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(54) Improved height adjusting mechanism for a table top

(57) The adjusting mechanism for adjusting the height of a table top consists of a first member (11) and a second member (12) connected to each other to form a kinematic screw pair, wherein the first member (11) of the pair acts as a lead screw member and the second member (12) of the pair acts as a nut screw member. The first member (11) and the second member (12) of the pair are mutually constrained by means of one or more rolling elements (13) intended to establish a rolling contact therebetween.

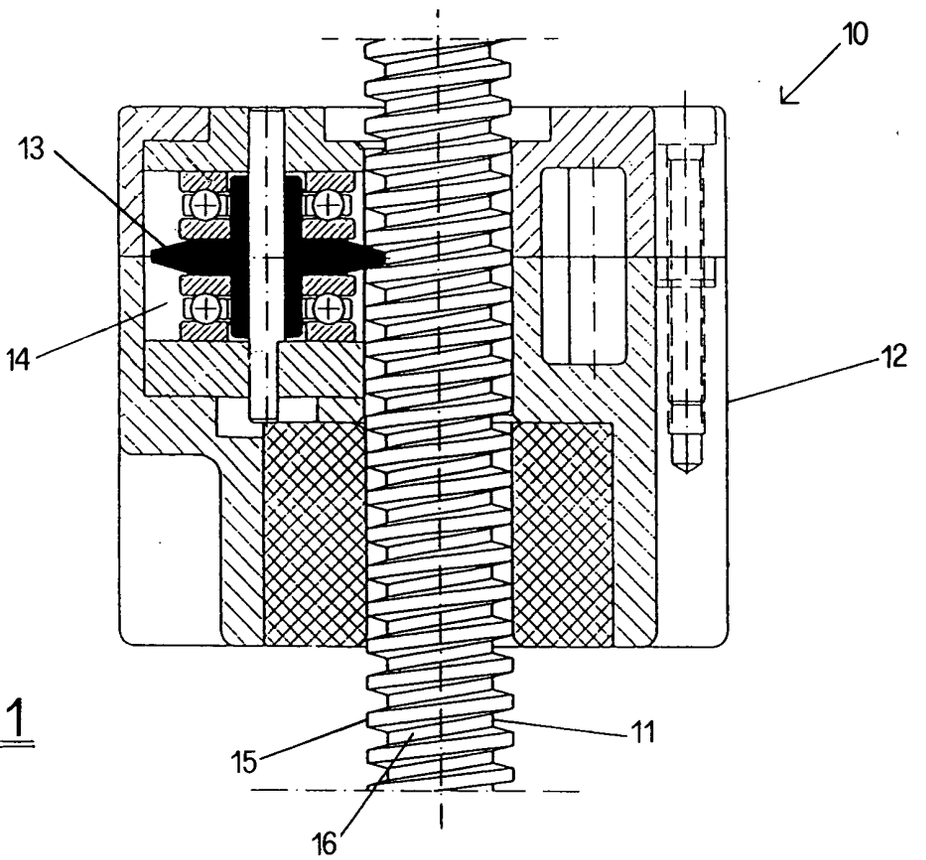

FIG. 1

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Description

[0001] The present invention generally relates to a height adjusting mechanism which makes use of mutually engaged relatively moving members combined into a novel configuration and arrangement, which is capable of assuring a higher degree of operating transmission efficiency, performance and noiselessness.

[0002] There are known in the art various adjusting mechanisms which are used for a plurality of purposes and which are operated by mutual engagement of two or more relatively moving members between which motion is transmitted.

In some devices for controlling the movement or adjusting the position of machine parts for instance, it is common to use male and female thread mechanisms wherein a long cylindrical shank member having machined thereon an external screw-thread is inserted into a hollow cylindrical nut member having machined therein an internal screw-thread which mates that of the cylindrical shank member. The mutual engagement of the mating screw-threads of the pair members allows for a degree of freedom to permit a relative displacement of said pair members consisting in a screw displacement, i.e. a rotation of one member of the pair about an axis accompanied by a translation of the pair member along the same axis.

