(54) Gripper means for stretcher leveller apparatus
Greifmittel für eine Streckrichtmaschine
Moyen de préhension pour une dresseuse à tension

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Description

This invention relates to a gripper element for use with a stretcher leveller apparatus. More specifically, the present invention relates to a gripping element for a stretcher leveller apparatus which eliminates or reduces surface disfigurement of the metal being stretched.

The two primary methods of providing straight or flattened steel strip or sheet are roller levelling and stretcher levelling. Roller levelling is typically performed in a rolling machine consisting of two sets of rolls. A top and bottom set of several small diameter horizontal rolls each are mounted in a housing so that the associated top and bottom rolls are offset from each other. A steel sheet or strip passing through the leveller is flexed up and down alternately between the offset rolls such that the amount of flexing decreases as the sheet travels toward the exit end of the roller leveller. The rolls nearest the exit end are designed to perform the basic straightening operation. The advantage of roller levelling is that long lengths of sheets or strip may be levelled or flattened with minimum surface disfigurement. However, roller levelling does not impart the same degree of flatness to the sheet as a pair of opposing jaws actuated by hydraulic or pneumatic means.

Typically, sheet or strip is elongated between one and three percent so that the elastic limit of the steel is exceeded to produce permanent elongation. There are numerous types of stretcher leveller apparatuses including those which can handle large coils of rolled strip. However, in all stretcher levellers the jaws of the apparatus include gripping means to grip securely the opposing ends of the sheet which is to be stretched. These gripper means typically comprise a flat elongated engagement member having a length slightly greater than the width of the sheet or strip to be stretched. The surface of the engagement member which is adapted to engage or grip the surface of the sheet or strip to hold it against movement during elongation is very rough, normally grooved, knurled or serrated. Consequently, in virtually all such stretcher leveller apparatuses the gripper means bite into the metal and disfigure the surface of the sheet. Traditionally, the disfigured portion of the sheet or strip is marked and subsequently cut off as scrap. For example, in a coil 647.7 metres (2,125 feet) in length, approximately 411.5 cm (162 inches) are lost in scrap.

The disfigurement of the metal results in substantial economic loss because that metal is normally discarded as waste. Moreover, when coils of rolled strips are stretched in sequential stretching, the gripper disfigurement marks must be indicated and cut from the coil. Thus, the maximum length of the strip or sheet which could be levelled is the distance between the grippers.

United States Patent No. 4,982,593 discloses a stretcher leveller apparatus having an element for gripping metal which does not disfigure the metal. The element has a single gripping surface comprised of high density cast polyurethane, which can grip the metal without slipping. United States Patent No. 5,077,887 (nearest state of the art) discloses a method of making a stretcher leveller gripping element wherein polyurethane is cast in situ onto a steel support surface, to form a gripping pad which is permanently bonded to the support surface.

French Patent No. 1260726 discloses the use of both sides of a gripping member (which sides have the same properties) in order to use the gripping member economically.

One aspect of the invention provides an element for gripping metal to be stretched by a stretcher leveller apparatus, the element comprising a first high density cast polyurethane gripping pad adapted for engagement with the metal to be stretched; characterized in that the element also includes:

- a second high density cast polyurethane gripping pad adapted for engagement with the metal to be stretched; and
- a support member to which the first and second gripping pads are chemically bonded, said support member being detachably mountable with respect to the stretcher leveller apparatus either in a first orientation in which the first pad is positioned for engagement with the metal to be stretched or in a second orientation in which the second pad is positioned for engagement with the metal to be stretched, the support member having ends through which the support member is connectible to the stretcher leveller apparatus, the pads being disposed between those ends.

Preferably, the pads form hydrogen bonds with the support member.

Preferably, the support member is a plate having a first support surface upon which the first gripping pad is anchored, and a second support surface upon which the second gripping pad is anchored. The support surfaces are disposed on opposite sides of the plate and in a parallel relationship. The gripping pads are preferably cast in situ on the support means to form a chemical bond therewith. Preferably, at least one threaded hole is disposed at either end of the support member for allowing attachment to the stretcher leveller apparatus with threaded fasteners.

