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(54) **Continuous drawing method for straight drawing operations and device that employs the method.**

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US-A- 2 797 798

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Description

This invention concerns a continuous drawing device for straight drawing. To be more exact, the invention concerns a device whereby the means supporting the drawing clamps and carrying out recirculation of those clamps in the drawing zone provide for adjustment of the distance between their centres in a plurality of steps separate from each other.

The state of the art covers a plurality of continuous drawing methods and devices for straight drawing operations.

Drawbenches are known which employ trolleys moving to-and-fro in the drawing direction; it is well known that these trolleys are troubled by dynamic problems since it is necessary to invert their motion regularly at each engagement and release of the material drawn by the clamps with which the trolleys are fitted. This gives rise to considerable stresses on the moving parts and to problems of guiding and controlling the moving parts. Moreover, the greatest drawback of these embodiments lies in their inability to reach high speeds.

With a view to achieving high speeds the state of the art has provided embodiments having the purpose of obtaining a continuous drawing action on the material being drawn by means of continuous movement of the drawing clamps.

According to the state of the art such clamps are positioned facing each other and parallel along a straight segment and are borne on a pair of tracked means or chains.

Along this straight segment the clamps, half of which are on one tracked means whereas the other half are on the other tracked means, firstly clamp the material and then draw it with a continuous action.

One type of known embodiment arranges that the clamps are borne and moved on the respective tracked means or chains and are secured thereto.

Another type of known embodiment provides for the tracked means or chains to be merely the means that support and recirculate the clamps; the drawing of the clamps performing the drawing operation is carried out by appropriate drawing means, such as threaded means, separate from the chains or tracked means.

These known embodiments include means to adjust mechanically the distance between centres of the tracks so as to adapt that distance to the various drawing diameters. In general, the drawing axis remains constantly the same, while both the tracked means are displaced crosswise to the drawing axis to adjust the distance between centres of the tracks according to the changes in diameter of the drawn product to be obtained.

All the known embodiments entail the problem of imperfect clamping of the drawn product between the clamps; this clamping with its mechanical actuation is not strong enough to meet the considerable drawing stresses in question in an adequate manner.

The results are not very efficient drawing operations, imperfect product quality, mechanical wear and still further shortcomings.

US-A-2,797,798 discloses a rod feeding device with tracks and with the pressure on the stock to be drawn produced by wedge-type positioning means, which serve to align the feed runs with the aperture of the die through which the stock is drawn, and by a plurality of jacks, all of which too act directly on the tracks.

This embodiment employs a combined hydraulic/mechanical system to obtain the positioning and compression action.

In fact, the positioning action is obtained by bevel gear-worm transmissions which act on two eccentrics, which act on two opposed wedge-type systems.

Instead, the system to clamp the stock is entrusted to a plurality of jacks working in sequence.

The positioning system includes also a pair of eccentric bushes which act on two motive shafts.

Starting from a drawing device according to the preamble of claim 1 (as known from US-A-2797798), the problems of the state of the art are overcome by providing a drawing device as defined in claim 1, while the dependent claims describe various embodiments of the invention.

The invention provides for the employment of known means in the drawing operation, the means including chains or tracks to support and draw the drawing clamps.

According to the invention the action of adjusting the distance between centres of the chains or tracks and the final clamping of the clamps on the material being drawn take place in at least two steps with different methods.

The first step is the approach of the chains or tracks to the drawing axis in a known manner by means of substantially mechanical operational means. In this first step one of the two chains or tracks reaches advantageously the final position it will occupy during the drawing operation, whereas the other chain or track is halted in a position near the drawing line but distanced therefrom by a required value.

In the second step, in which the product to be drawn is clamped between the clamps, the second chain or track is brought into cooperation with the first chain or track by a displacement caused by actuation by means of a fluid.

Both the chains or tracks may also be positioned at a distance from the drawing axis and then

be displaced finally by actuation by means of a fluid, but this solution is more complex from a constructional and operational point of view.

