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(54) Improved device for synchronizing weaving machines with looms.

(57) A device for synchronizing weaving machines with looms - of the type comprising a unit (10) of two coaxial clutches and an auxiliary motor (1) connected to said unit for controlling the weaving machine, through one of said clutches, when the drive between the loom and said machine is interrupted through the other clutch - comprises clutch control means in the form of a wheel (9) with face cams (9,9''), mounted coaxial and freely rotating on said clutches, but bound to the axial movements of an element (14'') of at least one of the clutches. Said wheel (9) is caused to rotate by the auxiliary motor (1) together with said element (14'') of said clutch and it is axially moved therewith, against the action of return spring means (17), when said face cams (9,9'') of the wheel (9) cooperate with fixed cam-followers (18) placed around the clutches.

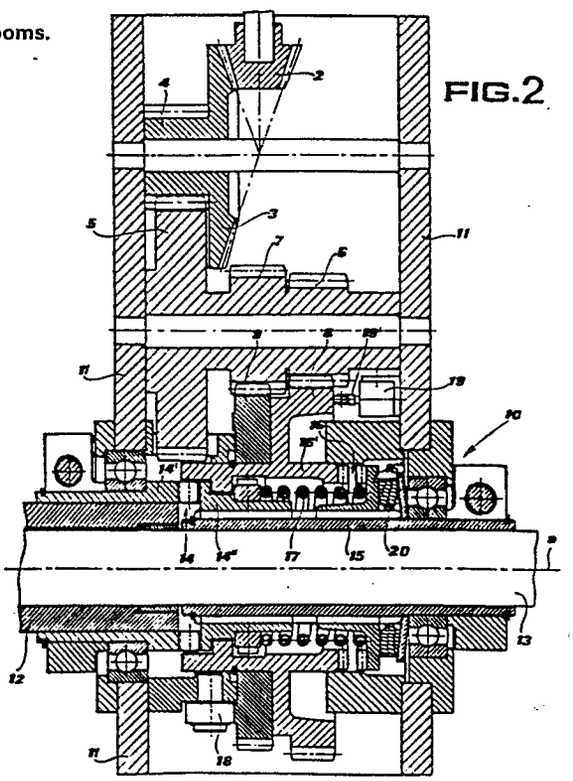

FIG.2

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"IMPROVED DEVICE FOR SYNCHRONIZING WEAVING MACHINES WITH LOOMS"

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The present invention relates to a device for synchronizing weaving machines - as dobbies, Jacquard and the like - with looms.

As known, weaving machines have to be connected to looms with perfect synchronism and when, during working of the loom, inconveniences arise - such as, breaking of the weft or warp yarns, reading mistakes, and other drawbacks or faults - the loom has to be stopped and likewise the weaving machine, while the synchronism between them has to be restored.

In fact, in order to eliminate the fault, it is usually necessary for the weaving machine to repeat an already performed operation, which means that it has to turn backward by one or more revolutions, while the loom is stationary, after which the timing between the loom and the weaving machine has to be reset in a precise and correct manner.

For this purpose, one interposes between the loom and the weaving machine, or rather in the drive which transmits motion from the first to the second, a device apt to stop said drive and allowing to operate the weaving machine with an auxiliary motor while the loom remains stationary.

There are already various types of synchronization devices, the simplest one comprising one or more axial clutches, which are controlled by an electromagnet or through a double lever and derive their control from an auxiliary motor. Nevertheless, all the devices of this type, known at present, have the serious drawback of a very complex structure and working, which is often cause for practical inconveniences in use, as lack of precision, failures and even breakages, having a negative effect on the performance of the loom to which they are applied.

The object of the present invention is therefore to supply a device of the aforementioned type, but with simplified features and

thus very efficient and safe. At the same time, the invention proposes to make the device in question with a more compact structure and a more rational arrangement of its parts, thereby also reducing dimensions and vibrations, with the advantage of making it most convenient in use, as well as improving still further its efficiency and safety.

The device according to the invention is of the type comprising a unit of two coaxial clutches and an auxiliary motor connected to said unit by a mechanical drive for controlling the weaving machine, through one of said clutches, when the drive between the loom and said machine is interrupted through the other clutch, and it is characterized in that it comprises clutch control means in the form of a wheel with face cams, mounted coaxial and freely rotating on said clutches, but bound to the axial movements of an element of at least one of the clutches, the said wheel being caused to rotate by the auxiliary motor together with said element of said clutch, and being axially moved therewith through cooperation of its face cams with fixed cam-followers, against the action of return spring means.

The invention will now be described in further detail, by mere way of example, with reference to a preferred embodiment thereof, illustrated in the accompanying drawings, in which:

Fig. 1 is a side view of the device according to the invention;

Fig. 2 is a front section view of the device of figure 1;

Figs. 3, 4 and 5 are diagrammatic front views, with some parts in section, of the clutches of the device in the different working positions;

Fig. 6 shows a modified embodiment of the device of figures 1 to 5; and

Fig. 7 is a perspective view, on an enlarged scale, of one of the elements of one of the clutches of the device according to the invention.

