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(54) **Method of and apparatus for manufacturing slide fastener coupling elements.**

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(73) Proprietor: **YOSHIDA KOGYO K.K.**
No. 1 Kanda Izumi-cho Chiyoda-ku
Tokyo (JP)

(72) Inventor: **Kasai, Kazumi**
3105-1, Kamikoizumi
Namerikawa-shi Toyama-ken (JP)
Inventor: **Morioka, Koitsu**
586-3, Ueki
Kurobe-shi Toyama-ken (JP)
Inventor: **Sugahara, Sadanobu**
3264-4, Hongo
Uozu-shi Toyama-ken (JP)

(74) Representative: **Patentanwälte Leinweber & Zimmermann**
Rosental 7/II Aufg.
D-8000 München 2 (DE)

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Description

The present invention relates to the production of slide fastener stringers, and more particularly to a method of and apparatus for manufacturing slide fastener coupling elements of metal suitable for use with a two-way slide fastener as claimed in the precharacterising parts of claim 1, 5. Such a method and apparatus are known from US—A—2804677.

A two-way slide fastener has a pair of oppositely disposed sliders and hence can be opened from either end. To facilitate smooth movement of the sliders in either direction, it is required to chamfer the coupling heads of metallic coupling elements on one face of each coupling head. Such chamfering is hitherto performed by means of a separate, small-sized cutting tool, which not only has a short endurance, but also often causes production of burrs and chips. Further, with the small-sized cutting tool, it is difficult to produce adequate quality of coupling elements.

According to one aspect of the invention, there is a method provided of manufacturing coupling elements for a slide fastener, comprising the steps of: providing a rod of metal of a generally Y-shaped cross section having a base, as a prospective coupling head, and a pair of legs divergently extending from the base; feeding the rod stepwise in a longitudinal direction; transversely slicing the rod into a plurality of coupling element blanks in timed relation to said stepwise feeding; placing the coupling element blanks, one at a time, in a coupling-head forming station away from the rod in a direction perpendicular to said longitudinal direction; and at the coupling-head forming station, forming the base of each coupling element blank into a final coupling head of one coupling element which head has a projection from one face and a coacting socket in the other face; characterized in: that said method comprises the further step of forming a chamfered portion on the base of the rod every time each coupling element blank is sliced off from the rod and then placed in the coupling-head forming station, each coupling element blank thus having the chamfered base; and that the first-named forming step is effected in such a manner that the chamfered portion is disposed around the socket.

According to another aspect of the invention, there is provided an apparatus for manufacturing coupling elements for a slide fastener from a rod of metal of a generally Y-shaped cross-section having a base, as a prospective coupling head, and a pair of legs divergently extending from the base, said apparatus comprising: means for feeding the rod in a longitudinal direction in regular steps of a predetermined distance equal to the thickness of one coupling element; a fixed cutting punch having a cutting edge; a reciprocating ram movable relatively to said cutting punch perpendicularly to said longitudinal direction; a cutting die carried by said ram and having a hole for the passage of the rod, said cutting die being movable, in response to the reciprocating movement of said ram, across a cutting edge of said cutting punch for transversely slicing the rod into a plurality of coupling element blanks, one on each stroke of said ram; a forming die carried by said ram and movable, in response to the reciprocating movement of said ram, toward and away from said cutting edge of said cutting punch at one end of each stroke of said ram; and a forming punch movable toward said forming die for forming the base of each coupling element blank into a final coupling head of one coupling element which head has a projection from one face and a coacting socket in the other face; characterized in: that said fixed cutting punch has a projection, said ram having a channel in which said projection of said cutting punch is slidably received and which communicates with said hole at one end thereof; means disposed on said projection of said cutting punch, for forming a chamfered portion on the base of the rod at one end of each stroke of said ram, each coupling element blank thus having the chamfered base; and that said forming die and punch are effective to form the socket in such a manner that the chamfered portion is disposed around the socket.

The present invention seeks to provide a method of manufacturing high quality metallic coupling elements suitable for two-way slide fasteners.

The invention also seeks to provide a method of manufacturing accurate coupling elements, for two-way slide fasteners, with improved rate of production.

The invention further seeks to provide an apparatus for carrying out the method described above, which not only requires no additional parts, but also has an improved endurance.

Other objects and advantages will appear from the following description of an example of the invention, when considered in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

Figure 1 is a fragmentary perspective view of an apparatus according to a first embodiment of the present invention.

Figure 2 is a longitudinal cross-section view taken along line II—II of Figure 1, showing the parts in a starting position for the manufacture of a coupling element;

Figures 3 through 5 are cross-sectional views similar to Figure 2, each showing a different stage of the manufacture;

Figure 6 is a fragmentary perspective view similar to Figure 1, but showing a second embodiment, with parts broken away;

Figure 7 is a longitudinal cross-sectional view taken along line VII—VII of Figure 6, showing the parts in a starting position for the manufacture of a coupling element;

Figures 8 through 10 are similar to Figure 7, each showing a different stage of the manufacture;

Figure 11 is a cross-sectional view similar to Figure 9, but showing a third embodiment, with parts omitted;

Figure 12 is a fragmentary plan view of a two-way slide fastener having coupling elements manufactured according to the present invention; and

Figures 13 and 14 are enlarged perspective views of different kinds of coupling elements manufactured according to the present invention and suitable for use with a two-way slide fastener.

Like reference numerals designate similar parts throughout the several views.

Figure 1 shows an apparatus 1 for manufacturing coupling elements 2', for a slide fastener and more particularly for a two-way slide fastener 3 (Figure 12), from a rod 4 of metal of a generally Y-shaped cross-section having a base 5, as a prospective coupling head 5" (Figures 2, 5, 13 and 14), and a pair of legs 6, 6 divergently extending from the base 5.

The apparatus 1 generally comprises a pair of rollers 7, 8 for feeding the rod 4 stepwise upwardly, i.e. in a longitudinal direction indicated by an arrow 9, in regular steps of a distance *h* (Figure 2) equal to the thickness of a single coupling element 2', a coacting cutting die and punch 10, 11 for transversely slicing the rod 4 into a plurality of coupling element blanks 2 (only one shown in Figures 3 and 4) in timed relation to the stepwise feeding of the rod 4, and a coacting forming die and punch 12, 13 for forming a slice of coupling element blank 2 into a final coupling element 2'.

The cutting punch 11, which is stationary, has at its forward end a cutting edge 14. The cutting die 10, which is carried by a reciprocating ram 15 at its forward end, has a vertical hole 16 for the passage of the rod 4. The ram 15 has a horizontal channel 17 in which a projection 18 of the cutting punch 11 is slidably received and which leads to the upper end of the hole 16 of the cutting die 10. Thus the cutting die 10 is movable back and forth, in response to the reciprocating movement of the ram 15, across the cutting edge 14 of the cutting punch 11 for transversely slicing the rod 4 into the individual coupling element blanks 2 one on each backward stroke of the movement of the ram 15.

The apparatus 1 also includes a means, disposed on the projection 18 of the cutting punch 11, for forming a chamfered portion 20 on the base 5 of the rod 4 at the end of each backward stroke of the ram 15, so that each coupling element blank 2 has the chamfereed base 5' (Figures 3 and 4). The chamfered-portion forming means comprises a chamfering surface 21 composed of a pair of first and second beveled surfaces 21*a*, 21*b* for being forced against the base 5 of the rod 4 at the end of each backward stroke of the ram 15. Thus the chamfered portion 20 on the base 5 of the rod 4 is composed of a pair of third and fourth beveled surfaces 20*a*, 20*b* corresponding to the first and second beveled surfaces 21*a*, 21*b* on the cutting punch 11. As shown in Figure 4, the third beveled surface 20*a* extends at an angle α with respect to a vertical outer side surface 23 of the rod 4, while the second beveled surface 20*b* extends at an angle β with respect to a horizontal upper end surface 4*a* of the rod 4.