The combined action of clamping mechanically and by a fluid has been found to be very efficient and gives an excellent performance even where great diameters are to be drawn. This great efficiency of performance enables drawing assemblies to be constructed with very modest dimensions even where great drawing stresses are involved.

The wear on the operational assemblies is also greatly lessened with resulting advantages.

The attached figures, which are given as a non-restrictive example, show the following:-

Fig.1 gives a diagrammatic side view of a drawing device to which the method according to the invention can be applied;

Fig.2 shows a detail of the drawing device that performs the method.

In Fig.1 a continuous drawing device 10 which is substantially known in itself is positioned downstream of a drawbench 11. In this example the device 10 comprises two drawing chains 12-112 located on the same plane in the neighbourhood of a drawing axis 13.

The two chains 12-112 may lie on the same horizontal, vertical or inclined plane, depending on the choice of the design work.

The two chains 12-112 are wound on their respective sprockets 14; each chain comprises an opposed straight segment on the drawing axis 13.

Each chain 12-112 bears its respective halves of drawing clamps 15-115, which cooperate in forming complete clamps on the drawing axis 13.

Both the first halves 15 and the second halves 115 of the clamps are connected to their respective chains 12-112 by suitable connection means 16.

The device 10 is equipped with means to adjust the distance between centres of the chains 12-112. The adjustment of the distance between centres is required in the initial drawing step when it is necessary to be able to apply great displacements to the clamps 15-115 at a right angle to the drawing axis 13 so as to enable the operations of introduction and gripping of the material to be drawn to be carried out.

This adjustment of the distance between centres in a direction at a right angle to the drawing axis 13 is of a modest value but is also required to adapt the chains 12-112 to the variations in the diameters to be drawn.

The means for adjustment of the distance between centres comprise a motor 17 of a suitable type that actuates a pair of threaded shafts 19 through transmissions 19.

Each threaded shaft 19 comprises two threaded segments 20-120, one having a righthand thread and the other a lefthand thread, which cooperate with their own nut screw assemblies 21-121 (see Fig.2). These nut screw assemblies 21-121 cooperate with sleeve assemblies 22-122 connected to the respective chains 12-112.

The sleeve assemblies 22-122 can slide in relation to the coordinated nut screw assemblies 21-121 and, when thrust by the latter 21-121 during rotation of the threaded shafts 19, are displaced.

According to the invention one chain 12 is brought, by means of the sleeve assembly 22 connected thereto, to a position orthogonally in relation to the drawing axis 13 by the motor 17; this position is the final one to be taken up by that chain 12 according to the pre-selected diameter to be drawn.

The other chain 112 is brought at the same time by the other sleeve assembly 122 connected thereto in the opposite direction to that of the first chain 12 to a required position in relation to the drawing axis 13, but this position is not the final position and is distant by a required value from the drawing axis 13.

The final position of the second chain 112, namely the position for clamping between the two chains 12-112 the material to be drawn, is reached with a supplementary travel of the second sleeve assembly 122. This supplementary travel is obtained by the injection of fluid under pressure into a chamber 23 positioned between the second nut screw assembly 121 and the second sleeve assembly 122.

In this example the fluid under pressure causes the second sleeve assembly 122 to slide in relation to the second nut screw assembly 121 and the second chain 112 to be displaced downwards by a value which corresponds to the play 24 in the embodiment of Fig.2.

Means 25 and 125 are included to eliminate the mechanical play proper to the system and, in particular, the play in the threaded segments 20-120 and nut screw assemblies 21-121.

Embodiments of the invention other than those described hereinbefore are possible within the scope of the invention as defined by the claims.

