Oct. 5, 1943. F. ULRICH 2,330,936

MANUFACTURE OF SLIDE FASTENER WIRE

Filed Dec. 20, 1940

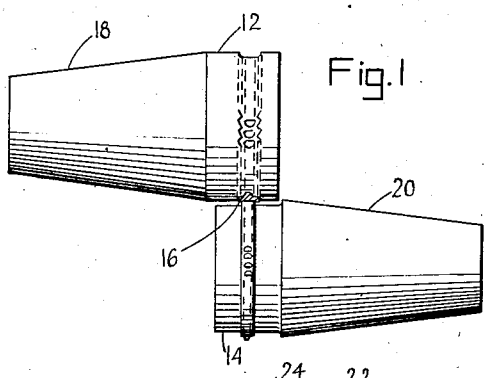


Fig. 1

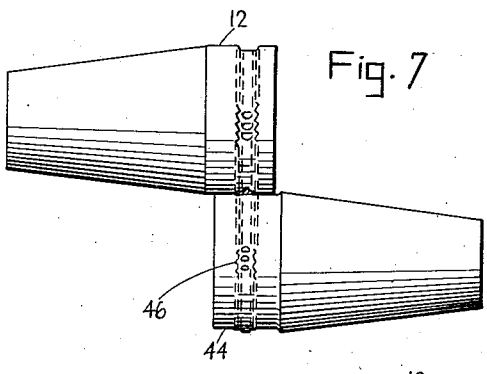


Fig. 7

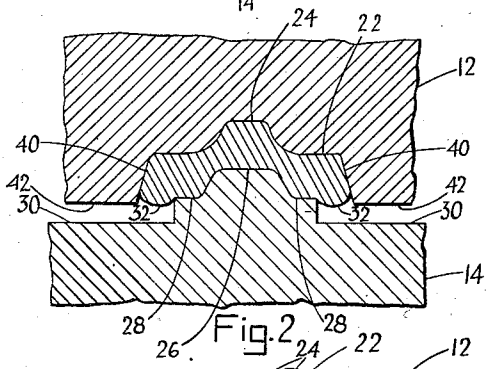


Fig. 2

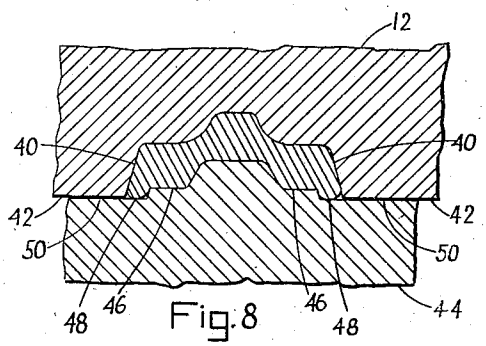


Fig. 8

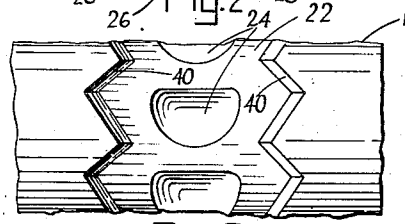


Fig 3

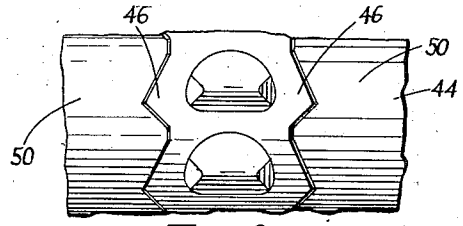


Fig. 9

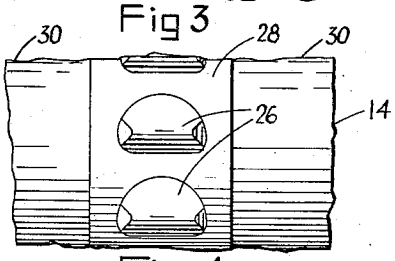


Fig. 4

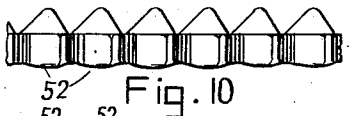


Fig. 10

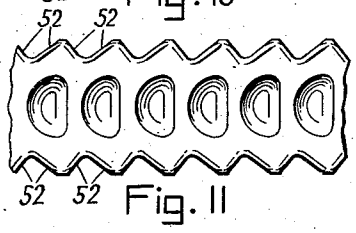


Fig. 11

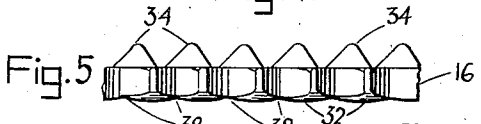


Fig. 5

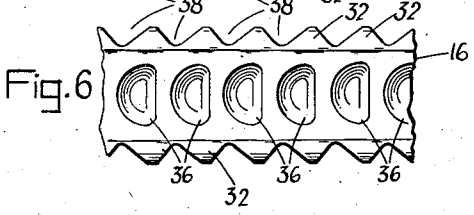


Fig. 6

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MANUFACTURE OF SLIDE FASTENER WIRE

Frederick Ulrich, Bayonne, N. J., assignor to Conmar Products Corporation, Bayonne, N. J., a corporation of New Jersey

Application December 20, 1940, Serial No. 370,946

12 Claims. (Cl. 80—30)

This invention relates to the manufacture of slide fasteners, and more particularly to the manufacture of a wire comprising a series of embryo slide fastener elements.

The primary object of my invention is to generally improve the manufacture of such a slide fastener wire.

In my Patent 2,221,740 I disclose a wire having closely spaced interlocking means at the top and bottom, and closely spaced notches or serrations at the side edges, the serrations corresponding to the outer ends of spread jaws. The strip provides metal for a series of slide fastener elements with the embryo head of one element nested within and filling the space between the embryo spread jaws of the next embryo element, so that the elements may be formed from the strip without substantial waste or scrap material. This wire is preferably formed by rolling a uniform wire between small diameter die rolls carried in massive shafts and bearings such that adequate pressure may be exerted on the wire to fully shape the same in a single passage of the wire through the rolls.

