The present invention relates to a strip processing device comprising a strip processing cartridge and intended for a rolling mill, and relates to a method for removing the strip processing cartridge from the strip processing device. The strip processing device comprises a strip processing cartridge mounted on a frame, wherein the strip processing cartridge is mounted on a bearing region, wherein the bearing region is open for the insertion or removal of the strip processing cartridge sideways and/or upwards out of the frame, and the strip processing device has a fixing mechanism for fixing the strip processing cartridge on the bearing region.
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(54) Titel: STRIP PROCESSING DEVICE

(54) Bezeichnung: BANDBEHANDLUNGSVORRICHTUNG

(57) Abschluss: The present invention relates to a strip processing device comprising a strip processing cartridge and intended for a rolling mill, and relates to a method for removing the strip processing cartridge from the strip processing device. The strip processing device comprises a strip processing cartridge mounted on a frame, wherein the strip processing cartridge is mounted on a bearing region, wherein the bearing region is open for the insertion or removal of the strip processing cartridge sideways and/or upwards out of the frame, and the strip processing device has a fixing mechanism for fixing the strip processing cartridge on the bearing region.

(57) Zusammenfassung: Die gegenständliche Erfindung betrifft eine Bandbehandlungskassette umfassende Bandbehandlungsvorrichtung für eine Walzenwerksanlage, sowie ein Verfahren zum Entnehmen der Bandbehandlungskassette aus der Bandbehandlungsvorrichtung. Die Bandbehandlungsvorrichtung umfasst eine an einem Rahmen gelagerte Bandbehandlungskassette, wobei die Bandbehandlungskassette an einem Lagerbereich angebracht ist, wobei der Lagerbereich offen ist und Einführung beziehungsweise zur Entnahme der Bandbehandlungskassette zur Seite und/oder nach oben aus dem Rahmen, und die Bandbehandlungsvorrichtung einen Fixierungsmechanismus zur Fixierung der Bandbehandlungskassette am Lagerbereich aufweist.
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Veröffentlicht:
mit internationalem Recherchenbericht (Artikel 21 Absatz 3)
Description

Title of the invention

Strip processing device

Background of the invention

The present invention relates to a strip processing device comprising a strip processing cassette for a rolling mill, and a method for removing the strip processing cassette from the strip processing device.

Prior art

In driving devices, also referred to as drivers, metal strip is clamped between a pair of rollers and driven or deflected. Drivers are typically used in rolling trains of rolling mills, for example hot strip rolling mills, where they are arranged upstream of rolled-strip coilers of the coiling stations in order to set the strip tension upstream of the coiler by means of two rolls, namely the driving roller and the supporting driving roller.

Directional drivers have the additional object of reducing lateral creeping of the rolled strip prior to coiling. To this end, for example the pivotable driving roller is actuated and positioned against the fixed supporting driving roller in such a way that, as a result of the position of the driving roller with respect to the supporting driving roller, the rolled strip experiences a desired strip tension and a desired lateral displacement.

Such directional drivers are known, for example, from EP747147B1 or AT500689B1.

EP747147B1 presents a directional driver, the pivotable driving roller of which is arranged mounted between two rockers by
means of the two ends of the driving roller axle. The two rockers are connected rigidly to a torsion spring of a
frame which forms an axle for the rockers.

AT500689B1 discloses a similar directional driver, in which, however, the rockers can be pivoted independently of one another on an axle of a frame.

The driving roller and the supporting driving roller of a directional driver have to be cleaned and polished regularly, since, for example as a result of carbon caking, particles of dirt present on the strip to be coiled, or as a result of surface defects in the strip to be coiled which are brought about during the first pass, the surface of the driving roller and of the supporting roller become nonhomogeneous, which can in turn lead to damage to the surface of the strip to be coiled.

In EP747147B1 or AT500689B1, the driving roller axle is mounted on a bearing region of the rockers, with the driving roller being located in each case underneath the rocker. In order to avoid damage during the first pass misalignment, the bearings of the driving roller are placed in a play-free setting using, for example, spring-activated balancing means.