Claims

1. Continuous drawing device for straight drawing operations, comprising a pair of opposing chain means (12-112) with drawing clamps (15-115) for carrying out the drawing, each of the chain means (12-112) being supported and positioned by movable plate means which are guided in a supporting structure for movement to and from the drawing axis (13), the device further comprising means for adjusting the distance between the plate means, thereby adapting the distance between the chain means (12-

112) to the various drawing diameters, at least one of the plate means being positioned by a pressurised medium,
characterised in that
the means for adjusting the distance between the plate means comprise a threaded shaft (19) rotatably supported by the supporting structure, the threaded shaft (19) being orientated in the direction of the adjustment of the plate means and comprising two threaded segments (20-120) each of which cooperates with threaded first movable means (21-121), rotation of the threaded shaft (19) resulting in opposed movements of the respective first movable means (21-121), each first movable means (21-121) being coupled with respective second movable means (22-122), each of the second movable means (22-122) being rigidly connected with the respective plate means and at least one of the second movable means (22-122) being movable relative to the corresponding first movable means (21-121) in the direction of the adjustment of the plate means, a fluid chamber (23) being positioned between the first movable means (21-121) and second movable means (22-122) and being adapted to be momentarily filled with pressurised fluid for effecting the relative movement between the first (21-121) and second (22-122) movable means.

2. Drawing device according to Claim 1, comprising two means for adjusting the distance between the plate means, the means acting in the vicinity respectively of the upstream end and the downstream end of the plate means, the rotations of the threaded segments (20-120) of the respective means being mechanically synchronised.

3. Drawing device according to Claim 1 or 2, further comprising means (25-125) for eliminating play between the threaded segments (20-120) and the first movable means (21-121)

4. Drawing device according to Claim 3, in which the means (25-125) for eliminating mechanical play comprise two opposed piston means acting on the respective second movable plate means (22-122).

Patentansprüche

1. Kontinuierliche Ziehvorrichtung zum Geradeziehen, die ein Paar von einander gegenüberliegenden Kettenorganen (12 - 112) mit Ziehbacken (15 - 115) zur Durchführung des Ziehens aufweist, wobei jedes der Kettenorgane (12 -112) durch bewegliche Plattenorgane getragen und in die richtige Lage gebracht wird, die in einer Tragkonstruktion zur Ausführung einer Bewegung zur und von der Ziehachse (13) geführt sind, und die Vorrichtung weiters Organe zur Einstellung des Abstandes zwischen den Plattenorganen aufweist, wodurch der Abstand zwischen den Kettenorganen (12 - 112) den verschiedenen Ziehdurchmessern angepaßt wird, wobei ferner mindestens eines der Plattenorgane durch ein Druckmedium in die richtige Lage gebracht wird, **dadurch gekennzeichnet**, daß die Organe zur Einstellung des Abstandes zwischen den Plattenorganen eine Gewindewelle (19) aufweisen, die in der Tragkonstruktion drehbar gelagert, in Richtung der Verstellung der Plattenorgane orientiert ist und zwei Gewindeabschnitte (20 - 120) aufweist, von denen jeder mit ersten beweglichen und mit einem Gewinde versehenen Organen (21 - 121) zusammenwirkt, wobei eine Drehung der Gewindewelle (19) entgegengesetzte Bewegungen der entsprechenden ersten beweglichen Organe (21 - 121) bewirkt, wobei ferner jedes erste bewegliche Organ (21 - 121) mit entsprechenden zweiten beweglichen Organen (22 - 122) gekuppelt ist und jedes der zweiten beweglichen Organe (22 - 122) fest mit den entsprechenden Plattenorganen verbunden ist sowie mindestens eines der zweiten beweglichen Organe (22 - 122) relativ zu dem entsprechenden ersten beweglichen Organ (21 - 121) in Richtung der Verstellung der Plattenorgane beweglich ist, weiters eine Kammer (23) für ein Fluidum zwischen den ersten beweglichen Organen (21 - 121) und den zweiten beweglichen Organen (22 - 122) angeordnet ist, die zur vorübergehenden Füllung mit einem unter Druck stehenden Fluidum ausgebildet ist, um die relative Verschiebung zwischen den ersten (21 - 121) und den zweiten (22 - 122) beweglichen Organen zu bewirken.