The device according to the invention, associated to an auxilia-

ry motor 1, comprises a train of gearwheels 2, 3, 4, 5, 6 and 7, acting as reduction gears, the first of said gearwheels being driven by the motor 1, and a double-clutch unit 10, controlled by gearwheels 8 and 9 meshing with the gearwheels 6 and 7 respectively, of said train of gearwheels. All these members - with the exception of the motor 1, which is external - are mounted inside a stout casing 11, into which penetrates the sleeve 12 which transmits the motion from the loom, and from which projects the shaft 13 - coaxial to the sleeve 12 - which controls the weaving machine. The gearwheels 8 and 9 are mounted freely rotatable about the main axis a of the clutch unit 10 of the device - common to the sleeve 12 and to the shaft 13 - and slidable along said axis.

The unit 10 comprises: a clutch 14, controlled by the sleeve 12 and formed by a clutch element 14', fixedly connected to said sleeve 12, and by a clutch element 14", mounted slidable but not rotatable on a tube 15 fixed to the shaft 13; a clutch 16, controlled by the gearwheels 8 and 9 and formed by a clutch element 16', forming a single piece with the gearwheel 8, and by a clutch element 16", mounted slidable but not rotatable on the tube 15 fixed to the shaft 13, a spring 17 being interposed between said elements 14" of the clutch 14 and 16" of the clutch 16, which spring acts along the axis of the shaft 13; and a pair of rollers 18, with which cooperate front cams 9' and 9" of the gearwheel 9. The unit 10 also comprises a control member 19, which stops the rotation of the motor 1 and the feeler 19' of which is controlled by the gearwheel 8, and an elastic support element 20, interposed between the element 16" of the clutch 16 and the casing 11.

It should be noted that the clutch elements 14' and 14" comprise mutually meshing teeth, positioned at different reciprocal distances, as shown in figure 7 for the element 14', so that their engagement for operating the clutch 14 can only take place in a single and very precise position.

During normal operation of the loom, the motion is transmitted (figure 3) by the loom itself to the weaving machine by way of the sleeve 12, the clutch 14 and the shaft 13.

When an inconvenience or a fault arises, the loom stops and the sleeve 12 therewith. It is in this condition that the synchronizing operation takes place: the motor 1 causes the rotation of the two gearwheels 8 and 9 through the train of gearwheels 2, 3, 4, 5, 6 and 7; while rotating, the gearwheel 9 engages with its cams 9' and 9" the two rollers 18; the gearwheels 8 and 9 are then axially shifted together towards the right of figures 2 to 6; the clutch 14 is consequently disengaged, the element 14" disengaging from the element 14', while the clutch 16 engages, the element 16' thereof engaging the element 16". At this stage (figure 4), the shaft 13 is no longer connected to the loom and it is instead connected to the motor 1, which thus operates the weaving machine while the loom is stationary. The profiles of cams 9' and 9" are such as to keep the clutch 16 engaged only through a limited rotation angle of the shaft 13, inferior to one turn; subsequently, the clutch 16 still remains engaged, as the teeth of elements 14' and 14" of the clutch 14 - owing to the different reciprocal angular distances - are not in an engaged position but bear the ones against the others (as shown in figure 5) and the action of the spring 17, which urges the gearwheels 8 and 9 towards the left of figure 2, is therefore ineffective. As the rotation of the parts continues, the elements 14' and 14" of the clutch 14 finally reach the position of mutual engagement and, under the action of the spring 17, the clutch 16 disengages and the clutch 14 engages again. At the same time, as the gearwheel 8 abandons the feeler 19' of the control member 19 stopping the motor 1, this latter is caused to stop.

The device has thus created the conditions for a synchronization of the weaving machine with the loom and for starting again the regular running of said machine. This synchronization is guaranteed

by the only possible position of reciprocal engagement of the two elements 14' and 14" of the clutch 14, which position in turn derives from the difference of the angular distances between the teeth of mutual engagement of the two clutch elements. It should be noted that this difference allows also a reciprocal bearing contact between said elements onto a particularly broad surface and in correspondence of at least two different areas, thereby reducing the contact pressure and making the engagement more steady.

Of course, to allow the gearwheels 8 and 9 to return into their original position, at the end of the heretofore described working cycle of the device, it is indispensable for the cams 9' and 9" not to coincide again with the rollers 18 upon engagement of the clutch 14: for this purpose, the gearwheels 8 and 9 have different speeds (one deriving the motion from the gearwheel 6, the other from the gearwheel 7 of different diameter, whereby, in the case illustrated, the speed of the gearwheel 9 is higher).

