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(54) **A variable section mobile ingot mold for a continuous casting plant**

Eine variable, unterteilte, bewegliche Blockkokille für eine Stranggiessanlage

Une coquille variable, mobile et divisée en sections pour la coulée continue

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- **PATENT ABSTRACTS OF JAPAN vol. 013, no. 300 (M-848), 11 July 1989 & JP 01 091942 A (NIPPON STEEL CORP;OTHERS: 01), 11 April 1989**
- **PATENT ABSTRACTS OF JAPAN vol. 013, no. 376 (M-862), 21 August 1989 & JP 01 130855 A (ISHIKAWAJIMA HARIMA HEAVY IND CO LTD;OTHERS: 01), 23 May 1989**

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Description

[0001] The present invention is relevant to a variable section mobile ingot mold for a continuous casting plant. In the continuous casting process for the production of billets and ingots it is known that stationary die elements or chill elements, with correct geometric shapes, have been used, steel from the ladle and the tundish is poured into said dies.

[0002] Slight oscillations are present in the direction of the material flow in order to avoid the steel to stick to the walls of the ingot mold.

[0003] In these plants with a fixed ingot mold there are low output speeds. Furthermore, the smallest castable section cannot drop under certain minimum limits so as to guarantee a correct centring of the incoming metal liquid casting without going near the walls of the ingot mold. Apart from these types of stationary plants, mobile ingot mold plants are also used.

[0004] In these mobile plants, the die elements or chill elements slide together at the same speed of the cast material which is in the solidification phase. In such a way any movement between the ingot mold and the material surface is eliminated.

[0005] In this case the forward movement can be realised through a chain that pulls copper blocks with various internal shapes.

[0006] During the pulling and the forward movement of the copper blocks, the material, as it cools, solidifies and shrinks. A solidification with shrinkages is deleterious when it determines a gap between the metal and the ingot mold that notably decreases the thermal exchange.

[0007] Instead, the thermal exchange must always be maximised since, in a minimum amount of time and for a limited section, the solid outer layer of the metal containment has to be formed wherein the core of the section is still at the liquid state.

[0008] In order to overcome said technical problem, plants have been set with ingot molds characterised by die elements or chill elements formed by two halves that have the possibility of moving closer to each other during the forward movement.

[0009] Also this solution has a significant disadvantage since the two halves, by moving closer, determine a different final geometrical configuration.

[0010] A continuous casting plant that has walls which travel in the vertical direction is known from DE 3911283.

[0011] In DE 3911283 the walls of the mould are formed by link chains, each consisting of metal blocks arranged one behind the other in closed formation, the mould walls consisting of four link chains forming, in a cross-sectional view of the mould, a rectangle with variable side lengths and being able to form a mould cavity of constantly narrowing cross-section from top to bottom.

[0012] The general purpose of the present invention

is to solve the technical problems listed above relating to the known art in an extremely simple, economical and particularly functional way, overcoming all the previously cited and disclosed disadvantages.

[0013] Another purpose is to reduce to a minimum the problems related to the thermal exchange between the concerned

[0014] parts in contact with each other during the continuous casting phase in a continuous casting plant with a mobile ingot mold.

[0015] In view of the above purposes, in accordance with the present invention, a variable section mobile ingot mold for a continuous casting plant has been realised, with its detailed characteristics shown hereinafter in the attached claims.

[0016] The structural and functional characteristics of the present invention and its advantages compared to the known art will be clearer and more evident from the following description, with reference to the attached drawings, that show examples of ingot mold embodiments in accordance with the present invention. In the drawings:

- Figure 1 is a side view of two structures of a variable section mobile ingot mold in accordance with the invention, of a chain type vertical continuous casting plant;
- Figure 2 is a schematic top perspective view of the variable section mobile ingot mold in accordance with the invention, with a head frame element partially exploded;
- Figure 3 is an enlarged cross-section that shows the inner portion of the ingot mold in a working phase;
- Figures 4 and 5 are small scale cross-sections, one corresponding to the upper part and the other corresponding to the lower part of a second embodiment of a ingot mold, in accordance with the invention, in a working phase.

[0017] Figure 1 shows a variable section mobile ingot mold, in accordance with the invention, which is set in vertical type continuous casting plant.

[0018] The molten metal outlet pipe 10 is shown in the figure, for example from a tundish, not shown, wherein said pipe feeds a variable section mobile ingot mold, indicated hereinafter by 11, wherein die elements are provided which can engage with each other at least along a rectilinear portion.

[0019] The ingot mold 11 comprises four pulling elements, properly driven, assembled in a swirl or closed ring shape, each of these pulling elements has, in the example, the chain couples 12, 12', 13, 13', 14, 14' and 15, 15', as shown in figures 3-5.

[0020] The four opposed chain couples rotate in opposite directions and, at any rate, each chain couples 12, 12', 13, 13', 14, 14' and 15, 15' carries a plurality of wall elements or copper sectors 16, 17, 18 and 19 that make up a die or a chill, since they are opposite, adja-

cent and in contact along the sides to form, for instance, a quadrilateral.

