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(54) **WIRE REEL FOR REBAR TYING MACHINES**

(57) The invention relates to a wire reel (2) for a rebar tying machine, wherein the wire reel is configured to hold iron wire, the wire reel comprising a tubular element (4, 6) configured to receive a shaft of a wire tying machine, wherein the tubular element is provided with a central axis (R) extending substantially parallel to a rotation axis or substantially coinciding therewith, and two flanges (10, 14), wherein each flange extends from the tubular element in radially outward direction substantially perpendicularly of the rotation axis, wherein a first of the two

flanges is connected to or close to a first outer end of the tubular element and a second of the two flanges is connected to or close to a second outer end of the tubular element, wherein a radial outer edge (12) of at least one of the two flanges is embodied, as seen in peripheral direction of the flange, as a wave pattern.

The invention further relates to a rebar tying machine provided with a wire reel according to the invention and a method for arranging tie wire with a rebar tying machine.

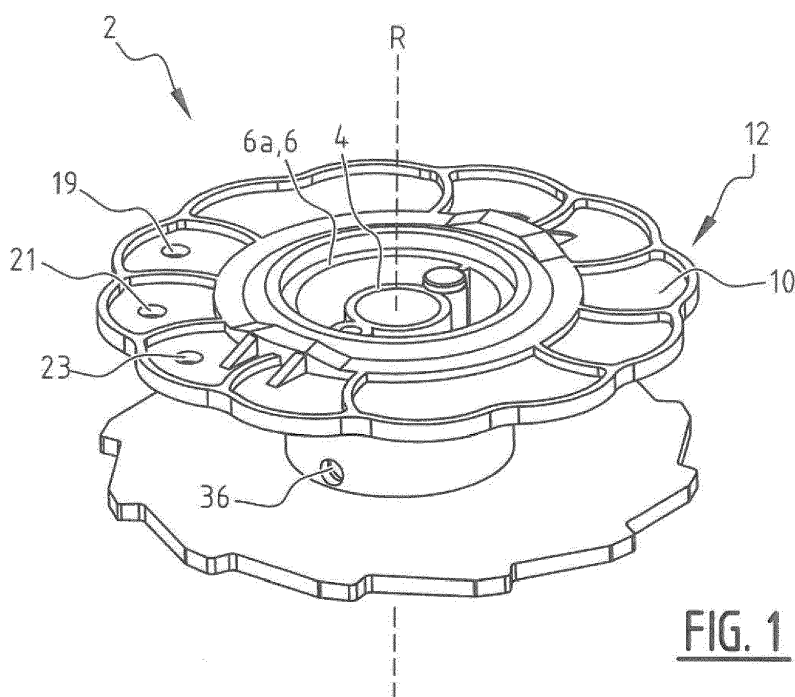


FIG. 1

Description

[0001] The invention relates to a wire reel for rebar tying machines and a method for manufacturing a wire reel for rebar tying machines, as well as to the use of the wire reel in rebar tying machines.

[0002] In the construction of structures frequent use is made in practice of concrete which, in order to obtain sufficient strength, is provided with a reinforcement which is usually made to measure for a determined structure by an ironworker or steel fixer. This reinforcement is made by making reinforcing bars to size and/or bending them. These reinforcing bars are then connected to each other by means of iron wire, which is referred to as 'steel fixing'.

[0003] During steel fixing the steel fixers have to arrange the concrete reinforcement carefully because a faulty or unsound reinforcement can have serious consequences for the structural strength of a concrete element and thereby the structure as a whole. At the same time, the speed with which a reinforcement, and thereby the structure, can be made is also an important aspect in the construction process.

[0004] The steel fixing is performed by the steel fixer using a rebar tying tool in which a replaceable wire reel with tie wire is arranged. Rebar tying tools are known in practice and are provided in use with a wire reel, known in practice, on which iron wire for the fixing is arranged. A drawback of the known wire reels is that they are susceptible to wear and breakage. This is mainly caused in that, after having unwound a determined length of iron wire, the machine clamps the reel firmly in order to stop the rotation.

[0005] The invention has for its object to provide an improved wire reel which obviates or at least reduces the stated drawbacks.

[0006] The invention provides for this purpose a wire reel for a rebar tying machine, wherein the wire reel is configured to hold iron wire, the wire reel comprising:

- a tubular element configured to receive a shaft of a wire tying machine, wherein the tubular element is provided with a central axis extending substantially parallel to a rotation axis or substantially coinciding therewith;
- two flanges, wherein each flange extends from the tubular element in radially outward direction substantially perpendicularly of the rotation axis, wherein a first of the two flanges is connected to or close to a first outer end of the tubular element and a second of the two flanges is connected to or close to a second outer end of the tubular element, characterized in that
- a radial outer edge of at least one of the two flanges is embodied, as seen in peripheral direction of the flange, as a wave pattern.

[0007] The wave pattern is preferably arranged on the

flange which can be brought into connection with a braking means of a rebar tying machine for the purpose of braking the wire reel during and/or after unwinding of wire from the wire reel in question by the rebar tying machine.

Application of the wave pattern realizes a gradual, substantially constant braking deceleration when the flange with the pattern is brought into engagement with the braking means of a rebar tying machine on which the wire reel is arranged, which braking deceleration decelerates the wire reel and/or brings it to a standstill in controlled manner. An advantage of applying such a gradual, substantially constant deceleration is that a smaller force is exerted on the flange of the wire reel, whereby less wear occurs than in known wire reels. A further advantage is that, particularly at lower temperatures, the chance of the flange breaking close to the edge is reduced in that the forces exerted on the flange are relatively limited compared to known wire reels.