Another aspect of the present invention provides a gripping element for gripping metal to be stretched by a stretcher leveller apparatus, which comprises a high density cast polyurethane gripping pad adapted for engagement with the metal to be stretched: characterized in that it includes:

- an essentially rectangular support plate having a first planar support surface upon which the gripping pad is chem-
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ically bonded, and also having a second planar support surface parallel to the first planar support surface, said plate having ends through which the support plate is connected to the stretcher leveller apparatus, said pad being disposed between said ends.

Preferably, the element also includes a second high density cast polyurethane gripping pad adapted for engagement with the metal to be stretched, said second pad being chemically bonded to the second planar support surface of the support plate, the second pad being disposed between the ends.

A further aspect of the present invention provides a method for producing a stretcher leveller gripping element, characterized by the steps of:

- providing a rectangular support plate having a first support surface; and a second support surface opposing the first support surface;
- pouring polyurethane material onto the first support surface;
- allowing the polyurethane material to solidify on the first support surface such that it chemically bonds thereto, thereby forming a first polyurethane gripping pad on the support plate whereby in use the polyurethane gripping pad acts to grip the metal being stretcher levelled within the stretcher leveller apparatus;
- pouring polyurethane material onto the second support surface; and
- allowing the polyurethane material to solidify on the second support surface such that it chemically bonds thereto, thereby forming a second polyurethane gripping pad on the support plate whereby in use the second polyurethane gripping pad acts to grip the metal being stretcher levelled within the stretcher leveller apparatus, the support plate having ends through which it is connectible to the stretcher leveller apparatus, the pads being disposed between those ends.

Preferably the first and second gripping pads have chamfered corners.

Preferably the gripping pad has chamfered corners.

Preferably the first and second gripping pads have a continuous surface with no holes.

Preferably the gripping pad has a continuous surface with no holes.

It can be appreciated that the present invention provides an improved gripper element which can be quickly replaced and withstand greater forces than heretofore known, and yet can be used without damaging the gripped regions of the metal being stretched.

For a better understanding of the present invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

Figures 1a-1c are schematic representations showing top, front and side views respectively of one embodiment of an element for gripping metal, in accordance with the present invention;

Figure 2 is a schematic representation of the gripping element of Figure 1 in relation to a stretcher leveller apparatus;

Figure 3 is a schematic representation showing an alternative embodiment of an element for gripping metal.

Referring now to the drawings wherein like reference numerals refer to similar or identical parts throughout the several views, and more specifically to figures 1a-1c thereof, there is shown an element 100 for gripping metal to be stretched by a stretcher leveller apparatus. The element 100 is double-sided so that when one gripping surface wears out, it is necessary only to flip the gripping element 100 over to expose a new gripping surface to the metal coil. The metal to be stretched can include steel, titanium, aluminum, alloys of various metals, etc., to name but a Few of the many metals that can be stretched. Essentially, any material that has a modulus of elasticity could be considered for flattening using element 100 in a stretcher leveler. The metal to be stretched is preferably no thicker than 1/2 inch with respect to coil. Greater thickness sheets could be stretched but would not be in coil form.

The gripping element 100 is comprised of a first high density cast polyurethane gripping surface or pad 102 adapted for engagement with the metal coil 20 to be stretched and a second high density cast polyurethane gripping surface or pad 104 adapted for engagement with the metal coil 20 to be stretched. There is also a common support member 106 upon which the first and second gripping pads 102 and 104 are chemically bonded. The support member 106 is adapted to be detachably mounted to the stretcher leveler apparatus either in a first orientation in which the first pad 102 faces the metal coil 20 or a second orientation in which the second pad 104 faces the metal coil. Preferably, the first and second gripping pads 102 and 104 have chamfered corners.

In one embodiment, the support member 106 is an essentially rectangular plate of tempered carbon steel, such as 4140 carbon steel, which has a first support surface 108 and a second support surface 110 upon which the first and second gripping pads 102, 104 are chemically bonded, respectively. Support member 106 can be made of any steel that is tempered enough to eliminate any deformation of the support member 106 during the stretching operation. The
metal to be stretched must be forced to conform to the flatness of the support member 106 to insure full contact there- with. If the member 106 is not made from a material with sufficient strength to insure this, the member 106 must be removed from service and reworked. The full contact also insures nonslippage between the metal to be stretched and the pad 102, 104 by providing the largest surface area possible with respect to friction.

Preferably, the gripping pads 102 and 104 can be chemically bonded to their respective support surface 108, 110 by casting molten polyurethane directly onto the support surfaces 108, 110 to form hydrogen bonds between the gripping pads 102, 104 and their respective support surface 108, 110.