[0021] The wall elements or sectors 16-19 made of copper, or of an equivalent material with a high heat transmission factor, positioned as previously described, i.e. opposite to each other and in contact along the sides, in order to prevent the leakage of the material while still in a liquid state, form a quadrilateral continuous cavity that realises a continuous die which moves forward with the molten metal and the casting liquid poured therein.

[0022] In the general structure of the ingot mold 11 it is noted that chains 12, 12', 13, 13', 14, 14' and 15, 15' wind on the geared wheels 20 and 21 are positioned at the ends of an elongated ring configuration.

[0023] In this way, the chain couples carrying the copper sectors 16-19, set to wind on the respective geared wheels 20 and 21, besides determining the forward movement of the chains and of the copper sectors, locate a rectilinear portion of the ingot mold. In this rectilinear portion the four adjacent and opposite sectors 16-19 are engaged to form a continuous quadrilateral cavity.

[0024] In this area, support plates 22 are provided, said plates are positioned behind the chain couples and serve as a containment frame. These support plates 22 are correctly inclined and are kept in position by elastic elements 23 so as to fit perfectly to the chains that slide while supporting the copper sectors 16-19.

[0025] Then, a pressure is exerted on the already solidified material external skin, said pressure causes an overall section reduction.

[0026] Furthermore, elements suitable to supply cooling water are provided, said element are indicated by 24, the water hits the inclined support plate 22 and the pulling chains 12, 12', 13, 13', 14, 14' and 15, 15' and the copper sectors 16-19. Cooling by water sprayed on a surface of the copper sectors 16-19 is carried out both in the casting phase and along the return section of the chains with the disengaged copper sectors.

[0027] Furthermore, in accordance with the invention, it has to be noted how the chain couples with the corresponding copper sectors are supported on the upper part by structures that can move in two perpendicular directions, allowing the structures to get closer to each other.

[0028] In fact, shafts 25 and 26 of the geared wheels 20 and 21 are provided, said shafts are pivoted, free to rotate, on a couple of elongated plates 27 and positioned on opposite sides of the geared wheels 20 and 21, said shafts connect said geared wheels and keep them at a fixed predetermined distance.

[0029] The upper support shaft 25 of the upper geared wheel 20 extends towards the outside in such a way as to insert itself in the holes 28 of a fork element 29 that encloses the plates 27 and the upper geared wheel 20.

[0030] In this way, there is an oscillation of the chains 12, 12', 13, 13', 14, 14' and 15, 15' and of the corre-

sponding copper sectors 16-19 around said upper shaft 25 with respect to the fork 29.

[0031] This fork element 29 is provided in its central upper portion with an appendix 30 with an attachment hole 31, obtained in a perpendicular direction to that of the previously mentioned upper shaft 25.

[0032] The ingot mold, in accordance to the invention, provides a head frame element 32, with quadrilateral shape and support, to which four similar fork elements are attached and each element supports one of the couples of chains 12, 12', 13, 13', 14, 14' and 15, 15' with their corresponding copper sectors 16-19.

[0033] In particular, the drilled appendix 30 of each fork 29 can be inserted in a 'U-shaped' support 33, directed downward, and provided with holes 34 on the walls of the U-shaped support. A pivot (not shown) is inserted into these holes 31 and 34 of both the appendix 30 and the U-shaped support 33, said pivot allows the oscillation of the single fork elements 29 with respect to the head frame element 32.

[0034] Figure 2 shows this head element 32 exploded and without connecting pivots to the appendixes of the four underlying fork elements 29 that carry the chains and the copper sectors.

[0035] This upper structure of the ingot mold allows the four chain couples and the corresponding copper sectors to realise a movement towards each other according to a first axis X, as well as a linear misalignment along a second axis Y, perpendicular to the first axis X, that allows such a movement.

[0036] Figure 3 shows the cross section of the configuration of a variable section ingot mold for a continuous casting plant wherein the copper sectors 16-19 are shown, and said sectors are engaged, by using pivots 40, to the intermediate supports 41 that are engaged, by using pivots 42, to chains 12, 12', 13, 13', 14, 14' and 15, 15'. The rollers 43, being part of the chain, slide and rotate directly on the corresponding support plate 22, which is placed behind the chain couple, when given the function of containment frame. The elastic elements 23, placed behind the inclined support plates 22, are also shown, said elements allow an adjustment of the chains 12, 12', 13, 13', 14, 14' and 15, 15', maintaining them in a correct working position to exert pressure.

[0037] In this example, the copper sections are perfectly flat. Figures 4 and 5 show a different embodiment of the copper sectors and their actions in two different sections of the ingot mold.

[0038] In this case, the copper sectors 16-19 present, at one of their ends, a wedge-shaped protrusion 44 that, engaging with equivalent shaped sectors, determines a blunt edge section configuration, of the pseudo octagonal type or an octagon with unequal sides.

[0039] Figure 4 is obtained at the upper portion of the ingot mold, where the metal is still in a liquid state and has still a significant overall dimension in the casting cavity.

[0040] Figure 5 is obtained at the lower portion of the

ingot mold, in accordance with the invention, wherein the metal has at last a good solidified skin.

