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(54) **Wire binding machine**

(57) A wire binding machine comprising:
- a wire guide track arrangement (10), by means of which a wire is guidable in two loops around a space configured for receiving one or more objects to be bound; and
- a twisting head (32), which is rotatable for binding overlapping wire portions of said wire together by twisting and which comprises three wire guide channels (33a, 33b, 33c) extending alongside of each other through the twist-

ing head at the front end thereof.

The wire guide track arrangement comprises a guiding device (20), by means of which the leading end of the wire is guidable into one (33c) of said wire guide channels when the wire has been guided in a first loop around said space and into another one (33b) of said wire guide channels when the wire has been guided in a subsequent second loop around said space.

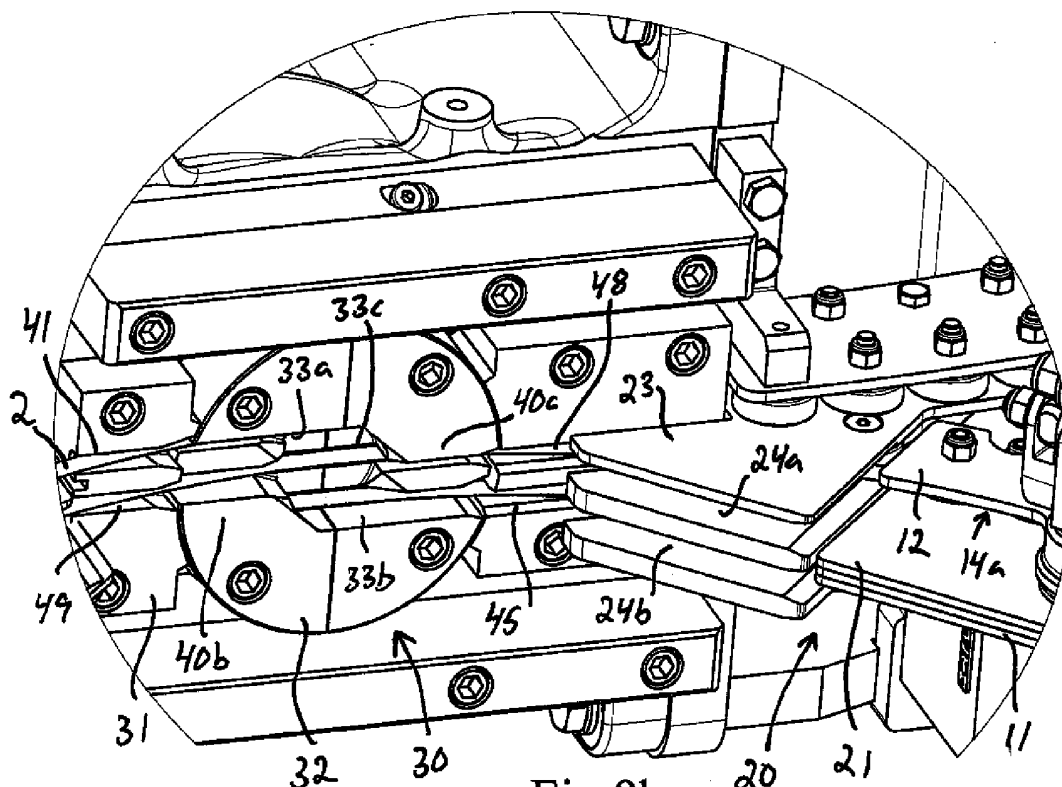


Fig 8b

Description

FIELD OF THE INVENTION AND PRIOR ART

[0001] The present invention relates to a wire binding machine according to the preamble of claim 1.

[0002] Automatic wire binding machines for applying a wire in one or more loops around an object or a bundle of objects, drawing the wire tightly around the object/bundle and thereafter tying overlapping wire portions together in order to secure the wire around the object/bundle are known in many different configurations. Different types of such wire binding machines are for instance disclosed in US 3 052 394 A and US 7 255 135 B2.