With both rolls oppositely recessed, a thin web of metal remains in the notches at the side edges, because of difficulty in completely controlling or guiding the flow of the metal. A very soft metal would not be satisfactory for a long-wearing slide fastener. With a satisfactory hard metal a residue or lateral fin remains in the notches. This lateral fin may be cut away in the machine which attaches the elements to a tape, all as is disclosed in my co-pending application Ser. No. 264,550, filed March 28, 1939, or it may be cut by means of a special rolling operation such as is disclosed and claimed in my Patent No. 2,279,768, patented April 14, 1942, but it is simpler and more convenient in some respects to roll the wire without any lateral web or fin, thereby eliminating all special operations for removing the same. To accomplish this result is one specific object of my invention.

I have found that such a wire may be formed if excess metal at the serrations is permitted to flow transversely of the flattened wire. In the specific arrangement here disclosed the wire is rolled with the projections on top and the recesses on bottom, and the excess metal is permitted to flow downwardly at the marginal portions of the wire. From a method viewpoint, the wire is confined at its side edges and at the top. The bottom is confined at the center, but is purposely not confined at its marginal portions, thus affording an outlet for excess metal.

To accomplish the foregoing and such other objects as will hereinafter appear, my invention consists in the subject matter outlined above and more particularly described in the following specification and sought to be defined in the claims. The specification is accompanied by a drawing, in which:

Fig. 1 is a front elevation of a pair of rolls embodying features of my invention;

Fig. 2 is an enlarged section at the wire being rolled;

Fig. 3 is a fragmentary view looking at the surface of the upper roll;

Fig. 4 is a similar view looking at the surface of the lower roll;

Fig. 5 is a side elevation of a piece of wire obtained from the rolls;

Fig. 6 is a bottom view of the wire;

Fig. 7 is a front elevation of a modified pair of rolls;

Fig. 8 is an enlarged section through the wire being rolled;

Fig. 9 is a view looking at the surface of the lower roll;

Fig. 10 is a side elevation of a piece of wire formed in the rolls shown in Fig. 7; and

Fig. 11 is a bottom plan view thereof.

