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(71) Applicant: **Sarcoil Processing Lines, S.L.**
20730 Azpeitia (Gipuzkoa) (ES)

(72) Inventor: **VÁZQUEZ, Iñaki**
20730 Azpeitia (GIPUZKOA) (ES)

(74) Representative: **Pons Ariño, Angel**
Pons Patentes y Marcas Internacional, S.L.
Glorieta Rubén Dario 4
28010 Madrid (ES)

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Amended claims in accordance with Rule 137(2) EPC.

(54) **DEVICE FOR PROCESSING STRIP MATERIAL AND METHOD FOR PROCESSING STRIP MATERIAL**

(57) The present invention relates to a device for processing strip material from a coil, wherein the device comprises:
- pull rollers before and outside the leveller to assist with threading;
- a leveller which in turn comprises a first set of rollers and a second set of rollers configured to process the strip material, in addition to a single drive motor configured to drive the first and second sets of rollers by applying torque to said first and second sets of rollers;
pull rollers after and outside the leveller, consisting of one or more pairs of driven rollers, in order to apply extra tension to the material.

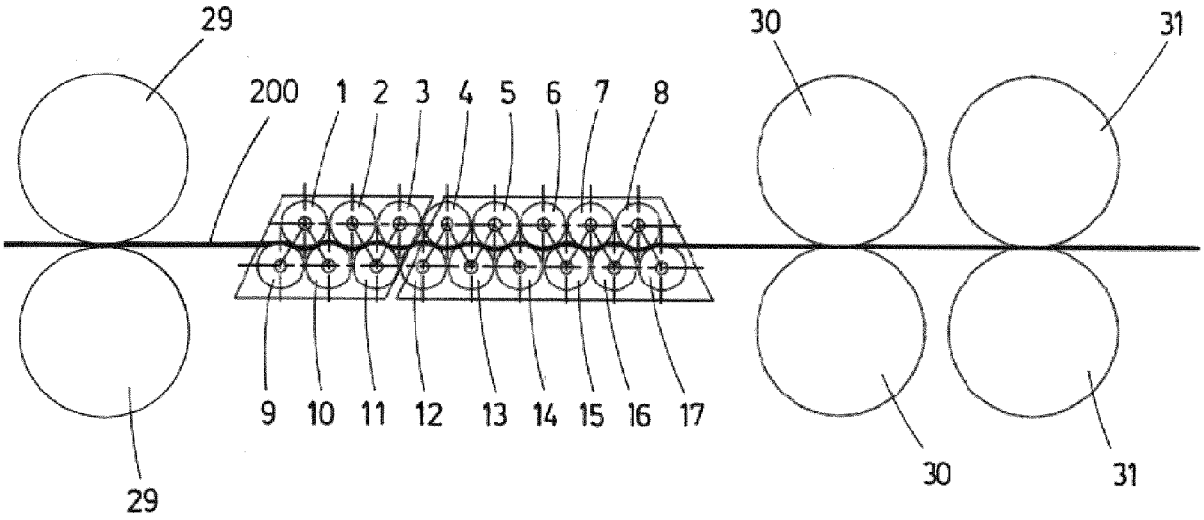

FIG.2

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Description

OBJECT OF THE INVENTION

[0001] The present invention relates to a system for processing strip material from a coil, wherein the system comprises a leveller which in turn comprises a first set of rollers and a second set of rollers configured to process the strip material, in addition to a single drive motor configured to drive both sets of rollers by applying torque to said first and second sets of rollers.

[0002] Another object of the present invention is a system for processing strip material and an associated method, wherein the second set of rollers has at least one freewheel (or any other transmission system), that makes it possible to adjust the different angular speeds of each of the rollers of the second set of rollers when they come into contact with the strip material.

[0003] In addition, the device for processing strip material of the present invention comprises first pull rollers positioned at the infeed and outside the leveller, which facilitate the insertion of the strip from the coil into the leveller, and second pull rollers, at the outfeed and outside the leveller, which produce a tension between the first group of rollers of the leveller and the second pull rollers.

