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(54) Shaping apparatus for optical lenses.

(57) Apparatus for shaping optical lenses, constituted by an articulated frames (1) and a movable frame (9) pivotally connected to said articulated frame (1).

Two axial pins (11, 20) which operate coaxially are provided at the lower end of the movable frame. A rubber tab (14) and a suction cup element (19) act at the inner end of said pins and bear against the outer surfaces of a lens for locking it. An appropriate template (26) retained between an actuating means (24) and a sleeve (25) rotates with the outer edge against a rotatable pin (29) connected to a movable arm (30) to produce an oscillation of the movable frame (9) so as to permit a continuous and constant contact of the peripheral edge of the lens with the peripheral edge of the grinding wheel (28) and generate a lens equal or proportional to the profile of the template used.

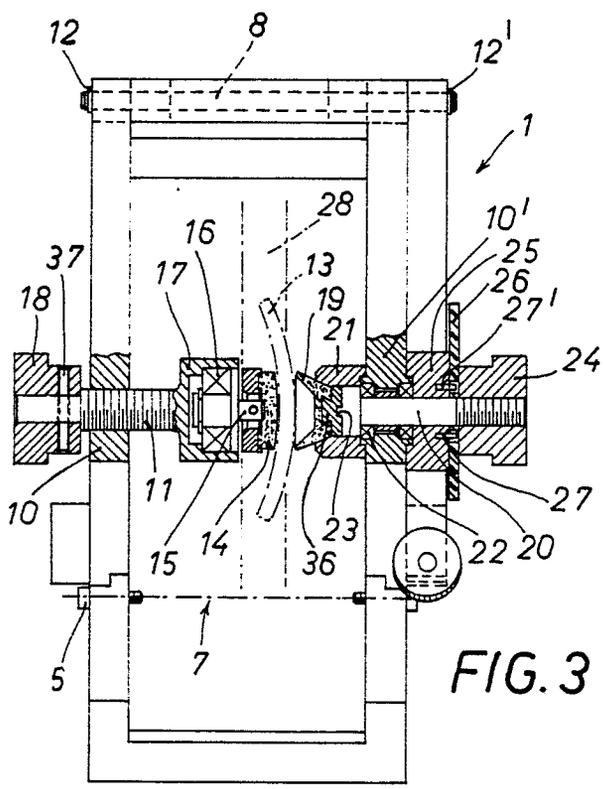

FIG. 3

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"Shaping apparatus for optical lenses"

The present invention relates to a shaping apparatus for optical lenses. The term "shaping apparatus" in the present description refers to an apparatus adapted to reproduce by a grinding operation the more or less complex perimetrical profile of an optical lens so that it can be easily inserted in the lens receiving recess of spectacles.

It is known that at present the operation of shaping a lens adapted to be inserted in the lens receiving recess of spectacles is carried out manually by qualified artisan personnel.

This latter personnel carriers out a successive sequence of operation such as, for example:
-tracing on a blank lens the inner profile of the lens receiving recess of the spectacles;
-cutting by a diamond bit along the above-mentioned tracing;
-manually perimetrically grinding the lens with frequent dimensional checks thereof in the lens receiving recess;
-perimetrically deburring for rounding off the edge formed by the previous grinding operation to produce a lens of a suitable shape adapted to be easily and stably inserted in the above-mentioned lens receiving recess of the spectacles.

However, the above-mentioned process of manufacture has numerous inconveniences and disadvantages such as, for example:
-an inaccuracy of dimensions in consideration of the, considerably limited, tolerances provided for the inner dimensions of the lens receiving recess;
-excessive peripheral grinding, particularly in the corner connection area, so as to create an inaccurate contact between the lens receiving recess and the lens itself;
-a considerably long time for the execution of the various working phases according to the above-mentioned operations with consequent high costs of production.

Further, it may also happen that the lens will break because of excessive pressure exerted thereon by the operator against the grinding wheel.

Sometimes when the optician does not have a particularly equipped workshop, he will resort for the lens shaping operation to external workshops equipped with considerably complex and costly shaping machines, with evident uneconomical consequences for the user.

It is the object of the present invention to eliminate or reduce the above-mentioned inconveniences by providing an apparatus for shaping optical lenses, which can be easily handled and is of reliable accuracy and affords a considerable adaptability to various benches that are equipped for grinding lenses and are at present in use in artisan optical workshops. Moreover, a further object of the present invention to be achieved thereby is to be able to form lenses with different dimensions by starting always with the same profile.

