

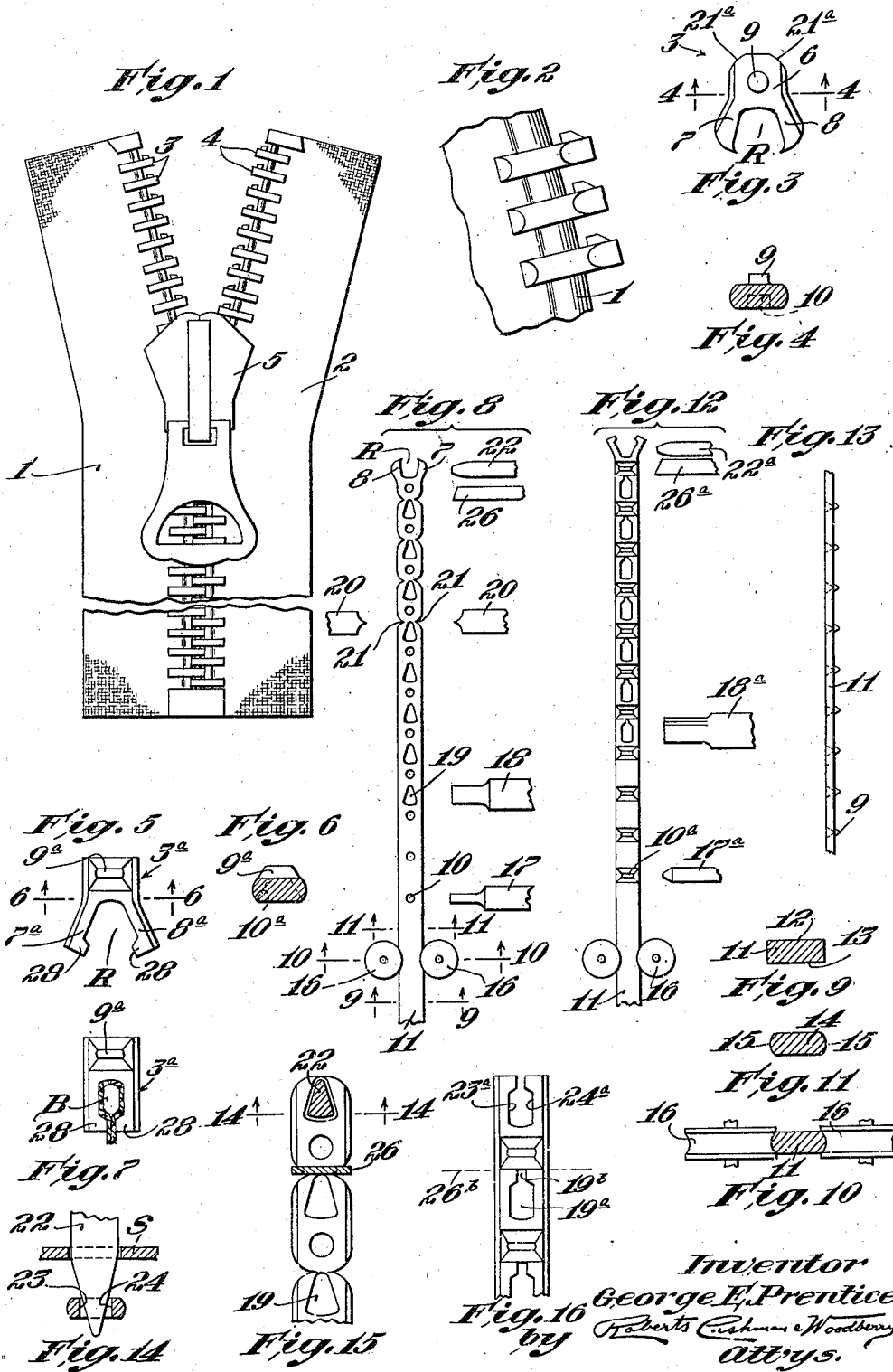
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METHOD OF MAKING FASTENER UNITS

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METHOD OF MAKING FASTENER UNITS

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6 Claims. (Cl. 29—148)

This invention pertains to separable fasteners of the kind in which opposed series of fastener units, attached respectively to the edges of flexible supports or stringers constituting the edges of a gap to be closed, are moved into gap-closing relation by means of a slider, and relates more particularly to an improved fastener unit and to a method of making such units. One common prior method of making such units has been to cut them from sheet material and the usual practice has been so to cut the unit that its legs or jaw portions are initially in divergent relation. This mode of procedure involves a very substantial waste of material, and as the corrosion-resistant metal, commonly employed in making such units, is quite expensive, this waste constitutes a large item in the cost of production.