BACKGROUND OF THE INVENTION

[0004] The devices, systems and processes for levelling strips by means of rollers (for example, straighteners, flatteners and levellers, etc.) are used to modify the flatness quality derived from the internal stresses of the material itself. These internal stresses cause the length of the longitudinal fibres of the material to be different, causing pouching to occur along the material. The material in movement may be a strip material (for example, a metal) that is taken from a roll or coil of the strip material and processed using a levelling machine or system by means of rollers, or it may be a pre-cut strip material that is cut into pre-determined lengths or sizes.

[0005] Regardless of whether a strip material is used in the pre-cutting process or in the post-cutting process, in general, the strip material is levelled, flattened and otherwise conditioned before cutting and stacking, by means of rollers to remove or substantially reduce undesirable features of the strip material due to defects in the shape and residual internal stresses resulting from the process of manufacturing the coiled material and/or storing the coiled material. Levellers are well known machines that can substantially flatten a strip material (for example, eliminate defects in the shape and release the residual internal stresses) as the strip material is pulled from the coil and passed through these machines.

[0006] European patent EP2624978B1 is known in the state of the art and discloses a device and method for processing strip material that comprises a first drive unit system to drive a first working roller, in which the first drive unit system includes a first motor; a second drive unit system to drive a second working roller, in which the second drive system includes a second motor; and a controller to provide a first instruction reference to the first drive unit system, wherein the controller measures a first torsion torque output value of the first drive unit system when the first drive unit system operates at the first instruction reference, determines a second torsion torque output value such that the second torsion torque output value is different from the first torsion torque output value and that the second torsion torque output value and the first torsion torque output value define a torsion torque ratio, and drives the second drive unit system at the second torsion torque output value to maintain the torsion torque ratio, wherein the first motor is a master drive unit, and the second motor is a slave drive unit.

[0007] European patent EP2058059B2 is also known and discloses a leveller and a method for levelling strip material that comprises a first plurality of working rollers to process a strip material, a second plurality of working rollers to process the strip material; and a motor to drive the first plurality of working rollers and the second plurality of working rollers, wherein the motor applies a first torque to the first plurality of working rollers and a second torque to the second plurality of working rollers, wherein the leveller further comprises means for determining the second torque using a measured output value of the first torque, with the second torque being higher than the first.

[0008] In the aforementioned systems and methods, if the operations take place with a lubricated material, slippage and loss of the control tension on the rollers may occur, due to the slippage between the rollers and the processed material, so that the speed of movement of the strip material within the leveller could change randomly. In addition, in said systems, the drive torque must be high, which causes all of the rollers to wear out quickly, making it necessary for said rollers to be replaced for the correct operation of the leveller.

[0009] All the aforementioned drawbacks are resolved by the device for processing strip material and the method for processing strip material of the present invention.

DESCRIPTION OF THE INVENTION

[0010] The present invention relates to a device for processing strip or band material, wherein the material preferably comes from a coil, and wherein the device comprises:

- a leveller which in turn comprises:
  - a first set of levelling rollers configured to process the strip material;
  - a second set of levelling rollers configured to process the strip material;
  - a first drive motor configured to drive the first set of levelling rollers and the second set of levelling rollers configured to process the strip ma-

terial by applying a torque to the first set of rollers and to the second set of rollers;
wherein the second set of levelling rollers are also configured to rotate freely if the strip material pulls them at a different rotational speed than the first set of levelling rollers.

[0011] Preferably, the device further comprises a first set of traction rollers outside the leveller and positioned at the infeed of the same, driven by means of a second motor.

[0012] Preferably, the device further comprises a second set of traction rollers outside the leveller and positioned at the outfeed of the same, driven by means of a third motor.

[0013] This generates tension between the first set of levelling rollers configured to process the strip material and the second set of traction roller, this generating tension between said groups and improving the processing of the material. The second set of traction rollers is configured to carry out the threading of the strip material into the leveller.

[0014] Preferably, the first set of levelling rollers configured to process the strip material and the second set of levelling rollers configured to process the strip material make up the totality of the rollers of the leveller. The totality of the rollers are driven by the same motor, with none of them rotating freely, except when the material produces different angular speeds produced by the interlocking difference that is generated between the infeed rollers and the outfeed rollers of the leveller.

[0015] Preferably, the first set of levelling rollers configured to process the strip material are infeed rollers of the leveller and the second set of levelling rollers configured to process the strip material are outfeed rollers of the leveller.

