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(54) **A machine for shaping boxes from a heat-weldable material**

Vorrichtung zum Formen von Behältern aus wärmeschweisbarem Material

Machine de façonnage de cartons d'un matériau thermosoudable

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**EP-A- 0 436 236**                      **GB-A- 900 118**  
**GB-A- 2 268 701**                      **US-A- 3 602 108**  
**US-A- 4 936 815**

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## Description

### OBJECT OF THE INVENTION.

**[0001]** This invention refers, as its title indicates, to a machine for shaping boxes from sheets or plates of heat-weldable material, whose configuration exactly corresponds to the development of the box or, in other words, with the unfolded box. This machine includes means for supply of the unfolded boxes, means of transport picking up the unfolded boxes from the supply unit, then locating them in a heating unit; means for immobilizing the unfolded boxes in the heating unit, a box former, a treader-former which introduces the unfolded box in the box former, hence obtaining the folding of its sides with respect to the base; means of pressing which determines the heat-welding of the opposite ends of the adjoining sides of the shaped box, previously heated in the heating unit and means to remove the shaped boxes by the machine.

### BACKGROUND OF THE INVENTION

**[0002]** At present, different types of machines are known for shaping boxes from die-cast sheets, generally of cardboard and having a series of movable items destined to fold said die-cast sheet to shape the box, this type of machine usually including means to apply adhesive products in those areas of the sheet to be joined, determining the adhesion of said areas for the shaped box to have a specific form.

**[0003]** EP-A-0 436 236 discloses a box forming machine substantially in accordance with the preamble of claim 1 of this patent. US-A-4 936 815 and GB-A-900 118 disclose further prior art machines.

### DESCRIPTION OF THE INVENTION

**[0004]** The invention relates to a machine in accordance with claim 1. Preferred embodiments are defined in the dependent claims.

**[0005]** According to the invention, the means of supplying the unfolded boxes can consist of a lifting platform, over which the unfolded boxes are piled; above said means of supply, the mentioned transport means are arranged, consisting of a horizontal motorized displacement carriage over which is assembled a pneumatic cylinder which vertically displaces an arm equipped with a pneumatically activated suction pad to hold the unfolded boxes from the supplier to the heating unit.

**[0006]** This heating unit includes coplanary plates, over which the transporter places the unfolded boxes, the latter being supported on the plates by means of which will be their sides, such that the box base arranged in said unit does not lean over any surface.

**[0007]** Some displaceable heaters are arranged in this heating unit which heat the opposite ends of the ad-

joining sides of the boxes by means of the projection over the same of hot air; these heaters are preferably equipped with nozzles defining a flat square-shaped outlet, through which the hot air emerges, permitting that each one of them simultaneously heats the opposite ends of two of the adjoining sides of the box to be shaped.

**[0008]** This heating will later allow the heat-welding of the ends of the adjoining sides of the box to be performed as it is made of heat-weldable material.

**[0009]** To prevent the unfolded box from being moved or warped during the mentioned heating, the invention foresees that the machine can include means of immobilization consisting of some treaders, activated by pneumatic cylinders assembled over an upper fixed bridge and which vertically pressed the sides of the unfolded box against the coplanary plates included in the heating unit.

**[0010]** According to the invention, the box former includes some side walls having a gap between them of dimensions slightly greater preferably than the size of the box to be shaped, said shaper being arranged at the lower area of the heating unit.

**[0011]** The walls of the box former have in their lower part some windows through which emerge, towards the central gap, some concealable stops preferably defining, as a whole, a coplanary surface, perpendicular to the walls of the shaper.

**[0012]** These concealable stops are preferably installed with the possibility of rotation over the back sides of the walls of the box former and those corresponding to each one of the walls are activated by a same pneumatic cylinder determining the arrangement in a hidden or protruding position with respect to the corresponding walls.

**[0013]** The side walls of the box former are preferably extended at their upper end in some diverging ramps destined to collaborate in the folding of the sides of the box with respect to its base.

**[0014]** The treader-former preferably includes two side walls joined together by a lower base of less length than the former and by two upper crossbars, fixed at their ends, the set defining the treader-former a width equal to the inside width of the box to be shaped.

**[0015]** This treader-former preferably includes between the side walls two bending wedges, arranged perpendicularly to the former and fixed to them with the possibility of rotation; said bending wedges being activated by two pneumatic cylinders arranged inside the treader-former and which arranges them in an open or closed position.

**[0016]** The bending wedges preferably have at their free end two chamfers set against each other which define a right-angled rim.

**[0017]** This treader-former is preferably fixed to a pneumatic cylinder obliging it to describe alternative vertical motions, passing from the upper area of the heating unit to the interior of the box former and viceversa; the

base of the treader-former is aligned vertically with the inner gap of the box former, such that on vertically descending, the base of the treader-former presses the base of the box, still unfolded, and introduces it in the box former, the ramps defined in its sides, determining the folding of the box, until it reaches a position perpendicular to its base, said perpendicular position being achieved when the box is totally introduced inside the box former. This limit position is determined by the contact of the base of the box against the concealable stops which during this operation are in a protruding position.

**[0018]** When the box reaches this limit position, the bending wedges are open and press to the lower edges of the box against the concealable stops arranged on two of the opposite sides of the box former, obliging the sides of the box to define a right angle with the base.

**[0019]** For the box to adopt this form definitely, the invention preferably contemplates that the machine includes in the corners of the former means of pressing, consisting of tightening clamps which, on gripping the opposite ends of the opposite sides of the adjoining sides of the shaped box, determine their heat-welding thanks to the heating previously made.

**[0020]** The gripping clamps are preferably provided with gripping devices having a length equal or slightly greater than the height of the boxes to be shaped, said gripping devices being able to have flat profiles or profiles with alternating recesses and salients.

**[0021]** Due to the fact that the gripping devices act over the hot box material, the invention considers the possibility that the box former have an internal conduit for cooling liquid to pass, said conduit defining in the gripping device an inlet and an outlet for connection thereof to the corresponding outside cooling circuit.

**[0022]** The opening and closing of the clamps is determined by some pneumatic cylinders which act over them.

**[0023]** According to the invention, the means of removing the boxes, once shaped and heat-welded, may consist of a motorized conveyor belt, arranged beneath the box former, the finished boxes falling over it due to the concealment of the concealable stops of the box former.