A last, but not least, object of the present invention is that of permitting a substantial reduction of the cost of shaping lenses since the operator is no longer required to perform some operations that were carried out according to the conventional method.

The above and other objects and advantages of the invention, which will become apparent from the following description, are achieved by an apparatus which is substantially constituted by an articulated supporting frame, which is adaptable to the form of the bench and to the diameter of the grinding wheel, and by a movable frame pivotally mounted at the upper end of the first frame, two coaxially operating axial pins being provided at the lower end of said movable frame, one of said pins being constituted by a threaded means shiftable axially by rotation and having arranged in its inner end a rubber tab, the other pin being constituted by a rotatable shaft at the inner end of which an elastic suction cup retaining element is provided and outwardly an appropriate template locked between an actuating means and a fixing sleeve, said template being peripherally supported on a rotatable reference pin fixed on a movable arm pivotally mounted on the first frame, positioning of said movable arm relative to the first frame being determined by a threaded shaft arranged at the free end of said movable arm and acting as a spacer and gauge means, said threaded means acting against said supporting frame constituting the element determining the distance between the grinding wheel and the periphery of the lens to be worked, said lens to be shaped being held in a fixed position between the two inner ends of the two above-mentioned coaxial pins, namely between the rubber pad and the elastic suction cup retaining element.

A preferred embodiment of the invention given by way of an illustrative non-limitative example will now be described with reference to the accompanying drawings, in which:

Fig. 1 is a top plan view of the apparatus according to the invention;

Fig. 2 is view in section taken along the line II-II of Fig. 1;

Fig. 3 is a front view, partly in section, of the apparatus according to the invention;

Fig. 4 is a top plan view of the apparatus according to a further embodiment thereof;

Fig. 5 is a front view, partly in section, of a different embodiment of the apparatus, shown together with a protection casing of a grinding machine;

Fig. 6 is a side view, partly in section, of the apparatus according to the embodiment of Fig. 5.

Referring to Figs, 1, 2 and 3, an articulated frame 1 for support on a workbench is constituted by two movable frames 3 and 4 connected to each other, but articulated and lockable in a suitable position by means of two screws 5 and 6 arranged outwardly of the frame 1 on the axis of articulation 7 of Fig. 3.

Pivotally mounted in the upper portion of the frame 4, by means of the through pin 8, is a further frame 9 at the upper end of which two ring-shaped thickened portions 10 and 10′ are provided which have the function of supporting the through pins.

The through pin 8 is unremovably held in position by two snap rings 12, 12′ arranged at the lateral ends of said pin and inserted in suitable retaining seats.

Locking of the lens 13 in the interior of the apparatus is obtained by positioning the same between a rotatable rubber pad 14 and an elastic suction cap retaining element 19, which exert a proper pressure on both the outer surfaces of the lens and lock it in such a manner as to avoid any possible displacement during the shaping operation.

The above-mentioned rubber tab 14 is secured to the head of a pin 15 and rotates together therewith as the latter is inserted in the interior of a bearing 16 and set in rotation by the circular movement of the lens 13.

Said bearing 16 is in turn seated at the end 17 of a threaded pin 11 which is shiftable axially in the interior of a threaded hole arranged in the centre of the thickened portion 10 of the frame 9. The rotation of a control knob 18, connected to the threaded pin 11 by a split pin 37, permits to adjust said pin 11 against a surface of the lens and at the same time to exert a proper pressure on said surface, thus obtaining a sound locking of the latter.

A partially threaded pin 20 is rotatably inserted in the interior of a bearing 22, the latter being in turn located in a suitable seat made in the thickened portion 10′ of the frame 9.

The head of the pin 20, which is of greater diameter than the remaining stem, is for a certain thickness locked in the interior of a sleeve 21, the latter also forming a seat for the elastic suction cup retaining element 19.

Coupling between the suction cup 19 and the pin 20 is obtained by a rectilinear guide 23 projecting from the head of said pin 20 and inserted in a seat made in the base of a plug 36 for retaining the suction cup.

Rotary movement is imparted to the pin 20 by a threaded control knob 24 screwed on to said pin 20 and rotated manually by an operator.

A template 26 is interposed between said knob 24 and a sleeve 25 arranged axially on the pin 20.