In accordance with usual procedure, the incisions made in producing the unit are wholly within the boundary of the sheet metal from which the unit is cut, so that the entire periphery of the unit is a raw surface resulting from the action of the cutting dies. When, as is quite common in the art, the units are secured directly after cutting to the edge of the stringer, these raw surfaces of the metal, particularly if the dies have become dull, are rough and burred, and in the finished fastener the units are disagreeable to the touch and cause a harsh and noisy action of the slider.

One object of the present invention is to provide a novel method of procedure in preparing fastener units of the class described whereby waste of material is reduced to a minimum.

A further object is to provide a new method procedure which results in the production of an improved unit whose lateral edges at least are smooth and free from burrs when the units are originally formed, so that if directly attached to the stringer without any intermediate finishing operation, the resultant unit is smooth and agreeable to the touch and permits an easy and substantially noiseless movement of the actuating slider.

In the accompanying drawing I have illustrated certain desirable steps in the practice of an improved method of producing such units, as well as a desirable modification thereof, and have also illustrated the resulting improved fastener unit produced in accordance with the practice of my novel method.

Fig. 1 is a fragmentary front elevation of a slide actuated fastener of the type to which the present invention relates;

Fig. 2 is a fragmentary elevation of one of the

stringers or flexible supports of such a fastener, to large scale, showing improved units made in accordance with the present invention attached thereto;

Fig. 3 is a plan view of a single fastener unit made in accordance with one desirable embodiment of the present invention, the unit being shown as it appears prior to application to the stringer;

Fig. 4 is a section substantially on the line 4—4 of Fig. 3;

Fig. 5 is a view similar to Fig. 3 but illustrating a unit of slightly different shape;

Fig. 6 is a section on the line 6—6 of Fig. 5;

Fig. 7 is a plan view of the unit of Fig. 5 but shown as applied to a stringer tape, the latter being in transverse section;

Fig. 8 is a diagrammatic plan view illustrating certain steps in the improved method of making fastener units of the specific type illustrated in Fig. 3;

Fig. 9 is a transverse section substantially on the line 9—9 of Fig. 8;

Fig. 10 is a transverse section on the line 10—10 of Fig. 8;

Fig. 11 is a transverse section on the line 11—11 of Fig. 8;

Fig. 12 is a view similar to Fig. 8 but illustrating a modified procedure resulting in the production of fastener units such as specifically illustrated in Fig. 5;

Fig. 13 is an edge elevation of a metallic strip or ribbon, such as is illustrated in plan view in Figs. 8 and 12, respectively, showing the strip after the completion of the cupping operation;

Fig. 14 is a transverse section, to larger scale, through the endmost section of the strip or ribbon of metal from which the units are prepared, showing the operation of the punch which exerts spreading pressure to cause the legs of the unit to diverge;

Fig. 15 is a fragmentary plan view, to large scale, showing the advancing end portion of a strip or ribbon and illustrating the operation of the spreading punch and also of the cutting off tool; and

Fig. 16 is a fragmentary plan view showing the forward advancing end portion of a strip or ribbon, such as illustrated in Fig. 12, and indicating the endmost unit in readiness to be severed and to have its legs spread apart divergently.

Referring to the drawing, the numerals 1 and 2 designate flexible stringers or supports of usual type to which the series of fastener units 3 and 4 are attached, the units of the opposed series being

moved into and out of engaging relation by means of the slider 5.

As illustrated in Fig. 3, the fastener unit, in accordance with the present invention and as it appears before application to the stringer, comprises a head portion 6 and divergent leg portions 7 and 8 separated by a recess R, the leg portions 7 and 8 constituting anchoring means for securing the unit to the flexible stringer.

10 The head portion of the unit is provided on one of its flat faces with a projecting pin 9 and is provided at its opposite face with a complementary socket or recess 10 coaxial with the pin 9.

In preparing this unit in accordance with the present invention, the first step is to provide a strip or ribbon 11 of metal of the desired character for use in forming the unit, such strip being of substantially the same width as the width of the head portion 6 of the desired unit and ordinarily having substantially flat and parallel upper and lower faces 12 and 13, respectively (Fig. 9). As illustrated in Fig. 9, this metal ribbon or strip is of substantially rectangular cross section.

