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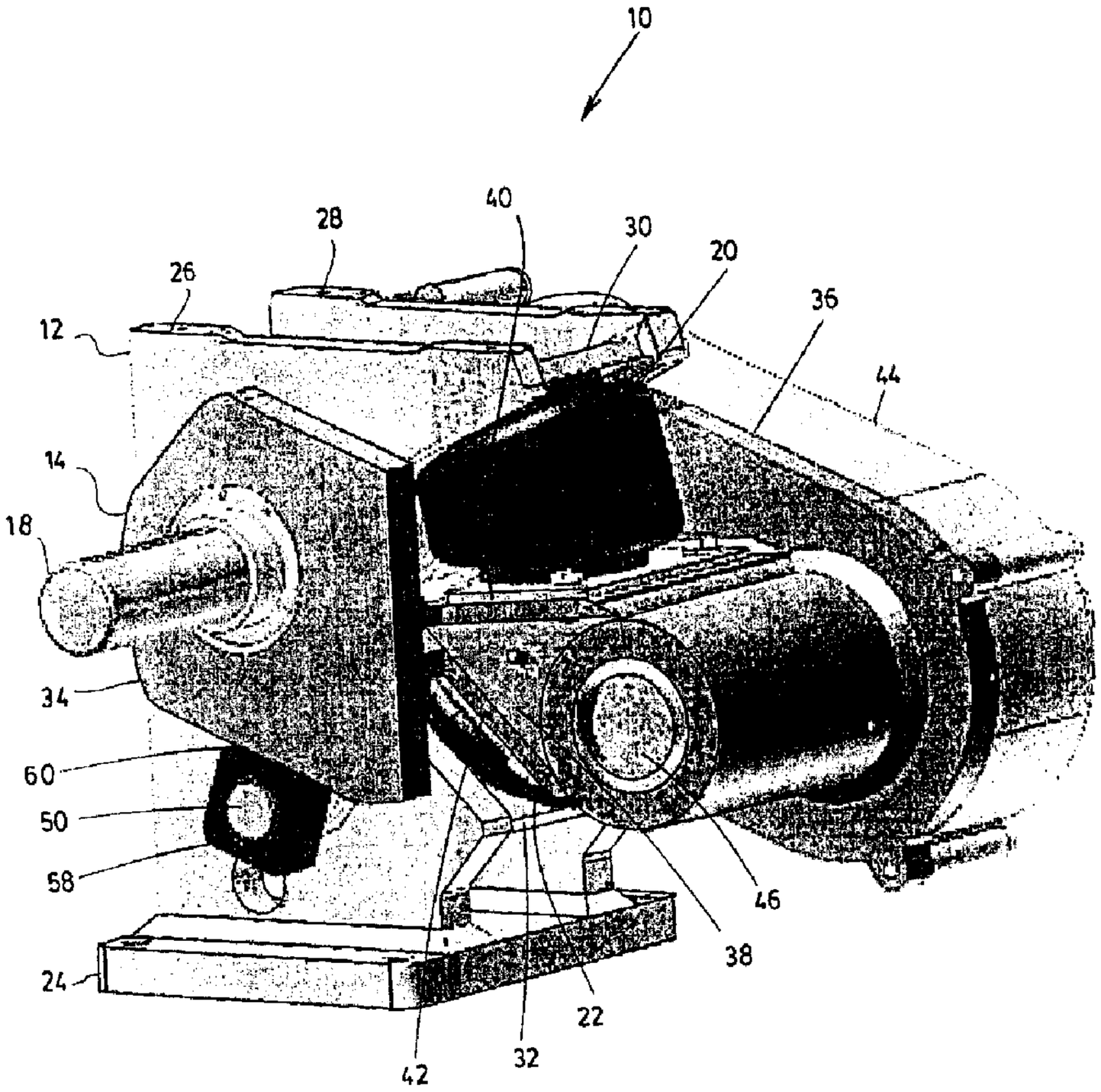
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(54) Titre : MECANISME DE POSITIONNEMENT POUR DISPOSITIF D'ENGAGEMENT D'ARTICLE EN BOIS
(54) Title: POSITIONING MECHANISM FOR A WOODEN ARTICLE ENGAGING DEVICE



(57) Abrégé/Abstract:
A positioning mechanism for a wooden article engaging device having a frame, a rocker arm, first and second air cushions and an eccentric member is provided. The rocker arm has a first end pivotally connected to the frame and a second end connected to the

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(57) Abrégé(suite)/Abstract(continued):
device. The first and second air cushions are fixed between the frame and the rocker arm. Each of the first and second air cushions has an air pressure therein which is controllable to vertically pivot the rocker arm in order to position the wooden article engaging device in one of a clearance position and a working position. The eccentric member eccentrically pivots about a generally horizontal axis, the at least one eccentric member is engages the rocker arm when in the working position. In this way, the eccentric pivoting of the eccentric member acts to pivot the rocker arm to further adjust the device.

Abstract:

A positioning mechanism for a wooden article engaging device having a frame, a rocker arm, first and second air cushions and an eccentric member is provided. The rocker arm has a first end pivotally connected to the frame and a second end connected to the device. The first and second air cushions are fixed between the frame and the rocker arm. Each of the first and second air cushions has an air pressure therein which is controllable to vertically pivot the rocker arm in order to position the wooden article engaging device in one of a clearance position and a working position. The eccentric member eccentrically pivots about a generally horizontal axis, the at least one eccentric member is engages the rocker arm when in the working position. In this way, the eccentric pivoting of the eccentric member acts to pivot the rocker arm to further adjust the device.

POSITIONING MECHANISM FOR A WOODEN ARTICLE ENGAGING DEVICE

Field of the invention:

The present invention relates to wood processing machinery. More particularly, the present invention concerns a positioning mechanism for a wooden article engaging device such as a roller or the like.

Background of the invention:

In the wood processing industry, wooden articles of varying sizes and shapes, and in varying stages of processing and finishing, are transported to and from wood processing machines, along conveyors and the like, in controlled production lines. Such a wooden article is transported along a specific path and must approach each successive processing station at a specific speed and in a specific orientation.

If a plank is improperly guided during transportation, the risk of it being misaligned as it is received by a processing machine is greatly increased. During processing, such a misalignment can lower the accuracy and effectiveness of the processing machine, for example a planer, a contouring machine, a molder or the like, increase the failure rate and result in a wasting of the material. Moreover, modern conveyors transport planks at high speeds and misalignment at any stage of the production line could cause damaging collisions, jams and equipment breakdowns, resulting in lost production and costly delays.

It is known in the art to provide a wooden article engaging device, for example rollers, rails, belt conveyors or the like for implementation alone, or in combination, with processing equipment in order to engage the wooden articles. Such devices guide the moving planks before, during or after the processing operation so as to ensure their proper alignment with the processing machines.