[0008] Yet another advantage is that the gradual, substantially constant deceleration reduces the chance of 'whipping' of the loose wire end of the wire reel. This is caused particularly by the fact that the deceleration of the wire reel, and thereby also the force on the wire arranged thereon, is less great than in known wire reels. In known wire reels the whipping is caused by the fact that the braking means is blocked by hitting the flange of the wire reel, wherein the suddenly occurring deceleration can exert a great force on the loose wire end. This wire end thereby 'whips' in uncontrolled manner, which results in dangerous situations. This is substantially prevented with the wire reel according to the invention.

[0009] It must be noted here that the term wave pattern is understood to mean a pattern comprising smooth transitions connecting the peaks and valleys of the pattern to each other. In other words, there are no defined (acute) transition angles in the wave pattern, and the pattern is (thus) characterized in that there is only a continuous transition between mutually adjacent peaks and valleys. It is this smooth transition, referred to as wave pattern, which achieves that hitting or hooking of the braking means onto the flange is substantially prevented, whereby it is prevented that a disproportionately great force is exerted on the flange.

[0010] In an embodiment according to the invention the tubular element can comprise an inner tube configured to receive a shaft of a wire tying machine, an outer tube extending concentrically with the inner tube, and a connecting part, wherein the connecting part extends between an outer side of the inner tube and an inner side of the outer tube in order to connect them to each other.

[0011] This embodiment has the advantage that relatively little material is required compared to a solid tubular element, which is caused in particular by the fact that relatively little material is required for the connecting part. In addition, it is an option to arrange additional structural elements, such as openings for photosensors, in the connecting part and/or the space formed between the inner and outer tube. It is also possible to arrange electronics,

such as chips and sensors, in the space in question.

[0012] In an embodiment according to the invention the wave pattern can have a substantially sinusoidal shape and the wave pattern can preferably have a substantially double-sidedly aligned sinusoidal shape.

[0013] The wave pattern preferably has a substantially sinusoidal shape. It is the case here that this sinusoidal shape can be embodied in various ways. Although a practically pure sinusoidal shape and/or a single-sidedly aligned sinusoidal shape are possible, it is the case that use is preferably made of a double-sidedly aligned sinusoidal shape. This shape has the advantage that a uniform distribution of peaks and valleys along the peripheral edge of the flange is achieved, whereby the deceleration when a braking means of the machine engages is also uniform and gradual. The peak load force exerted by the braking means on the flange of the wire reel is thereby better distributed over the time, whereby it is reduced. The 'hooking' or hitting of the braking means onto the flange edge is thereby substantially prevented.

[0014] It is more preferably the case that the valleys of the double-sidedly aligned sinusoidal shape are rounded, whereby a smooth progression of the outer edge of the flange, as seen in peripheral direction, is achieved. An advantage hereof is that the chance of hooking or clamping of the braking means of the machine which is configured to engage on the outer edge is reduced.

[0015] In an embodiment according to the invention a period of the wave pattern can be greater than an amplitude of the wave pattern, wherein a ratio of the period relative to the amplitude preferably amounts to a ratio in the range of 1.5:1 to 15:1, and more preferably amounts to a ratio in the range of 3:1 to 8:1.

[0016] By applying a period which is greater than the amplitude of the sinusoidal shape of the wave pattern a gradual slope is created which results in sufficient deceleration to decelerate the braking means, while great differences in speed of the deceleration and force on the flange of the wire reel are prevented at the same time. It is preferably the case here that the period is chosen such that it lies in the range of 3:1 to 8:1.

[0017] In an embodiment according to the invention a radial outer edge of the other of the two flanges, as seen in peripheral direction of the flange, can be embodied as sawtooth profile.

[0018] A wire reel which is provided with a wave pattern on an outer edge of the first flange and a sawtooth profile on the second flange has the advantage that, depending on the direction in which the wire is arranged on the wire reel, it can be used in a conventional configuration wherein the sawtooth profile can be brought into engagement with a braking means of a rebar tying machine, as well as in a configuration according to the invention wherein the wave pattern can be brought into engagement with a braking means of a rebar tying machine.

[0019] Such an embodiment is particularly interesting for adaptation of existing wire reels into wire reels according to the invention, wherein the advantage lies in

the fact that the wire reels are reusable and that existing wire reels can be improved by adaptation.

[0020] In an embodiment according to the invention at least one of the first and the second flange can be provided close to the outer edge thereof with a wire throughfeed opening which is configured to receive a wire end of wire arranged on the wire reel in order to secure the wire wound onto the wire reel.

[0021] An advantage of arranging a wire throughfeed opening in at least one of the flanges is that securing of the outer end of a wire wound onto the wire reel can take place in relatively simple manner by placing the wire outer end through the wire throughfeed opening and bending it. Another advantage is that no glue or tape residues remain on the wire, wherein the residues create a higher resistance during unwinding when used in the rebar tying machine. In addition, no residues can accumulate in the machine, which accumulation results in blockage in and/or damage to the machine. In the wire reels known in practice, where the wire outer end is secured with tape, these drawbacks can however occur.

[0022] In an embodiment according to the invention a position of the wire throughfeed opening can be adjusted to a predetermined amount of wire which can be arranged on the wire reel.

