A grinding apparatus includes a table, a grinding disk assembled on the table, three support plates for supporting workpieces, three weights, and a mechanism to suspend and lower any of the weights over the grinding disk. The three support plates are assembled on the table and located upon the grinding disk. The lifting mechanism includes a drive cylinder, a board member, a connecting member connecting the drive cylinder and the board member, and three fastening members rotatably attached to the board member, for hooking the weight blocks. The drive cylinder drives the board member bringing with the weight blocks to move towards the support plates until the weight blocks loaded on the support plates, to increase a grinding force.
GRINDING APPARATUS WITH ADJUSTABLE WEIGHTING

BACKGROUND

[0001] 1. Technical Field

The present disclosure generally relates to grinding apparatuses and particularly to a grinding apparatus with adjustable weighting.

[0002] 2. Description of Related Art

Grinding apparatuses are used for grinding planar workpieces, such as lenses. During grinding processes, weights are usually loaded on holders holding the workpieces, for increasing a grinding force. However, when different grinding forces are needed, weights must be manually changed, which requires labor intensity and is time consuming.

Therefore, there is room for improvement within the art.

BRIEF DESCRIPTION OF THE DRAWINGS

Many aspects of the disclosure can be better understood with reference to the drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the disclosure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the views.

FIG. 1 is an isometric view of a grinding apparatus in accordance with an exemplary embodiment.

FIG. 2 is an exploded view of the grinding apparatus of FIG. 1 viewed from a first angle.

FIG. 3 is an exploded view of some components of the grinding apparatus of FIG. 2 viewed from a second angle.

FIG. 4 is an enlarged, isometric view of a fastening member of the grinding apparatus of FIG. 2.

FIG. 5 is an enlarged, isometric view of a support assembly of the grinding apparatus of FIG. 2.

DETAILED DESCRIPTION

FIG. 1 shows an exemplary embodiment of a grinding apparatus 300 employing a lifting mechanism 100 for hanging weights 60 used by the grinding apparatus 300. The grinding apparatus 300 may be used for grinding planar workpieces, such as lenses. The grinding apparatus 300 includes a table 10, a controller (not shown), a grinding disk 20, a support assembly 30, and the lifting mechanism 100. The lifting mechanism 100 includes a drive cylinder 40 and a hooking assembly 50. The controller controls the grinding apparatus 300 and the lifting mechanism 100.

Referring to FIG. 2, the drive cylinder 40 has a cylinder rod 41. Referring to FIG. 4, the hooking assembly 50 has a board member 51, a connecting member 53, and three fastening members 55. The board member 51 may have a shape of an equilateral triangle and has three mounting holes 511 and a first retaining ring 512. Each of the three mounting holes 511 is defined in a corner portion of the board member 51 and is a through hole. The first retaining ring 512 is attached to a substantially middle portion of a surface of the board member 51. The connecting member 53 has a connector 531, a connecting chain 532, the connecting chain 532 permitting a swinging movement in one plane, and a first latching member 533. The first latching member 533 is substantially annular and formed by two arc blocks (not labeled) oppositely assembled, which together form a circle. One end of the connecting chain 532 is connected to a connector end of the connector 531. An opposite end of the connecting chain 532 is connected to the first latching member 533. The first latching member 533 is interlinked with the first retaining ring 512. The two arc blocks of the first latching member 533 may be joined by screws. An opposite connector end of the connector 531 is fixed to the cylinder rod 41 by a bolt, for example. As such, the hooking assembly 50 may be raised and lowered by the cylinder rod 41.

Each fastening member 55 includes a shaft 551, a linkage 552, and a second latching member 553. Each second latching member 553 includes two arc blocks 554. Each arc block 554 has two opposite fastening ends 555. The two arc blocks 554 of each second latching member 553 are oppositely positioned and detachably assembled by the fastening ends 555 being fixed together by screws 556, thus to form an annulus. One end of the linkage 552 is attached to an end of the shaft 551. An opposite end of the linkage 552 is attached to the second latching member 553. Each shaft 551 extends through one of the mounting holes 511, and is rotatably attached on the board member 51 by a sleeve 557 mounted to an opposite shaft end of the shaft 551 furthest from the linkage 552. The three second latching members 553 are located at the same side of the board member 51 and opposite to the first retaining ring 512, thereby maintaining the board member 51 in a horizontally balanced state.

Referring to FIGS. 1-4, a base pressure block 56 is attached to each second latching member 553. Each base pressure block 56 is disc-like and has a second retaining ring 561 attached to a substantially middle portion of a surface thereof. The second retaining rings 561 are detachably interlinked with the second latching members 553. Each base pressure block 56 has a bolt 562 secured to an opposite surface thereof, for securing the weights 60.

Referring to FIGS. 1-3, the table 10 includes a panel 11, a bracket 13, and a motor 15 installed inside the table 10. The panel 11 defines a receiving hole 12. The bracket 13 includes a support pillar 131 perpendicularly attached to the panel 11 and a fixing board 132 extending perpendicularly from an upper end of the support pillar 131. The drive cylinder 40 is attached to an end of the fixing board 132 furthest from the support pillar 131, and is aligned with the center of the receiving hole 12.

The grinding disk 20 includes a grinding surface 21. The grinding surface 21 may be configured of soft material, such as cow leather. The grinding disk 20 is connected to the motor 15 through a drive shaft 22, which is attached to a surface of the grinding disk 20 opposite to the grinding surface 21. When the motor 15 runs, the drive shaft 22 rotates, which rotates the grinding disk 20. The grinding disk 20 is received in the receiving hole 12.

