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(54) Grinding head particularly for chamfering-profiling machines for glass plate elements.

(57) This grinding head particularly for chamfering-profiling machines for glass plate elements comprises a supporting frame (10) which defines a cylindrical body (11) for accommodating and guiding a sleeve (12) which is axially slidable and rotatably supports the actuation shaft (13) of a grinder (14) which is rotated by a motor (19). The sleeve (12) may be moved with respect to the cylindrical body (11) so as to adjust the grinder position by virtue of a kinematic coupling (20, 22) extending between the sleeve and a control shaft (21), which is substantially parallel to the sleeve. The control shaft (21) is fixed in an axial direction and is rotated about its own axis by a positioning motor (30) controlled by a control and adjustment unit (40).

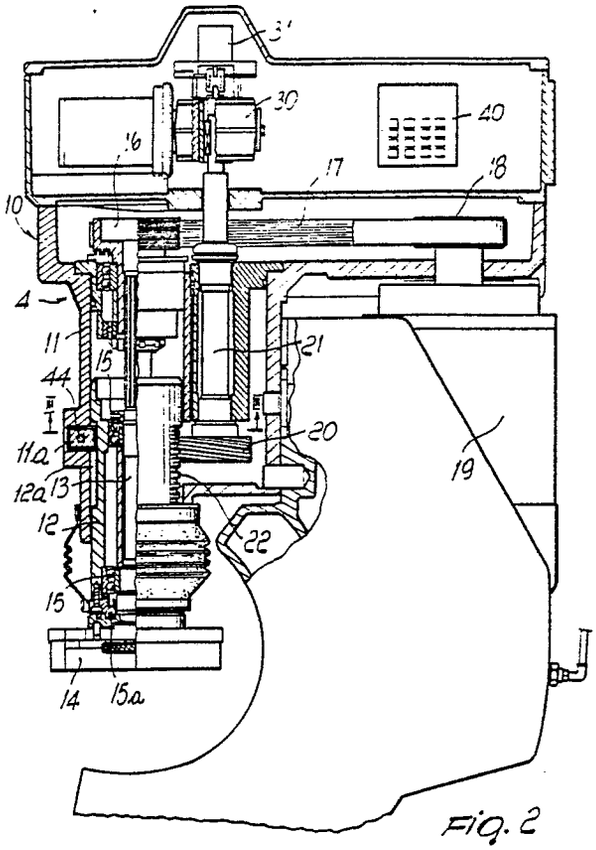


Fig. 2

EP 0 358 029 A2

GRINDING HEAD PARTICULARLY FOR CHAMFERING-PROFILING MACHINES FOR GLASS PLATE ELEMENTS

The present invention relates to a grinding head particularly for chamfering-profiling machines for glass plate elements.

As is known, so-called semiautomatic grinders for machining and chamfering the edges of glass plates and the like are already present on the market; said grinders are substantially constituted by a table which supports the glass plate being machined and has an arm on which a mandrel or grinder support head can move along its axial direction so as to adjust the depth of the stroke. Said heads can furthermore rotate about an axis which is substantially tangent to the edge being machined, so as to adjust the angle or inclination of the chamfering being machined and can furthermore rotate about an axis which is substantially perpendicular to the extension of the edge being machined, in order to vary the inclination of the grinder portion which operates on the edge.

Manually actuated kinematic systems are currently used to axially move the grinder and allow to move said grinder to preset positions defined by manually adjustable tappets which engage an auxiliary shaft having a rack-like portion which meshes with a gear which in turn meshes with a rack-like portion defined on the grinder supporting sleeve.

With such an arrangement the gear must be rotated to move both the sleeve and the auxiliary shaft which defines the position of the grinder by virtue of the engagement with tappets supported by the structure of the machine.

Said tappets must be adjusted in each instance so as to define the required working position or positions.

As is evident, considerable time is wasted with this kind of application to adjust said positions, which must be set manually and modified in each instance according to the different machinings and different requirements.

The aim of the invention is indeed to eliminate the previously described disadvantages by providing a grinder head particularly for chamfering-profiling machines for glass plate elements which can perform the translatory positioning of the grinder in a substantially automatic manner without requiring manual actuations and manual preset of the various stroke limit elements which were constituted by the tappets in the known art.