As shown in figures 1a-1c, each gripping element 100 is attached to the stretcher leveler through two holes 114 disposed at either end of the gripping element 100. Each hole 114 has an axis that is perpendicular to the plane of the gripping element. Preferably, each hole 114 is 1.43 cm (9/16 inch) diameter and is 5.08 cm (2 inches) from the closest end 111 of the element 100. Two screws 117 are inserted through the holes 114 and screwed directly into a mounting plate 115 (see figure 2) of the stretcher leveler apparatus. Alternatively, two threaded holes having an axis essentially parallel to the plane of the support member 106 (not shown) can be provided at either end 111 of the support member 106. In this embodiment, screws are threaded directly into the support member 106 to attach it to the stretcher leveler apparatus.

As shown in figure 3, there is shown a preferred embodiment of element 200 for gripping metal to be stretched in a stretcher leveler apparatus 10 which specifically defines a rectangular support plate having at least one gripping pad. The element 200 has a high density cast polyurethane gripping pad 202 for engagement with the metal to be stretched and an essentially rectangular support plate 204 having a first planar surface 206 upon which the gripping pad 202 is chemically bonded. The gripping pad 202 can have a durometer of 85 to 100 and preferably 90-95. Too soft a durometer and too thick of a pad 202 results in the pad 202 being torn during the stretching process. Also, too soft a durometer results in the shape of the support plate being imprinted on the metal being stretched. Preferably, the support member 204 also has a second planar surface 208 disposed opposite to said first surface 206 to which a second high density cast gripping pad is chemically bonded.

The gripping element 200 is adapted for placing within a rectangular recess 210 of a mounting plate 212 of the stretcher leveler apparatus 10. If the gripping element 200 has two polyurethane gripping pads, one of the gripping pads is disposed within the recess 210 while the other gripping pad is used to stretch metal. The gripping element 200 has a hole disposed at either end for allowing it to be removably attached within the recess 210 with screws. The gripping element 200 can be between 61 and 254 cm (24 and 100) inches long and preferably is 132 cm (52 inches) long, and can be between 20.3 and 50.8 cm (8 and 20 inches) in width and is preferably 31.8 cm (12.5 inch) in width as shown as reference character A in figure 3. The gripping element 200 length is not critical so long as its working surface length exceeds the width of the metal being stretched. The dimension of the width of the element 200 is determined by the metal being stretched, and is dictated by the thickness and modulus of elasticity of the metal being stretched. The success of the invention is determined by friction and the face width of the element 200 being wide enough to eliminate slippage of the pad 202 over the metal during stretcher leveling. Preferably, the support member 204 has a thickness of 0.32 to 6.35 cm (0.125 to 2.5 inches) and preferably 3.18 cm (1.25 inch) as shown as reference character B. Preferably, the thickness of the gripping pad 202 is between 0.32 and 2.54 cm (1/8 and 1 inch) and preferably is 0.64 cm (0.25 inch) as shown as reference character C in figure 3. The element 200 thickness can vary depending on the forces involved with the product being processed. The gripping element 200 of the preferred embodiment can support in excess of 544,308 kg (600 tons) of force applied to it to stretch the metal. Essentially, the constraints identified with respect to the gripping element 100 is also applicable to gripping element 200.

The present invention is also a method for producing a stretcher leveler gripping element. The method includes the step of providing a rectangular support plate having a first support surface. Then, there is the step of pouring polyurethane material onto the first support surface. Next, there is the step of allowing the polyurethane material to solidify on the first support surface such that it chemically bonds to it, thereby forming a first polyurethane gripping pad on the support plate so that the polyurethane gripping pad acts to grip the metal being stretched within the stretcher leveler apparatus. Preferably, before the pouring step, there is the step of applying adhesive to the support surface and the pouring step takes place in a vacuum.

In the operation of the invention, and as shown in figure 2, the stretcher leveler apparatus 10 is provided with access openings 112 at each end through which gripping element 100 is inserted. Each gripping element is 132 cm (52 inches) long and 31.8 cm (12.50 inches) wide and has two gripping pads 102 and 104 which were cast in situ onto the support member 106 to form a chemical bond therewith. The gripping pads 102 and 104 have a 0.64 cm (0.25 inch) thickness. The support member 106 has a thickness of 3.51 cm (1.38 inches). The gripping pads 102 and 104 are comprised of Adiprene®.

