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DESCRIPTION**DRIVING ROLL**

The invention pertains to a driving roll and specifically a driving roll or a driven roll for use in a roller conveyor or as a driven carrying roll for a belt conveyor.

Driving rolls such as those employed in roller conveyors or as carrying rolls in belt
5 conveyors conventionally consist of a cylindrical roller body, which is terminated at both ends by a roller base. The roller bases contain the bearings for the seating of the driving rolls on a roller axis. In a driving roll or a driven roll, one roller base is generally designed as a driving member by means of which a driving force is transferred to the roll. Depending on their purpose, the driving rolls can be driven
10 over belts, especially cogged belts or chains. In this case, depending on the selected driving means the driving member must be designed as a chain wheel or a toothed wheel for a cogged belt.

In addition, various possibilities are available to drive a multitude of driving rolls
15 arranged in series. On the one hand, the possibility is available to drive all driving rolls tangentially over a continuous cogged belt or a continuous chain. On the other hand, the possibility of a drive from roller to roller is also possible. In the case of a drive from roller to roller, two rollers each are connected with each other via a cogged belt or a chain. This means that the driving members must include
20 two chains or toothed wheels, one for the connection with the preceding roll and one for connection with the following roll.

These different driving possibilities imply a multitude of different design shapes of the driving members. For example, the driving members for the tangential drive
25 using cogged belts must include a toothed wheel, for tangential drive using a chain a chain wheel, for the drive using cogged belts from roll to roll two toothed wheels

each and for the drive using a chain from roll to roll two chain wheels each. These four possibilities alone include four different driving members. Other variation possibilities of the driving members may result from different types of bearings.

- 5 Because of the multitude of differently designed driving members, the known driving rolls imply high manufacturing and warehousing costs for the availability of individual parts. In addition, the availability of replacement parts is problematic, since all types of driving members must be kept in storage to ensure availability of replacement parts.

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The purpose of this invention is to create an improved driving roll, which because of its simplified design allows interaction with numerous different types of drives.

- 15 This task is resolved by means of a driving roll with the characteristics indicated in Claim 1. The subclaims present advantageous design forms.

- 20 The universal coupling device of the drive roll according to the invention permits the variable installation of different drive wheels, without such implying changes of modifications to the roller base. All drive wheels have a standardized design such that they can be optionally connected with the driving roll. This modular design of the driving roll reduces the number of required individual parts for the implementation of the most diverse types of drives, so that the manufacturing and warehousing costs for the driving rolls can be reduced considerable.

- 25 The coupling device is designed as a first holding device which contains at least one drive wheel, whereby the drive wheel comprises at a first face a coupling device, which meshes with the first holding device at the roller base, and which possesses at the opposite second face a second holding device for the connection of additional drive wheels or a coupling device. Different drive wheels can be
30 installed very easily on the mounting device by means of their coupling devices. Thus, depending on the desired drive, different drive wheels can be installed on an unchanged, i.e. universally usable roller body and roller base. In addition, any given additional drive wheel can be installed without problems on a drive wheel already installed in the roller base, since the first drive wheel on the front side

- away from the roller body, possesses a second mounting device, on which an additional drive wheel can be installed by means of a here provided coupling device included or terminating device. This results in a highly flexible, modular construction of the drive unit for the driving roll. Drive wheels of different sizes and designed differently in terms of their circumference can be employed which can be installed, depending on the requirements, in different numbers on an unchanged driving roll or roller body. For example, the drive wheels may have different diameters, or they can be designed as chain wheels or cogged wheels.
- 10 Preferably, the second holding device on the drive wheel is identical in its design to the first holding device on the roller base. This allows an even more flexible use of the drive wheels, since one and the same drive wheel can be connected directly with the roller base or can also be installed as a second drive wheel at a first drive wheel which is connected with the roller base. This allows a considerable reduction of the multitude of parts, since no differently designed drive wheels are required for use as the first or the second drive wheel.

An additional preference is that the driving roll includes two identically designed drive wheels, whereby the first drive wheel is connected with its connection device to the first mounting device in the roller base and the second drive wheel is connected with its connection device to the second holding device on the first drive wheel. This arrangement is preferred, when the drive is achieved from roller to roller, i.e. one chain or one belt connects two rolls with each other. The identical design of the drive wheels offers a high variability for the adaptation of the drive to the different usage purpose while requiring a limited number of different components.