[0023] Adjusting the position of the wire throughfeed opening to the length of the wire which is arranged on the reel has the advantage that the wire outer end can be fastened in simple manner. During arranging of the wire on the wire reel it is additionally possible in simple manner to check whether the correct length of wire has been wound, since the free outer end of the wire has to end up close to the position of the wire throughfeed opening. Arranging of the wire on the wire reel can hereby be realized more quickly and simply.

[0024] In an embodiment according to the invention the outer tube or the outer tube and the inner tube can have a wire throughfeed opening for receiving and/or feeding through a wire outer end, preferably prior to the wire being wound onto the wire reel, in order to secure said wire end on the wire reel.

[0025] In order to secure the wire to be arranged on the wire reel in simple manner the outer tube is provided with a wire throughfeed opening for feeding through a wire outer end. Alternatively, both the outer tube and the inner tube can be provided with a wire throughfeed opening, wherein the wire throughfeed openings are preferably positioned substantially opposite each other. Prior to the wire being wound onto the wire reel, a free outer end of the wire is placed through the wire throughfeed opening in order to secure it.

[0026] An advantage hereof is that the wire can be secured on the wire reel in simple and efficient manner in order to enable the wire to be wound easily onto the wire reel. In a preferred embodiment the wire throughfeed opening in the outer tube is combined with a wire throughfeed opening in the flange arranged at a suitable position for the length of the wire. In an embodiment the wire

throughfeed opening can here be provided with a cutting grip in the form of a V-profile. The upper side of the V-shape is here wider than the diameter of the wire to be arranged and the underside of the V-shape is here narrower than the diameter of the wire to be arranged, so that the wire, if moved from the upper side to the lower side of the V-shape, is gripped. The wire is hereby secured in simple manner, after which it can be wound tightly onto the wire reel.

[0027] In an embodiment according to the invention wherein both the flange and at least the outer tube are provided with a wire throughfeed opening the position of the wire throughfeed opening provided in the flange can substantially be adjusted to the position of the wire throughfeed opening in the outer tube, such that a determined length of the wire to be arranged on the wire reel can be placed through the wire throughfeed opening provided in the flange, wherein the relative position of the wire throughfeed openings is adjusted to a determined length of wire to be arranged on the wire reel.

[0028] Adjusting the relative position of the wire throughfeed openings for the purpose of securing the two outer ends on the wire reel has the advantage that winding of the wire onto the wire reel can be realized simply and quickly, whereby it is possible to work efficiently. This embodiment also has the advantage that it is possible in simple manner to determine whether the correct length of wire has been arranged on the wire reel, because the free outer end which can be placed through the throughfeed opening in the flange has to be positioned close to the relevant wire throughfeed opening.

[0029] In an embodiment according to the invention the flange can comprise two or more wire throughfeed openings which are placed close to the outer edge and which are spatially separated from each other, as seen in the peripheral direction, wherein the wire throughfeed openings are preferably distributed substantially uniformly along the outer edge.

[0030] An advantage of arranging a plurality of wire throughfeed openings in the outer edge of the flange is that the wire reel is suitable for different lengths of wire. This means that only one type of wire reel need be manufactured, whereby the manufacturing costs turn out to be relatively lower than when multiple models/types have to be manufactured. With the embodiment it is possible, depending on the amount of wire to be arranged on the wire reel, to select the corresponding wire throughfeed opening in the outer edge of the flange. The wire throughfeed openings are preferably marked so that it is possible in simple manner to determine which wire throughfeed opening has to be used for a determined length of the wire to be wound onto the wire reel.

[0031] Another advantage is that, if a wire reel is removed from a rebar tying machine after use without all the wire available on the wire reel having been used, the outer end can be placed through a wire throughfeed opening positioned close to the wire outer end in simple manner so as to secure it. Unwinding or loosening of the

wire from the wire reel during storage can hereby be prevented, and the wire reel can be stored safely. In the known wire reels, wherein tape is used to secure the free outer end, such a solution is not available.

[0032] In an embodiment according to the invention the connecting part can form a substantially closed surface between the outer side of the inner tube and the inner side of the outer tube, wherein the surface can be provided with one or more openings for transmitting light through the wire reel, when the wire reel is being used on a rebar tying machine, for the benefit of a photosensor arranged in the rebar tying machine, wherein the openings are preferably circular.

[0033] Embodying the connecting part as a substantially closed surface provided with light-transmitting openings has the advantage that use can be made of rebar tying machines which are provided with photosensors. The wire reel according to the invention is hereby applicable in almost all known rebar tying machines.

[0034] The openings, which are used as light-transmitting openings, preferably take a circular form. This has the advantage that a good light transmission takes place and that the ability of a rebar tying machine to detect whether a wire reel has been placed is improved.

[0035] In an embodiment according to the invention at least one flange can be provided with one or more projections extending outward from an outer surface of the flange substantially perpendicularly relative to the surface.

[0036] Arranging the projections has the advantage that imbalance of the wire reel in a rebar tying machine is substantially prevented. Disruptions in a rebar tying machine in which the wire reel is arranged, and particularly disruptions on the instruction of the so-called ratchet sensor, are hereby prevented or in any case reduced.

[0037] A thickness of the projections, as seen in the outward direction, preferably lies in the range of 0 mm to 0.5 mm, and the thickness of the projections is more preferably substantially 1 mm.

