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(54) **METHOD AND APPARATUS FOR THE MANUFACTURE OF CONCRETE REINFORCING ROD MESH**

VERFAHREN UND VORRICHTUNG ZUR HERSTELLUNG EINES
BETONVERSTÄRKUNGSSTABGITTERS

PROCEDE ET APPAREIL DE FABRICATION DE TREILLIS DE TIGES D'ARMATURE DE BETON

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(73) Proprietor: **Stema Engineering A/S
3490 Kvistgaard (DK)**

(72) Inventor: **PEDERSEN, Hans
DK-3000 Helsingør (DK)**

(74) Representative: **Nielsen, Leif et al
Patrade A/S
Fredens Torv 3A
8000 Århus C (DK)**

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• **PATENT ABSTRACTS OF JAPAN vol. 199, no. 908
30 June 1999 & JP 11 057 917 A (SHIMIZU CORP)
02 March 1999**

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Description

[0001] The invention relates to a method for the manufacture of concrete reinforcing rod mesh consisting of longitudinally extending steel supporting bands and transversely extending reinforcing irons being fastened to the steel supporting bands.

[0002] By known methods and apparatuses a binding wire of soft irons are used, said wire being so flexible that it easily can be wound around reinforcing iron and steel supporting band and thus connect the two parts. The modest strength properties of the wire, however, causes a relatively loose and weak connection established between the reinforcing iron and the steel supporting wire. This results in a rod mesh in a loosely rolled-up form, similar to a loosely rolled-up carpet roll, which is quite flexible transversely to its longitudinal axis and thus difficult to handle during transport and during its positioning on the point of use.

[0003] An apparatus having the same drawback is known from German utility model No. DE 94 12 405 U1.

[0004] For each connection the two leg ends of a clip (Halteclips, Drahtbügel, Montageclips, Befestigungssclips) are arranged from the upper side of a reinforcing iron with one leg on each side thereof and further through already punched holes in a supporting band and are fastened thereto when the intermediate body part of the clip extending between the two legs of the clip arranged at a distance from the sides of the reinforcing iron, has been arranged to rest against less than 180° of the upper side of the circumference of the reinforcing iron.

[0005] It appears that the body part of the clip consisting of wire according to the utility model, cf. Fig. 3, with its intermediate part is pressing against less than 180° of the upper side of a reinforcing iron with a relatively low force which depends only on the bending forces exerted by the wire parts in body and legs of the clip. Thus, the reinforcing iron is not efficiently supported on its sides of the clip which thus with a correspondingly weak grip keeps the reinforcing iron in its position on the supporting band. This also results in a loosely rolled-up rod mesh which is relatively easily flexible transversely to its longitudinal axis and is thus difficult to handle during transport and during its positioning on the site of use.

[0006] It is the purpose of this invention to eliminate this drawback.

[0007] According to the invention this is achieved by a method being characterized in that the fastening is made by pressing a U-shaped cramp - where the body part of the U is rectilinear - with its leg ends through the steel supporting band and tightly around the reinforcing iron, so that the cramp with its two leg ends preferably is brought to surround a part of the circumference of the reinforcing iron tightly from each side and with its body part to extend preferably in the longitudinal direction of the steel supporting band.

[0008] Thus, a far more firm and strong connection between the steel supporting band and the reinforcing iron

is achieved than by the known methods, since the cramp consists of an iron alloy with strength properties which causes articles such as rod mesh a far minor flexibility than with binding wire and makes a rolled up rod mesh far more rigid with the advantages resulting therefrom namely that the rod mesh roll will be less inclined to bend transversely to its longitudinal axis during transport and positioning.

[0009] In a preferred embodiment of the method according to the invention the two leg ends of the cramp is guided by the inner wall shape of a counter punch matrix so that the two leg ends of the staple are caused side by side to extend parallelly and tightly around the reinforcing iron by the fastening, whereby the cramp preferably is dispensed from a staple pistol with cramp supply, which pistol is stationarily arranged at one side of the steel supporting band and is cooperating with the counter punch matrix arranged at the opposite side of the steel supporting band for attaching the reinforcing iron against the steel supporting band and the cramp pistol and for the guiding the cramp leg ends during the fastening operation.

[0010] Thus is achieved relatively large contact surfaces between the cramp, the steel reinforcing band and the reinforcing iron and a resulting firm and strong connection between said parts.

[0011] In a preferred embodiment of the method according to the invention the two leg ends of the cramp is guided by the inner wall shape of a counter punch matrix so that the two leg ends of the cramp are caused to extend parallelly tightly around the reinforcing iron by the fastening whereby each cramp is dispensed from a cramp pistol with cramp supply, said pistol being displaceably arranged along one side of the steel supporting band and cooperates with a counter punch matrix being displaceable along the opposite side of the steel supporting band for the attachment of the reinforcing iron against the steel supporting band and the cramp pistol and for guiding the cramp leg ends during the fastening operation.

[0012] In a preferred embodiment of the method according to the invention the reinforcing irons are supplied from a magazine by a supply device to the side of the steel supporting band opposite the cramp pistol and each iron is attached against the steel supporting band and the cramp pistol by pressure from the counter punch matrix until the cramp pistol has shot a cramp in place.

[0013] Immediately thereupon the rod mesh can be advanced one length of feed and the next fastening operation can be carried out.

[0014] The invention also relates to an apparatus for carrying out the method according to the invention, namely an apparatus for use by the manufacture of concrete reinforcing rod mesh and comprising of in its longitudinal direction extending steel supporting bands and transversely extending reinforcing irons being fastened to the steel supporting irons.

[0015] The apparatus according to the invention is characterized in that it has means for said fastening by

cramp insertion operation and the fastening is adapted to take place by forcing or pressing a U-shaped cramp with a rectilinear body part with its leg ends through the steel supporting band and tightly around the reinforcing iron and with said body part extending preferably in the longitudinal direction of the steel supporting band. Thus, an apparatus for fulfilling the purpose of the method is achieved.

[0016] 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 cramp station with a dispensing slide in its position during the rolling up of the rod mesh,

Fig. 5 an embodiment for total or partly automatized supply of reinforcing iron and a key sketch, from the top showing a magazine arranged above the cramp stations and a supply device for reinforcing irons, and from the bottom showing a cramp pistol and a counter punch matrix arranged on the opposite side of the band,

Fig. 6 a driving ring around which the rod mesh should be rolled up,

Fig. 7 an axial section of a gear box,

Fig. 8 a gear box seen from the outer end and in an axial direction relatively to the apparatus,

Fig. 9 a tube shaped driving shaft with square section, and

Fig. 10 a cross section of a cramp station with a dispensing slide in its lowered position.

[0017] In Figs. 1 and 2 respectively a band roll 1 with steel supporting band 2 is shown to the left, said roll passing a cramp station 13 where the reinforcing irons 4 are fastened by cramps for forming a rod mesh 3 shown in its rolled-up condition at the left side.

[0018] Fig. 3 shows an apparatus 6 comprising three modules, namely a left end module 7, a right end module 9 and an intermediate module 8.