[0016] Preferably, the leveller further comprises at least one coupling/uncoupling device, preferably a freewheel, configured to uncouple the transmission of the torque of the first drive motor to the second set of levelling rollers, which avoids the rapid wear of the rollers of the second set of levelling rollers configured to process the strip material because they are not driven by the first drive motor, but rather rotate freely due to the forward movement of the strip material.

[0017] The coupling/uncoupling device is also configured to adjust the different angular speeds of each one of the rollers of the second set of levelling rollers, if there is a difference in angular speeds between said rollers of the second set of levelling rollers.

[0018] Also preferably, the first set of levelling rollers configured to process the strip material are coupled directly to the first drive motor.

[0019] The first traction or pull rollers positioned outside the leveller at the infeed of the same are also configured to produce additional tension during the processing of the strip material, in the case that the material is oiled and slippage occurs in the first set of levelling rollers with the processed material.

[0020] This additional tension is due to the fact that the drive generated by the first and only motor of the leveller and configured to drive the first and second sets of levelling rollers produces a slipping of the levelling rollers with the material, producing a loss of tension required at all times for the correct levelling of the material. This is when these first pull rollers assist the first set of levelling rollers to brake the material.

[0021] The rollers of the first set of levelling rollers configured to process the strip material are in turn configured to operate as a brake when the second pull rollers positioned at the outfeed of the leveller are operating.

[0022] The invention also relates to a method for processing strip material, which comprises:

- a step of processing a strip material by means of a first set of levelling rollers configured to process the strip material and a second set of levelling rollers configured to process the strip material through a leveller,
- a step of driving the first set of levelling rollers configured to process the strip material and the second set of levelling rollers configured to process the strip material by means of a first drive motor configured to drive the first and second sets of levelling rollers by applying a torque to the first and second sets of rollers,
- a step of uncoupling the second set of levelling rollers so that they rotate freely if the strip material pulls them at a different speed than the first set of levelling rollers, preferably by means of a coupling/uncoupling system of the leveller.

[0023] Preferably, the method comprises a threading step carried out by means of a first set of traction rollers outside the leveller and positioned at the infeed of the same, driven by means of a second motor.

[0024] Preferably, the method comprises a pulling step carried out by means of a second set of traction rollers outside the leveller and positioned at the outfeed of the same, driven by means of a third motor.

[0025] Preferably, the step of processing a strip material is carried out solely by means of the first set of levelling rollers configured to process the strip material and the second set of levelling rollers configured to process the strip material through the leveller.

[0026] In addition, during the uncoupling step, the different angular speeds of each one of the rollers of the second set of levelling rollers are adjusted to each other, if there is a difference in angular speeds between said rollers of the second set of levelling rollers.

[0027] Preferably, the method for processing strip material comprises a threading step of the strip material into the leveller by means of at least one pair of pull rollers positioned outside and before the leveller.

[0028] The pulling step carried out by means of a second set of traction rollers outside the leveller and posi-

tioned at the outfeed of the same is also optionally carried out by the first set of levelling rollers configured to process the strip material acting as a brake.

DESCRIPTION OF THE DRAWINGS

[0029]

Figure 1 shows an elevation view of the device for processing strip material of the present invention according to a preferred embodiment.

Figure 2 shows a detailed view of the rollers of the first set of rollers configured to process the strip material, of the second set of rollers configured to process the strip material, and of at least one pair of pull rollers of the device for processing strip material of the present invention.

Figure 3 shows a plan view of the leveller of the device for processing strip material of the present invention.

PREFERRED EMBODIMENT OF THE INVENTION

[0030] According to a detailed description of the invention, Figure 3 illustrates a leveller (100) that comprises a first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material (200) and a second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15, 16, 17) configured to process the strip material (200); with both sets making up the totality of rollers of the leveller (100), and in addition, a first and only drive motor (20) configured to drive the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material (200) by directly applying a torque to the first set of levelling rollers (1, 2, 3, 9, 10, 11) and to the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) by means of a coupling/uncoupling system, preferably one or more freewheels (21, 22).