Rollers, for example, rotate at a desired speed, driving the plank along the line. In addition they may also be operable to apply a pressure to the planks in order to keep them on the track. In order to control the pressure applied and accommodate planks of varying dimension, the distance between the roller and the track is variable.

In order to compensate for any unevenness in the plank, it is known to mount the rollers or the like with resilient shock absorbing mechanisms, such as an air cushion or other resilient member, in order to keep the applied pressure constant. United States Patent No. 6,283,353 (GILBERT) teaches a roller device for applying pressure on a wooden article including an air cushion disposed between the roller and the frame above the arm supporting the roller.

A major drawback associated with positioning mechanisms, is that they are difficult to adjust. More specifically, operation of such prior art devices must generally be stopped in order to perform any adjustment of the position of the device.

In view of the above, there is remains a need for an improved positioning mechanism for wooden article engaging devices with increased adjustability and ease of operation.

Summary of the invention:

An object of the present invention is to provide a positioning adjustment mechanism for a wooden article engaging device which, by virtue of its design and components, satisfies some of the above-mentioned needs and is thus an improvement over other related assemblies known in the prior art.

In accordance with the present invention, the above object is achieved, as will be easily understood, with a positioning mechanism such as the one briefly described herein and such as the one exemplified in the accompanying drawings.

In accordance with a first aspect of the present invention, there is therefore provided a positioning mechanism for a wooden article engaging device having a frame, a rocker arm, first and second air cushions and at least one eccentric member. The rocker arm has a first end pivotally connected to the frame and a second end connected to the wooden article engaging device. The first and second air cushions are fixed between the frame and the rocker arm, on either side of the rocker arm. Each of the first and second air cushions has an air pressure therein which is controllable to vertically pivot the rocker arm in order to position the wooden article engaging device in one of a clearance position and a working position. The at least one eccentric member eccentrically pivots about a generally horizontal axis with respect to the frame, and is operable to engage the rocker arm when the wooden article engaging device is in the working position. In this way, the eccentric pivoting of the at least one eccentric member with respect to the axis acts to pivot the rocker arm to further adjust the wooden article engaging device within the working position.

In accordance with a second aspect of the present invention, there is also provided a positioning system for a plurality of wooden article engaging devices. The positioning system includes a plurality of positioning mechanisms each associated with a corresponding wooden article engaging device. Each positioning mechanism has a rocker arm, first and second air cushions and at least one eccentric member. The rocker arm has a first end pivotally connected to the frame and a second end connected to the corresponding wooden article engaging device. The first and second air cushions are fixed between the frame and the rocker arm, on either side of the rocker arm. Each of the first and second air cushions has an air pressure therein which is controllable to vertically pivot the rocker arm in order to position the wooden article engaging device in one of a clearance position and a working position. The at least one eccentric member eccentrically pivots about a generally horizontal axis with respect to the frame. The at least one eccentric member is operable to engage the rocker arm when the wooden article engaging device is in the working position. In this way, the eccentric pivoting of the at least one eccentric member with respect to the axis

acts to pivot the rocker arm to further adjust the wooden article engaging device within the working position. The positioning system further includes at least one synchronization member operatively connected between the eccentric members of adjacent mechanisms for synchronizing the adjustment of the plurality of wooden article engaging devices.

Advantageously, this present invention provides a positioning mechanism and system for a wooden article with increased adjustability and ease of operation.

The invention and its advantages will be better understood by reading the following non-restrictive description of a preferred embodiment thereof, made with reference to the accompanying drawings.

Brief description of the drawings:

These and other objects and advantages of the invention will become apparent upon reading the detailed description and upon referring to the drawings in which:

FIG. 1 is a partial cutaway perspective view of a positioning mechanism in accordance with an embodiment of the present invention.

FIG. 2 is a rear view of the positioning mechanism of FIG. 1.

FIG. 3 is a side view of the positioning mechanism of the previous Figures in a working position, showing an adjusted working position in phantom lines, the rocker arm being shown in transparency.

FIG. 4 is a cross-sectional view taken along IV-IV in FIG. 2 of the positioning mechanism in a clearance position.

FIG. 5 is a cross-sectional view taken along IV-IV in FIG. 2 of the positioning mechanism in a working position.

FIG. 6 is a perspective view of a positioning system in accordance with another embodiment of the present invention.

FIG. 7 is a partial perspective view of the positioning system of FIG. 6.

Detailed description of preferred embodiments of the invention:

In the following description, the same numerical references refer to similar elements. The embodiments shown in the figures are preferred, for exemplification purposes only.

In the context of the present description, the expression "wooden article" includes all appropriate types of wood products, as apparent to a person skilled in the art. For this reason, the expressions “timber”, “lumber”, “board", "plank" or "article ", for example, should not be taken as to limit the scope of the present invention, may be used interchangeably and include all other kinds of items with which the present invention may be used and could be useful.

In addition, although the preferred embodiments of the present invention as illustrated in the accompanying drawings include various components, etc., and although the preferred embodiments of the positioning mechanism and system and corresponding parts of the present invention as shown consist of certain geometrical configurations as explained and illustrated herein, not all of these components and geometries are essential to the invention and thus should not be taken in their restrictive sense, i.e. should not be taken as to limit the scope of the present invention. It is to be understood, as also apparent to a person skilled in the art, that other suitable components and co-operations therebetween, as well as other suitable geometrical configurations may be used for the positioning mechanism and system according to the present invention, as will be briefly explained herein and as can be easily inferred herefrom by a person skilled in the art, without departing from the scope of the invention.

With reference to FIGs. 1 to 5, there is shown a positioning mechanism 10 for a wooden article engaging device 16 according to a first embodiment of the present invention. The positioning mechanism 10 includes a frame 12 mounted in proximity to the path of a wooden article (not shown), and a rocker arm 14 pivotally mounted to the frame 12 for holding the wooden article engaging device 16. In the present embodiment, the wooden article engaging device 16 is preferably a roller, although, other suitable devices, such as belt conveyors or the like, are also within the scope of the present invention.

In the illustrated embodiment, the rocker arm 14 is pivotally connected to the frame 12 about an axle 18, enabling the roller 16 to be pivoted between an upper "clearance position" where the roller 16 is elevated and away from the path of the wooden article, and a lower "working position", where the roller 16 is lowered and apt to interact with the wooden article. These positions are best seen in FIGs. 4 and 5, respectively. A first air cushion 20 and a second air cushion 22 are disposed on opposite sides of the rocker arm 14 to effect this pivoting. Control of the air pressure in both these air cushions enables and operator to position the roller 16 in either of the clearance and working positions, as will be discussed in further detail herein below.

