

[54] **ROTARY TILTER FOR ROLLED PRODUCTS**

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FOREIGN PATENTS OR APPLICATIONS

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[22] Filed: **Apr. 24, 1972**

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[21] Appl. No.: **246,585**

[30] **Foreign Application Priority Data**

Apr. 24, 1971 Germany 2120211

[57] **ABSTRACT**

[52] U.S. Cl. **214/1 QG, 198/33 AC**

[51] Int. Cl. **B65g 47/24**

[58] Field of Search.. 214/130 R, 146.5, 1 Q, 1 QG, 214/1 QA; 198/33 AC, 33 AD; 193/43 R, 43 D

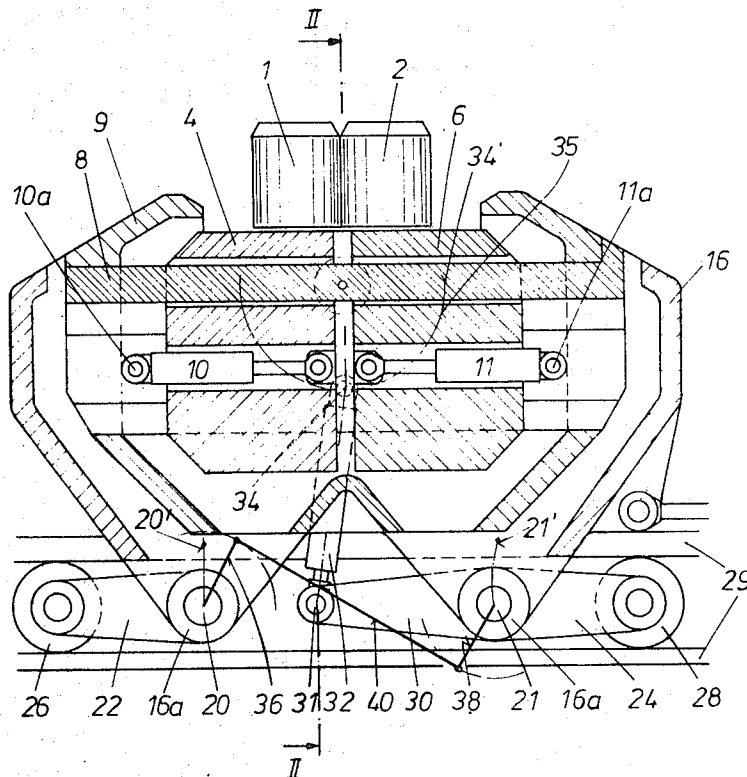
A rotary tilter for bar-like products supported for example on a rollway comprises tilter rollers supported by respective holders movable on a common guide rotatable within a main casing, and means are provided for lifting the main casing with a movement derived from the rotary movement of the guide and the holders thereon during the turning or inverting operation.