[0003] A part of a wire binding machine provided with a twisting head 101 of a previously known type is illustrated in Figs 1a and 1b. The front end of this previously known twisting head 101 is shown in Figs 1a and 1b. The twisting head 101 is rotatably mounted in a housing. A first wire guide channel 102 and a second wire guide channel 103 extend through the twisting head at the front end thereof. These wire guide channels 102, 103 extend alongside of each other. The twisting head 101 is provided with a first gripping member (not shown) for gripping and locking a wire part received in the first wire guide channel 102 and a second gripping member (not shown) for gripping and locking a wire part received in the second wire guide channel 103. When a wire is to be applied in a loop around a space configured for receiving an object or a bundle of objects to be bound, the wire is fed through the first wire guide channel 102 of the twisting head, into a wire guide arrangement (not shown), along the wire guide arrangement around said space and finally into the second wire guide channel 103 of the twisting head. The second gripping member is then actuated to grip the leading end of the wire received in the second wire guide channel 103 to thereby lock the leading end of the wire to the twisting head 101. The wire is thereafter retracted and drawn tightly around an object/bundle received in said space, whereupon the first gripping member is actuated to grip the part of the wire received in the first wire guide channel 102 to thereby lock this part of the wire to the twisting head 101. Thereafter, the twisting head 101 is rotated in order to bind the overlapping wire portions received in the wire guide channels 102, 103 together by twisting and thereby secure the wire loop to the object/bundle, whereupon the gripping members are actuated to release said wire portions from the twisting head 101. When the twisting head 101 starts to rotate, the part of the wire extending from the first wire guide channel 102 towards the feeding device of the wire binding machine is cut off by means of a cutting edge provided adjacent to the inlet opening of the first wire guide channel 102 at the interface between the twisting head and the above-mentioned housing.

[0004] When a wire is to be applied in two continuous loops around said space, a guide rail 104 is pushed forwards into a position in front of the twisting head 101, as

illustrated in Fig 1 b. In this case, the wire is fed through the first wire guide channel 102 of the twisting head, into the wire guide arrangement, along the wire guide arrangement in a first loop around said space, into a guide track 105 of the guide rail 104, into the wire guide arrangement, along the wire guide arrangement in a second loop around said space and finally into the second wire guide channel 103 of the twisting head. Before the twisting head 101 is rotated in order to bind the overlapping wire portions received in the wire guide channels 102, 103 together by twisting, the guide rail 104 has to be retracted from the area in front of the twisting head, i.e. from the advanced position illustrated in Fig 1b to the retracted position illustrated in Fig 1a. Thus, the guide rail 104 has to be moved from the retracted position to the advanced position and then back to the retracted position every time the wire is to be secured in two continuous loops around an object or a bundle of objects to be bound.

OBJECT OF THE INVENTION

[0005] The object of the present invention is to provide a wire binding machine of new and favorable design, by means of which it will be possible to secure a wire in two continuous loops around an object or a bundle of objects in a simple and rapid manner.

SUMMARY OF THE INVENTION

[0006] According to the invention, this object is achieved by a wire binding machine having the features defined in claim 1.

[0007] The wire binding machine according to the present invention comprises:

- a wire guide track arrangement, by means of which a wire is guidable in two continuous loops around a space configured for receiving one or more objects to be bound;
- a twisting device, which comprises a housing and a twisting head rotatably mounted in the housing, the twisting head being rotatable to bind overlapping wire portions of said wire together by twisting to thereby secure the wire around said one or more objects, wherein the twisting head is provided with:
 - a first wire guide channel extending through the twisting head at the front end thereof, and
 - a second wire guide channel extending through the twisting head at the front end thereof alongside of at least a part of the first wire guide channel; and
- a feeding device for feeding the wire through the first wire guide channel of the twisting head, into the wire guide arrangement, along the wire guide arrangement around said space and into the second wire

guide channel of the twisting head and subsequently retracting the wire to draw it tightly around one or more objects received in said space.

[0008] The twisting head also comprises a third wire guide channel, which extends across the twisting head at the front end thereof alongside of at least a part of the first and second wire guide channels and in the area between them. Furthermore, the wire guide track arrangement comprises a guiding device, by means of which the leading end of the wire is guidable into the third wire guide channel of the twisting head when the wire has been guided by the wire guide track arrangement in a first loop around said space and into the second wire guide channel of the twisting head when the wire has been guided by the wire guide track arrangement in a subsequent second loop around said space.