A particularly suitable polymeric material for forming the gripping pads is Adiprene 410 liquid resin. The liquid polymeric is poured upon the prepared carbon steel support member 106 and then is cured in situ to form one or two cast rigid gripping pads 102 and 104. It is preferable, however, to precoat the support member 106 with thixon (R) adhesive as a base, before the pour application of the preferred polyurethane resin. This will ensure the cast gripping surface's
adhesion to the support member 106, despite the massive shearing pressure that the gripping elements will undergo while up to 544308 kg (600 tons) of tensile stress are repetitively placed upon the extended coil length to achieve the conventional stretcher leveling process, required in selective steel sheet applications. As stated before, the tons of tensile stress applied to the metal being stretched is dependent upon the metal being stretched. Thus, greater than 544308 kg (600 tons) can be applied if necessary.

The casting, in situ, on the support member 26 preferably occurs in a vacuum or as close to a vacuum as possible. The method of casting is preferably accomplished by first evacuating a chamber having the support member 106. Then, the polymeric material is heated until it liquefies (93°C or 200°F for polyurethane) and poured on the support surface of the support member 106. The liquid polymeric material is allowed to solidify and form the gripping pad 102. During this entire operation, the chamber is evacuated to minimize the potential for bubbles forming in the gripping pad 102. Any bubbles in the gripping pad 102 could weaken the gripping pad 102 or allow the gripping element 100 to mar the metal being stretched along a deformity in the gripping pad 102 where a bubble has caused an opening in the surface. When completed, the element 100 is turned over and the same process is repeated to form the other pad 104.

A pair of gripping elements 100 are then inserted through each access opening 112. The pair of gripping elements 100 are then attached to the stretcher leveling apparatus with screws or locks through holes 114. For purpose of discussion, the gripping elements 100 are originally inserted in their first orientation with the first gripping pads 102 facing the metal to be stretched. The metal 20 is then stretched in accordance with the invention, until one or more of the gripping pads 102 wear out or a set time has passed. At this point, the advantage offered by the gripping elements 100 is readily apparent. Instead of replacing the gripping element 100 altogether, it is necessary only to turn each gripping element 100 over to its second orientation, such that the second, unused gripping pad 104 faces the metal 20. Preferably, all four gripping elements 100 (two per each side of the stretcher leveling) are turned at the same time. After turning, the stretcher leveling 10 can be operated for another period until the second gripping pads 104 of the gripping elements wear out or the set time has passed. After both pads 102 and 104 of the gripping element 100 are worn out, it is then necessary to replace the entire gripping element 100 with a new one, having two fresh pads 102, 104. Of course, if element 200 having only one gripping pad 202 is used, then the element 200 must be completely replaced when gripping pad 202 is worn down. Alternatively, the pad 202 can be remachined and reinserted.

The carbon steel support surface forms an effective gripper only when polyurethane elastomer is cast in situ on it because the support surface is composed of oxides and hydroxides of iron which can mechanically and hydrogen bond to the polyurethane elastomer. Moreover, when the thixon adhesive (403/404 type adhesive) is utilized (although it is not needed), hydrogen bonds are further created through the adhesive as well as through the fact that the thixon adhesive is a good wetting agent and easily flows into the grooves and irregular surfaces of the steel support surface. This facilitates the formation of hydrogen bonds between the polyurethane elastomer and the carbon steel support structure with the iron oxide and/or iron hydroxide bonds of steel. In addition, Vander Waals forces and other secondary bonding forces add considerably to the steel/adhesive bond.

When the molten polyurethane elastomer is cast in situ on the steel support surface, the adhesive sets and is able to chemically cross-link with the diisocyanates in the polyurethane by way of the adhesive's amine or active hydroxyl groups. Hydrogen bonding and other secondary bonding forces such as Vander Waals forces complete the tight bonding between the adhesive and the polyurethane coating. As it cures, the polyurethane elastomer hydrogen bonds and form secondary bonds to the steel support surface. Through use of the adhesive's excellent wetting properties there is formed a strong mechanical bond to the steel in the form of a lock and key effect. This three way bonding is useful because cast materials don't always bond well to steel alone.