[0019] Each module 7, 8, 9 is provided with two cramp stations 13. At the end modules 7 and 9 the cramp stations 13 closest to the ends of the apparatus 6 are mutually displaceable in the longitudinal direction of the apparatus so that the mutual distance of the cramp stations 13 in each end module 7, 9 can be varied whereby the distance from the outer cramp stations 13 to the ends of the apparatus can be varied. Thus it is achieved that the length of the free ends of the reinforcing irons 4 at the sides of the rod mesh 3 can be varied.

[0020] At each end of the apparatus 6 a gear box 11 with gear wheel 12 is arranged which is able to drive the rolling up of the rod mesh 3.

[0021] Fig. 4 shows at the left side of the cramp station 13 a band roll 1 for a steel supporting band 2. The steel

supporting band 2 can be drawn up to and along a cramp mounting block 14 forward to a rod mesh rolling up device 19. Above the cramp stations 13 is arranged a supporting beam 17 with a shelf 16 on which a bunch of rods of reinforcing iron 4 can be placed. A number of rods therefrom can be arranged in a magazine 15 immediately above the cramp mounting block 14. The connecting by cramps of reinforcing iron 4 to the steel supporting band 2 is carried out by a number of reinforcing irons 4 which are arranged transversely to the steel supporting band 2 being arranged on the supporting beam 17 of the cramp mounting block 14 and then cramped thereto. Thereafter the steel supporting band 2 is drawn forward a predetermined length of feed and connecting by cramps can continue or the net rolling up can be finished.

[0022] The net rolling-up device 22 is shown to the right in Fig. 4. It consists of a driving ring 18 being driven via a shaft from the gear wheel 12 and to which a front or outermost reinforcing iron 4 on the steel supporting band 2 of the rod mesh 3 has been attached, and around which the steel supporting band 2 with cramped reinforcing irons 4 is rolled up. The driving ring 18 may as shown follow upwards in accordance with the rolling up until a fully rolled up rod mesh 3 is achieved. During the rolling up the driving ring 18 is supported during its rotation via the rod mesh 3 by a support 19 travelling with the outer circumference of the rod mesh, said support 19 may consist of two car rubber wheels 19. A chain wheel 23 with a friction hub being driven via a shaft from the gear box 11 may bring the car rubber wheel 19 closest to the band roll 1 in rotation clockwise or anticlockwise and may thus contribute to the rod mesh 2 being tightly wound up. At the following-on support 19 is arranged a dispensing slide 21 along with the finished rod mesh 3 may roll when the following-on support 19 is lowered.

[0023] The arrangement of the reinforcing iron 4 on steel supporting bands 2 can be made manually, partly automatic or fully-automatic. An embodiment for fully or partly automatic arrangement is shown in Fig. 5. Here the upper sketch shows a magazine 15 and a supply device 30 for reinforcing iron to be arranged on the steel supporting band 4. The supply devices 30 are arranged between and outside the cramp stations 13 and are lifted when the rod mesh 3 is moved. The lower sketch shows a cramp station 13 where a cramp 5 from a cramp pistol 33 has been shot through the steel supporting band 2 against the inner wall form of a counter punch matrix 32 so that the two leg ends of the cramp 5 are brought into parallel extension tightly around the reinforcing iron 4 by the fastening. The counter punch matrix 32 is lifted while reinforcing irons 4 are arranged on the steel supporting band 2 and during the movement thereof. The apparatus is driven intermittently so that all parts are moved in mutual synchronism.

[0024] Fig. 6 shows a driving ring 18 with a square hub hole 34 with one side a little larger than the cross section of a tubular driving shaft 28. A hook 35 is fastened to the circumference of the driving ring 18 to which a reinforcing

iron 4 on the rod mesh 3 can be fastened, whereupon the rolling-up of the rod mesh 3 can be initiated with the point of the hook pointing in the rolling-up direction.

[0025] Figs. 7 and 8 show the driving motor 24 of the gear box 11 and driving a friction hub 31. A chain or belt drive 29 therefrom drives a gear wheel 12 arranged on a hollow shaft 26 with a square driving hole 27 through which the tubular driving shaft 28 with the square cross section (cf. Fig. 9) for a driving ring 18 can be inserted.

[0026] Fig. 9 shows a tubular driving shaft 28 with square cross section which is a little smaller than the cross section of the driving hole 27 in the gear wheel 12 and the cross section of the hub hole 34 in the driving ring 18.

[0027] Fig. 10 shows the cramp station 13 with lowered dispensing slide 21.

[0028] Before the rod mesh 3 is released from the net rolling device 22 and is guided to the dispensing slide 21 it should be fastened against unintended unrolling. This can be carried out by locking or winding it with wire or clips or providing it with hooklike locking means or the like. The driving rings 18 and cooperating auxiliary supporting rings arranged inside the rod mesh roll remain in the finished roll and may be returned to the manufacturer after the positioning of the rod mesh.

[0029] By the manufacture the rod mesh 3 is guided to a rod mesh rolling device where the end forwarded from the steel supporting bands 2 synchronously are subject to a pulling force in the circumferential direction of at least two driving rings 18, said driving rings 18 are arranged practically coaxially as inner rod mesh rolling drive unit for the rod mesh 3 and having an outer diameter corresponding to the desired inner diameter for the rod mesh 3. Each of the driving rings 18 is supported by a support 19 following the circumference of the rod mesh 3 which supports the driving ring 18 during its rotation via the rod mesh 3 being rolled up. Thus it is achieved that the rod mesh during its rolling-up is not so inclined to bend across its longitudinal axis and therefore is easier to handle lateron.

[0030] The following-on support 19 of the driving rings 18 may as mentioned take place by a couple of supporting wheels 19 arranged at mutual axial distance, such as car rubber wheels. Thus it is achieved that the full pulling force is exploited for tightening the rolling-up of the rod mesh.

[0031] The outermost steel supporting bands 2 for the manufacture of the rod mesh 3 are each supported by a combined band guiding and cramping station 13 which is displaceably arranged in the transverse direction of the rod mesh 3 for adjustment of the predetermined protruding reinforcement iron end. Thus, a predetermined protruding length of the ends of the reinforcing irons at the sides of the rod mesh can be achieved.

[0032] The rotation of the rod mesh 3 is locked preferably by each rotation stop during the manufacture of the rod mesh 3. Thus it is achieved that the tight rolling-up of the rod mesh is maintained.

[0033] The rod mesh 3 which after the rolling-up is fastened to itself, e.g. by means of wire, is then as a finished unflexible roll guided downwards and is resting on the supporting wheels 19 by the lowering thereof, until the rod mesh roll 3 is delivered for the sliding or rolling down on at least two from the cramp station 13 downwardly inclining supporting rods 17 for delivery to a conveyor band, a trolley, in a transport container or a storage yard.

[0034] The invention is not limited to the embodiments described in this application. Further embodiments are possible within the scope of the invention, which is defined by the appended claims.