[56] **References Cited**

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7 Claims, 2 Drawing Figures



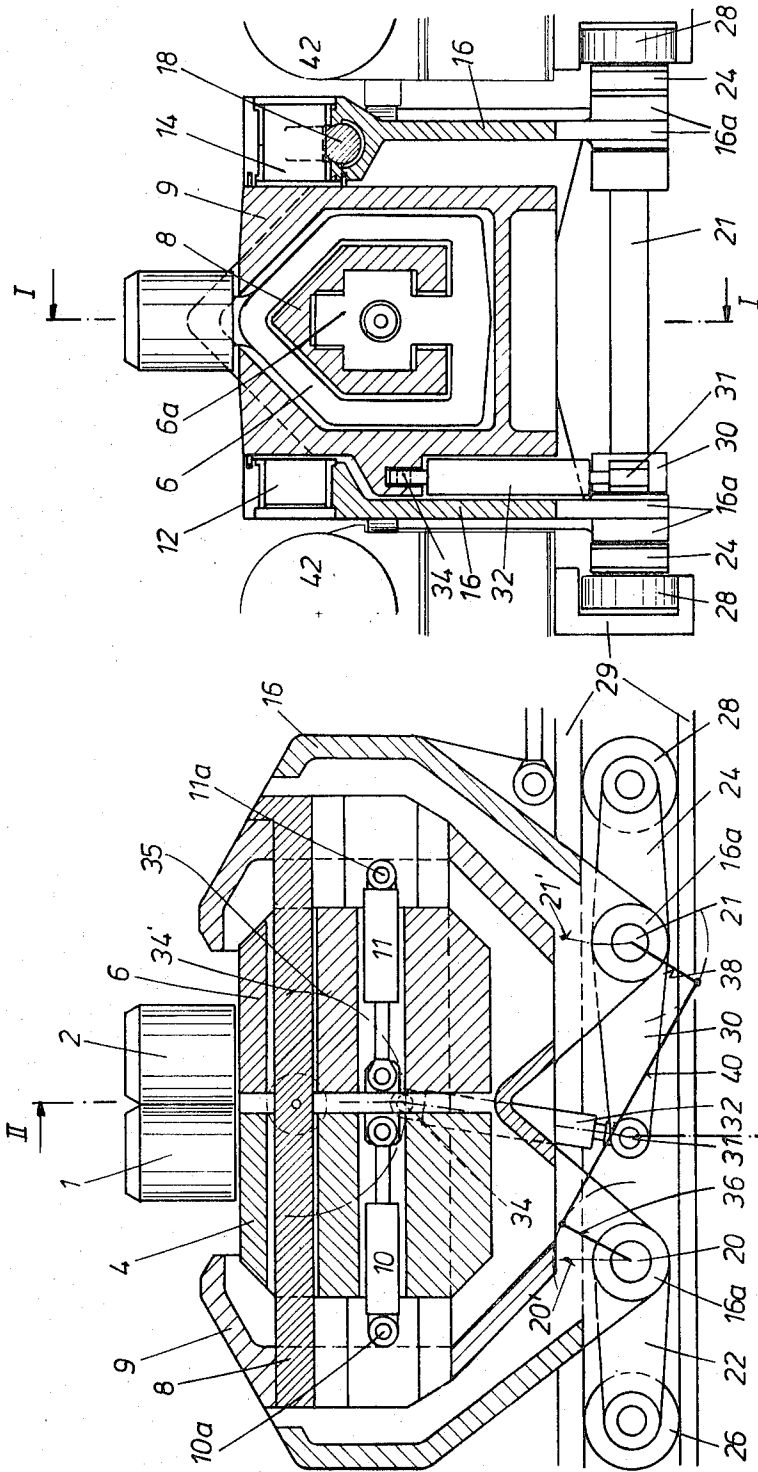


Fig. 2

Fig. 1

ROTARY TILTER FOR ROLLED PRODUCTS

The invention relates to a rotary tilter or inverter for bar-like or other rolled products, having tilter roller holders movable linearly one towards the other and a common guide which is pivotally supported for turning through about 180° around an axis disposed in a main casing.

Such devices may be associated with a rollway and since the turning axis is generally arranged beneath the rollway plane for constructional reasons provision must be taken to avoid one of the tilter rollers from moving beneath the rollway plane during the turning operation. For this reason a special drive has been provided previously for raising and lowering the turner head.

The equipment required for such a lifting drive is rather complicated, and one object of the invention is to simplify this lifting drive, for which purpose a drive for lifting the main casing from the level of the horizontal centre position of the linear guide is taken from the drive for rocking the common linear guide of the tilter roller holders.

This basic feature is advantageously applied to a rotary tilter the casing of which is provided with support wheels and is therefore adapted to be displaced. The invention provides for this case that the support wheels are arranged on rockers supported in the turner casing and which are pivotally displaced dependently on the rocking movements of the linear guide of the tilter roller holder.

The present invention further includes as an independent feature the particular construction of the lifting and lowering drive described and claimed hereinafter and including a linkage connection for converting the rocking movement of the linear guide into a rocking movement of rocker arms carrying the support wheels whereby the turner casing is displaced up and down from the actual rocking of the rockers around the support wheel axes — since the support wheels are supported on running rails.

The linkage connection is advantageously formed by a hydraulic cylinder the piston rod of which is operable from a hydraulically locked position for preliminary lowering of the turner casing together with the tilter rollers to a point beneath the rollway plane, and the support rails for the support wheels are disposed outside of the width dimension of the turner casing in order that they do not limit the downward movement of the casing. The locking position of the piston rod is conveniently an inward stop position of the piston, the hydraulic pressure medium of which is normally cut off by means of a valve.