#### DESCRIPTION OF THE DRAWINGS

**[0024]** To aid the description of the invention being made and to permit a greater understanding of the characteristics of the invention, this specification is accompanied by a set of drawings which illustrate and do not limit it:

- Figure 1 shows a schematic view of the end elevation of the machine object of this invention, where, the box former has not been included so as to obtain greater clarity in the drawing.
- Figure 2 shows a schematic profile view of the unfolded box supplier.

5 - Figure 3 shows a profile view of the machine where the heating unit may be observed, together with two boxes arranged respectively in the shaping area where the box former is not shown and the other arranged over the means for removal.

- Figure 4 shows a plan view of the machine.

10 - Figure 5 shows a plan view of the machine, sectioned by a horizontal plane where the arrangement of the pressing means determining heat welding of the box may be observed.

15 - Figure 6 shows a detail of the box former and treader-former, vertically sectioned during the shaping of a box. Moreover, this view represents the plates supporting the unfolded boxes in the heating unit, determining the position of the box former in the whole machine.

#### PREFERRED EMBODIMENT OF THE INVENTION.

20 **[0025]** As may be observed in the mentioned figures, the machine object of this invention, presents means of supply of the unfolded boxes, consisting of a lifting platform (1), over which the unfolded boxes are piled (2).

25 **[0026]** On the platform (1), some means of transport of the unfolded boxes (2) are arranged consisting of a motorized carriage (3), permitting displacement in a horizontal direction, and over which, is installed a pneumatic cylinder (4) causing the vertical displacement of an arm (5) equipped a suction pad (6) activated pneumatically, and which hold the unfolded boxes (2) during their transport.

30 **[0027]** The carriage (3) picks up the boxes one by one from the platform (1) and transports them to the heating unit placing them on coplanary plates (7) where they are supported with what will be the sides of the box.

35 **[0028]** Moreover, this heating unit includes some heaters (8) that may be placed near or far away from the opposite ends of the adjoining sides of the box by the action by some lower cylinders (9).

40 **[0029]** The mission of these heaters (8) is to project hot air over the opposite ends of the adjoining sides of the unfolded boxes, being equipped with nozzles (10) defining a flat right angled outlet, which permits them to simultaneously heat said opposite ends of the adjoining sides of the box to be shaped.

45 **[0030]** To prevent the unfolded boxes from being moved during heating, the machine includes means of immobilizing them, consisting of some treaders (11) which are activated by pneumatic cylinders (12) installed over a fixed upper bridge (13).

**[0031]** The treaders (11) vertically press the sides of the unfolded box against the coplanary plates (7) included in the heating unit.

50 **[0032]** Beneath the heating unit, the box former is arranged, shown in the figure as (14) and including side walls (15) which define a gap between them having dimensions slightly higher than that of the box to be shaped.

[0033] The walls (15) of the box former define in their lower area some windows (16) through which emerge, towards the central gap, some concealable stops (17).

[0034] The set of concealable stops (17) defines a coplanary surface, perpendicular to the walls (15) of the box former.

[0035] The concealable stops (17) are assembled with the possibility of rotation over the back sides of the walls (15), the concealable stops (15) being activated, installed over each one of the walls (15), by a pneumatic cylinder (18) determining their arrangement in a hidden or protruding position with respect to the corresponding walls (15).

[0036] The side walls (15) of the box former (14) are extended at their upper end in some diverging ramps (19) destined to collaborate in the folding of the unfolded boxes (2) when they are displaced towards the interior of the box former by a treader-former, shown as a whole as (20) in figure 3.

[0037] As may be observed in the detail of the figure (6), the treader-former (20), consists of two side walls (21) which are joined to each other by a lower base (22) of less length than the former and by two upper cross bars (23), fixed at their ends, the treader-former having a width equal to the inside width of the box to be shaped.

[0038] The treader-former (20) includes between the side walls (21) two bending wedges (24) arranged perpendicular to the box former and fixed to them with the possibility of rotation by means of the respective axes (25).

[0039] The bending wedges may be arranged in an open or closed position due to the action of two pneumatic cylinders (26) over them and have at their free end two chamfers set against each other which define a right angle.

[0040] The treader-former (20) is fixed to a pneumatic cylinder (27) fitted over the upper fixed bridge (13).

[0041] The pneumatic cylinder (27) transmit to the treader-former an alternative vertical motion, displacing it from the upper area of the heating unit to the inside of the box former and viceversa.

[0042] The base of the treader-former (20) is aligned vertically with the interior gap of the box former (14) and in its vertical descent acts over the base of the box (2) arranged in the heating unit and over which the heaters (8) have previously acted, projecting hot air over the opposite ends of the adjoining sides of the box to be shaped; in this descent, the treader-former (20) induces the introduction of the box inside the box former (14), bending its sides with respect to the base, first of all by the action of the ramps (19) over them and secondly, by the action of the sides (15) of the box former over said sides.

[0043] The treader-former (20) provokes the descent of the box to be shaped until it makes contact with the concealable stops (17) when the bending wedges (24) open to activate with their ends, against the edges defined by the base of the box and two of its sides, this

moment corresponding with that representing in figure 6.

[0044] For the sides of the shaped box to be kept in a position perpendicular to the base thereof, the machine includes in the corners of the box former (14), some means of pressing, consisting of tightening clamps (28) which are activated by pneumatic cylinders (29); these clamps (28) press the opposite ends of the adjoining sides of the box which are still hot, determining their heat-welding, by which the box is definitely shaped.

[0045] Once the box has been shaped and the adjoining sides heat-welded at their ends, the bending wedges (24) pass to the closing position and the treader-former set is displaced towards the upper area, by the action of the cylinder (27); simultaneously the concealable stops (17) are concealed in the walls (15) and the finished box falls under its own weight towards means for removal, consisting of motorized transport means (30), responsible for removing the boxes from the machines.

[0046] We do not consider it necessary to extend this description more, as any expert in the matter can understand the scope of the invention and the benefits derived from it.

[0047] The terms in which this specification has been drafted should always be interpreted in the widest sense without limitations.

[0048] The materials, form, size and arrangement of the items may be varied, provided it does not change the characteristics of the invention as claimed below.