Claims

1. Method for the manufacture of concrete reinforcing rod mesh (3) comprising of longitudinally extending steel supporting bands (2) and transversely extending reinforcing irons (4) being fastened to the steel supporting bands (2), **characterized in that** the fastening is made by pressing a U-shaped cramp (5) with a rectilinear body part with its leg ends through the steel supporting band (2) and tightly around the reinforcing iron (4), so that the cramp (5) with each of its leg ends is brought to surround a part of the circumference of the reinforcing iron (4) from each side and with its body part to extend preferably in the longitudinal direction of the steel supporting band.
2. Method according to claim 1, **characterized in that** the two leg ends of the cramp (5) is guided by the inner wall shape of a counter punch matrix (32) so that the two leg ends of the cramp (5) side by side is brought to a parallell extension tightly around the reinforcing iron (4) by the fastening, whereby the cramp (5) preferably is dispensed from a cramp pistol (33) with a cramp supply, said pistol being arranged stationarily at one side of the steel supporting band (2) and cooperating with the counter punch matrix (32) at the opposite side of the steel supporting band (2) for attachment of the reinforcing iron (4) against the steel supporting band (2) and the cramp pistol (33) and for the guiding of the cramp leg ends during the fastening operation.
3. Method according to claim 1, **characterized in that** the two leg ends of the cramp (5) is guided by the inner wall shape of a counter punch matrix (32) so that the two leg ends of the cramp (5) are brought to a parallell extension tightly around the reinforcing iron (4) by the fastening, whereby each cramp (5) is dispensed from a cramp pistol (33) with cramp supply, said pistol being arranged displaceably along the steel supporting band (2) at one band side and cooperating with a counter punch matrix (32) arranged at the opposite band side and also being dis-

placeable along the band, said matrix being arranged for the attachment of the reinforcing iron (4) against the band and the cramp pistol (33) and for the guiding of the cramp leg ends during the fastening operation.

4. Method according to any one of the preceding claims, **characterized in that** the reinforcing irons (4) are supplied from a magazine by a supply device (30) to the side of the steel supporting band (2) opposite the cramp pistol (33) and each iron is attached against the steel supporting band (2) and the cramp pistol (33) by a pressure from the counter punch matrix (32) until the cramp pistol has shot a cramp in place.
5. Apparatus for use by the manufacture of concrete reinforcing rod mesh (3) comprising of longitudinally extending steel supporting bands (2) and transversely extending reinforcing irons (4) being fastened to the steel supporting bands (2), **characterized in that** it has means for said fastening by connecting by cramps, and the fastening is adapted to take place by forcing or pressing a U-shaped cramp (5), where the body part of the U is rectilinear, with its leg ends through the steel supporting band (2) and tightly around the reinforcing iron (4) and with said body part extending preferably in the longitudinal direction of the steel supporting band.

Patentansprüche

1. Verfahren zur Herstellung von Betonarmierungsrollennetz (3) umfassend in Längsrichtung verlaufende Stahlträgerbänder (2) und querverlaufende Armierungseisen (4), die an den Stahlträgerbändern (2) befestigt werden, **dadurch gekennzeichnet, dass** die Befestigung durch eine U-förmige Klammer (5) mit geradlinigem Körperteil mit seinen Beinenden durch das Stahlträgerband (2) und dicht um das Armierungseisen (4) herum erfolgt, so dass die Beinenden der Klammer (5) derart angebracht werden, dass sie einen Teil des Umkreises des Armierungseisens (4) von beiden Seiten umgeben und ihr Körperteil sich vorzugsweise in Längsrichtung des Stahlträgerbandes erstreckt.
2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die Enden der Beinenden der Klammer (5) von der Innenwandform einer Auflagermatrix (32) derart geführt werden, dass die zwei Beinenden der Klammer (5) bei der Befestigung dazu gebracht werden, parallel nebeneinander dicht um das Armierungseisen (4) zu verlaufen, wobei die Klammer (5) vorzugsweise von einem Tacker (33) mit einem Klammermagazin (5) abgegeben wird, wobei der Tacker fest an einer Seite des Stahlträgerbandes (2)

angeordnet ist und zur Befestigung des Armierungseisens (4) gegen das Stahlträgerband (2) und den Tacker (33) und zur Führung der Klammerbeinenden während der Befestigung mit der Auflagermatrix (32) auf der gegenüberliegenden Seite des Stahlträgerbandes (2) zusammenwirkt.

3. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die Beinenden der Klammer (5) von der Innenwandform einer Auflagermatrix (32) derart geführt werden, dass die zwei Beinenden der Klammer (5) bei der Befestigung dazu gebracht werden, parallel nebeneinander dicht um das Armierungseisen (4) zu verlaufen, wobei jede Klammer (5) von einem Tacker (33) mit einem Klammermagazin abgegeben wird, wobei der Tacker versetzbar entlang des Stahlträgerbandes (2) an einer Bandseite angeordnet ist und mit einer ebenfalls entlang des Bandes versetzbaren, auf der gegenüberliegenden Bandseite angeordneten Auflagermatrix (32) zusammenwirkt, wobei die Matrix zur Befestigung des Armierungseisens (4) gegen das Band (2) und den Tacker (33) und zur Führung der Klammerbeinenden während der Befestigung angeordnet wird.
4. Verfahren nach jedem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Armierungseisen (4) von einem Magazin durch eine Zuführungsvorrichtung (30) zur dem Tacker (33) gegenüberliegenden Seite des Stahlträgerbandes (2) zugeführt werden und gegen das Stahlträgerband (2) und jedes Eisen den Tacker durch einen Druck von der Auflagermatrix (32) bis Festsetzung einer Klammer durch den Tacker festgehalten werden.
5. Gerät zur Anwendung bei der Herstellung von Betonarmierungsrollennetz (3) umfassend in Längsrichtung verlaufende Stahlträgerbänder (2) und querverlaufende Armierungseisen (4), die an den Stahlträgerbändern (2) befestigt sind, **dadurch gekennzeichnet, dass** es Befestigungsmittel zur Fixierung durch Klammern aufweist, und dass die Befestigung derart vorgesehen ist, dass sie durch Drücken einer U-förmigen Klammer (5), bei der der Körperteil der U geradlinig ist, durch das Stahlträgerband (2) mit ihren Beinen und dicht um das Armierungseisen (4) herum und mit dem Körperteil vorzugsweise in Längsrichtung des Stahlträgerbandes verlaufend erfolgt.

Revendications

1. Procédé de fabrication de treillis de tiges d'armature de béton (3) comprenant des bandes de support en acier (2) qui s'étendent longitudinalement et des fers d'armature (4) qui s'étendent transversalement et sont fixés aux bandes de support en acier (2), **ca-**

ractérisé en ce que la fixation s'effectue en pressant les extrémités de pattes d'un crampon ayant une forme de U (5) et un élément de corps rectiligne à travers les bandes de support en acier (2) et bien autour des fers d'armature (4) de manière à ce que le crampon (5) avec chacune des extrémités de pattes est amené pour entourer une partie de la circonférence du fer d'armature (4) de chaque côté et avec son élément de corps s'étendant de préférence dans la direction longitudinale de la bande de support en acier.