Said template 26 is in turn locked without any possibility of sliding by two pins projecting from the sleeve 25, these pins being in part inserted in said sleeve 25 and in part in the template.

As the template 26 rotates integrally with the pin 20 it bears peripherally against the rotatable reference pin 29 fixed at one end of a movable arm 30 which is pivotally mounted at the top of the frame 4.

A threaded shaft 31 passing through a threaded hole made in the end of the movable arm 30 reacts against an abutment 32 secured to the frame 4 to shift said rotatable pin 29 in a precise arc of circle. As the threaded shaft 31 acts in the described manner is provides a gauging element for the distance between the axis of the template 26 and the axis of said rotatable pin 29.

As the template continuously and constantly bears against the peripheral surface of the rotatable pin 29 and as said pin 29 is opposed to said template 26 and is firmly secured to the movable arm 30, an oscillation of the movable frame 30 is produced so as to obtain a continuous contact of the peripheral edge of the lens 26 with the peripheral edge of the grinding wheel 28, thus affording the possibility of obtaining a series of lenses which may be equal or proportional to the template which has generated them.

It will be evident and it is thus possible to obtain with the apparatus of the present invention a very great number of lenses which are of different dimensions and thus adaptable to a great number of spectacles and at the same time having only very few pattern templates of standard geometrical forms and dimensions.

On the basis of the description given so far it will be evident that it is possible to increase or diminish the pressure exerted by the lens 13 against the grinding wheel 28 by simply rotating the frame 4 around its axis of articulation 7 by a certain angle (shown in Fig. 2) relative to the horizontal plane of support on the workbench.

In this manner an increase in pressure is obtained by increasing the angle and vice versa a diminution is obtained by diminishing said angle.

Thus the operator can obtain a choice of the best point of working characterized by a short time of execution and a minimum risk of breaking the lenses.

Fig. 4 shows another embodiment of the apparatus forming the subject matter of the present invention. It is constructed substantially as the apparatus already described, but the rotary movement of the lens, instead of being produced manually by the operator, is transmitted by a motorized system with variable speed. A motor means 33 actuates a belt 34 which in turn sets in rotation a pulley 35 connected axially to the various elements that have already been described and impart rotary movement to the lens to be shaped.

A different embodiment of the apparatus according to the invention is shown in Figs. 5 and 6.

It is substantially constituted by the apparatus that has already been described, but from which the frame 1 comprising the frameworks 3 and 4 has been removed. In this case the remaining movable frame 9 is in engagement with another frame in turn connected to a protective casing of a grinding machine as described in greater detail hereinafter.

The base frame 38 constituted by two longitudinal beams 47, 47′ and by two transverse beams 50, 50′ is supported on the upper portion of the protective casing 40 of a grinding machine 51 and firmly connected thereto by means of screws 46 arranged between the transverse beams 50 and 50′ and screwed into said casing 40.

Two slots of limited length are made in the interior of the transverse beams 50 and 50′ so as to permit the base frame 38 to be shifted transversely, i.e. parallel to the axis of rotation of the grinding wheel 28 (as indicated by the opposed arrows A in Fig. 5), by an extent equal to or greater than the thickness of the grinding wheel 28.

Said transverse shifting permits the point of contact of the lens 13 with the grinding wheel 28 to be varied in such a manner that by successive shiftings a uniform wear of the peripheral plane of said grinding wheel is facilitated.

The upper plane of the longitudinal beams 47, 47′ forms the seat for two slideways 52, 52′ on which a frame 39 moves in alternate directions (as indicated by the opposed arrows B in Fig. 6).

Thus the movable frame 9 is arranged and pivotally mounted for oscillating movement in the interior of the frame 39 between a fixed pin 41 and a movable pin 42.

Inserted outwardly of said movable pin 42 is the movable arm 30 which has the same spacer and gauging function as described previously.

The gauged shifting of the frame 39 on the slideways 52, 52′ is produced by means of a micrometre screw 44 with interacts between a bracket 48 connected to the casing 40 and a threaded lug 45 connected to the frame 39.

With this further movement in a direction normal to the axis of rotation of the grinding wheel, the apparatus for shaping optical lenses is completed and is given a great versatility and adaptability to any type of grinding machine that is normally used by optical workers in their workshops.