Adjusting mechanisms of the above mentioned kind are widely used. An exemplificatory use is represented in tables having a table top which is adjustable in height so as to permit a position ergonomical for the user to be obtained. Generally, such adjusting mechanisms are located in the legs of the table and are operated directly or indirectly by means of suitable driving devices.

In adjusting mechanisms formed of a screw kinematic pair of conventional kind, the mutually engaging members of the pair contact each other on a surface and the mating pair members slide on each other. From the point of view of the dynamical features, this means that the sliding surface contact is suitable for transmitting great forces, but also introduces a sliding frictional force which contrasts the relative movement of the members and causes some undesired effects, namely a power loss in the adjusting mechanism, a premature wear of the pair members and a noisy operation of the adjusting mechanism. In the particular case the adjusting mechanism is used in tables with a table top adjustable in height, these effects result into a series of disadvantages which negatively affect the performance of the table.

[0003] The object of the present invention is to overcome these disadvantages by providing an adjusting mechanism for adjusting the height of a table top formed of a screw kinematic pair wherein the pair members are configured and arranged according to a novel fashion which is more advantageous in terms of efficiency, performance and noiselessness of operation of the adjusting mechanism.

According to the present invention, this object is achieved by providing an adjusting mechanism for adjusting the height of a table top consisting of a first member and a second member connected to each other to form a kinematic screw pair, wherein the first member of the pair acts as a lead screw member and the second member of the pair acts as a nut screw member, characterised in that the first member and the second member of the pair are mutually constrained by means of one or more rolling elements intended to establish a rolling contact therebetween.

[0004] In order to better understand the features of the present invention, a detailed description thereof will be given with reference to the accompanying drawings, wherein:

Figure 1 is a cross-sectional view of the adjusting mechanism according to the present invention;
Figure 2 is a top plan view of the nut screw pair member of the adjusting mechanism according to the present invention;
Figure 3 is cross-sectional view of the nut screw pair member of the adjusting mechanism according to the present invention taken along line III-III of Figure 2;
Figure 4 is a perspective view of the nut screw pair member of the adjusting mechanism according to the present invention shown in Figure 3; and
Figure 5 is a bottom plan view of the nut screw pair member of the adjusting mechanism according to the present invention.

[0005] Referring to the Figures of the drawings, there is shown a preferred embodiment of the adjusting mechanism according to the present invention, generally designated by 10 and intended to be used in a movement control device or in a position adjustment device. For exemplificatory purposes, the adjusting mechanism could be incorporated into a device for adjusting the height of a table top.

The adjusting mechanism 10 comprises a first member 11 acting as a lead screw and a second member 12 acting as a nut screw, which are mutually connected so as to form a kinematic pair which permits a screw displacement of one member of pair relative to the other. In the particular case where the adjusting mechanism is used in a device for adjusting the height of a table top, a preferred embodiment of the adjusting mechanism is formed of the first member 11 acting as a lead screw which represents the movable member of kinematic pair, i.e. the member connected to the table top, and the second member 12 acting as a nut screw which represents the stationary member of the kinematic pair, i.e. the member connected to the table leg. In another preferred embodiment, the first member 11 acting as a lead screw rotates only and is connected to the table leg, whereas the second member 12 acting as a nut screw translates only and is connected to the table top.

[0006] According to the present invention, a con-

straint between the lead screw member 11 and the nut screw member 12 is provided consisting of a plurality of wheels or rollers 13 which transform the sliding friction between the members of the kinematic screw pair into a rolling friction.

[0007] In the preferred embodiment shown in the Figures of the drawings, the wheels or rollers 13 are rotatably arranged in suitable housings 14 provided in the nut screw member 12 and are symmetrically arranged about the axis of the lead screw member 11 so as to uniformly distribute the load transmitted between the mutually constrained members of the kinematic screw pair.