The chamfering surface 21 is disposed at a corner defined by the projection 18 and a horizontal surface 24. The horizontal surface 24 is disposed at a level above the bottom surface 25 of the projection 18 by a distance H (Figure 2). The upper horizontal surface 26 of the cutting die 10, which includes a cutting edge 27, is disposed at a level above the bed 17*a* of the channel 17 of the ram 15 by the same distance H. Thus as the projection 18 of the cutting punch 11 slides on the bed 17*a* of the channel 17 of the ram 15, the horizontal surface 24 of the cutting punch 11 slides on the upper horizontal surface 26 of the cutting die 10, during which time the cutting edges 27, 14 of the cutting die and punch 10, 11 are moved relatively to each other.

The forming die 12, contiguous to the cutting die 10, is carried by the ram 15 and is movable, in response to the reciprocating movement of the ram 15, toward and away from the cutting edge 14 of the cutting punch 11 for receiving one coupling element blank 2 in a coupling head forming recess 28 at the end of each backward stroke of the movement of the ram 15.

At the end of backward stroke of the ram 15 (Figures 4 and 5), the forming recess 28 is in vertical alignment with the forming punch 13 which is movable vertically toward and away from the recess 28, i.e. in directions indicated by arrows 36, 37 (Figure 1). As the forming punch 13 is lowered to press the coupling element blank 2 at the chamfered base 5', the latter is formed into a final coupling head 5" (Figures 2, 5, 13 and 14) having a projection 30 from the lower face and a coacting socket 31 in the upper face at such a position that the beveled surfaces 20*a*, 20*b* are disposed around the socket 31. At that time, the coupling element blank 2 is retained in the recess 28 by a presser 32 lowered together with the forming punch 13. Thus a complete coupling element 2' has been produced (Figures 2 and 5).

At the end of forward stroke of the ram 15 (Figures 1 and 2), a freshly completed coupling element 21' is located adjacent to a slide fastener stringer tape 33 with the legs 6, 6 disposed astride the beaded tape edge 34. A pair of pressing levers 35, 35 (Figure 1) is moved toward each other to clinch the opposite legs 6, 6 about the beaded edge 34 of the tape 33, which is fed upwardly in steps of a predetermined distance equal to the element-to-element pitch.

In operation, when the ram 15 is moved backwardly, i.e. leftwardly in Figure 2, the cutting die 10 is moved in the same direction to force the rod 4 to move across the cutting edge 14 of the fixed cutting punch 11, whereby the upper end portion of the rod 4 which projects out of the hole 16 is sliced off into a coupling element blank 2 (Figure 3). The rod 4 is fed stepwise upwardly so that it projects from the cutting edge 27 of the cutting die 10 by a length *h* (Figure 2) at a time in order

that the sliced coupling element blank 2 will have a thickness equal to the length *h*.

With continued backward movement of the ram 15, the sliced coupling element blank 2 slides on the horizontal upper surface 26 of the cutting die 10 and then on the horizontal upper surface 12*a* of the forming die 12, as shown in Figure 3, until the coupling-head forming recess 28 is vertically aligned with both the sliced coupling element blank 2 and the forming punch 13 (Figure 4). During that time the rod 4 is moved leftwardly and, at the end of the backward stroke of the ram 15, the rod 4 is forced, at portions adjacent to the freshly cut end, against the chamfering surface 21 on the projection 18 of the cutting punch 11. Thus a pair of beveled surfaces 20*a*, 20*b* corresponding to the beveled surfaces 21*a*, 21*b* of the chamfering surface 21 has been formed on the base 5 of the rod 4 so that a succeeding coupling element blank 2 will have the chamfered base 5'. The preceding coupling element blank 2 has been provided at the base 5' with the same chamfered portion 21 in the same manner.

The forming punch 13 is lowered to press the coupling element blank 2 at the chamfered base 5' to thereby form the latter into a final coupling head 5" (Figures 2, 5, 13 and 14) having a projection 30 from the lower face and a coacting socket 31 in the upper face at such a position that the beveled surfaces 20*a*, 20*b* are disposed around the socket 31. At that time the coupling element blank 2 is retained in the recess 28 by the presser 32 lowered together with the forming punch 13. Thus a complete coupling element 2' has been produced (Figures 2 and 5). Then, the forming punch 13 and the presser 32 are retracted upwardly and, at the same time, the ram 15 is moved forwardly from the retracted position (Figures 4 and 5) to the advanced position (Figure 2) in which the opposite legs 6, 6 of the coupling element blank 2 in the recess 28 are disposed astride the beaded edge 34 of the stringer tape 33.

Finally, the opposite legs 6, 6 of the coupling element blank 2 are clinched by the pair of pressing levers 35, 35 about the beaded edge 34 of the tape 33 which is held at rest between intermittent movements thereof.

According to the present invention, a chamfered portion is formed on the base of the rod in order that the base of the individual coupling element blank will have had such chamfered portion before the formation of a projection and a coacting socket, and for this reason, it is possible to form a chamfered portion accurately and reliably, thus producing high quality of coupling elements suitable for a two-way slide fastener (Figure 12).

Since the slicing step and the placing step and the chamfered-portion forming step are performed in sequence on only a single stroke of relative movement of the cutting die and punch, it is possible to manufacture accurate coupling elements with improved rate of production.

Further, the apparatus 1 is very simple in construction and hence can be obtained from the conventional apparatus by providing the cutting die with a horizontal channel behind the vertical hole and by providing the cutting punch with a chamfering surface, which requires no complicated machining or added parts.

Figures 6 through 10 show a modified apparatus 40 according to a second embodiment similar to the apparatus 1 of Figures 1 through 5, and the only difference therefrom is as follows. The chamfering surface 21 on the projection 18 of the cutting punch 11 is disposed below a corner 41 (described below) by a distance *h* (Figure 7) equal to the thickness of a single coupling element 2', the corner 41 being defined by the projection 18 and the horizontal surface 24. The chamfering surface 21 comprises a beveled surface of a nose 42 extending forwardly from the projection 18.

When the ram 15 is moved backwardly, i.e. leftwardly in Figure 7, the cutting die 10 is moved in the same direction to force the rod 4 to move across the cutting edge 14 of the fixed cutting punch 11, whereby the upper end portion of the rod 4 which projects out of the hole 16 is sliced off into a coupling element blank 2 (Figure 8). The rod 4 is fed stepwise upwardly so that it projects from the cutting edge 27 of the cutting die 10 by a length *h* (Figure 7) at a time in order that the sliced coupling element blank 2 will have a thickness equal to the length *h*.

With continued backward movement of the ram, the sliced coupling element 2 slides on the horizontal upper surface 36 of the forming die 12, as shown in Figure 8, until the coupling head forming recess 28 is vertically aligned with both the sliced coupling element blank 2 and the forming punch 13 (Figure 9). During that time the rod is moved leftwardly and, at the end of the backward stroke of the ram 15, the rod 4 is forced, at a portion below the freshly cut end, against the nose 42 on the projection 18 of the cutting punch 11. The nose 42 bites into the base 5 of the rod 4. Thus a beveled surface 20 corresponding to the chamfering surface 21 has been formed on the base 5 of the rod 4 so that next to next coupling element blank 2 will have the chamfered base 5'. The preceding coupling element blank 2 had been provided at the base 5' with the same chamfered portion 21 in the same manner. The next coupling element blank 2 will have the chamfered portion 21 which had been formed on the previous backward stroke of the ram 15.

The forming punch 13 is lowered to press the coupling element blank 2 at the chamfered base 5' to thereby form the latter into a final coupling head 5" (Figures 7, 10, 13 and 14) having a projection 30 from the lower face and a coating socket 31 in the upper face at such a position that the beveled surface 20 is disposed around the socket 31. At that time the coupling element blank 2 is retained in the recess 28 by the presser 32 lowered together with the forming punch 13. Thus a complete coupling element 2' has been produced (Figures 7 and 10). Then, the forming punch 13 and the presser 32 are retracted up-

wardly and, at the same time, the ram 15 is moved forwardly from the retracted position (Figures 9 and 10) to the advanced position (Figures 7) in which the opposite legs 6, 6 of the coupling element blank 2 in the recess 28 are disposed astride the beaded edge 34 of the stringer tape 33.