Referring to FIG. 5, the support assembly 30 includes three support plates 31 and three ledges 33 holding the support plates 31. Each support plate 31 is disk-shaped. Each support plate 31 defines a recess 311 (see FIG. 3) in a surface facing the grinding disk 20, for receiving a workpiece to be ground, and has a protrusion 312 protruding from a substantially middle portion of an opposite surface. Each ledge 33 includes a fixing post 331, a retaining board 332, and two leather wheels 333. The fixing posts 331 of the three ledges 33 are fixed to the panel 11 and are evenly positioned along a periphery of the receiving hole 12. Each retaining board 332 has an end attached to one of the fixing posts 331.
and is located upon the receiving hole 12. A distal end of each retaining board 332 furthest from the corresponding fixing post 331 has an arcuate notch 334. The two leather wheels 333 of each ledge 33 are mounted to a surface of one of the retaining boards 332 facing the receiving hole 12, and are located at two ends of the arcuate notch 334 thereof. One of the two leather wheels 333 and each ledge 33 faces the arcuate notch 334 of an adjacent ledge 33. Each support plate 31 is mounted in one of the arcuate notches 334, with a periphery in contact with the two leather wheels 333 located at two ends of the arcuate notch 334 and in close proximity to the leather wheel 333 of another ledge 33 facing the arcuate notch 334 (see FIG. 2). Thus, three leather wheels 333 act as a brake on the support plates 31 to give a resisting force to the support plates 31.

What is claimed is:

1. A lifting mechanism for hooking weights of a grinding apparatus, the lifting mechanism comprising:
   a drive cylinder having a cylinder rod;
   a board member;
   a connecting member connecting the drive cylinder and the board member, and
   three fastening members each comprising a shaft, a second latching member for hooking the weights, and a linkage connecting the shaft and the second latching member, the three fastening members being rotatably attached to the board member through the shafts.

2. The lifting mechanism as claimed in claim 1, wherein the board member has a shape of an equilateral triangle and has a retaining ring attached to a substantially middle portion of a surface; the connecting member has a connector, a first latching member, and a connecting chain connecting the connector and the first latching member, the first latching member is interlinked with the retaining ring; the connector is connected to the drive cylinder.

3. The lifting mechanism as claimed in claim 2, wherein the board member has three mounting holes each defined in a corner position of the board member; the shafts extend through the mounting holes, respectively, to be rotatably attached on the board member:
   the second latching members and the connecting member are located at two opposite sides of the board member.

4. The lifting mechanism as claimed in claim 1, wherein each of the second latching members is formed by two arc blocks; each of the two arc blocks has two opposite fastening ends; the two arc blocks of each second latching member are oppositely positioned and detachably assembled by the fastening ends being fixed together by screws.

5. The lifting mechanism as claimed in claim 4, wherein each of the second latching members has a base pressure block attached to; each base pressure block has a retaining ring attached to a substantially middle portion of a surface thereof; the retaining ring is interlinked with one of the second latching members; the weights are attached to the base pressure blocks.

6. A grinding apparatus comprising:
   a table;
   a grinding disk assembled on the table;
   three support plates for supporting workpieces, the three support plates assembled on the table and located upon the grinding disk;
   weights; and
   a lifting mechanism comprising:
   a drive cylinder;
   a board member;
   a connecting member connecting the drive cylinder and the board member, and
   three fastening members rotatably attached to the board member, for hooking the weights; wherein the drive cylinder drives the board member bringing with the weights to move towards the support plates until the weights loaded on the support plates, to increase a grinding force.

7. The grinding apparatus as claimed in claim 6, wherein each of the three fastening members comprises a shaft, a latching member for hooking the weights, and a chain connecting the shaft and the latching member, the three fastening members being rotatably attached to the board member through the shafts.
8. The grinding apparatus as claimed in claim 7, wherein each of the latching members is formed by two arc blocks; each of the two arc blocks has two opposite fastening ends; the two arc blocks of each second latching member are oppositely positioned and detachably assembled by the fastening ends fixed together by screws.

9. The grinding apparatus as claimed in claim 8, wherein each of the latching members has a base pressure block attached; each base pressure block has a retaining ring attached to a substantially middle portion of a surface thereof; the retaining ring is interconnected with one of the latching members.

10. The grinding apparatus as claimed in claim 9, wherein the weights are attached to the base pressure blocks.

11. The grinding apparatus as claimed in claim 10, wherein each of the weights has a threaded hole and a locking recess defined on two opposite surfaces, respectively; each of the base pressure blocks has a bolt; each of the support plates has a protrusion protruding from a surface; the weigh blocks are attached to the base pressure blocks by the bolts threadedly secured into the threaded holes; the protrusions are engaged with locking recesses.

12. The grinding apparatus as claimed in claim 7, wherein the table includes a panel and a motor; the panel defines a receiving hole; the grinding disk includes a grinding surface and is received in the receiving hole; the grinding disk is driven by the motor to rotate.

13. The grinding apparatus as claimed in claim 12, further comprising three ledges each including a fixing post fixed to the panel, a retaining board attached to the fixing post and located upon the receiving hole, and two leather wheels mounted to the retaining board; wherein the fixing posts are evenly positioned along a periphery of the receiving hole; a distal end of each retaining board furthest from a corresponding fixing post has an arcuate notch; the two leather wheels of each ledge are located at two ends of the arcuate notch; one of the two leather wheels of each ledge faces the arcuate notch of an adjacent ledge; each support plate is mounted in one of the arcuate notches, with a periphery in contact with the two leather wheels located at two ends of the arcuate notch and in close proximity to the leather wheel of another ledge facing the arcuate notch.