[0009] In this description and the subsequent claims, the "front end" of the twisting head refers to the end of the twisting head that faces the space configured for receiving one or more objects to be bound.

[0010] The above-mentioned third wire guide channel of the twisting head and the above-mentioned guiding device makes it possible to bind the wire in two continuous loops around an object or a bundle of objects without having to move any guide rail or other guide member into and out of the area in front of the twisting head during each binding sequence. Hereby, the binding of the wire in two continuous loops around an object or bundle of objects can be made in a more simple and rapid manner as compared to the case described above with repeated movements of a guide rail during each binding sequence. Furthermore, by the arrangement of said third wire guide channel in the twisting head alongside of the first and second wire guide channels, the leading end of the wire can be made to enter the second loop at the same level as the first loop and the leading end of the wire may thereby be guided in the same manner at the beginning of both loops. Hereby, the design of the wire guide arrangement is simplified.

[0011] According to an embodiment of the invention, said guiding device comprises a moveable guide member, which is moveable in relation to the housing of the twisting device to and fro between:

- a first position, in which the guide member is configured to guide the leading end of the wire into the second wire guide channel of the twisting head when the wire has been guided by the wire guide track arrangement in a first loop around said space; and
- a second position, in which the guide member is configured to guide the leading end of the wire into the third wire guide channel of the twisting head when the wire has been guided by the wire guide track arrangement in a first loop around said space and into the second wire guide channel of the twisting head when the wire has been guided by the wire guide track arrangement in a subsequent second

loop around said space.

The wire is consequently guided in one single loop around said space when the moveable guide member is set in said first position, and in two continuous loops around said space when the moveable guide member is set in said second position. Thus, the moveable guide member makes it possible to switch in a simple manner between a binding sequence in which the wire is bound in one single loop around an object or a bundle of objects and a binding sequence in which the wire is bound in two continuous loops around an object or a bundle of objects.

[0012] According to another embodiment of the invention, said moveable guide member is mounted to or constitutes an end section of a guide plate which extends in a curve around said space. The moveable guide member may hereby be integrated in the wire guide arrangement in a simple and space-saving manner.

[0013] Further advantages as well as advantageous features of the wire binding machine according to the present invention will appear from the following description and the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] With reference to the appended drawings, a specific description of preferred embodiments of the invention cited as examples follows below. In the drawings:

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|----|---------|--|
| 30 | Fig 1 a | is a perspective view of a part of a wire binding machine of previously known type, as seen with a guide rail in a retracted position, |
| 35 | Fig 1 b | is a perspective view corresponding to Fig 1 a, as seen with the guide rail in an advanced position, |
| 40 | Fig 2 | is a lateral view of a part of a wire binding machine according to an embodiment of the present invention, |
| 45 | Fig 3 | is a longitudinal section through a part of the wire binding machine of Fig 2, |
| 50 | Fig 4 | is a planar view from below of a twisting device included in the wire binding machine of Fig 2, |
| 55 | Fig 5 | is a first longitudinal section through a part of the twisting device illustrated in Fig 4, |
| | Fig 6 | is a second longitudinal section through a part of the twisting device illustrated in Fig 4, |
| | Fig 7 | is a third longitudinal section through the twisting device illustrated in Fig 4, |
| | Fig 8a | is a perspective view of the twisting device illustrated in Fig 4 and an adjacent guiding de- |

vice, as shown with a moveable guide member of the guiding device in a first position, and