It is not possible to remove the driving roller in the upward direction, since the rocker is in the way of such a removal and blocks the upward path. For downward removal, to the right or to the left, in the operating state the path is blocked by the supporting driving roller and the frame. Before removal becomes possible, a blocked path therefore has to be opened.

In order to make it possible to clean and polish the driving roller and the supporting driving roller, the pair of rockers on which the driving roller is mounted is normally pivoted by means of rocker cylinders into an intermediate position; this is likewise necessary for exchanging the driving roller. The intermediate position is often reached after the pair of
rockers has been pivoted through 180°. Subsequently, the driving roller and the supporting
driving roller are usually cleaned and sanded or polished by hand in the installed state. Cleaning, sanding and polishing in the plant constitute a safety risk. This is because the persons involved with these processes have to position themselves between the plant components within the plant, which plant components thus have to be reliably shutdown and blocked. In addition, there is a safety risk due to the time pressure for carrying out these tasks, since cleaning and sanding or polishing have to be carried out in the time period of 10 to 15 minutes required for changing the working rolls of frameworks. If cleaning, sanding and polishing do not produce a sufficiently homogeneous surface on the driving roller or supporting driving roller, or in the event of damage, the driving roller or the supporting driving roller has to be removed from the frame after pivoting of the rockers, and exchanged for a new driving roller or supporting driving roller. To this end, in the case of directional drivers according to EP747147B1 or AT500689B1, the entire rocker structure, together with the driving roller, has to be disinstalled. Owing to the multiplicity of connecting elements to be released and the mass of the frame together with the driving roller, maintenance of driving rollers and supporting driving rollers involves a significant and time-consuming amount of work. Furthermore, it is not easy to access the driving roller for maintenance work when it is arranged between the rockers.

According to the internal prior art, drivers are known which overcome the disadvantages of the prior art and which involve a less time-consuming amount of work with fewer safety risks when changing the driving rollers than conventional drivers and methods.

Such a driver for a steel strip coiling plant has at least one supporting driving roller mounted on a frame and at least one driving roller which can be adjusted with respect to the supporting driving roller and is mounted on at least one rocker
connected to the frame, wherein the driving roller is attached to a bearing region of the rocker,
wherein

the bearing region is open for the insertion or removal of the
driving roller to the side and/or in the upward direction when
the rocker is positioned in the operating position, and the
driver has a securing mechanism for securing the driving roller
at the bearing region.
The bearing region is to be understood as the region of the
rocker in which the driving roller is attached to the rocker.

The bearing region is open for the insertion or removal of the
driving roller to the side and/or in the upward direction when
the rocker is positioned in the operating position, and therefore the bearing region does not prevent the driving
roller from being disinstalled to the side and/or in the upward
direction. A driving roller can therefore be removed from the
rocker to the side and/or in the upward direction as required
without the rocker together with the driving roller having to
be removed substantially from the operating position or without
the rocker together with the driving roller having to be
completely dismantled. Operating position to be understood as a
position of the rocker which is assumed during normal operation
of the driver.

The driver has a securing mechanism for securing the driving
roller at the bearing region. This ensures during operation
that the driving roller does not undesirably veer off to the
side and/or in the upward direction. In the secured state,
controlled displacement of the driving roller into different
operating positions is possible.
The positioning of the driving roller with respect to the
supporting driving roller in the secured state can preferably
be changed by changing the setting of the securing mechanism to
different positions.
According to one embodiment, the securing mechanism comprises a displaceable bar, which can preferably be secured to the rocker.
According to another embodiment, the securing mechanism comprises a swing-action device, the components of which can be swung about at least one axle fastened to the rocker, and which can be secured to the rocker. For example, said swing-action device may involve two arms which can be swung into one another and which are locked by a displaceable wedge. Each of the arms swings about a different axle here.

The supporting driving roller is located underneath the driving roller. It is therefore not possible to remove the supporting driving roller in the upward direction while the driving roller is installed in the driver. If the driving roller has been removed, the path for removing the supporting driving roller in the upward direction is open.

If the driving roller is mounted between a pair of rockers, the distance between the rockers is preferably greater than the length of the supporting driving roller. This ensures that the supporting driving roller can be removed in the upward direction as a result of the free space produced by the removal of the driving roller.