20 However, if a strip, such as shown in Fig. 9, be employed, the edges of the strip are rounded off (as shown at 15 in Fig. 11) at an early stage in the operation of making the units, preferably, as illustrated in Fig. 10, by passing the strip or ribbon between a pair of rollers or wheels 16 adapted either by compression or by abrasion to round the edges of the strip and to give them a smoothly finished appearance. Preferably the edges are rounded by pressure or the equivalent of a drawing operation so as to make these edges dense

25 and hard and capable of withstanding considerable use without becoming rough or becoming worn by the action of the slider.

When the operation of making the units as herein described is to be carried out as a continuous process, the strip or ribbon 11 may be advanced endwise intermittently by steps each substantially equal to the length of a complete unit, first passing between the edge shaping rolls 16 and then reaching the position of operation

30 of the cupping die 17. This die is actuated by any appropriate mechanism (not shown) and operates at regular intervals to form the recesses or sockets 10 in the upper face of the ribbon or blank,—at the same time forcing the metal at the under side of the ribbon into an outwardly projecting boss constituting the pin 9, it being understood that a suitable die at the lower side of the ribbon cooperates with the punch 17 to shape the pin 9 and give it the accurate contour

35 necessary for the intended purpose.

The ribbon is then again advanced, and after the performance of several of the cupping operations the ribbon reaches the field of activity of the piercing die 18. This die is so arranged as to form an aperture or perforation 19 in the space between consecutive sockets 10. Preferably the aperture 19 is elongate in the direction of the length of the ribbon, and preferably it is wider at one end than at the other, the wider

40 end being adjacent to the pin which follows it.

The ribbon now continues to advance, and after a suitable interval reaches the field of operation of a pair of oppositely moving forming tools 20, which engage the ribbon at its opposite rounded edges and indent these edges so as to form the opposed indentations or recesses 21. The forming tools 20 are of such shape that they press the metal inwardly, causing it to flow smoothly so that the walls of the indentations

45 21 consist of substantially unbroken portions of

the original rounded edges of the ribbon. The ribbon continues to advance intermittently until the endmost of the apertures 19 is brought into the field of action of the spreading punch 22. With the understanding that this endmost aperture 19 extends to the end of the ribbon, so that the small end of the aperture is open at the end of the ribbon, the descent of the spreading punch 22 causes pressure to be exerted against the inner walls 23 and 24 (Fig. 14) of the endmost aperture, thus spreading apart the metal forming the walls of the aperture resulting in the formation of the divergent legs 7 and 8 (Fig. 3) of the unit.

As the spreading punch 22 begins to press against the side walls of the endmost aperture 19, a cutting-off tool 26 engages the ribbon on a transverse line joining the inner ends of that pair of recesses 21 which is nearest to the end of the ribbon, thus cutting off the completed endmost unit which has the appearance shown in Fig. 3. It may be noted that this transverse cut intersects the end of the next aperture 19 so that the incision made by the tool 26 frees the metal at opposite sides of the aperture 19 in readiness to be spread apart at the next operation of the spreading die 22. The endmost unit thus formed is stripped off from the spreading die 22 by means of any appropriate stripping device S, such as indicated diagrammatically at S in Fig. 14. The extreme ends of the leg portions 7 and 8 of the completed unit are sharp and prong-like, well adapted to grip the material of the stringer when the unit is applied thereto.

It may be understood that the several dies and forming tools are all operated at substantially the same time and at proper intervals so that, for example, while the cupping tool is forming the recesses 10, the piercing die 18 is forming the apertures 19, the forming tools 20 are producing the indentations 21, the spreading die 22 is acting to spread the legs of the endmost unit, while the cutting tool 26 operates at the proper time to cut off the completed endmost unit as the legs are being spread.

It will be noted that the side edges of the head 6 of the unit, as well as the outer edges of the legs 7 and 8 and parts 21^a (Fig. 3) of the end surface of the head 6 are smoothly rounded and are in fact portions of the original rounded edges 15 of the ribbon. Thus the major portion of the exposed edge of the unit, after application to the stringer, is finished and smooth so that even though the units be attached directly to the stringer as they are formed, the units present smooth surfaces for engagement by the slider so that the action of the latter is much easier and less noisy than when cut units of usual type are attached directly to the stringer without preliminary finishing.