Finally, the opposite legs 6, 6 of the coupling element blank 2 are clinched by the pair of pressing levers 35, 35 about the beaded edge 34 of the tape 33 which is held at rest between intermittent movements thereof.

Figure 11 is a fragmentary cross-sectional view showing a third embodiment similar to the embodiment of Figures 6 through 10, and the only difference therefrom is that the chamfered-portion forming means further includes an auxiliary chamfering surface 43 disposed below the chamfering surface 21 by a distance *h* (Figure 2) equal to the thickness of one coupling element. The auxiliary chamfering surface 43 comprises a beveled surface of a small nose 44. The nose 44 bites into the base 5 of the rod 4 when the latter is forced against the projections 18 of the cutting punch 11 at the end of backward stroke of the ram 15. Thus in addition to the beveled surface 20 corresponding to the chamfering surface 21, a beveled surface 45 corresponding to the auxiliary chamfering surface 43 is formed on the base 5 of the rod 4. The beveled surface 45 is disposed below the beveled surface 20 by the distance *h* equal to the thickness of one coupling elemeht 2' and hence facilitates the formation of the beveled surface 20 on the next backward stroke of the ram 15.

Claims

1. A method of manufacturing coupling elements (2') for a slide fastener (3), comprising the steps of: providing a rod (4) of metal of a generally y-shaped cross section having a base (5), as a prospective coupling head, and a pair of legs (6, 6) divergently extending from the base (5); feeding the rod (4) stepwise in a longitudinal direction; transversely slicing the rod (4) into a plurality of coupling element blanks (2) in timed relation to said stepwise feeding; placing the coupling element blanks (2), one at a time, in a coupling-head forming station away from the rod in a direction perpendicular to said longitudinal direction; and at the coupling-head forming station, forming the base 5' of each coupling element blank (2) into a final coupling head (5") of one coupling element (2') which head has a projection (30) from one face and a coacting socket (31) in the other face; characterized in: that said method comprises the further step of forming a chamfered portion (20) on the base (5) of the rod (4) prior to each coupling element blank (2) being sliced off from the rod (4) and then placed in the coupling-head forming station, each coupling element blank (2) thus having the chamfered base (5); and that the first-named forming step is effected in such a manner that the chamfered portion (20) is disposed around the socket (31).

2. A method according to claim 1, said slicing step and said placing step and said chamfered-portion forming step being performed in sequence on each stroke of relative movement of a coacting cutting die (10) and punch (11).

3. A method according to claim 2, said chamfered-portion forming step being performed at one end of each said stroke of the cutting die (10) and punch (11).

4. A method according to claim 1, said chamfered-portion forming being effected by cold pressing.

5. An apparatus for manufacturing coupling elements (2') for a slide fastener (3) from a rod (4) of metal of a generally Y-shaped cross-section having a base (5), as a prospective coupling head, and a pair of legs (6, 6) divergently extending from the base (5), said apparatus comprising: means (7, 8) for feeding the rod (4) in a longitudinal direction in regular steps of a predetermined distance (*h*) equal to the thickness of one coupling element (2'); a fixed cutting punch (11) having a cutting edge (14); a reciprocating ram (15) movable relatively to said cutting punch (11) perpendicularly to said longitudinal direction; a cutting die (10) carried by said ram (15) and having a hole (16) for the passage of the rod, said cutting die (10) being movable, in response to the reciprocating movement of said ram (15), across said cutting edge (14) of said cutting punch for transversely slicing the rod (4) into a plurality of coupling element blanks (2), one on each stroke of said ram (15); a forming die (12) carried by said ram (15) and movable, in response to the reciprocating movement of said ram (15), toward and away from said cutting edge (14) of said cutting punch (11) at one end of each stroke of said ram (15); and a forming punch (13) movable toward said forming die (12) for forming the base (5') of each coupling element blank (2) into a final coupling head (5") of one coupling element (2') which head has a projection (30) from one face and a coacting socket (31) in the other face; characterized in: that said fixed cutting punch (11) has a projection (18), said ram (15) having a channel (17) in which said projection (18) of said cutting punch (11) is slidably received and which communicates with said hole (16) at one end thereof; means (21), disposed on said projection (18) of said cutting punch (11), for forming a chamfered portion (20) on the base (5) of the rod (4) at one end of each stroke of said ram (15), each coupling element blank (2) thus having the chamfered base (5'); and that said forming die and punch (12, 13) are effective to form the socket (31) in such a manner that the chamfered portion (20) is disposed around the socket (31).

6. An apparatus according to claim 5, said chamfered-portion forming means including a chamfering surface (21) for being forced against the base (5) of the rod (4) at one end of each stroke of said ram (15).

7. An apparatus according to claim 6, said chamfering surface (21) being disposed at a first level immediately below said cutting edge (14) of

said cutting punch (11).

8. An apparatus according to claim 6, said chamfering surface (21) being disposed at a second level below said cutting edge (14) of said cutting punch (11) by a distance equal to *n* times the thickness of one coupling element (2'), where *n* represents a natural number.

9. An apparatus according to claim 8, said chamfered-portion forming means (21) including an auxiliary chamfering surface (43) disposed below said chamfering surface (21) by a distance *h* equal to the thickness of one coupling element (2').

Patentansprüche

1. Verfahren zur Herstellung von Kuppelgliedern (2') für einen Reißverschluß (3), bestehend aus folgenden Schritten: Bereitstellen eines Metallstabes (4) mit im allgemeinen Y-förmigem Querschnitt, der eine Basis (5) für einen zukünftigen Kuppelkopf und zwei von der Basis (5) divergierende Schenkel (6, 6) aufweist, schrittweises Zuführen des Stabes (4) in Längsrichtung, Querschneiden des Stabes (4) in zahlreiche Kuppelgliederrohlinge (2) in zeitlicher Abhängigkeit mit dem schrittweisen Vorschub, Anordnen jeweils eines Kuppelgliedrohlings (2) in einer Kuppelkopfformstation, die rechtwinklig zur Längsrichtung des Stabes im Abstand von diesem angeordnet ist, und Verformen der Basis (5') eines jeden Kuppelgliedrohlings (2) an der Kuppelkopfformstation in einen endgültigen Kuppelkopf (5') eines Kuppelglieds (2'), wobei der Kopf einen Vorsprung (30) auf einer Seite und eine entsprechende Vertiefung (31) auf der anderen Seite aufweist, dadurch gekennzeichnet, daß jedesmal, bevor ein Kuppelgliedrohling (2) von dem Stab (4) abgeschnitten und sodann in der Kuppelkopfformstation angeordnet wird, an der Basis (5) des Stabes (4) ein abgeschrägter Bereich (20) gebildet wird, so daß jeder Kuppelgliedrohling (2) eine abgeschrägte Basis (5) aufweist, und daß dieser Verformungsschritt derart ausgeführt wird, daß der abgeschrägte Bereich um die Vertiefung (31) herum angeordnet ist.

2. Verfahren nach Anspruch 1, daß die Schritte des Querschneidens des Stabes, des Anordnens des Kuppelgliedrohlings ind der Kuppelkopfformstation und des Ausbildens des abgeschrägten Bereichs in aufeinanderfolgender Reihenfolge bei jedem Hub der Relativbewegung eines Schneidgesenks (10) und eines mit diesem zusammenwirkenden Stempels (11) durchgeführt werden.

3. Verfahren nach Anspruch 2, dadurch gekennzeichnet, daß die Ausbildung des abgeschrägten Bereichs an einem Ende eines jeden Hubes des Schneidgesenks (10) und des Stempels (11) durchgeführt wird.

4. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Ausbildung der Schrägfläche durch Kaltpressen erfolgt.