[0038] The advantage of the preferred thickness in question is that the effect of wearing down/wearing away of the projections is less serious, whereby disruptions, particularly in older machines and wire reels which have been used for longer, are prevented or at least reduced in number.

[0039] In an embodiment according to the invention the flange can be provided with two projections which, as seen in a rotation direction around the rotation axis, are positioned removed 180° from each other.

[0040] Arranging the projections has the advantage that imbalance of the wire reel in a rebar tying machine is substantially prevented. Disruptions in a rebar tying machine in which the wire reel is arranged, and particularly disruptions on the instruction of the so-called ratchet sensor, are hereby prevented or in any case reduced.

[0041] A thickness of the projections, as seen in the outward direction, preferably lies in the range of 0 mm to 0.5 mm, and the thickness of the projections is more pref-

erably substantially 1 mm.

[0042] The advantage of the preferred thickness in question is that the effect of wearing down/wearing away of the projections is less serious, whereby disruptions, particularly in older machines and wire reels which have been used for longer, are prevented or at least reduced in number. This embodiment is based on two projections which, as seen in a rotation direction, are positioned removed 180° from each other. This has the advantage that the intended effect can be achieved with only two projections, whereby the manufacturing costs remain relatively low. A further advantage of this positioning is that the wire reel can be applied in machines of various brands and/or manufacturers. A widely usable wire reel is thus effectively realized hereby.

[0043] In an embodiment according to the invention the inner tube can be provided on an inner side thereof with a ring or annular thickened portion which extends parallel to the rotation axis over a determined length and is configured to engage on a shaft of a rebar tying machine.

[0044] Arranging a ring or annular thickened portion on the inner side of the inner tube has the advantage that a shaft of a rebar tying machine on which the wire reel is arranged is received clampingly in the wire reel. By having the clamping take place over the whole surface of the shaft the wire reel wears less quickly and can be used without disruption for longer.

[0045] In an embodiment according to the invention at least one flange can be provided with at least one opening extending radially outward from the outer side of the outer tube toward the outer edge.

[0046] Arranging such an opening in the flange makes it possible to determine in simple manner how much wire is still available on the wire reel after the wire reel is removed from a rebar tying machine. Preferably incorporated adjacently of or close to the opening is an indicator which can give a rough indication of the amount of wire which is still available.

[0047] The invention further relates to a rebar tying machine provided with a wire reel according to the invention.

[0048] The rebar tying machine according to the invention has similar effects and advantages as the wire reel according to the invention. An advantage of the rebar tying machine according to the invention is that this rebar tying machine can in principle be of any common brand, since the wire reel according to the invention is suitable for use on any known rebar tying machine. A high degree of flexibility is hereby achieved. In addition, it is the case that the rebar tying machine according to the invention also has a longer lifespan because the wire reel received therein is less susceptible to wear and breakage. The risk of damage to the machine is hereby likewise prevented or at least greatly reduced.

[0049] The invention further relates to a method for arranging tie wire with a rebar tying machine, the method comprising of:

- providing a rebar tying machine according to the invention;
- the rebar tying machine at least partially unwinding the wire on the wire reel;
- applying a braking means of the rebar tying machine to the outer edge of the wire reel after a predetermined amount of wire has been unwound, such that the wire reel is decelerated and/or comes to a standstill with a uniform deceleration.

[0050] The method according to the invention has similar effects and advantages as the wire reel and the rebar tying machine according to the invention.

[0051] The method according to the invention has the advantage that the speed of the deceleration and the accompanying (peak load) force on the wire reel is reduced. The wire reel is hereby less susceptible to wear and the chance of breakage of (parts of) the wire reel is hereby substantially prevented. Another advantage is that the force and speed of the unwinding are more gradual, whereby the free outer end coming from the rebar tying machine to make the connection is less prone to 'whipping' movements. This increases the safety of the person operating the rebar tying machine.

[0052] In an embodiment of the method according to the invention the method can further comprise the step of uncoupling the braking means in order to release the wire reel for rotation by the rebar tying machine.

[0053] Further advantages, features and details of the invention are elucidated on the basis of the preferred embodiments thereof, wherein reference is made to the accompanying drawings, in which:

Figure 1 is a perspective view of an example of a wire reel according to the invention;

Figure 2 is a second perspective view of the wire reel of figure 1;

Figure 3 is a side view of a first side of the wire reel of figure 1;

Figure 4 is a side view of a second side of the wire reel of figure 1;

Figure 5 is a schematic diagram of a rebar tying machine according to the invention.

[0054] Wire reel 2 according to the invention (see figures 1-4) is provided with inner tube 4, outer tube 6 and connecting part 8. Outer ends 6a, 6b of outer tube 6 are respectively provided with flanges 10, 14 extending substantially perpendicularly and radially outward from outer ends 6a, 6b of outer tube 6. Outer edge 12 of flange 10 is provided with a wave pattern which in this example is a double-sidedly aligned sinusoidal pattern with rounded valleys. The pattern is here manufactured in this example such that a wholly symmetrical pattern results. It is generally the case that the period of the sinusoidal shape has to be chosen such that a pattern with uniform waves results. In the example in question a ratio of period and amplitude is chosen such that it is about 9:1.

[0055] Flange 10 is further provided with wire through-feed openings 19, 21, 23 which are arranged mutually equidistantly close to outer edge 12 in the peripheral direction in order to be able to secure the wire to be arranged on the wire reel (see figure 1, figure 3).