If the distance between the rockers in the operating position is less than the length of the supporting driving roller, it is preferred for at least one of the rockers to be able to be displaced or pivoted in relation to the other rocker when the driving roller has been disinstalled. As a result of this, the supporting driving roller can be removed.

The steel strip coiler is preferably a steel strip coiler for a hot strip.

The driver is preferably a directional driver.

According to one preferred embodiment, the driving roller and the supporting driving roller are arranged in a holding device.
The holding device, which may be for example a holding frame, thus contains both the driving roller and the supporting driving roller. As a result, in order to remove or insert a pair consisting of a driving roller and a supporting driving roller, all that is required is to act on the holding device and to remove it from the driver.

By virtue of the fact that the driving roller and supporting driving roller do not have to be removed individually from or inserted individually into the driver, the removal and insertion can be carried out more quickly.

The supporting driving roller may be mounted on the frame in a fixed or displaceable manner.

According to one embodiment, the driving roller axle and/or the supporting driving roller axle about which the driving roller or the supporting driving roller rotates comprise/comprises at least two driving roller axle parts and/or supporting driving roller axle parts, wherein at least one of the driving roller axle parts is configured as a shaft stub which is releasably fastened - for example via a connecting flange, a perforated disk having displaceable drive pins, or a claw coupling - to the cylindrical body of the driving roller or supporting driving roller. The shaft stub can be configured here as a hollow shaft, into which a motor-driven shaft can be introduced for driving the driving roller or the supporting driving roller. This makes it possible to remove the driving roller and/or supporting driving roller quickly from the driver, and this reduces a safety risk caused by time pressure when changing the driving rollers.

According to one embodiment of the driver, the supporting driving roller can be removed from the driver laterally in the direction of its longitudinal axis. It can also be introduced
into the driver laterally in the direction of its longitudinal axis.
In the drivers shown in EP747147B1 or AT500689B1, one end of the rockers can be rotated about an axle while the other end of the rockers is connected to an actuating device such as, for example, a pressure-medium cylinder, preferably a hydraulic cylinder. By adjusting this actuating device, the rockers can be pivoted about their axle, for example in order to permit the removal of the driving roller or in order to control or adjust the distance between the driving roller and the supporting driving roller.

The bearing region of the driving roller is located between the pivotable end of the rocker and the end of the rocker connected to the actuating device.

In the driver according to the internal prior art too, the rockers can be pivoted about an axle arranged in an axle region of the rockers, and said rockers are connected in an actuating region to an actuating device. In this case, the bearing region of the driving roller can, as in EP747147B1 or AT500689B1, be located between the axle region and the actuating region. According to another embodiment, the axle region can be located between the bearing region and the actuating region. An advantage of such an embodiment is that forces flow away into the rocker better during the pressing of the driving roller and more favorable stress states are generated for the rocker. The effective distance of an actuating device which acts on one end of the rocker can also be increased more easily in structural terms in such a construction than in embodiments configured as in EP747147B1 or AT500689B1. As a result of an increased effective distance, the same forces can be achieved with smaller actuating devices or larger forces can be achieved with the same actuating devices.
A further part of the internal prior art is a method for removing a driving roller from a driver according to the internal prior art.

This method is characterized in that it comprises the steps
- opening the securing mechanism,
- removing the driving roller to the side and/or in the upward direction from the driver.

Opening the securing mechanism is to be understood as meaning that the securement of the driving roller to the bearing region is released.

The supporting driving roller in a driver is secured in the driver by securing devices in order to ensure that during normal operation its position does not change at all or its position does not change beyond an acceptable degree. The supporting driving roller can be secured here so that no movement at all is possible. It can also be displaceable to an acceptable or desired degree. The degree of displaceability which is acceptable or desired depends on the respective operating state. In order to be able to change the deflection forces of the driver as a function of the strip thickness and the strip quality, it is possible, for example, to change the distance between the axle of the driving roller and that of the supporting driving roller to a certain degree.