[0031] Both the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material (200) as well as the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material (200) comprise a plurality of upper rollers (1, 2, 3, 4, 5, 6, 7, 8) and a plurality of lower rollers (9, 10, 11, 12, 13, 14, 15, 16, 17), wherein the upper rollers (1, 2, 3, 4, 5, 6, 7, 8) are offset with respect to the lower rollers (9, 10, 11, 12, 13, 14, 15, 16, 17) in one forward direction of the strip material (200) through the leveller (100), such that the strip material (200) is fed between the upper rollers (1, 2, 3, 4, 5, 6, 7, 8) and the lower rollers (9, 10, 11, 12, 13, 14, 15, 16, 17) alternately.

[0032] The coupling/uncoupling system of the leveller (100) comprises two or more freewheels (21, 22) (or another uncoupling system) configured to uncouple the transmission of the torque of the first and only drive motor (20) to the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17), such that they rotate freely due to the forward movement of the strip material (200). These freewheels (21, 22) uncouple the transmission of the torque of the first and only drive motor (20) to a first roller (6) of the plurality of upper rollers (1, 2, 3, 4, 5, 6, 7, 8) and to a first roller (13) of the plurality of lower rollers (9, 10, 11, 12, 13, 14, 15, 16, 17), with both first rollers (6, 13), belonging to the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material (200), preferably outfeed rollers of the leveller (100).

[0033] In this preferred embodiment, the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material (200) are coupled directly to the first and only drive motor (20), as shown in Figure 3.

[0034] The device for processing strip material further comprises a first pair of pull rollers (29) positioned outside and before the leveller (100) and configured to carry out the threading of the strip material (200) into the leveller (100).

[0035] The device for processing strip material further comprises at least one second pair of pull rollers (30, 31) at the outfeed and outside the leveller (100) and configured to produce the tension on the strip material (200) and improve the levelling.

[0036] The rollers of the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material (200) are in turn configured to operate as a brake when the at least one second pair of pull rollers (30, 31) are operating.

[0037] In this preferred embodiment, to transfer the torque only to the first set of levelling rollers (1, 2, 3, 9, 10, 11) through the single drive motor (20), the single drive motor (20) is connected to two input shafts (23, 24) that connect the single drive motor (20) to a second roller (3) of the plurality of upper rollers (1, 2, 3, 4, 5, 6, 7, 8) and to a second roller (10) of the plurality of lower rollers (9, 10, 11, 12, 13, 14, 15, 16, 17), with both second rollers (3, 10) belonging to the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material (200), preferably infeed rollers of the leveller (100).

[0038] The method for processing strip material (200) comprises:

- a step of processing a strip material (200) solely by means of a first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material (200) and a second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material (200) through a leveller (100), and
- a step of driving the first set of levelling rollers (1, 2, 3, 9, 10, 11) and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material (200) by means of a first and only drive motor (20) configured to drive the first set of levelling rollers (1; 2, 3, 9, 10, 11) and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) applying a torque to the first set of levelling rollers (1, 2, 3, 9, 10, 11) and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15,

16, 17);

- a step of uncoupling the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) so that they rotate freely if the strip material pulls them at a different rotational speed than the first set of levelling rollers (1, 2, 3, 9, 10, 11), preferably by means of a coupling/uncoupling system of the leveller;
- a threading step carried out by means of a first set of traction rollers (29) outside the leveller and positioned at the infeed of the same, driven by means of a second motor;
- a pulling stage carried out by means of a second set of traction rollers (30, 31) positioned outside the leveller and positioned at the outfeed of the same, driven by means of a third motor.

[0039] In the step of uncoupling the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) so that they rotate freely if the strip material pulls them at a different rotational speed than the first set of levelling rollers (1, 2, 3, 9, 10, 11), preferably by means of a coupling/uncoupling system of the leveller, more preferably by means of two or more freewheels (21, 22), the different angular speeds of each one of the rollers of the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) are adjusted to each other, if there is a difference in angular speeds between said rollers of the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17).

[0040] Preferably, the threading step is carried out before the processing step of a strip material (200).

[0041] The method further comprises a sub-step of braking the rollers of the first set of rollers configured to process the strip material, preferably by driving the first and only drive motor (20) in a direction opposite the forward direction of the strip material (200) through the leveller (100).

Claims

1. A device for processing strip material that comprises a leveller (100) which in turn comprises:

• a first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material (200); and

• a second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material (200);

characterised in that it comprises:

• a first drive motor (20) configured to drive the first set of levelling rollers (1, 2, 3, 9, 10, 11) and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material (200) by applying a torque to the first set of levelling rollers (1, 2, 3, 9, 10, 11) and to the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material;

wherein the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 , 16, 17) are also configured to rotate freely if the strip material pulls them at a different rotational speed than the first set of levelling rollers (1, 2, 3, 9, 10, 11).

