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(54) **METHOD AND APPARATUS FOR THE HANDLING, INCLUDING ROLLING-UP OF ROD MESH FOR CONCRETE REINFORCEMENT**

VERFAHREN UND VORRICHTUNG ZUM HANDHABEN, EINSCHLIESSLICH AUFROLLEN, VON STANGENGITTER FÜR BETONBEWEHRUNG

PROCEDE ET DISPOSITIF DE MANIPULATION, NOTAMMENT D'ENROULAGE DE GRILLES DE BARRES D'ARMATURE POUR BETON

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Description

[0001] The invention relates to a rod mesh or bar mesh for the reinforcement of concrete, and more particularly the invention relates to a method and an apparatus for the handling thereof, including rolling-up of rod mesh during the manufacturing thereof, said rod mesh consisting of in its longitudinal direction extending steel supporting bands or strips and in the width direction extending reinforcement rods preferably secured by welding to the steel supporting bands, whereby the rod mesh is conveyed in the longitudinal direction of the steel supporting bands onto a rod mesh rolling-up device.

[0002] By prior methods and apparatuses rod meshes are rolled up as a kind of loosely rolled up carpet roll being relatively flexible across its longitudinal axis and thus difficult to handle during transport and during mounting in the place where the rod mesh should be used. Normally it will be necessary to use a crane for handling of said rod mesh rolls.

[0003] EP 0 677 343 B1 discloses a rod mesh rolled up without a core, cf. claim 4. This provides a diametrally squeezable rod mesh roll which cannot be transported as a rigid drum. The related difficulties cause the need for particular facilities during transport, e.g. a crane.

[0004] It is the purpose of this invention to eliminate this drawback.

[0005] The purpose is achieved with the method mentioned which is characterized in that the conveyed ends of the steel supporting bands after the rod mesh having been conveyed to the rod mesh rolling-up device each being secured to one of at least two driving rings and by the device synchroneously being subject of a tangential pulling force in the peripheral direction of the driving rings, that the driving rings are practically coaxially arranged as internal drive unit for the rod mesh and having an outer diameter corresponding to the desired inner diameter of the rod mesh, and that each driving ring is supported by a movable supporting means being synchronous following the radially outer periphery of the rod mesh, said supporting means supporting the driving ring during its rotation via the rod mesh being rolled up.

[0006] Thus it is achieved that the rod mesh during and after its rolling-up is exposed to a relatively high tensible force in the steel supporting bands and thus in the longitudinal direction of the rod mesh, causing the rod mesh to be tightly rolled up around the driving rings to act like a rigid and unsqueezable rod mesh roll which is reluctant to bend across its longitudinal axis and thus being easy to handle. Just manually it can be rolled across a substrate as a rigid drum without any energy consumption for overcoming a continuous deformation of the steel supporting bands, and maintaining safe parallel fastening of the reinforcement rods on to the steel supporting bands having been tightened up by said tensible force.

[0007] In order to avoid a permanent deformation of the steel supporting bands the outer diameter of the driving rings should be so big that the enforced bending forces of the steel supporting bands are kept within the yield point of the steel.

[0008] Furthermore, the method according to the invention may be characterized in that the following supporting means of the driving rings are realized by means of a pair of axially parallel supporting wheels arranged at a mutual distance, such as vehicle rubber wheels.

[0009] Thus it is achieved that the full pull is exploited for tightening up the rolling-up of the rod mesh.

[0010] The method according to the invention may also be
characterized in that the outermost ones of the steel supporting bands for the manufacture of the rod mesh each is supported by a combined band conveying and welding station which is displaceably arranged in the width direction of the rod mesh.

[0011] Due to this arrangement a desired freely protruding length of the ends of the reinforcement rods from the outermost ones of the supporting bands at the sides of the rod mesh can be achieved.

[0012] The method according to the invention can also be characterized in that the rotation of the rod mesh rolling-up device can be locked at each rotational stop during the manufacture of the rod mesh.

[0013] Thus it is achieved that the tight rolling-up of the rod mesh is maintained during its manufacture, and simultaneously energy is saved for the maintenance of a torque on the rolling-up device.

[0014] The method according to the invention may also be characterized in that after its rolling-up to a per se tightly fixed rod mesh, e.g. by means of binding wire, it is lowered, resting on the supporting wheels by lowering said wheels until the rod mesh is delivered for the rolling or sliding down on at least two opposite the welding station downwardly inclining discharge slides and furtheron for being delivered to a conveyor band, in a lorry, in a container or in a storing place.

[0015] Thus, the need for a crane is avoided which up till now has been necessary for removing the finished rod meshes due to the inferior rigidity thereof.

[0016] The invention also relates to an apparatus or a machine for carrying out the method according to the invention, viz. an apparatus for use by handling, including the rolling-up, of reinforcement rolling netrworks for concrete during the manufacture of the rod meshes, said rod mesh consisting of in its longitudinal direction extending steel supporting bands and in its width direction extending reinforcement rods being secured preferably by welding to the stel supporting bands, and whereby the rod mesh is conveyed in the longitudinal direction of the steel supporting bands to a rod mesh rolling-up device.

[0017] The apparatus according to the invention is characterized in that the rod mesh rolling-up device - after the conveyed ends of the steel supporting bands having been conveyed to the rod mesh rolling-up device, has been arranged to synchroneously exposing the steel supporting bands of the rod mesh to a tensible force in the peripheral direction of at least two driving rings, that the

driving rings are practically coaxially arranged as internal drive unit for the rod mesh and having an outer diameter corresponding to the desired inner diameter of the rod mesh, and that each driving ring is supported by a movable supporting means being synchronous following the radially outer periphery of the rod mesh, such as a pair of axially parallel supporting wheels, e.g. vehicle wheels arranged at a mutual distance, which wheels support each driving ring during its rotation via the layers of rod mesh being rolled up.

[0018] The apparatus according to the invention may also advantageously consist of one or more modules arranged subsequently in the longitudinal direction of the apparatus or the machine, whereby each single module has at least one and preferably two attached welding stations, each of which having a corresponding supply supply band roll with steel supporting band and at least one rod mesh rolling-up device with inherent traction means being arranged and provided to transmit a tensible force for rolling-up the steel supporting bands and so that the tensible force can be maintained during a temporary interruption of the rolling-up.

[0019] The apparatus according to the invention may also advantageously consist of at least two modules with end modules whereby the right welding station on one end module and the left welding station on the second end module can be adjusted so that the distance between these welding stations of the respective end modules can be adjusted.

[0020] The apparatus according to the invention - whereby the welding station has a welding table with a rail of a material having a relatively high specific heat capacity, said rail being so arranged that the steel supporting band may slide on the rail on its way from the supplly supply band roll to the rod mesh rolling-up device - may also be characterized in that next to, parallel to and somewhat below the rail of each welding table an exchangeable operating lever which is rotatable 90° around its axis is arranged and equipped with a number of parallel stop pins arranged perpendicularly to the operating lever at a mutual distance corresponding to a desired distance between the reinforcement rods of a rod mesh arranged longitudinally to the rod mesh, and rotatably by means of the operating lever between a vertical and a horizontal position.

[0021] Thus it is achieved that a number of reinforcement rods, each abutting a stop pin in the longitudinal direction at respective welding tables can be correctly mutually arranged on the corresponding steel supporting bands and be welded thereto. Hereafter the pins can be rotated to a horisontal position and the welded part of the rod mesh can be drawn forward towards the rod mesh rolling-up device in a length corresponding to the recently welded part whereupon a new part can be welded or the rolling-up can be terminated.

[0022] The apparatus according to the invention can also be characterized in that it has one or two tubular driving shafts with a square cross section and being displaceable in their longitudinal direction, said driving shafts being driven from gear boxes arranged at one end or both ends, respectively, of the apparatus and having gear wheels with hollow shafts with driving key holes of square cross section where the side of the square is a little larger than the cross section sides of the driving shaft, whereby the driving rings have hollow hubs, likewise with driving key holes of square cross section, whereby the side of the square is a little larger than the cross section sides of the driving shaft.

[0023] Thus it is achieved that the driving shafts with fixedly arranged gear wheels can follow the movement of the driving rings upwardly during the rolling-up of the rod mesh to the increasing diameter of the rod mesh, seeing that the relatively considerable clearance between the drive shafts and the driving key holes allows the driving shaft to tilt around the respective edges of the driving rings.