An embodiment of the method according to the internal prior art is characterized in that, after removal of the driving roller, it additionally comprises the steps
- releasing securing devices for securing the supporting driving roller in the driver, and
- removing the supporting driving roller in the upward direction from the driver.
By virtue of the opening which comes about as a result of the removal of the driving roller, the supporting driving roller can also be removed in the upward direction from the driver.
According to another embodiment, the supporting driving roller can be pulled out of the driver laterally, that is to say in the direction of its longitudinal axis, for the purpose of removal. This can take place before or after the inventive removal of the driving roller. This can also take place during the removal of the driving roller from the driver; in this way, the driving roller and the supporting driving roller can be removed more quickly than if the two removals take place in succession. The method according to the internal prior art then additionally comprises, during the removal of the driving roller, the steps
- releasing securing devices for securing the supporting driving roller in the driver, and
- removal of the supporting driving roller by pulling it laterally out of the driver.

According to one preferred embodiment, the driving roller and supporting driving roller are removed from the driver in pairs by removing a holding device in which a pair consisting of a driving roller and a supporting driving roller is arranged.

The internal prior art is described by way of example in the appended schematic figures.

Figure 1a shows a side view of an embodiment of a driver according to the internal prior art,
figure 1b shows an elevated oblique view of a driver according to figure 1a,
figure 2 shows an elevated oblique view of a driver according to figure 1b having a driving roller and a supporting driving roller arranged in a holding device,
figure 3 shows an embodiment of a driver according to the internal prior art in which the axle region 11 is located between the bearing region 7 and the actuating region 12,
figure 4 shows an elevated oblique view of a driver according to the internal prior art with the supporting driving roller removed,
figure 5 shows an alternative to the securing mechanism for securing the driving roller to the bearing region, and
figure 6 shows a further embodiment of a driver according to the internal prior art in which the axle region 11 is located between the bearing region 7 and the actuating region 12.

Figure 1a shows a side view of a driver 1 according to the internal prior art for a steel strip coiler, specifically a directional driver for a hot strip coiler. The driver 1 comprises a supporting driving roller 3 mounted on a frame 2, and a driving roller 4 which can be adjusted with respect to the supporting driving roller. In figure 1, the driving roller 4 and the supporting driving roller 3 are illustrated merely by dashed lines, since in the side view they are concealed by the frame 2 and other parts of the driver. The driving roller 4 is mounted on a pair of rockers 5a, 5b connected to the frame. In the side view in figure 1, only one rocker 5a can be seen; the second rocker 5b of the pair is concealed by the rocker 5a in this view. The pair of rockers 5a, 5b is located in the operating position. The pair of rockers 5a, 5b can be pivoted about an axle 6 of the frame 2. The driving roller 4 is attached to a bearing region 7 of the rockers. The bearing region 7 is opened for the insertion or removal of the driving roller 4 to the side and in the upward direction when the rockers are placed in the operating position. The bearing region is shown with a curved, closed line. A securing mechanism for securing the driving roller 4 to the bearing region 7 is present, and is embodied as a displaceable bar 8. In the illustrated position of the bar 8, the latter has not yet been displaced into its end position in which it secures the driving roller 4 to the bearing region 7. To present a clear overview, part of the rocker 5 is illustrated in sectional form so that part
of the course of the bar 8 in the rocker 5 is shown. When the bar 8 is moved out of the illustrated position into its end position, as is shown in the following figure 1b, on the one hand the driving roller 4 is secured and on the other hand the balancing pots 20a, 20b for placing the bearings of the driving roller 4 in a play-free setting are activated.

Figure 1b shows an elevated oblique view of a driver 1 according to figure 1a. Components which are identical to those in figure 1a are provided with identical reference symbols. In contrast to figure 1a, the bar 8 of the securing mechanism is illustrated in its end position in which it secures the driving roller to the bearing region 7 of the rockers 5a, 5b. The driving roller 4 and the supporting driving roller 3 can be seen more clearly than in figure 1a. The second rocker 5b of the pair of rockers 5a, 5b can be seen, in contrast to figure 1a.