2. Procédé selon la revendication 1, **caractérisé en ce que** les deux extrémités de pattes du crampon (5) sont guidées par la forme de la paroi intérieure d'une matrice de contre-pression (32) de manière à ce que les deux extrémités de pattes du crampon (5), côte à côte, sont amenées à une extension parallèle et bien pressées autour des fers d'armature par la fixation, le crampon (5) étant fourni de préférence par un pistolet pour crampons (33) avec un fournisseur de crampons, ledit pistolet étant aménagé de façon fixe à l'un des côtés de la bande de support en acier (2) et coopérant avec la matrice de contre-pression (32) à l'autre côté de la bande de support en acier (2) pour une fixation des fers d'armature (4) à la bande de support en acier (2) et le pistolet pour crampons (33) et pour le guidage des extrémités de pattes du crampon lors de l'opération de fixation.
3. Procédé selon la revendication 1, **caractérisé en ce que** les deux extrémités de pattes du crampon (5) sont guidées par la forme de la paroi intérieure d'une matrice de contre-pression (32) de manière à ce que les deux extrémités de pattes du crampon (5) sont amenées à une extension parallèle et bien pressées autour des fers d'armature par la fixation, chaque crampon (5) étant fourni par un pistolet pour crampons (33) avec un fournisseur de crampons, ledit pistolet étant aménagé de façon déplaçable le long de la bande de support en acier (2) à une côté de la bande et coopérant avec la matrice de contre-pression (32) aménagée à l'autre côté de la bande et étant déplaçable aussi le long de la bande, ladite matrice étant aménagée pour la fixation des fers d'armature (4) à la bande et le pistolet pour crampons (33) et pour le guidage des extrémités de pattes du crampon lors de l'opération de fixation.
4. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les fers d'armature (4) sont fournis à partir d'un magasin par un dispositif d'alimentation (30) au côté de la bande de support en acier (2) et à l'opposé du pistolet pour crampons (33) et chaque fer est fixé à la bande de support en acier (2) et le pistolet pour crampons (33) par une pression venant de la matrice de contre-

pression (32) jusqu'à ce que le pistolet pour crampons a tiré un crampon en place.

5. Appareil pour une utilisation à la fabrication de treillis de tiges d'armature de béton (3) comprenant des bandes de support en acier (2) qui s'étendent longitudinalement et des fers d'armature (4) qui s'étendent transversalement et sont fixés aux bandes de support en acier (2), **caractérisé en ce qu'il** comprend des moyens pour ladite fixation par un raccordement des crampons, et que la fixation est adaptée pour s'effectuer par force ou par pression d'un crampon en forme de U (5), la partie de corps de l'U étant rectiligne, avec ses extrémités de pattes à travers la bande de support en acier (2) et bien autour du fer d'armature (4) et avec ladite partie de corps s'étendant de préférence dans la direction longitudinale de la bande de support en acier.