Within the above described aim, a particular object of the invention is to provide a grinding head which allows to preset, in a very rapid and simple manner, the various preselected adjustment positions, and furthermore allows to rapidly vary said positions.

Another object of the present invention is to provide a grinding head with control means which prevent incorrect actuations and in particular do not allow the axial movement of the grinder if the sleeve which supports the grinder has not been released.

Another object of the present invention is to provide a grinding head which by virtue of its peculiar implementation features is capable of giving the greatest assurances of reliability and safety in use.

Not least object of the present invention is to provide a grinding head which can be easily obtained starting from elements and materials commonly commercially available and is furthermore advantageous from a merely economical point of view.

This aim, the objects mentioned and others which will become apparent hereinafter are achieved by a grinding head particularly for chamfering-profiling machines for glass plate elements, as defined in the appended claims.

The characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of a grinding head particularly for chamfering-profiling machines for glass plate elements, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic view of a chamfering-profiling machine with the grinding head according to the invention;

figure 2 is a sectional view of the grinding head;

figure 3 is a sectional view of the sleeve locking means, taken along the line III-III of figure 2;

figure 4 is a sectional view taken along the line IV-IV of figure 3.

With reference to the above figures, the chamfering-profiling machine for glass plate elements according to the invention comprises essentially a base indicated at 1, of a per se known kind, which defines a star-shaped table 2 with suckers for locking the plate being machined; an arm 3 extends from said base and supports a grinding head, generally indicated by the reference numeral 4, which in a per se known manner has means which allow to vary its inclination about an axis which is substantially tangent to the edge of the plate being machined and means for inclining said head about an axis which is substantially perpendicular to the edge of the plate being machined, in particular a glass pane.

Said inclination adjustment means are of a known kind and are not described herein in detail, since they are not related to the present invention.

The grinding head 4 has a supporting frame, generally indicated by the reference numeral 10, which defines a cylindrical body 11 which extends towards the work area where the edge of the glass pane is located.

A sleeve 12 is accommodated inside the cylindrical body 11 and can slide axially therein; said sleeve internally rotatably supports the actuation shaft 13 of a grinder 14 which may be of any kind according to the machinings to be performed.

The shaft 13 is supported by the sleeve 12 through bearings, generally indicated at 15, and a labyrinth-like portion 15a also of a known kind which prevents the infiltration of dust.

The shaft 13 engages with a pulley 16 so that it can slide axially but rotates rigidly therewith; a belt 17 engages said pulley and draws its motion from a driving pulley 18 actuated by motor means constituted by the motor 19.

Means are provided for the axial translatory motion of the grinder towards and away from the work area; said means comprises a kinematic coupling including a gear 20 of the worm-screw type which is keyed on a control shaft 21 which extends parallel and to the side of the sleeve 12.

Said gear 20 couples with a rack-like portion 22 which is correspondingly defined on the sleeve 12, which has a longitudinal groove 12a engaged by a protruding tab 11a rigid with the cylindrical body 11 so that the sleeve 12 is prevented from rotating and the rotation of the gear 20 causes an axial translatory motion of the sleeve 12.

Motorized positioning means are provided on the shaft 21 and comprise a direct-current motor 30 with which an angular position control encoder 31 is associated.

The motor 30 is controlled by an electronic control and adjustment unit indicated at 40, which displays the position of the grinder and allows a plurality of preselectable work positions to be stored according to the various requirements.

Sleeve locking means act on the sleeve 12 and include, as is more clearly illustrated in figures 3 and 4, a pair of mutually opposite shaped jaws 41 and 42 which respectively have a shaped portion 41a and 42a which engages with the sleeve and an abutment portion 41b and 42b which abuts against the fixed structure.

One of said jaws, and in particular the first jaw 41, has a threaded hole 43 engaged by the threaded stem 44 of a rod 45 which passes through the other jaw 42 and has a widened head 46 which exerts the locking pushing action for the jaw 42.

The widened head 46 engages, by means of a key-like coupling or the like, with the tang 47 of a rotating piston 48 which has a cam 49 which interacts with the contact 50 of an enabling microswitch 51 which enables the operation of the motor 30 only after the locking means of the sleeve 12 have been released. The rotating piston 48 may be actuated by an own motor means, also controlled through unit 40 so as to cause releasing of the locking means and the actuation of motor 30.

