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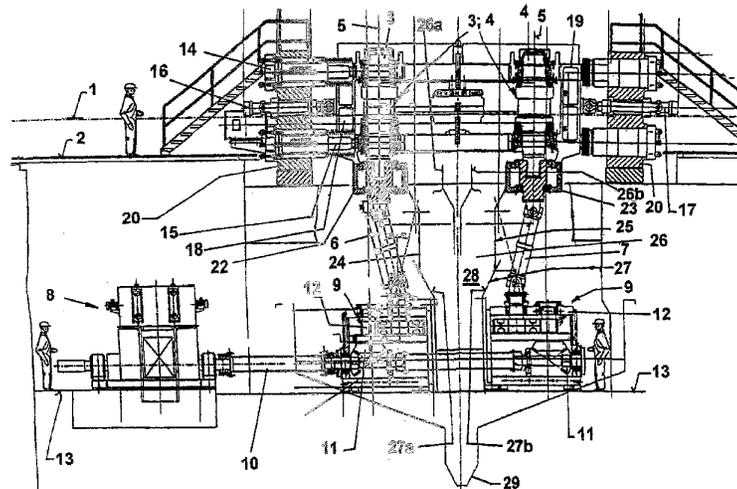
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(54) Title: ROLLING MILL, ESPECIALLY A SWAGE ROLLING MILL, FOR HEATED OPERATION

(54) Bezeichnung: WALZWERK, INSBESONDERE STAUCHWALZWERK FÜR DEN WARBETRIEB



(57) Abstract: The invention relates to a rolling mill, especially a swage rolling mill for heated operation, said rolling mill being provided with a pair of cylinders (3, 4) which are vertically arranged with the central axes thereof (5), can be adjusted in relation to each other, and are connected to at least one rotating drive (8) by means of cardan shafts (6; 7). The aim of the invention is to render the adjustment of the cylinders more favourable with lower displaced masses, to reduce friction and to improve lever arm relations. To this end, the rotating drive (8) for both cylinders (3; 4) is fixed beneath the mill floor level (2) and is respectively connected to a fixed gearbox (9) and the cardan shaft (6, 7) in a driving manner.

(57) Zusammenfassung: Ein Walzwerk, insbesondere ein Stauchwalzwerk für den Warmbetrieb, ist mit einem Paar, mit ihren Mittelachsen (5) senkrecht angeordneten, gegeneinander anstellbaren Walzen (3, 4), die mittels Gelenkwellen (6; 7) an zumindest einen Drehantrieb (8) angeschlossen sind, ausgerüstet. Um ein günstigeres Anstellverhalten bei geringeren bewegten

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Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

ROLLING MILL, ESPECIALLY AN EDGING MILL, FOR HOT OPERATIONTechnical Field

The invention concerns a rolling mill, especially an
5 edging mill for the hot operation, with a pair of rolls,
which are arranged with their center axis vertical, can be
adjusted relative to each other, and are connected to at
least one rotary drive by means of a cardan shafts.

10 Background of the Invention

Edging mills become of this type are widely used as
vertical rolling stands or edging stands with one or more
crossheads, on which the heavy rotary drives for the rolls
are supported (DE 1 602 177 A). The rolls can also be
15 supported in horizontally cross-sliding cassettes (EP 0
493 430 B1). In accordance with an older proposal (DE 2
227 549 A), the rolls can be taken out in the upward
direction vertically between the rotary drives.

The previously known rotary drives and adjustment
20 drives have the disadvantage that this type of
construction is technically complicated and not very
reliable. Due to the large number of working action
intervals of drive parts moving within each other, a great
deal of wear occurs, and this results in high maintenance
25 costs. The previously known drive arrangement is also
associated with poor accessibility for maintenance work.
Other disadvantages result from the sluggish adjustment
response of the edging rolls, which are very heavy, cause
tremendous friction and require large lever arms for the
30 adjustment.