[0024] The invention will now be described in more detail with reference to the drawing in which:

Fig. 1 shows a side view of the manufacture of the rod mesh,
Fig. 2 a top view of the manufacture of the rod mesh,
Fig. 3 a top view of an embodiment of the apparatus,
Fig. 4 a cross section in a welding station with a discharge slide and a following supporting means in its position during the rolling-up of the rod mesh,
Fig. 5 an exchangeable operating lever,
Fig. 6 a driving ring around which the rod mesh is rolled up,
Fig. 7 an axial section in a gear box,
Fig. 8 a gear box seen from the outer end with relation to the apparatus and in its axial direction,
Fig. 9 a tubular driving shaft with a square cross section, and
Fig. 10 a cross section in a welding station with the following supporting means in a position lowered to a discharge slide.

[0025] In Figs. 1 and 2, respectively, a supply band roll 1 with steel supporting band 2 is seen to the left, said roll passing a welding station wherein the reinforcing rod 4 are welded on for the formation of a rod mesh 3 which is seen in its rolled up condition to the left. Although the invention is explained in detail in connection with rod meshes where the reinforcement rods 4 are welded on, they may of course also be otherwise secured to the steel supporting bands 2, e.g. by means of binding wire, staples or by adhesion.

[0026] In Fig. 3 is shown an apparatus 6 or a machine consisting of three modules, viz. a left end module 7, a right end module 9 and an intermediate module 8.

[0027] Each module 7, 8, 9 is here provided with two welding stations 13. At the end modules 7 and 9 the welding stations 13 arranged closest to the ends of the apparatus 6 are adjustable in the longitudinal direction of the apparatus so that the distance from said welding stations

13 to the ends of the apparatus can be varied. Thus it is achieved that the length of the cantilevered ends of the reinforcing rods 4 outside the supporting bands by the sides of the rolling net 3 can be varied.

[0028] At each end of the apparatus 6 is arranged a gear box 11 with gear wheels 12 for driving the rolling-up of the rod mesh 3.

[0029] Fig. 4 shows in the left side of the welding station 13 a supply band roll 1 for a steel supporting band 2. The steel supporting band can be rolled up to and along a welding table 14 and forwardly to a rod mesh rolling-up device 22. Above the welding stations 13 is arranged a supporting beam 17 with a material shelf 16 on which a bundle of reinforcing rods 4 can be arranged. A number of rods therefrom can be arranged in a tray 15 immediately above the welding table 14. The welding of reinforcement rod 4 to steel supporting bands 2 takes place by a number of reinforcement rods 4 being arranged on and being welded to the steel supporting band 2 which is arranged on the rail 20 on the welding table 14. Thereafter the steel supporting band 2 is pulled one step forward and the welding can continue or the rolling-up of the rod mesh can be stopped.

[0030] The net rolling device 22 is seen in the left side of Fig. 4. The device consists of a driving ring 18 being driven via a shaft from the gear wheel 12 and on which an outermost reinforcing rod 4 being welded to the rod mesh on the steel supporting band 2 has been hooked, and around which the steel supporting band 2 with welded reinforcement rods 4 has been rolled up. As shown the drive unit 18 can follow upwardly when the rolling-up proceeds to a fully rolled up rod mesh 3. During the rolling-up the driving ring 18 is supported via the rod mesh 3 by a supporting means 19 following the periphery of the rod mesh 3, said supporting means consisting of two vehicle rubber wheels 19 supporting the driving ring 18 during its rotation via the rod mesh 3 being rolled up. A chain wheel 23 with friction hub which is driven via a shaft from the gear wheel 12 might bring the vehicle rubber wheel 19 closest to the supply band roll 1 to rotation clockwise and may thus contribute to the rod mesh 3 being tightly rolled up. By the follower or following supporting means 19 a discharge slide 21 has been provided, along which the finished rod mesh 3 can slide or roll downwardly when the following supporting means 19 is tilted or lowered.

[0031] Fig. 5 shows an exchange- or replaceable operating lever 32 which can be arranged beside, parallel with and somewhat below the rail 20 of each welding table 14, and which is rotatable about 90° around its axis. It is equipped with a number of parallel and perpendicularly to the operating lever 32 arranged stop pins 33 at a mutual distance corresponding to a desired distance between reinforcing rods 4 arranged longitudinally to the rod mesh 3 and being arranged with the operating lever 32 between its vertical and horisontal position.

[0032] Fig. 6 shows a driving ring 18 with a square hub key hole 34, the square of which is a little larger than the cross section of the tubular driving shaft. On the periphery of the driving ring 18 there may be arranged a hook 35 on which a reinforcement rod 4 on the rod mesh 3 can be hooked whereafter the tight rolling-up of the rod mesh 3 can be started.

[0033] Fig. 7 shows an axial section of the driving motor 24 of the gear boxes 11, said motor driving a friction hub 31. A chain drive 29 therefrom is driving a gear wheel 12 arranged on a hollow shaft 26 with a square drive key hole 27 through which a tubular driving shaft 28 for a driving ring 18 and having a square cross section can be inserted, cf. Fig. 9.

[0034] Fig. 8 shows the friction hub 31 of the gear box 11, the chain drive 19, gear wheel 12 and hollow shaft 26.

[0035] Fig. 9 shows a tubular driving shaft 28 with tubular cross section which is somewhat smaller than the cross section of the driving key hole 27 in a gear wheel and the cross section of the hub key hole 34 in a driving ring 18.

[0036] Fig. 10 shows the welding station 13 with a tilted down supporting means 19 for delivering a finished rod mesh to the discharge slide 21.

[0037] Before the rod mesh 3 is leaving the rod mesh rolling-up device 22 and is discharged to the discharge slide 21, it should be secured against unintended unrolling. This may be realized e.g. by tying it up or by fixing it with binding wire or with easily removable or breakable, however strong locking means in a different way.

[0038] The invention is in no way limited to the embodiments described in the present specification and claims, as other embodiments are possible within the scope of the invention.

List of parts

[0039]

1	supply band roll
2	steel supporting band
3	rod mesh
4	reinforcing rod
5	
6	apparatus or machine
7	left end module
8	intermediate module
9	right end module
10	
11	gear box
12	gear wheel
13	welding station
14	welding table
15	tray
16	material shelf
17	supporting beam
18	driving ring
19	following supporting means
20	rail
21	discharge slide
22	rod mesh rolling-up device

23 chain wheel with friction hub
24 driving motor
26 hollow shaft
27 driving key holes
28 tubular driving shaft
29 chain drive
31 friction hub
32 exchangeable operating lever
33 stop pins
34 hub key hole
36 hook
38 tubular driving shaft

Claims

1. Method of handling, including the rolling-up, of a concrete reinforcement rod mesh (3) during its manufacture, said rod mesh (3) comprising in its longitudinal direction extending supporting bands (2) of flexible steel and in its width direction extending reinforcement rods (4) being secured preferably by welding to the steel supporting bands (2), and whereby the rod mesh (3) is conveyed in the longitudinal direction of the steel supporting bands to a rod mesh rolling-up device (22), **characterized in that** the conveyed ends of the steel supporting bands (2) - after the rod mesh (3) has been conveyed to the rod mesh rolling-up device (22) - each is secured to one of at least two driving rings (18) and by the device (22) synchroneously is exposed to a tangential pulling force in the peripheral direction of the driving rings (18), that the driving rings (18) are practically coaxially arranged as internal drive unit for the rod mesh (3) and having an outer diameter corresponding to the desired inner diameter of the rod mesh (3), and that each driving ring (18) is supported by a movable supporting means (19) being synchronous following the radially outer periphery of the rod mesh (3), said supporting means (19) supporting the driving ring (18) during its rotation via the rod mesh (3) being rolled up.

2. Method according to claim 1, **characterized in that** the support by means of the movable supporting means (19) of the driving rings (18) is taking place by means of a pair of axially parallel supporting wheels, such as vehicle rubber wheels, arranged at a mutual distance.

3. Method according to claim 1, **characterized in that** the outermost ones of the steel supporting bands (2) for the manufacture of the rod mesh (3) each is supported by a combined band conveying and welding station (13) which is displaceably arranged in the width direction of the rod mesh (3).

4. Method according to one of the claims 1-3, **characterized in that** the rotation of the rod mesh rolling-up device (22) is locked at each rotation stop during the manufacture of the rod mesh (3).