One constructional example of a rotary tilter turner according to the invention is shown on the drawings in which:

FIG. 1 is a longitudinal section transverse to the rolled product to be turned or tipped, as seen on the line I—I in FIG. 2, and

FIG. 2 is a cross-section on the line II—II in FIG. 1.

Two tilter rollers 1 and 2 shown in the upright position in FIGS. 1 and 2 are secured to slide-mounted tilter roller holders 4, 6 respectively which are movably guided on a common linear guide 8. The linear guide 8 has an inverted V-shaped cross-section as shown in FIG. 2 and embodies an internal cross-shaped recess in which the tilter roller holders 4, 6, also of inverted V-

shape, engage from beneath by means of a cross-shaped guide member which in FIG. 2 is indicated at 6a for the tilter roller holder 6 shown in that position. The guide faces are thus completely protected against falling scale. The guide 8 is fitted to a rocker member 9 which forms a cover for the linear guide 8 over the range of adjustment of the tilter rollers 1, 2.

The tilter roller holders 4, 6 are bored out and receive hydraulic cylinders 10, 11 respectively which are secured at 10a and 11a to the linear guide 8 and permit selective adjustment of the tilter rollers. Also these hydraulic cylinders are completely protected.

The turning axis for rocking the linear guide 8 is formed by two pins 12, 14 on the rocker member 9, which are supported in the main casing 16 of the turning device. All the previously described parts are thus carried from the casing 16 by the support pins 12, 14. The turning drive for the linear guide 8 and all the tilter rollers 1, 2 consist of a displaceable rack 18 which engages a toothed portion of the rotary pin 14.

A drive for lifting the linear guide 8 is derived from this turning motion of the linear guide 8 and of the rocker member 9 and is operative when the linear guide is moved from the horizontal centre position shown on the drawing through 90° in one direction or the other. For this purpose spindles 20, 21 are rotatably supported in lower bearing apertures 16a of the main casing 16 on which approximately horizontally disposed pairs of rockers 22 and 24 are keyed. Pairs of guide wheels 26, 28 are arranged in an overhung manner on the ends of these rockers.

At least one of these rockers, in the constructional example shown in FIG. 2 a rocker 24 pertaining to the pair of guide wheels 28, is in the form of a double armed lever the second arm 30 of which lies opposite to the rocker. The arm 30 has at its free end a joint 31 to which a tension-transmitting member 32, in the constructional example shown a hydraulic cylinder adapted to be locked solid, is connected which at its upper end is pivotally connected to a pin 34 which moves in a circular arc 35 during the rocking or overturning of the linear guide. The pin 34 is fitted to the rocker member 19 which participates in all the turning movements of the linear guide 8 and forms a member rigid therewith.

In the horizontal centre position of the linear guide 8 shown on the drawings the pin 34 is in its lower dead-centre position of the circular path 35, shown in chain dot lines; in this position all the rockers 22, 24 and the lever arm 30 extend approximately horizontally that is parallel to the guide rails 29 for the support wheels 26, 28.

As previously described the system is only in the stable balanced position in reference to the spindle 21 which is in a floating position, although a support force acts on the rocker 22 by the action of the other spindle 20 which prevents downward movement of the spindle 20 and prevents lateral tilting of the turning device relatively to the pair of guide wheels 26. For this reason the spindles 20, 21 are operatively connected for rotation in opposite directions and are offset to one another, through 180° in the constructional example shown, by the cranks 36, 38 and a coupling rod 40 connecting the crank pins, which parts are shown only diagrammatically in FIG. 1 and are omitted from FIG. 2.

If for example a bar is to be tilted through 90° in the counter clockwise direction by the tilter rollers 1, 2, only the tilter roller 2 is displaced by retracting the hydraulic cylinder 11, in order to permit the bar to enter. The tilter roller 2 then functions as a clamp whereas the tilter roller 1 effects the turning action when the toothed rack 18 is displaced to move the rocker member 9 with the linear guide 8 through 90°.