With respect to the specific brand of polyurethane elastomer adiprene 410 liquid resin, it is made in three steps which are the following:

1. A basic intermediate is first prepared in the form of a low molecular weight polymer with hydroxyl end groups.

2. The basic intermediate, which is here designated "B" is then reacted with the aromatic disocyanate to give a pre-polymer.

![Chemical structure](attachment:chemical_structure.png)
3. The elastomer polyurethane is then vulcanized through the isocyanate groups by reactions with glycols. This leads to cross linkages like the disulfide cross linkages found in vulcanized rubber.

The polyurethane elastomer vulcanization sets up a tenuous network of primary chemical bond cross links which inhibit the irreversible flow characteristics of the molten state but permit the local freedom of motion of the polymer chains. This gives the polyurethane the elastic properties that are associated with typical rubbers. Thus, by vulcanization, the flow of the polyurethane elastomer is decreased, its tensile strength and modulus is increased and its extensibility is preserved.

Although vulcanized rubbers are very elastic, they do not exhibit the tensile strength, toughness, abrasion resistance and tear resistance of the elastic polyurethane. The abrasion resistance of both natural and SBR rubber can be improved at the 5-fold by proper reinforcement but the resilience of rubber decreases with the increasing load of filler. Tests show that reinforcing filler represents a compromise between adequate abrasion and tear resistance and abnormal heat build up.

The elastomer polyurethane is very important for another reason, it is the only coating that is able to be cast directly on the metal. This is because the irreversible flow characteristics of the molten state are inhibited by the primary chemical bond cross links introduced by vulcanization. For example, pure nylon (Nylon 6) as in Magner's patent-US.047,934 Bonding Nylon to Steel and polyethylene are semicrystalline solids at room temperature. These bunches of little crystals give mechanical stability at room temperature but do not preserve their dimensional stability above a certain temperature. If either is heated above their melting point they flow away from the steel. They also do not exhibit the same elasticity or abrasion resistance of polyurethane.

Claims

1. An element (100) for gripping metal (20) to be stretched by a stretcher leveller apparatus (10), the element (100) comprising a first high density cast polyurethane gripping pad (102) adapted for engagement with the metal (20) to be stretched; characterized in that the element (100) also includes:

   a second high density cast polyurethane gripping pad (104) adapted for engagement with the metal (20) to be stretched; and

   a support member (106) to which the first and second gripping pads (102,104) are chemically bonded, said support member (106) being detachably mountable with respect to the stretcher leveller apparatus (10) either in a first orientation in which the first pad (102) is positioned for engagement with the metal (20) to be stretched or in a second orientation in which the second pad (104) is positioned for engagement with the metal (20) to be stretched, the support member having ends through which the support member is connectible to the stretcher leveller apparatus, the pads being disposed between those ends.

2. An element (100) as claimed in claim 1, characterized in that the support member (106) is a plate having a first support surface (108) upon which the first gripping pad (102) is bonded and a second support surface (110) upon which the second gripping pad (104) is bonded, said support surfaces (108,110) being disposed on opposite sides of the plate and in a parallel relationship.

3. An element (100) as claimed in claim 2, characterized in that the gripping pads (102,104) are also adhesively bonded to their respective gripping surface (108,110).

4. An element (100) as claimed in claim 3 characterized in that the pads (102,104) form hydrogen bonds with the support member (106).

5. An element (100) as claimed in claim 4, characterized in that each gripping pad (102,104) is cast in situ on its respective support surface (108,110).

6. An element (100) as claimed in any preceding claim, characterized in that the support member (106) is comprised of tempered carbon steel.

7. An element (200) for gripping metal (20) to be stretched by a stretcher leveller apparatus (10), which comprises a high density cast polyurethane gripping pad (202) adapted for engagement with the metal (20) to be stretched: characterized in that it includes:

   an essentially rectangular support plate (204) having a first planar support surface (206) upon which the grip-
An element (200) as claimed in claim 7, characterized in that it also includes a second high density cast polyurethane gripping pad adapted for engagement with the metal (20) to be stretched, said second pad being chemically bonded to the second planar support surface (208) of the support plate (204), the second pad being disposed between the ends (111).