[0008] Each wheel or roller engages the helical ridge 15 of a thread 16 formed on the lead screw member 11, and to this purpose the axis of rotation of the wheels or rollers 13 forms an angle with the axis of the lead screw member 11 which is the same as that of the thread 16 on the lead screw member 11.

[0009] In order to give the rotation axis of the wheels or rollers 13 the necessary inclination there are provided in each housing 14 a pair of wedge-shaped inserts 17 and 18 which have the inclined surfaces parallel to each other and are intended to firmly secure in place each wheel or roller 13 with the interposition of ball bearings 19.

[0010] The structure of the adjusting mechanism according to the present invention may differ from that described and shown here for exemplificatory purposes, though remaining the inventive idea according to which provision is made for a plurality of wheels or rollers 13 which constrain the lead screw member 11 to the nut screw member 12 so as to achieve a rolling contact between these members, instead of a sliding contact.

[0011] Generally, owing to the fact that the rolling friction is much smaller than the sliding friction, the dynamical features of the adjusting mechanism according to the invention are superior to those of adjusting mechanisms which make use of a kinematic screw pair of conventional kind wherein there usually is a sliding contact between the members of the pair.

[0012] Therefore, the adjusting mechanism of the invention offers doubtlessly great advantages in terms of greater efficiency, lower wear and greater noiselessness of adjustment. The adjusting mechanism of the invention is particularly suited for applications in which it is not necessary to have a great accuracy of movement, as for example for adjusting the height of a table top. Compared with other adjusting mechanisms known in the art, the adjusting mechanism of the present invention is relatively inexpensive since it does not require a lead screw member made of tempered steel.

Claims

1. An adjusting mechanism for adjusting the height of a table top consisting of a first member (11) and a second member (12) connected to each other to form a kinematic screw pair, wherein the first member (11) of the pair acts as a lead screw member and the second member (12) of the pair acts as a nut screw member, **characterised in that** the first member (11) and the second member (12) of the pair are mutually constrained by means of one or more rolling elements (13) intended to establish a rolling contact therebetween.

2. An adjusting mechanism according to claim 1, **characterised in that** the rolling elements (13) are formed of wheels or rollers which are rotatably arranged in housings (14) provided in the second member (12) of the kinematic screw pair.

3. An adjusting mechanism according to claim 2, **characterised in that** each wheel or roller forming the rolling elements (13) engages the helical ridges (15) of a thread (16) formed on the first member (11) of the kinematic screw pair.

4. An adjusting mechanism according to claim 2, **characterised in that** each wheel or roller forming the rolling elements (13) is firmly kept in place in its housing (14) inside the second member (12) by means of wedge-shaped inserts (17) and (18) arranged on one side and on the opposite side of the wheel or roller, respectively, so as to have their respective inclined surface arranged parallel to each other, said wedge-shaped inserts (17) and (18) being intended to impart to the axis of the respective wheel or roller the same inclination as that of the thread (16) formed on the first member (11) of the kinematic screw pair.

5. An adjusting mechanism according to claim 4, **characterised in that** each wheel or roller forming the rolling elements (13) is kept in place between the wedge-shaped inserts (17) and (18) by the intermediary of ball bearings (19).

6. An adjusting mechanism according to claim 2, **characterised in that** the housings (14) for the wheels or rollers forming the rolling elements (13) are arranged in the second member (12) in symmetrical positions with respect to the first member (11).

7. An adjusting mechanism according to the claims 1-6, **characterised in that** in the case where the adjusting mechanism is incorporated into a device for adjusting the height of a table top, the first member (11) represents the movable member of the kinematic screw pair and is connected to the table top, whereas the second member (12) represents the stationary member of the kinematic screw pair and is connected to the table leg.

8. An adjusting mechanism according to the claims 1-6, **characterised in that** in the case where the adjusting mechanism is incorporated into a device for adjusting the height of a table top, the first member (11) forms the rotating member of the kinematic screw pair and is connected to the table leg, whereas the second member (12) forms the translating member of the kinematic screw pair and is connected to the table top.