Both in figure 1a and in figure 1b, one end of the rockers 5a, 5b is connected in each case to an actuating device, specifically a hydraulic cylinder 9a, 9b. By adjusting this hydraulic cylinder 9a, 9b, the rockers 5a, 5b can be pivoted about their axle 6, for example in order to set the distance of the driving roller 4 from the supporting driving roller 3. The bearing region 7 of the driving roller is located between that end of the rockers 5a, 5b which can be pivoted about the axle 6 and that end of the rockers 5a, 5b which is connected to the hydraulic cylinder 9a, 9b of the actuating device.

Figure 2 shows a further elevated oblique view of a driver according to figure 1b. Components which are identical to those in figure 1b are provided with identical reference symbols. In contrast to figure 1b, the bar 8 of the securing mechanism is illustrated in its starting position, in which it does not secure the driving roller 4 to the bearing region 7. The driving roller 4 and the supporting driving roller 3 are not
installed in the driver 1. They are arranged in a holding device, specifically a holding frame 10.
The installation and removal of the driving roller 4 and of the supporting driving roller 3 are carried out by inserting the holding frame 10 into the frame 2 of the driver 1 or removing it therefrom.

Figure 3 shows a side view, similar to figure 1a, of a driver according to the internal prior art. Components which are identical to those in figure 1a are provided with identical reference symbols. To present a clearer overview, the driving roller 4 and the supporting driving roller 3 are not illustrated. The axle 6 is arranged in an axle region 11 of the rocker 5a. The hydraulic cylinder 9a is arranged in an actuating region 12 of the rocker 5a. In contrast to figure 1a, the axle region 11 is located between the bearing region 7 and the actuating region 12.

Figure 4 shows an elevated oblique view, similar to figure 1b, of a driver according to the internal prior art. Components which are identical to those in figure 1b are provided with identical reference symbols. A driving roller has not been inserted into the driver 1, and accordingly no driving roller is illustrated. The supporting driving roller 3 is not inserted either. Figure 4 shows the supporting driving roller in the removed state. The supporting driving roller 3 can be removed laterally in the direction of its longitudinal axis from the driver 1 and can be introduced into the driver 1. Figure 4 shows a removal framework, on which the supporting driving roller 3 is guided out of the driver 1 and is respectively introduced into the driver 1.

The securing mechanism for securing the driving roller 4 to the bearing region 7 does not have to be embodied as a displaceable bar 8.

Figure 5 shows an alternative securing mechanism which has a swing-action device having two arms 14, 16, which can be swung
into one another and are locked by a displaceable wedge device 18. Each of the arms 14, 16 swings here about a different axle, arm 14 about axle 15 and arm 16 about axle 17. The two arms 14, 16 are connected to the rocker 5a
via the axles 15, 17. The displaceable wedge device 18 is fastened to the arm 16; said wedge device 18 can be displaced by means of a hydraulic cylinder 19. The arm 14 has protuberances which fit into depressions on the displaceable wedge device 18. When the securing mechanism closes, the arms 14, 16 swing into the illustrated position and the hydraulic cylinder 19 moves the displaceable wedge device 18 in such a way that the depressions slide over the protuberances. In this way, the two arms 14, 16 are locked together.

Figure 6 shows a side view, similar to figure 1a and figure 3, of a driver according to the internal prior art. Components which are identical to those in figure 1a are provided with identical reference symbols. The axle 6 is arranged in an axle region 11 of the rocker 5a. The hydraulic cylinder 9a is arranged in an actuating region 12 of the rocker 5a. As in figure 3, in contrast to figure 1a, the axle region 11 is located between the bearing region 7 and the actuating region 12. Figure 3 and figure 6 differ in the form of the rocker 5a and the way in which the driving roller is attached to the bearing region of the rocker.

As described above, according to one embodiment of the driver according to the internal prior art the driving roller and the supporting driving roller are arranged in a holding device. The holding device, which may be, for example, a holding frame, therefore contains both the driving roller and the supporting driving roller. As a result, in order to remove or insert a pair consisting of a driving roller and a supporting driving roller, all that is required is to act on the holding device and to remove it from the driver. By virtue of the fact that the driving roller and supporting driving roller do not have to be removed individually from or inserted individually into the driver, the removal and insertion can be carried out more quickly.
In a rolling mill, the strip is, if appropriate, also subjected in strip processing devices to strip processing steps, for example
- cutting of the strip,
- measuring of the strip,
- cooling of the strip, and
- heating of the strip.

