Dec. 7, 1965 K. HEESEMANN 3,221,448

BELT GRINDING MACHINE

Filed July 11, 1961 2 Sheets-Sheet 1

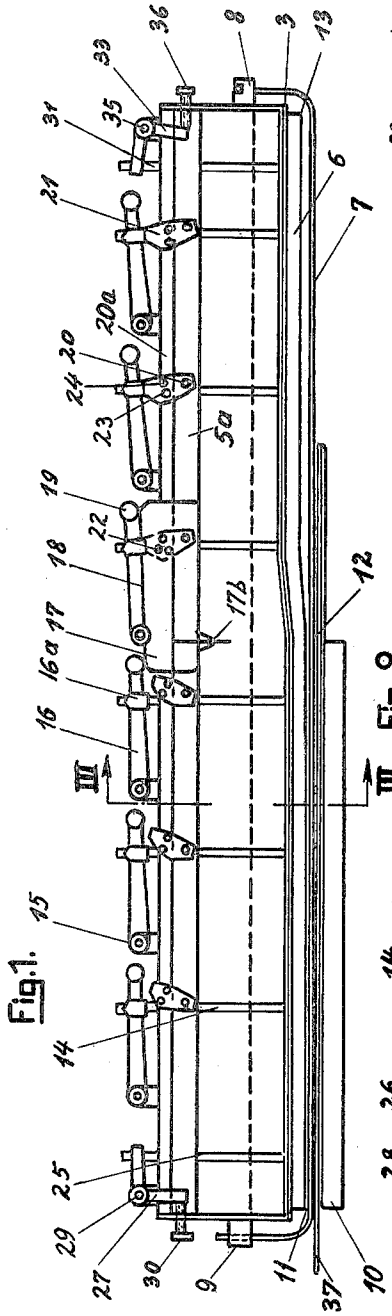


Fig. 1.

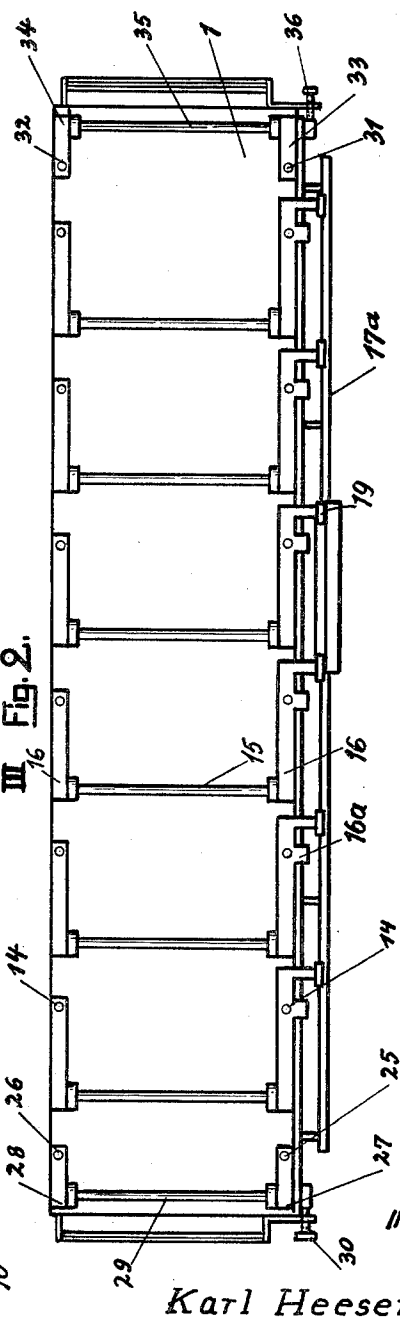


Fig. 2.

INVENTOR

Karl Heesemann

By Lowry & Rinehart

ATTYS.

