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(54) **Automatic grinding wheel adjusting system, especially for glass grinding machines**

Automatisches Schleifscheibeneinstellungssystem, insbesondere für Glasschleifmaschinen

Système de réglage d'une meule automatique, notamment pour meules en verre

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Description

[0001] As is known, the processing of glass plates is done on rectilinear automatic machines and on double-sided grinding machines that allow grinding the edges of the plate by a multiple number of cup-shaped grinding wheels. The grinding wheels are of a different grain size, so that the first grinding wheels contacting the plate achieve a greater removal of material, while the subsequent grinding wheels set up downstream of the former are of a finer grain size, so as to perform a finishing treatment on the edge of the plate.

[0002] In the grinding machines of a known type, the grinding wheels are normally mounted on spindles fitted with an adjusting screw, so as to adjust the position of the grinding wheel with respect to the edge of the plate to be processed, depending on the grinding wheel's position along the edge of the plate and on the grain size of the grinding wheel itself.

[0003] Based on the state of the art of the grinding machines for glass processing, it is known that both the initial positioning of the grinding wheels as well as their re-positioning on the edge of the plate as needed to correct the different action due to grinding wheel wear is done manually.

[0004] The state of the art also includes the Italian patent application ITMI20020289 in the name of the same Applicant.

[0005] The object of this patent application is a grinding machine equipped with a rod fitted with fixed locators, so as to allow the grinding wheel to be correctly positioned against the edge of the plate.

[0006] Despite the fact that this device constituted a substantial improvement over the traditional machines requiring the operator's manual action for a positioning of the grinding wheels, a number of drawbacks were encountered while operating the machine.

[0007] This automatic system in fact included the presence of a mobile rod inside the grinding section.

[0008] The cooling water for the grinding wheels and the presence of the glass dust resulting from the grinding operation form in fact a deposit on the rod which affects its proper operation in the long term.

[0009] This setup of the automatic grinding wheel adjusting means thus involves a frequent maintenance of the system on the part of the user.

[0010] Another automatic grinding wheel adjusting system is known from document EP-A-1 063 053, where a sensor detects the position of the machined surface of the glass and considers the displacement from the zero position.

[0011] The primary task of the present invention is therefore to eliminate the drawbacks affecting the adjusting system already known.

[0012] Within this task, in particular, a purpose of the present invention is to provide an automatic grinding wheel adjusting system capable of eliminating or at least reducing the maintenance problems affecting the system already known from the previous patent application, while improving the system's and therefore the machine's reliability while the cutting its maintenance and other costs associated with a shutdown of the machine over the maintenance period.

[0013] This task and other purposes that will become better evident following the description of a preferred form of embodiment of this invention are achieved by a system for an automatic grinding wheel adjustment of a grinding machine for glass and similar materials, as defined by all the features of claim 1.

[0014] Further characteristics and advantages of the present invention will become better evident from the following detailed description offered in an exemplifying and non-limiting form and illustrated in the attached figures, wherein:

Figure 1 shows a top view of a detail of the grinding machine fitted with the grinding wheel adjusting system according to the invention.

Figure 2 shows a detail of the same grinding machine according to this invention, in a lateral view.

[0015] According to the preferred form of embodiment of the present invention illustrated in the mentioned figures for exemplifying purposes, the same concerns an automatic adjusting system for the grinding wheels of a grinding machine for glass plates, wherein a locator 4 is firmly attached to the extremity of a shaft 9 facing each grinding wheel 8. This locator sets the distance between the processing surface of the grinding wheel and the edge of the edge of the plate being processed.

[0016] The shaft 9 is mounted on a guide bushing 5 that extends, through a grinding wheel retainer shaft 3, into the grinding wheel processing zone, where said shaft 9 is mounted on bearings that lock it in an axial direction, thus allowing it to rotate around its axis.

[0017] The locator is therefore mobile with the rotation of the shaft 9, because it is firmly attached to the extremity of the latter.

[0018] As can be seen in Figure 2, the rotation of the shaft 9 allows moving the locator 4 from the position A in the figure where it forms a reference point facing the grinding wheel 8, to the position B where it is detached from the grinding wheel, which can therefore process the plate.

[0019] In an advantageous manner, the rotation of the shaft 9 that allows commanding the positioning of the locator 4 is controlled by locator driving means.

[0020] These locator driving means comprise a rod 2 that connects, through a crankshaft, the extremities of the shafts 9 opposite the locators, one or more threaded ring nuts 6 and 7 for an axial adjustment of the position of the locators 9, and a pneumatic driving cylinder 1.