2. Ziehvorrichtung nach Anspruch 1, die zwei Organe für die Einstellung des Abstandes zwischen den Plattenorganen aufweist, wobei diese Organe nahe des in Arbeitsrichtung vorderen Endes und des hinteren Endes der Plattenorgane wirken und die Drehung der Gewindeabschnitte (20 -120) der entsprechenden Organe mechanisch synchronisiert ist.

3. Ziehvorrichtung nach Anspruch 1 oder 2, die weiters Organe (25 - 125) zum Ausschalten des Spiels zwischen den Gewindeabschnitten (20 - 120) und den ersten beweglichen Organen (21 - 121) aufweist.

4. Ziehvorrichtung nach Anspruch 3, bei der die Organe (25 - 125) zum Ausgleich des mechanischen Spiels zwei gegenüberliegende Stempelorgane aufweisen, die auf die entsprechenden zweiten beweglichen Plattenorgane (22 - 122) wirken.

Revendications

1. Dispositif d'étirage en continu pour des opérations d'étirage droit, comportant une paire de moyens à chaîne (12-112) situés l'un en face de l'autre, comportant des pinces d'étirage (15-115) pour effectuer l'étirage, chacun des moyens à chaîne (12-112) étant soutenu et positionné par des moyens à plaque mobile qui sont guidés dans une structure de soutien pour se rapprocher et s'écarter de l'axe d'étirage (13), le dispositif comportant en outre des moyens pour ajuster la distance entre les moyens à plaque, pour ainsi adapter la distance entre le moyens à chaîne (12-112) aux différents diamètres d'étirage, au moins un des moyens à plaque étant positionné par un fluide sous pression,
caractérisé en ce que
les moyens pour ajuster la distance entre les moyens à plaque comportent un arbre fileté (19) soutenu à rotation par la structure de soutien, l'arbre fileté (19) étant orienté dans la direction de l'ajustement du moyen à plaque et comportant deux segments filetés (20-120), dont chacun coopère avec des premiers moyens mobiles filetés (21-121), la rotation de l'arbre fileté (19) entraînant des déplacements opposés des premiers moyens mobiles respectifs (21-121), chaque premier moyen mobile (21-121) étant accouplé à des seconds moyens mobiles respectifs (22-122), chacun des seconds moyens mobiles (22-122) étant solidaire des moyens à plaque respectifs, et au moins un des seconds moyens mobiles (22-122) pouvant être déplacé par rapport au premier moyen mobile (21-121) dans la direction de l'ajustement des moyens à plaque, une chambre à fluide (23) étant située entre les premiers moyens mobiles (21-121) et les seconds moyens mobiles (22-122) et étant adaptée pour être temporairement remplie de fluide sous pression pour effectuer le déplacement relatif entre les premiers (21-121) et les seconds (22-122) moyens mobiles.

2. Dispositif d'étirage selon la revendication 1, comportant deux moyens pour ajuster la distance entre les moyens à plaque, les moyens agissant respectivement au voisinage de l'extrémité amont et de l'extrémité aval des moyens à plaque, les rotations des segments filetés (20-120) des moyens respectifs étant synchronisées mécaniquement.

3. Dispositif d'étirage selon la revendication 1 ou 2, comprenant en outre des moyens (25-125) pour éliminer le jeu entre les segments filetés (20-120) et les premiers moyens mobiles (21-121).

4. Dispositif d'étirage selon la revendication 3, dans lequel les moyens (25-125) pour éliminer le jeu mécanique comportent deux moyens opposés à piston agissant sur les seconds moyens mobiles à plaque respectifs (22-122).