[0041] Both positions are similar to the one schematised in figure 1 and they show that the section of the metal in figure 5 is smaller than the section previously shown in figure 4, because of the presence of the particular type of couple chains support with the corresponding copper sectors. In fact, providing the upper support structures that can move in two perpendicular directions, allows the movement towards each other of the opposite and of the adjacent sectors.

[0042] Further, in this case, the blunt edge configuration section, of the pseudo octagonal type, significantly reduces the problems related to the sharp edges, as previously shown in the example with flat copper sectors. This is how a continuous variable section cavity is realised, which is defined inside the four opposite, adjacent and joined sectors, into which the metal is cast directly from the tundish.

[0043] The constant reduction of the cross-section of the metal that moves forward between the copper sectors during the solidification phase determines some sort of rolling of the skin with the core still being in a liquid state. In fact, the skin is subjected to the action of the copper sectors that move closer to each other to decrease the quadrilateral section, by moving in relation to the skin with a limited mutual sliding between the contact surfaces. Therefore, the section of the metal coming out from the ingot mold has smaller dimensions than the dimensions of the entrance section.

[0044] In the rectilinear portion of the ingot mold, the presence of the rollers, placed so as to interact on the support plate surfaces, positioned behind the chain couples and serving as a containment frame, realise a further rear guide, in collaboration with the other elastic elements which adjust the thrust.

[0045] It is natural and evident that there can be different dispositions and shapes of the sectors and of the chains, as well as of the related elements, without thereby departing from the principles of novelty of the inventive idea.

[0046] This is how the purpose mentioned at the beginning of the description is attained.

[0047] Naturally, the embodiments can be different from those shown, as a non limiting example, in the drawings, the same goes for the engagement elements suitable to generate the interaction between the various elements.

[0048] The invention is protected by the boundaries defined in the attached claims.

Claims

1. A mobile ingot mold for a continuous vertical casting plant, said ingot mold comprises four pulling elements (12, 12', 13, 13', 14, 14', 15, 15'), each of which being wound around geared wheels (20,21)

positioned at the ends of an elongated ring configuration, and carrying a plurality of wall die elements (16-19), which can engage with each other along at least one rectilinear portion, said wall die elements (16-19) being assembled in the shape of a closed circuit and are positioned so as to face each other and to be in contact side by side in order to form a quadrilateral continuous cavity that forms a continuous die which moves forward with the cast molten and liquid metal, said four pulling elements (12, 12', 13, 13', 14, 14', 15, 15') and the relevant die elements (16-19) being supported by structures that allow for each of the four pulling elements to pivot about a first axis (X) as well as about a second axis (Y), perpendicular to the first axis (X), in order to decrease the cross section from the upper end to the lower end of the mold, said structures allowing the movement of each of the four pulling elements towards each other comprises

♦ for the movement about the first axis (X) :

- shafts (25) and (26) of the geared wheels (20) and (21) provided pivoted, free to rotate, on a couple of elongated plates (27) positioned on opposite sides of the geared wheels (20) and (21), said plates (27) connecting said geared wheels and keeping them at a fixed predetermined distance;
- for each of the four pulling elements, a fork element (29) that encloses the plates (27) and the upper geared wheel (20), said fork element (29) being provided with holes (28) in which is inserted the upper support shaft (25) of the upper geared wheel (20) for allowing the four pulling elements (12, 12', 13, 13', 14, 14', 15, 15') and of the corresponding die elements (16-19) to pivot about said upper shaft (25) with respect to the fork (29); and

♦ for the movement about the second axis (Y) :

- each fork element (29) is provided in its central upper portion with an appendix (30) with an attachment hole (31), in a perpendicular direction to that of said upper shaft (25) so that the appendix (30) of each fork (29) can be pivotally connected to a head frame element (32) of the ingot mold allowing each of the single fork elements (29) to pivot with respect to the head frame element (32).

2. A mobile ingot mold as claimed in claim 1, **characterised in that** U-shaped support (33) are provided on said head frame element (32) directed downward, the walls of said U-shaped support (33) being

provided with holes (34) for pivotally connecting the drilled appendix (30) of each fork (29).

3. A mobile ingot mold as claimed in claim 1, **characterised in that** each of said four pulling elements comprises a couple of chains (12, 12', 13, 13', 14, 14', 15, 15'), wherein opposite chains rotate in opposite directions, each couple of chains carries said plurality of die elements (16-19) that form a continuous quadrilateral cavity, and said two chain couples (12, 12', 13, 13', 14, 14', 15, 15') are set to wind on the geared wheels (20, 21) wherebetween said rectilinear portion is formed. 5 10
4. A mobile ingot mold as claimed in claim 3, **characterised in that** said die elements (16-19), carried by said chain couples to form said continuous quadrilateral cavity in said rectilinear portion, are provided with rear support plates (22) and elements suitable to supply cooling water (24), elastic thrust elements (23) are engaged to said support plates (22), for reducing the section. 15 20
5. A mobile ingot mold as claimed in claim 4, **characterised in that** said support plates (22) can be inclined together with said head frame element (32) of said ingot mold. 25
6. A mobile ingot mold as claimed in claim 1, **characterised in that** said die elements are formed by copper sectors (16-19). 30
7. A mobile ingot mold as claimed in claim 1, **characterised in that** said die elements are made of a material with a high heat transmission factor (16-19). 35
8. A mobile ingot mold as claimed in claim 1, **characterised in that** said die elements (16-19) are flat.
9. A mobile ingot mold as claimed in claim 1, **characterised in that** said die elements (16-19) are flat and are provided at one of their ends with a wedge-shaped protrusion (44), in such a way that, by engaging with equivalent die elements, said protrusions form a section having blunt edges with an octagonal shape. 40 45