Fig 8b a perspective view corresponding to Fig 8a, but with the moveable guide member in a second position.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0015] A part of a wire binding machine 1 according to an embodiment of the present invention is illustrated in Figs 2 and 3. The wire binding machine 1 comprises a wire guide track arrangement 10, by means of which a wire 2 may be guided in one loop or two continuous loops around a space 3 configured for receiving one or more objects 4 to be bound. The guide track arrangement 10 comprises a guide plate 11, which extends in a curve around said space 3. A plate-shaped and curved first guide element 12 is mounted to the guide plate 11 on a first side thereof and a plate-shaped and curved second guide element (not shown) is mounted to the guide plate 11 on the opposite side thereof. The first and second guide elements 12 extend in parallel with each other along the guide plate 11. A curved first guide track 14a is formed between the guide plate 11 and the first guide element 12 on one side of the guide plate 11 for guiding the wire in a first loop around said space 3, and a curved second guide track 14b (see Fig 7) is formed between the guide plate 11 and the second guide element on the other side of the guide plate 11 for guiding the wire in a subsequent second loop around said space 3. Guide rollers 15 are rotatably mounted between the guide plate 11 and the respective guide element 12. These guide rollers 15 are distributed along the respective guide track 14a, 14b.

[0016] In the illustrated embodiment, retainer units 16 are mounted to the guide plate 11 in order to retain and subsequently release the wire 2 during the tightening of the wire around one or more objects. The design and functioning of these retainer units 16 is described in closer detail in the European patent application No. 11169754.6.

[0017] A twisting device 30 is located between the ends of the guide plate 11. This twisting device 30 comprises a housing 31 and a twisting head 32 rotatably mounted in the housing. The twisting head 32 is rotatable by means of a motor 6, for instance in the form of an electric or hydraulic motor, in order to bind overlapping wire portions of the wire 2 together by twisting to thereby secure the wire in one or two loops around one or more objects 4 received in the above-mentioned space 3.

[0018] The twisting head 32 is provided with:

- a first wire guide channel 33a, which extends through the twisting head at the front end thereof;
- a second wire guide channel 33b, which extends through the twisting head at the front end thereof

alongside of at least a part of the first wire guide channel 33a;

- a third wire guide channel 33c, which extends across the twisting head at the front end thereof alongside of at least a part of the first and second wire guide channels 33a, 33b and in the area between them;
- a first gripping member 34a (see Fig 5) for gripping and locking a wire part received in the first wire guide channel 33a; and
- a second gripping member 34b (see Fig 6) for gripping and locking a wire part received in the second wire guide channel 33b.

[0019] The first, second and third wire guide channels 33a, 33b, 33c preferably extend in parallel with each other, as illustrated in Fig 4.

[0020] The respective gripping member 34a, 34b is displaceable to and fro between a retracted wire releasing position, in which the wire 2 is free to pass through the associated wire guide channel 33a, 33b and may be released from it, and an advanced wire gripping position, in which the wire 2 is retained in the associated wire guide channel 33a, 33b and prevented from being released from it. In the illustrated embodiment, the respective gripping member 34a, 34b is displaceable in the axial direction of the twisting head 32 and moveable from the retracted wire releasing position to the advanced wire gripping position against the action of the spring force from a spring member 35a, 35b. The gripping members 34a, 34b are preferably hydraulically or pneumatically actuated.

[0021] The first wire guide channel 33a has an inlet opening 36 at a first end and an outlet opening 37 at the other end, as illustrated in Fig 5. The inlet opening 36 is connected to a wire inlet channel 38 which extends through the housing 31. A cutting edge is formed in the twisting head 32 at the inlet opening 36 of the first wire guide channel 33a or in the housing 31 at the outlet opening 39 of the wire inlet channel 38. When the twisting head 32 is rotated in relation to the housing 31, this cutting edge will cut off the wire at the interface between the first wire guide channel 33a and the wire inlet channel 38. The part of the first wire guide channel 33a closest to the inlet opening 36 is covered by a structural part 40a which forms a counter member for the first gripping member 34a. The remaining part of the first wire guide channel 33a is not covered and consequently open towards the front end of the twisting head 32. The outlet opening 37 of the first wire guide channel is connected to a guide groove 41 provided in the housing 31. Through this guide groove 41, the leading end of the wire 2 is directed from the first wire guide channel 33a towards the first guide track 14a of the guide track arrangement 10.