The presence of the elastic element 20 for engagement of the clutch element 16" provides the double advantage of deadening the blows caused by the clutches and of facilitating - by elastic compression - the engagement of such clutches when the addendums of the opposite teeth of their elements hit each other.

Figure 6 illustrates a modified embodiment of the invention. The gearwheels 8 and 9 are here caused to rotate by a single gearwheel 6', from which the gearwheel 9 is disengaged when finding itself in the original position, to the left of the device in figure 6. Two supplementary gearwheels 21 and 22 of different diameter are besides provided, freely rotating on a pin 23 and with their teeth meshing with the gearwheels 8 and 9. In the already cited left position, the gearwheel 9 is thus caused to rotate by the gearwheel 8 through gearwheels 21 and 22. The same figure illustrates pistons 24 and 25 which, under the action of springs 26 and 27, keep the gearwheel 9 bearing against the stop 28.

It is understood that there may be other practical embodiments of the invention, differing from that heretofore described, and that modifications of the illustrated device can be provided within the scope of the invention itself. In particular, fixed cams could be provided to replace the rollers 18 and the cam-followers applied to the gearwheel 9, or else - advantageously - the rollers 18, instead of being arranged diametrally opposite at equal distances from the axis a, could have any angular distances and be differently spaced from the axis a. This arrangement, which would involve a corresponding different spacing of the cams 9' and 9" from the axis a on the gearwheel 9, would help to prevent possible inconveniences deriving from the inertia of the clutch unit 10 upon stopping of the auxiliary motor 1.

CLAIMS

1) Device for synchronizing weaving machines with looms, of the type comprising a unit of two coaxial clutches and an auxiliary motor connected to said unit for controlling the weaving machine through one of said clutches, when the drive between the loom and said machine is interrupted through the other clutch, characterized in that it comprises clutch control means in the form of a wheel with face cams, mounted coaxial and freely rotating on said clutches, but bound to the axial movements of an element of at least one of the clutches, the said wheel being caused to rotate by the auxiliary motor together with said element of said clutch, and being axially moved therewith through cooperation of its face cams with fixed cam-followers, against the action of return spring means.

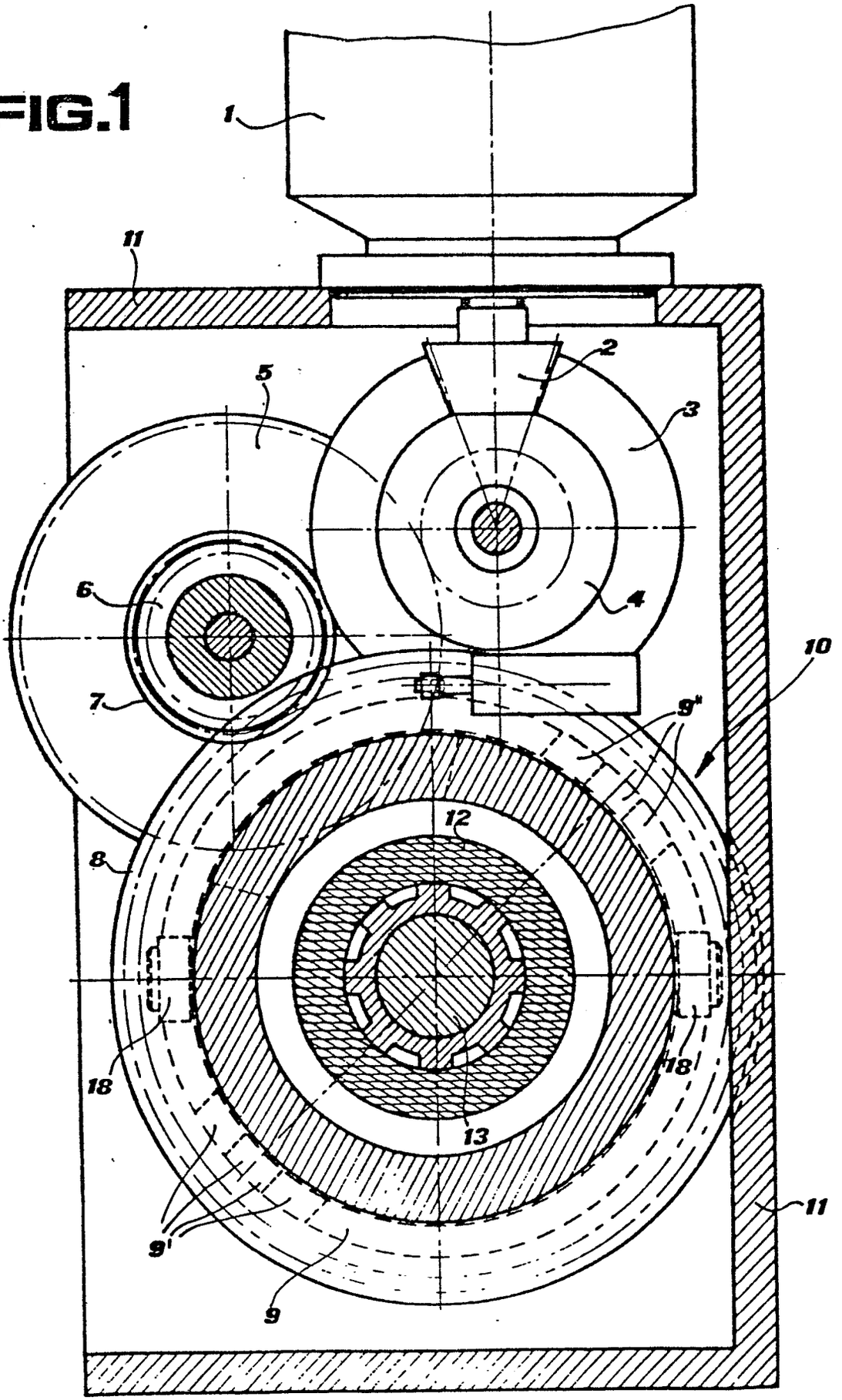
2) Device as in claim 1), wherein said wheel and said clutch element, reciprocally bound in their axial movements, are caused to rotate at different speeds, both being directly rotated by the drive of the auxiliary motor.