Although the internal prior art relating to drivers and specifically the embodiment with an arrangement of a driving roller and a supporting driving roller in a holding device permits driving rollers and supporting driving rollers to be replaced more quickly than in the prior art according to EP747147B1 or AT500689B1, if strip processing devices of a rolling mill require components to be replaced, the steps necessary to do so are time-consuming and limit the availability and performance of the rolling mill.

**Summary of the invention**

**Technical object**

The object of the present invention is to permit components of strip processing devices of a rolling mill to be replaced more quickly compared to the prior art by making available a strip processing device and a method for operating the strip processing device.

**Technical solution**

This object is achieved by means of a strip processing device for a rolling mill, preferably a hot strip rolling mill, which is characterized in that said strip processing device comprises
a strip processing cassette mounted on a frame, wherein the strip processing cassette is attached to a bearing region, wherein the bearing region is open for the insertion or removal of the strip processing cassette to the side and/or in the upward direction from the frame, and the strip processing device has a securing mechanism for securing the strip processing cassette at the bearing region.

The strip processing cassette contains at least one device for processing strips. The strip is processed by interaction between the strip processing cassette and the strip. The remaining parts of the strip processing device serve to support and secure the strip processing cassette.

The bearing region, at which the strip processing cassette is mounted, is open for the insertion or for the removal of the strip processing cassette to the side and/or in the upward direction from the frame.

A securing mechanism serves to secure the strip processing cassette to the bearing region.

Advantageous effects of the invention

Since the strip processing cassette contains the devices which are necessary for the desired type of strip processing, worn devices for processing the strips can be renewed or various types of devices for processing strips can be replaced quickly and easily by removing a strip processing cassette and inserting another strip processing cassette into the frame. Specifically, only the strip processing cassette, that is to say one component, has to be removed from the frame or inserted into the frame instead of individual components of the strip processing device contained in the strip processing cassette having to be removed individually from the frame or inserted into it.
The strip processing cassette preferably comprises at least a device from the group comprising the elements
- device for stamping the strip,
- device for roughening the strip,
- device for smoothing the strip,
- device for cutting the strip,
- device for slitting the strip,
- device for trimming the strip,
- device for coating the strip,
- device for doubling the strip,
- device for testing material properties of the strip,
- device for measuring the strip,
- device for marking the strip,
- device for shaping the strip,
- device for welding the strip to another strip,
- device for cooling the strip,
- device for heating the strip,
- device for punching the strip, and
- device for taking a sample of the strip.

According to one preferred embodiment of the strip processing device according to the invention, the strip processing cassette comprises a device for driving the strip, which is also a device from the group comprising the elements
- device for stamping the strip,
- device for roughening the strip,
- device for smoothing the strip,
- device for cutting the strip,
- device for slitting the strip,
- device for trimming the strip,
- device for coating the strip,
- device for doubling the strip,
- device for testing material properties of the strip,
- device for measuring the strip,
- device for marking the strip,
- device for shaping the strip,
- device for welding the strip to another strip,
- device for cooling the strip,
- device for heating the strip,
- device for punching the strip, and
- device for taking a sample of the strip.

In this way, the strip processing cassette also serves as a driver. The internal prior art presented above relating to drivers, specifically the embodiment of the driver according to the internal prior art, in which the driving roller and the supporting driving roller are arranged in a holding device, can be correspondingly used.

According to one preferred embodiment of the strip processing device according to the invention, the strip processing cassette comprises a device for driving the strip, and said strip processing cassette also comprises a device from the group comprising the elements
- device for stamping the strip,
- device for roughening the strip,
- device for smoothing the strip,
- device for cutting the strip,
- device for slitting the strip,
- device for trimming the strip,
- device for coating the strip,
- device for doubling the strip,
- device for testing material properties of the strip,
- device for measuring the strip,
- device for marking the strip,
device for shaping the strip,
device for welding the strip to another strip,
device for cooling the strip,
device for heating the strip,
device for punching the strip, and
device for taking a sample of the strip.