## Claims

1. A machine to shape boxes from heat-weldable material, as from unfolded boxes; including means of supply of the unfolded boxes (2), means of transport picking up the unfolded boxes from the means of supply and arranging them in a heating unit; means of immobilization of the unfolded boxes in the heating unit; a box former (14) consisting of side walls (15) defining a gap between them having dimensions slightly greater than the sides of the box to be shaped; a treader-former (20) introducing the unfolded box in the box former, obtaining the folding of its sides with respect to its base; concealable stops (17) arranged in the box former; means of pressing determining the heat-welding of the opposite ends of the adjoining sides of the shaped box and means of removal of the boxes shaped by the machine; **characterized in that**

- the walls (15) of the box former define in its lower area some windows (16) through which the concealable stops (17) emerge towards the gap; and **in that**
- the heating unit includes coplanary plates (7) over which the unfolded boxes are placed by the transporter, and some displaceable heaters

- (8) which project hot air over the opposite ends of the adjoining sides of the boxes.
2. A machine, according to claim 1, **characterized in that** the means of supply of unfolded boxes consist of a lifting platform (1), over which the unfolded boxes are piled. 5
  3. A machine according to any of the previous claims, **characterized in that** the means of transport of the unfolded boxes (2) consists of a horizontal motorized displacement carriage over which is assembled a pneumatic cylinder (4) which vertically displaces an arm (5) equipped with a pneumatically activated suction pad (6) to hold the unfolded boxes during transport. 10 15
  4. A machine, according to any of the previous claims, **characterized in that** the heaters are equipped with nozzles (10) defining a flat right angled outlet, through which hot air emerges, permitting opposite ends of the adjoining sides of the box to be shaped to be simultaneously heated. 20
  5. A machine, according to any of the previous claims, **characterized in that** the means of immobilization of the unfolded boxes in the heating unit consist of treaders (11) activated by pneumatic cylinders (12) assembled over a fixed upper bridge and which vertically press the sides of the unfolded box against the coplanary plates (7) included in the heating unit, preventing their mobility during the heating process. 25 30
  6. A machine, according to any of the previous claims, **characterized in that** the box former is arranged at the lower area of the heating unit. 35
  7. A machine, according to any of the previous claims, **characterized in that** the concealable stops (7) define a coplanary surface, perpendicular to the walls of the box former. 40
  8. A machine, according to any of the previous claims, **characterized in that** the concealable stops (17) are assembled with the possibility of rotation over the back sides of the walls of the box former. 45
  9. A machine, according to any of the previous claims, **characterized in that** the concealable stops assembled over each one of the walls are activated by a pneumatic cylinder (18) determining their hidden or protruding position with respect to the corresponding walls. 50
  10. A machine, according to any of the previous claims, **characterized in that** the side walls of the box former are extended by their upper end in some diverging ramps. 55
  11. A machine, according to any of the previous claims, **characterized in that** the treader-former (20) includes two parallel side walls (21) joined to each other by a lower base (22) having less length than the side walls of the box former and by two upper cross bars (23), fitted to their ends, the treader-former defining a width equal to the inside width of the box to be shaped.
  12. A machine, according to claim 11 **characterized in that** the treader-former includes between its side walls (21) two bending wedges (24), arranged perpendicularly to them and fixed to them with the possibility of rotation.
  13. A machine, according to claim 12, **characterized in that** inside the treader-former, two pneumatic cylinders (26) are arranged which act over the bending wedges (24) arranging them in an open or closed position.
  14. A machine, according any of claims 12 and 13, **characterized in that** the bending wedges (24) have at their free end, two chamfers set against each other defining a right angled rim.
  15. A machine, according to any of the previous claims, **characterized in that** the treader-former is fixed to a pneumatic cylinder (27) obliging it to describe alternative vertical movements, passing from the upper area of the heating unit to the inside of the box former and viceversa.
  16. A machine, according to any of the previous claims, **characterized in that** the base of the treader-former (20) is aligned vertically with the inside gap of the box former (14), acting during the descent of the treader-former over the base of the unfolded box arranged in the filling unit, provoking its introduction inside the box former and the bending of its sides until reaching a position perpendicular to its base.
  17. A machine, according to any of the previous claims, **characterized in that** the means of pressing which determine the heat-welding of the opposite ends of the adjoining sides of the shaped box consist of tightening clamps (28) arranged at the corners of the box former.
  18. A machine, according to claim 17, **characterized in that** gripping devices of the tightening clamps (28) have a length equal or slightly greater than the height of the boxes to be shaped.
  19. A machine, according to claim 18, **characterized in that** the gripping devices of the tightening clamps have an internal conduit for the circulation of cooling

fluid.

20. A machine, according to claim 19, **characterized in that** the internal conduit of the tightening clamps has external outlet and inlets for the connection of the corresponding external cooling circuit. 5
21. A machine, according to any of claims 17-20, **characterized in that** the tightening clamps are activated by pneumatic cylinders (29). 10
22. A machine, according to any of the previous claims, **characterized in that** the means of removal of the shaped boxes consist of a motorized conveyor belt. 15
23. A machine, according to claim 22, **characterized in that** the motorized conveyor belt is arranged beneath the box former, the boxes falling over it once shaped, when the concealable stops (17) of the box former are concealed. 20