3) Device as in claim 1), wherein said wheel and said clutch element, reciprocally bound in their axial movements, are caused to rotate: the second one directly by the drive of the auxiliary motor, and the first one by the second one, through a pair of auxiliary wheels.

4) Device as in claims 1) to 3), wherein the other element of said clutch, the first element of which is bound in its axial movements to said control wheel, supports on one side said spring means and bears, on the other side, onto the casing of the device through an elastic element.

5) Device as in claims 1) to 4), wherein a member is provided for stopping the auxiliary motor, said member comprising a feeler operated directly by said element of said clutch which is bound in its axial movements to said control wheel.

FIG.1



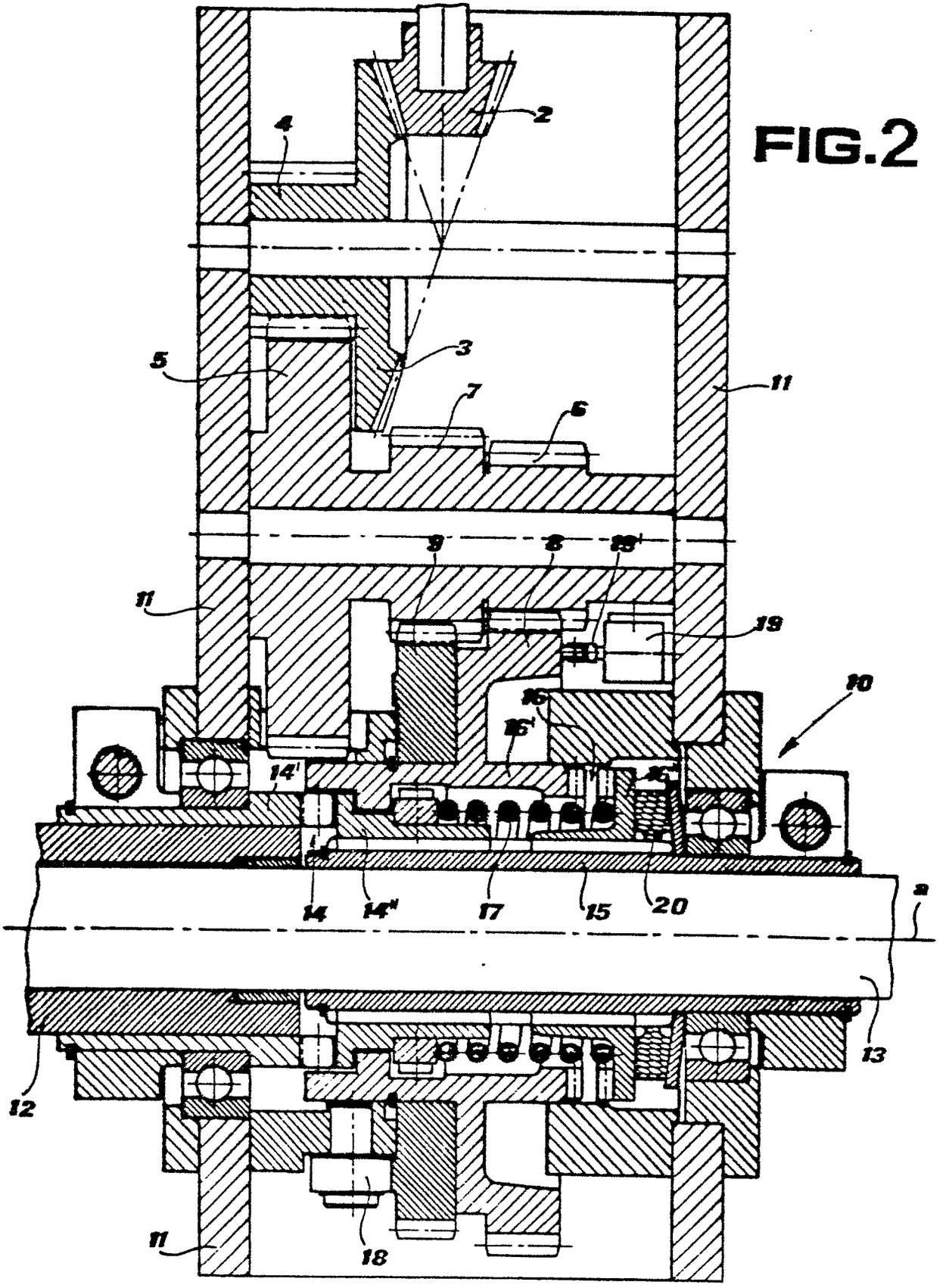


FIG.2

FIG.3

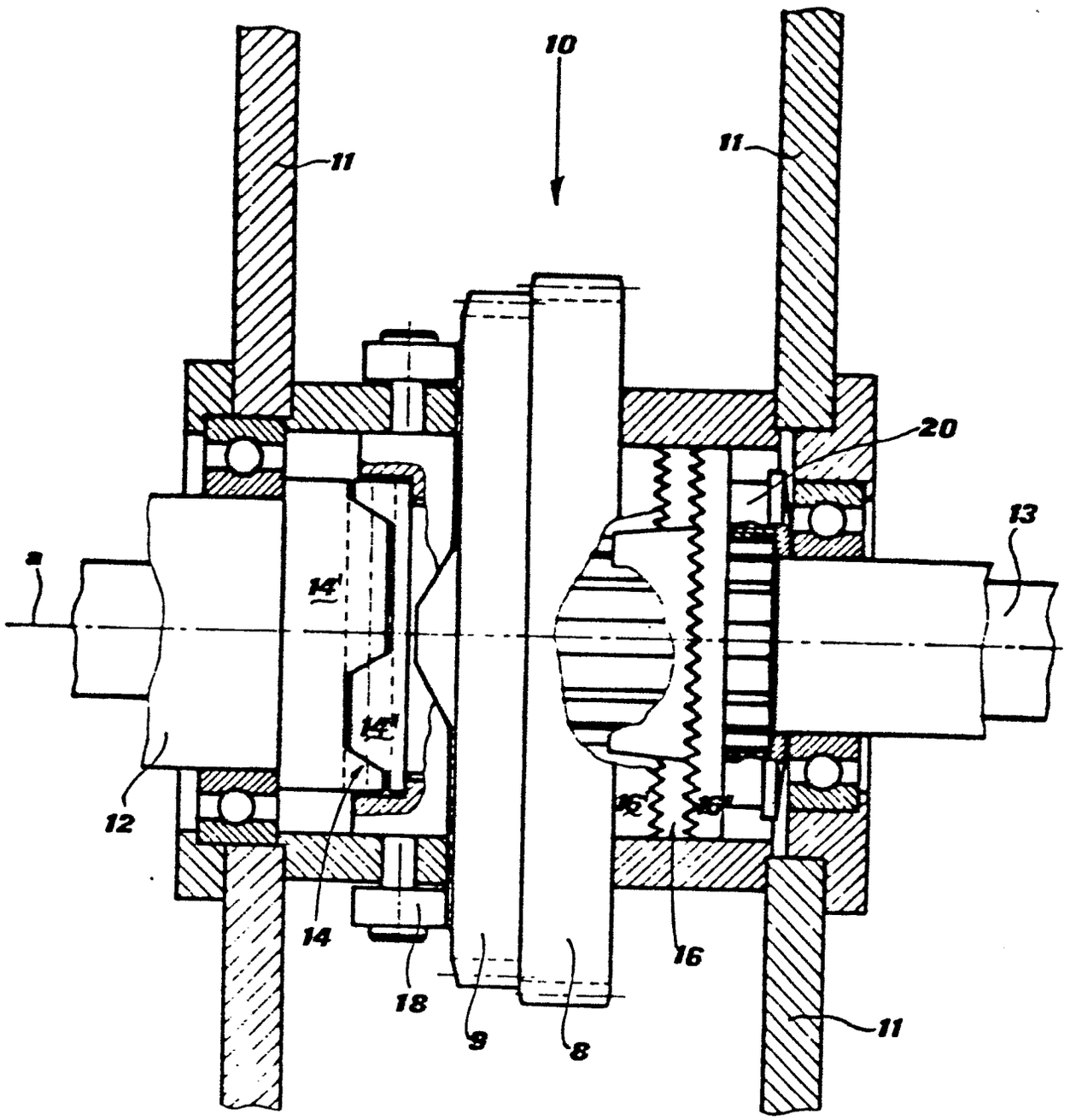


FIG.4

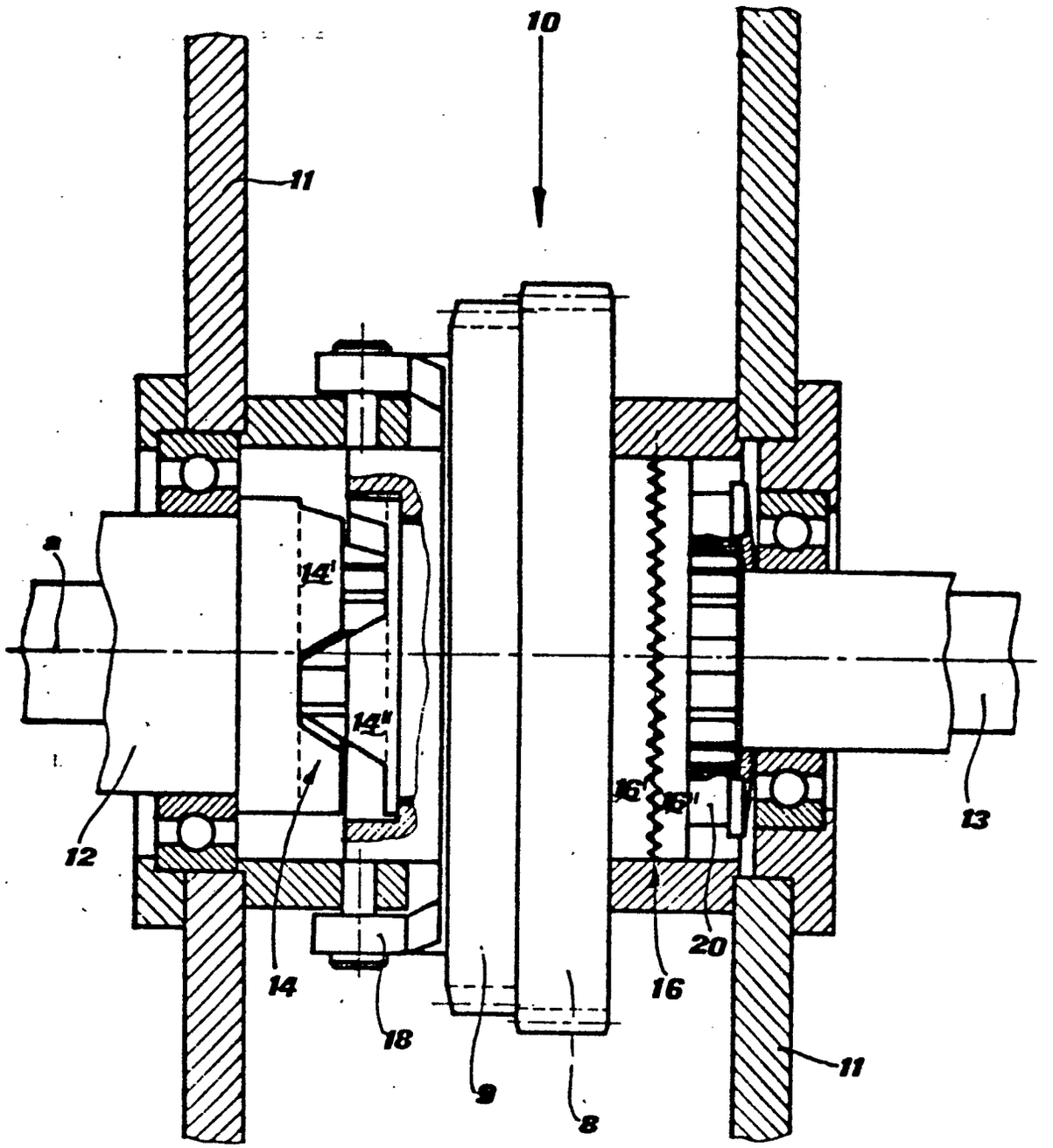


FIG.5

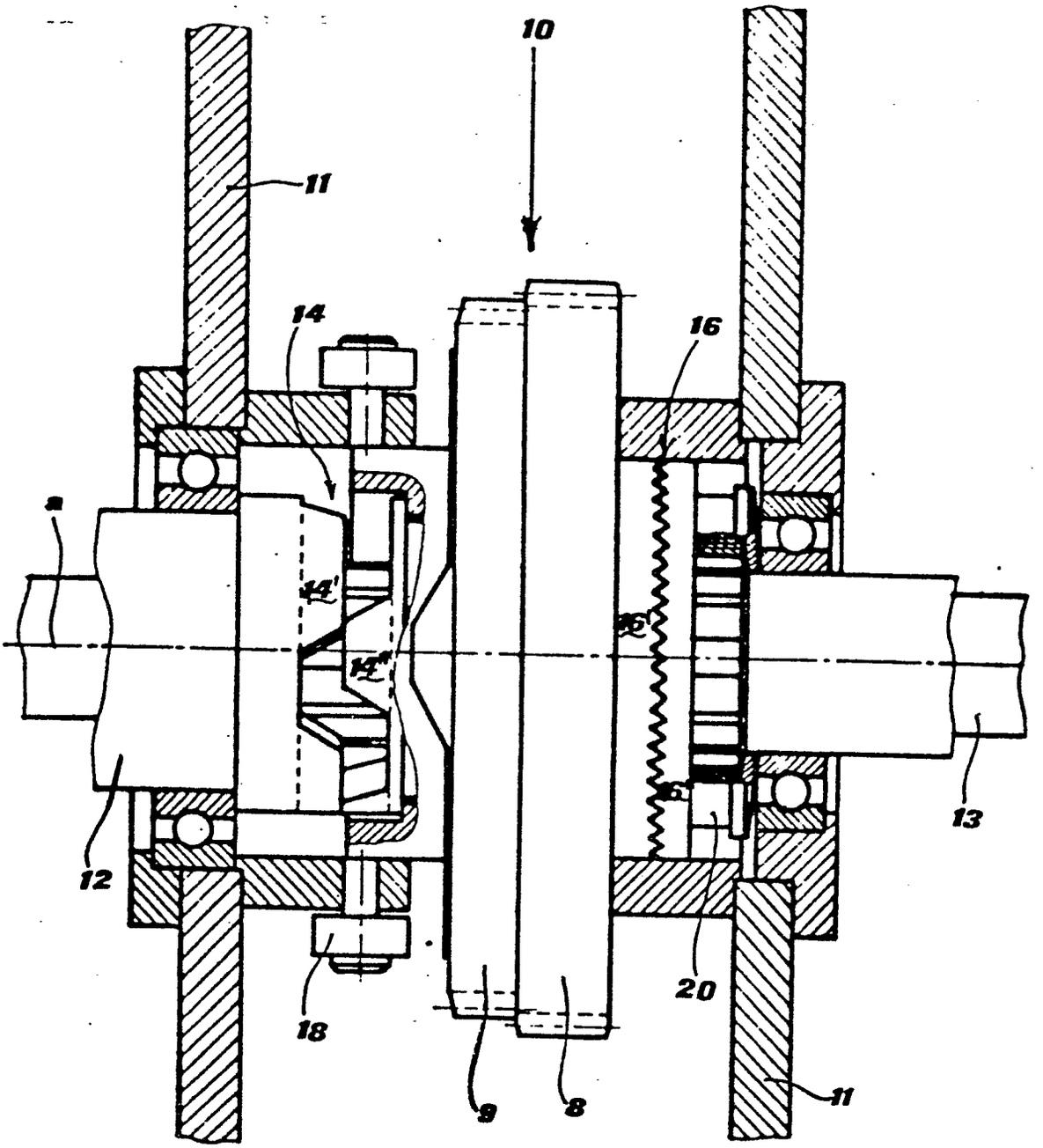


