising alternately spaced circular and rectangular apertures 16 and 17 respectively.

In Fig. 8, a band or ribbon portion 7e is shown from which the fastener elements have been severed. Band 7e is substantially the same as band 7b except that feed notches 18 are formed in the edge opposite to that on which the element connecting neck portions 8e are disposed.

In Fig. 9, a stock strip is illustrated that comprises a central ribbon or band portion 7c having a series of spaced fastener elements 3c disposed in rows on each side thereof and each unitarily connected to its respective edges by a neck portion 8c. This stock strip may be made in accordance with the procedure or method described in connection with Fig. 1 from a long strip of metal 10c whose width is greater than that of strip 10 of Fig. 1 but may be less than twice the overall width of strip 10 since the band or ribbon portion serves for two rows of fastener elements. The elements 3c of one row are disposed opposite the elements of the other row and may be completely formed while unitarily connected to band 7c and given such surface finish treatment or operations as may be required to provide each element with a smooth exposed surface of the color or finish desired.

In Fig. 10 the procedure involved is somewhat the same so far as the forming and shaping of the individual elements 1d are concerned. However, the elements of one row are offset or staggered with respect to the elements of the opposite row. Each element is connected by a neck portion 8d to the central band or ribbon portion 7d. These elements may be formed in two rows as illustrated from a strip 10d of substantially the same width as strip 10c.

It will be apparent that the procedure employed in connection with the manufacture of the stock strips shown in Fig. 2 may also be carried out in the manufacture of a stock strip having two rows of elements on each side of the band or ribbon portion.

Because of the state of completion to which the fastener elements are brought, in my improved stock strip, where the only remaining necessary operations to be performed thereon are, their severance from the band or ribbon portion and their attachment to the tape member of a separable fastener, the fastener elements need not, at any stage of manufacture, be individually handled in any way or for any purpose except the last step of attaching them to a tape. This invention therefore, dispenses with some of the most troublesome and exacting operations heretofore considered indispensable in the manufacture of fasteners of this type.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A method of making a stock strip comprising a row of equally spaced slide fastener elements each having an interlocking head at one end and tape gripping jaws at the other end and a band or ribbon having one straight edge with the opposite edge formed with lateral extensions which connect with the jaw ends of said fastener elements, which includes the steps of selecting a metal strip of indeterminate length having a width exceeding that of the finished stock strip and a thickness corresponding to that of the completed fastener elements, partially punching out successive portions of the metal strip in such manner that the end of each element which is subsequently provided with the interlocking head is formed inwardly of the adjacent marginal edge of such metal strip and completing the formation of the stock strip by further punching and by die heading or drawing operations of such character that accurately dimensioned fastener elements may be severed from such lateral extensions by a single punching operation for each such fastener element.

2. A method of making a stock strip comprising a row of equally spaced slide fastener elements each having an interlocking head at one end, tape gripping jaws at the other end and a band or ribbon having one straight edge with the opposite edge formed with lateral extensions which connect with the jaw ends of said fastener elements, which includes the steps of selecting a relatively long metal strip having a width exceeding that of the finished stock strip and a thickness corresponding to that of the jaw portions of the completed fastener elements, punching out successive portions along one edge of the strip to outline a plurality of fastener elements, completing by a die operation the interlocking head on at least the first of such outlined fastener elements and then in completing such headed element by punching out material therefrom to form the tape gripping jaw portions thereof.

EINAR M. ARENTZEN.