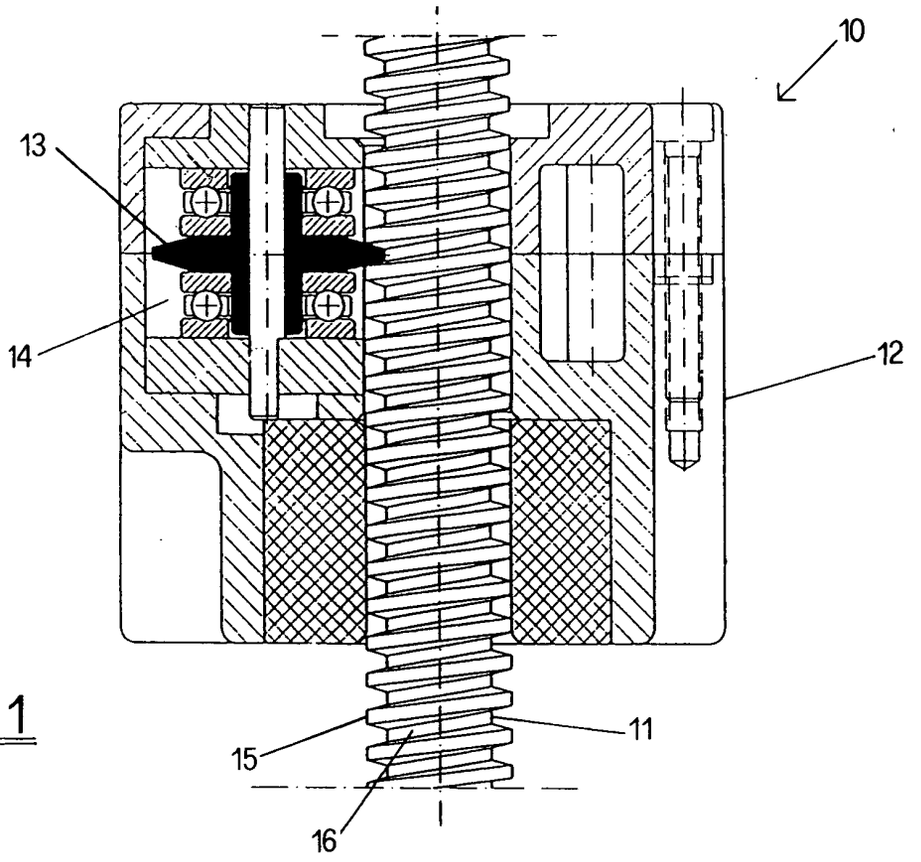


FIG. 1

FIG. 5

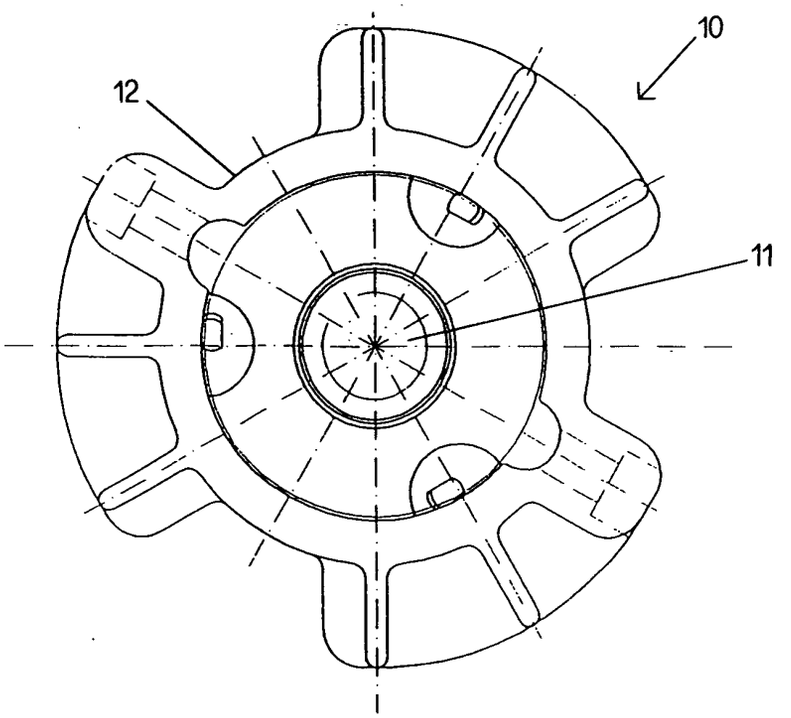


FIG. 3

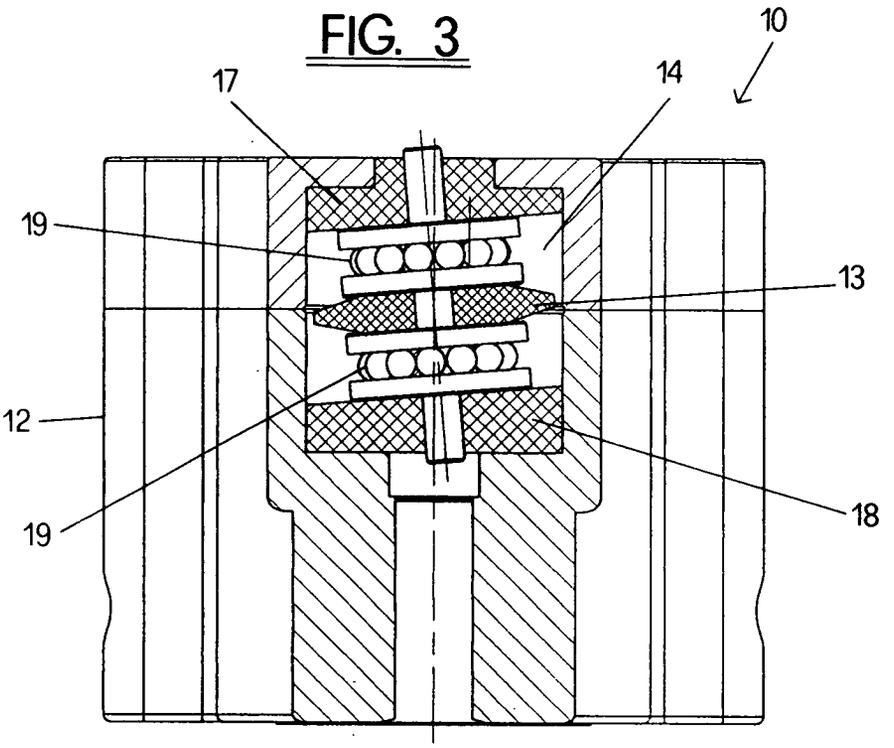