[0021] The operation of the automatic adjusting system according to the illustration given up to this point is therefore as follows:

[0022] The diamond grinding wheels normally em-

ployed for the processing of glass plates have different grain sizes, depending on the type of processing they are called to perform. More in detail, the grinding wheels of a coarse grain size remove a greater amount of material, and those of a finer grain size perform surface finishing operations while removing a lesser quantity of material. The adjustment of the locators 4 thus determines the position of the grinding wheels 8 with respect to the finished size of the glass item, so that the last locator downstream of the grinding wheel series with respect to the glass advancing direction will be adjusted in the zero point position.

[0023] The second-last locator can for instance be adjusted to a distance of ab. 0.2 mm, which equals the amount of material to be removed from the last grinding wheel, the third-last locator will be set at a distance of about 0.5 mm from the zero point and so on up to the first locator, which be the farthest from point zero and the locator of the first grinding wheel that performs the chipping of the glass edge.

[0024] Whenever, in a machine calibrating stage, it is necessary to adjust the positioning of the locators with respect to the zero point as described above, the operator positions the locators 4 depending on the grain size, as described above. The registration of the position of the locators may be performed by using the adjusting means for the position of the locators, where said adjusting means may for instance comprise one or more threaded ring nuts 6 and 7 mounted on the shaft 9. Once the distance of the locators from the zero point has been set, which will at this point be in the position A of Figure 2, the operator acts by using an automatic control that rests the grinding wheels on the locators 4. Once the grinding wheels have been positioned, the operator acts on the driving cylinder 1 to move the locators 4 to the position B, where they cannot interfere with the rotation of the grinding wheels.

[0025] The actuating of the driving cylinder 1 causes, through the rod 2 and the crankshaft connecting system not shown in the figures, the rotation of the shafts 9 and consequently of the locators 4, which shift from the position A useful for positioning the grinding wheels to the position B where the locators are removed from the grinding wheels, thus allowing them to be driven and thence the glass to be processed.

[0026] It has thus been shown that the automatic grinding wheel adjusting system according to the present invention allows securing the advantages sought after and overcoming the drawbacks left unresolved by similar machines already known from the state of the art. In particular, it has been shown that the automatic grinding wheel adjusting system according to the present invention allows positioning all the grinding wheels simultaneously and in a very short time against the edge of the plate, thanks to the use of the locators under remote control. The automatic grinding wheel adjusting system according to the present invention also proves to be more reliable and less susceptible to the drawbacks associated with the presence of dirt due to the processing residues and refrigerating liquid, as all the controlling and driving organs are set up in a clean area, far from the processing grinding wheels.

[0027] The skilled person in the art may apply numerous modifications, without departing from the scope of the present invention, as defined by the appended claims

Claims

1. Automatic grinding wheel position adjusting system, especially for grinding machines for the processing of glass plates, comprising a locator (4) for each of said grinding wheels, where said locator is set up in front of said grinding wheel so as to arrest the grinding wheel's forward motion to the edge of the plate under processing in the position determined by said locator, and driving means for said locators (1, 2, 6, 7, 9) set up outside the plate processing area and therefore out of contact with the grinding wheel cooling liquid and the dusts deriving from the grinding process **characterized by** the fact that each of said locators (4) is mobile between a position A engaging it with the grinding wheel (8), and a position B d disengaging it from the grinding wheel (8), the locator (4) setting the distance between the processing surface of the respective grinding wheel and the edge of the plate being processed.

2. Automatic system according to claim 1, **characterized by**, the fact that said locator driving means comprise for each locator (4), a shaft (9) that can be rotated around its axis and extends into the zone of the grinding wheels with a grinding wheel retainer shaft (3) and carries said locator (4) and one or more threaded and axially adjustable ring nuts (6,7) in a firmly fastened manner.

3. Automatic system according to the previous claim, **characterized by** the fact that said locator driving means also comprise a driving cylinder (1) connected to a rod (2) that is in turn connected to each of said shafts (9) through a crankshaft and crank system, so that the shifting motion of the shaft (2) can be transformed into an motion of axially rotating said shafts (9).

4. Automatic system according to the previous claim, **characterized by** the fact that said grinding wheel retaining shaft (3) rotates while being firmly attached to said shaft (9), and by the fact that said locator (4) is firmly attached to the extremity of said grinding wheel retainer shaft (3), so that a rotation of said shaft (9) is matched by a rotation of said locator (4) that moves from said grinding wheel locating position A to said grinding wheel disengaging position B.