#### Patentansprüche

1. Maschine zum Formen von Schachteln aus heißschweißbarem Material, wie aus ungefalteten Schachteln, mit einem Zufuhrmittel für ungefaltete Schachteln (2), einem Transportmittel, das die ungefalteten Schachteln von dem Zufuhrmittel aufnimmt und sie in einer Erhitzereinheit anordnet, einem Mittel zur Festlegung der ungefalteten Schachteln in der Erhitzereinheit, einem Schachtelformer (14), der aus Seitenwänden (15) besteht, die zwischen sich einen Zwischenraum definieren, der etwas größere Abmessungen besitzt als die Seiten der zu formenden Schachtel; einem Niederdrückformer (20), der die ungefaltete Schachtel in den Schachtelformer einführt, wobei das Falten ihrer Seiten relativ zu ihrer Basis erreicht wird, versenkbaren Anschlägen (17), die in dem Schachtelformer angeordnet sind, einem Pressmittel, welches das Heißschweißen der einander gegenüberliegenden Enden der aneinander angrenzenden Seiten der geformten Schachtel bestimmt, und mit einem Mittel zum Entnehmen der durch die Maschine geformten Schachteln, **dadurch gekennzeichnet, dass** die Wände (15) des Schachtelformers in ihrem unteren Bereich mehrere Fenster (16) definieren, durch die die versenkbaren Anschläge (17) gegen den Zwischenraum hin eintreten, und dass die Erhitzereinheit in gemeinsamer Ebene liegende Platten (7), über die die ungefalteten Schachteln durch den Transporter verbracht werden, sowie einige verschiebbare Erhitzer (8) beinhaltet, die Heißluft über die einander gegenüberliegenden Enden der aneinander angrenzenden Seiten der Schachteln blasen. 25
2. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** das Zufuhrmittel für ungefaltete Schachteln aus einer Hubplattform (1) besteht, über der die ungefalteten Schachteln aufgestapelt sind. 30
3. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** das Transportmittel der ungefalteten Schachteln (2) aus einem horizontalen, motorisch angetriebenen Verschiebewagen besteht, über dem ein Pneumatikzylinder (4) angeordnet ist, der einen Arm (5) vertikal verschiebt, der mit einem pneumatisch betätigten Saugkissen (6) ausgerüstet ist, um die ungefalteten Schachteln während des Transportes zu halten. 35
4. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** die Erhitzer mit Düsen (10) ausgerüstet sind, die einen flachen, rechtwinkligen Auslass definieren, durch den Heißluft austritt, was ermöglicht, dass die einander gegenüberliegenden Enden der aneinander angrenzenden Seiten der zu formenden Schachtel gleichzeitig erhitzt werden. 40
5. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** das Mittel zum Festlegen der ungefalteten Schachteln in der Erhitzereinheit aus Niederdrückern (11) besteht, die durch Pneumatikzylinder (12) betätigt sind, die über einer feststehenden, oberen Brücke angeordnet sind und die die Seiten der ungefalteten Schachteln, um deren Beweglichkeit während des Erhitzungsprozesses zu verhindern, gegen die in gemeinsamer Ebene liegenden Platten (7) anpressen, die in der Erhitzereinheit vorhanden sind. 45
6. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** der Schachtelformer im unteren Bereich der Erhitzereinheit angeordnet ist. 50
7. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** die versenkbaren Anschläge (17) eine koplanare, zu den Wänden des Schachtelformers senkrechte Fläche definieren. 55
8. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** die versenkbaren Anschläge (17) mit der Möglichkeit einer Drehung über die Rückseiten der Wände des Schachtelformers eingerichtet sind.
9. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** die versenkbaren Anschläge, die über jeder der Wände angeordnet sind, durch einen Pneumatikzylinder

(18) betätigt sind, welcher ihre versenkte oder vorstehende Stellung relativ zu den betreffenden Wänden bestimmt.

10. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** die Seitenwände des Schachtelformers über ihr oberes Ende hinaus in einigen divergierenden Rampen fortgesetzt sind. 5
11. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** der Niederdrück-Former (20) zwei parallele Seitenwände (21) beinhaltet, die durch eine untere Basis (22), welche eine geringere Länge besitzt als die Seitenwände des Schachtelformers, sowie durch zwei obere Querstangen (23) miteinander verbunden sind, die an deren Enden angebracht sind, wobei der Niederdrück-Former eine Breite definiert, die der inneren Breite der zu formenden Schachtel gleich ist. 10
12. Maschine nach Anspruch 11, **dadurch gekennzeichnet, dass** der Niederdrück-Former zwischen seinen Seitenwänden (21) zwei Biegekeile (24) beinhaltet, die senkrecht zu ihnen angeordnet und an ihnen mit der Möglichkeit einer Drehung angebracht sind. 15
13. Maschine nach Anspruch 12, **dadurch gekennzeichnet, dass** innerhalb des Niederdrück-Formers zwei Pneumatikzylinder (26) angeordnet sind, die auf die Biegekeile (24) einwirken, um diese in eine offene oder geschlossene Stellung zu bringen. 20
14. Maschine nach einem der Ansprüche 12 und 13, **dadurch gekennzeichnet, dass** die Biegekeile (24) an ihrem freien Ende zwei Schrägkanten aufweisen, die gegeneinander gerichtet sind und einen rechtwinkligen Rand definieren. 25
15. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** der Niederdrück-Former an einem Pneumatikzylinder (27) befestigt ist, der abwechselnde vertikale Bewegungen bewirkt, die vom oberen Bereich der Erhitzereinheit ins Innere des Schachtelformers verlaufen und umgekehrt. 30
16. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** die Basis des Niederdrück-Formers (20) vertikal auf den inneren Zwischenraum des Schachtelformers (14) ausgerichtet ist, um während des Niederganges des Niederdrück-Formers auf die Basis der ungefalteten, in der Erhitzereinheit angeordneten Schachtel einzuwirken, um deren Einführung in den Schachtelformer hinein sowie das Biegen von de-

ren Seiten hervorzurufen, bis eine zu ihrer Basis senkrechte Position erreicht ist.

17. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** das Mittel zum Pressen, welche das Heißschweißen der einander gegenüberliegenden Enden der aneinander angrenzenden Seiten der geformten Schachtel bestimmt, aus Spannbacken (28) besteht, die an den Ecken des Schachtelformers angeordnet sind. 35
18. Maschine nach Anspruch 17, **dadurch gekennzeichnet, dass** Greifvorrichtungen der Spannbacken (28) eine Länge besitzen, die gleich oder etwas größer ist als die Höhe der zu formenden Schachteln. 40
19. Maschine nach Anspruch 18, **dadurch gekennzeichnet, dass** die Greifvorrichtungen der Spannbacken einen inneren Kanal für die Zirkulation von Kühlfluidum aufweisen. 45
20. Maschine nach Anspruch 19, **dadurch gekennzeichnet, dass** der innere Kanal der Spannbacken einen äußeren Auslass und Einlässe für den Anschluß des entsprechenden externen Kühlkreises aufweist. 50
21. Maschine nach den Ansprüche 17 bis 20, **dadurch gekennzeichnet, dass** die Spannbacken durch Pneumatikzylinder (29) betätigt sind. 55
22. Maschine nach einem der vorausgehenden Ansprüche, **dadurch gekennzeichnet, dass** das Mittel zum Entnehmen der geformten Schachteln aus einem motorisch angetriebenen Förderband besteht. 60
23. Maschine nach Anspruch 22, **dadurch gekennzeichnet, dass** das motorisch angetriebene Förderband unterhalb des Schachtelformers angeordnet ist, wobei die Schachteln, die geformt sind, auf es herabfallen, wenn die versenkbaren Anschläge (17) des Schachtelformers versenkt werden. 65