[0056] Outer edge 16 of flange 14 is provided with a conventional sawtooth pattern, wherein the sawteeth are distributed uniformly over the periphery of outer edge 16 of flange 14. In order to be able to secure the wire to be arranged on the wire reel flange 14 is provided with wire throughfeed openings 18, 20, 22 which are arranged mutually equidistantly close to outer edge 16 in the peripheral direction (see figure 2, figure 4). This construction makes it possible, regardless of the length of the wire to be arranged, to secure this wire after it has been wound onto the wire reel. Outer tube 6 of wire reel 2 is further provided with an opening 36 for throughfeed of wire from an outer side of outer tube 6 to an inner side thereof in order to be able to secure the wire on the inner side (see figure 1).

[0057] Connecting surface 8 of wire reel 2 forms a surface, closed in principle, which is provided with openings 24 for allowing passage of a photosensor optionally present in the rebar tying machine (see figure 3, figure 4). In addition, flange 14 is provided with V-shaped opening 34 whereby the quantity of wire still present on wire reel 2 can be determined (see figure 4).

[0058] Wire reel 2, 102 is configured to be inserted in or arranged on a rebar tying machine, for instance rebar tying machine 136 (as shown schematically in figure 5). Rebar tying machine 136 is provided with housing 138 which comprises diverse components of rebar tying machine 136. Rebar tying machine 136 is configured to receive wire reel 102, wherein wire reel 102 is operatively connected to drive mechanism 140 and braking means 142. Drive mechanism 140 is preferably provided with a shaft or axle on which wire reel 102 can be placed so that it can be rotated. Rebar tying machine 136 further comprises feed means 144, in this example consisting of feed motor 144a and feed wheels 144b. Feed motor 144b can be controlled by a user by means of trigger 146 which protrudes from housing 138.

[0059] Rebar tying machine 136 further comprises wire twisting motor 148 which is configured to twist together tie wire and/or iron wire. Rebar tying machine 136 also comprises guide means 150 for guiding out of housing 138 tie and/or iron wire which has to be wound around the bars to be connected. Rebar tying machine 136 is further provided with control 152 and energy source 154, preferably a (rechargeable) battery 154.

[0060] In use of rebar tying machine 136 wire reel 102 is placed in rebar tying machine 136. Guide means 150 can then be positioned on, at or close to the bars to be connected. By pressing trigger 146 drive mechanism 140 and feed motor 144a are set into operation, whereby wire is unwound from wire reel 102 and is fed to feed wheels 144b, through which the wire is carried. After a determined amount of unwound wire, control 152, preferably

a control provided with a chip with control software 152, activates braking means 142, which exert a continuous, gradual braking force on wire reel 102. Also activated is wire twisting motor 148, which twists the wire ends around each other and the bars to be connected close to guide means 150. A cutting or slicing device then cuts the twisted wires, and rebar tying machine 136 is ready for a subsequent use. Rebar tying machine 136 is here provided with energy by rechargeable battery pack 154.

[0061] The present invention is by no means limited to the above described preferred embodiments thereof. The rights sought are defined by the following claims, within the scope of which many modifications can be envisaged.

Claims

1. Wire reel for a rebar tying machine, wherein the wire reel is configured to hold iron wire, the wire reel comprising:

- a tubular element configured to receive a shaft of a wire tying machine, wherein the tubular element is provided with a central axis extending substantially parallel to a rotation axis or substantially coinciding therewith;
- two flanges, wherein each flange extends from the tubular element in radially outward direction substantially perpendicularly of the rotation axis, wherein a first of the two flanges is connected to or close to a first outer end of the tubular element and a second of the two flanges is connected to or close to a second outer end of the tubular element,

wherein a radial outer edge of at least one of the two flanges is embodied, as seen in peripheral direction of the flange, as a wave pattern.