5. Method according to one of the claims 1-4, **characterized in that** after the rolling-up of a per se rigidly locked rod mesh, e.g. by means of binding wire, it is lowered resting on the supporting wheels (19) by lowering thereof, until the rod mesh (3) is discharged for the rolling down or gliding down on at least two away from the welding station (13) downwardly inclining discharge slides (21) and furtheron for discharge to a conveyor band, in a lorry, in a container or in a storing place.

6. Apparatus for the use by handling, including the rolling-up, of rod mesh (3) during the manufacture of the rod mesh, said rod mesh (3) comprising of in its longitudinal direction extending steel supporting bands (2) and in its width direction extending reinforcement rods (4) being secured preferably by welding to the steel supporting bands (2), and whereby the rod mesh (3) is conveyed in the longitudinal direction of the steel supporting bands to a rod mesh rolling-up device (22),
characterized in that the rod mesh rolling-up device (22) - after the conveyed ends of the steel supporting bands (2) having been conveyed to the rod mesh rolling-up device (22) - is adapted to synchroneously to expose the steel supporting bands (2) of the rod mesh (3) to a tensible force in the peripheral direction of at least two driving rings (18), that the driving rings (18) are practically coaxiallly arranged as internal drive unit for the rod mesh (3) and having an outer diameter corresponding to the desired inner diameter of the rod mesh (3), and that each driving ring (18), is supported by a movable supporting means (19) being synchronous following the radially outer periphery of the rod mesh (3), such as a pair of axially parallel supporting wheels, e.g. vehicle wheels, arranged at a mutual distance, and which supporting means (19) each supports its driving ring (18) during its rotation via the rod mesh (3) being rolled up.

7. Apparatus according to claim 6, **characterized in that** it (6) consist of one or more modules (7-9) arranged side by side in the longitudinal direction of the apparatus (6), whereby each module has at least one, preferably two mounted welding stations (13), each with a corresponding supply supply band roll with steel supporting band (2) and at least one rod mesh rolling-up device (22) with an integrated pulling device which is arranged and adapted to transfer a tensible force for the rolling-up of the steel supporting bands (2) and so that the tensible force can be maintained during intermediate interruption of the rolling-up.

8. Apparatus according to claim 7, **characterized in that** it consists of at least two end modules (7 and 9) where the right welding station (13) on the one end module (9) and the left welding station (13) on the second end module (7) is adjustable so that the distance between of the welding stations (13) in the respective end modules (7) and (9) can be varied.

9. Apparatus according to one of the claims 6-7, whereby the welding station (13) has a welding table (14) with a rail (20) of a material having of a relatively high specific heat capacity, said rail being arranged so that the steel supporting band (2) can slide on the rail on its way from supply supply band roll (1) to rod mesh rolling-up device (22), **characterized in that** next to and parallel to and somewhat below the rail (20) of each welding table (14) is exchangeably arranged an operating lever (32) which is rotatable about 90° around its axis, said operating lever being provided with a number of parallel stop pins perpendicularly to the operating lever (32) and having a mutual distance corresponding to a desired distance between the reinforcement rods (4) of a rod mesh (3) arranged longitudinally to the rod mesh (3), and rotatable by means of the operating lever (32) between a vertical and s horisontal position.

10. Apparatus according to one of the claims 6-9, **characterized in that** it has one or two tubular driving shafts (28) having square cross section and being displaceable in their longitudinal direction, said driving shafts being driven from gear boxes (11) arranged at the one end or both ends, respectively, of the apparatus (6), said gear boxes being provided with gear wheels with hollow shafts with driving key holes (27) of square cross section where the side of the square is a little larger than the cross section sides of the driving shaft (28), whereby the driving rings (18) have hollow hubs, also provided with driving key holes (27) of square cross section, where the side of the square is a little larger than the cross section sides of the driving shaft (28).

Patentansprüche

1. Verfahren zum Handhaben einschließlich Aufrollen eines Betonverstärkungs-Stabgitters (3) während seiner Herstellung, wobei das Stabgitter (3) in seiner Längsrichtung sich erstreckende Unterstützungsbänder (2) aus biegsamem Stahl und in seiner Breitenrichtung sich erstreckende Verstärkungsstäbe (4), die vorzugsweise durch Schweißen an den Stahlunterstützungsbändern (2) befestigt sind, umfasst, wobei das Stabgitter (3) in Längsrichtung der Stahlunterstützungsbänder zu einer Stabgitter-Aufrollvorrichtung (22) befördert wird, **dadurch gekennzeichnet, dass** die beförderten Enden der Stahlunterstützungsbänder (2) - nachdem das Stabgitter (3) zu der Stabgitter-Aufrollvorrichtung (22) befördert worden ist - jeweils an einem von wenigstens zwei Antriebsringen (18) befestigt wird und die Vorrichtung (22) synchron einer tangentialen Zugkraft in Umfangsrichtung der Antriebsringe (18) ausgesetzt wird, dass die Antriebsringe (18) praktisch koaxial als interne Antriebseinheit für das Stabgitter (3) angeordnet sind und einen Außendurchmesser besitzen, der dem gewünschten Innendurchmesser des Stabgitters (3) entspricht, und dass jeder Antriebsring (18) durch ein bewegliches Unterstützungsmittel (19) unterstützt ist, das dem radial äußeren Umfang des Stabgitters (3) synchron folgt, wobei das Unterstützungsmittel (19) den Antriebsring (18) während seiner Drehung über das Stabgitter (3), das aufgerollt wird, unterstützt.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die Unterstützung mittels des beweglichen Unterstützungsmittels (19) der Antriebsringe (18) mittels eines Paars axial paralleler Unterstützungsräder wie etwa Fahrzeuggummiräder, die in einem gegenseitigen Abstand angeordnet sind, erfolgt.

3. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die äußersten Stahlunterstützungsbänder (2) für die Herstellung des Stabgitters (3) jeweils durch eine kombinierte Bandbeförderungs- und Schweißstation (13) unterstützt sind, die in Breitenrichtung des Stabgitters verlagerbar angeordnet ist.

4. Verfahren nach einem der Ansprüche 1-3, **dadurch gekennzeichnet, dass** die Drehung der Stabgitter-Aufrollvorrichtung (22) bei jedem Drehstopp während der Herstellung des Stabgitters (3) verriegelt wird.

5. Verfahren nach einem der Ansprüche 1-4, **dadurch gekennzeichnet, dass** nach dem Aufrollen eines beispielsweise mittels eines Bindedrahts von selbst starr verriegelten Stabgitters das Stabgitter, das auf den Unterstützungsrädern (19) ruht, abgesenkt wird, indem diese abgesenkt werden, bis das Stabgitter (3) ausgegeben wird, damit es auf wenigstens zwei von der Schweißstation (13) entfernten nach unten geneigten Ausgabegleitern hinab rollt oder hinab gleitet, um weiterhin an ein Förderband, auf einen Lastkraftwagen, in einen Behälter oder zu einem Aufbewahrungsort ausgegeben zu werden.

6. Vorrichtung für die Verwendung durch Handhabung einschließlich Aufrollen eines Stabgitters (3) während der Herstellung des Stabgitters, wobei das Stabgitter (3) in seiner Längsrichtung sich erstreckende Stahlunterstützungsbänder (2) und in seiner

Breitenrichtung sich erstreckende Verstärkungsstäbe (4), die vorzugsweise durch Schweißen an den Stahlunterstützungsbändern (2) befestigt sind, umfasst, wobei das Stabgitter (3) in Längsrichtung der Stahlunterstützungsbänder zu einer Stabgitter-Aufrollvorrichtung (22) befördert wird, **dadurch gekennzeichnet, dass** die Stabgitter-Aufrollvorrichtung (22) - nachdem die beförderten Enden der Stahlunterstützungsbänder (2) zu der Stabgitter-Aufrollvorrichtung (22) befördert worden sind - dazu ausgelegt ist, die Stahlunterstützungsbänder (2) des Stabgitters (3) synchron einer Zugkraft in Umfangsrichtung von wenigstens zwei Antriebsringen (18) auszusetzen, dass die Antriebsringe (18) praktisch koaxial als interne Antriebseinheit für das Stabgitter (3) angeordnet sind und einen Außendurchmesser haben, der dem gewünschten Innendurchmesser des Stabgitters (3) entspricht, und dass jeder Antriebsring (18) durch ein bewegliches Unterstützungsmittel (19), das dem radial äußeren Umfang des Stabgitters (3) synchron folgt, etwa ein Paar axial paralleler Unterstützungsräder, z. B. Fahrzeugräder, die in einem gegenseitigen Abstand angeordnet sind, unterstützt ist, wobei das Unterstützungsmittel (19) seinen jeweiligen Antriebsring (18) während seiner Drehung über das Stabgitter (3), das aufgerollt wird, unterstützt.

7. Vorrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** sie (6) aus einem oder mehreren Modulen (7-9) besteht, die nebeneinander in Längsrichtung der Vorrichtung (6) angeordnet sind, wobei jedes Modul wenigstens eine, vorzugsweise zwei montierte Schweißstationen (13) besitzt, wovon jede eine entsprechende Zufuhrbandrolle mit einem Stahlunterstützungsband (2) und wenigstens eine Stabgitter-Aufrollvorrichtung (22) mit einer integrierten Zugvorrichtung, die so angeordnet und ausgelegt ist, dass eine Zugkraft zum Aufrollen der Stahlunterstützungsbänder (2) übertragen wird und dass die Zugkraft während einer unterdessen auftretenden Unterbrechung des Aufrollens aufrechterhalten werden kann, besitzt.

8. Vorrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** sie aus wenigstens zwei Endmodulen (7) und (9) besteht, wobei die rechte Schweißstation (13) an dem einen Endmodul (9) und die linke Schweißstation (13) an dem zweiten Endmodul (7) einstellbar sind, so dass der Abstand zwischen den Schweißstationen (13) in den jeweiligen Endmodulen (7) und (9) verändert werden kann.

9. Vorrichtung nach einem der Ansprüche 6-7, wobei die Schweißstation (13) einen Schweißtisch (14) mit einer Schiene (20) aus einem Material mit einer verhältnismäßig hohen spezifischen Wärmekapazität besitzt, wobei die Schiene so angeordnet ist, dass das Stahlunterstützungsband (2) auf der Schiene auf seinem Weg von der Zufuhrbandrolle (1) zu der Stabgitter-Aufrollvorrichtung (22) gleiten kann, **dadurch gekennzeichnet, dass** in der Nähe der Schiene (20) jedes Schweißtisches (14), parallel hierzu und etwas unterhalb hiervon ein austauschbar angeordneter Bedienungshebel (32) angeordnet ist, der um seine Achse um etwa 90° drehbar ist, wobei der Bedienungshebel mit einer Anzahl paralleler Anschlagstifte senkrecht zu dem Bedienungshebel (32) versehen ist, die in einem gegenseitigen Abstand angeordnet sind, der einem gewünschten Abstand zwischen den Verstärkungsstäben (4) eines Stabgitters (3) entspricht, die in Längsrichtung des Stabgitters (3) angeordnet sind, und mittels des Bedienungshebels (32) zwischen einer vertikalen und einer horizontalen Stellung drehbar sind.

10. Vorrichtung nach einem der Ansprüche 6-9, **dadurch gekennzeichnet, dass** sie eine oder zwei rohrförmige Antriebswellen (28) mit quadratischem Querschnitt, die in ihrer Längsrichtung verlagerbar sind, besitzt, wobei die Antriebswellen durch Getriebe (11) angetrieben werden, die an dem einen Ende bzw. an beiden Enden der Vorrichtung (6) angeordnet sind, wobei die Getriebe mit Zahnrädern versehen sind, die Hohlwellen besitzen, die antreibende Keillöcher (27) mit quadratischem Querschnitt aufweisen, wobei die Seite des Quadrats etwas größer als die Querschnittsseiten der Antriebswellen (28) ist, wobei die Antriebsringe (18) Hohlnaben besitzen und ebenfalls mit antreibenden Keillöchern (27) mit quadratischem Querschnitt versehen sind, wobei die Seite des Quadrats etwas größer ist als die Querschnittsseiten der Antriebswelle (28).

Revendications

1. Procédé de manipulation, notamment d'enroulage, d'un treillis de tiges d'armature pour béton (3) lors de sa fabrication, ledit treillis de tiges (3) comprenant des bandes porteuses en acier flexible (2) s'étendant dans son sens longitudinal et des barres d'armature (4) s'étendant dans son sens transversal étant fixées de préférence par soudage aux bandes porteuses en acier (2), et le treillis de tiges (3) étant transporté dans le sens longitudinal des bandes porteuses en acier à un dispositif d'enroulage de treillis de tiges (22), **caractérisé en ce que** les extrémités des bandes porteuses en acier (2) transportées - après que le treillis de tiges (3) a été transporté au dispositif d'enroulage de treillis de tiges (22) - sont fixées chacune à au moins l'un des deux anneaux de guidage (18) et étant exposées de manière synchrone par le dispositif (22) à une force de traction tangentielle dans le sens périphérique des anneaux de guidage (18), que les anneaux de guidage (18) sont pratique-

ment agencés de façon coaxiale comme unité d'entrainement interne pour le treillis de tiges (3) et ayant un diamètre extérieur correspondant au diamètre intérieur désiré du treillis de tiges (3), et que chaque anneau de guidage (18) est soutenu par des moyens de support mobiles (19) suivant la périphérie extérieure du treillis de tiges (3), lesdits moyens de support (19) supportant l'anneau de guidage (18) pendant sa rotation par le treillis de tiges (3) étant enroulé.

2. Procédé selon la revendication 1, **caractérisé en ce que** le support par des moyens de support mobiles (19) des anneaux de guidage (18) s'effectue à l'aide d'une paire de roues de support à axe parallèle, par exemple des roues à bandages en caoutchouc pour véhicules, agencées à une distance mutuelle.

3. Procédé selon la revendication 1, **caractérisé en ce que** les bandes porteuses en acier (2) les plus externes pour la fabrication du treillis de tiges (3) sont supportées chacune par un poste combiné de transport de barres et de soudage (13) qui est agencé de façon déplaçable dans le sens transversal du treillis de tiges (3).

4. Procédé selon l'une des revendications 1-3, **caractérisé en ce que** la rotation du dispositif d'enroulage de treillis de tiges (22) est bloquée à chaque arrêt de rotation pendant la fabrication du treillis de tiges (3).

5. Procédé selon l'une des revendications 1-4, **caractérisé en ce qu'**après l'enroulage d'un treillis de tiges en soi bloqué de façon rigide, par exemple à l'aide de fil à lier, il est abaissé et repose sur les roues de support (19) par abaissement de celles-ci, jusqu'à ce que le treillis de tiges (3) est déposé pour le roulement vers le bas ou le glissement vers le bas sur au moins deux glissières de décharge d'inclinaison vers le bas (21) détournées du poste de soudage (13) et pour ensuite le décharger sur une bande de transport, dans un véhicule de transport, dans un conteneur ou sur un emplacement de stockage.

6. Dispositif d'utilisation par manipulation, notamment l'enroulage, du treillis de tiges (3) lors de la fabrication du treillis de tiges, ledit treillis de tiges (3) comprenant des bandes porteuses en acier (2) s'étendant dans son sens longitudinal et des barres d'armature (4) s'étendant dans son sens transversal étant fixées de préférence par soudage aux bandes porteuses en acier (2), et le treillis de tiges (3) est transporté dans le sens longitudinal des bandes porteuses en acier (2) à un dispositif d'enroulage de treillis de tiges (22), **caractérisé en ce que** le dispositif d'enroulage de treillis de tiges (22) - après que les extrémités des bandes porteuses en acier (2) transportées ont été transportées au dispositif d'enroulage de treillis de tiges (22) - étant adapté à exposer de manière synchrone les bandes porteuses en acier (2) du treillis de tiges (3) à une force de traction dans le sens périphérique d'au moins deux anneaux de guidage (18), que les anneaux de guidage (18) sont pratiquement agencés de façon coaxiale comme unité d'entrainement interne pour le treillis de tiges (3) et ayant un diamètre extérieur correspondant au diamètre intérieur désiré du treillis de tiges (3), et que chaque anneau de guidage (18) est supporté par des moyens de support mobiles (19) qui suivent de manière synchrone la périphérie extérieure du treillis de tiges (3), comme une paire de roues de support à axe parallèle (19), par exemple des roues pour véhicules, agencée à une distance mutuelle, et les moyens de support (19) supportant chacun son anneau de guidage (18) pendant sa rotation par le treillis de tiges (3) étant enroulée.