[0022] The second wire guide channel 33b has an inlet opening 42 at a first end. A stop surface 43 is provided at the other end of the second wire guide channel, as illustrated in Fig 6. In the illustrated embodiment, the second wire guide channel 33b is provided with an outlet

opening 44 and said stop surface 43 is provided on a part of the housing 31 facing said outlet opening. As an alternative, the stop surface 43 could be integrated in the twisting head 32 and form an end surface in the second wire guide channel 33b. In the last-mentioned case, the second wire guide channel 33b would lack said outlet opening 44. The part of the second wire guide channel 33b closest to the stop surface 43 is covered by a structural part 40b which forms a counter member for the second gripping member 34b. The remaining part of the second wire guide channel 33b is not covered and consequently open towards the front end of the twisting head 32. The inlet opening 42 of the second wire guide channel is connected to a guide groove 45 provided in the housing 31. Through this guide groove 45, the leading end of the wire 2 is directed into the second wire guide channel 33b.

[0023] The third wire guide channel 33c has an inlet opening 46 at a first end and an outlet opening 47 at the other end, as illustrated in Fig 7. The third wire guide channel 33c is not covered and consequently open along its entire length towards the front end of the twisting head 32. The inlet opening 46 of the third wire guide channel is connected to a guide groove 48 provided in the housing 31. Through this guide groove 48, the leading end of the wire 2 is directed into the third wire guide channel 33c. The outlet opening 47 of the third wire guide channel is connected to another guide groove 49 provided in the housing 31. Through this guide groove 49, the leading end of the wire 2 is directed from the third wire guide channel 33c towards the second guide track 14b of the guide track arrangement 10.

[0024] The wire binding machine 1 also comprises a feeding device 5 (see Fig 3) for feeding the wire 2 into said wire guide arrangement 10 and along the wire guide arrangement in one or two loops around said space 3 and subsequently retracting the wire to draw it tightly around one or more objects 4 received in said space 3. The feeding device 5 is with advantage provided with an electric or hydraulic motor (not shown) for feeding and pulling the wire. At the beginning and at the end of each loop the leading end of the wire is guided into one of the wire guide channels 33a, 33b, 33c of the twisting head 32.

[0025] The guide track arrangement 10 comprises a guiding device 20, by means of which the leading end of the wire 2 is guidable into the third wire guide channel 33c of the twisting head when the wire has been guided by the guide track arrangement 10 in a first loop around the above-mentioned space 3 and into the second wire guide channel 33b of the twisting head when the wire has been guided by the guide track arrangement in a subsequent second loop around said space 3.

[0026] In the illustrated embodiment, the guiding device 20 comprises a moveable guide member 21, which is moveable in relation to the housing 31 of the twisting device to and fro between:

- a first position (see Fig 8a), in which the guide member 21 is configured to guide the leading end of

the wire 2 into the second wire guide channel 33b of the twisting head when the wire has been guided along the first guide track 14a of the guide track arrangement 10 in a first loop around said space 3; and
 ● a second position (see Fig 8b), in which the guide member 21 is configured to guide the leading end of the wire 2 into the third wire guide channel 33c of the twisting head when the wire has been guided along the first guide track 14a of the guide track arrangement 10 in a first loop around said space 3 and into the second wire guide channel 33b of the twisting head when the wire has been guided along the second guide track 14b of the guide track arrangement 10 in a subsequent second loop around said space 3.

The moveable guide member 21 is preferably arranged to be displaceable laterally between said first and second positions.

[0027] In the illustrated embodiment, the moveable guide member 21 constitutes an end section of the guide plate 11 and is consequently integrated in the guide plate. The moveable guide member 21 may alternatively be a separate part arranged between the end of the guide plate 11 and the twisting device 30. The moveable guide member 21 is arranged at the "downstream end" of the guide plate 11 where the leading end of the wire exits the respective guide track 14a, 14b after having been fed in a loop around the above-mentioned space 3. In the illustrated embodiment, the moveable guide member 21 is displaceable laterally between said first and second positions by a lateral displacement of said end of the guide plate 11 in relation to the twisting head 32. The other end of the guide plate 11, where the leading end of the wire 2 enters the respective guide track 14a, 14b, is fixed. The wire binding machine 1 is provided with an actuating member 22 (illustrated in cross-section in Fig 3), preferably in the form of a hydraulic cylinder, for displacing said moveable guide member 21 between said first and second positions. In the illustrated embodiment, the laterally moveable end of the guide plate 11 is fixed to a displaceable part of this actuating member 22.