Patentansprüche

1. Bewegliche Blockkokille für eine vertikale Stranggussanlage, wobei die Blockkokille vier Zugelemente (12, 12', 13, 13', 14, 14', 15, 15') umfasst, die jeweils um an den Enden einer länglichen Ringanordnung angeordnete Zahnräder (20, 21) gewunden sind und eine Vielzahl von Wandungsformelementen (16-19) tragen, die miteinander entlang zumindest eines geradlinigen Abschnittes in Eingriff 50 55

stehen können, wobei die Wandungsformelemente (16-19) in der Form eines geschlossenen Kreises zusammengebaut und derart angeordnet sind, dass sie einander zugewandt sind und nebeneinander in Kontakt stehen, um einen vierseitigen kontinuierlichen Hohlraum zu bilden, der eine kontinuierliche Form bildet, die sich mit dem erschmolzenen Gussteil und dem flüssigen Metall vorwärts bewegt, wobei die vier Zugelemente (12, 12', 13, 13', 14, 14', 15, 15') und die relevanten Formelemente (16-19) durch Aufbauten getragen sind, die es zulassen, dass sich jedes der vier Zugelemente um eine erste Achse (X) sowie um eine zweite Achse (Y), die senkrecht zu der ersten Achse (X) steht, drehen kann, um den Querschnitt vom oberen Ende bis zum unteren Ende der Kokille zu verringern, wobei die Aufbauten, die die Bewegung von jedem der vier Zugelemente aufeinander zu zulassen, umfassen

♦ zur Bewegung um die erste Achse (X):

- Wellen (25) und (26) der Zahnräder (20) und (21), die zur freien Drehung an einem Paar länglichen Platten (27), die auf entgegengesetzten Seiten der Zahnräder (20) und (21) angeordnet sind, drehbar vorgesehen sind, wobei die Platten (27) die Zahnräder verbinden und in einem festen vorbestimmten Abstand halten;
- für jedes der vier Zugelemente ein Gabelement (29), das die Platten (27) und das obere Zahnrad (20) umschließt, wobei das Gabelement (29) mit Löchern (28) versehen ist, in denen die obere Lagerwelle (25) des oberen Zahnrades (20) eingesetzt ist, damit die vier Zugelemente (12, 12', 13, 13', 14, 14', 15, 15') und die entsprechenden Formelemente (16-19) sich um die obere Welle (25) in Bezug auf die Gabel (29) drehen können; und

♦ für die Bewegung um die zweite Achse (Y):

- jedes Gabelement (29) in seinem zentralen oberen Abschnitt mit einem Fortsatz (30) mit einem Befestigungsloch (31) in einer rechtwinkligen Richtung zu jener der oberen Welle (25) versehen ist, so dass der Fortsatz (30) jeder Gabel (29) mit einem Kopfrahmenelement (32) der Blockkokille drehbar verbunden sein kann, damit sich jedes der einzelnen Gabelemente (29) in Bezug auf das Kopfrahmenelement (32) drehen kann.

2. Bewegliche Blockkokille nach Anspruch 1, **dadurch gekennzeichnet, dass** U-förmige Träger

(33) an dem Kopfrahmenelement (32) nach unten gerichtet vorgesehen sind, wobei die Wände des U-förmigen Trägers (33) mit Löchern (34) versehen sind, um mit dem gebohrten Fortsatz (30) jeder Gabel (29) eine Drehverbindung herzustellen.