7. Dispositif selon la revendication 6, **caractérisé en ce qu'**il (6) comprend un ou plusieurs modules (7-9) agencés côte à côte dans le sens longitudinal du dispositif (6), chaque module ayant au moins un et de préférence deux postes de soudage montés (13), chacun ayant un rouleau d'alimentation de bandes correspondant avec des bandes porteuses (2) et au moins un dispositif d'enroulage de treillis de tiges (22) avec un dispositif de traction intégré étant agencé et adapté à transférer une force de traction pour l'enroulage des bandes porteuses en acier (2) et ainsi que la force de traction peut être maintenue pendant une interruption intermédiaire de l'enroulage.

8. Dispositif selon la revendication 7, **caractérisé en ce qu'**il comprend au moins deux modules d'extrémité (7 et 9) où le poste de soudage à droite (13) sur l'un des modules d'extrémité (9) et le poste de soudage à gauche (13) sur le deuxième module d'extrémité (7) sont réglables de manière à ce que la distance entre les postes de soudage (13) dans les modules d'extrémité respectifs (7) et (9) peut être variée.

9. Dispositif selon l'une des revendications 6-7, le poste de soudage (13) ayant une table de soudage (14) avec un rail (20) d'une matière ayant une capacité thermique spécifique et relativement élévée, ledit rail (20) étant agencé de manière à ce que la bande porteuse en acier (2) peut glisser sur le rail sur son chemin du rouleau d'alimentation de bandes (1) au dispositif d'enroulage de treillis de tiges (22), **caractérisé en ce qu'**un levier de manoeuvre (32) est agencé de façon amovible à côté de et parallèle à et un peu en dessous du rail (20) de chaque table de soudage (14) et pouvant tourner environ 90° autour de son axe, ledit levier de manoeuvre étant réalisé avec un nombre de butées parallèles perpen-

diculairement au levier de manoeuvre (32) et ayant une distance mutuelle qui correspond à une distance désirée entre les barres d'armature (4) d'un treillis de tiges (3) agencées longitudinalement du treillis de tiges (3), et de façon rotative par le levier de manoeuvre (32) entre une position verticale et horizontale.

10. Dispositif selon l'une des revendications 6-9, **caractérisé en ce qu'**il comprend un ou deux arbres de transmission tubulaires (28) ayant une section carrée et étant déplaçable dans leur sens longitudinal, lesdits arbres de transmission étant entraînés à partir de boîtes de vitesses (11) agencées à l'une des deux extrémités ou aux deux extrémités respectivement du dispositif (6), lesdites boîtes de vitesses étant pourvues de roues dentées avec des arbres creux avec des entrées d'entraînement (27) de section carrée où le côté du carré est un peu plus grand que les côtés de section de l'arbre de transmission (28), les anneaux de guidage (18) ayant des moyeux creux, aussi pourvus d'entrées d'entraînement (27) de section carrée, où le côté du carré est un peu plus grand que les côtés de section carrée de l'arbre de transmission (28).