Since the centre of the turning axis represented by the rotatable pins 12, 14 lies beneath the plane of the rollway formed by the rollway rolls 42, the tilter roller 1 in particular, must be lifted during the turning in order that the peripheral surface bearing on the rolled product does not come beneath the rollway plane.

This lifting is effected automatically from the turning movement of the linear guide 8 by the fact that the pin 34 fixed on the rocking member 9, which is at a predetermined distance from the axis, moves away from the lower dead-centre position shown in FIG. 1, into the position 34'. Thereby the tension-transmitting member 32 moves the two-armed lever 30, 24 with it and causes a rocking of this lever around the axis of the support wheels 28 which remain in a constant vertical position. With the lever ratios provided the centre of the spindle 21 is shifted to 21' and thereby the main casing 16 is lifted.

The rotation of the spindle 21 obtained from the rocking movement of the two-armed lever 30, 24 is transmitted in the opposite direction to the other spindle 20 by means of the operative connection 38, 40, 36 if the pair of rockers 22, 24 extend diametrically one to the other as shown. The axis of the spindle 20 is thus caused to move upwardly to the point 20'. Since the spindles 20, 21 are raised to the points 20' and 21' on turning the linear guide 8, the main casing 16 with all the parts carried by it is lifted.

The same lifting operation occurs also in the other direction of turning of the linear guide 8; further the tilter rolls 1, 2 with their axes horizontal may engage an article being rolled for turning it through 180°.

If the member 32 is in the form of a hydraulic cylinder the piston rod can be locked in the fully retracted position by cutting off the hydraulic pressure medium so that it forms a tension-transmitting link. If this locking action is removed by opening the cut-off valve, the natural weight of the turning member acts downwardly through the spindles 20, 21 on the rocker members 22, 24 which are now no longer constrained as to their pivotal movement so that the turning device with its tilter rollers 1, 2 can be lowered as far beneath the plane of the rollway as is permitted by the stroke of the hydraulic cylinder 32 or until the hydraulic pressure medium is again cut off. To return the turning device into the working position shown, the piston of the hydraulic cylinder 32 is operated in the sense of drawing in the piston rod.

What is claimed is:

1. Rotary tilter for rolled products, comprising relatively movable holders for tilter rollers, a support for said holders pivotable about a rotary axis disposed in a main casing, drive means for rotating said support in said casing, and means for lifting the main casing, wherein said main casing lifting means is operatively connected to and responsive to the drive means for rotating said support with the tilter roller holders thereon.

2. Rotary tilter according to claim 1, comprising support wheels on rockers supported in the main casing, which rockers are pivotally driven from the turning movement of the support.

3. Rotary tilter according to claim 2, in which: the rockers are keyed in pairs diametrically opposite one another on two spindles rotatably supported in the main casing and operatively connected together for opposite rotation; at least one rocker includes an arm opposite to the rocker which arm is connected through a tension-transmitting link to a pin movable in a circular path during turning of the support; and the arm and the associated rocker extend approximately horizontally at the lower dead-centre position of the pin.

4. Rotary tilter according to claim 3, in which the operative connection between the spindles carrying the rockers consists of cranks offset at 180° one to the other and a coupling rod connecting pins on the cranks.

5. Rotary tilter according to claim 4, in which the operative connection between the spindles carrying the pair of rockers consists of cranks offset at 180° one to the other and a coupling rod connecting the cranks.

6. Rotary tilter according to claim 3, in which the link consists of a hydraulic cylinder the piston rod of which includes a hydraulically locked position and a free position to permit lowering of the main casing and the tilter rollers thereon beneath the rollway plane, and the rockers carrying support wheels running in rails which lie externally of the width dimension of the main casing.

7. Rotary tilter comprising a main casing supporting a rotatable turning assembly having means to engage bar products resting on support means, rockers keyed in pairs diametrically opposite one another on two spindles rotatably supported in the main casing and operatively connected together for opposite rotation for coordinate lifting of the main casing during rotation of the turning assembly, at least one rocker having a second arm opposite to the rocker, and a tension-transmitting link connecting said rocker to a pin movable in a circular path during turning of the assembly, said rockers and said arm extending approximately horizontally at the lower dead-centre position of the pin.

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