3. Bewegliche Blockkokille nach Anspruch 1, **dadurch gekennzeichnet, dass** jedes der vier Zuelemente ein Paar Ketten (12, 12', 13, 13', 14, 14', 15, 15') umfasst, wobei entgegengesetzte Ketten in entgegengesetzte Richtungen rotieren, wobei jedes Paar Ketten die Vielzahl von Formelementen (16-19), die einen kontinuierlichen vierseitigen Hohlraum bilden, trägt, und die beiden Kettenpaare (12, 12', 13, 13', 14, 14', 15, 15') derart eingerichtet sind, dass sie auf den Zahnräder (20, 21), zwischen denen der geradlinige Abschnitt gebildet ist, gewikkelt werden können. 10
4. Bewegliche Blockkokille nach Anspruch 3, **dadurch gekennzeichnet, dass** die Formelemente (16-19), die von den Kettenpaaren getragen sind, um den kontinuierlichen vierseitigen Hohlraum in dem geradlinigen Abschnitt zu bilden, mit hinteren Tragplatten (22) und Elementen versehen sind, die dafür geeignet sind, Kühlwasser (24) zuzuführen, wobei elastische Druckelemente (23) mit den Tragplatten (22) zur Verringerung des Querschnittes in Eingriff stehen. 20
5. Bewegliche Blockkokille nach Anspruch 4, **dadurch gekennzeichnet, dass** die Tragplatten (22) zusammen mit dem Kopfrahmenelement (32) der Blockkokille geneigt sein können. 25
6. Bewegliche Blockkokille nach Anspruch 1, **dadurch gekennzeichnet, dass** die Formelemente durch Kupfersektoren (16-19) gebildet sind. 30
7. Bewegliche Blockkokille nach Anspruch 1, **dadurch gekennzeichnet, dass** die Formelemente aus einem Material mit einer hohen Wärmeübergangszahl (16-19) hergestellt sind. 35
8. Bewegliche Blockkokille nach Anspruch 1, **dadurch gekennzeichnet, dass** die Formelemente (16-19) flach sind. 40
9. Bewegliche Blockkokille nach Anspruch 1, **dadurch gekennzeichnet, dass** die Formelemente (16-19) flach sind und an einem ihrer Enden mit einem keilförmigen Vorsprung (44) versehen sind, auf eine solche Weise, dass durch Eingriff mit äquivalenten Formelementen die Vorsprünge ein Teilstück mit stumpfen Kanten und einer achteckigen Form bilden. 45

Revendications

1. Moule pour lingot mobile pour une installation de coulée en continu verticale, ledit moule pour lingot comprenant quatre éléments de traction (12, 12', 13, 13', 14, 14', 15, 15'), chacun d'entre eux étant enroulé autour de roues dentées (20, 21) positionnées aux extrémités d'une configuration annulaire allongée, et portant une pluralité d'éléments de filière de paroi (16 à 19) qui peuvent rentrer en contact les uns avec les autres le long d'au moins une partie rectiligne, lesdits éléments de filière de paroi (16 à 19) étant assemblés sous la forme d'un circuit fermé et étant positionnés de façon à se faire mutuellement face, et à être en contact côte à côte de façon à former une cavité continue quadrilatérale qui constitue une filière continue qui se déplace vers l'avant avec le métal fondu et liquide coulé, lesdits quatre éléments de traction (12, 12', 13, 13', 14, 14', 15, 15'), et les éléments de filière concernés (16 à 19) étant supportés par des structures qui permettent à chacun des quatre éléments de traction de pivoter autour d'un premier axe (X) ainsi qu'autour d'un deuxième axe (Y), perpendiculaire au premier axe (X), de façon à diminuer la section transversale de l'extrémité supérieure à l'extrémité inférieure du moule, lesdites structures permettant le déplacement de chacun des quatre éléments de traction les uns vers les autres comprenant :
 - . pour le déplacement autour du premier axe (X) :
 - des arbres (25) et (26) des roues dentées (20) et (21) disposés de façon à pivoter, libres de tourner, sur une paire de plaques allongées (27) positionnées sur des côtés opposés des roues dentées (20) et (21), lesdites plaques (27) reliant lesdites roues dentées et les maintenant à une distance fixe prédéterminée ;
 - pour chacun des quatre éléments de traction, un élément de fourche (29) qui renferme les plaques (27) et la roue dentée supérieure (20), ledit élément de fourche (29) étant muni de trous (28) dans lesquels est inséré l'arbre de support supérieur (25) de la roue dentée supérieure (20) pour permettre aux quatre éléments de traction (12, 12', 13, 13', 14, 14', 15, 15') et aux éléments de filière correspondants (16 à 19) de pivoter autour dudit arbre supérieur (25) par rapport à la fourche (29) ; et
 - . pour le déplacement autour du deuxième axe (Y) :
 - chaque élément de fourche (29) est muni,