In the arrangement illustrated in Figs. 5, 6, 7 and 12, the strip or ribbon 11, after having its edges rounded, is first caused to advance into the field of activity of a cupping punch 17^a, which is so shaped as to form a transversely elongate recess 10^a of inwardly tapering form, and at the same time to cause the metal at the opposite side of the ribbon to project and form a pin 9^a which is elongate transversely of the strip or ribbon, and which is preferably of substantially truncated, pyramidal form.

After the formation of the recess and corresponding pin, the ribbon is advanced intermittently, and after several forward steps comes into the field of activity of the piercing die 18^a. This

die forms an elongate aperture 19^a (Fig. 16) of more or less rectangular contour but having at its forward end a narrow recess or bay 19^b. After the completion of the piercing operation, the ribbon further advances, but in this instance is not indented at the sides, the edge of the ribbon being left straight and continuous.

Assuming that a perforation or aperture 19^a has been formed at the advancing end of the ribbon and that the extension or bay 19^b of this aperture is open at the end of the ribbon, the advance of the ribbon brings this aperture into the field of operation of the spreading punch 22^a, which now enters the aperture 19^a, and by exerting pressure against the side walls of the aperture spreads such walls apart, causing them to assume the divergent relation shown at 7^a, 8^a, respectively, in Fig. 5. As the punch 22^a comes into action, the cutting-off tool 26^a severs the ribbon along the line 26^b (Fig. 16) so as to separate the unit from the remainder of the ribbon. By reference to Fig. 5, it will be noted that the portions of the metal at opposite sides of the narrow bay or recess 19^b now constitute prongs or anchoring elements 28 (Fig. 5) which, when the unit is compressed on the stringer, as shown in Fig. 7, press into the substance of the stringer and thus anchor the latter firmly with the beaded edge B of the stringer disposed in the bottom of the recess R. It may be noted that since the aperture 19 or 19^a is a freely open aperture, such as results from punching out and removing a portion of the metal, sufficient space is thus provided for the reception of the beaded edge of the stringer when the unit is secured to such edge, in this way permitting the divergent leg portions of the unit to be so compressed that in the finished fastener the attached portion of the unit is no wider in a front-to-rear direction than is the head of the unit (Fig. 7). This insures smooth operation of the slider and permits the slider to be made of minimum dimensions in front-to-rear thickness.

While I have herein illustrated desirable embodiments of the invention, it is to be understood that the invention is of broader application, and that while certain specific sequences of steps in the method have been described, the same steps may be carried out in other sequence without departing from the invention as set forth in the appended claims.

I claim:

1. Method of making fastener units, having smoothly rounded lateral edges, from ribbon-like material, without waste, said method comprising as steps preparing a metal ribbon having substantially flat upper and lower surfaces and rounded edges, successively cupping the ribbon, at points regularly spaced apart by distances substantially equal to the length of a completed unit, to produce sockets in one face and corresponding projecting pins on the other face of the ribbon, piercing the ribbon in the spaces between successive pins to provide elongate open apertures, projecting a spreading device into each such elongate aperture and, as the spreading device begins to act, cutting completely through the ribbon transversely at the end of the aperture nearest the pin, but without removing any substantial portion of the material of the ribbon, thereby to divide a completed unit from the ribbon and concomitantly to release the metal at opposite sides of the next aperture to permit it to be spread apart in the succeeding operation of the spreading device.

2. Method of making fastener units of the class described each having smoothly rounded lateral edges a head portion, and a pair of diverging attaching jaws, the head portion being provided with a projecting pin on one face and a corresponding socket in the opposite face, said method comprising as steps preparing a metal ribbon of a width substantially equaling the width of the head of the desired unit and of a thickness substantially equaling that of the body of the completed unit, the ribbon having parallel upper and lower faces providing the ribbon with smoothly rounded edges, successively cupping the ribbon, at points regularly spaced apart by distances substantially equal to the length of a completed unit, to produce a socket in one face and a corresponding projecting pin on the other face, piercing the ribbon to form an elongate open aperture spaced from the projecting pin and extending longitudinally of the ribbon, applying spreading pressure to the metal at opposite sides of the aperture and cutting completely through the ribbon by a transverse incision at that end of the aperture nearest to the pin, but without waste of any substantial portion of the material of the ribbon, thereby without waste to divide a completed unit from the ribbon and concomitantly to release the metal at opposite sides of the aperture so that it may be spread apart at the next actuation of the spreading means.