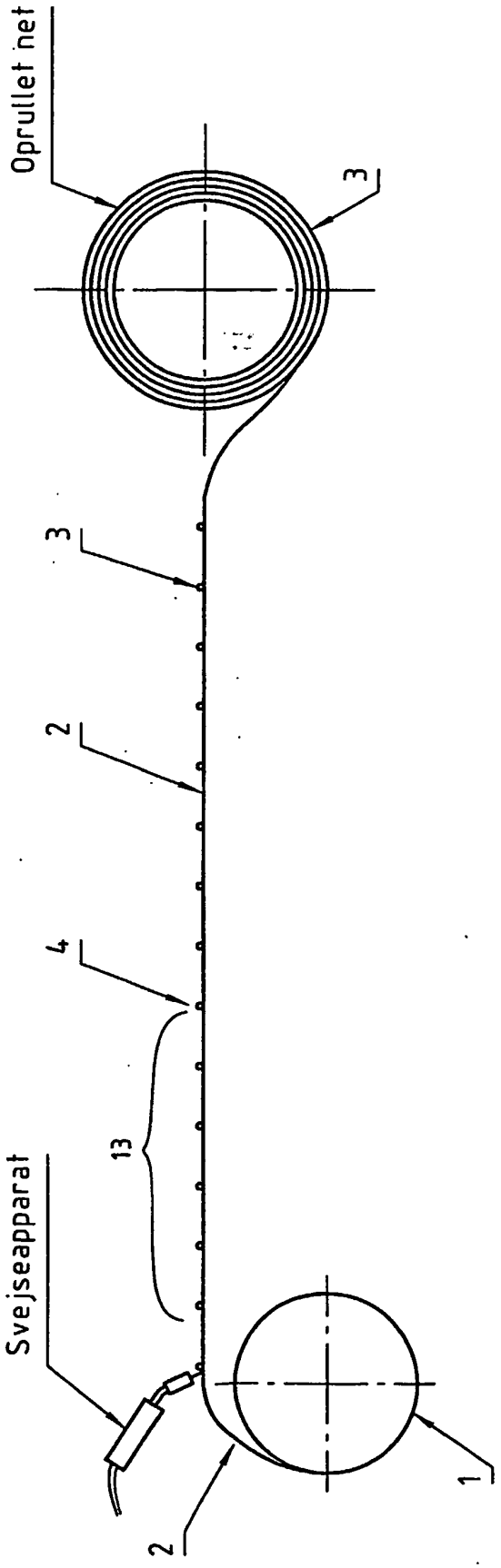


FIG. 1

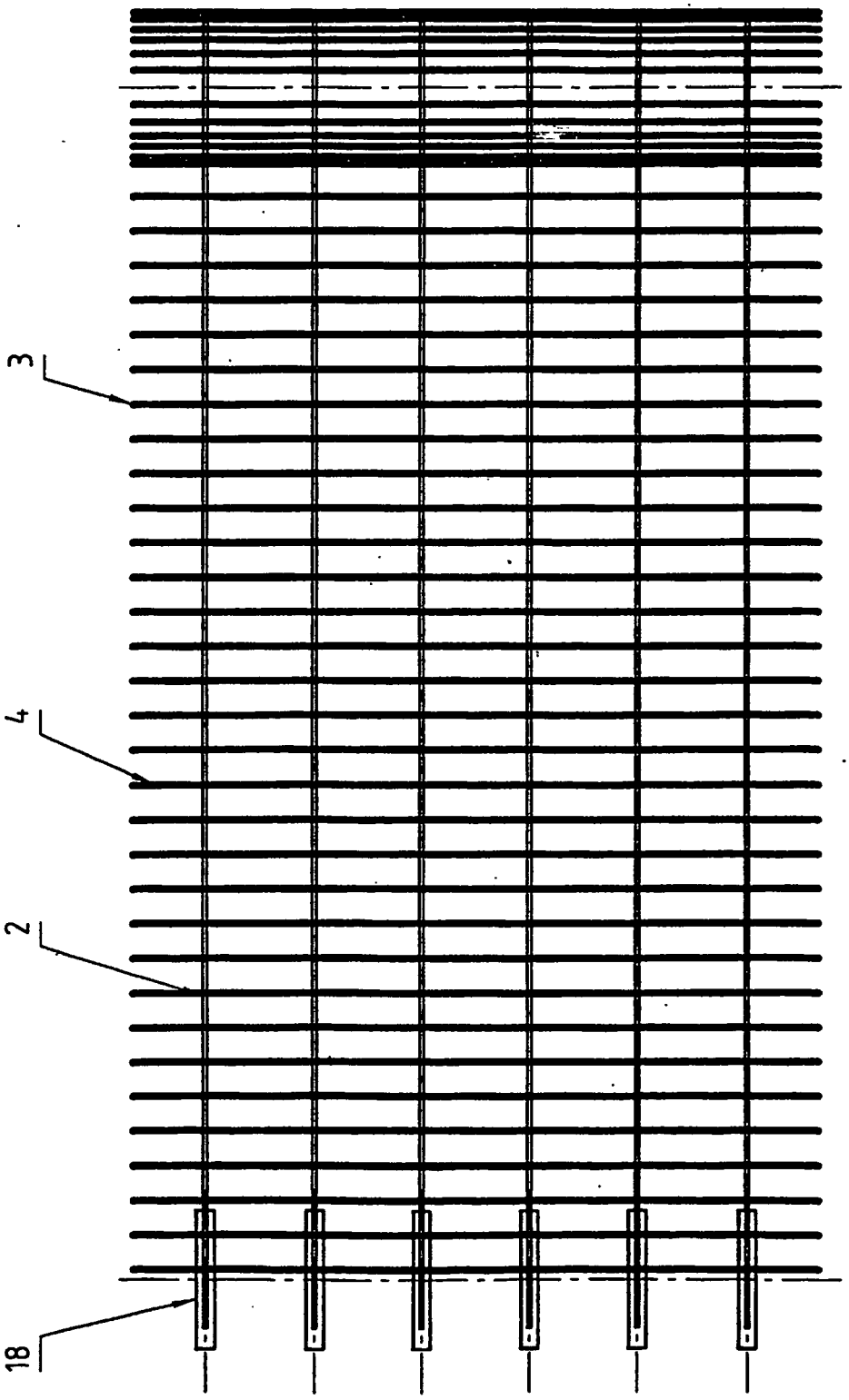


FIG. 2

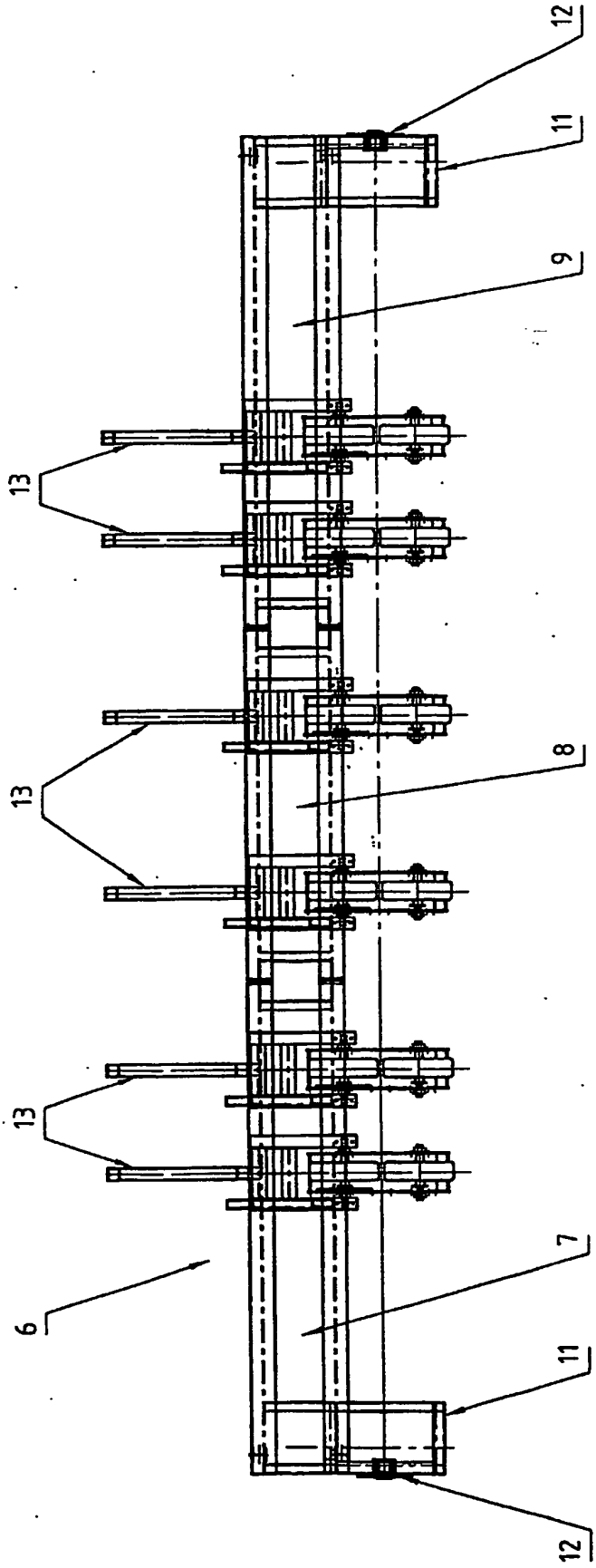


FIG. 3

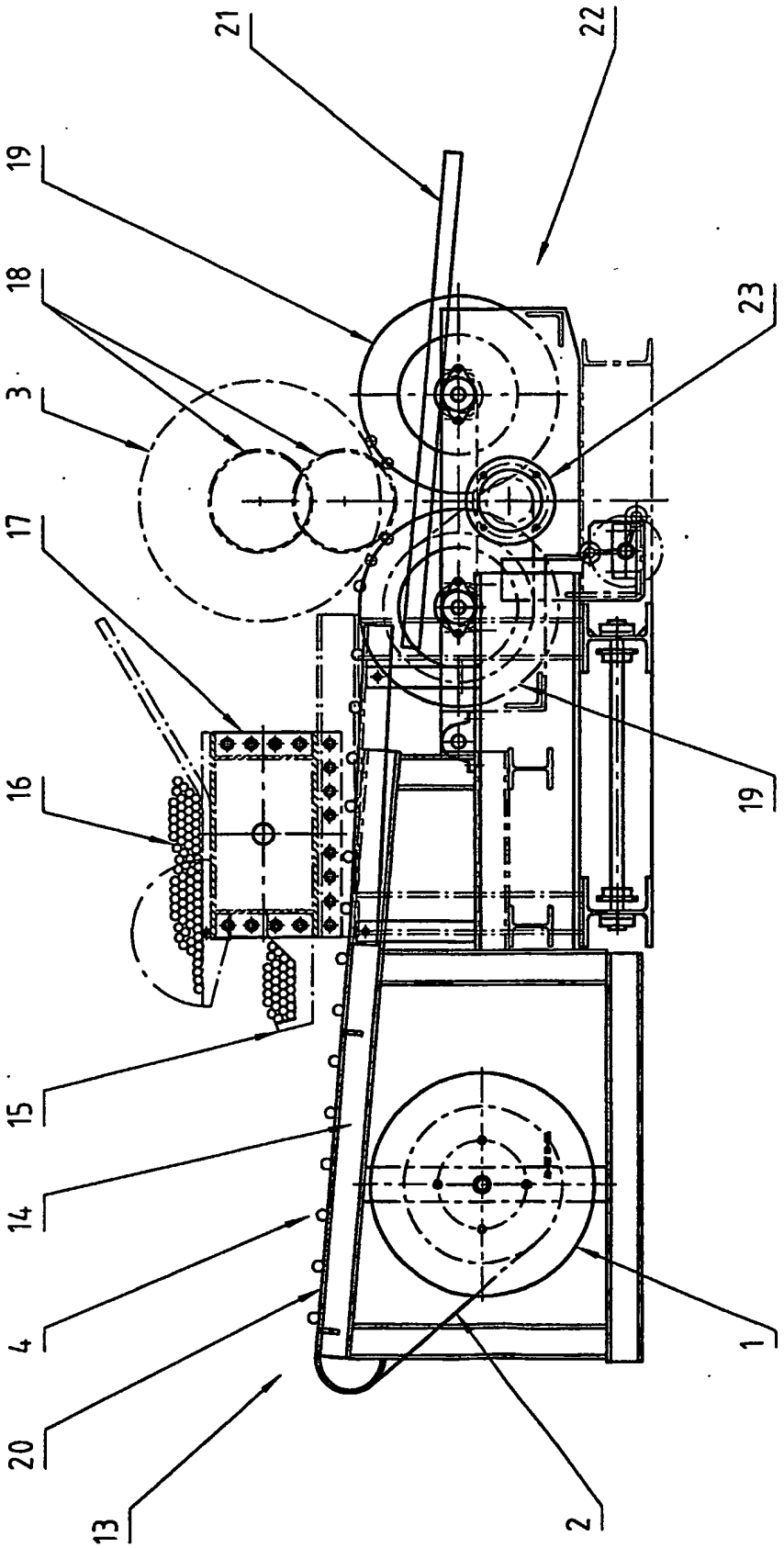