FIG. 2

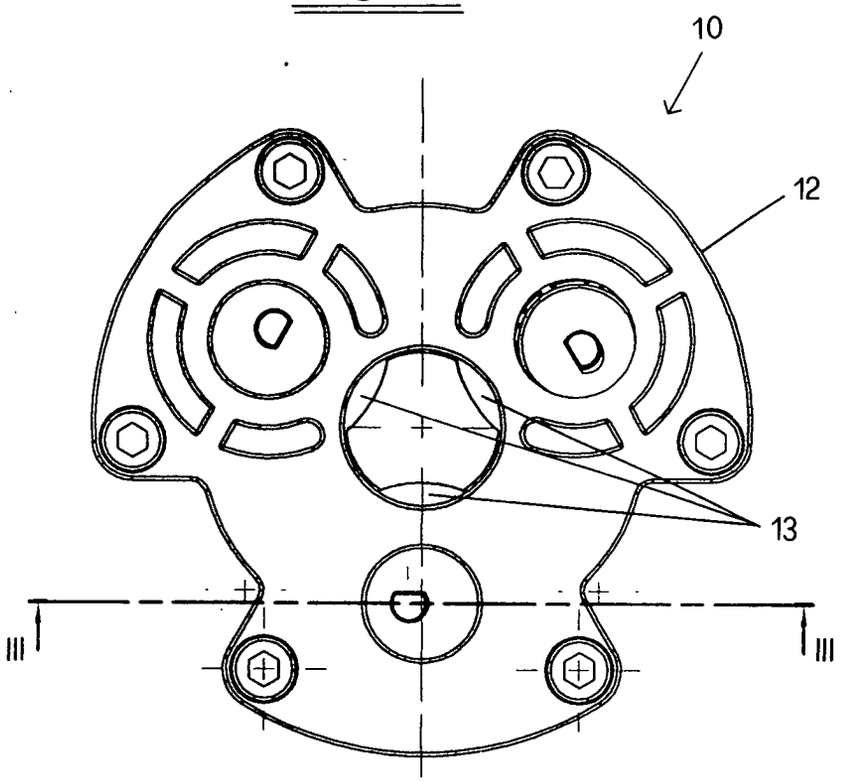
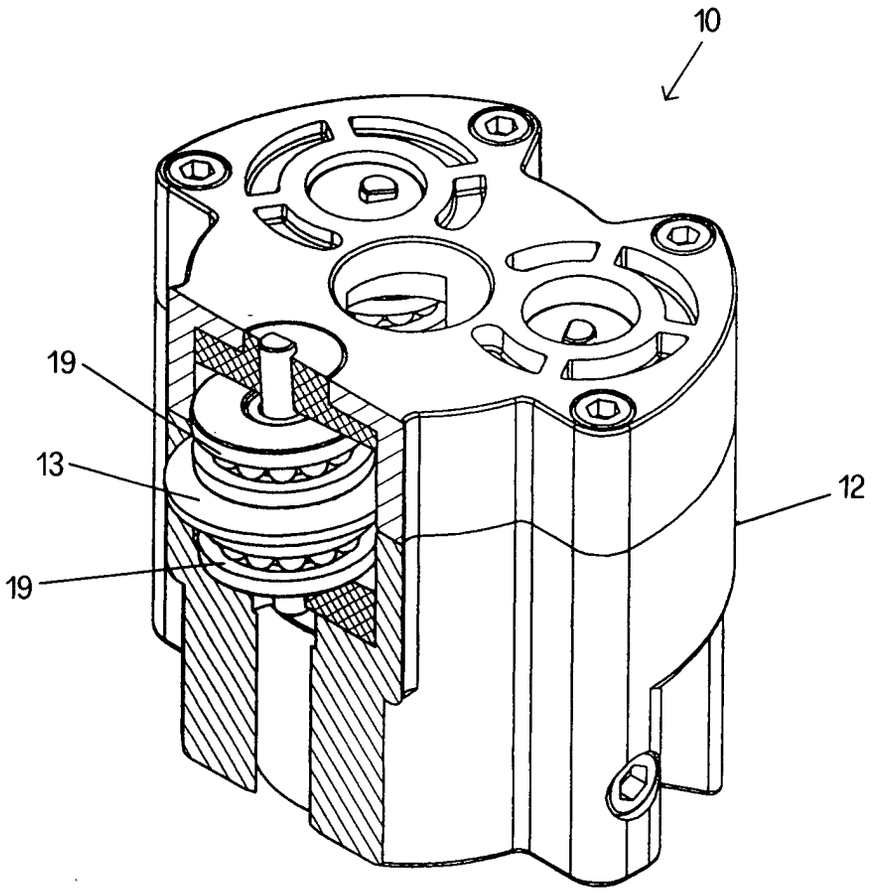


FIG. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 01 12 7116

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	28 January 2002	Papadimitriou, S

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