In practical operation the user, by acting on a button, actuates the motor 30, which rotates the gear 20 and thus moves the sleeve 12 until the grinder reaches the required position.

The user can store a series of preset positions which he can recall in each instance during machining, and he can modify them in any case according to his requirements.

Every successive actuation requires the preliminary intervention of the rotating piston 48 which releases the sleeve and consequently enables the operation of the motor 30, the rotation whereof is controlled by the encoder 31 which always allows to visualize the position of the grinder, thus allowing an extremely precise machining.

From what has been described above it can thus be seen that the invention achieves the proposed aim and objects, and in particular the fact is stressed that the particular mechanical actuation adopted for the translatory motion of the sleeve 12 allows to automate the selection of the various positions, storing a plurality of positions which can be recalled in each instance during machining.

All the steps of axial translation of the grinder may furthermore be performed in an extremely rapid and automatic manner without requiring the operator's manual intervention, as instead occurs in the solutions of the known art which adopted tappets for the various positionings.

Another important aspect of the invention resides in that the use of locking means which control and prevent the operation of the motor 30 if the sleeve 12 has not been released, allows to always have great assurances of safety during the various work steps.

The invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may furthermore be replaced with other technically equivalent elements.

In practice the materials employed, so long as compatible with the specific use, and the dimensions and contingent shapes may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element

identified by way of example by such reference signs.

Claims

1. A grinding head particularly for chamfering profiling machines for glass plate elements, comprising a support frame (10) which defines a cylindrical body (11) for accommodating and guiding a sleeve (12) which is axially slidable and rotatably supports an actuation shaft (13) for a tool (14) which is rotated by motor means (19), positioning means (20-22, 30) being furthermore provided for moving said sleeve with respect to said cylindrical body and positioning said tool, characterized in that said positioning means comprise a kinematic coupling (20, 22) arranged between said sleeve and a control shaft (21), and a sleeve positioning motor (30), said control shaft being substantially parallel to said sleeve, said control shaft being fixed in an axial direction and rotated about its own axis by said sleeve positioning motor, which is controlled by a control and adjustment unit (40).

2. A grinding head, according to claim 1, characterized in that said kinematic coupling comprises a worm screw (20) which is keyed on said control shaft (21) and meshes with a rack-like portion (22) which extends axially on said sleeve (12).

3. A grinding head, according to any of the preceding claims, characterized in that said sleeve positioning motor comprises a direct-current motor (30) controlled by an angular control encoder (31).

4. A grinding head according to any of the preceding claims, characterized by means (41-48) for locking said sleeve, said sleeve positioning motor (30) being controlled by said locking means.

5. A grinding head according to any of the preceding claims, characterized in that said locking means comprise a pair of jaws (41, 42) which define a shaped portion (41a, 42a) for engaging with said sleeve (12) and an abutment portion (41b, 42b) for engaging with said supporting frame (10), said jaws being actuated by a stem (45) which is kinematically connected to a rotating piston (48) which has a cam (49) interacting with a microswitch (51) for enabling operation of said sleeve positioning motor (30).

6. A grinding head according to any of the preceding claims, characterized in that said control and adjustment unit (40) is adapted to drive said direct-current motor (30) and to store a plurality of preselectable positions for said tool (14).