5. Vorrichtung zur Herstellung von Kuppelgliedern (2') für einen Reißverschluß (3) aus einem Metallstab (4) mit im allgemeinen y-förmigem Querschnitt, der eine Basis (5) für den zukünftigen Kuppelkopf und zwei von der Basis (5) divergierende Schenkel (6, 6) aufweist, bestehend aus Mitteln (7, 8) zum Zuführen des Stabes (4) in Längsrichtung mit gleichmäßigen Schritten einer vorbestimmten Entfernung (h), die der Dicke eines Kuppelglieds (2') entspricht, einem ortsfesten Schneidwerkzeug (11) mit einer Schneidkante (14), einem rechtwinklig zur Längsrichtung gegenüber dem Schneidwerkzeug (11) hin- und herbeweglichen Stempel (15), einem von dem Stempel (15) getragenen Schneidgesenk (10), das eine Öffnung (16) für den Durchtritt des Stabes aufweist, wobei das Schneidgesenk (10) in Abhängigkeit von der hin- und hergehenden Bewegung des Stempels (15) quer zur Schneidkante (14) des Schneidwerkzeugs bewegbar ist, um bei jedem Hub des Stempels (15) den Stab (4) zur Bildung eines Kuppelgliedrohlings quer zu durchschneiden, einem von dem Stempel (15) getragene Formgesenk (12), das in Abhängigkeit von der hin- und hergehenden Bewegung des Stempels (15) an einem Ende eines jeden Hubes des Stempels (15) zur Schneidkante (14) des Schneidwerkzeugs (11) hin und von dieser weg bewegbar ist, und einem Formstempel (13), der zu dem Formgesenk (12) hin bewegbar ist, um die Basis (5) eines jeden Kuppelgliederrohlings (2) in einen fertigen Kuppelkopf (5") eines Kuppelglieds (2') umzuformen, wobein der Kuppelkopf einen Vorsprung (30) auf einer Seite und eine entsprechende Vertiefung (31) auf der anderen Seite aufweist, dadurch gekennzeichnet, daß das ortsfeste Schneidwerkzeug (11) einen Vorsprung (18) aufweist und daß der Stempel (15) einen Kanal (17) aufweist, in dem der Vorsprung (18) des Schneidwerkzeugs (11) verschiebbar angeordnet ist und der an einem Ende mit der Öffnung (16) in Verbindung steht, daß an dem Vorsprung (18) des Schneidwerkzeugs (11) Mittel (21) angeordnet sind, um am Ende eines jeden Hubes des Stempels (15) an der Basis (5) des Stabes (4) einen abgeschrägten Bereich (20) zu bilden, so daß jeder Kuppelgliedrohling (2) eine abgeschrägte Basis (5') aufweist, und daß das Formgesenk (12) und der Stempel (13) die Ausnehmung (31) derart ausbilden, daß der abgeschrägte Bereich (20) um die Ausnehmung (31) herum angeordnet ist.

6. Vorrichtung nach Anspruch 5, dadurch gekennzeichnet, daß die Mittel zur Ausbildung des abgeschrägten Bereichs (20) eine Abschrägfläche (21) umfassen, die am Ende eines jeden Hubes des Stempels (15) gegen die Basis (5) des Stabes (4) gepreßt wird.

7. Vorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß die Abschrägfläche auf einem ersten Niveau unmittelbar unter der Schneidkante (14) des Schneidwerkzeugs (11) angeordnet ist.

8. Vorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß die Abschrägfläche (21) auf einem zweiten Niveau in einem Abstand unter der Schneidkante (14) des Schneidwerkzeugs (11) angeordnet ist, der einem ganzzahligen Vielfachen der Dicke eines Kuppelgliedes (2') entspricht.

9. Vorrichtung nach Anspruch 8, dadurch gekennzeichnet, daß die den abgeschrägten Bereich (20) bildenden Mittel (21) eine Hilfsabschrägfläche (43) umfassen, die in einem der Dikke eines Kuppelglieds (2') entsprechenden Abstand (h) unter der Abschrägfläche (21) angeordnet ist.

Revendications

1. Un procédé de fabrication d'éléments d'accouplement (2') pour une fermeture à glissière (3), comprenant les phases consistant: à prendre une barre métallique (4) de section droite en forme de *y* dans son ensemble, comportant une base (5), en tant que future tête d'accouplement, et une paire de branches (6, 6) s'étendant de façon divergente depuis la base (5); à avancer la barre (4) pas à pas dans sa direction longitudinale; à trancher transversalement la barre (4) en une pluralité d'ébauches (2) d'éléments d'accouplement en synchronisme avec ledit avancement pas à pas; à placer les ébauches (2) d'élément d'accouplement, une par une dans un poste de formation de tête d'accouplement à l'écart de la barre dans une direction perpendiculaire à ladite direction longitudinale; et au poste de formation de tête d'accouplement, à transformer la base (5') de chaque ébauche (2) d'élément d'accouplement en une tête d'accouplement finale (5") d'un élément d'accouplement (2'), cette tête comportant une saillie (30) s'étendant à partir d'une des faces et un creux coopérant (31) dans l'autre face; caractérisé par le fait: que ledit procédé comprend la phase supplémentaire de formation d'une partie chanfreinée (20) sur la base (5) de la barre (4) avant que chaque ébauche (2) d'élément d'accouplement soit séparée par tranchage de la barre (4) puis placée dans le poste de formation de tête d'accouplement, chaque ébauche (2) d'élément d'accouplement comportant de ce fait la base chanfreinée (5); et que ladite phase de formation mentionnée en premier est effectuée de manière que la partie chanfreinée (20) soit disposée autour du creux (31).

2. Un procédé selon la revendication 1. ladite, phase de tranchage et ladite phase de mise en place ainsi que ladite phase de formation de partie chanfreinée étant effectuées de façon successive lors de chaque course relative d'une matrice (10) et d'un poinçon (11) de découpage coopérants.

3. Un procédé selon la revendication 2, ladite phase de formation de partie chanfreinée étant effectuée à une des extrémités de chaque course précitée de la matrice (10) et du poinçon (11) de découpage.

4. Un procédé selon la revendication 1, ladite formation de partie chanfreinée étant effectuée par pressage à froid.

5. Un appareil pour fabriquer des éléments d'accouplement (2') pour une fermeture à glissière (3) à partir d'une barre (4) de métal d'une section droite en forme de *Y* dans son ensemble, comportant une base (5), en tant que future tête d'accouplement, et une pair de branches (6, 6) s'étendant de façon divergente depuis la base (5), ledit appareil comprenant: un moyen (7, 8) pour avancer la barre (4) dans une direction longitudinale par pas réguliers d'une distance prédéterminée (*h*) égale à l'épaisseur d'un élément d'accouplement (2'); un poinçon de découpage fixe (11) comportant une arête coupante (14); un piston plongeur (15) un mouvement de va et vient pouvant être déplacé par rapport audit poinçon de découpage (11) perpendiculairement à ladite direction longitudinale; une matrice de découpage (10) supportée par ledit piston plongeur (15) et comportant un trou (16) pour le passage de la barre, ladite matrice de découpage (10) pouvant être déplacée, en réponse au déplacement de va et vient dudit piston plongeur (15), en travers de ladite arête coupante (14) dudit poinçon de découpage pour trancher transversalement la barre (4) en une pluralité d'ébauches (2) d'éléments d'accouplement, à raison d'une ébauche lors de chaque course dudit piston plongeur (15); une matrice de formage (12) supportée par ledit piston (15) et pouvant être déplacée, en réponse au déplacement de va et vient du piston plongeur (15) de manière à se rapprocher et à s'éloigner de ladite arête coupante (14) dudit poinçon de découpage (11) à une des extrémités de chaque course dudit piston plongeur (15); et un poinçon de formage (13) pouvant être déplacé en direction de ladite matrice de formage (12) pour transformer la base (5) de chaque ébauche (2) d'élément d'accouplement en une tête d'accouplement final (5") d'un élément d'accouplement (2'), cette tête comportant une saillie (30) s'étendant à partir d'une des faces et un creux coopérant (31) dans l'autre face; caractérisé par le fait: que ledit poinçon de découpage fixe (11) comprend une saillie (18), ledit piston plongeur (15) comportant une rainure (17) dans laquelle ladite saillie (18) dudit poinçon de découpage (11) est logée de façon coulissante et qui communique avec ledit trou (16) se trouvant à une des extrémités de ce dernier; un moyen (21), disposé sur ladite saillie (18) dudit poinçon de découpage (11) pour former une partie chanfreinée (20) sur la base (5) de la barre (4) à une des extrémités de chaque course dudit piston plongeur (15), chaque ébauche (2) d'élément d'accouplement comportant de ce fait la base chanfreinée (5'); et que les matrice et poinçon de formage précités (12, 13) ont pour effet de former le creux (31) de manière telle que la partie chanfreinée (20) se trouve autour du creux (31);

6. Un appareil selon la revendication 5, ledit moyen de formation de partie chanfreinée comprenant une surface de chanfreinage (21) destinée à venir porter avec force contre la base (5) de la barre (4) à une des extrémités de chaque course dudit piston plongeur (15).