Referring to the drawing, and more particularly to Fig. 1, round or rectangular wire is fed between rolls 12 and 14, and is thereby deformed to desired shape, as indicated at 16. The roll 12 is preferably formed integrally with a tapered shank 18 adapted to be received in one end of a massive drive shaft, not shown. Similarly, the roll 14 is integrally formed with a tapered shank 20, which in turn is adapted to be received in the end of a separate massive drive shaft, not shown. The shafts are preferably arranged and driven as disclosed in United States Patent No. 2,201,068, issued May 14, 1940, to George Wintritz.

Referring now to Figs. 2 and 3, it will be seen that the upper roll 12 is rather deeply recessed at 22 to form a serrated wire, and is additionally more deeply recessed at 24 to form projections on the upper side of the wire. The lower roll 14 (Figs. 2 and 4) is provided with projections 26 which form recesses at the bottom of the wire, and is further provided with a surface 28 which defines and confines the bottom of the wire. However the lower roll 14 is turned down at 30, thus providing a clearance or open space outside the portion 28 into which excess metal may flow, as indicated at 32.

Referring now to Figs. 5 and 6, I there show a fragmentary piece of wire 16 rolled from a wire

of uniform section. The original stock, not shown, is preferably a simple round wire, as that is the cheapest, but stock of rectangular section may also be used. The rolled wire comprises a series of closely spaced interlocking means or projections 34 along the top of the wire and a series of recesses 36 (Fig. 6) along the bottom. The side edges are serrated or provided with notches 38. Ordinarily these notches would be occupied by a thin lateral web of metal, as disclosed in my Patent No. 2,279,768 and application Serial No. 264,550, previously referred to, but in the present case the notches are rolled clean and open with no such lateral fin. Instead, the excess metal has been displaced transversely of the broad or flat plane of the wire, producing the raised or upset marginal portions 32 previously mentioned in connection with Fig. 2, and also shown in Figs. 5 and 6.

There is no lateral web because the side edges of the wire are fully confined by the serrated walls 40 of the upper roll 12. These walls are made deep enough for the intended purpose. In fact, as will be seen in Fig. 2, they are actually deeper than the thickness of the rolled wire as defined between the surface 22 of the upper roll and the surface 28 of the lower roll. In other words, the periphery 42 of the upper roll has a radius large enough to come below the surface 28 of the lower roll. Thus it is impossible for the usual lateral or sidewardly extending web to form, and excess metal is instead displaced downwardly. Excess metal so located does not interfere with proper operation of the slide fastener.

In Figs. 2 and 3 it will be noted that the serrated side walls 40 of the upper roll are disposed at an angle to the vertical. This angle is highly desirable for clearance of the serrations from notches in the wire as the wire leaves the roll. It provides a clearance which helps compensate for angularity caused by rotation of the roll.

In Fig. 7 the upper roll 12 is substantially the same as that previously described. The lower roll 44 differs from the lower roll 14 in having small serrations 46, instead of simple straight edges. In Fig. 8 it will be seen that the serrations at 46 are smaller than and are located inside the serrations at 40, thus providing a lateral clearance therebetween into which excess metal may flow, as is indicated at 48. The lower roll 44 is turned down at 50 to clear the large radius portion 42 of the upper roll, but preferably only enough for the intended purpose.

The result of the use of the small or degenerate serrations 46 on the lower roll is to confine the downwardly displaced metal 48 more closely to the serrated or zigzag marginal portions of the wire. The displaced metal is indicated at 52 in Fig. 11 and is in the form of a zigzag ridge, rather than a series of connected triangles, such as are shown in Fig. 6.

Because the displaced metal is confined more narrowly when using the bottom roll 44, the metal may tend to flow downwardly an excessive amount in spots, and it is therefore desirable to limit the downward flow. This is done by the surface 50 of the lower roll, and it is for this reason that the surface 50 is made large enough in diameter to practically meet the surface 42 of the upper roll. This is to be contrasted with the construction of the lower roll 14, for as will be seen in Fig. 2, a very large open clearance may be left at roll 14. This is so because with roll 14, the downwardly displaced metal is spread over a very much larger area, and there is accordingly no danger of any of this metal flowing downwardly an excessive distance.

It will be understood that if the rolls are rotated with equal rotational speeds, which is the simplest case, then the pitch diameters of the rolls should be equal. In the specific case here shown, the rolls have a pitch diameter of one inch. The actual diameter of the upper roll is greater than one inch, this being so because the pitch line or point of theoretical contact between the pitch circles, is preferably selected to come just about half way through the thickness of the wire. Thus the diameter of the lower roll at the surface 28 is somewhat less than an inch, but the initial blank is larger in order to allow for the formation of the projections 26. The pitch line is located about half way between the surface 22 of upper roll 12 and the surface 28 of lower roll 14.