## Revendications

1. Machine pour façonner des boîtes à partir d'une matière thermosoudable, par exemple à partir de boîtes dépliées, comprenant des moyens d'approvisionnement en boîtes dépliées (2), des moyens de transport prenant les boîtes dépliées sur les moyens d'approvisionnement et les plaçant dans une unité de chauffage, des moyens d'immobilisation des boîtes dépliées dans l'unité de chauffage, un façonneur de boîtes (14) comprenant des parois latérales (15) qui délimitent un espace entre elles,

ayant des dimensions légèrement supérieures aux parois de la boîte à façonner, un façonneur-presseur (20) introduisant la boîte dépliée dans le façonneur de boîtes, réalisant le pliage de ses côtés par rapport à sa base, des butoirs encastrables (17) disposés dans le façonneur de boîtes, des moyens de pressage déterminant le thermosoudage des extrémités opposées des côtés contigus de la boîte façonnée et des moyens d'enlèvement des boîtes façonnées par la machine ; **caractérisée en ce que**

- les parois (15) du façonneur de boîtes délimitent dans leur zone inférieure des fenêtres (16) à travers lesquelles les butoirs encastrables (17) s'avancent vers l'espace ; et **en ce que**
- l'unité de chauffage comprend des plaques coplanaires (7) sur lesquelles les boîtes dépliées sont placées par le transporteur et des appareils de chauffage (8) mobiles qui projettent de l'air chaud sur les extrémités opposées des côtés contigus des boîtes.

2. Machine selon la revendication 1, **caractérisée en ce que** les moyens d'approvisionnement des boîtes dépliées comprennent une plate-forme de levage (1) sur laquelle sont empilées les boîtes dépliées.

3. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le moyen de transport des boîtes dépliées (2) comprend un chariot de déplacement motorisé dans le sens horizontal au-dessus duquel est monté un vérin pneumatique (4) qui déplace un bras (5) équipé d'un coussin d'aspiration (6) à commande pneumatique dans le sens vertical pour maintenir les boîtes dépliées pendant le transport.

4. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les appareils de chauffage sont équipés de buses (10) définissant une sortie à angle droit plan à travers laquelle sort l'air chaud, permettant le chauffage simultané des extrémités opposées des côtés contigus de la boîte à façonner.

5. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les moyens d'immobilisation des boîtes dépliées dans l'unité de chauffage comprennent des presseurs (11) commandés par des vérins pneumatiques (12) montés au-dessus d'un pont supérieur fixe et qui pressent verticalement les côtés de la boîte dépliée contre les plaques coplanaires (7) insérées dans l'unité de chauffage, les empêchant de bouger pendant l'opération de chauffage.

6. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le fa-

çonneur de boîtes est placé dans la zone inférieure de l'unité de chauffage.

7. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les butoirs encastrables (7) délimitent une surface coplanaire perpendiculaire aux parois du façonneur de boîtes.

8. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les butoirs encastrables (17) sont montés avec la possibilité d'effectuer une rotation au-dessus des côtés arrière des parois du façonneur de boîtes.

9. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les butoirs encastrables montés au-dessus de chacune des parois sont commandés par un vérin pneumatique (18) déterminant leur position encastrée ou saillante par rapport aux parois correspondantes.

10. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les parois latérales du façonneur de boîtes se prolongent à leur extrémité supérieure par des rampes divergentes.

11. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le façonneur-presseur (20) comprend deux parois latérales parallèles (21) reliées l'une à l'autre par une base inférieure (22) dont la longueur est inférieure à celle des parois latérales du façonneur de boîtes et par deux traverses supérieures (23) fixées à leurs extrémités, le façonneur-presseur délimitant une largeur égale à la largeur intérieure de la boîte à façonner.

12. Machine selon la revendication 11, **caractérisée en ce que** le façonneur-presseur comprend entre ses parois latérales (21) deux clavettes de pliage (24) disposées perpendiculairement auxdites parois et fixées sur celles-ci avec la possibilité d'effectuer une rotation.

13. Machine selon la revendication 12, **caractérisée en ce que** deux vérins pneumatiques (26) sont installés à l'intérieur du façonneur-presseur et actionnent les clavettes de pliage (24) pour les placer en position ouverte ou fermée.

14. Machine selon l'une quelconque des revendications 12 et 13, **caractérisée en ce que** les clavettes de pliage (24) comportent à leur extrémité libre deux chanfreins disposés l'un contre l'autre délimitant un rebord à angle droit.

15. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le façonneur-presseur est fixé sur un vérin pneumatique (27) l'obligeant à décrire des mouvements verticaux alternatifs, passant de la zone supérieure de l'unité de chauffage à l'intérieur du façonneur-presseur et vice-versa. 5
16. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la base du façonneur-presseur (20) est alignée verticalement sur l'espace intérieur du façonneur de boîtes (14), agissant pendant la descente du façonneur-presseur sur la base de la boîte dépliée placée dans l'unité de remplissage, provoquant son introduction à l'intérieur du façonneur de boîtes et le pliage de ses côtés jusqu'à ce qu'elle atteigne une position perpendiculaire à sa base. 10 15
17. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les moyens de pressage qui déterminent le thermosoudage des extrémités opposées des côtés contigus de la boîte façonnée sont constitués de coussinets de serrage (28) disposés dans les coins du façonneur de boîtes. 20 25
18. Machine selon la revendication 17, **caractérisée en ce que** la longueur des dispositifs de serrage des coussinets de serrage (28) est égale ou légèrement supérieure à la hauteur des boîtes à façonner. 30
19. Machine selon la revendication 18, **caractérisée en ce que** les dispositifs de serrage des coussinets de serrage comportent un conduit intérieur pour la circulation du fluide de refroidissement. 35
20. Machine selon la revendication 19, **caractérisée en ce que** le conduit intérieur des coussinets de serrage comporte des sorties et entrées extérieures pour la connexion du circuit de refroidissement extérieur correspondant. 40
21. Machine selon l'une quelconque des revendications 17 à 20, **caractérisée en ce que** les coussinets de serrage sont commandés par des vérins pneumatiques (29). 45
22. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les moyens d'enlèvement des boîtes façonnées sont constitués d'un transporteur à bande motorisé. 50
23. Machine selon la revendication 22, **caractérisée en ce que** le transporteur à bande motorisé est disposé sous le façonneur de boîtes, les boîtes tombant sur ce dernier une fois façonnées, lorsque les 55
- butoirs rétractables (17) du façonneur de boîtes sont rétractés.