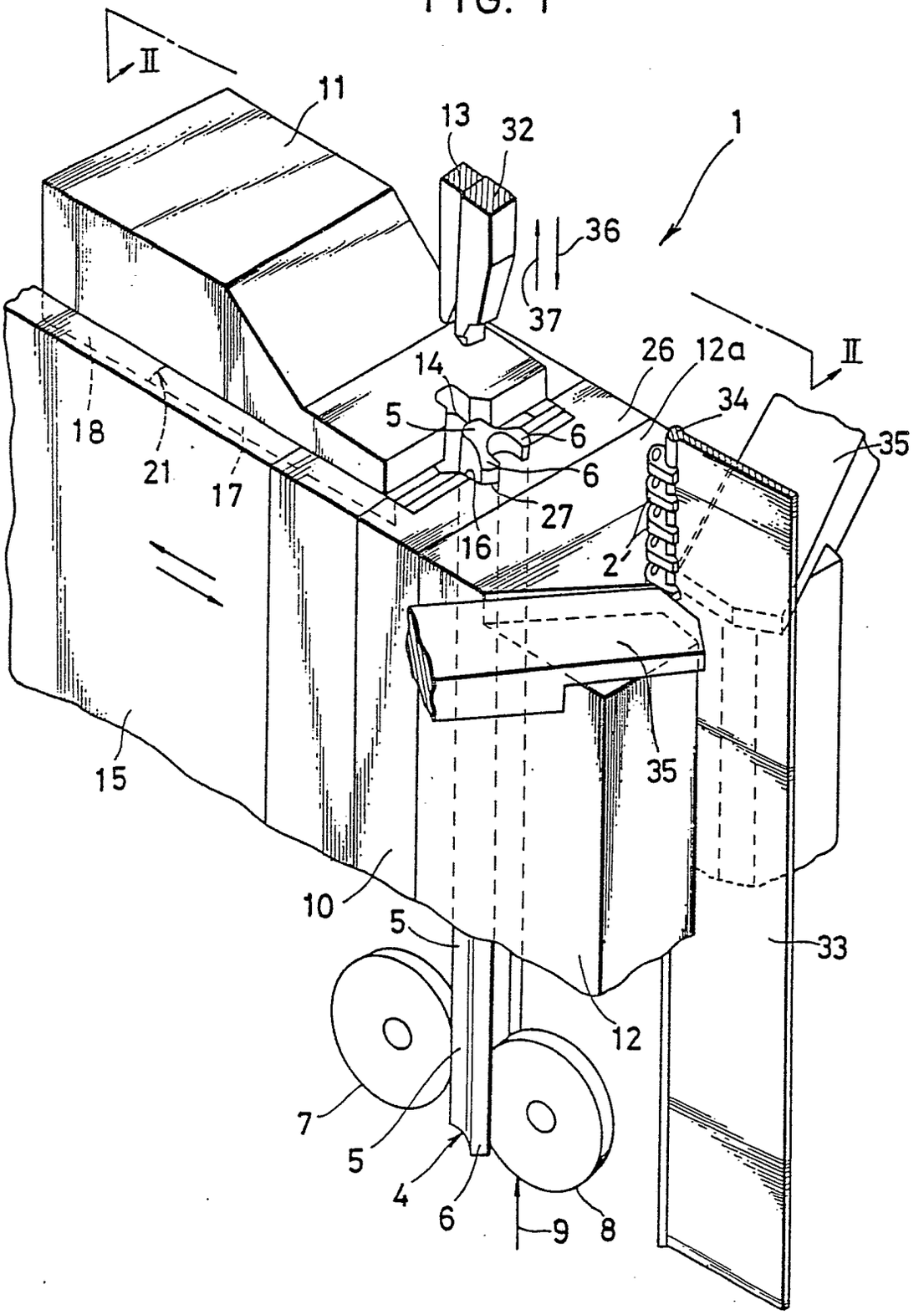
7. Un appareil selon la revendication 6, ladite surface de chanfreinage (21) étant disposée à un premier niveau immédiatement en dessous de ladite arête tranchante (14) dudit poinçon de découpage (11).

8. Un appareil selon la revendication 6, ladite

surface de chanfreinage (21) étant disposée à un second niveau en dessous de ladite arête tranchante (14) dudit poinçon de découpage (11) d'une distance égale à *n* fois l'épaisseur d'un élément d'accouplement (2'), où *n* représente un nombre naturel.

9. Un appareil selon la revendication 8, ledit moyen (21) de formation de partie chanfreinée comprenant une surface de chanfreinage auxiliaire (43) disposée en dessous de ladite surface de chanfreinage (21) à une distance *h* égale à l'épaisseur d'un élément d'accouplement (2').

FIG. 1


II
11
13
32
1
36
37
26
12a
II
14
34
5
6
35
18
21
17
6
27
16
2
15
35
10
5
33
12
7
5
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9
8

FIG. 2

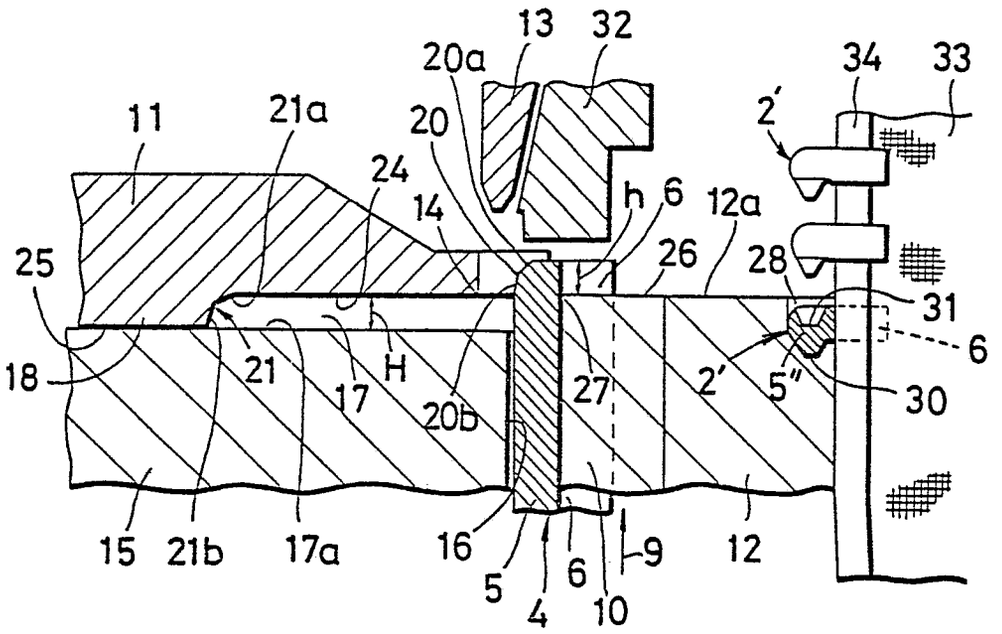
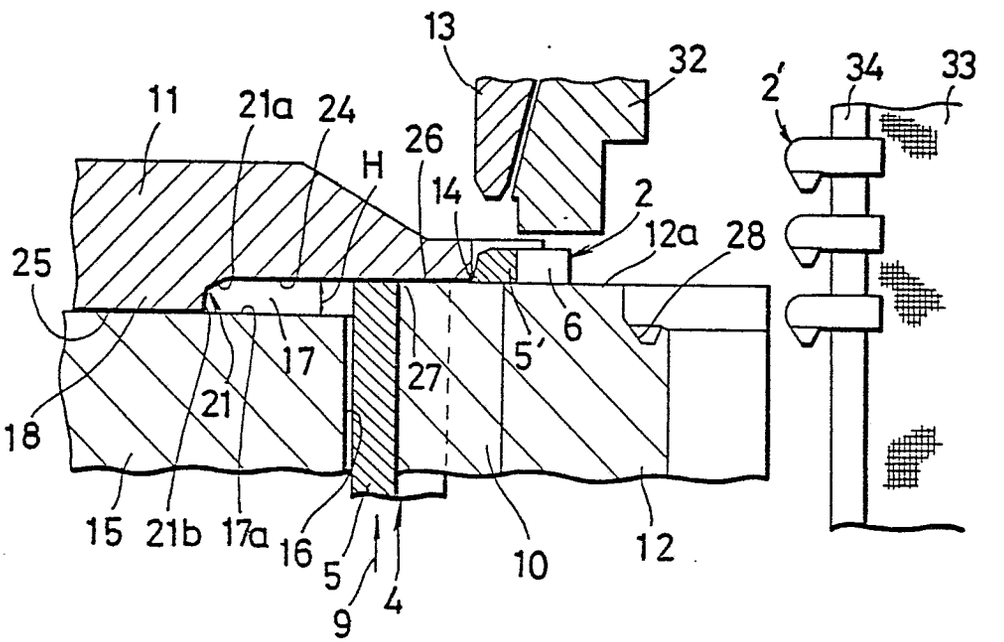