Dec. 7, 1965 K. HEESEMANN 3,221,448

BELT GRINDING MACHINE

Filed July 11, 1961 2 Sheets-Sheet 2

FIG. 3

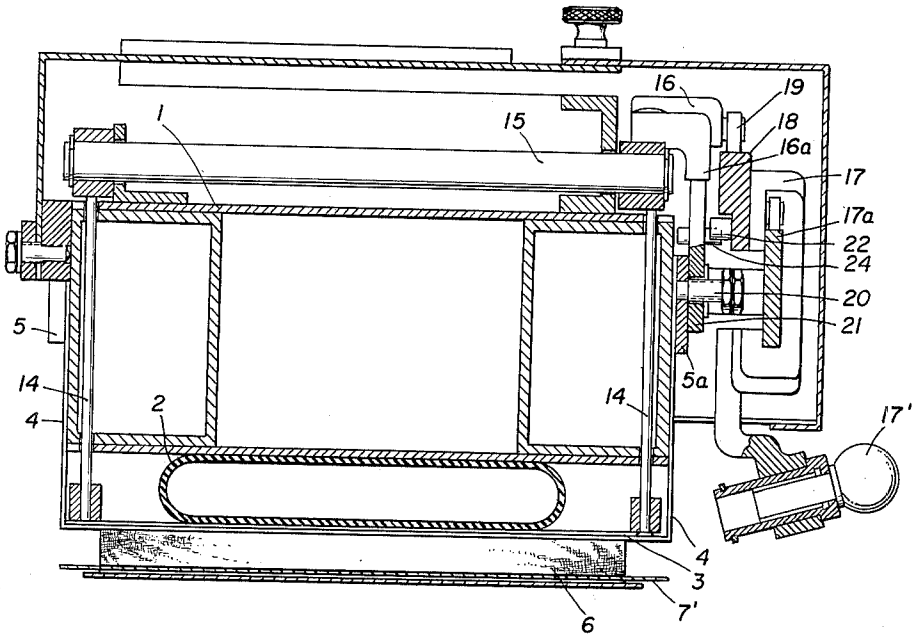
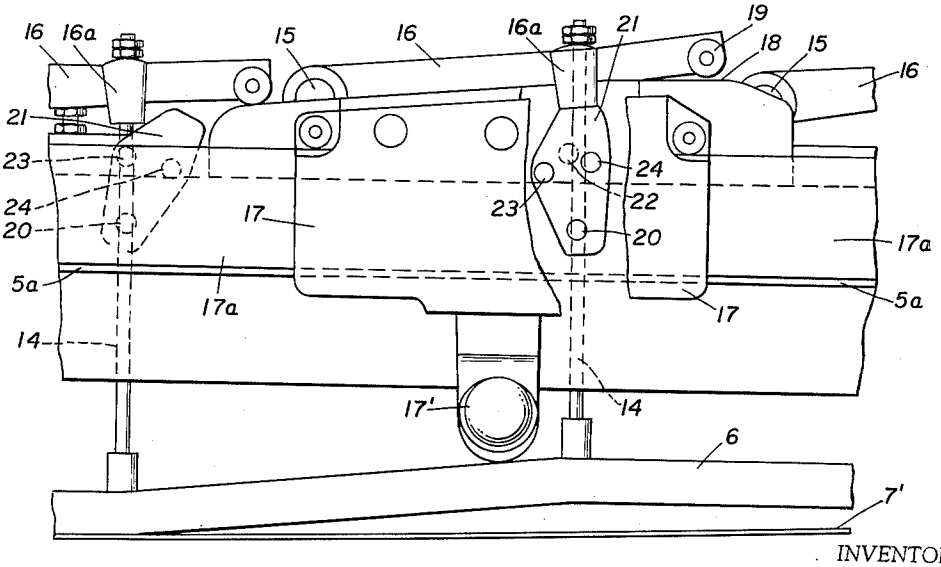


FIG. 4



INVENTOR

Karl Heesemann

BY Lowry, Rinehart

ATTORNEYS

United States Patent Office

3,221,448

Patented Dec. 7, 1965

3,221,448

BELT GRINDING MACHINE

Karl Heesemann, 54 Friedenstrasse, Rehme Via Bad Oeynhausen, Germany

Filed July 11, 1961, Ser. No. 123,305
Claims priority, application Germany, Oct. 22, 1960, H 40,748
9 Claims. (Cl. 51—141)

This invention relates to grinding machines, and more specifically to an automatic belt grinding machine with an endless grinding belt.

In machines of this kind the grinding belt is during the grinding operation pressed against a workpiece to be ground, by means of a presssure beam extending over the whole grinding width of the machine. Since the workpieces have varying widths, it is necessary to provide the pressure beam with an arrangement which permits the effective grinding width of the belt to be adjusted to the widths of the workpieces.