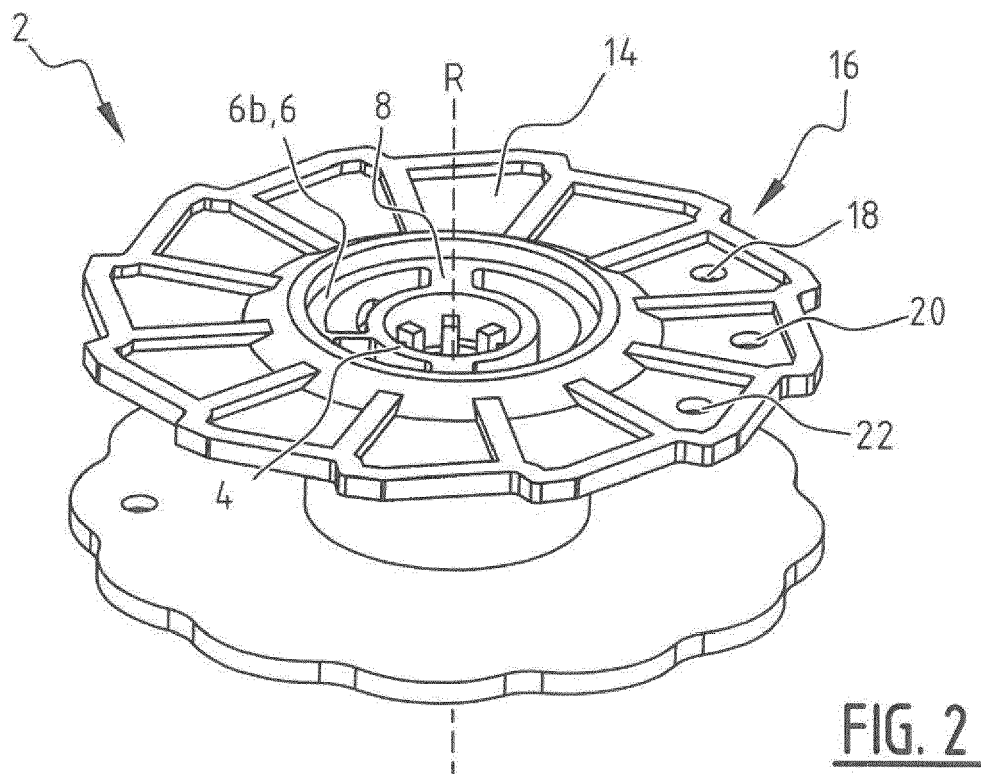
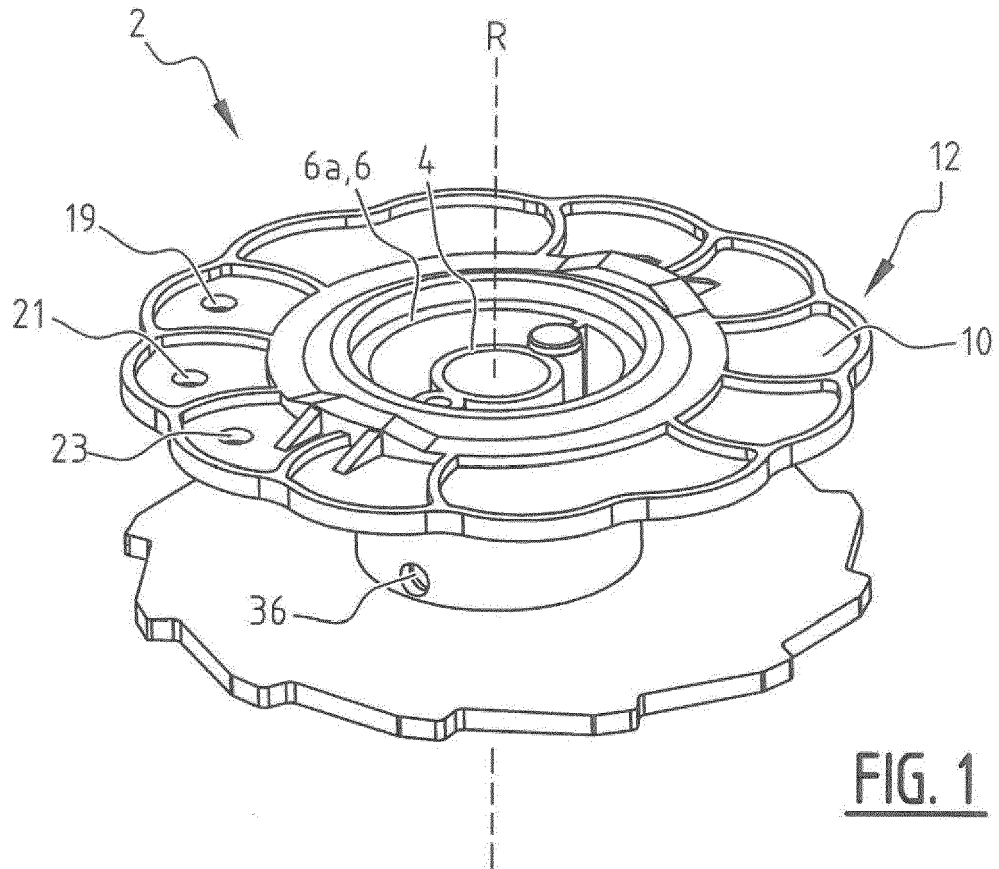
2. Wire reel as claimed in claim 1, the tubular element comprising:

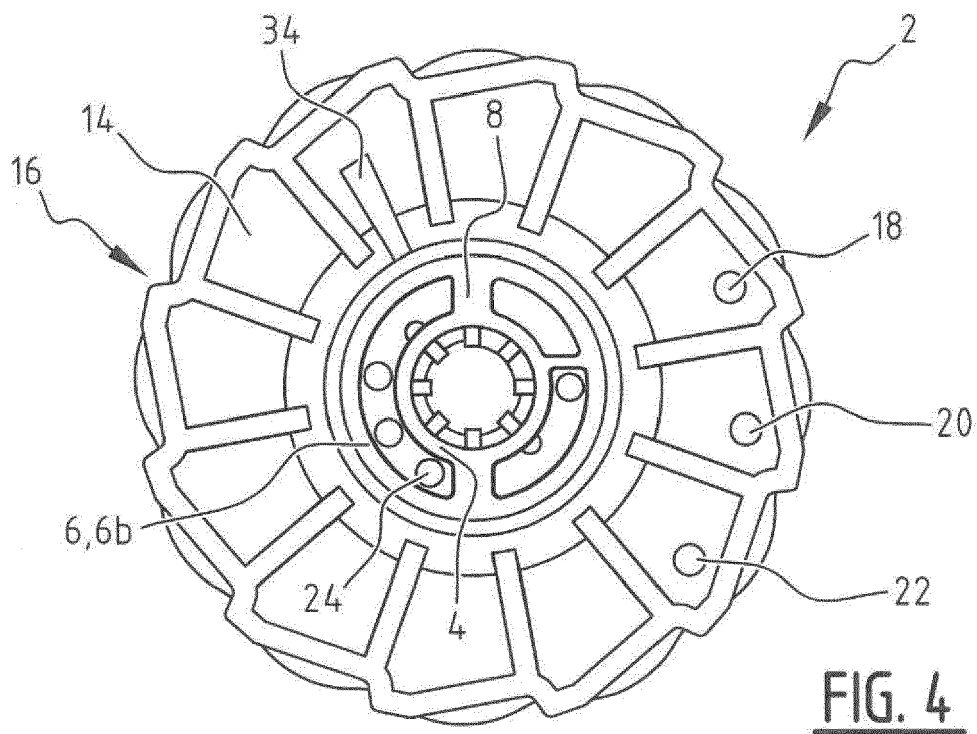
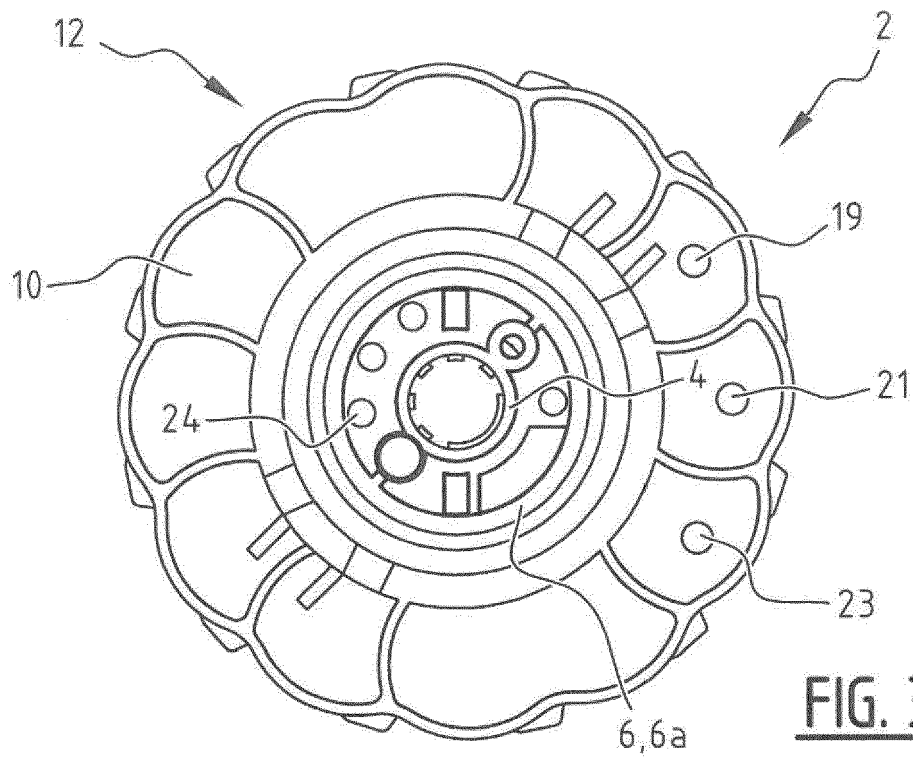
- an inner tube configured to receive a shaft of a wire tying machine;
- an outer tube extending concentrically with the inner tube;
- a connecting part extending between an outer side of the inner tube and an inner side of the outer tube in order to connect them to each other.

3. Wire reel as claimed in claim 1 or 2, wherein the wave pattern has a substantially sinusoidal shape.

4. Wire reel as claimed in any one of the claims 1-3, wherein a period of the wave pattern is greater than an amplitude of the wave pattern.

5. Wire reel as claimed in any one of the foregoing claims, wherein a radial outer edge of the other of the two flanges, as seen in peripheral direction of the flange, is embodied as sawtooth profile.
6. Wire reel as claimed in any one of the foregoing claims, wherein at least one of the first and the second flange is provided close to the outer edge thereof with a wire throughfeed opening which is configured to receive a wire end of wire arranged on the wire reel in order to secure the wire wound onto the wire reel.
7. Wire reel as claimed in claim 6, wherein a position of the wire throughfeed opening is adjusted to a predetermined amount of wire which can be arranged on the wire reel.
8. Wire reel as claimed in any one of the claims 6 or 7, wherein the flange comprises two or more wire throughfeed openings which are placed close to the outer edge and which are spatially separated from each other, as seen in the peripheral direction, wherein the wire throughfeed openings are preferably distributed substantially uniformly along the outer edge.
9. Wire reel as claimed in any one of the foregoing claims 2-8, wherein the connecting part forms a substantially closed surface between the outer side of the inner tube and the inner side of the outer tube, wherein the surface is provided with one or more openings for transmitting light through the wire reel, when the wire reel is being used on a rebar tying machine, for the benefit of a photosensor arranged in the rebar tying machine, wherein the openings are preferably circular.
10. Wire reel as claimed in any one of the foregoing claims, wherein at least one flange is provided with one or more projections extending outward from an outer surface of the flange substantially perpendicularly relative to the surface, and wherein the flange is preferably provided with two projections which, as seen in a rotation direction around the rotation axis, are positioned removed 180° from each other.
11. Wire reel as claimed in any one of the foregoing claims, when dependent on claim 2, wherein the inner tube is provided on an inner side thereof with a ring or annular thickened portion which extends parallel to the rotation axis over a determined length and which is configured to engage on a shaft of a rebar tying machine.
12. Wire reel as claimed in any one of the foregoing claims, wherein at least one flange is provided with at least one opening extending radially outward from the outer side of the outer tube toward the outer edge.
13. Rebar tying machine provided with a wire reel as claimed in any one of the foregoing claims.
14. Method for arranging tie wire with a rebar tying machine, the method comprising of:
- providing a rebar tying machine as claimed in claim 13;
 - the rebar tying machine at least partially unwinding the wire on the wire reel;
 - applying a braking means of the rebar tying machine to the outer edge of the wire reel after a predetermined amount of wire has been unwound, such that the wire reel is decelerated and/or comes to a standstill with a uniform deceleration.
15. Method as claimed in claim 14, further comprising the step of uncoupling the braking means in order to release the wire reel for rotation by the rebar tying machine.