- dans sa partie supérieure centrale, d'un appendice (30) avec un trou de fixation (31), dans une direction perpendiculaire à celle dudit arbre supérieur (25), de telle sorte que l'appendice (30) de chaque fourche (29) puisse être relié de façon pivotante à un élément de bâti de tête (32) du moule pour lingot, de façon à permettre à chacun des éléments de fourche individuels (29) de pivoter par rapport à l'élément de bâti de tête (32).
2. Moule pour lingot mobile selon la revendication 1, **caractérisé en ce que** des supports en forme de U (33) sont disposés sur ledit élément de bâti de tête (32), dirigés vers le bas, les parois desdits supports en forme de U (33) étant munies de trous (34) pour relier de façon pivotante l'appendice percé (30) de chaque fourche (29). 15
 3. Moule pour lingot mobile selon la revendication 1, **caractérisé en ce que** chacun desdits quatre éléments de traction comprend une paire de chaînes (12, 12', 13, 13', 14, 14', 15, 15'), dans lequel des chaînes opposées tournent dans des directions opposées, chaque paire de chaînes portant ladite pluralité d'éléments de filière (16 à 19) qui constituent une cavité quadrilatérale continue, et lesdites deux paires de chaînes (12, 12', 13, 13', 14, 14', 15, 15') sont disposées de façon à s'enrouler sur les roues dentées (20, 21) entre lesquelles est formée ladite partie rectiligne. 20 25 30
 4. Moule pour lingot mobile selon la revendication 3, **caractérisé en ce que** lesdits éléments de filière (16 à 19), portés par lesdites paires de chaînes pour former ladite cavité quadrilatérale continue dans ladite partie rectiligne, sont munis de plaques de support arrière (22) et d'éléments appropriés pour délivrer de l'eau de refroidissement (24), et **en ce que** des éléments de poussée élastiques (23) s'engagent avec lesdites plaques de support (22), pour réduire la section. 35 40
 5. Moule pour lingot mobile selon la revendication 4, **caractérisé en ce que** lesdites plaques de support (22) peuvent être inclinées avec ledit élément de bâti de tête (32) dudit moule pour lingot. 45
 6. Moule pour lingot mobile selon la revendication 1, **caractérisé en ce que** lesdits éléments de filière sont formés par des secteurs en cuivre (16 à 19). 50
 7. Moule pour lingot mobile selon la revendication 1, **caractérisé en ce que** lesdits éléments de filière sont réalisés en un matériau ayant un facteur de transmission thermique élevé (16 à 19). 55
 8. Moule pour lingot mobile selon la revendication 1, **caractérisé en ce que** lesdits éléments de filière (16 à 19) sont plats.
 9. Moule pour lingot mobile selon la revendication 1, **caractérisé en ce que** lesdits éléments de filière (16 à 19) sont plats et sont munis à l'une de leurs extrémités d'une saillie en forme de coin (44), de telle sorte que, grâce à l'engagement avec des éléments de filière équivalents, lesdites saillies forment une section ayant des bords émoussés avec une forme octogonale.