Summary of the Invention

In accordance with a first aspect, the present invention provides an edging mill for hot operation, comprising a pair of rolls having their center axis vertical and which
5 are arranged to be adjusted relative to each other, the rolls being connected to a rotary drive by means of cardan shafts, wherein the rotary drive comprises a stationary installation located below a floor level of the mill, the rotary drive comprising a rotary drive motor, a stationary
10 transmission associated with respective ones of the rolls and a drive connection connecting the rotary drive motor with each stationary transmission and each stationary transmission with its cardan shaft.

Advantages of the invention include producing a more
15 favourable adjustment response with lower displaced masses, reducing friction, and achieving better lever arm ratios.

In accordance with embodiments of the invention, these advantages are achieved by stationary installation
20 of the rotary drives for the two rolls below the mill floor level and by drive connection of the rotary drive motor with the respective cardan shaft by a stationary transmission. This allows faster and easier adjustment of the edging rolls, and, in addition, the displaced masses
25 are smaller. The transmission is no longer moved together with the edging rolls but rather is anchored on the foundation or areas of the foundation. The lower displaced weight results in less friction. The lever arm relationships are also more favourable due to shorter

adjustment devices. Furthermore, maintenance costs are reduced and maintenance is easier, because the accessibility on the level of the mill floor and on the level of the foundation is easier. All of these advantages together result in a greater plant availability, a greater operational readiness, and this makes it possible to achieve optimized product quality.

In accordance with another embodiment of the invention, the displaced masses can be further reduced by connecting the rotary drive motor in drive connection to each cardan shaft by a continuous drive shaft with detached bevel gears and spur gears for each respective cardan shaft.

In a further embodiment, weight can also be locally adjusted relative to each other by a plurality of adjustment drives installed on opposing sides of the rolls and arranged to be above the floor level of the mill. The edging rolls can be freely lifted out upwardly between the adjustment drives and can be managed during installation.

In accordance with an embodiment of the invention, the cardan shaft comprise of heads located proximal to the rolls, the heads having corresponding receivers with movable deflector plates mounted thereon, wherein the deflector plates move together with their corresponding roll during relative adjustment of the rolls. Thus the drive components located in the lower foundation area are protected by deflector plates.

In this connection, means for collecting and carrying the process waste materials to be removed are created by

the formation of an essentially vertical, first shaft by the moveable deflector plates.

In an embodiment of this system, a second shaft that follows the first shaft is formed between the stationary spur gears of the cardan shafts by stationary deflector plates.

The protection of the lower-lying drive components can be further enhanced by at least part of the stationary deflector plates forming a trapezoidal or conical inlet that follows and is directly opposite the movable deflector plates.

The process waste materials that are collected in the first shaft and the second shaft can be further conveyed and disposed of by providing a trough-like collecting pit below the second shaft for carrying away dirt, scale, wastewater and the like.

It will hereinafter be convenient to describe an embodiment of the invention with reference to the accompanying drawing. It is to be understood that the particularity of this drawing and the related description does not supersede the preceding broad description of the invention.

Brief Description of the Drawing

Figure 1 shows a front elevation of the rolling mill, in which the rolling stock moves perpendicularly to the plane of the drawing.

Detailed Description of the Preferred Embodiment

The rolling mill, which is shown in cross section perpendicular to the rolling direction, is constructed as an edging mill for hot operation. The direct deformation zone 1 lies above the mill floor level 2. The rolls 3 and

4 are arranged with their center axes 5 vertical and are connected to at least one rotary drive motor 8 by means of cardan shafts 6 and 7.

The special features, then, are the stationary
5 installation of the rotary drive motor 8 for the two rolls 3 and 4 below the mill floor level 2 and the drive connection of the rotary drive motor 8 with a cardan shaft 6, 7 on each side by a stationary transmission 9.

For drive transmission, starting from the rotary
10 drive motor 8 (which consists of a heavy electric motor), the driving power is transmitted by means of a continuous, rotatably supported drive shaft 10 and detached bevel gears on both sides (bevel gear steps) 11 and a one-step spur gear 12 on each cardan shaft 6 and 7.