A method for producing a stretcher leveller gripping element (100), characterized by the steps of:

- providing a rectangular support plate (106) having a first support surface (108); and a second support surface (110) opposing the first support surface (108);
- pouring polyurethane material onto the first support surface (108);
- allowing the polyurethane material to solidify on the first support surface (108) such that it chemically bonds thereto, thereby forming a first polyurethane gripping pad (102) on the support plate (106) whereby in use the polyurethane gripping pad (102) acts to grip the metal (20) being stretcher levelled within the stretcher leveller apparatus (10);
- pouring polyurethane material onto the second support surface (110); and
- allowing the polyurethane material to solidify on the second support surface (110) such that it chemically bonds thereto, thereby forming a second polyurethane gripping pad (104) on the support plate (106) whereby in use the second polyurethane gripping pad (104) acts to grip the metal (20) being stretcher levelled within the stretcher leveller apparatus (10), the support plate (106) having ends through which it is connectible to the stretcher leveller apparatus, the pads (102 and 104) being disposed between those ends.

A method as claimed in claim 10, characterized by the fact that before the pouring step there is included the step of applying adhesive to said support surface.

A method as claimed in claim 10 or 11, characterized by the fact that the pouring step occurs essentially in a vacuum.

An element (100) as claimed in claim 1 characterized in that the first and second gripping pads (102, 104) have chamfered corners.

An element (200) as claimed in claim 7 characterized in that the gripping pad (202) has chamfered corners.

An element (100) as claimed in claim 1 characterized in that the first and second gripping pads (102, 104) have a continuous surface with no holes.

An element (200) as claimed in claim 7 characterized in that the gripping pad (202) has a continuous surface with no holes.

Patentansprüche

1. Element (100) zum Ergreifen von Metall (20), das von einer Streckziehvorrichtung (10) gestreckt werden soll, wobei das Element (100) ein erstes hochdichtetes geossenes Polyurethan-Greifpad (102) aufweist, das zum Angreifen dem zu streckenden Metall (20) geeignet ist; dadurch gekennzeichnet, daß das Element (100) ferner aufweist:

   ein zweites hochdichtetes geossenes Polyurethan-Greifpad (104), das zum Angreifen an dem zu streckenden Metall (20) geeignet ist; und

   ein Stützteil (106), mit dem das erste und das zweite Greifpad (102, 104) chemisch verbunden sind, wobei das Stützteil (106) in bezug auf die Streckziehvorrichtung (10) losbar entweder in einer ersten Ausrichtung, in der das erste Pad (102) zum Angreifen an dem zu streckenden Metall (20) positioniert ist, oder in einer zweiten Ausrichtung montierbar ist, in der das zweite Pad (104) zum Angreifen an dem zu streckenden Metall (20) posi-
tioniert ist, wobei das Stützteil Enden aufweist, durch die das Stützteil mit der Streckziehvorrückung verbindbar ist, und wobei die Pads zwischen diesen Enden angeordnet sind.

2. Element (100) nach Anspruch 1, dadurch gekennzeichnet, daß das Stützteil (106) eine Platte mit einer ersten Stützfläche (108), auf der das erste Greifpad (102) angebracht ist, und einer zweiten Stützfläche (110) ist, auf der das zweite Greifpad (104) angebracht ist, wobei die Stützflächen (108, 110) auf entgegengesetzten Seiten der Platte und parallel zueinander angeordnet sind.

3. Element (100) nach Anspruch 2, dadurch gekennzeichnet, daß die Greifpads (102, 104) ebenfalls haftend mit ihrer jeweiligen Greiffläche (108, 110) verbunden sind.

4. Element (100) nach Anspruch 3, dadurch gekennzeichnet, daß die Pads (102, 104) Wasserstoffbindungen mit dem Stützteil (106) bilden.

5. Element (100) nach Anspruch 4, dadurch gekennzeichnet, daß jedes Greifpad (102, 104) in situ auf die jeweilige Stützfläche (108, 110) gegossen ist.

6. Element (100) nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Stützteil (106) aus gehärtetem Kohlenstoffstahl besteht.