Fig.1

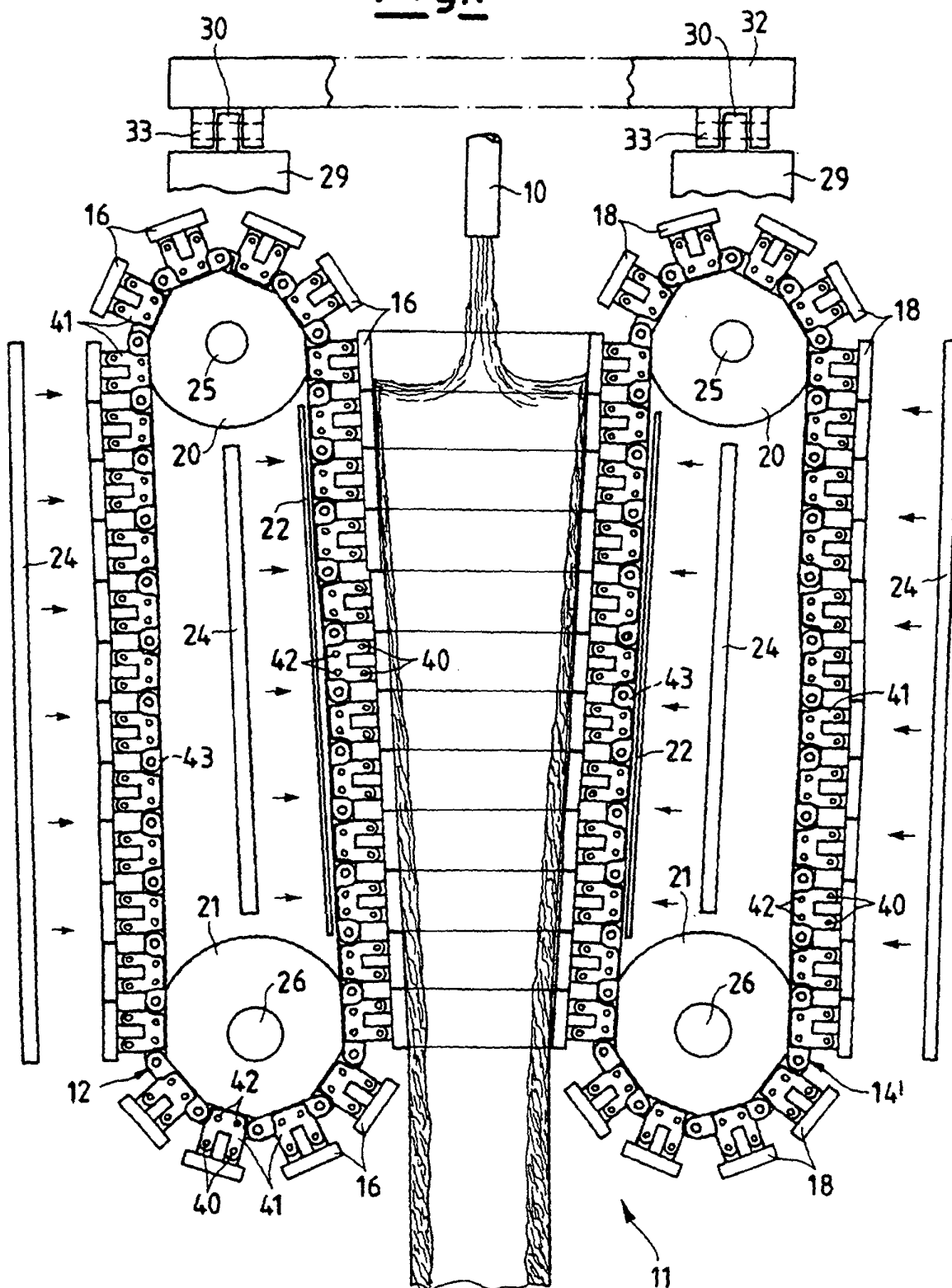


Fig.2

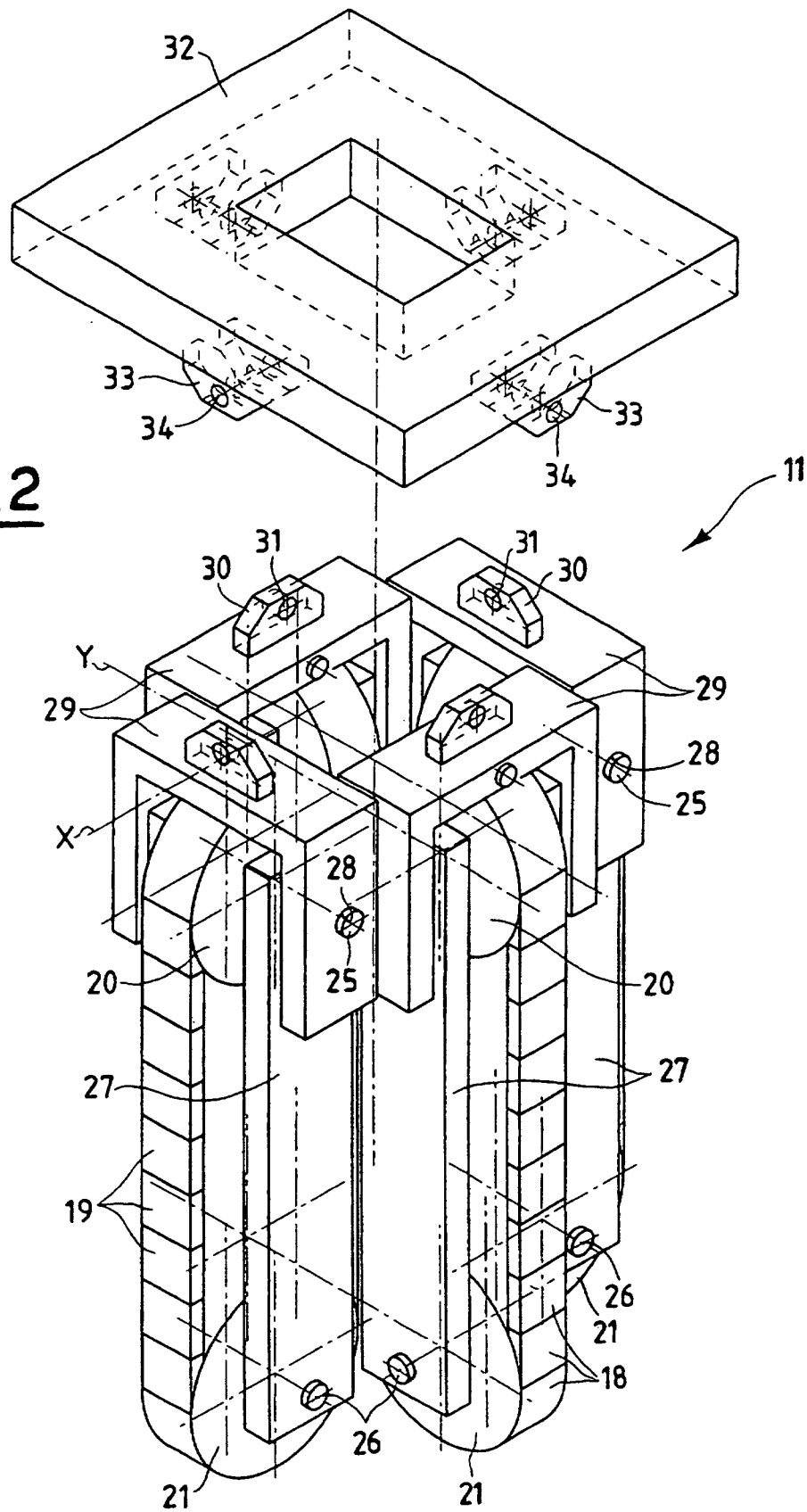