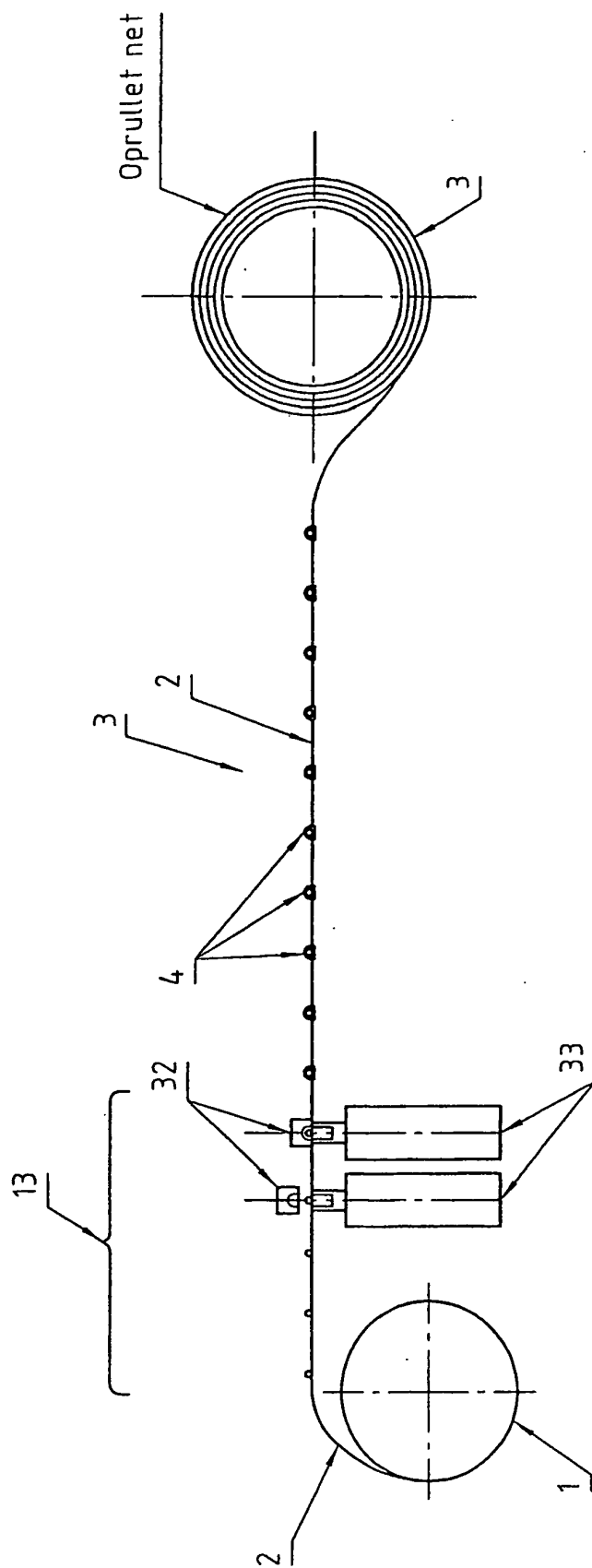


FIG. 1

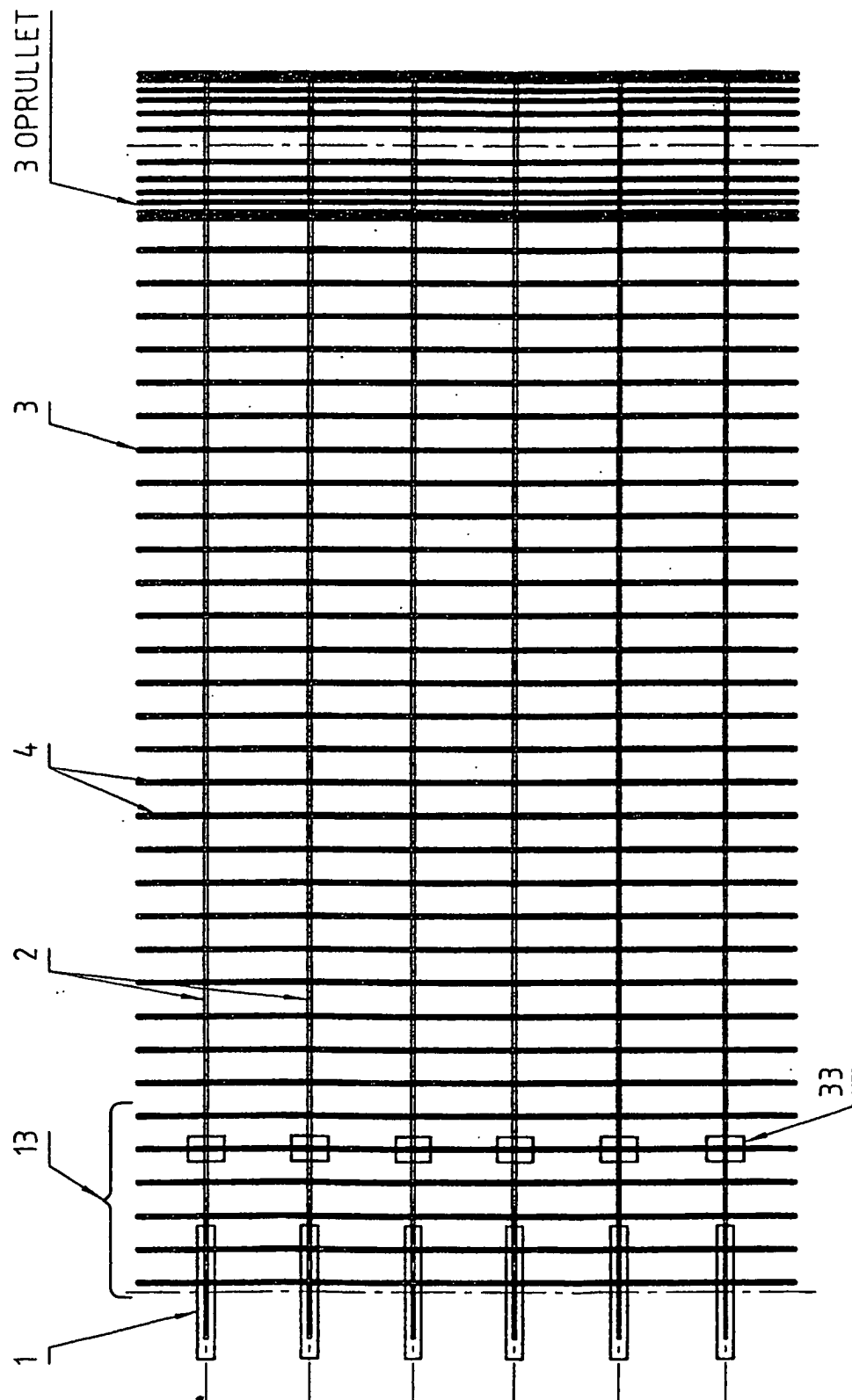


FIG. 2

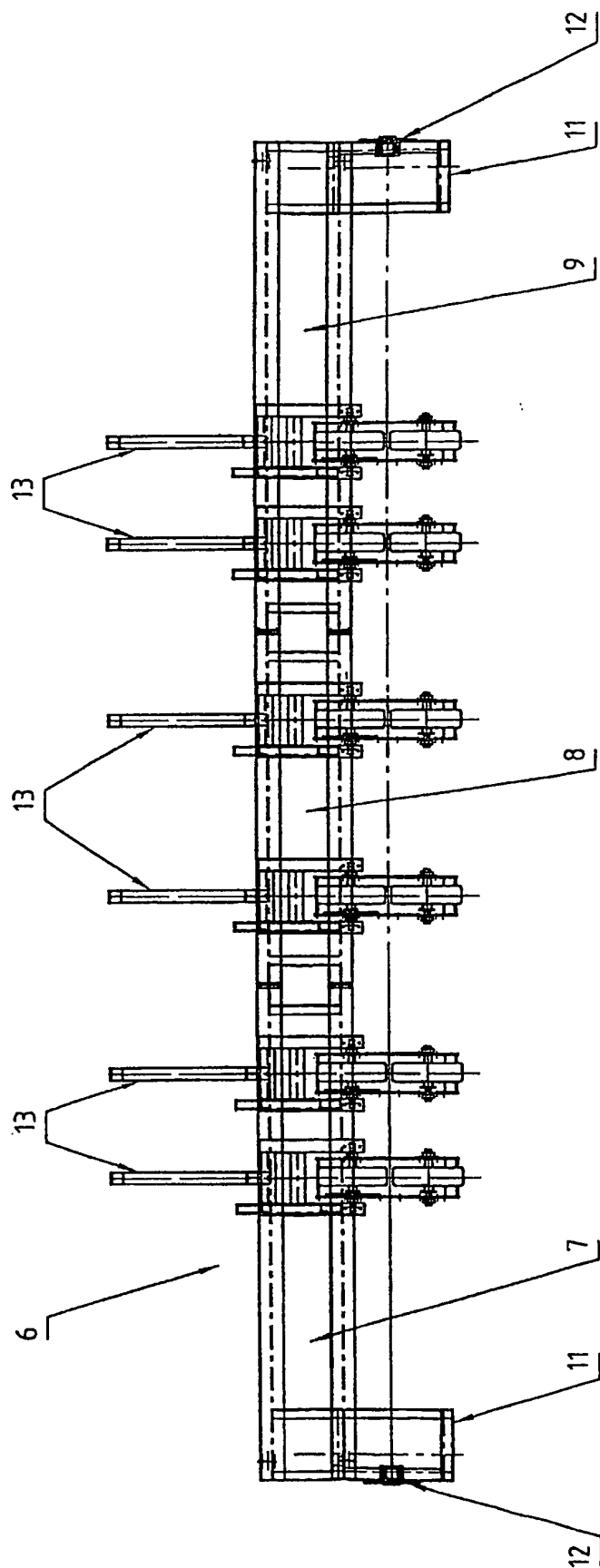