FIG. 4

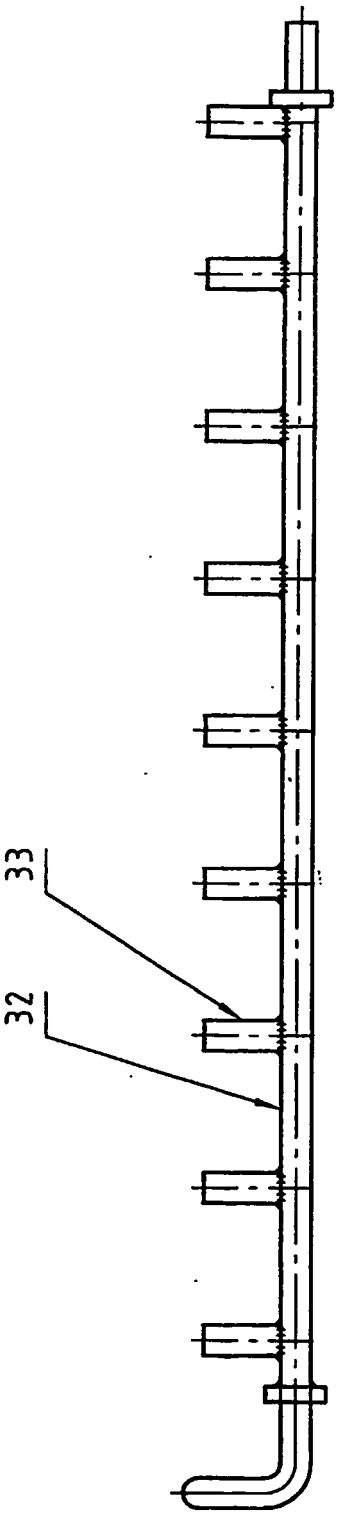


FIG. 5

FIG. 6

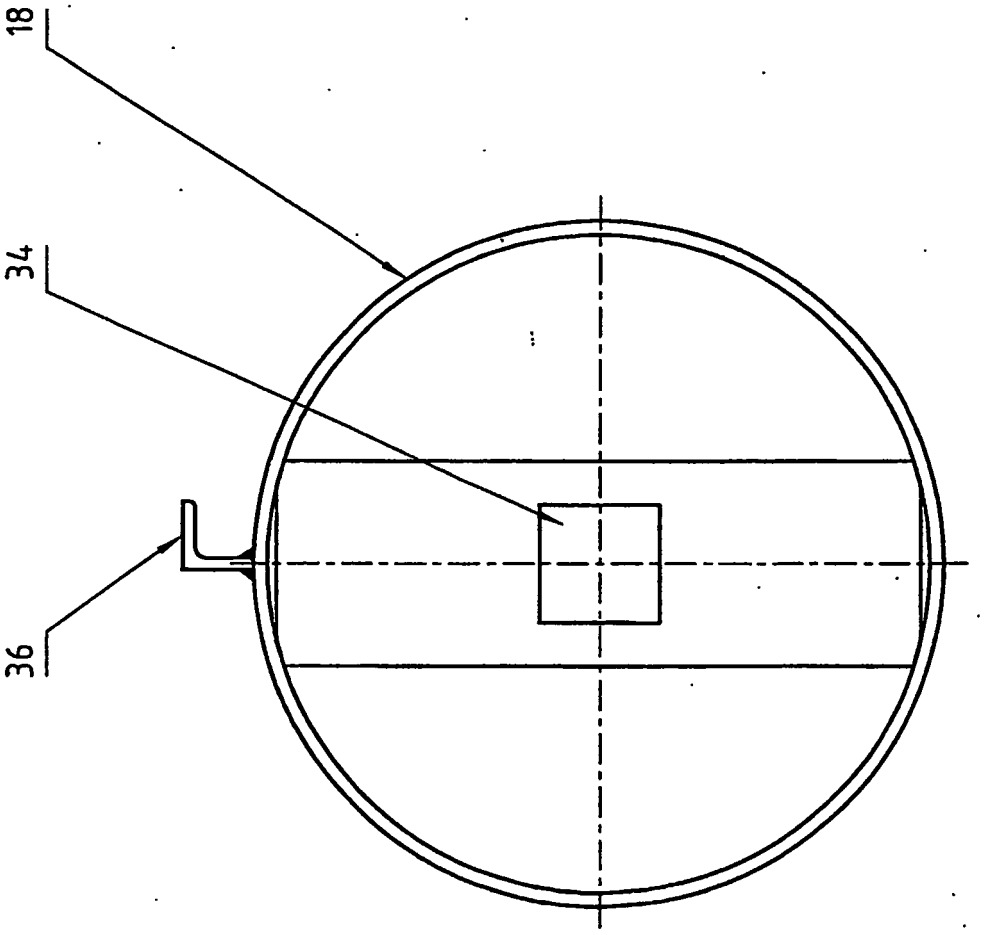


FIG. 7

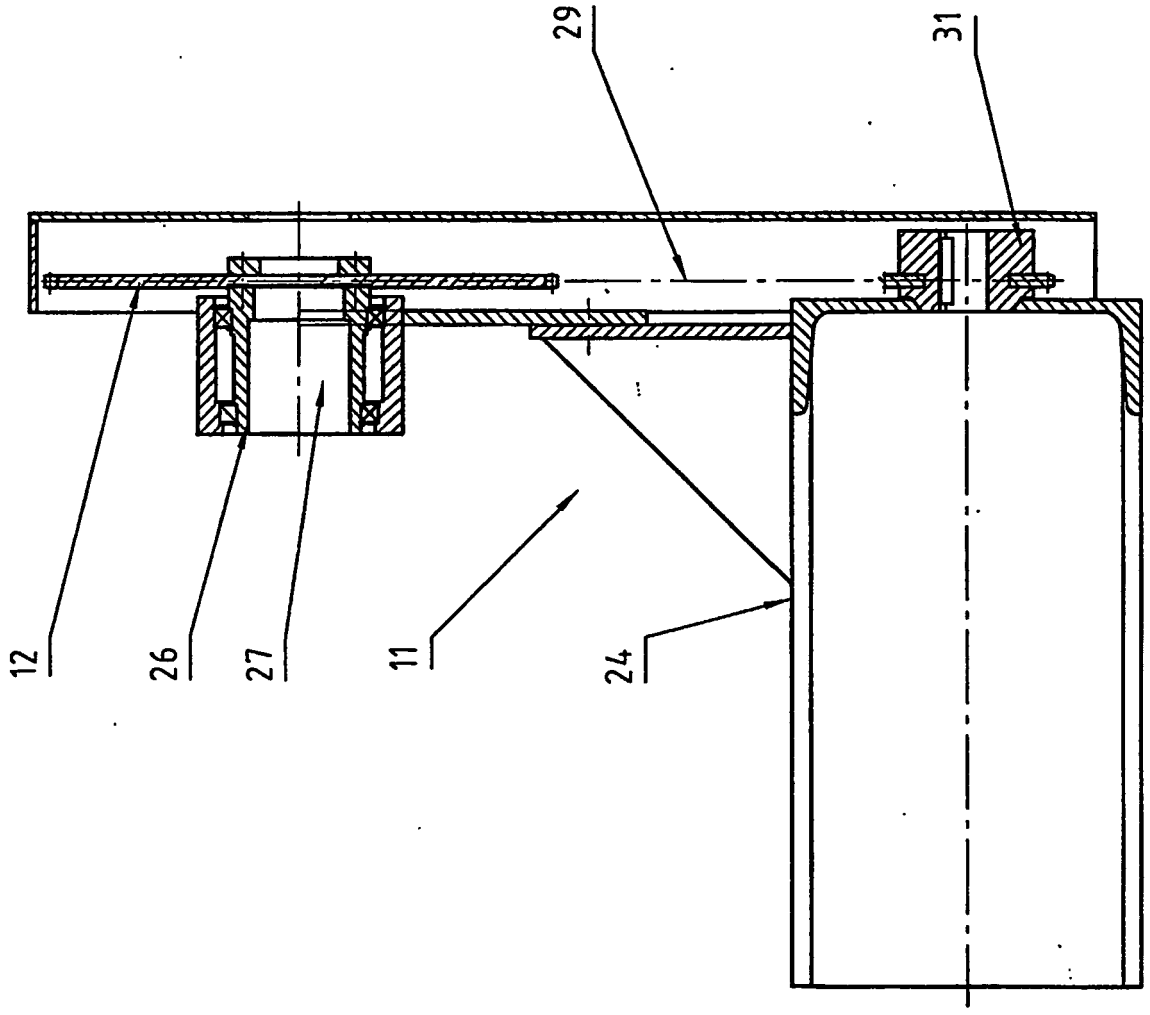
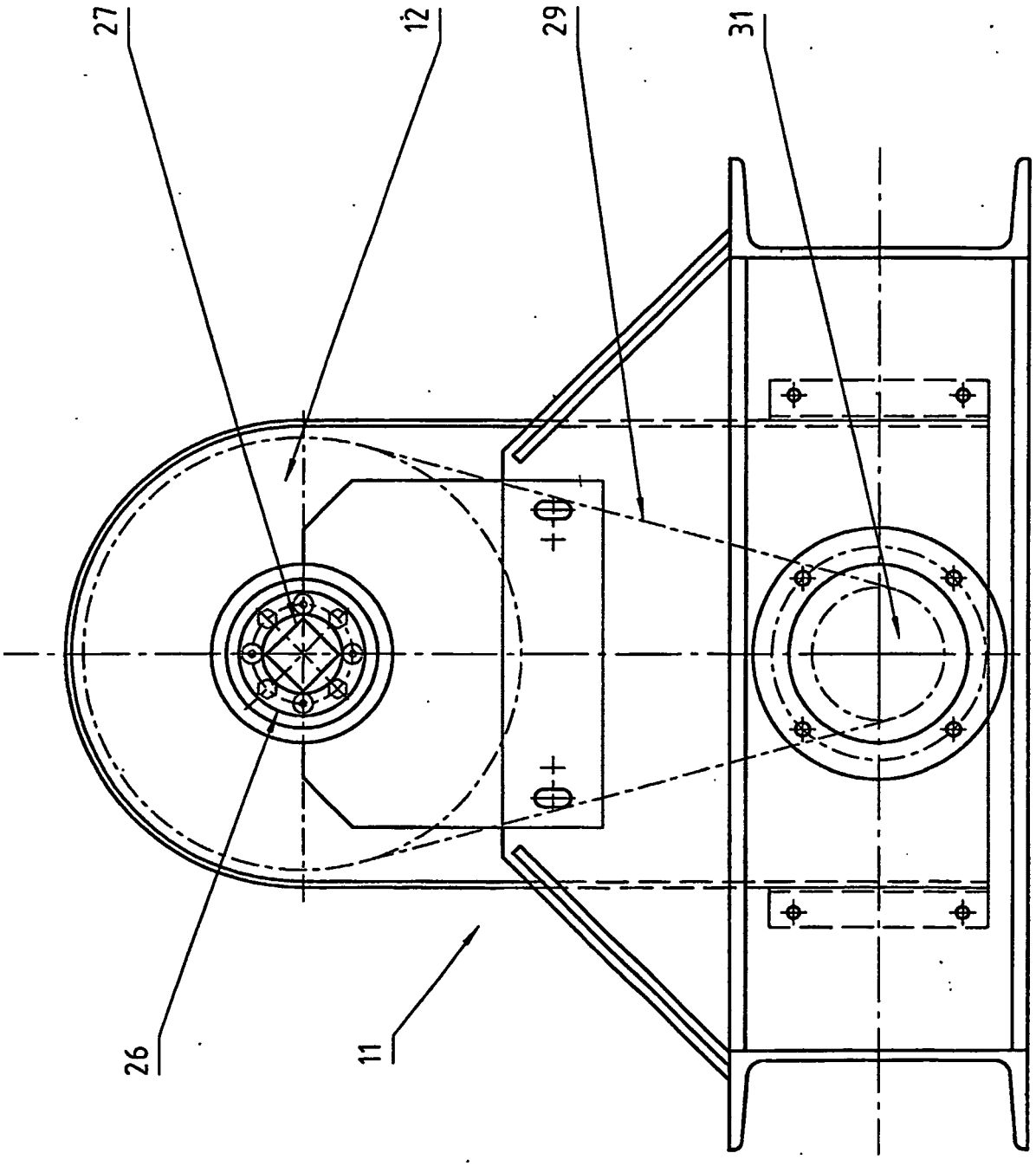