2. The device for processing strip material according to claim 1, **characterised in that** it further comprises a first set of traction rollers (29) outside the leveller (100) and positioned at the infeed of the same, driven by means of a second motor.

3. The device for processing strip material according to any of the preceding claims, **characterised in that** it further comprises a second set of traction rollers (30, 31) outside the leveller (100) and positioned at the outfeed of the same, driven by means of a third motor.

4. The device for processing strip material according to claim 3, **characterised in that** the second set of traction rollers (30, 31) is configured to carry out the threading of the strip material into the leveller (100).

5. The device for processing strip material according to any of the preceding claims, **characterised in that** the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material make up the totality of rollers of the leveller (100).

6. The device for processing strip material according to any of the preceding claims, **characterised in that** the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material are infeed rollers of the leveller (100) and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material are outfeed rollers of the leveller (100).

7. The device for processing strip material according to any of the preceding claims, **characterised in that** the leveller (100) further comprises at least one coupling/uncoupling device, preferably a freewheel (21, 22), configured to uncouple the transmission of the torque of the first drive motor (10) to the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17).

8. The device for processing strip material according to claim 7, **characterised in that** the coupling/uncoupling device is also configured to adjust the different angular speeds of each one of the rollers of the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17), if there is a difference in angular

speeds between said levelling rollers of the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15, 16, 17).

9. The device for processing strip material according to any of the preceding claims, **characterised in that** the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material are coupled directly to the first drive motor (10).

10. The device for processing strip material according to claim 2, **characterised in that** the first traction rollers (29) positioned outside the leveller (100) at the infeed of the same are also configured to produce additional tension during the processing of the strip material.

11. The device for processing strip material according to claim 3, **characterised in that** the rollers of the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material are in turn configured to operate as a brake when the second pull rollers (30, 31) positioned at the outfeed the leveller (100) are operating.

12. A method for processing strip material, which comprises:

- a step of processing a strip material by means of a first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material and a second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material through a leveller (100);
- a step of driving the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material and of the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material by means of a first drive motor (10) configured to drive the first set of levelling rollers (1, 2, 3, 9, 10, 11) and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) applying a torque to the first set of levelling rollers (1, 2, 3, 9, 10, 11) and the second sets of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15, 16, 17);

characterised in that it further comprises:

- a step of uncoupling the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) so that they rotate freely if the strip material pulls them at a different rotational speed than the first set of levelling rollers (1, 2, 3, 9, 10, 11), preferably by means of a coupling/uncoupling system of the leveller (100).

13. The method for processing strip material according to claim 12, **characterised in that** it comprises a threading step carried out by means of a first set of traction rollers (29) outside the leveller (100) and positioned at the infeed of the same, driven by means of a second motor.

14. The method for processing strip material according to any of claims 12 or 13, **characterised in that** it comprises a pulling stage carried out by means of a second set of traction rollers (30, 31) outside the leveller (100) and positioned at the outfeed of the same, driven by means of a third motor.

15. The method for processing strip material according to any of claims 12 to 14, **characterised in that** the step of processing strip material is carried out only by means of the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material and of the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material through the leveller (100).

Amended claims in accordance with Rule 137(2) EPC.

1. A device for processing strip material that comprises a leveller (100) which in turn comprises:

- a first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material (200); and
- a second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material (200);
- a first drive motor (20) configured to drive the first set of levelling rollers (1, 2, 3, 9, 10, 11) and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material (200) by applying a torque to the first set of levelling rollers (1, 2, 3, 9, 10, 11) and to the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material;
- a coupling/uncoupling system configured to uncouple the transmission of the torque of the first drive motor (10) to the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17);

the device further comprising a first set of traction rollers (30, 31) outside the leveller (100) and positioned at the outfeed of the same, driven by means of a second motor;
characterised in that the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) rotate freely when the strip material pulls them at a different rotational speed than the first set of levelling rollers (1, 2, 3, 9, 10, 11) by the interlocking difference that is generated between the first set of levelling rollers (1, 2, 3, 9, 10, 11) and the second set of levelling rollers

(4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17); and
the first set of traction rollers (30, 31) outside the leveller (100) and positioned at the outfeed of the same are configured to produce a tension between the first set of levelling rollers (1, 2, 3, 9, 10, 11) of the leveller and the first set of traction rollers (30, 31) outside the leveller (100) and positioned at the outfeed of the same.