It is believed that the present improvement as well as the advantages thereof will be apparent from the foregoing detailed description thereof. It will also be apparent that while I have shown and described my invention in several preferred forms, many changes and modifications may be made without departing from the spirit of the invention as sought to be defined in the following claims.

I claim:

1. A step product in the manufacture of slide fastener elements, said step product comprising a strip of metal pressed to shape by rolling said strip between die rolls, said strip having interlocking means at the top and bottom faces, the exterior edges of the strip having notches or serrations to conform to the outer ends of spread jaws, the edge portions of said strip of metal being raised or upset in a direction transverse to the faces of the strip, the raised or upset marginal portions containing some of the metal displaced when forming the notches or serrations in the edges, said strip having no residuary web or fin in said notches or serrations.

2. A step product in the manufacture of slide fastener elements, said step product comprising a strip of metal pressed to shape by rolling said strip between die rolls, said strip having closely spaced interlocking means at the top and bottom faces, the exterior edges of the strip having closely spaced notches or serrations to conform to the outer ends of spread jaws, said spacing being only a fraction of the length of the elements, the strip providing metal for a series of embryo fastener elements with the embryo head of one element nested within and filling the space between the embryo spread jaws of the next embryo element, whereby the elements may be formed from a strip without substantial waste or scrap material, the edge portions of said strip of metal being raised or upset in a direction transverse to the face of the strip, the raised or upset marginal portions containing some of the metal displaced when forming the notches or serrations in the edges, said strip having no residuary web or fin in said notches or serrations.

3. A step product in the manufacture of slide fastener elements, said step product comprising a strip of metal pressed to shape by rolling said strip between die rolls, said strip having closely spaced projections at the top and recesses at the bottom, the exterior edges of the strip having closely spaced notches or serrations to conform to the outer ends of spread jaws, said spacing being only a fraction of the length of the ele-

ments, the strip providing metal for a series of embryo fastener elements with the embryo head of one element nested within and filling the space between the embryo spread jaws of the next embryo element, whereby the elements may be formed from a strip without substantial waste or scrap material, the edge portions of the bottom of said strip of metal being upset in a direction transverse to the bottom face of the strip, the upset marginal portions containing some of the metal displaced when forming the notches or serrations in the edges, said strip having no residuary web or fin in said notches or serrations.

4. In a process of coining rolling a wire between die rolls to form a strip having faces with spaced projections and recesses therealong and having serrated edges, for use in the manufacture of slide fastener elements, the method of avoiding the production of a web or fin in the notches or serrations at the edges of the strip, which includes confining the edges of the strip, but not confining the peripheral portions of the strip at one of the faces, in order to permit flow or upsetting of metal at said peripheral portions in a direction transverse to the face of the strip.

5. In a process of coining rolling a smooth uniform wire between die rolls to form a strip having a face with spaced projections and an opposite face with spaced recesses and having serrated edges, for use in the manufacture of slide fastener elements, the method of avoiding the production of a web or fin in the notches or serrations at the edges of the strip, which includes confining the edges of the strip, and confining the face with the projections, but not confining the peripheral portions of the face with the recesses, in order to permit flow or upsetting of metal at said peripheral portions in a direction transverse to the recessed face of the strip.

6. In the manufacture of a step product used in the manufacture of slide fastener elements, which step product comprises an integral strip of embryo fastener elements having spaced interlocking means at the top and bottom faces and notches or serrations at the side edges to conform to the outer ends of embryo spread jaws, the method which includes coining rolling a metal wire between die rolls having peripherally spaced recesses and projections corresponding to the projections and recesses in the wire and the serrated edges of the wire, and confining the wire against lateral expansion at the side edges but not confining the wire against transverse expansion along the peripheral portions of the wire, whereby excess metal caused by the serrations at the edges may flow transversely of the faces of the wire.