FIG. 3

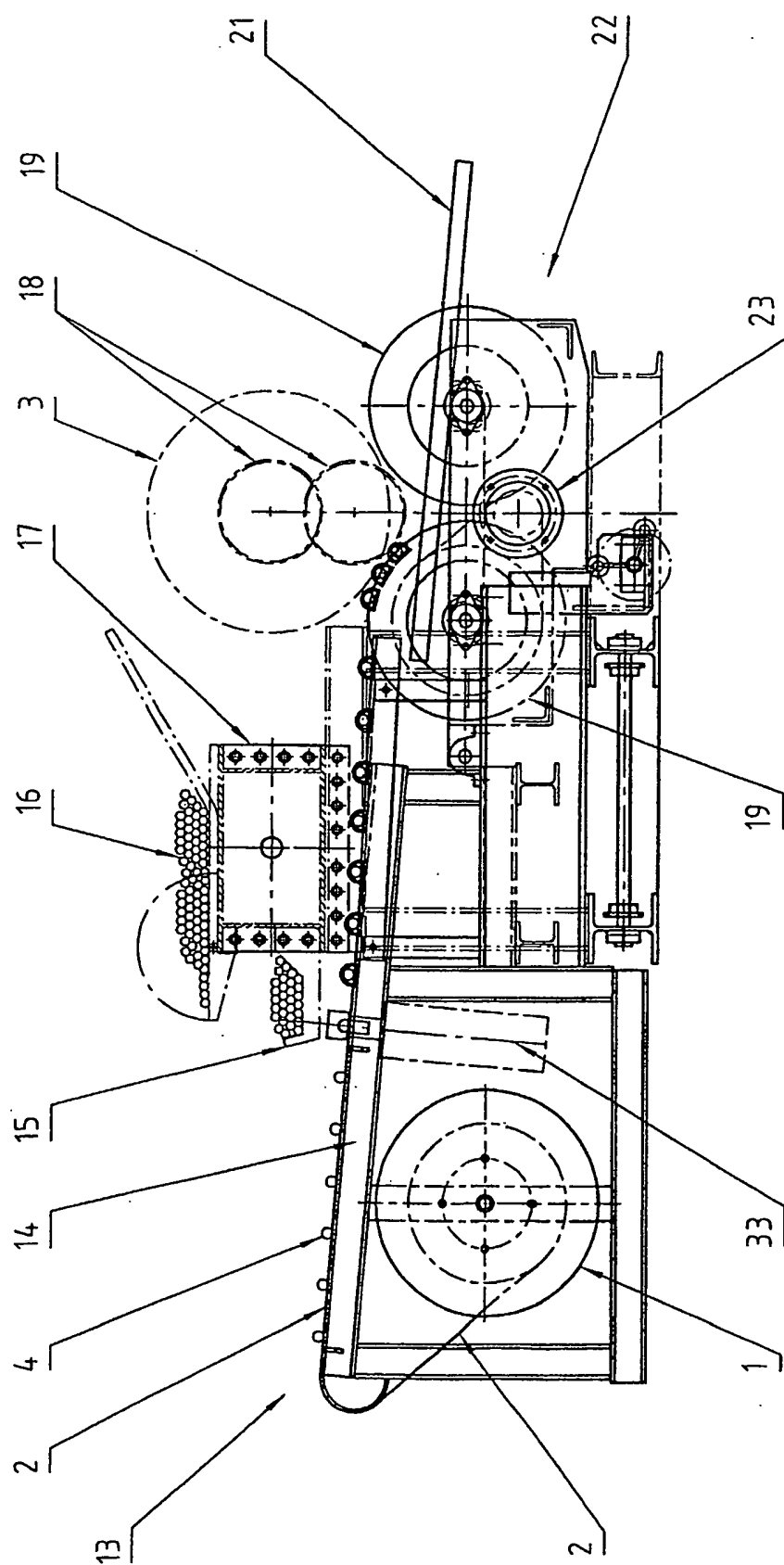


FIG. 4

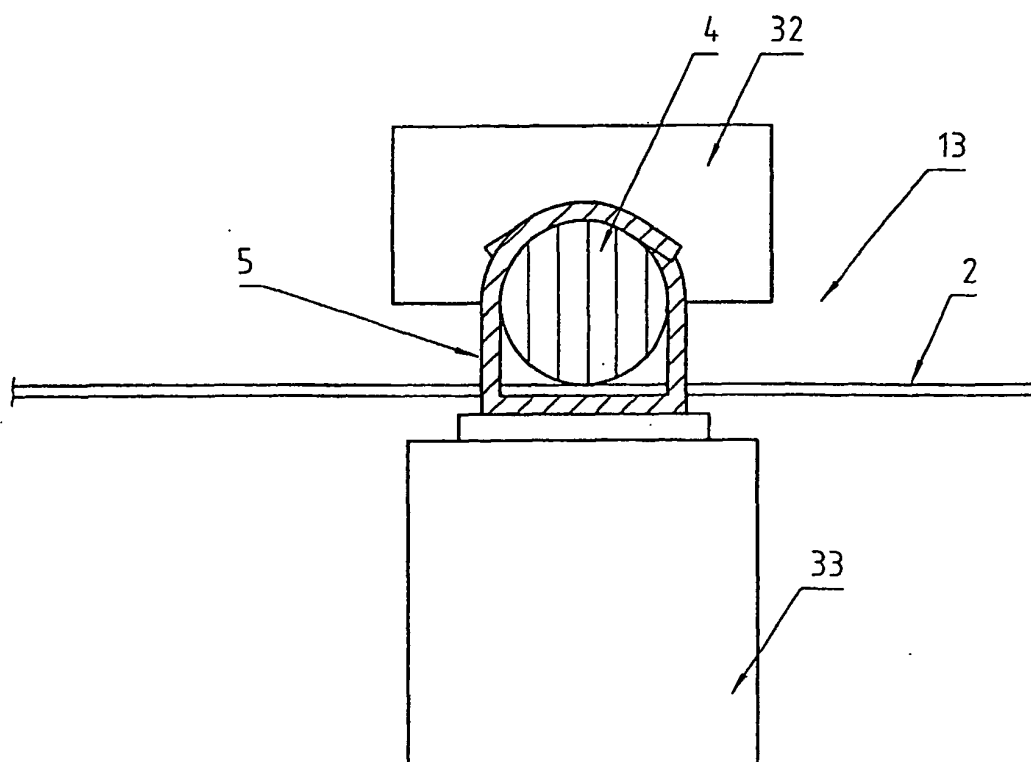
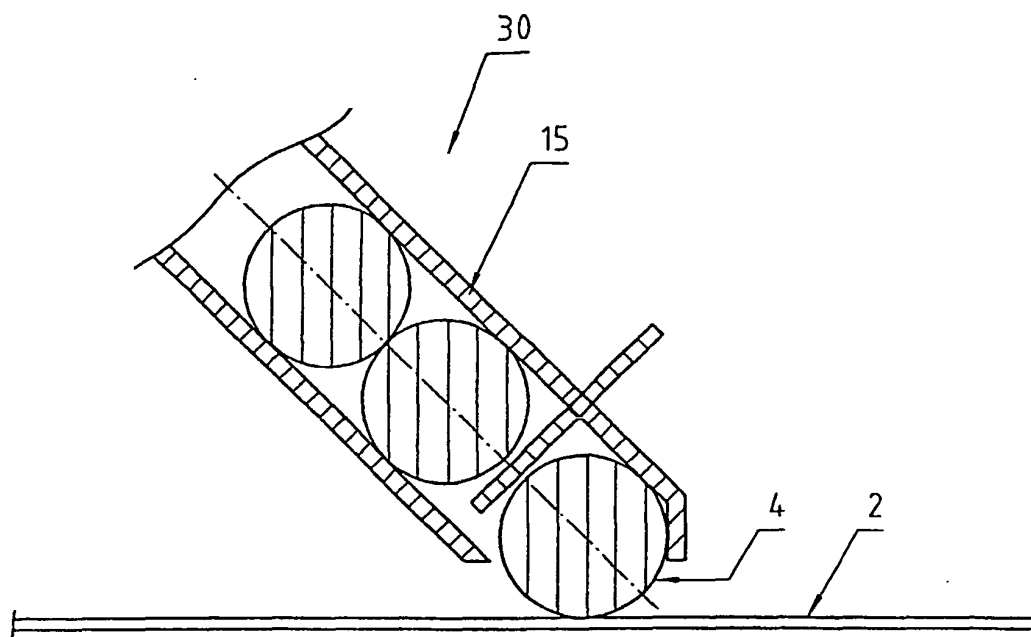