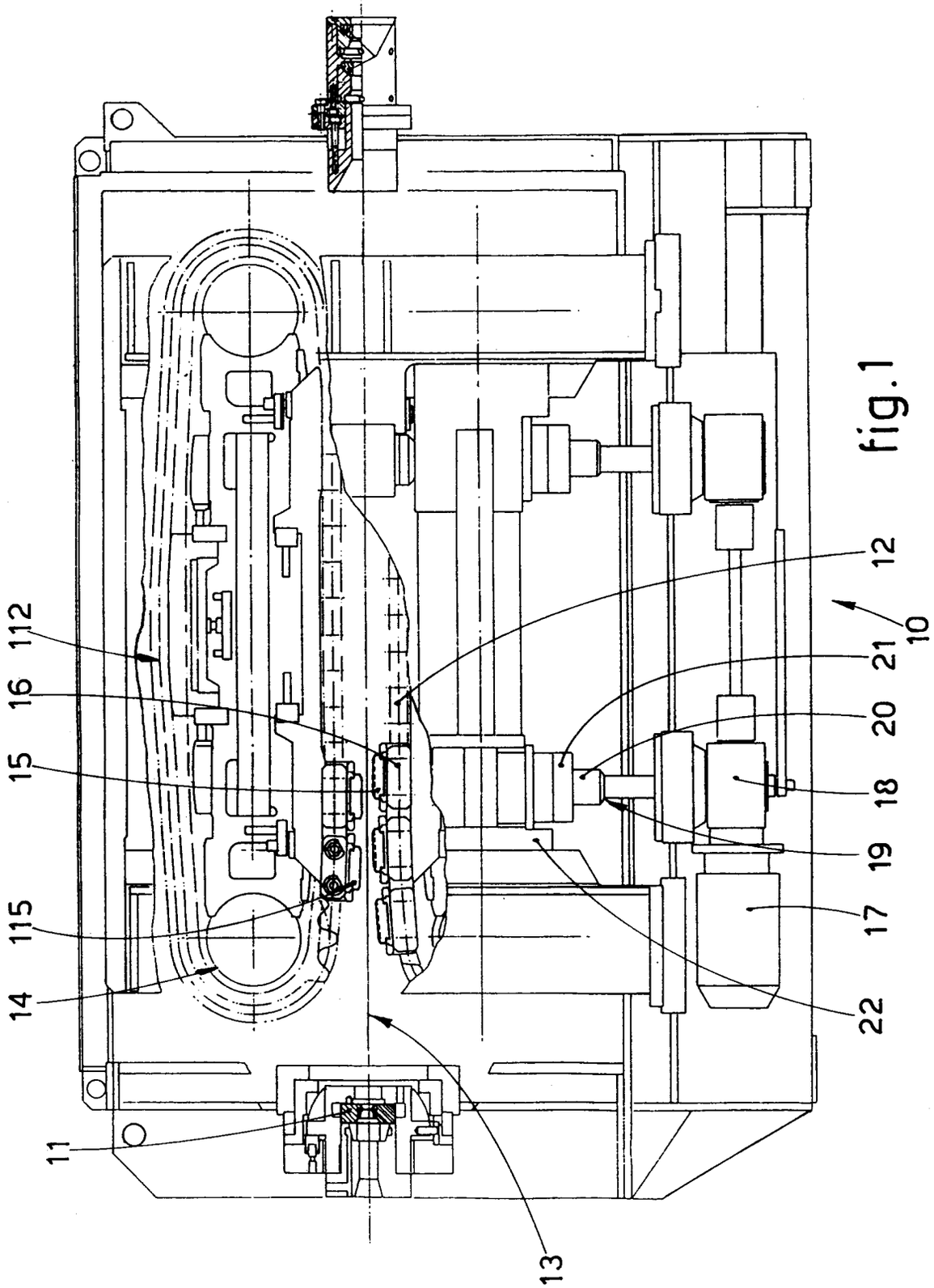


fig.1