13
32
20a
34
33
11
21a
20
2'
24
14
h
6
12a
25
26
28
31
6
18
21
17
H
20b
27
2'
5"
30
15
21b
17a
16
5
4
6
9
10
12

FIG. 3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32
2'
34
33
11
21a
24
26
H
14
2
12a
28
25
6
5'
17
27
21
18
15
21b
17a
16
5
9
4
10
12

FIG. 4

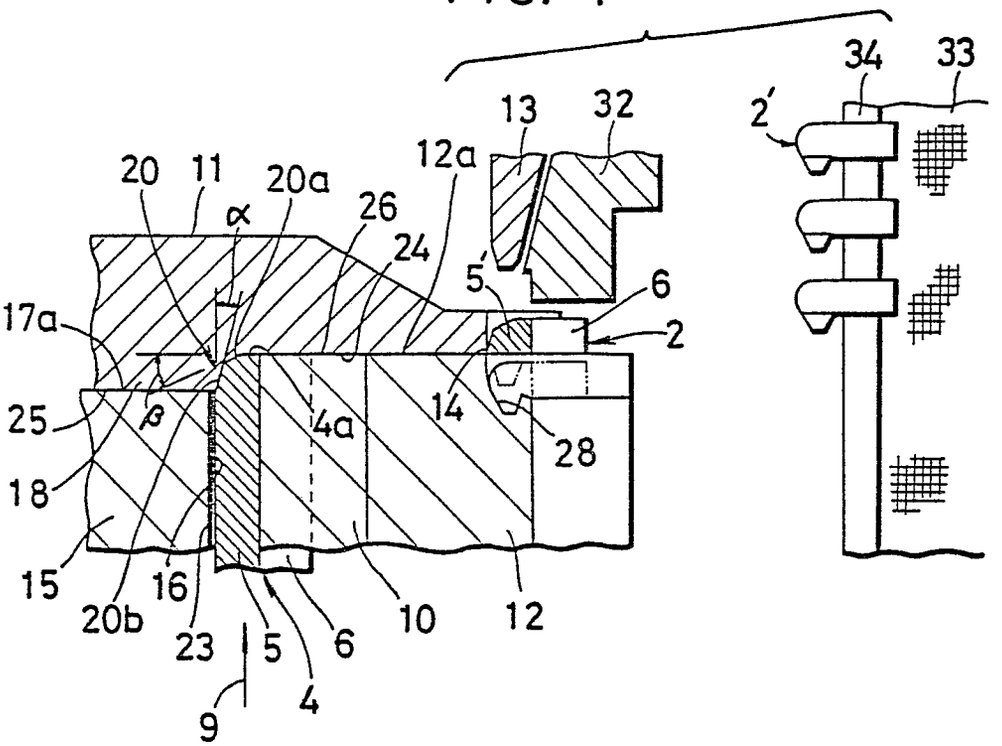

34
33
2'
13
32
12a
20
11
20a
α
26
24
5'
6
2
17a
25
β
4a
14
28
18
15
16
20b
23
5
6
10
12
9
4

FIG. 5

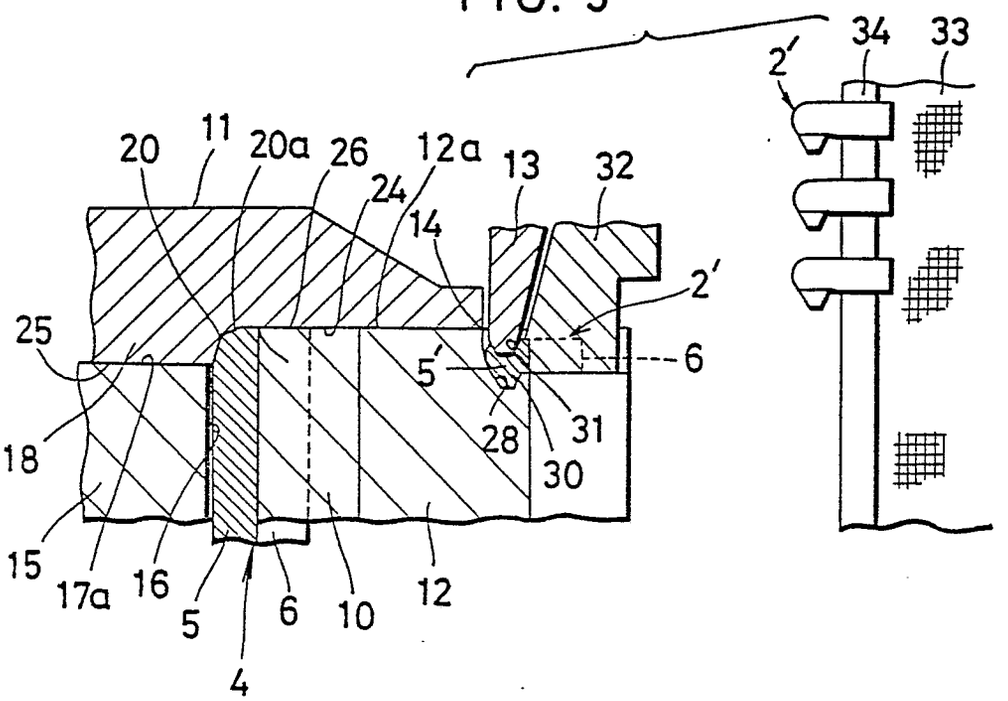
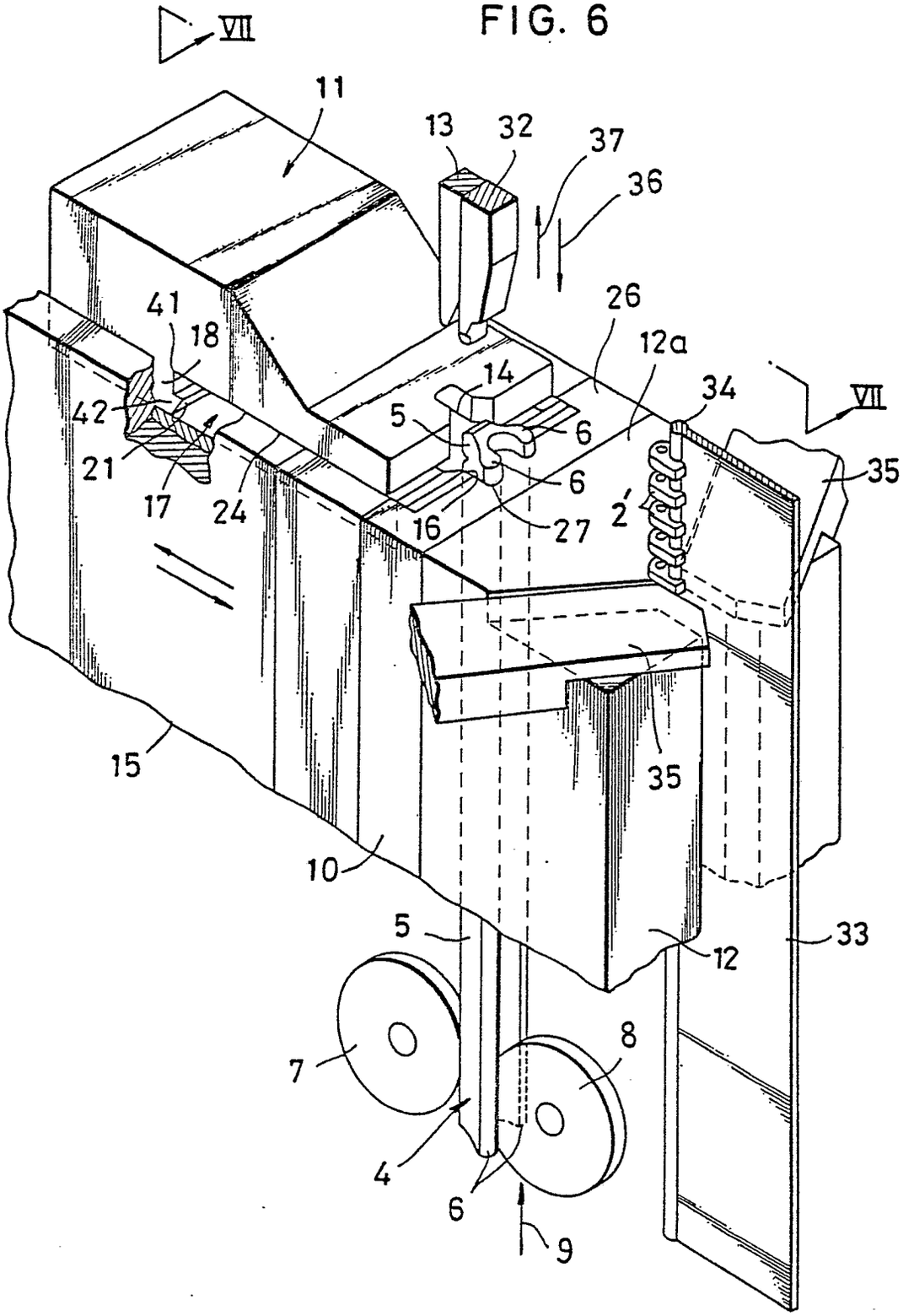