Obviously some preferred embodiments of the apparatus for shaping optical lenses according to the invention have been described, but these embodiments are not limited to the examples given above and any other form or dimension of the parts forming the apparatus always comes within the scope of the same inventive idea as defined by the appended claims.

Claims

1. Shaping apparatus for optical lenses, characterized in that it comprises an articulated supporting frame (1), which is adaptable to the form of the bench (2) and the grinding wheel (28), and a movable frame (9) pivotally mounted at the upper end of the first frame (1), two coaxially operating axial pins (11, 20) being provided at the lower end of said movable frame (9), one of said pins (11) being constituted by a threaded means shiftable axially by rotation and having arranged in its inner end a rubber tab (14), the other pin (20) being connected by a rotatable shaft at the inner end of which an elastic suction cup retaining element (19) is provided and outwardly an appropriate template (26) locked between an actuating means (24) and a fixing sleeve (25), said template (26) being peripherally supported on a rotatable reference pin (29) fixed on a movable arm (30) pivotally mounted on the first frame (1), positioning of said movable arm (30) relative to the first frame (1) being determined by a threaded shaft (31) arranged at the free end of said movable arm (30) and acting as a spacer and gauge means, said threaded means (31) acting against said supporting frame (1) constituting the element determining the distance between the grinding wheel (28) and the periphery of the lens (13) to be worked, said lens (13) to be shaped being held in a fixed position between the two inner ends of the two above-mentioned coaxial pins (11, 20), namely between the rubber pad (14) and the elastic suction cup retaining element (19).

2. Apparatus for shaping lenses according to claim 1, characterized in that the rotation of the template (26), which continuously and constantly bears against the peripheral surface of the rotatable

pin (29) opposed thereto and firmly secured to the movable arm (30), causes an oscillation of the movable frame (9) so as to permit continuous contact of the peripheral edge of the lens (13) with the grinding wheel (28), thus producing a lens which is equal or proportional to the profile of the template used.

3. Apparatus according to Claim 1, characterized in that the pressure of the lens (13) on the peripheral edge of the grinding wheel is variable according to the inclination assumed by the frame (4) relative to the horizontal plane provided by the frame (3) supported on the plane of the workbench (2).

4. Apparatus for shaping lenses according to claim 1, characterized in that the rotary movement of the lens to be worked is obtained by manually actuating the special control knob (24) provided at the outer end of the axial pin (20) carrying the suction cup (19).

5. Apparatus for shaping lenses according to claims 1 to 3, characterized in that the rotary movement of the lens to be worked is obtained by an appropriate motor means (33).

6. Apparatus for shaping lenses according to claims 1 to 3, characterized in that a first frame (38) connected to a protective casing (40) and a second frame (39) slidable on said first frame (38) constitute means for pivotally mounting and gauging a movable frame (9) and a movable arm (30), said first frame (38) being shiftable parallel to the axis of rotation of the grinding wheel (28) by means of screws (46) arranged in the interior of slots (49), and said second frame (39) being slidable in a direction normal to the axis of rotation of the grinding wheel (28) on guides (52, 52') arranged above said first frame (38), said second frame (39) being regulable in its longitudinal displacement by adjustable means (44).