The frame 12 is preferably provided with a base 24 for fixing the mechanism 10 along a processing line, and left and right side walls 26 and 28 extending substantially vertically from the base 20 and substantially parallel to one another. Extending transversally between the side walls 26 and 28 are upper and lower cushion supports 30 and 32 for retaining the upper and lower air cushions 20 and 22, respectively.

Referring more particularly to FIG. 1 showing the positioning mechanism 10 in a partial cutaway, the rocker arm 14 preferably includes left and right side panels 34 and 36, also extending substantially vertically in parallel to one another. Extending between the side panels 34 and 36 is a cushion seat 38 having upper and lower

faces 40 and 42. The upper and lower faces 40 and 42 serve to connect the upper and lower air cushions 20 and 22 to the rocker arm 14, respectively. Preferably, the air cushions 20 and 22, the cushion supports 30 and 32 of the frame 12, and the faces 40 and 42 are all at least partially angled about the axle 18. As seen best in the cross-sectional views of FIGs. 4 and 5, the planes of the cushion supports 30 and 32 are aligned radially with the axis of the axle 18. The upper face 40 is disposed so as to be substantially parallel to the upper cushion support 30 when the mechanism 10 is in the clearance position (see FIG. 4). In addition, the cushion seat 38, in the area of the upper and lower faces 40 and 42, is triangular. Consequently, when the lower air cushion 22 is inflated, the upper air cushion 20 may advantageously be reduced to its smallest volume. Similarly, the lower face 42 is disposed to as to be substantially parallel to the lower cushion support 32 when the mechanism 10 is in the working position (see FIG. 5).

Advantageously, in the present embodiment the left and right side panels 34 and 36 are disposed outside of the side walls 26 and 28. It will be noted that the cushion supports 30 and 32, faces 40 and 42 and side walls 26 and 28 preferably surround the air cushions 20 and 22 in order to protect them from damage.

In operation, the roller 16 is driven by a motor (not shown) operatively connected to the free end of the axle 18 extending from the left side panel 34. The motion of the axle 18 is transferred to the roller 16, which rotates about a roller axle 46, via gearing 44. The gearing 44 is mounted directly to the right side panel 36. The axle 46 passes through the cushion seat 38 and is mounted, preferably via roller bearings, at both the left and right side panels 34 and 36. The motor axle 46 is preferably substantially parallel to the axle 18.

Positioned on opposite sides of the rocker arm 14, the upper and lower air cushions 20 and 22 cooperate to position the roller 16 by a coordinated inflation of one and deflation of the other. In the first embodiment, this opposition of positions is achieved by positioning the first and second air cushions 20 and 22 above and below the rocker arm 14, respectively.

When the lower air cushion 22 is inflated, as seen in FIG. 4, the roller 16 is lifted and said to be in the clearance position. This position is useful for inspecting the roller, for clearing jams, for removing pieces at the end of a production cycle, and the like.

When the upper air cushion 20 is inflated and the lower air cushion 22 is deflated, as seen in FIGs. 1 and 5, the roller 16 is allowed to drop and said to be in the working position and operable to engage lumber passing therebelow. By regulating the degree of inflation of each air cushion 20 and 22, and more specifically the air pressure within the upper air cushion 20, the upper air cushion 20 is operable to absorb the shocks resulting from the engagement of the roller 16 with the planks. The air pressure in the air cushions 20 and 22 is preferably controlled via an air pump (not shown) via pneumatic tubing (also not shown).

As will be apparent to one of ordinary skill in the art, the expressions “inflated” and “deflated” as used herein are not to be construed in absolute terms indicating a complete filling or emptying of air within a given cushion. Rather, the air pressure in the upper air cushion 20 may be simply released as the lower air cushion 22 is expanded, and vice versa.

In an alternate embodiment, the rocker arm 14 extends on both sides of the axle 18 and the first and second air cushions 20 and 22 are disposed behind and in front of the axle 18. As will be apparent to one of ordinary skill in the art, placing the air cushions 20 and 22 on opposite sides of the axis of rotation, both either above or below the rocker arm 14, achieves exactly the same functionality as if the air cushions 20 and 22 were vertically opposite one another. More precisely, the inflation of the first air cushion 20 located behind the axle 18 and below the rocker arm 14, combined with the corresponding deflation of the second air cushion 22 located between the axle 18 and the roller 16 will put the roller 16 in the working position. As will be further apparent to one of ordinary skill in the art, a similar

arrangement wherein both air cushions are above the rocker arm 14 and on either side of axle 18 is similarly within the scope of the present invention.

FIGs. 4 and 5, which show the mechanism 10 in cross-section, illustrate the maximum and minimum heights 46 and 48 of the roller 16, respectively. Given, for example, a 12 inch (30.48 centimeters) diameter roller, the maximum height 46 is 5 ¼ inches (13.34 centimeters). This is the height of the roller 16 in the clearance position in one embodiment of the invention. In this example, the minimum height 48 is $^{15}/_{16}$ inches (2.38 centimeters). This minimum height 48 is the lowest possible working position, however the working position is not limited to this minimum position, as will be evident from the description below.

While in the working position, the height of the roller 16 is further adjustable by an eccentric member 50 which is eccentrically pivotable about a generally horizontal axis with respect to the frame 12. Preferably, the mechanism 10 includes two such eccentric members 50 projecting laterally outward from an adjustment shaft 52 disposed therebetween and engaging the left and right side panels 34 and 36. The adjustment shaft 52 passes through the frame 12 and is mounted, preferably via roller bearings, on both the left and right side panels 34 and 36. Preferably, the adjustment shaft 52 is substantially parallel to the axle 18.

In a preferred embodiment, the eccentric member 50 has a circular cross-section of lesser diameter than that of the adjustment shaft 52. Because the member 50 is eccentric, i.e. the axis of the adjustment shaft, about which it rotates, does not coincide with its geometric center, any rotation thereof will possess a translational component. In the working position, the eccentric member 50 engages the rocker arm 14 and thereby displaces it upon its eccentric rotation with respect to the frame 12.

In an alternate embodiment, and equally within the scope of the present invention, the eccentric member 50 may be cam-shaped, that is having a non-circular cross section. In such a case, any rotation, whether about the geometric centre of the

member 50 or not, will similarly cause a displacement of the rocker arm 14 when it is engaging its periphery.

With specific reference to FIG. 3, the rocker arm 14 and roller 16 are shown at the minimum height 48, as well as in phantom lines at a maximum working height 54. Returning to the example of a 12 inch (30.48 centimeters) roller 16, the maximum working height 54 is 3 ⅛ inches (7.94 centimeters). This variation in working height corresponds to a rotation 56 of the eccentric member 50, in this case a rotation of 70°.