The known arrangements used for this purpose require a relatively long time for the adjustment of another grinding width.

It is the object of the present invention to overcome this drawback.

This object is substantially achieved according to the invention by providing a belt grinding machine which comprises an endless grinding belt, a pressure beam including a box-like main structure and positioned within said grinding belt to bring a desired portion of the grinding belt into grinding engagement with a workpiece being moved through the machine in a direction transversely of the direction of movement of said endless grinding belt, and an adjusting device for infinitely varying the effective grinding width to obtain in case of varying widths of workpieces varying widths of grinding.

A continuous plate preferably consisting of hardened steel may be arranged on the pressure side of the box-like main structure of the pressure beam. The continuous plate may be of certain flexibility and suspended on spaced pairs of supporting elements, such as vertical bolts or the like, mounted so as to be adjustable in height on the box-like main structure of the pressure beam.

The supporting elements are preferably suspended on pairs of levers the position of which can be varied, for example, by means of a slide having an inclined surface. After the free ends of the levers preferably mounted on one side of the pressure beam and the supporting elements suspended thereon have been lifted one after the other by the inclined surface of the slide so that a portion of the pressure beam no longer exerts a grinding pressure, the levers may be locked by locking devices.

This arrangement permits to infinitely lift desired portions of the pressure beam by moving the slide, which is shiftable on a guide rail extending parallel to the pressure beam, in one direction and to lock the levers in the lifted positions. By moving the slide in the opposite direction the lifted portions of the pressure beam are restored to their original positions to exert grinding pressure over the whole length of the grinding belt.

A preferred embodiment of the invention will now be described by way of example and with reference to the accompanying drawings, in which:

FIG. 1 is a front elevational view of a pressure beam according to the invention with an adjusting device for infinitely varying the effective grinding width by means of a slide;

FIG. 2 is a top plan view thereof;

FIG. 3 is a cross-section through the pressure beam and adjusting device, taken on the line III—III of FIG. 1, and

FIG. 4 is a fragmentary side elevational view, on an enlarged scale, of the slide of the adjusting device.

With reference now to FIGS. 1 and 2, an automatic belt grinding machine has an endless grinding belt 37 led around a driving and a reversing roller and extending in a direction transversely of the direction of movement of a workpiece 10 moved through the machine. A pressure beam having a box-like main structure 1 is arranged between the strands of this grinding belt 37.

FIG. 3 shows an elastic tubing 2 of rubber or synthetic plastic material which extends below the box-like main structure 1 of this pressure beam and is filled with air or another medium. The elastic tubing 2 rests on a continuous plate 3 of hardened spring steel or any other material possessing a certain flexibility. The plate 3 extends over the whole length and width of the box-like main structure 1 and is held by a strip 4 of elastic material, e.g. rubberized linen or the like. The strip 4 is secured laterally to the box-like main structure 1 by means of clamping rails 5 and 5*a*. A web 6 of felt or another suitable material is arranged on the underside of the plate 3 and serves the purpose of exerting pressure on the grinding belt 37 through the intermediary of a sliding mat 7 arranged below the web 6, the pressure being exerted either directly or with the interposition of a laminated pressure belt or the like.

As shown in FIG. 1, the sliding mat 7 is secured at the ends of the box-like main structure 1 in lateral supports 8 and 9. The plate 3 serves the purpose of distributing the pressure exerted by the elastic tubing 2 over the grinding belt 37, the pressure being distributed uniformly over the length and width of the pressure beam through the web 6 and the sliding mat 7. The plate 3 may have a thickness of 1 mm. so as to be flexible within certain limits and is suspended on pairs of supporting elements such as vertical bolts 14 which are arranged at both sides of the box-like main structure of the pressure beam at distances of 100 to 140 mm., preferably 120 mm., from one another. Each of the bolts 14 is pivotally connected at its upper end to a lever 16. The levers 16 are arranged in pairs and each pair of levers 16 is rotatably connected at one end thereof by means of a transverse axle 15. One lever of each pair of levers 16 carries at its free end a roller 19 adapted to roll on an inclined surface 18 formed on a slide 17. Instead of the roller 19 also a sliding member or the like may be provided. The slide 17 rests on a continuous guide rail 17*a* and can be shifted thereon by means of a handle 17*b*.