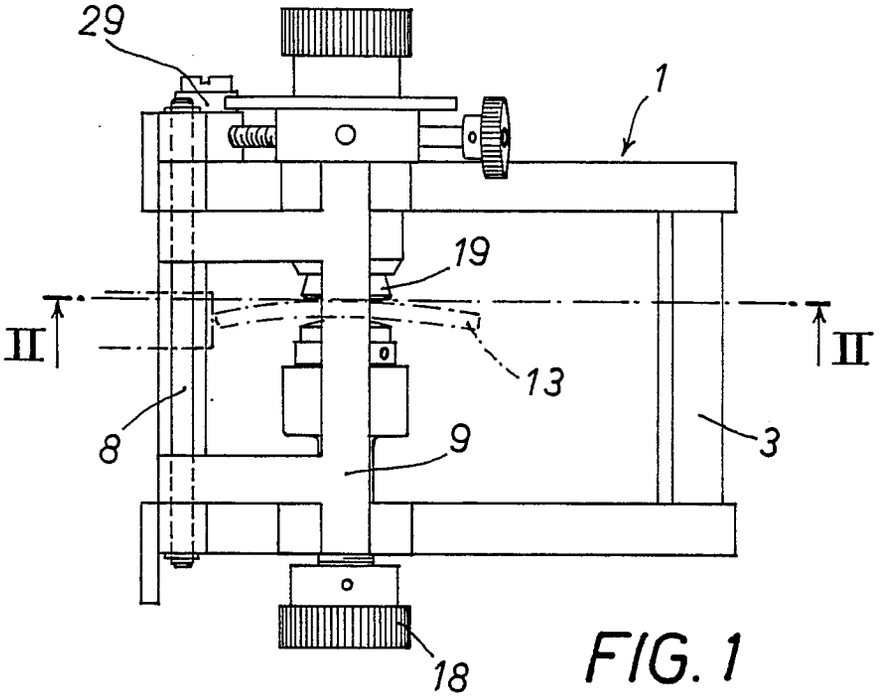

FIG. 1

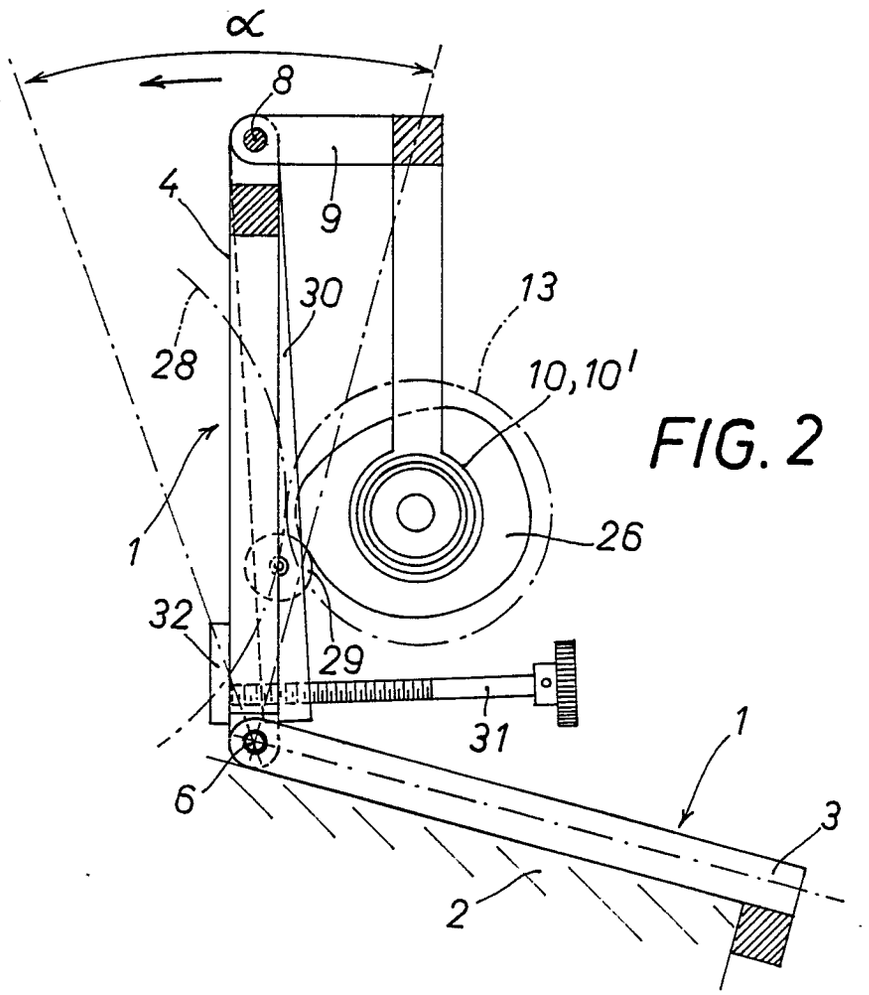

FIG. 2

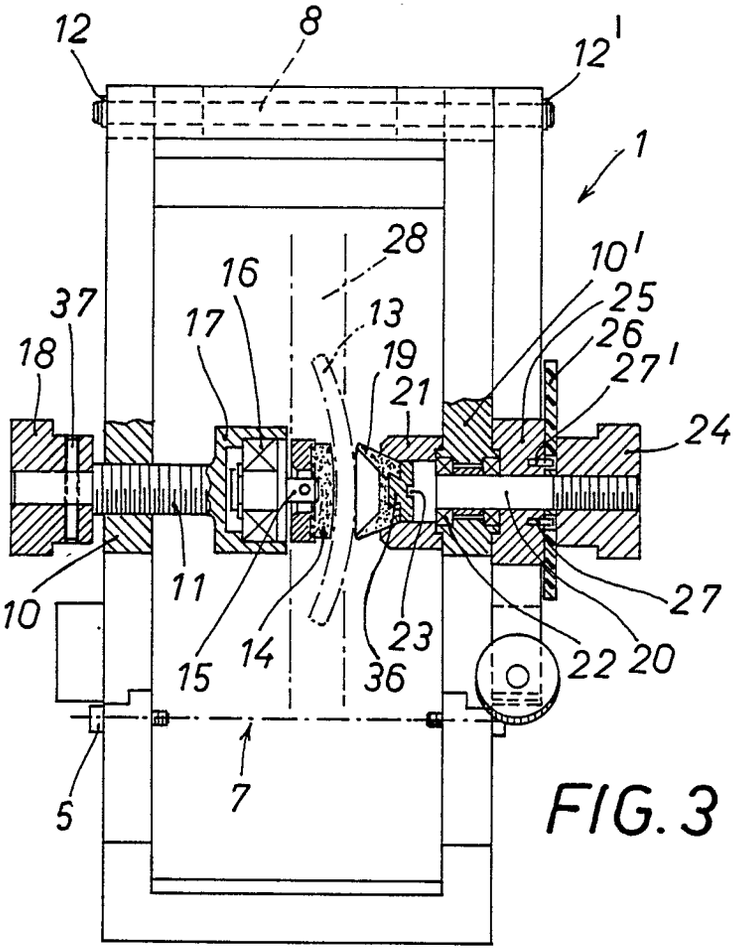