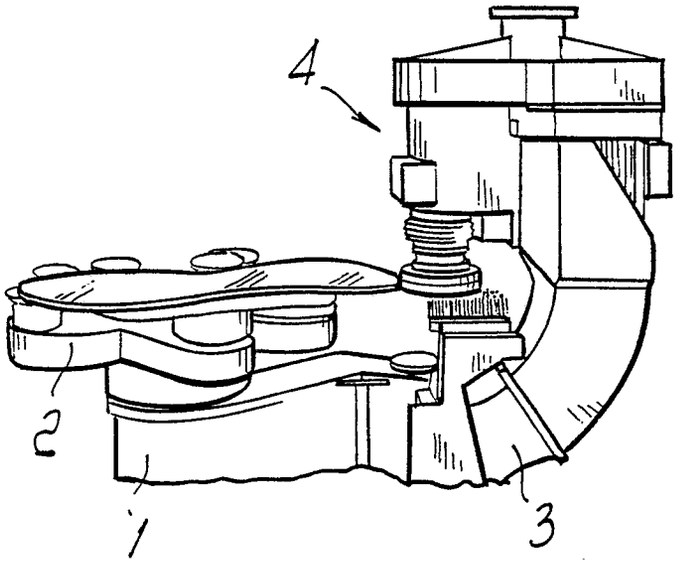


Fig. 1

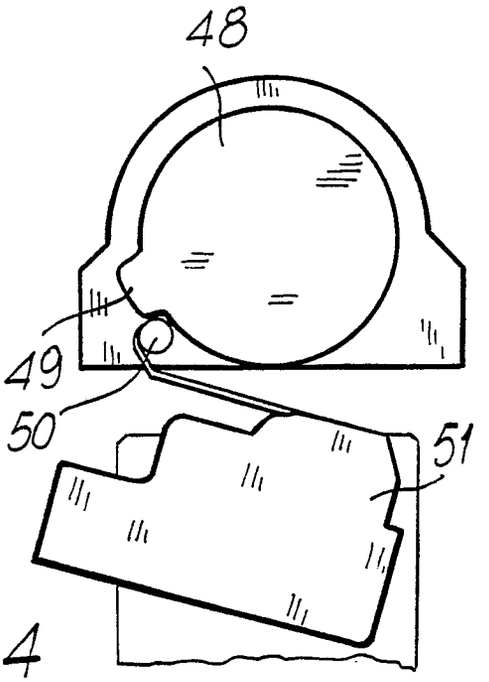
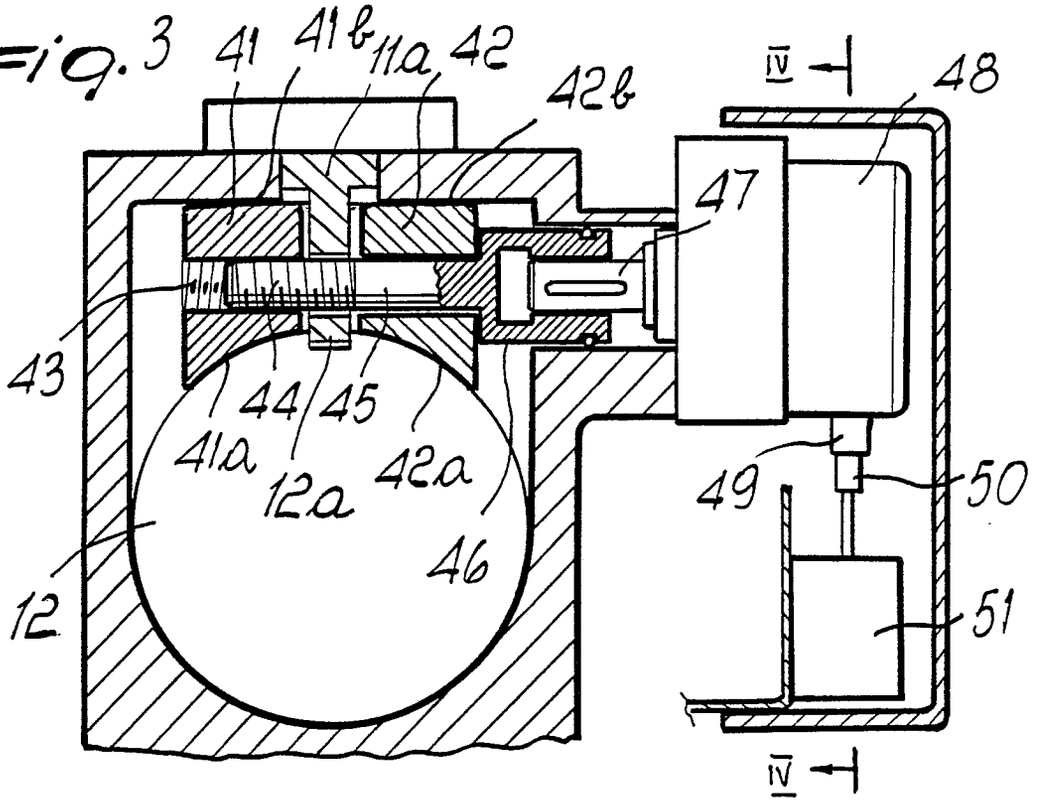