FIG. 5

FIG. 6

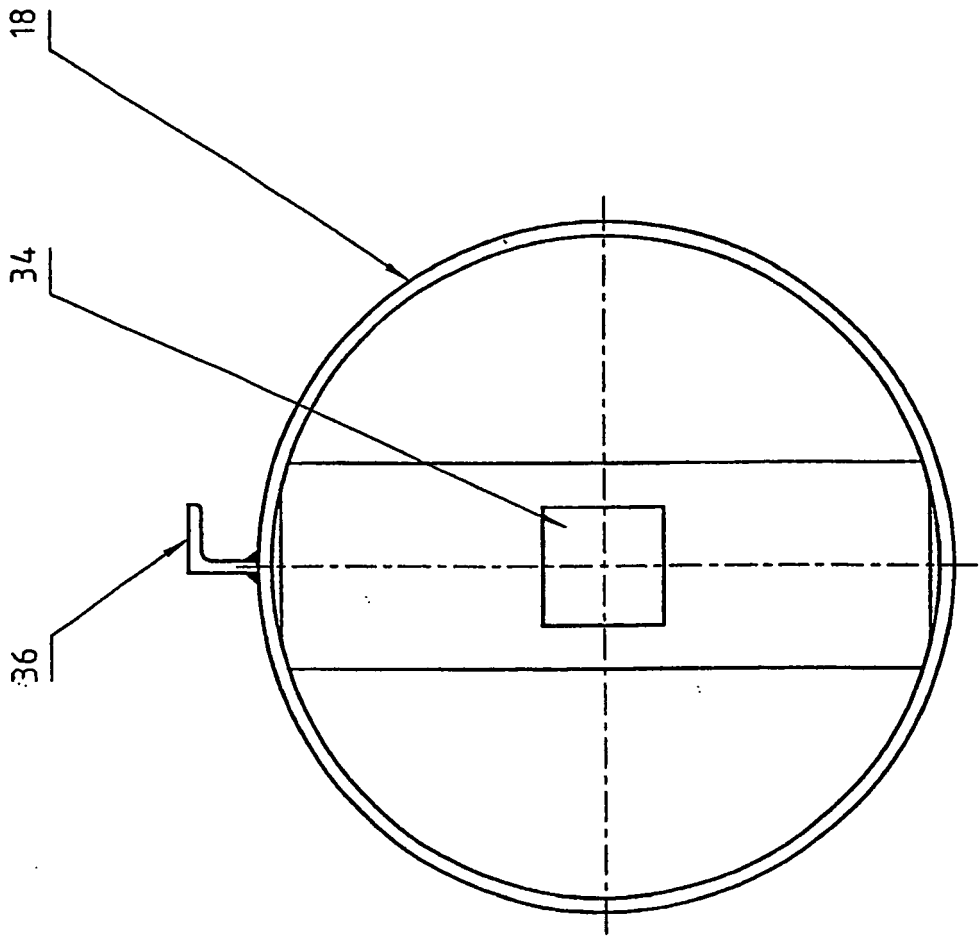


FIG. 7

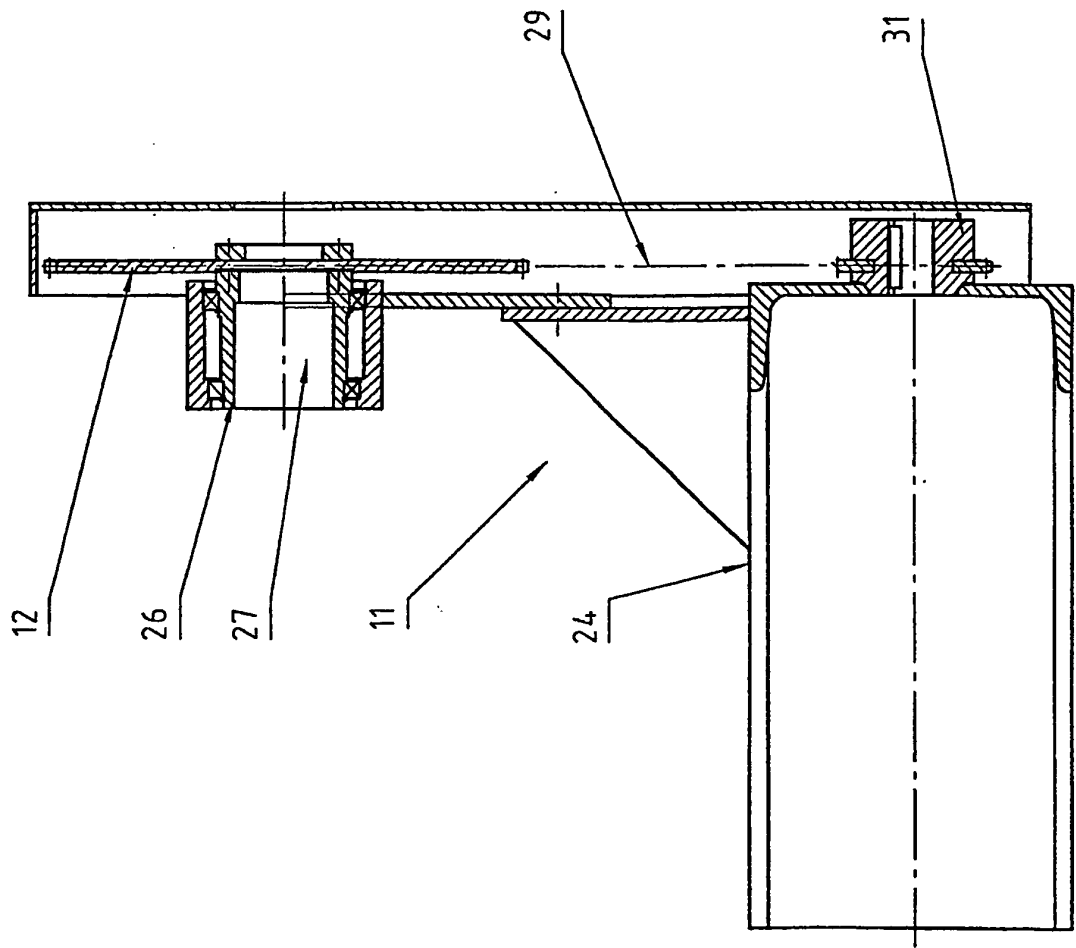
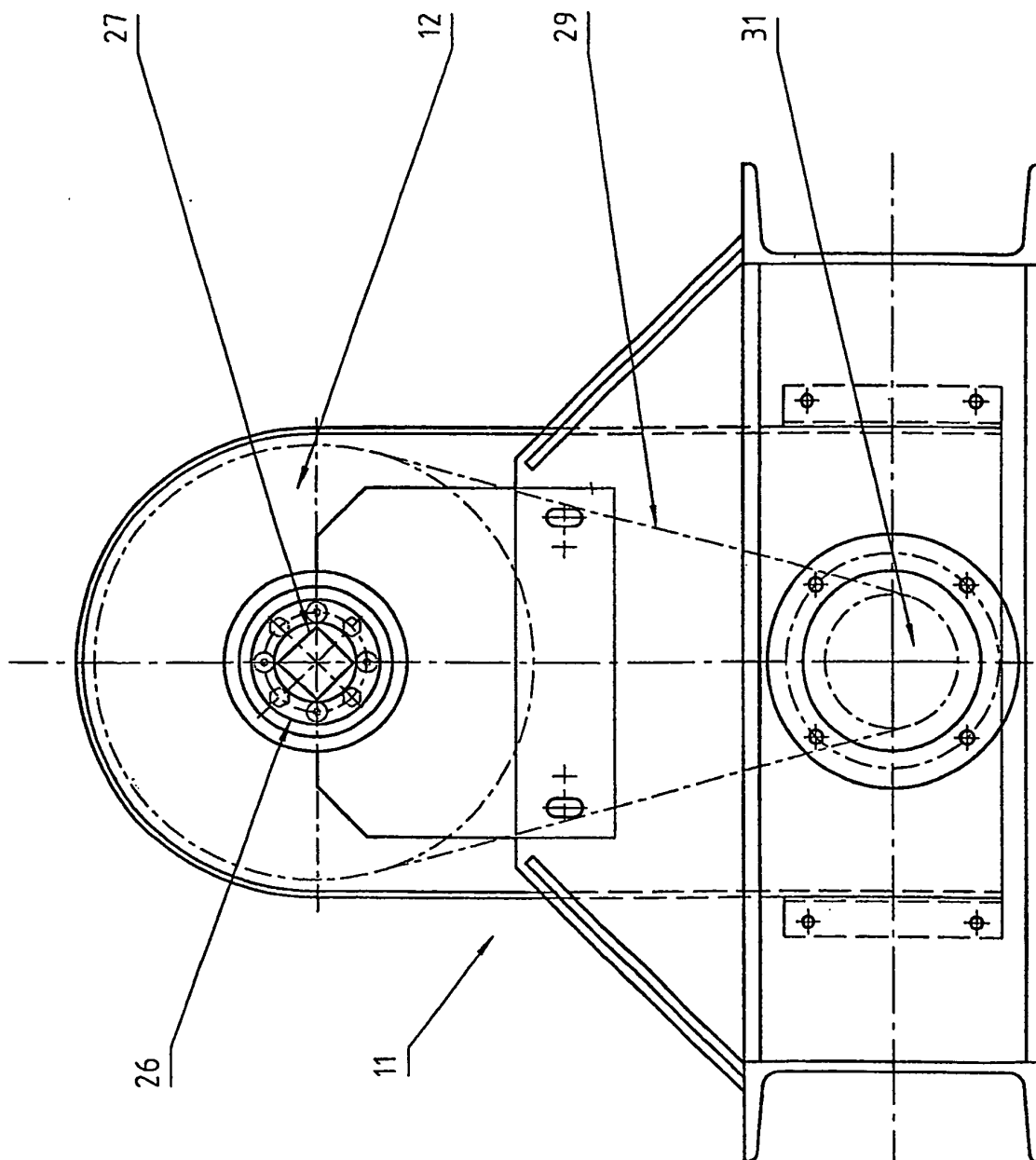