It is advantageous that the first mounting device is shaped in the form of an opening in the roller base, in which the drive wheel can engage with its connection device shaped in the form of a protrusion. With this design the different drive wheels are simply inserted in the roller base or another drive wheel, which results in an easy mounting. Advantageously, the opening contains a profile into which the corresponding profile on the protrusion engages, so that a solid connection is achieved between the drive wheels or a drive wheel and the roller base, which

permits a reliable transfer of force from the drive wheels to the roller base and therefore the roller body. However, the openings and protrusions can also be designed in such a manner that a non-positive connection between the drive wheels and the roller body is achieved.

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The mounting and connection devices preferably include latching means, especially in the form of latching grooves and the corresponding latching protrusions. This allows that when the drive wheels are inserted in each other or in the roller based, they are locked or snapped there, which results in a firm connection between the individual components, so that an unintentional separation can be prevented. No additional mounting processes, such as for example bolting, are required for connection the drive wheels with each other or with the roller base.

15 Preferably at least one drive wheel is a chain wheel. Such a drive wheel allows that a chain drive or a conveyor chain drive is used to drive the rolls, which permits an extremely reliable transfer of force. Depending on the desired gear ratio, the employed chain wheels can be designed with different diameters or number of teeth, so that an extremely flexible adaptation of the drive to the individual requirements of the roller trajectory or conveyor belt is possible.

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In addition, the drive wheel preferably possesses on its circumference a toothed design for engaging a cogged belt. Thus it is very easy to drive an unchanged, i.e. universal driving roll, if desired, also by a cogged belt, whereby merely another drive wheel with the corresponding toothing must be installed on the roller base. Again, depending on the desired transfer ratio the drive wheels may have different diameters and numbers of teeth. If a drive from roll to roll is preferred, the preferably identical toothed wheels can again be placed behind each other on the roller base.

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It is preferred that at least one drive wheel is placed on the axis carrying the driving roll. In this manner the radial forces applied by the driving means, such as for example a chain or a cogged belt can be transferred to the roller axis without being induced into the driving roll and without affecting action.

It is purposeful to provide on at least one drive wheel a seat for the holding of a bearing. For example, a corresponding bearing, such as a roller bearing, can be incorporated directly on the drive wheel, so that larger occurring forces, especially radial forces, can also be transferred in a reliable manner onto the roller axis.

Preferably, at least one drive wheel and/or the terminating device possesses a plain bearing surface which is in sliding contact with the axis. This design is extremely cost effective since no additional bearing elements need to be employed. For example, especially when the drive wheel and the terminating device are made of synthetic material, these can slide directly on the roller axis. This design is especially favorable for driving means which transfer only limited radial forces to the drive wheel, as is, for example, the case with a tangential drive of the drive wheels by means of cogged belts or chains.

The following contains a description of the invention based on the attached drawings. The following is shown:

- Figure 1: a cutaway view of a roller base with an installed chain wheel,
- Figure 2: a cutaway view of a roller base with two installed chain wheels,
- 20 Figure 3: a cutaway view of a roller base with an installed chain wheel with an inserted roller bearing,
- Figure 4: a cutaway view of a roller base with two installed chain wheels and one inserted roller bearing,
- Figure 5: a cutaway view of a roller base with two installed toothed wheels for a drive using a cogged belt, and
- 25 Figure 6: a cutaway view of a roller base with two installed toothed wheels and an inserted roller bearing.

Figures 1 to 6 only depict the roller base of a driving roll according to the invention with installed drive wheels.

Figure 1 shows a cutaway view of a roller base 102 of a driving roll according to the invention with an installed chain wheel 104. Roller base 102 is for example made of a circularly shaped synthetic material, which on its circumference is