2. The device for processing strip material according to claim 1, **characterised in that** it further comprises a second set of traction rollers (29) outside the leveller (100) and positioned at the infeed of the same, driven by means of a third motor.

3. The device for processing strip material according to claim 1, **characterised in that** the first set of traction rollers (30, 31) outside the leveller (100) and positioned at the outfeed of the same is configured to carry out the threading of the strip material into the leveller (100).

4. The device for processing strip material according to any of the preceding claims, **characterised in that** the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material make up the totality of rollers of the leveller (100).

5. The device for processing strip material according to any of the preceding claims, **characterised in that** the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material are infeed rollers of the leveller (100) and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material are outfeed rollers of the leveller (100).

6. The device for processing strip material according to any of the preceding claims, **characterised in that** the at least one coupling/uncoupling device comprises a freewheel (21, 22).

7. The device for processing strip material according to claim 1, **characterised in that** the coupling/uncoupling device is also configured to adjust the different angular speeds of each one of the rollers of the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17), if there is a difference in angular speeds between said levelling rollers of the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 , 16, 17).

8. The device for processing strip material according to any of the preceding claims, **characterised in that** the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material are coupled directly to the first drive motor (10).

9. The device for processing strip material according to claim 2, **characterised in that** the second set of traction rollers (29) positioned outside the leveller (100) at the infeed of the same are also configured to produce additional tension during the processing of the strip material.

10. The device for processing strip material according to claim 1, **characterised in that** the rollers of the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material are in turn configured to operate as a brake when the first set of traction rollers (30, 31) positioned at the outfeed the leveller (100) are operating.

11. A method for processing strip material, which comprises:

- a step of processing a strip material by means of a first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material and a second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material through a leveller (100);
- a step of driving the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material and of the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material by means of a first drive motor (10) configured to drive the first set of levelling rollers (1, 2, 3, 9, 10, 11) and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) applying a torque to the first set of levelling rollers (1, 2, 3, 9, 10, 11) and the second sets of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15, 16, 17);
- a step of uncoupling the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) so that they rotate freely if the strip material pulls them at a different rotational speed than the first set of levelling rollers (1, 2, 3, 9, 10, 11), by means of a coupling/uncoupling system of the leveller (100);

characterised in that it further comprises:

- a step of generating an interlocking difference between the first set of levelling rollers (1, 2, 3, 9, 10, 11) and the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) by means of the strip material in such a way that the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) rotate freely when the strip material pulls them at a different rotational speed than the first set of levelling rollers (1, 2, 3, 9, 10, 11); and

• a step of producing a tension between the first set of levelling rollers (1, 2, 3, 9, 10, 11) of the leveller and a first set of traction rollers (30, 31) outside the leveller (100) and positioned at the outfeed of the same, by means of a second motor that drives the first set of traction rollers (30, 31).

12. The method for processing strip material according to claim 11, **characterised in that** it comprises a threading step carried out by means of a second set of traction rollers (29) outside the leveller (100) and positioned at the infeed of the same, driven by means of a third motor.

13. The method for processing strip material according to any of claims 11 to 12, **characterised in that** the step of processing strip material is carried out only by means of the first set of levelling rollers (1, 2, 3, 9, 10, 11) configured to process the strip material and of the second set of levelling rollers (4, 5, 6, 7, 8, 12, 13, 14, 15 ,16, 17) configured to process the strip material through the leveller (100).