In this way, the strip processing device also serves as a driver. The internal prior art presented above relating to drivers, specifically the embodiment of the driver according to the internal prior art in which the driving roller and the supporting driving roller are arranged in a holding device, can be correspondingly used.

Wherever a device for testing material properties of the strip is mentioned, these material properties also include properties of the surface of the strip.

According to one preferred embodiment of the strip processing device according to the invention, the strip processing cassette is mounted on a rocker connected to the frame, wherein the strip processing cassette is attached to a bearing region of the rocker, wherein the bearing region is open for the insertion or the removal of the strip processing cassette to the side and/or in the upward direction when the rocker is positioned in the operating position.

According to a further preferred embodiment of the strip processing device according to the invention, the strip processing cassette is mounted between a pair of rockers connected to the frame, wherein the strip processing cassette is attached to a bearing region of the rockers, wherein the bearing region is open for the insertion or the removal of the strip processing cassette to the
side and/or in the upward direction when the rockers are positioned in the operating position. According to one preferred embodiment, in this context at least one of the rockers can be displaced or pivoted relative to the other rocker. These embodiments are of similar design to the internal prior art relating to drivers discussed above. Accordingly, a frame of such a driver can be used as part of a strip processing device according to the invention by inserting a strip processing cassette. This increases flexibility - with respect to reaction to changed demands made of the product - of rolling mills containing drivers corresponding to this internal prior art.

A further subject matter of the present application is a rolling mill, preferably hot strip rolling mill, comprising one or more strip processing devices according to the invention.

A further subject matter of the present application is a method for removing a strip processing cassette from a strip processing device according to the invention, characterized in that it comprises the steps - opening of the securing mechanism, and - removal of the strip processing cassette to the side and/or in the upward direction from the strip processing device.

**Brief description of the drawings**

Figure 1a shows a side view of an embodiment of a driver according to the internal prior art. Figure 1b shows an elevated oblique view of a driver according to figure 1a.
Figure 2 shows an elevated oblique view of a driver according to figure 1b with a driving roller and a supporting driving roller arranged in a holding device.

Figure 3 shows an embodiment of a driver according to the internal prior art, in which embodiment the axle region 11 is located between the bearing region 7 and the actuating region 12.

Figure 4 shows an elevated oblique view of a driver according to the internal prior art with the supporting driving roller removed.

Figure 5 shows an alternative to the securing mechanism for securing the driving roller to the bearing region.

Figure 6 shows a further embodiment of a driver according to the internal prior art, in which embodiment the axle region 11 is located between the bearing region 7 and the actuating region 12.

Figure 7 shows, in an illustration similar to figure 2, a strip processing device according to the invention.

Description of the embodiments

Figure 7 illustrates how a strip processing cassette is inserted into the strip processing device. Parts corresponding to figure 2 are provided with identical reference symbols.

The strip processing device 22 comprises a strip processing cassette 21 mounted on a frame 2. In the case illustrated, the strip processing cassette comprises a holding frame 23 in which a processing unit 24 is inserted. In the state in which it is inserted into the frame, the strip processing cassette 21 is mounted on a pair of rockers 5a, 5b connected to the frame. The pair of rockers 5a, 5b are in the operating position. The pair of rockers 5a, 5b can pivot about an axle 6 of the frame 2. The strip processing cassette 21 is attached to a bearing region 7 of the rockers. The bearing region 7 is open for the insertion
or removal of the strip processing cassette 21 in the upward direction when the rockers are placed
in the operating position. The bearing region is shown with a wavy closed line. A securing mechanism for securing the strip processing cassette 21 to the bearing region 7 is present, it is embodied as a displaceable bar 8. The bar 8 of the securing mechanism is illustrated in its starting position in which it does not secure the strip processing cassette 21 to the bearing region 7. If the bar 8 is moved out of the illustrated position into its end position, on the one hand the strip processing cassette 21 is secured and on the other hand the balancing pots 20a, 20b for placing the bearings of the strip processing cassette 21 in a play-free setting are activated.