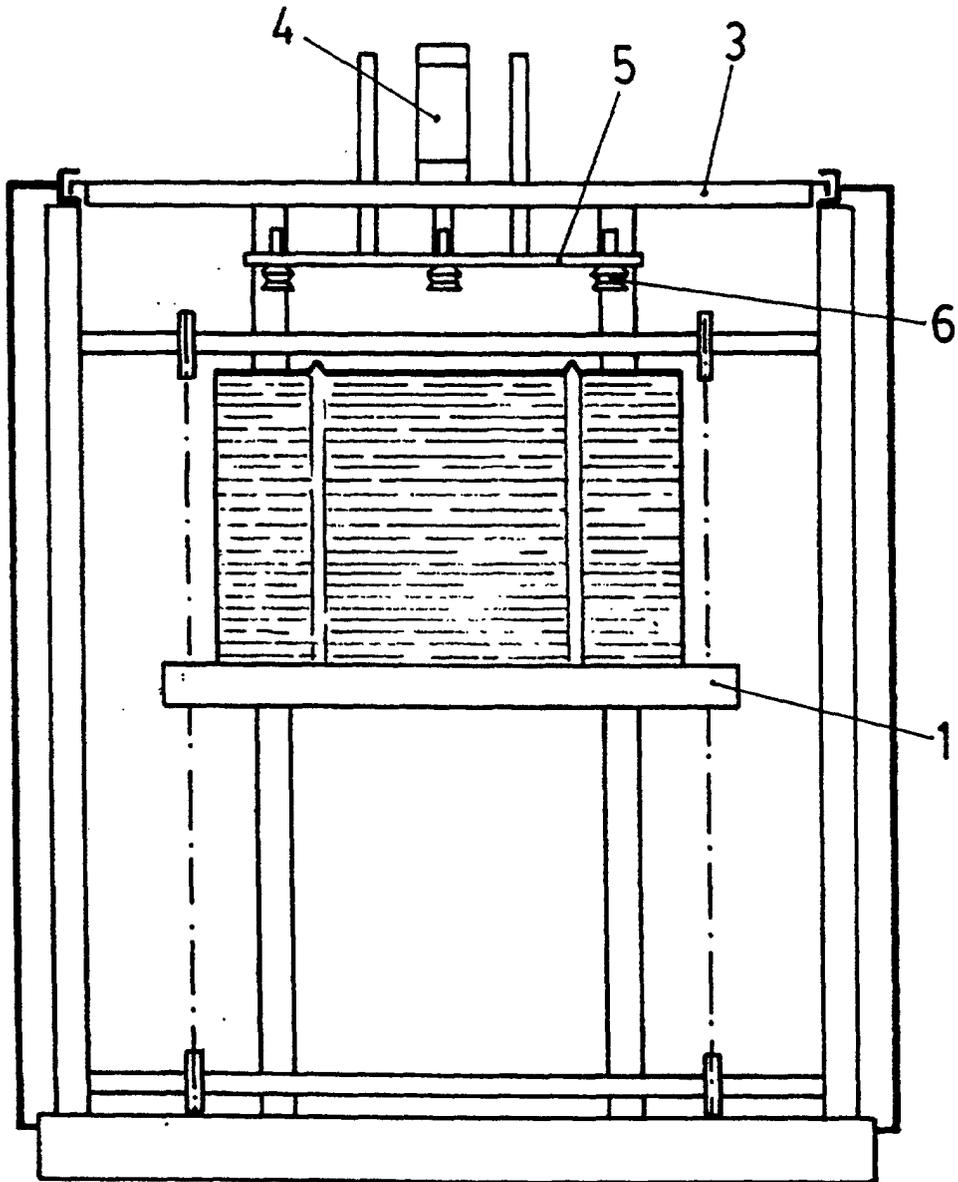


Fig. 2

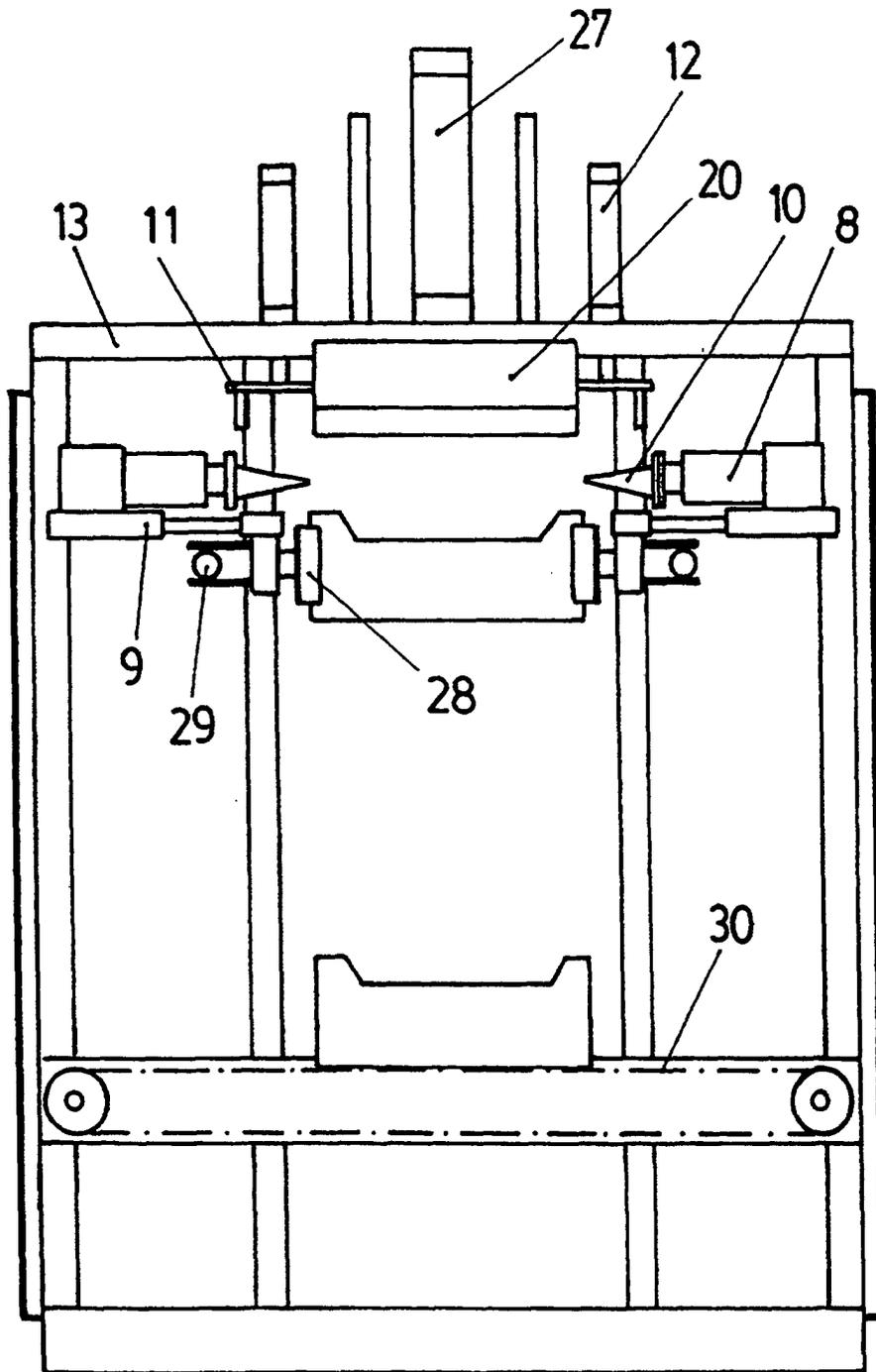