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FIG.6

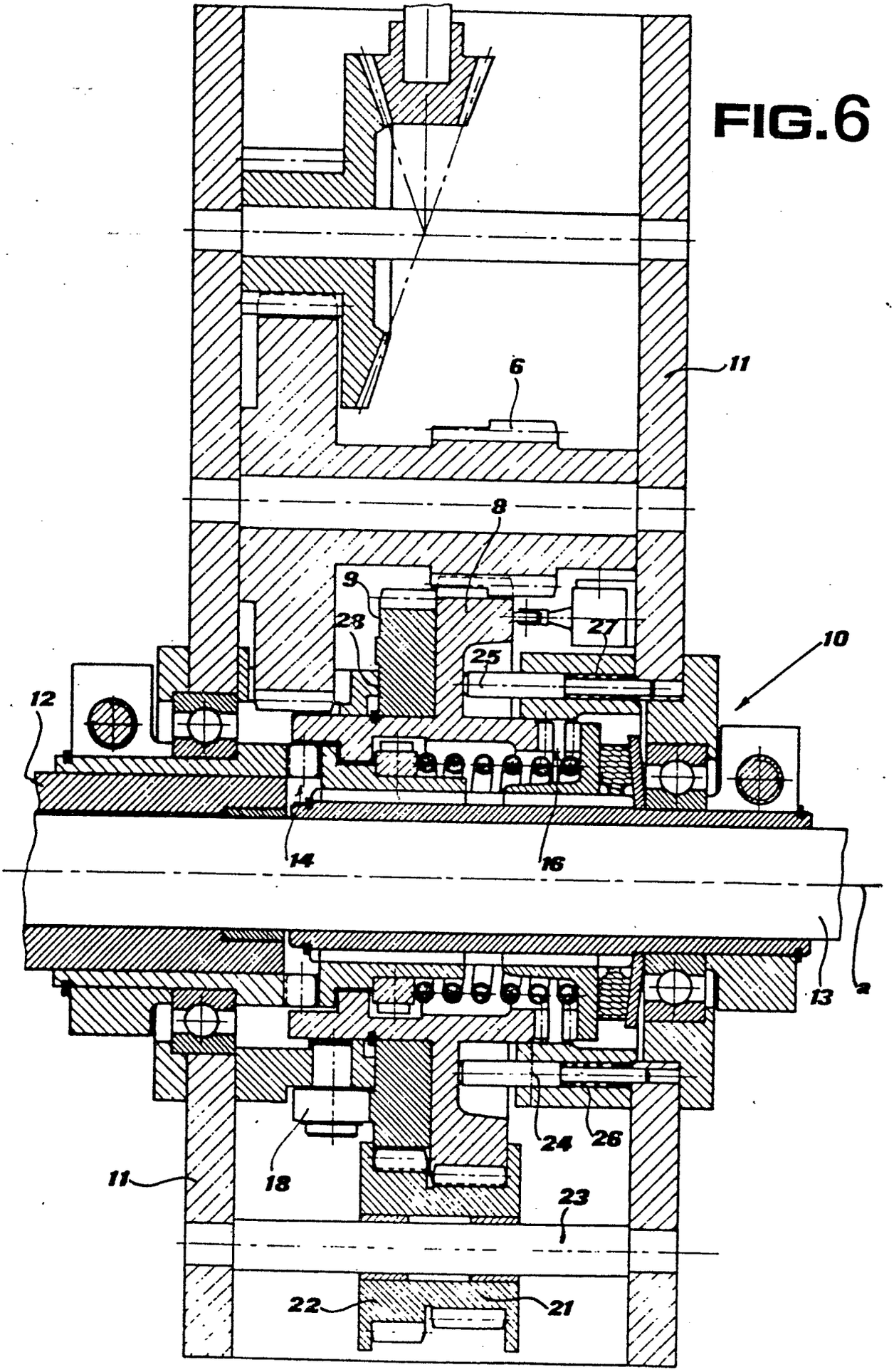
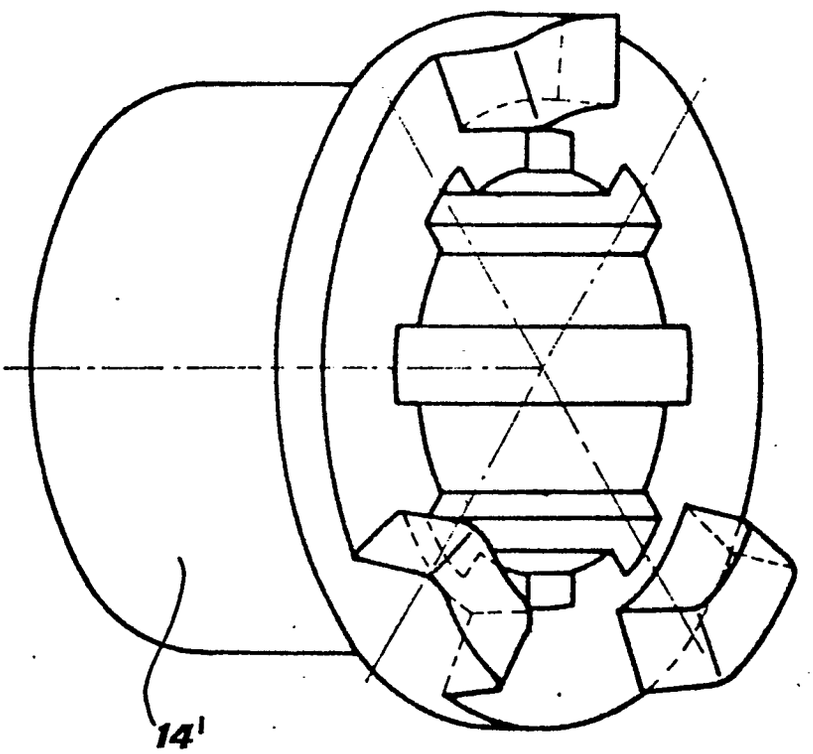


FIG.7



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EUROPEAN SEARCH REPORT

0086999
Application number

EP 83 10 0863

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	DE-B-2 222 151 (NUOVO PIGNONE)		D 03 D 51/02
A	DE-B-2 602 512 (SULZER)		
A	DE-A-2 509 665 (LENTZ)		

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

D 03 D 51/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	28-04-1983	KLITSCH G

CATEGORY OF CITED DOCUMENTS

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