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FIG. 3

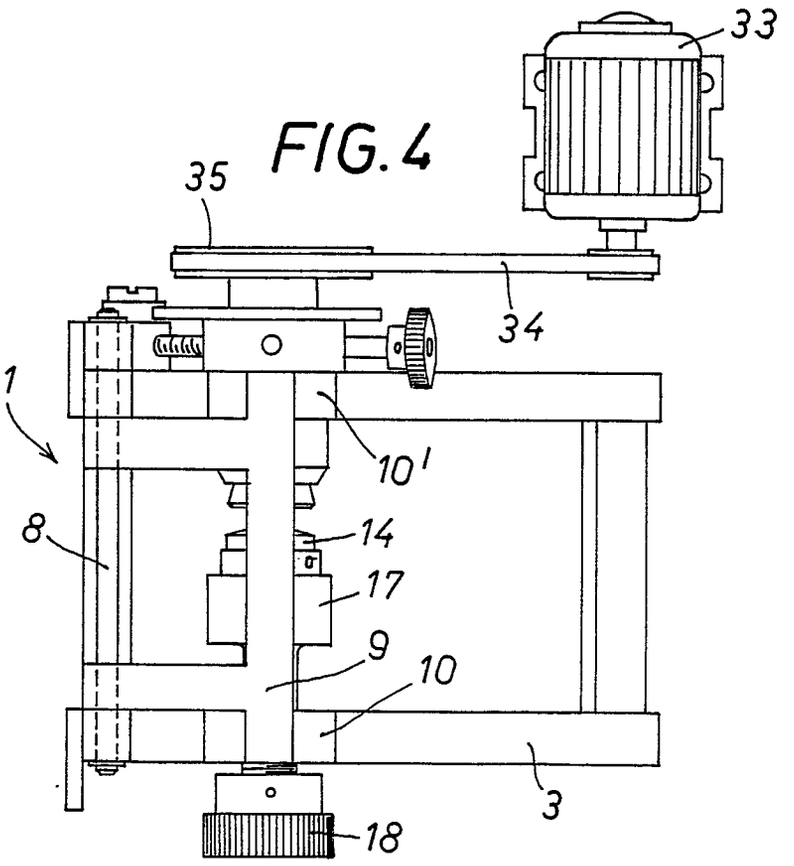
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FIG. 4