Fig. 3

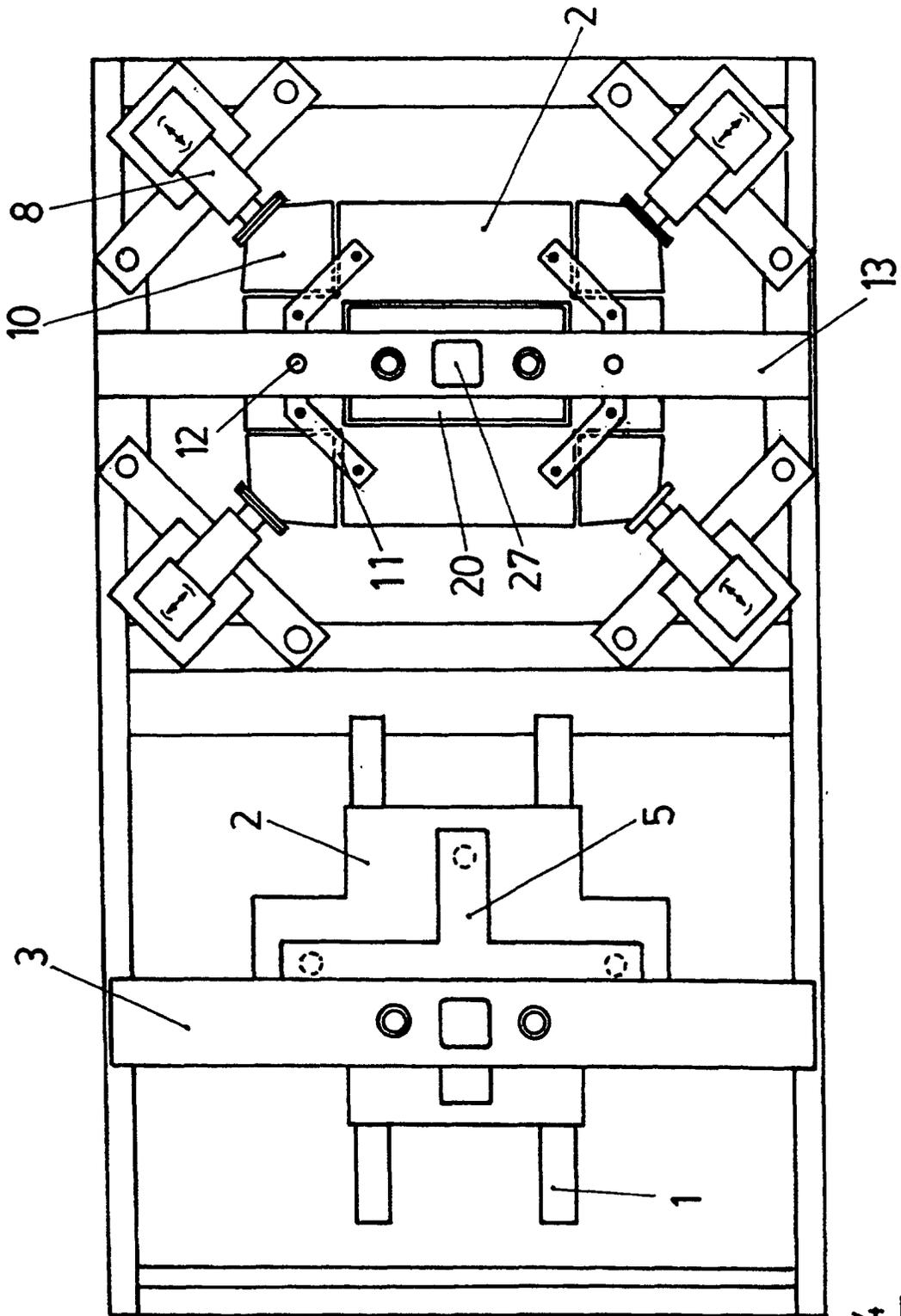


Fig. 4