connected to a roller body not depicted here. In its interior, roller base 102 includes an opening 106 in which a roller bearing 108 is installed, which carries the driving roll on a roller axis. In addition, roller bearing 108 can be protected in the conventional manner, for example by a fastening ring, from axial displacement on roller axis 110, so that the driving roll is fixed in an axial direction on the roller axis 110 (not depicted here). Opening 106 extends up to the facing side 112 of roller base 102. The external circumference of opening 106, which preferably has an essentially circular shape, has a profile or a toothing 114, which meshes with a correspondingly shaped profile or toothing 116 on chain wheel 104. Toothing 116 is formed on a protrusion 118, which extends starting from a facing side of chain wheel 104. Together with protrusion 118, chain wheel 104 has been inserted in opening 106 at roller base 102, so that toothing 114 and 116 can engage each other. In addition, on the circumference of opening 106 on its end turned to the facing side 112 of roller base 102, a latch protrusion 120 has been formed. The circumference of protrusion 118 of chain wheel 104 presents a corresponding latch groove 122, which meshes with ring-shaped latch protrusion 120, when chain wheel 104 is inserted in opening 106 in roller base 102. This ensures a solid connection between chain wheel 104 and roller base 102, which prevents that chain wheel 104 can slide from opening 106. Furthermore, toothings 114 and 116 form such a solid connection between chain wheel 104 and roller base 102, that a reliable transfer of force from chain wheel 104 to roller base 102 is assured and therefore also onto a roller body. On its end turned away from roller base 102 or the facing side turned away from roller base 102, chain wheel 104 is provided with an opening 124. The shape of opening 124 essentially corresponds to that of opening 106 in roller base 102. This means specifically that it has the same dimensions. In addition, a toothing 126 has been provided in the circumference of opening 124, whose dimensions correspond to the dimensions of toothing 114 in roller base 102. The circumference of opening 124 also contains a latch protrusion 128 which corresponds to latch protrusion 120 in roller base 102, which extends ring-shaped along the circumference of opening 124 in the area of the end of chain wheel 104 turned away from roller base 102. In the implementation example depicted in Figure 1, opening 124 includes a terminating device in the form of a end ring 130, which closes opening 124 and simultaneously acts as an additional bearing for chain wheel 104. Terminating ring 130 includes in its center

an opening 132, whose diameter is adapted to the outer diameter of roller axis 110. The inner circumference of opening 132 is designed as a sliding surface, which together with the surface of roller axis 110 forms a plain bearing for chain wheel 104. In addition, chain wheel 104 also includes an opening 134 in the center of protrusion 118, whose diameter is also adapted to the outer diameter of roller axis 110 and whose circumference is also designed as a sliding surface so that it can rotate freely on roller axis 110. Thus, opening 134 also acts as a plain bearing with which chain wheel 104 is carried on roller axis 110, so that no undesired lateral forces are transferred from chain wheel 104 to roller base 102 and thus in the roller body. Both roller base 102 as well as chain wheel 104 and terminating ring 130 can be produced cost-effectively from synthetic material, for example by means of injection molding, but can also be made of metal in the event that higher forces occur.

The design of roller base 102 and terminating ring 130 depicted here also permit that the roller base is used on a roller end on which no drive wheels are installed. In this case, terminating ring 130 is inserted directly into opening 106 in roller base 102, which is possible because of the identical shape of opening 106 and 124. Thus, similar to the earlier described method, a roller bearing 108 can be installed in roller base 102, which is then fixed by terminating ring 130. Thus, the roller base 102 as well as terminating ring 130 can be used universally, which reduces the required number of individual parts.

Figure 2 presents a cutaway view through a roller base 102 with installed chain wheels 104, 136 according to the invention. Roller base 102 with the first installed chain wheel 104 corresponds to the design described with the help of Figure 1. Rather than a terminating ring 130, the implementation example shown in Figure 2 depicts a second chain wheel 136 installed in opening 124 of the first chain wheel 104. Chain wheel 136 is designed identically to chain wheel 104. Since opening 124, as explained with the help of Figure 1, is designed identically to opening 106 in roller base 102, chain wheel 136 can be inserted with its protrusion 138 in opening 124 of the first chain wheel 104. Chain wheel 136 meshes with a corresponding toothing 140 and a latch groove 142 in toothing 126 or latch protrusion 128 in opening 124 of chain wheel 104. If two chain wheels 104, 136

are required, these can be simply inserted in sequence and then be inserted into roller base 102, without this requiring additional mounting or adaptation steps. No other special components are required since both chain wheels 104, 136 are identical. In the implementation example depicted here, terminating ring 130 is
5 inserted in opening 144 of the second chain wheel 136, which is designed identical to opening 124. The bearing of chain wheels 104, 136 essentially corresponds to a bearing using plain bearing, as explained with the help of Figure 1. In addition to the sliding surfaces of terminating ring 130 and chain wheel 104, there is another sliding surface of chain wheel 136 at the opening of protrusion 138, which
10 correspond to opening 134 explained with the help of Figure 1, since the chain wheels 104 and 136 have an identical design.