As illustrated, the eccentric member 50 is located below the rocker arm 14 such that the rocker arm 14 sits thereon, engaging its periphery. Preferably, the eccentric member engages the rocker arm 14 via a block 58 having a flat surface 60. As the eccentric member 50 rotates with respect to the frame 12, the block 58 can pivot about the eccentric member 50 and maintain its contact with the rocker arm 14 along the flat surface 60. Preferably, the block 58 is made of a firm but resilient material, for example a rubber, which contributes to further dampen any shock transmitted from the device 16 to the frame 12.

Once in the working position, the roller 16 can be further adjusted to any position between the minimum height 48 and the maximum working height 54 by rotating the adjustment shaft 52 and displacing the eccentric member 50.

With reference to FIGs. 6 and 7, there is shown a positioning system 90 for a plurality of wooden article engaging devices 16, for example two rollers 16, according to a second embodiment of the present invention. The positioning system 90 as embodied herein includes two positioning mechanisms 100 each of which corresponding substantially to the positioning mechanism as described hereinabove.

As in the previous embodiment, each positioning mechanism 100 includes a frame 112 mounted in proximity to the path of a wooden article and a rocker arm 114

pivotally mounted thereto for holding a roller 116. In this particular embodiment, a second, non-adjustable roller 118 is provided beneath each roller 116 for rotating in conjunction therewith. Again, each rocker arm 114 includes side panels 134 and 136, and a cushion seat 138 extending therebetween, as well as a pair of eccentric members 150 projecting eccentrically from an adjustment shaft 152.

The positioning system 90 further includes a synchronization member 160 operatively connected between the eccentric members 150 so as to synchronize the adjustment of the plurality of rollers 116. The synchronization member 160 may be directly or indirectly connected, but is preferably a mechanical link pivotally connected to each adjustment shaft 152, although it may also be, but is in no way limited to, a pneumatic or hydraulic circuit, an electronic position encoder with servomotors and a controller, or a rack engaging a pinion attached to each eccentric member 150.

In order rotate the adjustment shaft 152, a linear actuator 162 is operatively connected thereto by a linking member 164. The linear actuator 162 can be an electrically or electronically controlled servo motor, but is preferably a screw jack 162 operable by a handle 166 and lockable by a lock 168. In use, an operator adjusts the working height of the device 116 in accordance with the thickness of a particular plank to be processed by turning the handle 166, which drives the screw jack 162 and rotates the adjustment shaft 152 of a first mechanism 100. The adjustment of the working height of the first mechanism 100 is transferred to the remaining mechanisms 100 of system 90 by synchronization member 160. The lock 168 is provided to ensure that the working position is not further altered during operation. Advantageously, this adjustment can be safely and easily carried out during operation of the rollers 116 and hence without unduly disrupting the production line.

As will be apparent to one of ordinary skill in the art, the use of the actuator 162, the handle 166, and the lock 168 is not limited to the system 90 but is equally applicable to the system 10 of FIGs. 1 to 5.

As being now better appreciated, the present invention is an improvement and presents several advantages over other related devices and/or methods known in the prior art. Indeed, the present invention is particularly advantageous in that it provides a positioning system for a wooden article engaging device with increased adjustability and ease of operation.

Of course, numerous modifications could be made to the above-described embodiments without departing from the scope of the invention, as apparent to a person skilled in the art. While a specific embodiment of the present invention has been described and illustrated, it will be apparent to those skilled in the art that numerous modifications and variations can be made without departing from the scope of the invention as defined in the appended claims.

Claims:

1. A positioning mechanism for a wooden article engaging device, the positioning mechanism comprising:

a frame;

a rocker arm having a first end pivotally connected to the frame and a second end connected to the wooden article engaging device;

first and second air cushions fixed between the frame and the rocker arm on opposite sides of the rocker arm, each of the first and second air cushions having an air pressure therein controllable to vertically pivot the rocker arm so as to position the wooden article engaging device in one of a clearance position and a working position;

at least one eccentric member eccentrically pivotable about a generally horizontal axis with respect to the frame, the at least one eccentric member being operable to engage the rocker arm when the wooden article engaging device is in the working position so that eccentric pivoting of the at least one eccentric member with respect to the axis pivots the rocker arm to further adjust the wooden article engaging device within the working position.

2. The positioning mechanism of claim 1, further comprising an adjustment shaft rotationally connected to the frame and rotatable about the axis, the at least one eccentric member projecting eccentrically therefrom.

3. The positioning mechanism of claim 2, further comprising a linear actuator for rotating the adjustment shaft.

4. The positioning mechanism of claim 2, further comprising a linking member operatively disposed between the adjustment shaft and the linear actuator.

5. The positioning mechanism of claim 3, further comprising a radial arm extending radially from the adjustment shaft, the linking member being operatively connected to a radial arm.

6. The positioning mechanism of claim 3, wherein the linear actuator is actuated by a handle.

7. The positioning mechanism of claim 6, wherein the handle is lockable.

8. The positioning mechanism of claim 1, further comprising a block operable to pivot about the at least one eccentric member, the block having a flat surface for contacting the rocker arm along a corresponding surface.

9. The positioning mechanism of claim 8, wherein the block is made of rubber.

10. The positioning mechanism of claim 1, wherein the frame comprises left and right side walls, the first and second air cushions being located laterally therebetween.

11. The positioning mechanism of claim 10, wherein the first air cushion is fixed above the rocker arm and the second air cushion is fixed below the rocker arm.

12. The positioning mechanism of claim 11, wherein the frame further comprises upper and lower cushion supports extending between the left and right side walls, the upper and lower cushion supports retaining the first and second air cushions, respectively.

13. The positioning mechanism of claim 12, wherein the rocker arm comprises left and right side panels, said left and right side panels being pivotally connected to the left and right side walls, respectively.

14. The positioning mechanism of claim 13, wherein the rocker arm further comprises a cushion seat extending between the left and right side panels and having upper and lower faces, the upper and lower faces engaging the first and second air cushions, respectively.

15. The positioning mechanism of claim 14, wherein the cushion seat has an at least partially triangular cross-section.

16. The positioning mechanism of claim 15, wherein the at least one eccentric member comprises a pair of eccentric members each operable to engage a respective one of the left and right side panels.

17. The positioning mechanism of claim 16, further comprising an adjustment shaft pivotally connected to the frame and pivotable about the axis, the eccentric members projecting eccentrically from opposing ends thereof.

18. The positioning mechanism of claim 1, wherein the first air cushion air pressure is regulated to dampen movement of the rocker arm when the wooden article engaging device is in the working position.