7. In the manufacture of a step product used in the manufacture of slide fastener elements, which step product comprises an integral strip of embryo fastener elements having closely spaced interlocking means at the top and bottom faces and closely spaced notches or serrations at the side edges to conform to the outer ends of embryo spread jaws, the spacing of said interlocking means and serrations being only a fraction of the length of the elements, thus providing metal for a series of embryo fastener elements with the embryo head of one embryo element nested within and filling the space between the embryo spread jaws of the next embryo element, the method which includes coining rolling a uniform metal wire between die rolls having spaced recesses and projections corresponding to the projections and recesses in the wire and the serrated edges of the wire, and confining the wire against lateral expansion at the edges but not confining the wire against transverse expansion along the peripheral portions of the wire, whereby excess metal caused by the serrations at the edges may flow transversely of the faces of the wire.

8. A pair of die rolls for the coining rolling of a smooth wire into a strip of embryo fastener elements, said strip having notches or serrations along the side edges thereof corresponding to the outer ends of embryo spread jaws, one of said rolls being recessed to a depth greater than the thickness of the desired elements, said recess being defined by notched or serrated side walls, the other of said rolls having a raised surface corresponding to the bottom of the strip, said raised surface terminating well inside the serrations of the other roll in order to provide a space for transverse flow of metal at the edge portions of the strip in a direction from the first-named roll toward the second roll, whereby said serrated wire may be rolled without the production of a web or fin in the serrations.

9. A pair of die rolls for the coining rolling of a smooth wire into a strip of embryo fastener elements, said strip having spaced projections and recesses on the top and bottom thereof, and notches or serrations along the side edges thereof corresponding to the outer ends of embryo spread jaws, one of said rolls being recessed to a depth greater than the thickness of the desired elements, said recess being defined by notched or serrated side walls, said roll being additionally recessed to form the desired projections on the strip, the other of said rolls having projections corresponding to the desired recesses on the strip and having a raised surface corresponding to the bottom of the strip, said raised surface terminating well inside the serrations of the other roll in order to provide a space for transverse flow of metal at the edge portions of the strip in a direction from the first roll toward the second roll, whereby said serrated wire may be rolled without the production of a web or fin in the serrations.

10. A pair of die rolls for the coining rolling of a smooth wire into a strip of embryo fastener elements, said strip having spaced projections and recesses on the top and bottom thereof, and notches or serrations along the side edges thereof corresponding to the outer ends of embryo spread jaws, one of said rolls being recessed to a depth greater than the thickness of the desired elements, said recess being defined by notched or serrated side walls, said roll being additionally recessed to form the desired projections on the strip, the other of said rolls having projections corresponding to the desired recesses on the strip and having a raised surface corresponding to the bottom of the strip, said raised surface having straight side edges well inside the serrations of the other roll in order to provide a space for transverse flow of metal at the edge portions of the strip in a direction from the first roll toward the second roll, whereby said serrated wire may be rolled without the production of a web or fin in the serrations.

11. A pair of die rolls for the coining rolling of a smooth wire into a strip of embryo fastener elements, said strip having spaced projections and recesses on the top and bottom thereof, and notches or serrations along the side edges thereof corresponding to the outer ends of embryo

spread jaws, one of said rolls being recessed to a depth greater than the thickness of the desired elements, said recess being defined by notched or serrated side walls, said roll being additionally recessed to form the desired projections on the strip, the other of said rolls having projections corresponding to the desired recesses on the strip and having a raised surface corresponding to the bottom of the strip, said raised surface having small serrations located inside the serrations of the other roll in order to provide a space for transverse flow of metal at the edge portions of the strip in a direction from the first roll toward the second roll, whereby said serrated wire may be rolled without the production of a web or fin in the serrations.

12. A pair of die rolls for the coining rolling of a smooth wire into a strip of embryo fastener elements, said strip having notches or serrations along the side edges thereof corresponding to the outer ends of embryo spread jaws, one of said rolls being recessed to a depth at least as great as the thickness of the desired elements, said recess being defined by notched or serrated side walls, the other of said rolls having a raised surface corresponding to the bottom of the strip, said raised surface terminating well inside the serrations of the other roll in order to provide a space for transverse flow of metal at the edge portions of the strip in a direction from the first-named roll toward the second roll, whereby said serrated wire may be rolled without the production of a web or fin in the serrations.

FREDERICK ULRICH.