7. Element (200) zum Ergreifen von Metall (20), das von einer Streckziehvorrückung (10) gestreckt werden soll, wobei das Element (200) ein hochdichtig gegossenes Polyurethan-Greifpad (202) aufweist, das zum Angreifen an dem zu streckenden Metall (20) geeignet ist; dadurch gekennzeichnet, daß es ferner aufweist:

   eine im wesentlichen rechteckige Stützplatte (204) mit einer ersten planaren Stützfläche (206), an der das Greifpad (202) durch chemisches Verbonden angebracht ist, und ferner mit einer zweiten planaren Stützfläche (208), die zu der ersten planaren Stützfläche (206) parallel ist, wobei die Platte Enden (111) aufweist, durch welche die Stützplatte (204) mit der Streckziehvorrückung (10) verbunden ist, wobei das Pad (202) zwischen den Enden (111) angeordnet ist.

8. Element (200) nach Anspruch 7, dadurch gekennzeichnet, daß es ferner ein zweites ein hochdichtig gegossenes Polyurethan-Greifpad aufweist, das zum Angreifen an dem zu streckenden Metall (20) geeignet ist, wobei das zweite Greifpad durch chemisches Verbonden an der zweiten planaren Stützfläche (208) der Stützplatte (204) angebracht ist, wobei das zweite Pad zwischen den Enden (111) angeordnet ist.


10. Verfahren zum Herstellen eines Streckzieh-Greifelements (100), gekennzeichnet durch die folgenden Schritte:

    Bereitstellen einer rechteckigen Stützplatte (106) mit einer ersten Stützfläche (108) und einer der ersten Stützfläche (108) entgegengesetzten zweiten Stützfläche (110);

    Gießen von Polyurethanmaterial auf die erste Stützfläche (108);

    Verfestigenlassen des Polyurethanmaterials auf der ersten Stützfläche (108), derart, daß es chemisch damit verbunden ist, wodurch ein erstes Polyurethan-Greifpad (102) auf der Stützplatte (106) gebildet wird, und wodurch das Polyurethan-Greifpad (102) im Gebrauch das in der Streckziehvorrückung (10) streckgezogene Metall (20) ergreift;

    Gießen von Polyurethanmaterial auf die zweite Stützfläche (110); und

    Verfestigenlassen des Polyurethanmaterials auf der zweiten Stützfläche (110), derart, daß es chemische mit dieser verbunden ist, wodurch ein zweites Polyurethan-Greifpad (104) auf der Stützplatte (106) gebildet wird, und wodurch das Polyurethan-Greifpad (104) im Gebrauch das in der Streckziehvorrückung (10) streckgezogene Metall (20) ergreift, wobei die Stützplatte (106) Enden aufweist, durch die sie mit der Streckziehvorrückung verbindbar ist, wobei die Pads (102 und 104) zwischen diesen Enden angeordnet sind.


13. Element (100) nach Anspruch 1, dadurch gekennzeichnet, daß das erste und das zweite Greifpad (102, 104) abge- schrägte Ecken haben.


15. Element (100) nach Anspruch 1, dadurch gekennzeichnet, daß das erste und das zweite Greifpad (102, 104) eine durchgehende Fläche ohne Löcher aufweisen.

16. Element (200) nach Anspruch 7, dadurch gekennzeichnet, daß das Greifpad (202) eine durchgehende Fläche ohne Löcher aufweist.

Revendications

1. Élément (100) pour la préhension d’un métal (20) à étirer à l’aide d’un appareil à dresser par traction (10), cet élé- ment (100) comprenant un premier patin de préhension (102) en polyuréthane haute densité coulé, adapté pour venir en prise avec le métal (20) à étirer, caractérisé en ce que l’élément (100) comprend aussi:

une deuxième patin de préhension (104) en polyuréthane haute densité coulé, adapté pour venir en prise avec le métal (20) à étirer; et

un organe de support (106) auquel sont liés chimiquement les premier et deuxième patins de préhension (102, 104), ledit organe de support (106) pouvant être monté de façon amovible par rapport à l’appareil à dresser par traction (10) soit suivant une première orientation, dans laquelle le premier patin (102) est positionné de manière à venir en prise avec le métal (20) à étirer, soit suivant une deuxième orientation dans laquelle le deuxième patin (104) est positionné de manière à venir en prise avec le métal (20) à étirer, l’organe de support comportant des extrémités à l’aide desquelles l’organe de support peut être assemblé à l’appareil à dresser par traction, les patins étant disposés entre ces extrémités.

2. Élément (100) selon la revendication 1, caractérisé en ce que l’élément de support (106) est une plaque compor- tant une première surface de support (108) à laquelle le premier patin de préhension (102) est lié et une deuxième surface de support (110) à laquelle le deuxième patin de préhension (104) est lié, lesdites surfaces de support (108, 110) étant disposées de part et d’autre de la plaque et étant parallèle l’une à l’autre.