15 In contrast to the installation of the rotary drive motor 8 below the mill floor level 2 on a foundation 13 built at low level, the adjustment drives 14 and 15 are arranged on both sides of the vertical rolls 3, 4 above the mill floor level 2.

20 Between the paired adjustment drives 14 and 15 on both sides, hydraulically actuated piston-cylinder units 16 and 17 for roll crossheads 18, 19 are mounted in the columns 20 of the rolling stand.

Deflector plates 24 and 25 are mounted on receivers
25 22 and 23 for the heads of the cardan shafts 6, 7 and move together with the rolls 3, 4 when the rolls are adjusted. The pair of deflector plates 24, 25 forms a first, vertical shaft 26 or two adjacent partial shafts 26a and 26b.

30 A second shaft 27 is formed between the stationary spur gears 12 of the cardan shaft 6, 7. In consists of stationary deflector plates 27a, 27b.

The stationary deflector plates 27a, 27b form a trapezoidal or conical inlet that follows and is directly opposite the moveable deflector plates 24, 25.

5 A trough-like collecting pit 29 is formed in the foundation below the second shaft 27 for carrying away the collected dirt, scale, wastewater and the like.

10 It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country.

15 In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprise" or variations such as "comprises" or "comprising" is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

Reference symbol list

	1	direct deformation zone
5	2	mill floor level
	3	roll
	4	roll
	5	center axis
	6	cardan shaft
10	7	cardan shaft
	8	rotary drive motor
	9	stationary transmission
	10	drive shaft
	11	bevel gear
15	12	spur gears (spur gear step)
	13	foundation
	14	adjustment drive
	15	adjustment drive
	16	piston-cylinder unit
20	17	piston-cylinder unit
	18	roll cross-head
	19	roll cross-head
	20	roll standards
	21	
25	22	receiver for the head of a cardan shaft
	23	receiver for the head of a cardan shaft
	24	moveable deflector plate
	25	moveable deflector plate
	26	first shaft
30	26a	partial shaft
	26b	partial shaft
	27	second shaft
	27a	stationary deflector plate

- 27b stationary deflector plate
- 28 trapezoidal or conical inlet
- 29 trough-like collecting pit

CLAIMS

1. An edging mill for hot operation, comprising a pair of rolls having their center axis vertical and which
5 are arranged to be adjusted relative to each other, the rolls being connected to a rotary drive by means of cardan shafts, wherein the rotary drive comprises a stationary installation located below a floor level of the mill, the rotary drive comprising a rotary drive motor, a stationary
10 transmission associated with respective ones of the rolls and a drive connection connecting the rotary drive motor with each stationary transmission and each stationary transmission with its cardan shaft.

2. An edging mill according to claim 1, wherein the
15 rotary drive motor is in drive connection to each cardan shaft by a continuous drive shaft with detached bevel gears and spur gears for each respective cardan shaft.

3. An edging mill according to any preceding claim, wherein the rolls are adjusted relative to each other by a
20 plurality of adjustment drives installed on opposing sides of the rolls and arranged to be above the floor level of the mill.

4. An edging mill according to any preceding claim, wherein the cardan shaft comprise of heads located
25 proximal to the rolls, the heads having corresponding

receivers with movable deflector plates mounted thereon, wherein the deflector plates move together with their corresponding roll during relative adjustment of the rolls.

5 5. An edging mill according to claim 4, wherein the movable deflector plates form a substantially vertical first shaft.

 6. An edging mill according to claims 4 or 5, wherein stationary deflector plates are arranged to be located
10 between the spur gears for the cardan shafts, the stationary deflector plates forming a second shaft following the first shaft.

 7. An edging mill according to claims 6, wherein at least part of the stationary deflector plates form a
15 trapezoidal or conical inlet that follows and is directly below the moveable deflector plates.

 8. An edging mill according to claims 6 to 7, wherein a trough-like collecting pit is formed below the second shaft for carrying away dirt, scale, waste water and the
20 like.

 9. An edging mill substantially as herein described with reference to the accompanying drawing.

FIG. 1