When workpieces of a width corresponding to the length of the pressure beam are ground, the levers 16 are in their lowermost positions, the slide 17 being in its position of rest, e.g. on the right-hand side of FIGS. 1 and 2. The plate 3 then extends in a single plane and a uniform grinding pressure is exerted by the grinding belt over the whole width of the workpiece. If it is intended to grind workpieces of a width smaller than the length of the pressure beam, it is necessary for the pressure beam to be lifted off the grinding belt in the region located beside the workpieces.

This means with reference to FIG. 1, that during the grinding operation the pressure beam is intended to act on the grinding belt from a region indicated at 11 up to a region indicated at 12 and to be ineffective, i.e. lifted off the grinding belt, from the region indicated at 12 up to a region indicated at 13.

The partial lifting off of the pressure beam is effected by

infinitely lifting a portion of the plate 3, the bolts 14 supporting this portion of the plate 3 being moved upwardly. By moving the slide 17 from right to left in FIGS. 1 and 2 the rollers 19 travel one after the other upwards on the inclined surface 18 of the slide 17, thereby infinitely lifting the plate 3 at the points where the bolts 14 are connected with the plate 3. The number of levers 16 and bolts 14 to be lifted depend upon the length of the pressure beam intended to be lifted off the grinding belt. Shortly before a roller 19 has reached the highest point of the inclined surface 18 of the slide 17, a rocker arm 21 serving as locking device for the raised lever and pivotable about a pivot pin 20 is moved to the left-hand side in FIGS. 1 and 4 and in this position engages under a lug 16*a* on the lever 16, thereby locking the lever 16 in its upper position. The pivot pin 20 is secured to a rail 20*a* extending parallel to the guide rail 17*a*. As shown in FIG. 4, a pin 22 is secured to the slide 17 for moving the rocker arm 21 and alternately butting against stop pins 23 and 24 on the rocker arm 21, thereby turning the rocker arm 21 about the pivot pin 20 into the left-hand or right-hand position in FIG. 4. In the case illustrated in FIGS. 1 and 4, the pin 22 butts against the stop pin 23 when the slide 17 is moved to the left and thereby urges the rocker arm 21 to the left. The stop pin 23 then comes to bear against the clamping rail 5*a* serving as abutment so that the rocker arm 21 cannot move further to the left. The pin 22 on the slide 17 is thus set free and permits the slide 17 to move on below the next lever 16 while the lever 16 which has just been moved upwardly is locked in its upper position.

As shown in FIG. 1, this shifting of the slide 17 to the left-hand side causes the right-hand portion of the plate 3 and also of the web 6 to be infinitely variable lifted off the sliding mat 7. Due to its flexibility the plate 3 has its bent portion extending in a continuous line of curvature so that any undesired markings on the surface of the workpiece are avoided.

If the lifted portion of the plate 3 is to be moved downwardly into its initial position, the slide 17 is moved to the right. The pin 22 on the slide 17 then butts against the stop pin 24 on the rocker arms 21 and tilts the rocker arms 21 one after the other into the right-hand positions. The top of each rocker arm 21 leaves the lug 16*a* of the lever 16 and the roller 19 runs off the inclined surface 18. The pair of levers 16 and the pair of bolts 14 move downwardly so that the corresponding portion of the plate 3 is moved downwardly again by the filled tubing 2. The slide 17 is, for example by its special configuration enclosing the guide rail 17*a* or by special arrangements, so constructed that it can be arrested at any desired position on the guide rail 17*a*. With the preferred distance of 120 mm. between the pairs of bolts 14, the roller 19 and the axle 15 of the levers 16 are likewise arranged at a distance of 120 mm. from each other. The inclined surface 18 of the slide 17 is slightly longer than the levers 16 so that the roller 19 of the next pair of levers 16 is already on the inclined surface 18 before the preceding roller 19 has left the same. With the aforementioned spacing of the rollers 19 and the pairs of bolts 14 the difference in height of the inclined surface 18 on the slide 17 is 6 mm.