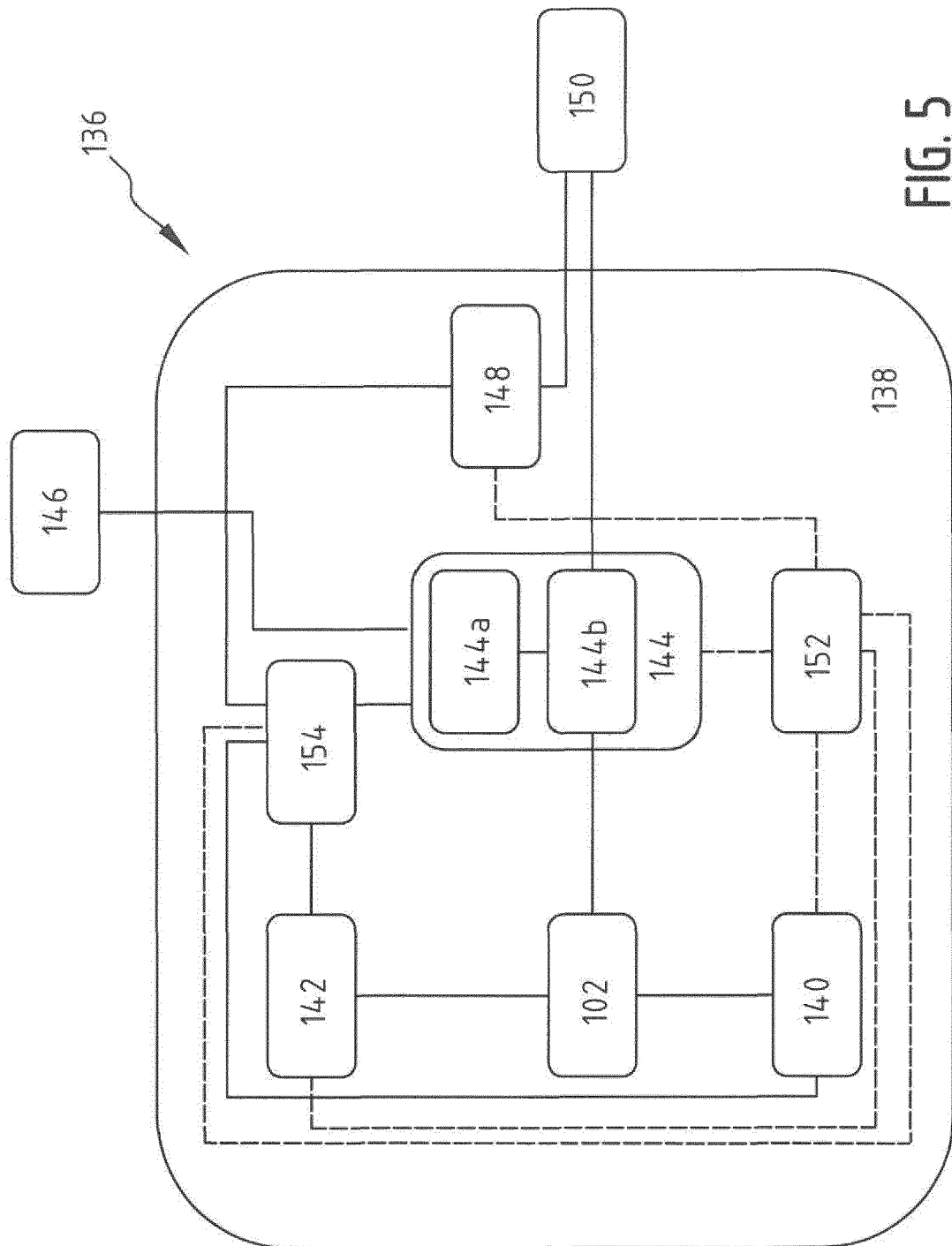


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 19 15 1631

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 203 268 339 U (TAIZHOU XINDALU ELECTRONIC TECHNOLOGY CO LTD) 6 November 2013 (2013-11-06)	1,2,4-15	INV. B65H75/14 B65H75/30 E04G21/12
A	* abstract; figures 1,3 * -----	3	
X	EP 0 908 582 A1 (MAX CO LTD [JP]) 14 April 1999 (1999-04-14)	1,2,4, 6-15	
A	* paragraph [0012]; figure 3 * -----	3,5	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65H E04G B65B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 May 2019	Examiner Pussemier, Bart
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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