34
33
2'
20
11
20a
26
12a
13
32
24
14
2'
25
5'
6
18
28
31
30
15
17a
16
5
6
10
12
4

FIG. 6


VII
11
13
32
37
36
41
18
26
12a
14
34
VII
42
5
6
35
21
6
2'
17
24
16
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15
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10
5
33
12
7
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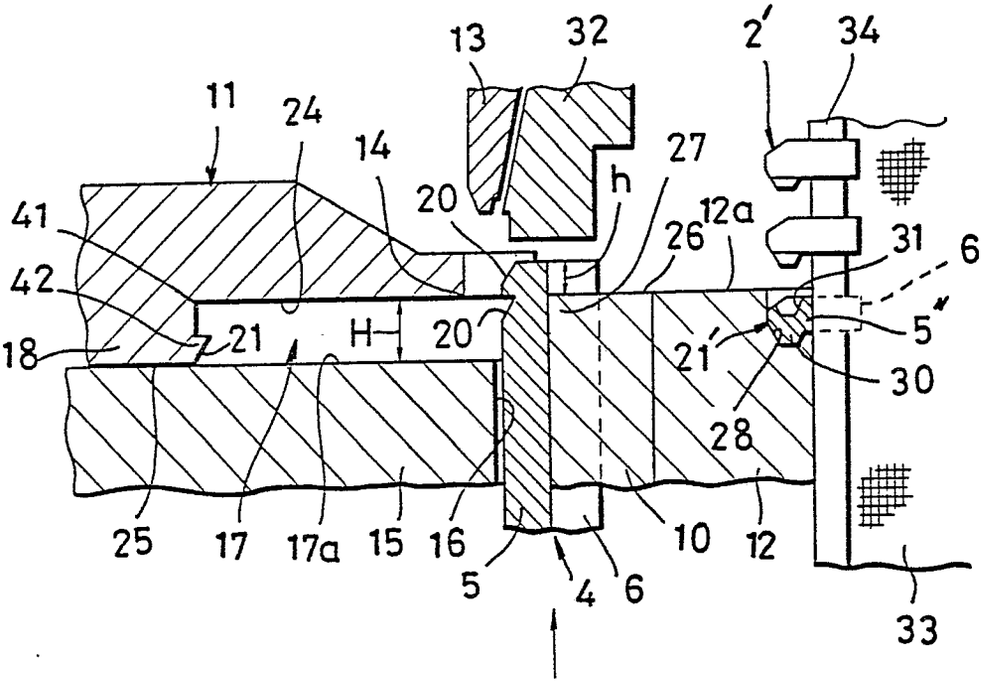
4
6
9

FIG. 7


13
32
2'
34
11
24
14
27
h
20
41
26
12a
31
6
42
21
H
20
5
18
21'
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28
25
17
17a
15
16
5
4
6
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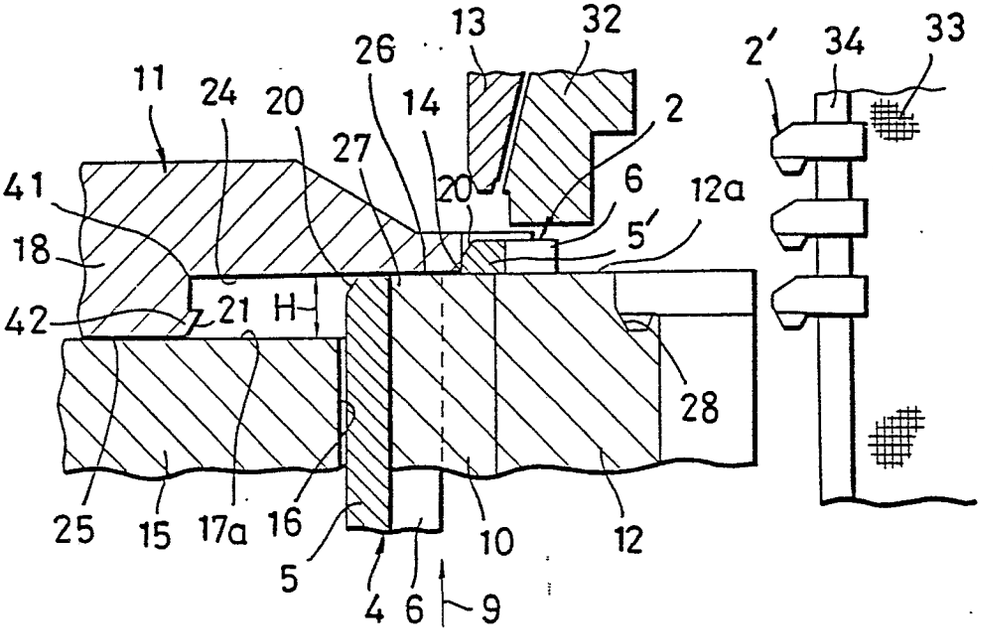
12
33