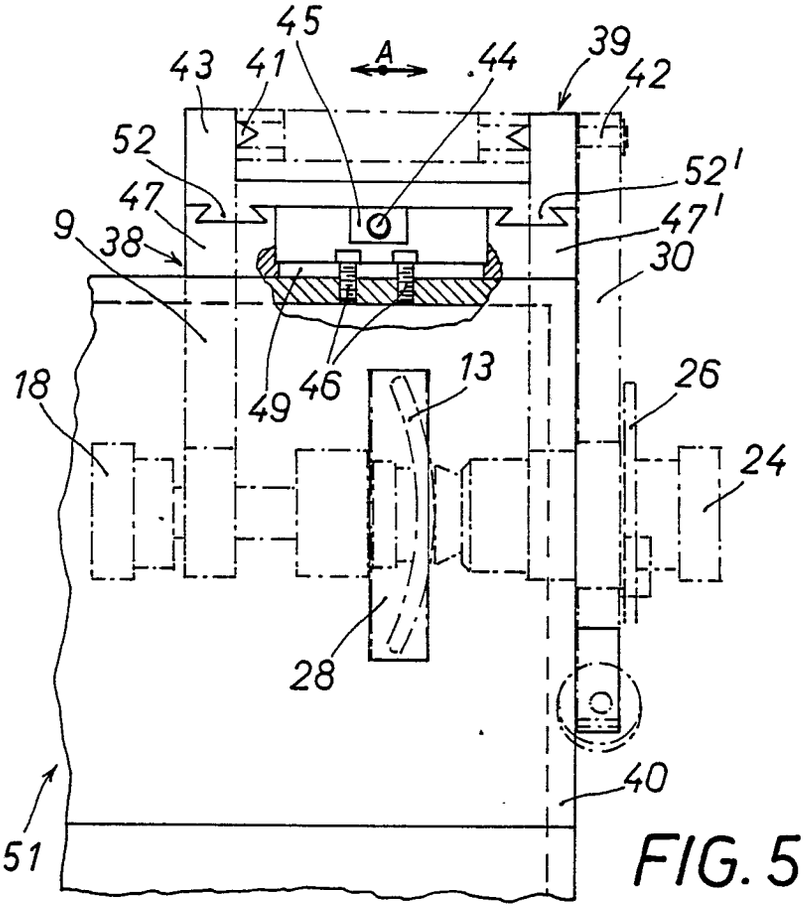
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FIG. 5

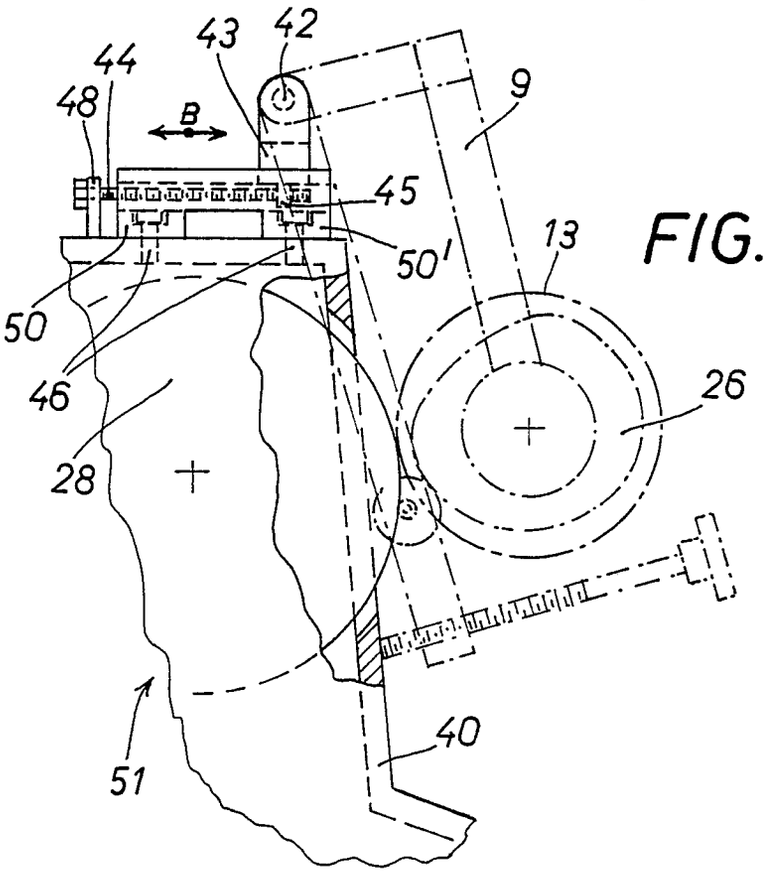
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FIG. 6