One end of the rockers 5a, 5b is respectively connected to an actuating device, specifically a hydraulic cylinder 9a, 9b. By adjusting this hydraulic cylinder 9a, 9b, the rockers 5a, 5b can be pivoted about their axle 6.

The bearing region 7 of the strip processing cassette 21 is located between the end which can be pivoted about the axle 6 and the end of the rockers 5a, 5b which is connected to the hydraulic cylinder 9a, 9b of the actuating device.

The installation and removal of the strip processing cassette 21 in the strip processing device 22 are carried out by introducing the strip processing cassette 21 into the frame 2 of the strip processing device 22 and removing it therefrom.
### List of reference numbers

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Claims

1. A strip processing device for a rolling mill, preferably a hot strip rolling mill, characterized in that said strip processing device comprises a strip processing cassette mounted on a frame, wherein the strip processing cassette is attached to a bearing region, wherein the bearing region is open for the insertion or removal of the strip processing cassette to the side and/or in the upward direction from the frame, and the strip processing device has a securing mechanism for securing the strip processing cassette at the bearing region, wherein the strip processing cassette is mounted between a pair of rockers connected to the frame, wherein the strip processing cassette is attached to a bearing region of the rockers, wherein the bearing region is open for the insertion or the removal of the strip processing cassette to the side and/or in the upward direction when the rockers are positioned in the operating position.

2. The strip processing device as claimed in claim 1, characterized in that the strip processing cassette comprises at least a device from the group comprising the elements
   - device for stamping the strip,
   - device for roughening the strip,
   - device for smoothing the strip,
   - device for cutting the strip,
   - device for slitting the strip,
   - device for trimming the strip,
   - device for coating the strip,
   - device for doubling the strip,
   - device for testing material properties of the strip,
- device for measuring the strip,
- device for marking the strip,
- device for shaping the strip,
- device for welding the strip to another strip,
- device for cooling the strip,
- device for heating the strip,
- device for punching the strip, and
- device for taking a sample of the strip.

3. The strip processing device as claimed in claim 1 or 2, characterized in that the strip processing cassette comprises a device for driving the strip, which is also a device from the group comprising the elements
- device for stamping the strip,
- device for roughening the strip,
- device for smoothing the strip,
- device for cutting the strip,
- device for slitting the strip,
- device for trimming the strip,
- device for coating the strip,
- device for doubling the strip,
- device for testing material properties of the strip,
- device for measuring the strip,
- device for marking the strip,
- device for shaping the strip,
- device for welding the strip to another strip,
- device for cooling the strip,
- device for heating the strip,
- device for punching the strip, and
- device for taking a sample of the strip.
4. The strip processing device as claimed in one of claims 1 to 3, characterized in that the strip processing cassette comprises a device for driving the strip, and comprises a device from the group comprising the elements
- device for stamping the strip,
- device for roughening the strip,
- device for smoothing the strip,
- device for cutting the strip,
- device for slitting the strip,
- device for trimming the strip,
- device for coating the strip,
- device for doubling the strip,
- device for testing material properties of the strip,
- device for measuring the strip,
- device for marking the strip,
- device for shaping the strip,
- device for welding the strip to another strip,
- device for cooling the strip,
- device for heating the strip,
- device for punching the strip, and
- device for taking a sample of the strip.

5. The strip processing device as claimed in one of claims 1 to 4, characterized in that the strip processing cassette is mounted on a rocker connected to the frame, wherein the strip processing cassette is attached to a bearing region of the rocker, wherein the bearing region is open for the insertion or the removal of the strip processing cassette to the side and/or in the upward direction when the rocker is positioned in the operating position.
6. The strip processing device as claimed in claim 5, characterized in that at least one of the rockers can be displaced or pivoted relative to the other rocker.

7. A rolling mill, preferably hot strip rolling mill, comprising one or more strip processing devices as claimed in one of claims 1 to 6.

8. A method for removing a strip processing cassette from a strip processing device as claimed in one of claims 1 to 6, characterized in that said method comprises the steps - opening of the securing mechanism, and - removal of the strip processing cassette to the side and/or in the upward direction from the strip processing device.