[0028] In the illustrated embodiment, the above-mentioned guiding device 20 also comprises a fixed guide member 23, which is located between the moveable guide member 21 and the twisting head 32 in a fixed position in relation to the housing 31 of the twisting device. This fixed guide member 23 is provided with a first wire guide passage 24a, which forms a passage for the wire 2 from the moveable guide member 21 to the third wire guide channel 33c of the twisting head, and a second wire guide passage 24b, which forms a passage for the wire from the moveable guide member 21 to the second wire guide channel 33b of the twisting head. The moveable guide member 21 is laterally displaceable in relation to this fixed guide member 23 between said first and second positions.

[0029] An operating sequence for securing a loop of metal wire 2 around an object 4 with the aid of the

above-described wire binding machine 1 will be described in the following.

[0030] If the wire 2 is to be bound in a single loop around the object 4, the moveable guide member 21 is positioned in the above-mentioned first position (see Fig 8a). In a first step, the motor of the feeding device 5 is operated in a first direction in order to feed a metal wire 2 forwards from a wire coil (not shown), through the first wire guide channel 33a in the twisting head 32 and then further on through the guide groove 41 and into the first guide track 14a. The wire 2 is fed forwards in the first guide track 14a in a loop around the space 3, while rolling on the guide rollers 15 between the guide plate 11 and the first guide element 12. At the end of the first guide track 14a, the leading end of the wire 2 is directed by the moveable guide member 21 into the second wire guide passage 24b of the fixed guide member 23 and then further on through the guide groove 45 and into the second wire guide channel 33b of the twisting head 32, whereupon the leading end of the wire actuates a stop member (not shown) and the motor of the feeding device 5 is stopped. Thereafter, the second gripping member 34b is displaced towards the counter member formed by the structural part 40b so that the part of the wire received in the second wire guide channel 33b is clamped between the second gripping member 34b and said counter member. The leading end of the wire 2 is thereby locked to the twisting head 32. An object 4 or a bundle of objects is feed into the space 3, for instance by means of a conveyor (not shown). Thereafter, the motor of the feeding device 5 is reversed in order to pull the wire 2 backwards and thereby tighten the wire around the object 4. The retainer units 16 are arranged to release the wire 2 consecutively one by one during the tightening of the wire around the object 4, starting with the retainer unit located closest to the twisting head 32 as seen in the direction backwards along the wire from the twisting head. When the wire 2 has been drawn tightly around the object 4, the first gripping member 34a is displaced towards the counter member formed by the structural part 40a so that the part of the wire received in the first wire guide channel 33a is clamped between the first gripping member 34a and said counter member. The trailing end of the wire loop is thereby locked to the twisting head 32. The twisting head 32 is then rotated in order to bind the overlapping wire portions received in the first and second wire guide channels 33a, 33b of the twisting head together by twisting and thereby secure the wire loop to the object 4, whereupon the gripping members 34a, 34b are retracted in order to release the wire loop from the twisting head 32. When the twisting head 32 starts to rotate, the cutting edge provided at the inlet opening 36 of the first wire guide channel 33a will cut off the wire 2 at the interface between the first wire guide channel 33a and the wire inlet channel 38.