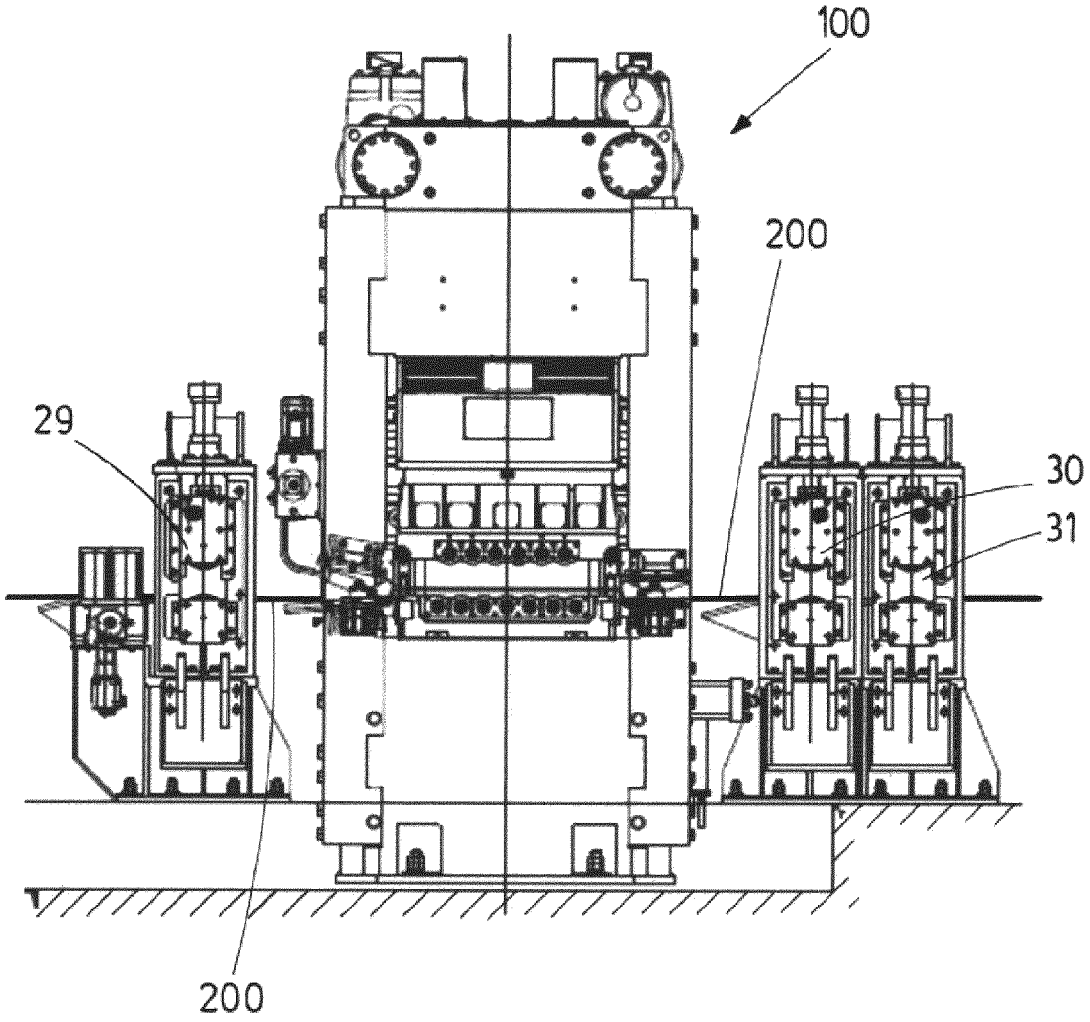

FIG.1

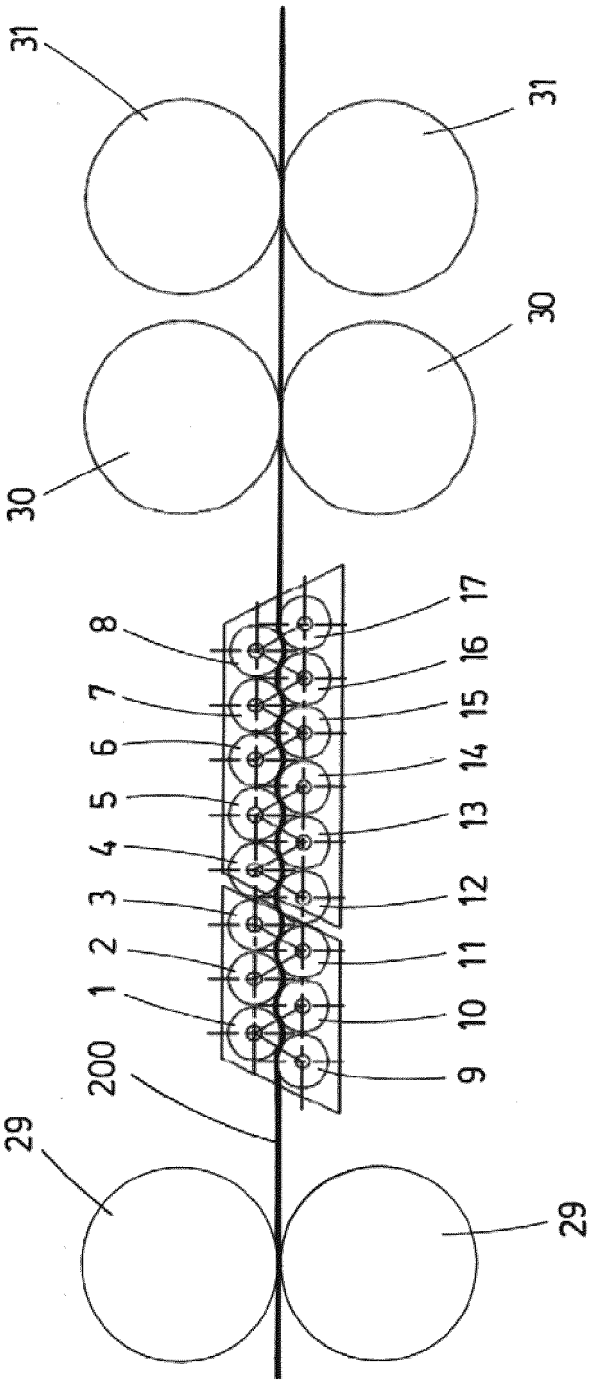

FIG.2

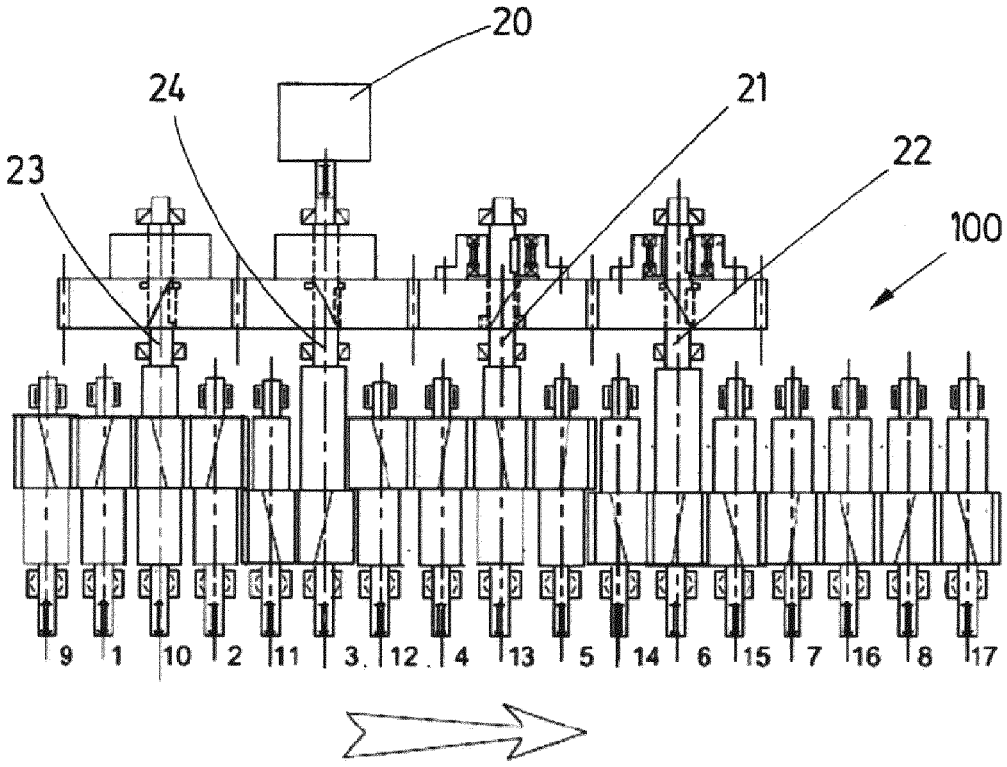

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 19 38 3135

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Place of search	Date of completion of the search	Examiner
Munich	14 May 2020	Stanic, Franjo

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