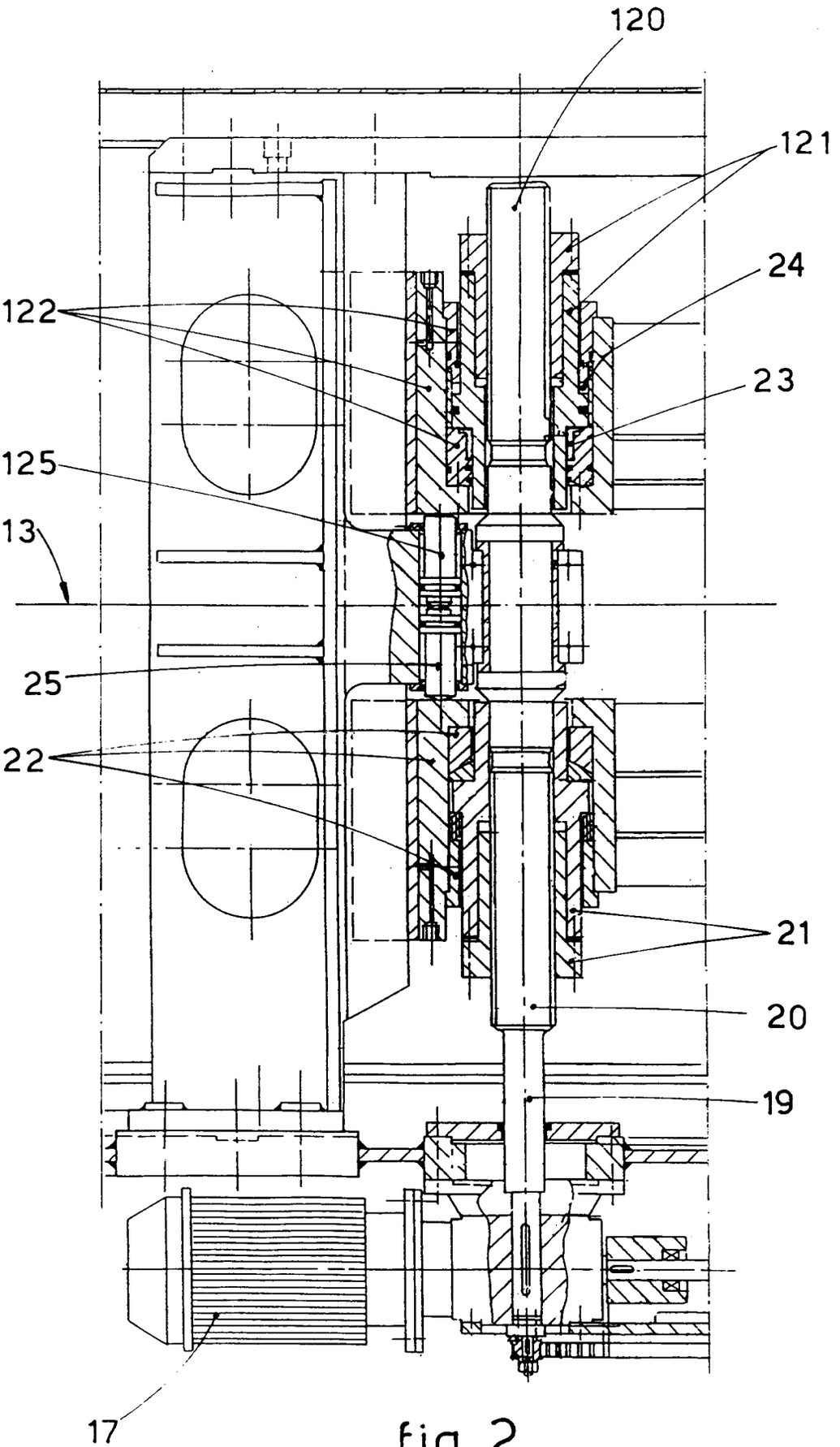


fig. 2