[0031] If the wire 2 is to be bound in two continuous loops, i.e. in a double loop, around the object 4, the moveable guide member 21 is positioned in the above-men-

tioned second position (see Fig 8b). In a first step, the motor of the feeding device 5 is operated in a first direction in order to feed a metal wire 2 forwards from a wire coil (not shown), through the first wire guide channel 33a in the twisting head 32 and then further on through the guide groove 41 and into the first guide track 14a. The wire 2 is fed forwards in the first guide track 14a in a first loop around the space 3, while rolling on the guide rollers 15 between the guide plate 11 and the first guide element 12. At the end of the first guide track 14a, the leading end of the wire 2 is directed by the moveable guide member 21 into the first wire guide passage 24a of the fixed guide member 23 and then further on through the guide groove 48 and into the third wire guide channel 33c of the twisting head 32. The wire 2 is fed through the third wire guide channel 33c and then further on through the guide groove 49 and into second guide track 14b. The wire 2 is fed forwards in the second guide track 14b in a second loop around the space 3, while rolling on the guide rollers 15 between the guide plate 11 and the second guide element. At the end of the second guide track 14b, the leading end of the wire 2 is directed by the moveable guide member 21 into the second wire guide passage 24b of the fixed guide member 23 and then further on through the guide groove 45 and into the second wire guide channel 33b of the twisting head 32, whereupon the leading end of the wire actuates the stop member and the motor of the feeding device 5 is stopped. Thereafter, the second gripping member 34b is actuated to grip the part of the wire received in the second wire guide channel 33b and thereby lock the leading end of the wire 2 to the twisting head 32. An object 4 or a bundle of objects is feed into the space 3. Thereafter, the motor of the feeding device 5 is reversed in order to pull the wire 2 backwards and thereby tighten the wire around the object 4. During this tightening of the wire 2, the wire is pulled out of the third wire guide channel 33c. When the wire 2 has been drawn tightly around the object 4, the first gripping member 34a is actuated to grip the part of the wire received in the first wire guide channel 33a and thereby lock the trailing end of the two wire loops to the twisting head 32. The twisting head 32 is then rotated in order to bind the overlapping wire portions received in the first and second wire guide channels 33a, 33b of the twisting head together by twisting and thereby secure the wire loops to the object 4, whereupon the gripping members 34a, 34b are retracted in order to release the two wire loops from the twisting head 32. When the twisting head 32 starts to rotate, the cutting edge provided at the inlet opening 36 of the first wire guide channel 33a will cut off the wire 2 at the interface between the first wire guide channel 33a and the wire inlet channel 38.

[0032] The invention is of course not in any way restricted to the embodiments described above. On the contrary, many possibilities to modifications thereof will be apparent to a person with ordinary skill in the art without departing from the basic idea of the invention such as defined in the appended claims.

Claims

1. A wire binding machine comprising:

- a wire guide track arrangement (10), by means of which a wire, preferably a metal wire, is guidable in two continuous loops around a space (3) configured for receiving one or more objects to be bound;

- a twisting device (30), which comprises a housing (31) and a twisting head (32) rotatably mounted in the housing, the twisting head (32) being rotatable to bind overlapping wire portions of said wire together by twisting to thereby secure the wire around said one or more objects, wherein the twisting head (32) is provided with:

● a first wire guide channel (33a) extending through the twisting head at the front end thereof, and

● a second wire guide channel (33b) extending through the twisting head at the front end thereof alongside of at least a part of the first wire guide channel (33a); and

- a feeding device (5) for feeding the wire through the first wire guide channel (33a) of the twisting head, into the wire guide arrangement (10), along the wire guide arrangement around said space (3) and into the second wire guide channel (33b) of the twisting head and subsequently retracting the wire to draw it tightly around one or more objects received in said space (3); **characterized in:**

- **that** the twisting head (32) comprises a third wire guide channel (33c), which extends across the twisting head at the front end thereof alongside of at least a part of the first and second wire guide channels (33a, 33b) and in the area between them; and

- **that** the wire guide track arrangement (10) comprises a guiding device (20), by means of which the leading end of the wire is guidable into the third wire guide channel (33c) of the twisting head when the wire has been guided by the wire guide track arrangement in a first loop around said space (3) and into the second wire guide channel (33b) of the twisting head when the wire has been guided by the wire guide track arrangement in a subsequent second loop around said space (3).