Fig.3

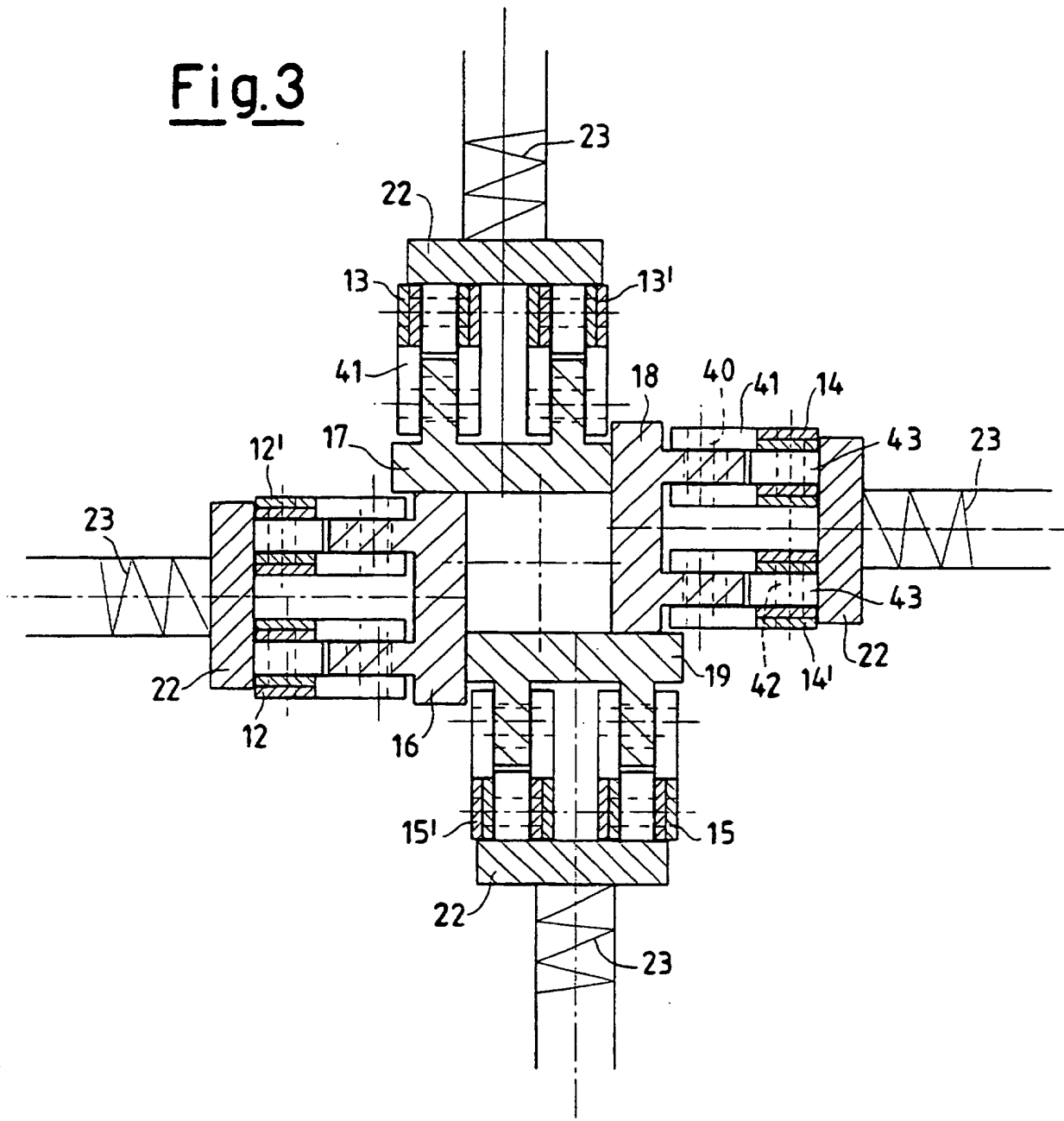


Fig.4

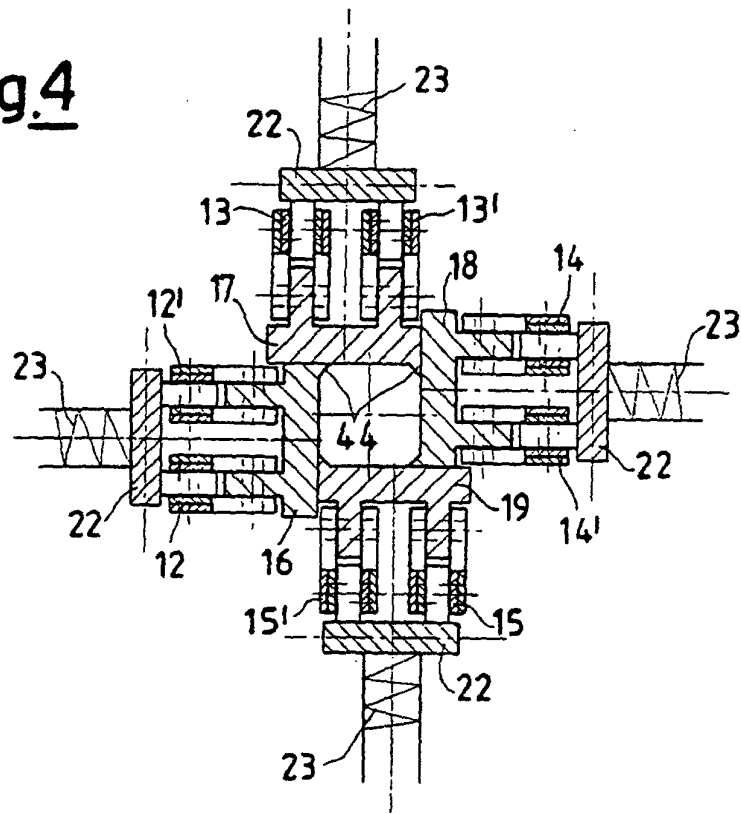


Fig.5