FIG. 8



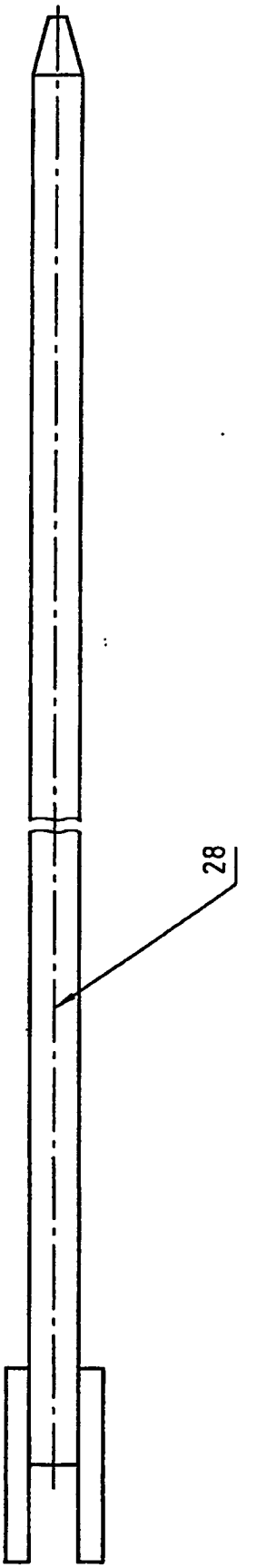


FIG. 9.

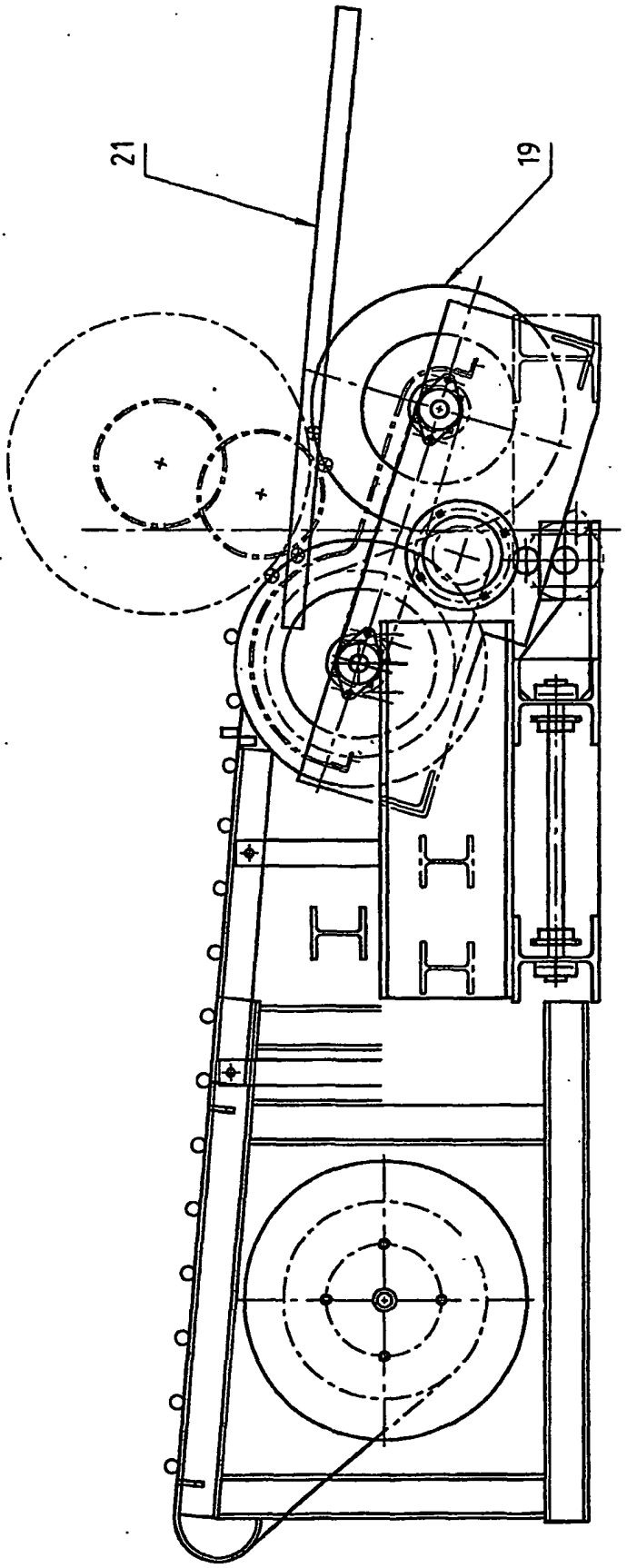


FIG. 10

REFERENCES CITED IN THE DESCRIPTION

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