Figure 3 depicts a cutaway view through another implementation example of the invention, which essentially corresponds to the implementation example explained
15 with the help of Figure 1. Roller base 102, depicted in Figure 3, as well as chain wheel 104, terminating ring 130, roller axis 110 and roller bearing 108 correspond to the components explained with the help of Figure 1. Additionally, the implementation form depicted in Figure 3 presents a second roller bearing 146 in the opening 124 of chain wheel 104. Ball bearing 146 allows chain wheel 104 to
20 rotate on roller axis 110. In this manner, higher forces, especially radial forces from chain wheel 104 can be transferred to roller axis 110, as is also possible with the plain bearing explained with the help of Figure 1. The plain bearings are also present in the implementation form depicted in Figure 3, since chain wheel 104 and terminating ring 130 are identical to the parts shown in Figure 1. In addition
25 terminating ring 130 is used to fix ball bearing 146 axially in opening 124. Ball bearing 146 is retained between an offset 148 established in opening 124 and terminating ring 130. This design of chain wheel 104 provides an even more flexible use of identical components, since an additional roller bearing or ball bearing 146 can simply be installed on the chain wheel 104 without additional
30 changes to the components.

Figure 4 shows the implementation form explained on the basis of Figure 2, where an additional roller or ball bearing 150 is installed in opening 144 of chain wheel 136. Considering that chain wheels 104 and 136, as explained with the help of

Figure 2, are identical, the arrangement of ball bearing 150 in chain wheel 136 corresponds exactly to the arrangement of ball bearing 146 in chain wheel 104, as described with the help of Figure 3. Thus, even when two chain wheels 104, 136 are used, an additional roller bearing, here in the form of ball bearing 150, can simply be installed without great effort or without requiring additional components, so that greater forces can reliably be transferred from chain wheels 104, 136 to roller axis 110. The overall remaining design of the arrangement depicted in Figure 4 corresponds to the implementation form described with the help of Figure 2, specifically chain wheels 104, 136 are identical components.

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Figure 5 shows an implementation example of the driving roll according to the invention for use with a drive using a cogged belt. Similar to the preceding figures, Figure 5 merely depicts roller base 102 together with the installed drive wheels. The roller body, which is connected to roller base 102, is not depicted. Roller base 102 as well as the installed ball bearing 108, which is used to retain the driving roller on roller axis 110, are identical to the components described with the help of Figure 1 to Figure 4. Contrary to the earlier described implementation examples, Figure 5 depicts two drive wheels on the roller base in the form of toothed wheels 152 and 154. Toothed wheels 152 and 154 are identical in form and present on their outer circumferences a toothing, which can mesh with the corresponding cogged belt to drive the driving roll. On their face side, toothed wheels 152, 154 each present a protrusion 156 or 158, which correspond to the design of protrusions 118 and 138, which have been explained with the help of Figures 1 and 2. Toothed wheel 152 with its protrusion 156 is installed in opening 106 in roller base 102, whereby protrusion 156 meshes with an appropriate toothing in toothing 114 in opening 106, as was explained with the help of Figure 1. Protrusion 156 also presents a latch groove, which meshes with the latch protrusion 120 in opening 106. Overall, the design of toothed wheels 152 and 154 merely differs from chain wheels 104 and 136 in terms of their outer circumference. The interior design, i.e. especially the construction of protrusions 156, 158 and openings 160, 152 is identical to the interior design of protrusions 118, 138 and opening 124 and 144 of chain wheels 104 and 136, as depicted in Figures 1 to 4. Thus the second toothed wheel 154 is simply inserted in opening 160 of the first toothed wheel 152, which has been inserted in opening 106 of roller

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base 102, where it meshes with a corresponding toothing and a corresponding latch protrusion. Additionally, a spacer 164 is placed or clamped between the two toothed wheels 152, 154, which separates the running surfaces for the cogged belts on toothed wheels 152 and 154, in order to avoid contact between the belts during operation. Terminating ring 130 is installed in opening 162 of toothed wheel 154, as was explained earlier with the help of the previous Figures. Terminating ring 130 presents a ring-shaped protrusion 166, which extends radially over the outer circumferential surface of toothed wheel 154 and acts as a stop ring for the cogged belt. Thus, two cogged belts, which can run on toothed wheels 152 and 154, can be guided between protrusion 166 and spacer 164 or spaces 164 and facing side 112 of roller base 102. The bearing of toothed wheels 152 and 154 on ball bearing 108 corresponds to the plain bearing of chain wheels 104 and 136 described with the help of Figure 2, since the interior design of toothed wheels 152, 154 is identical to that of chain wheels 104, 136.