3. Élément (100) selon la revendication 2, caractérisé en ce que les patins de préhension (102, 104) sont aussi liés par un adhésif à leurs surfaces de préhension respectives (108, 110).

4. Élément (100) selon la revendication 3, caractérisé en ce que les patins (102, 104) forment des liaisons hydrogène avec l’organe de support (106).

5. Élément (100) selon la revendication 4, caractérisé en ce que chaque patin de préhension (102, 104) est coulé in situ sur sa surface de support respective (108, 110).

6. Élément (100) selon l’une quelconque des revendications précédentes, caractérisé en ce que l’organe de support (106) est constitué d’acier au carbone trempé.

7. Élément (200) destiné à la préhension d’un métal (20) à étirer à l’aide d’un appareil à dresser par traction (10), qui comprend un patin de préhension (202) en polyuréthane haute densité coulé, adapté pour venir en prise avec le métal (20) à étirer, caractérisé en ce qu’il comprend:

une plaque de support (204) essentiellement rectangulaire comportant une première surface de support plane (206) à laquelle le patin de préhension (202) est lié chimiquement, et comportant aussi une deuxième surface de support plane (208) parallèle à la première surface de support plane (206), ladite plaque comportant des extrémités (111) à l’aide desquelles la plaque de support (204) est assemblée à l’appareil à dresser par trac-
8. Élément (200) selon la revendication 7, caractérisé en ce qu'il comprend aussi un deuxième patin de préhension en polyuréthane haute densité coulé, adapté pour venir en prise avec le métal (20) à étirer, ledit deuxième patin étant lié chimiquement à la deuxième surface de support plane (208) de la plaque de support (204), le deuxième patin étant disposé entre les extrémités (111).

9. Élément (200) selon la revendication 7 ou 8, caractérisé par le fait que le patin (202) forme des liaisons hydrogène avec la plaque de support.

10. Procédé pour fabriquer un élément de préhension (100) d’appareil à dresser par traction, caractérisé par les étapes consistant à:

- prendre une plaque de support rectangulaire (106) comportant une première surface de support (108), et une deuxième surface de support (110) en face de la première surface de support (108);
- verser le polyuréthane sur la première surface de support (108);
- laisser le polyuréthane se solidifier sur la première surface de support (108) de telle sorte qu’il y soit lié chimiquement, en formant ainsi un premier patin de préhension (102) en polyuréthane sur la plaque de support (106), grâce à quoi, pendant l’utilisation, le patin de préhension (102) en polyuréthane agit de manière à agripper le métal (20) en cours de dressage par traction dans l’appareil à dresser par traction (10);
- verser le polyuréthane sur la deuxième surface de support (110) et laisser le polyuréthane se solidifier sur le deuxième surface de support (110) de telle sorte qu’il y soit lié chimiquement, en formant ainsi un deuxième patin de préhension (104) en polyuréthane sur la plaque de support (106), grâce à quoi, pendant l’utilisation, le deuxième patin de préhension (104) en polyuréthane agit de manière à agripper le métal (20) en cours de dressage par traction dans l’appareil à dresser par traction (10), la plaque de support (106) comportant des extrémités à l’aide desquelles elle peut être assemblée à l’appareil à dresser par traction (10), les patins (102 et 104) étant disposés entre ces extrémités.

11. Procédé selon la revendication 10, caractérisé par le fait qu’avant l’étape de versement est incluse l’étape d’application d’adhésif à ladite surface de support.

12. Procédé selon la revendication 10 ou 11, caractérisé par le fait que l’étape de versement a lieu essentiellement sous vide.

13. Élément (100) selon la revendication 1, caractérisé en ce que les premier et deuxième patins de préhension (102, 104) comportent des arêtes chanfreinées.

14. Élément (200) selon la revendication 7, caractérisé en ce que le patin de préhension (202) comporte des arêtes chanfreinées.

15. Élément (100) selon la revendication 1, caractérisé en ce que les premier et deuxième patins de préhension (102, 104) ont une surface continue sans aucun trou.

16. Élément (200) selon la revendication 7, caractérisé en ce que le patin de préhension (202) a une surface continue sans aucun trou.