FIG. 8



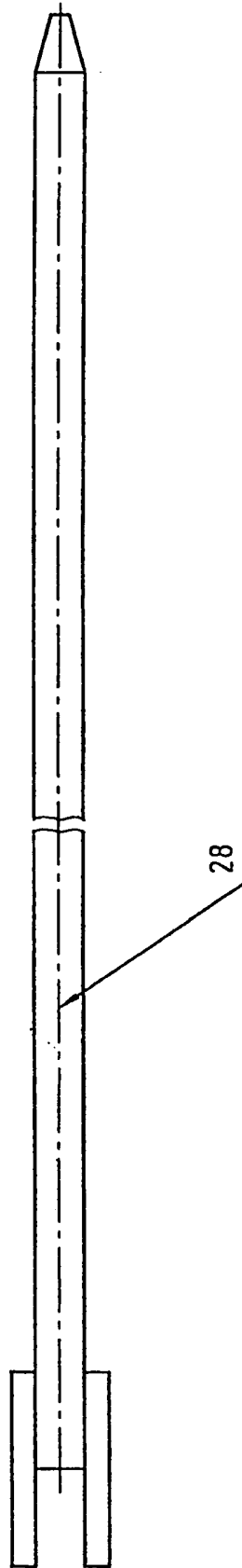


FIG. 9

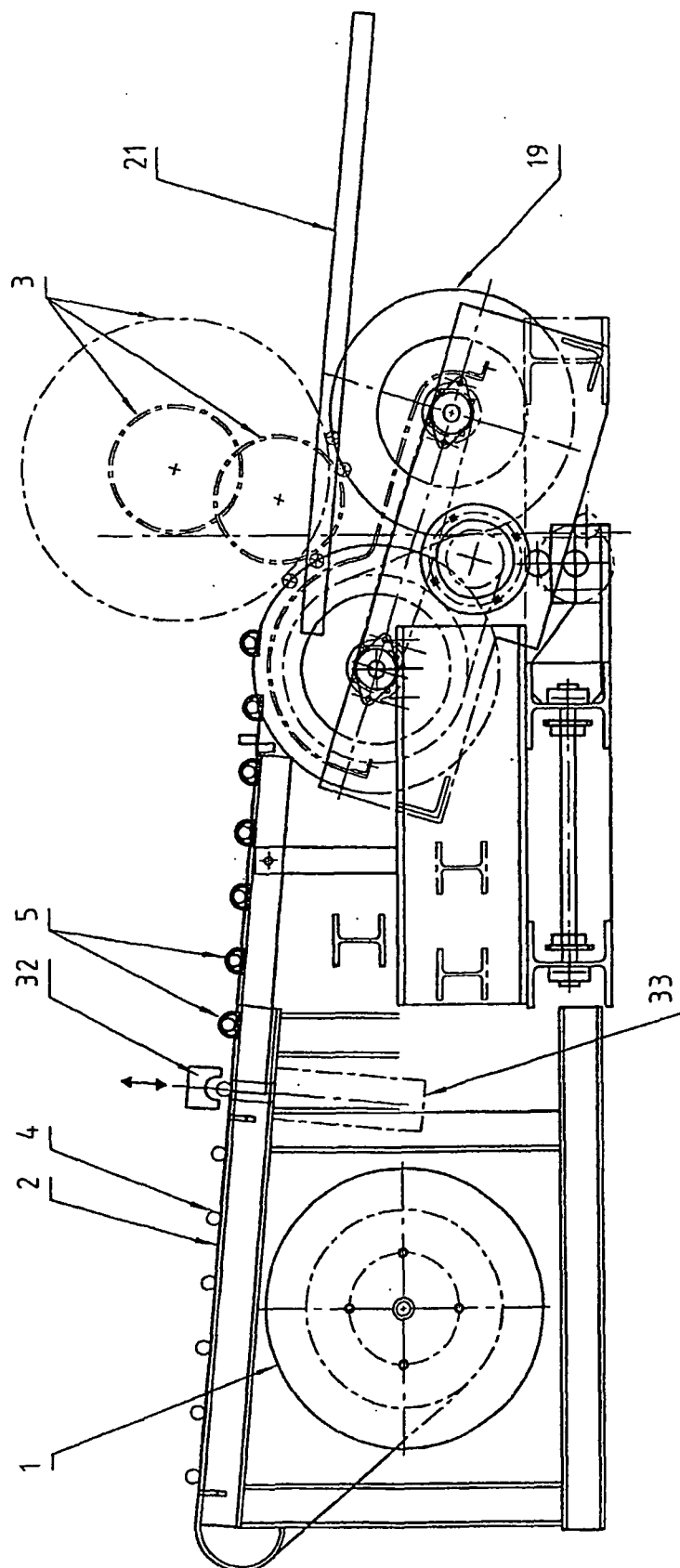


FIG. 10

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 9412405 U1 [0003]