Patentansprüche

1. Automatisches System zur Regelung der Position von Schleifscheiben insbesondere in Schleifmaschinen zur Bearbeitung von Glasplatten, mit einem Positionsgeber (4) für jede einzelne der genannten Schleifscheiben, wobei der genannte Positionsgeber vor der genannten Schleifscheibe angebracht ist, so dass die Vorwärtsbewegung der Schleifscheibe in Richtung der Kante der bearbeiteten Platte in der Position angehalten wird, die durch den genannten Positionsgeber bestimmt wird und mit Antriebsmitteln der genannten Positionsgeber (1, 2, 6, 7, 9), die außerhalb des Plattenbearbeitungsbereich angebracht sind und deshalb nicht mit der Schleifscheibenkühlflüssigkeit und dem Staub des Schleifverfahrens in Kontakt kommen, **gekennzeichnet durch** die Tatsache, dass jeder einzelne der genannten Positionsgeber (4) mobil zwischen einer Position A zum Einkuppeln mit der Schleifscheibe (8) und einer Position B zum Auskuppeln von der Schleifscheibe (8) ist; der Positionsgeber (4) regelt den Abstand zwischen der Bearbeitungsoberfläche der betreffenden Schleifscheibe und der Kante der zu bearbeitenden Platte.

2. Automatisches System nach Anspruch 1, **gekennzeichnet durch** die Tatsache, dass die genannten Positionsgeber-Antriebsmittel über eine Welle (9) für jeden einzelnen Positionsgeber (4) verfügen, die um ihre eigene Achse gedreht werden kann und die mit einer Schleifscheiben-Haltewelle (3) bis in den Bereich der Schleifscheiben ragt und den genannten Positionsgeber (4) trägt und über eine oder mehrere Ringmuttern (6, 7) mit Gewinde verfügt, die auf sicher befestigte Weise axial regelbar sind.

3. Automatisches System nach dem vorhergehenden Anspruch, **gekennzeichnet durch** die Tatsache, dass die genannten Positionsgeber-Antriebsmittel auch einen Antriebszylinder (1) enthalten, der mit einer Stange (2) verbunden ist, die abwechselnd mit jeder einzelnen der genannten Wellen (9) über eine Kurbelwelle und ein Kurbelsystem verbunden ist, so dass die Verschiebungsbewegung der Welle (2) in eine axiale Drehbewegung der genannten Wellen (9) umgewandelt werden kann.

4. Automatisches System nach dem vorhergehenden Anspruch, **gekennzeichnet durch** die Tatsache, dass die genannte Schleifscheiben-Haltewelle (3) sich dreht während sie sicher an der genannten Welle (9) befestigt ist und **durch** die Tatsache, dass der genannte Positionsgeber (4) sicher am Ende der genannten Schleifscheiben-Haltewelle (3) befestigt ist, so dass eine Drehung der genannten Welle (9) auf eine Drehung des genannten Positionsgebers (4) abgestimmt ist, der sich von der genannten Schleifscheiben-Lageposition A in die genannte Schleifscheiben-Auskuppelposition B verschiebt.

Revendications

1. Système automatique de réglage de la position de la meule, surtout pour les ponceuses destinées au traitement des plaques de verre, comprenant un localisateur (4) pour chacune desdites meules, où ledit localisateur est installé devant lesdites meules de sorte à arrêter le mouvement vers l'avant de la meule vers le bord de la plaque en cours d'usinage dans la position déterminée par ledit localisateur, et un moyen d'entraînement pour lesdits localisateurs (1, 2, 6, 7, 9) installé à l'extérieur de la zone d'usinage de la plaque et donc sans contact avec le liquide de refroidissement de la meule et avec la poussière dérivant du processus de meulage, **caractérisé en ce que** chacun desdits localisateurs (4) est mobile entre une position A les engageant dans la meule (8), et une position B les désengageant de la meule (8), le localisateur (4) réglant la distance entre la surface d'usinage de la meule respective et le bord de la plaque en cours d'usinage.

2. Système automatique selon la revendication 1, **caractérisé en ce que** les dits moyens d'entraînement du localisateur comprennent pour chaque localisateur (4), un arbre (9) qu'on peut faire pivoter autour de son axe et qui se développe à l'intérieur de la zone des meules avec un arbre de retenue (3) de la meule et qui porte ledit localisateur (4) et une ou plusieurs bagues (6, 7) filetées et réglables axialement d'une façon solidement fixe.