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Figure 6 presents a cutaway view through a variant of the implementation form described with the help of Figure 5. Roller base 102 and ball bearing 108, the two toothed wheels 152, 154 as well as terminating ring 130 correspond to the components depicted in Figure 5. Figure 6 in addition presents a roller bearing, here in the form of a ball bearing 168, installed in opening 162 of toothed wheel 154. The arrangement of ball bearing 168 is identical to the arrangement of ball bearing 150 in opening 144 of chain wheel 136, as depicted in Figure 4. Again, ball bearing 168 is retained between a terminating ring 130 and a stop or shoulder 170 in opening 162. Ball bearing 168 provides for a high carrying capacity of the bearing of toothed wheels 152, 154 on roller axis 110 compared to a plain bearing alone, as was described with the help of Figure 2.

As shown by the examples described in Figures 1 to 6, in the case of the driving roll according to the invention, which presents a modular construction, a multiple number of different driving types can be implemented without this requiring at the same time a multiple number of different specially adapted components. For example, depending on the needs, different toothed or chain wheels can be inserted on roller base 102, and depending on the needs, additional toothed or chain wheels can be added to a toothed chain wheel that has been installed on

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roller base 102. Additionally, it is also easy to employ chain or toothed wheels with different diameters, which can be easily combined.

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List of Reference Numerals

	102	Roller base
	104	Chain wheel
10	106	Opening
	108	Roller bearing
	110	Roller axis
	112	Facing side
	114	Toothing
15	116	Toothing
	118	Protrusion
	120	Latch protrusion
	122	Latch groove
	124	Opening
20	126	Toothing
	128	Latch protrusion
	130	Terminating ring
	132	Opening
	134	Opening
25	136	Chain wheel
	138	Protrusion
	140	Toothing
	142	Latch groove
	144	Opening
30	146	Ball bearing
	148	Shoulder
	150	Ball bearing
	152	Toothed wheel
	154	Toothed wheel

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5	156	Protrusion
	158	Protrusion
	160	Opening
	162	Opening
	164	Spacer
	166	Protrusion
	168	Ball bearing
	170	Shoulder

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Claims

1. Driving roll for a roller path or belt conveyor, in which at least one roller base (102) is provided with a first holding device (106, 114), in which at least one modular drive wheel (104; 152) is installed, whereby the drive wheel (104; 152) presents on a first face a connection device (116, 118; 156), which meshes with the first holding device (106, 114) at the roller base (102), and on its opposite second face a second holding device (124, 126; 160) for the installation of additional drive wheels (136; 154) or a terminating device (130).
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- 10 2. Driving roll according to Claim 1, in which the second holding device (124, 126; 160) on the drive wheel (104; 162) is designed identically to the first holding device (106, 114) in the roller base (102).
- 15 3. Driving roll according to Claim 1 or 2, which includes two preferably identically designed drive wheels (104, 136; 152, 154), whereby the first drive wheel (104; 152) is connected through its connecting device (116, 118; 156) with the first holding device (106, 114) in the roller base (102) and the second drive wheel (136; 154) is connected through its connecting device (138, 140; 158) with the second holding device (124, 126; 160) at the first drive wheel (104; 152).
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4. Driving roll according to one of the preceding claims, in which the first holding device is shaped as an opening (106) in the roller base (102), in which the drive wheel (104, 152) is inserted with its connection device shaped as a protrusion (118; 156).
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5. Driving roll according to one of the preceding claims, in which latching means (120, 122, 128, 142) especially in the form of latch grooves (122,

142) and corresponding latch protrusions (120, 128) are provided at the holding devices (106, 114; 160) and connection devices (116, 118; 156).

- 5 6. Driving roll according to one of the preceding claims, in which at least one drive wheel is a chain wheel (104).
7. Drive wheel according to one of the preceding claims, in which at least one drive wheel (152) presents on its circumference a toothing for the placement of a cogged belt.
- 10 8. Driving roll according to one of the preceding claims, in which at least one drive wheel (104; 152) is installed on a roller axis (110) which carries the driving roll.
- 15 9. Driving roll according to Claim 8, in which at least one drive wheel (104; 152) provides a seat (148) for holding a bearing (146).
- 20 10. Driving roll according to Claim 8 or 9, in which at east one drive wheel (104; 152) and/or the terminating device (130) presents a plain bearing surface (134, 132), which has a sliding contact with roller axis (110).