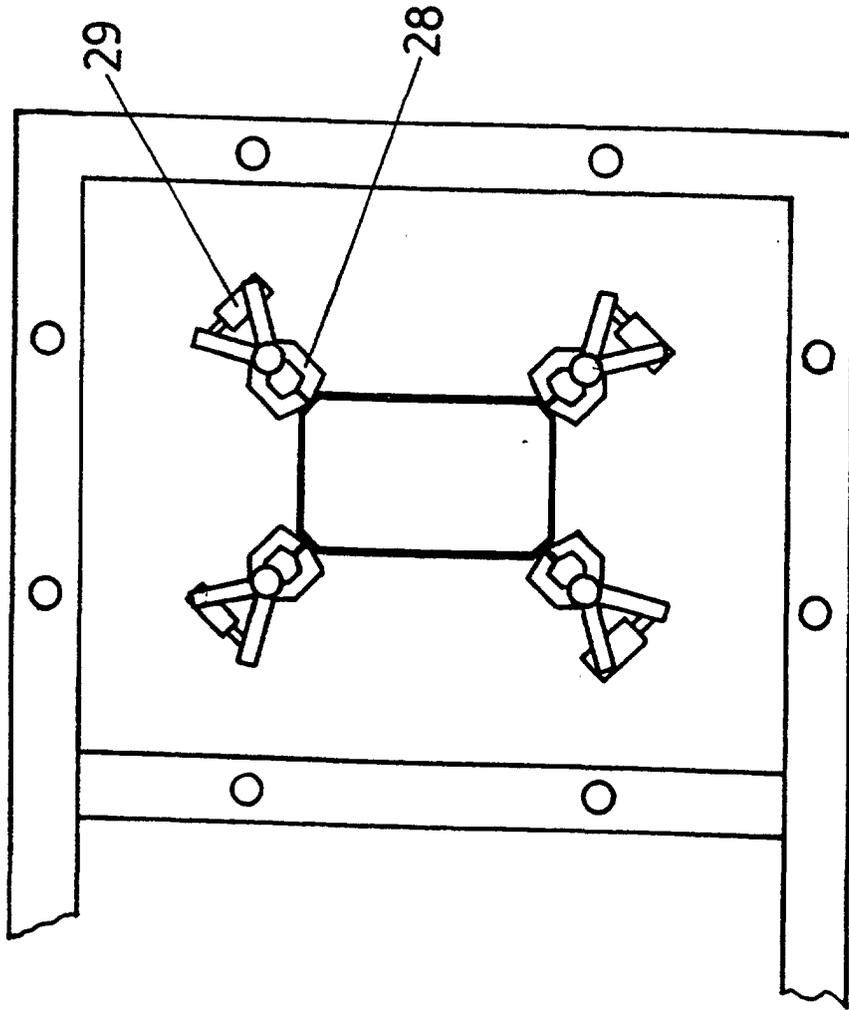


Fig. 5

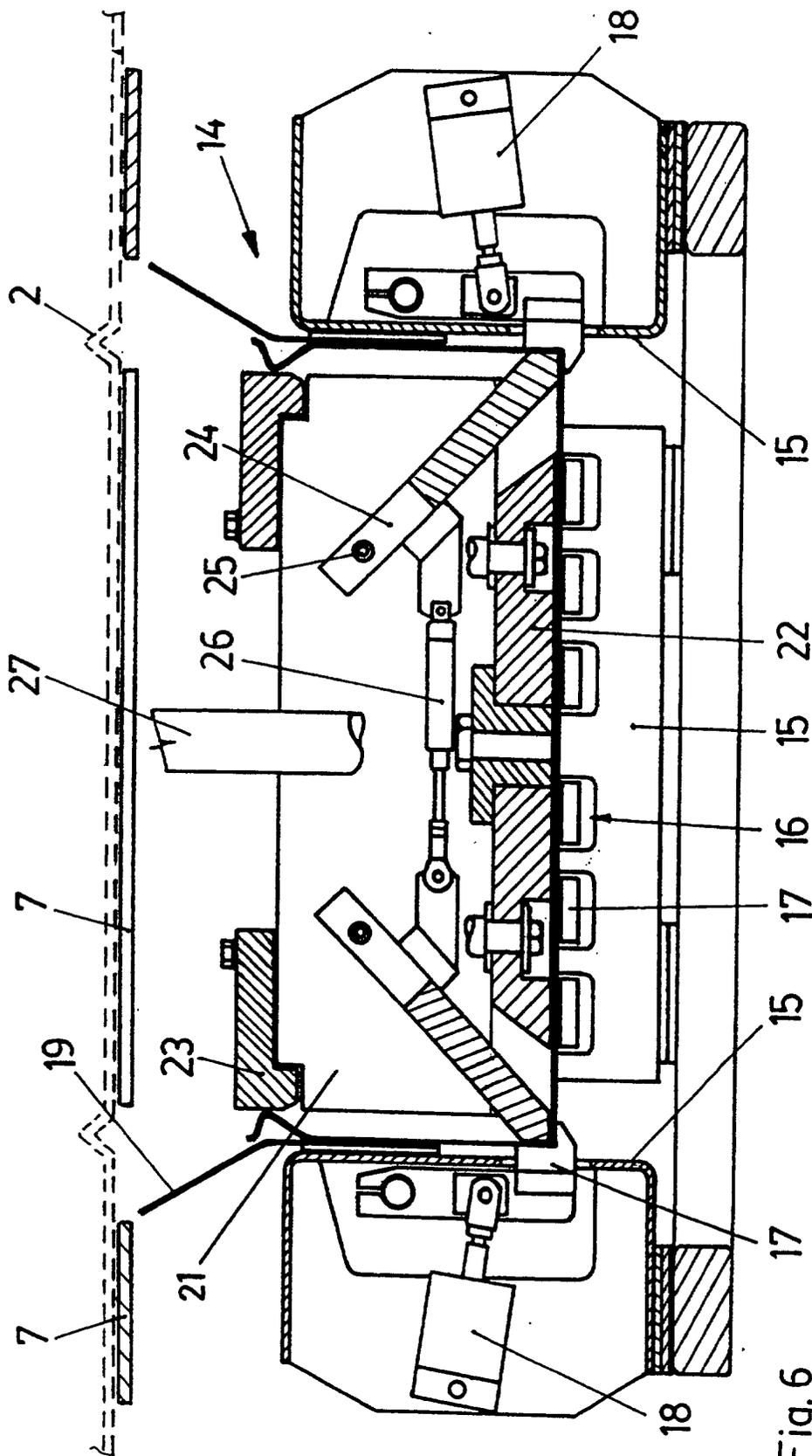


Fig. 6