For the infinitely variable and quick adjustment of the effective width of the pressure beam and the grinding belt it is essential to appropriately select the spacing of the rollers 19 and of the bolts 14 and the length and the angle of inclination of the surface 18 of the slide 17 as well as the thickness of the plate 3.

To permit a fine adjustment of the pressure beam at the ends thereof where the slide 17 is not fully effective, two bolts 25 and 26 shown on the left in FIG. 1 are connected with the plate 3 in a similar manner as the bolts 14. The plate 3 can be adjusted in height by means of pivoted toggle levers 27 and 28 fixed on a shaft 29 with the aid of an adjusting spindle 30. Analogously, on the right-hand side, two bolts 31 and 32 with pivoted toggle levers 33 and 34, a shaft 35 and an adjusting spindle 36 serve the same purpose.

The adjustment of the slide 17 is advantageously carried out by means of the handle 17*b*. The handle 17*b* is constructed so as to serve simultaneously as boundary marking for the grinding width. The workpiece 10 is placed on the working table and the slide 17 is moved over the workpiece in such a manner that the handle 17*b* is located perpendicularly above the right-hand end of the workpiece, i.e. above the region 12.

The quick adjustment of the grinding width especially in automatic belt grinding machines is most simple. It ensures in a novel manner the infinitely variable lifting of that portion of the pressure surface of the pressure beam which is intended to be inoperative.

Instead of the guide rail 17*a* and the slide 17 also a chain with cams secured thereto or a spindle with a spindle nut thereon may be used. This cam or spindle nut would then have an appropriate inclined surface which corresponds to the inclined surface 18 of the slide 17.

The pressure surface of the pressure beam or the plate 3 is suspended on a surface as small as possible, preferably on a pin-point surface by means of the bolts 14 or other suspending elements.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

Especially the rocker arm 21 serving as device for locking the levers 16 or other suitable suspending elements in their raised positions may be constructed in a different manner.

I claim:

1. A belt grinding machine comprising an endless grinding belt, a pressure beam arranged for pressing the grinding belt toward a workpiece, said workpiece being moved through the machine transversely to the direction of movement of the grinding belt, said pressure beam being extended over the entire grinding width of the machine, a sliding adjusting device movable parallel to the pressure beam and adjacent thereto, a plurality of pairs of levers movably mounted on the pressure beam and alternately contacted by said sliding adjusting device and a plurality of supporting elements connected to said pairs of levers and arranged for supporting the effective pressure surface of said pressure beam and varying the height of said pressure surface as the levers are contacted by the sliding adjusting device.

2. A belt grinding machine as in claim 1, wherein a continuous plate of flexible hardened steel at the lower side of the pressure beam has a lower pressure surface transferring the pressure of the pressure beam to the workpiece, means for supporting the continuous plate and being operable by said sliding adjusting device to vary the height of the plate over the length of the pressure beam.

3. A belt grinding machine as in claim 1, wherein pairs of levers carry the plate supporting means with the continuous plate being adjustable in height.

4. A belt grinding machine as in claim 3, wherein the pairs of levers are mounted at one end for unilateral pivotal movement, whereas one of their free ends is engageable by a movable inclined surface so as to be variable in height.

5. A belt grinding machine as in claim 4, comprising a guide rail extending parallel to the pressure beam, and said sliding adjusting device having an inclined surface and shiftable on said guide rail so as to engage under the free ends of the levers.

6. A belt grinding machine as in claim 5, wherein a roller is provided at the free end of each lever.

7. A belt grinding machine as in claim 5, wherein a handle is provided on the sliding adjusting device and constructed to mark at the same time the effective grinding width of the grinding machine.

8. A belt grinding machine as in claim 5 ,wherein locking devices are arranged for locking the levers in their raised positions.

9. A belt grinding machine as in claim 8, wherein each locking device is embodied in a rocker arm fitted with two stop pins adapted to be alternately depressed by a pin on the slide.

References Cited by the Examiner

UNITED STATES PATENTS

799,694	9/1905	Tyden	51—141
1,145,184	7/1915	Clemons	51—141

FOREIGN PATENTS

37,580	11/1956	Germany.

ROBERT C. RIORDON, *Primary Examiner.*

FRANK E. BAILEY, LESTER M. SWINGLE, *Examiners.*