3. Système automatique selon la revendication précédente, **caractérisé en ce que** les dits moyens d'entraînement du localisateur comprennent également un cylindre d'entraînement (1) relié à une tige (2) à son tour reliée à chacun desdits arbres (9) par l'intermédiaire d'un vilebrequin et d'une manivelle, de sorte que le mouvement de déplacement de l'arbre (2) puisse être transformé en un mouvement de rotation axiale desdits arbres (9).

4. Système automatique selon la revendication précédente, **caractérisé en ce que** ledit arbre de retenue (3) de la meule tourne tandis qu'il est solidement attaché audit arbre (9), et **en ce que** ledit localisateur (4) est solidement attaché à l'extrémité dudit arbre de retenue (3) de la meule, de sorte que la rotation dudit arbre (9) est couplée à une rotation dudit localisateur (4) qui se déplace de ladite position A de localisation à ladite position B de désengagement de la meule.

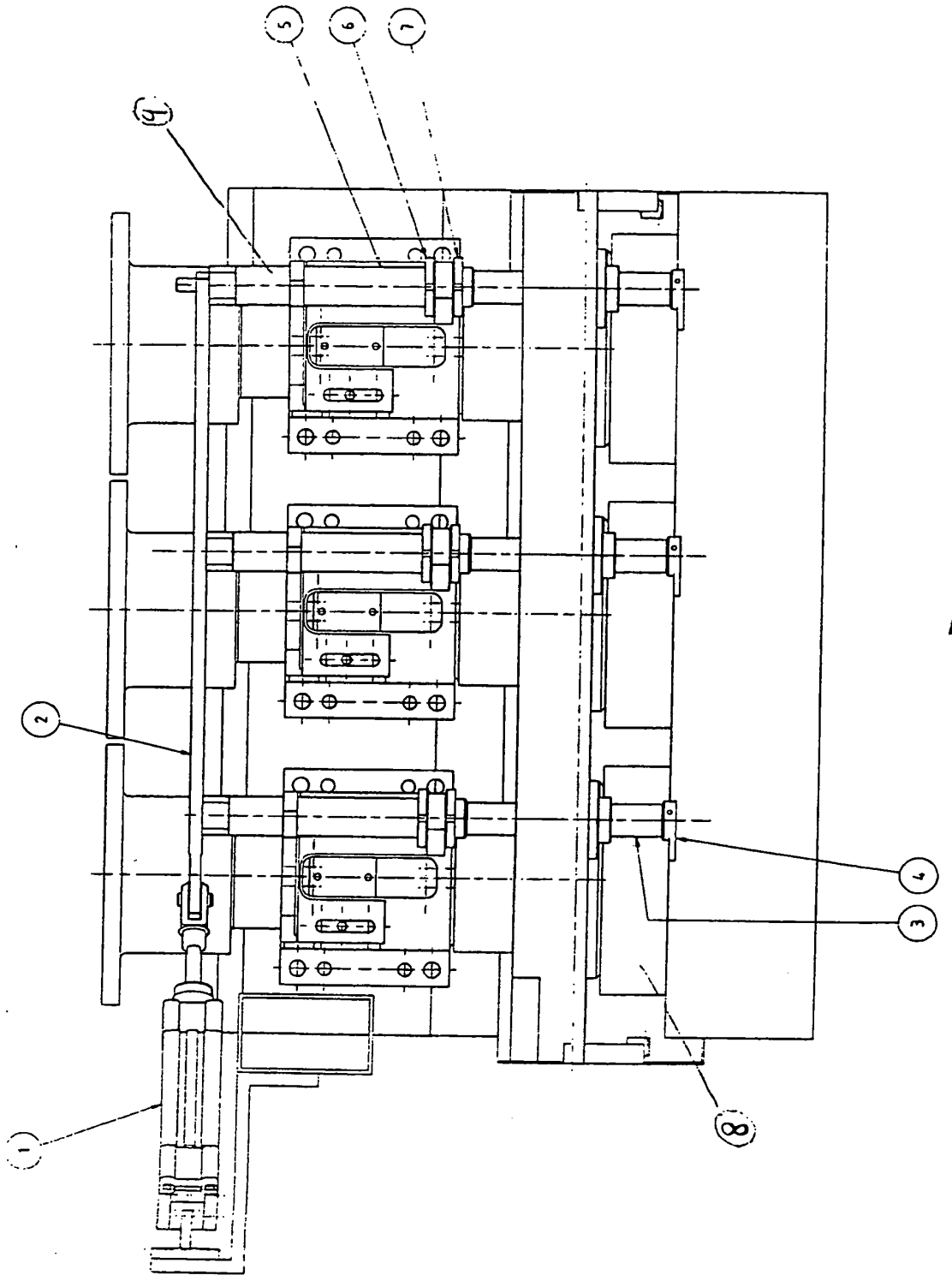

Fig. 1

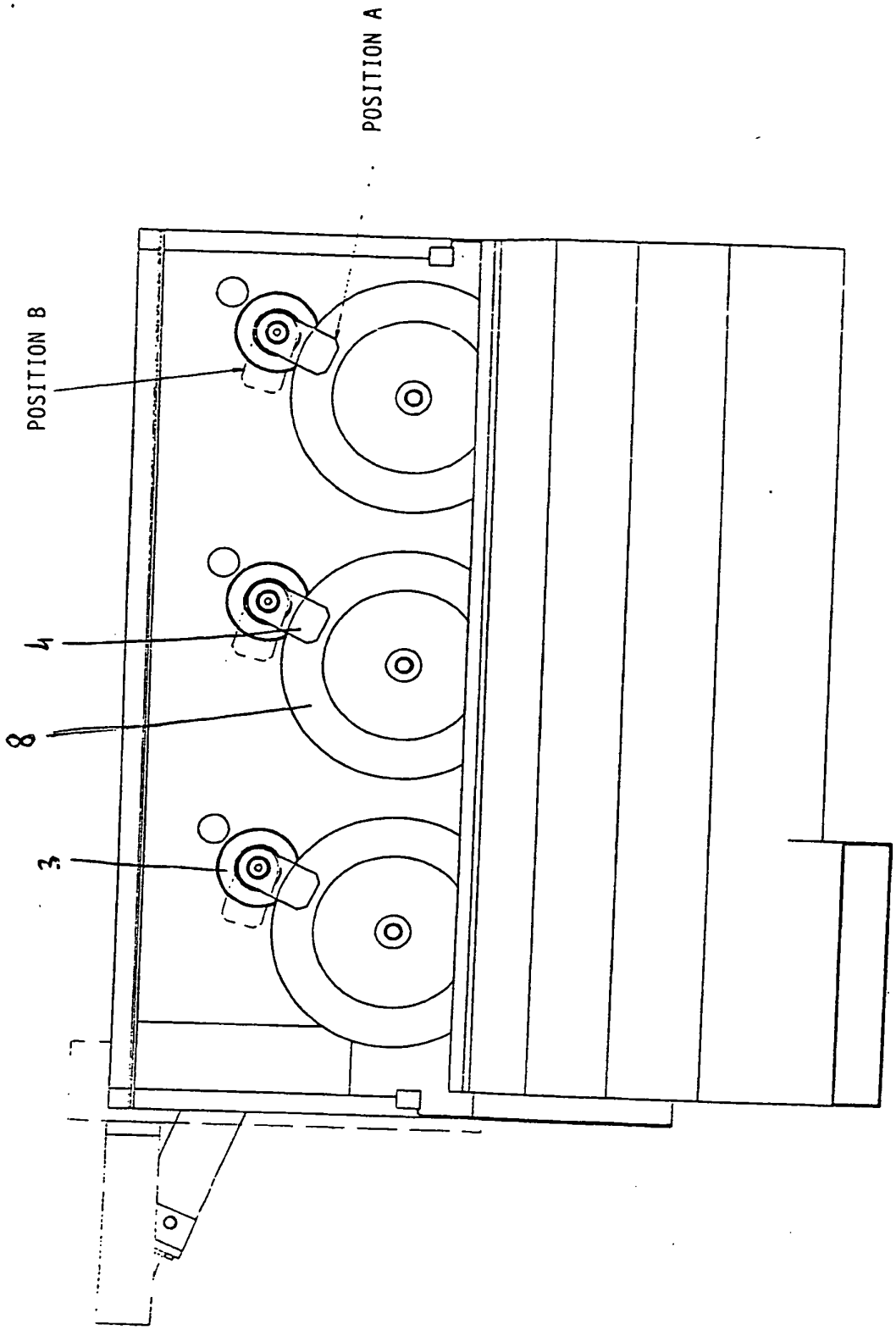

Fig. 2

REFERENCES CITED IN THE DESCRIPTION

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