3. Method of making fastener units of the class described each having smoothly rounded lateral edges, a head portion, and a pair of diverging attaching jaws, the head portion being provided with a projecting pin on one face and a corresponding socket in the opposite face, said method comprising as steps preparing a metal ribbon of a width substantially equaling the width of the head of the desired unit and of a thickness substantially equaling that of the body of the completed unit and having parallel upper and lower faces and smoothly rounded edges, successively cupping the ribbon, at points regularly spaced apart by distances substantially equal to the length of a completed unit, to form a transversely elongate socket in one face and a transversely elongate projecting pin member on the opposite face, piercing the ribbon to form an elongate substantially rectangular aperture extending longitudinally of the ribbon, said aperture having a narrow extension at that end most remote from the pin, cutting completely through the ribbon by a transverse incision intersecting the narrow extension of the aperture in such a way as without waste of any substantial portion of the ribbon to divide a unit from the ribbon while concomitantly freeing the metal at opposite sides of the aperture so that the opposite side walls of the aperture may be caused to diverge, and applying spreading pressure to the inner walls of the aperture.

4. Method of making fastener units of the class described each having smoothly rounded lateral edges, a head portion, and a pair of diverging attaching jaws, the head portion being provided with a projecting pin on one face and a corresponding socket in the opposite face, said method comprising as steps preparing a metal ribbon of a width substantially equaling the width of the head of the desired unit and of a thickness substantially equaling that of the body of the completed unit and having parallel upper and lower faces and smoothly rounded edges, cupping the ribbon, at points regularly spaced apart by distances substantially equaling the

length of a completed unit, to produce the socket in one face and the corresponding projecting pin on the other face, piercing the ribbon to form an elongate aperture spaced from the projecting pin and extending longitudinally of the ribbon, indenting the round edges of the ribbon at opposite sides and at points substantially opposite to that end of the aperture most remote from the pin, severing the ribbon, without removing any substantial portion of the material as waste, by a transverse incision at that end of the aperture most remote from the pin in such a way as without waste to divide a unit from the ribbon and concomitantly to free the metal at opposite sides of the aperture so that it may be spread apart divergently, and applying pressure to the interior walls of the aperture to spread said walls apart.

5. Method of making fastener units of the class described each having smoothly rounded lateral edges, a head portion, and a pair of divergent attaching jaws, the head portion being provided with a projecting pin on one side and a corresponding socket in the opposite side, said method comprising as steps providing a metal ribbon of a width substantially equaling the width of the head of the desired unit and of a thickness substantially equaling that of the body of the completed unit, advancing said ribbon past finishing means operative smoothly to round the edges of the ribbon, successively cupping the advancing ribbon at points regularly spaced apart by distances substantially equal to the length of a completed unit, to produce spaced sockets in one face of the ribbon and corresponding projecting pins on the other face of the ribbon, piercing the advancing ribbon in each space between adjacent pins to produce elongate open apertures extending longitudinally of the ribbon, severing the ribbon by successive incisions, each cutting com-

pletely through the ribbon, which intersect the forward ends of the apertures in such a manner as without waste to divide a unit from the ribbon and concomitantly to free the metal at opposite sides of each aperture and thereby permit the metal at opposite sides of the aperture to be divergently spread, and applying spreading pressure to the opposite inner walls of said apertures in succession.

6. Method of making fastener units of the class described each having smoothly rounded lateral edges, a head portion, and a pair of divergent attaching jaws, the head portion being provided with a projecting pin on one side and a corresponding socket in the opposite side, said method comprising as steps preparing a metal ribbon of a width substantially equal to the width of the head portion of the desired unit and of a thickness substantially equaling the thickness of the body portion of a completed unit, intermittently advancing said ribbon endwise by steps each substantially equal to the length of a completed unit past a series of operating stations spaced apart distances which are substantially integral multiples of the length of a completed unit, cupping the ribbon at the first of said stations thereby to produce a socket on one face and a corresponding projecting pin on the other face, piercing the ribbon at a later station to form an open aperture elongate in the direction of the length of the ribbon, cutting the ribbon completely through at that end of the aperture most remote from the pin, in such a way as without waste of material to divide a unit from the ribbon and concomitantly to free the material at opposite sides of the aperture, and at another station exerting spreading pressure against the walls of the aperture.

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