Fig. 4

Fig. 3



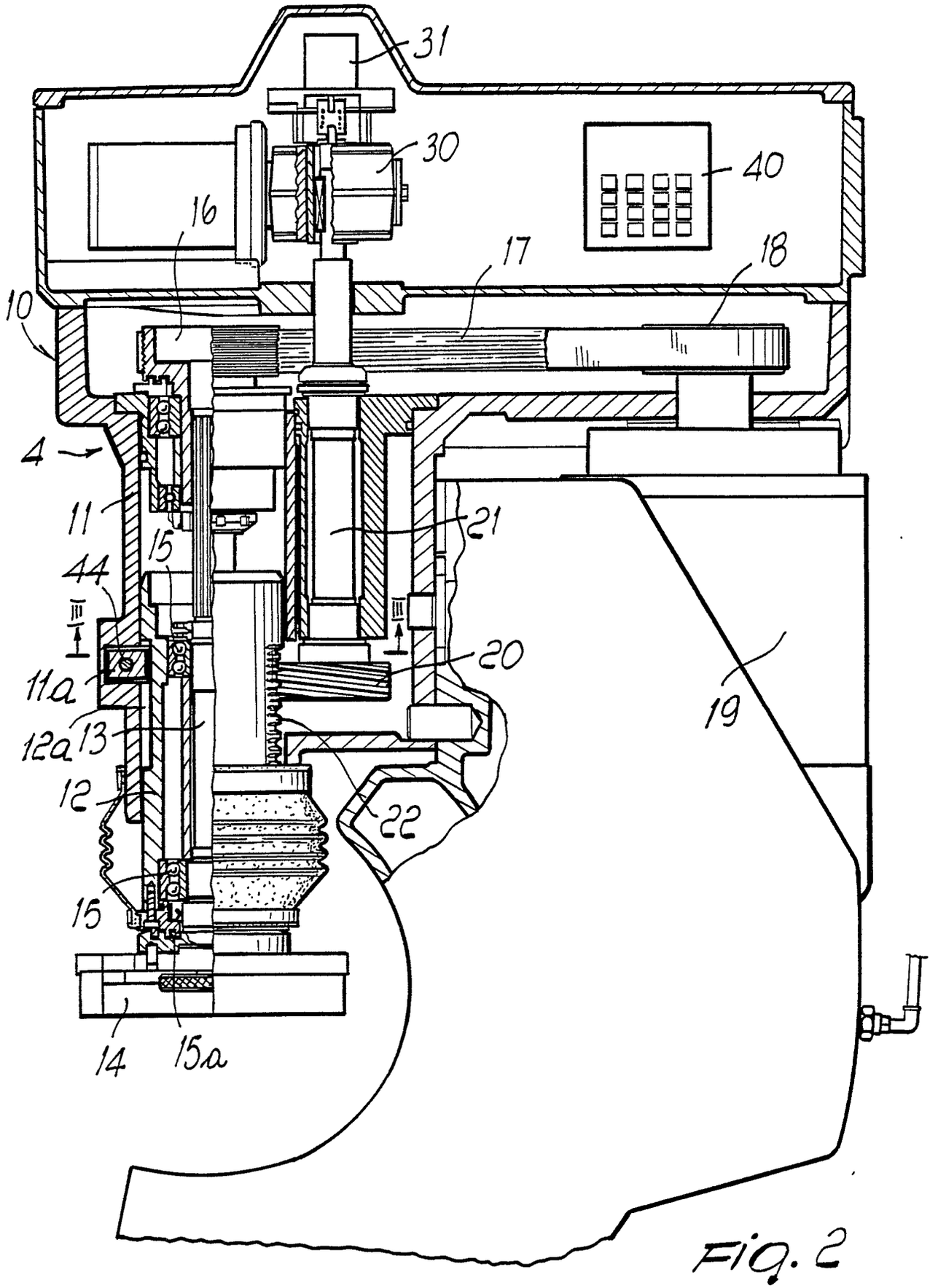


Fig. 2