FIG. 8


13
32
26
2'
34
33
11
24
20
14
2
27
41
20
6
12a
5'
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42
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H
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17a
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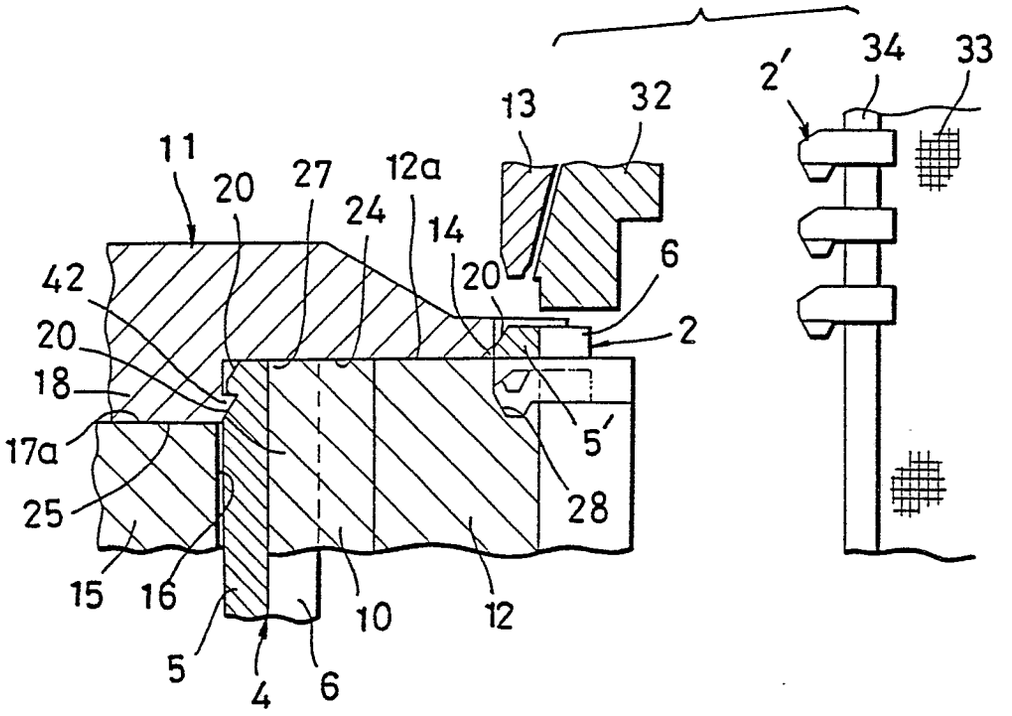
FIG. 9


2'
34
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27
12a
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17a
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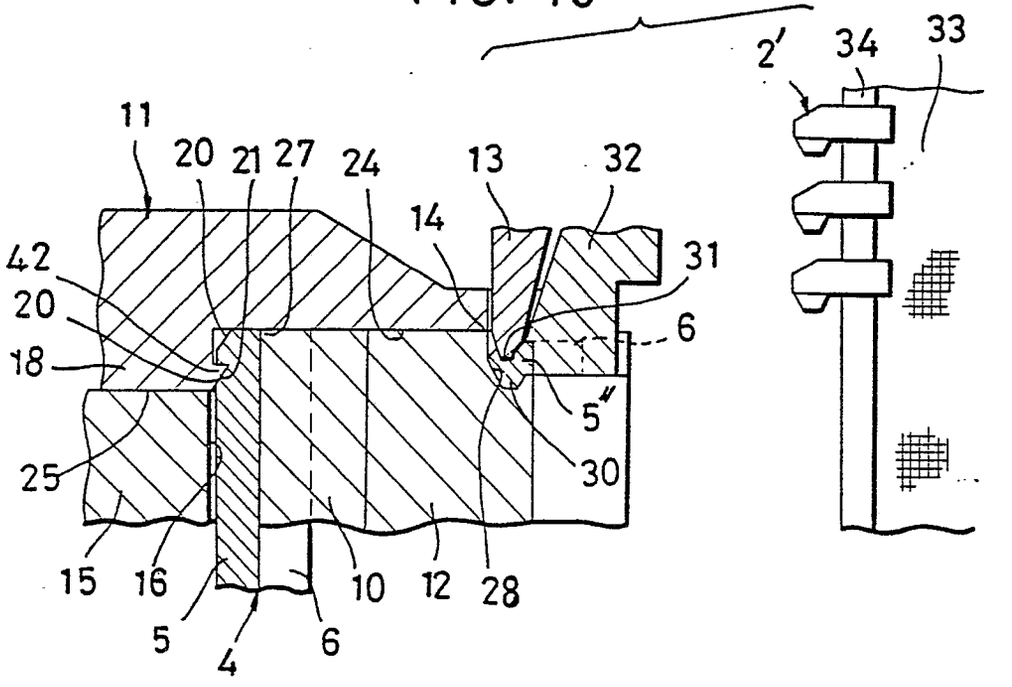
6

FIG. 10


2'
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6

FIG. 11

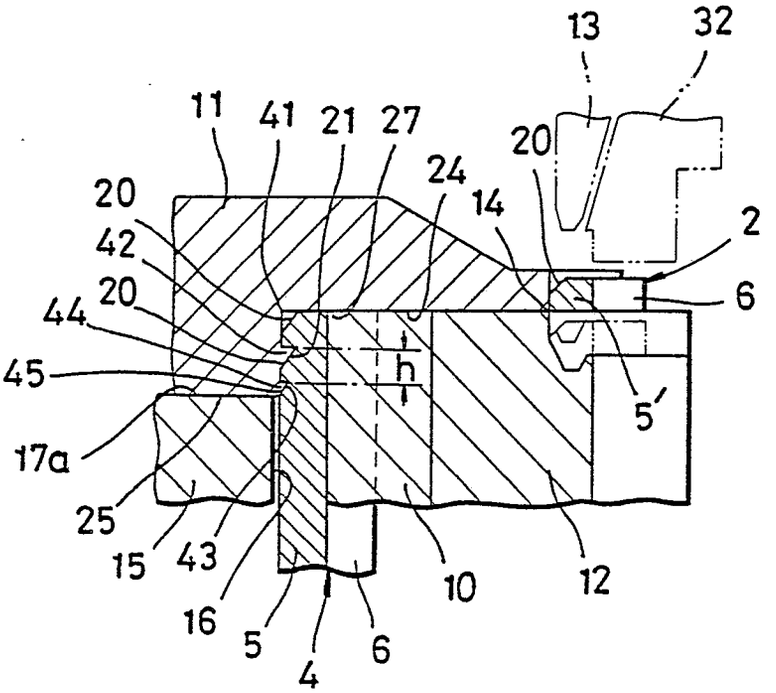
13
32
11
41
21
27
20
24
14
20
2
42
20
6
44
45
h
5'
17a
25
15
43
16
5
4
6
10
12

FIG. 12

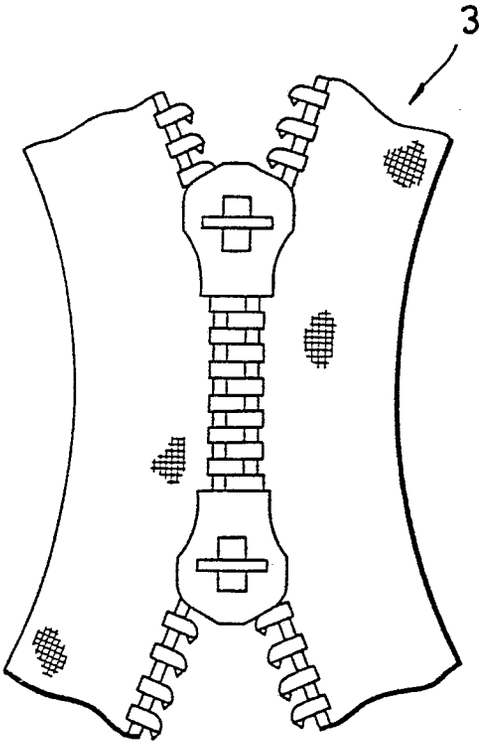

FIG. 13

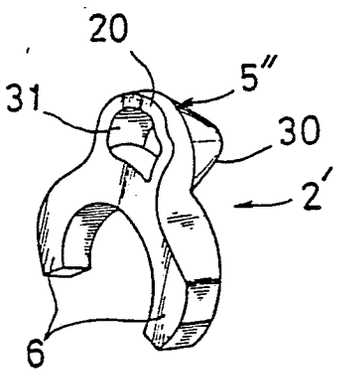

FIG. 14