19. A positioning system for a plurality of wooden article engaging devices, the positioning system comprising:

a plurality of positioning mechanisms, each positioning mechanism associated with a corresponding one of the plurality of wooden article engaging devices, each positioning mechanism comprising:

a frame;

a rocker arm having a first end pivotally connected to the frame and a second end connected to the corresponding wooden article engaging device;

fist and second air cushions fixed between the frame and the rocker arm on opposite sides of the rocker arm, each of the first and second air cushions having an air pressure therein controllable to vertically pivot the rocker arm so as to position the corresponding wooden article engaging device in one of a clearance position and a working position; and

at least one eccentric member eccentrically pivotable about an axis with respect to the frame, the at least one eccentric member operable to engage the rocker arm when the corresponding wooden article engaging device is in the working position so that eccentric pivoting of the at least one eccentric member with respect to the axis pivots the rocker arm to further adjust the corresponding wooden article engaging device within the working position; and

at least one synchronization member operatively connected between the eccentric members of adjacent mechanisms for synchronizing the adjustment of the plurality of wooden article engaging devices.

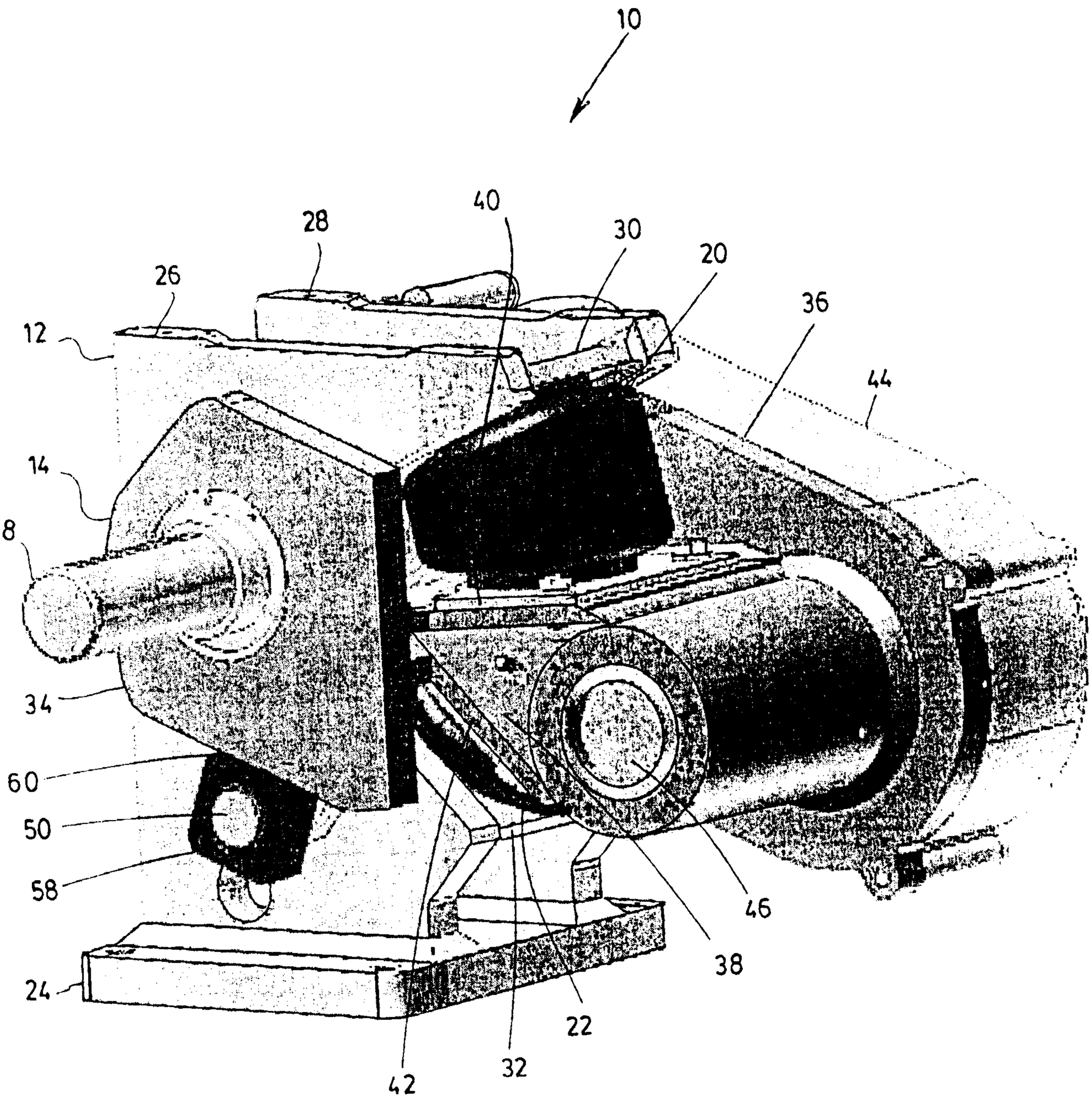


FIG. 1

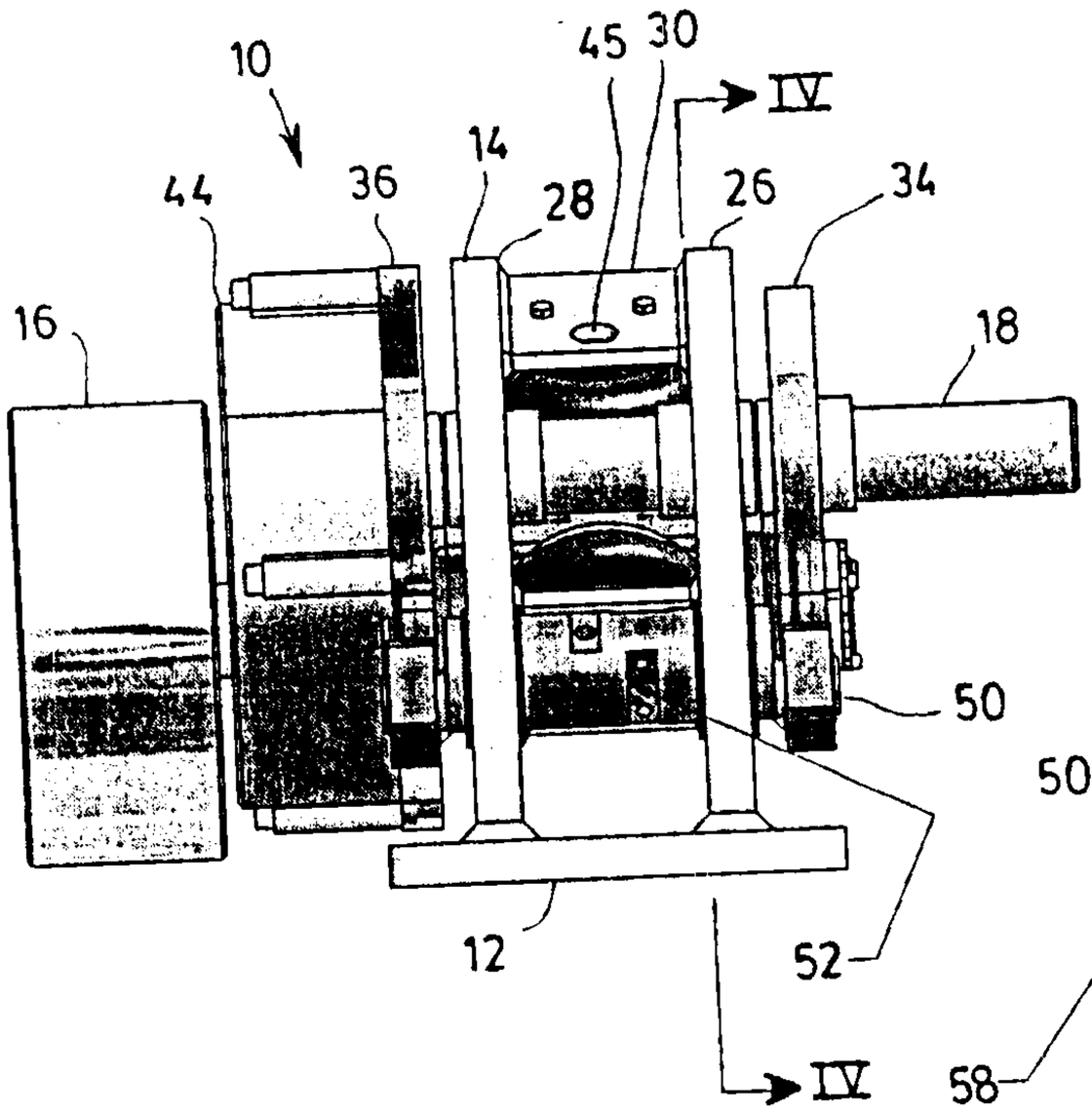


FIG. 2

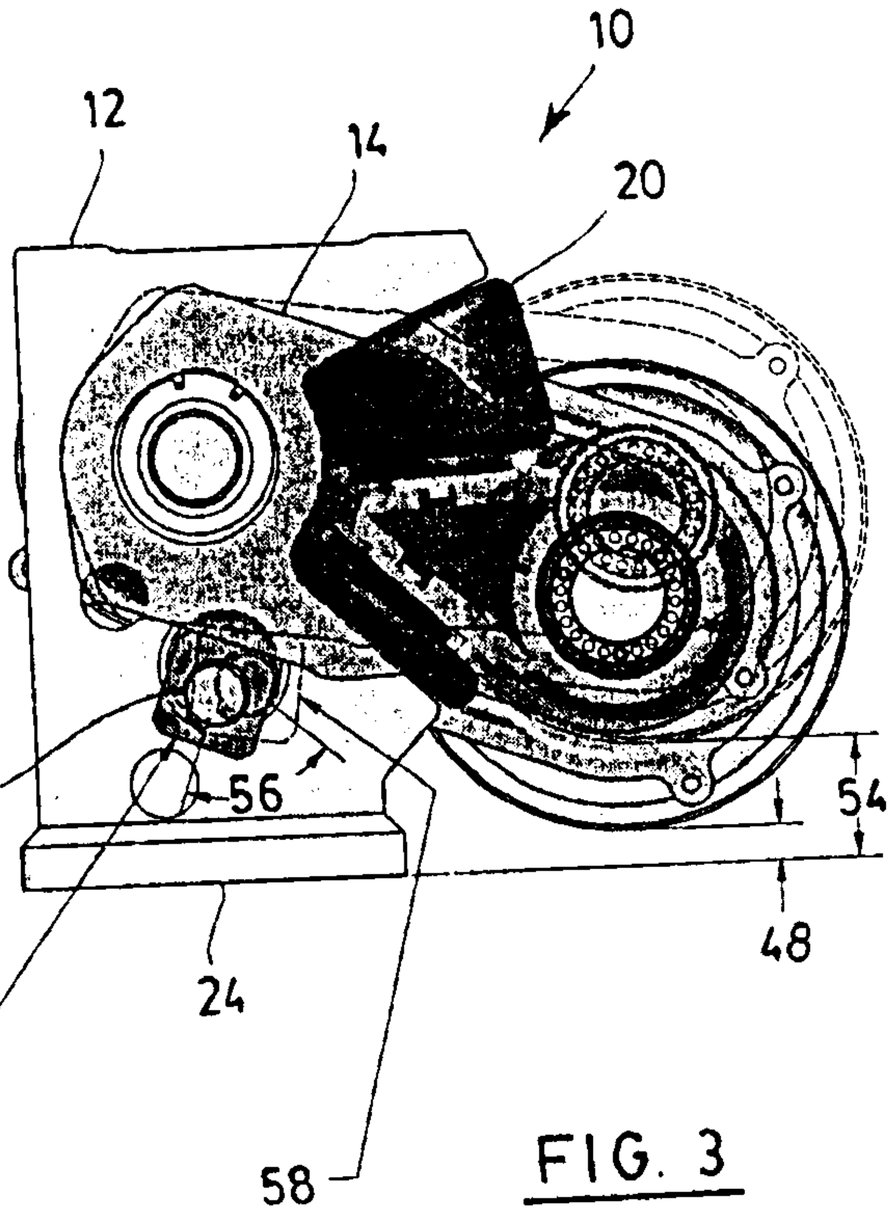


FIG. 3

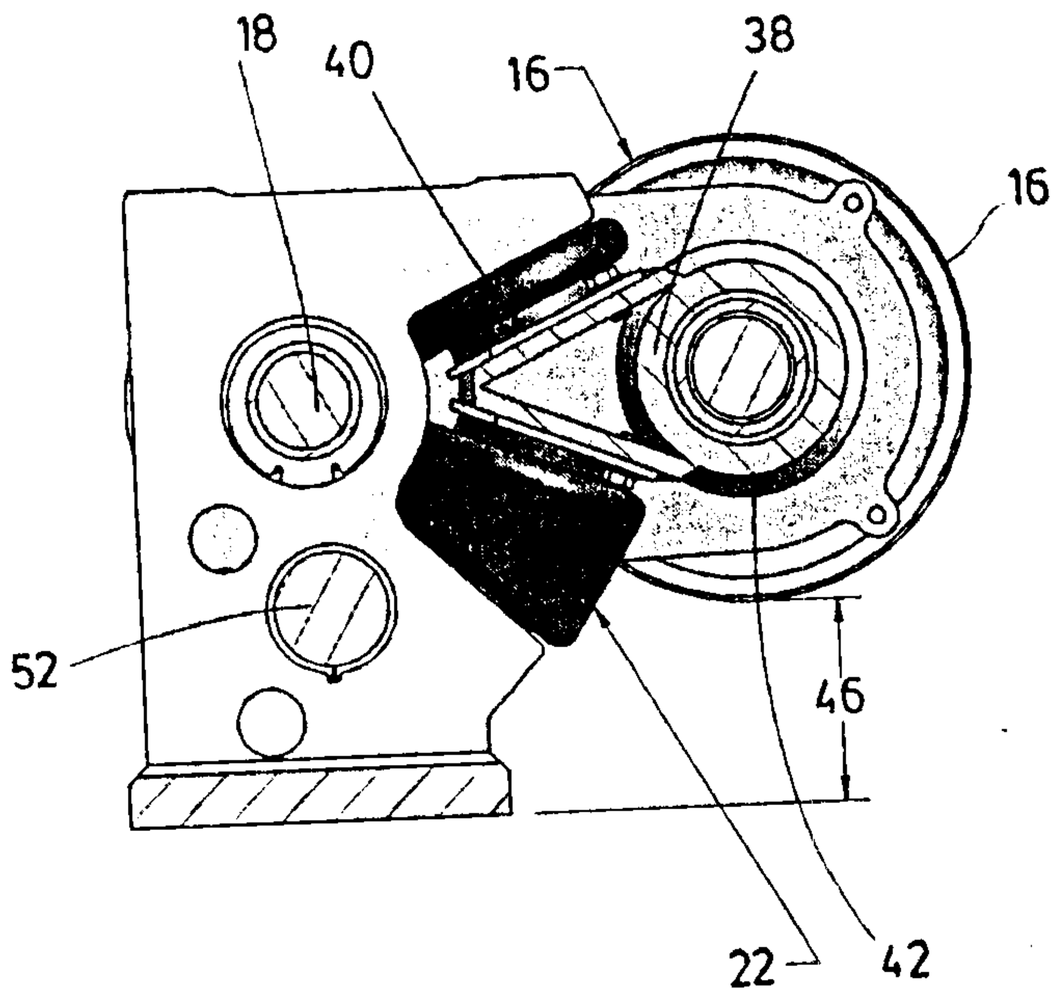


FIG. 4

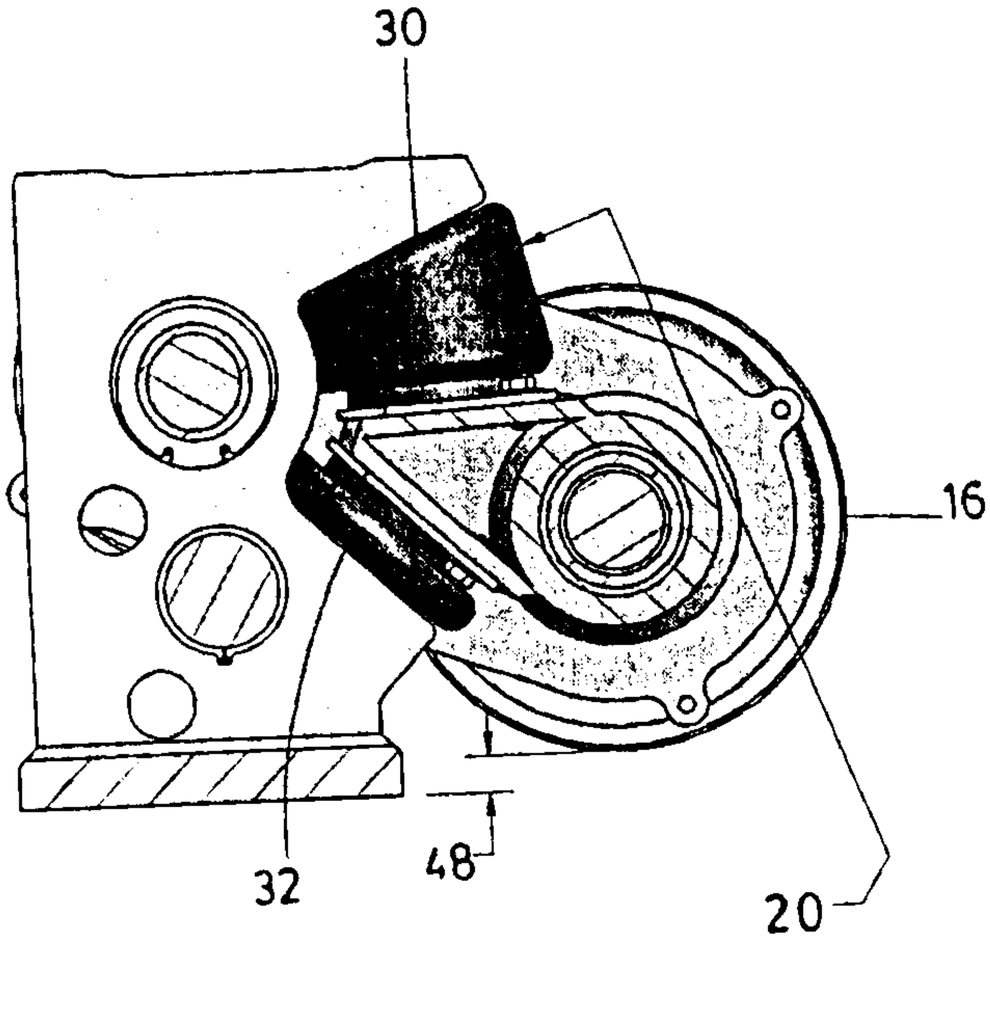


FIG. 5

FIG. 6

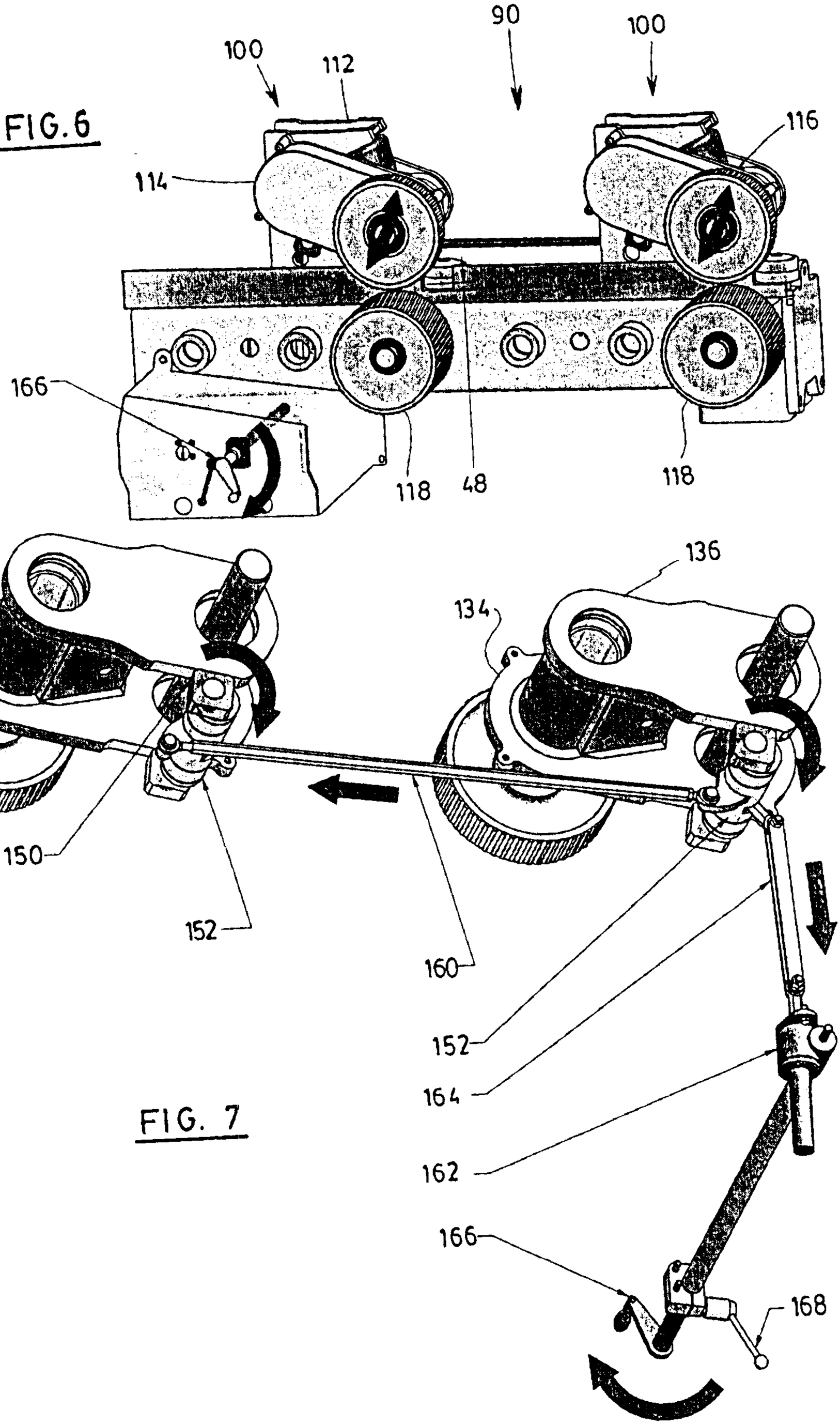
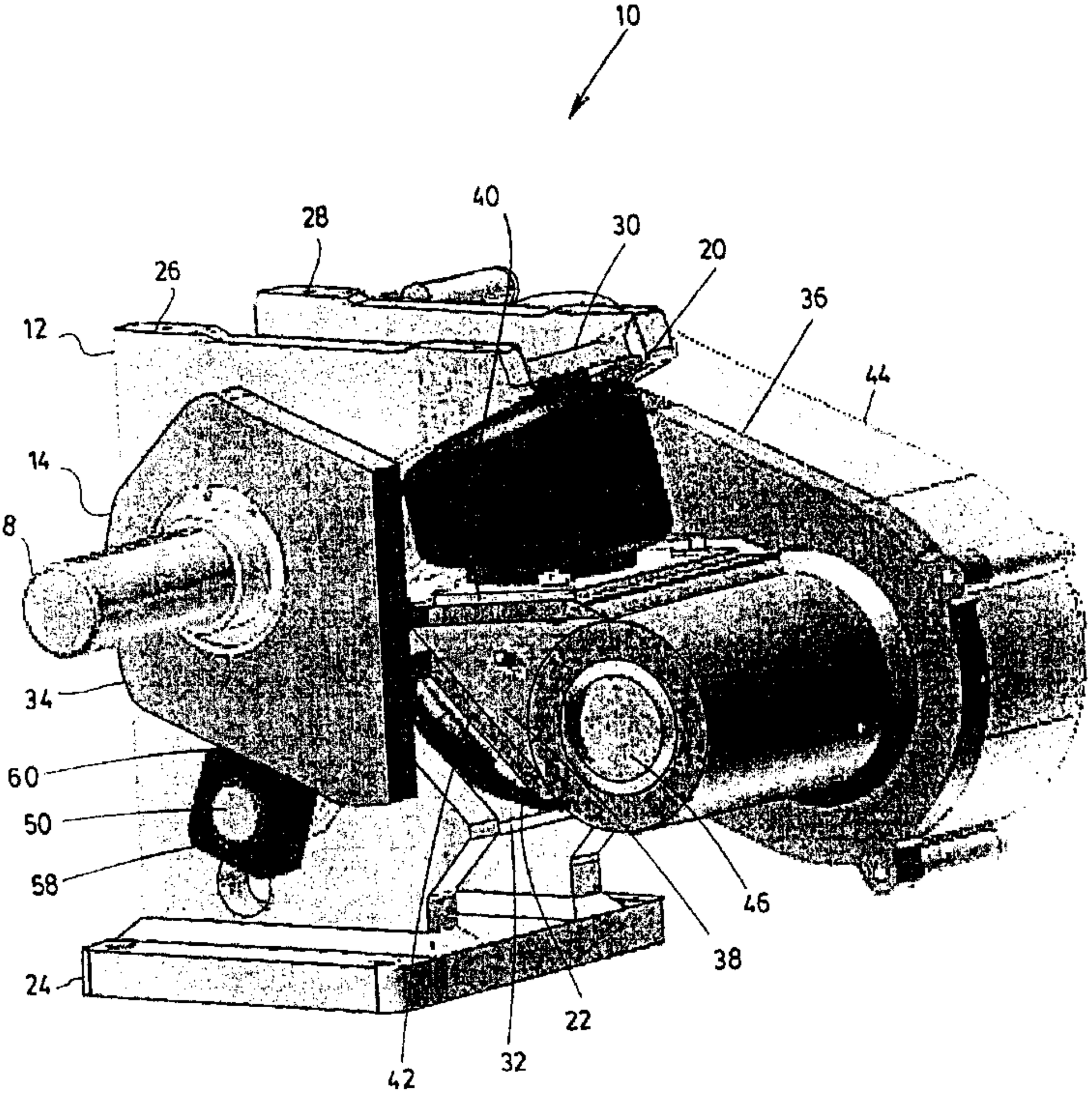

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FIG. 7


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