2. A wire binding machine according to claim 1, **characterized in that** said guiding device (20) comprises a moveable guide member (21), which is moveable in relation to the housing (31) of the twisting device to and fro between:

● a first position, in which the guide member (21) is configured to guide the leading end of the wire into the second wire guide channel (33b) of the twisting head when the wire has been guided by the wire guide track arrangement (10) in a first loop around said space (3); and

● a second position, in which the guide member (21) is configured to guide the leading end of the wire into the third wire guide channel (33c) of the twisting head when the wire has been guided by the wire guide track arrangement (10) in a first loop around said space (3) and into the second wire guide channel (33b) of the twisting head when the wire has been guided by the wire guide track arrangement (10) in a subsequent second loop around said space (3).

3. A wire binding machine according to claim 2, **characterized in that** said moveable guide member (21) is mounted to or constitutes an end section of a guide plate (11) which extends in a curve around said space (3).

4. A wire binding machine according to claim 3, **characterized in that** said moveable guide member (21) is displaceable laterally between said first and second positions.

5. A wire binding machine according to claim 3 or 4, **characterized in that** a curved first guide track (14a) for guiding the wire in a first loop around said space (3) is provided on a first side of said guide plate (11), and that a curved second guide track (14b) for guiding the wire in a subsequent second loop around said space (3) is provided on the other side of said guide plate (11).

6. A wire binding machine according to any of claims 2-5, **characterized in that** the wire binding machine (1) is provided with an actuating member (22), preferably in the form of a hydraulic cylinder, for displacing said moveable guide member (21) between said first and second positions.

7. A wire binding machine according to any of claims 2-6, **characterized in that** said guiding device (20) also comprises a fixed guide member (23), which is located between the moveable guide member (21) and the twisting head (32) in a fixed position in relation to the housing (31) of the twisting device, this fixed guide member (23) being provided with a first wire guide passage (24a), which forms a passage for the wire from the moveable guide member (21) to the third wire guide channel (33c) of the twisting head, and a second wire guide passage (24b), which forms a passage for the wire from the moveable guide member (21) to the second wire guide channel (33b) of the twisting head.

8. A wire binding machine according to any of claims 1-7, **characterized in that** the twisting head (32) is provided with:

- a first gripping member (34a) for gripping and locking a wire part received in the first wire guide channel (33a), and 5
- a second gripping member (34b) for gripping and locking a wire part received in the second wire guide channel (33b). 10

9. A wire binding machine according to claim 8, **characterized in that** the respective gripping member (34a, 34b) is displaceable to and fro between a retracted wire releasing position and an advanced wire gripping position. 15

10. A wire binding machine according to claim 9, **characterized in that** the respective gripping member (34a, 34b) is moveable from the retracted wire releasing position to the advanced wire gripping position against the action of the spring force from a spring member (35a, 35b). 20

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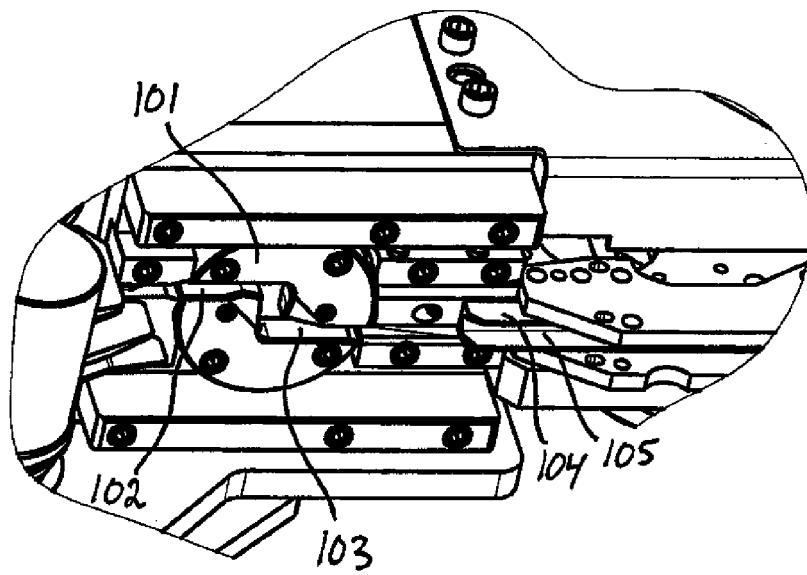


Fig 1a

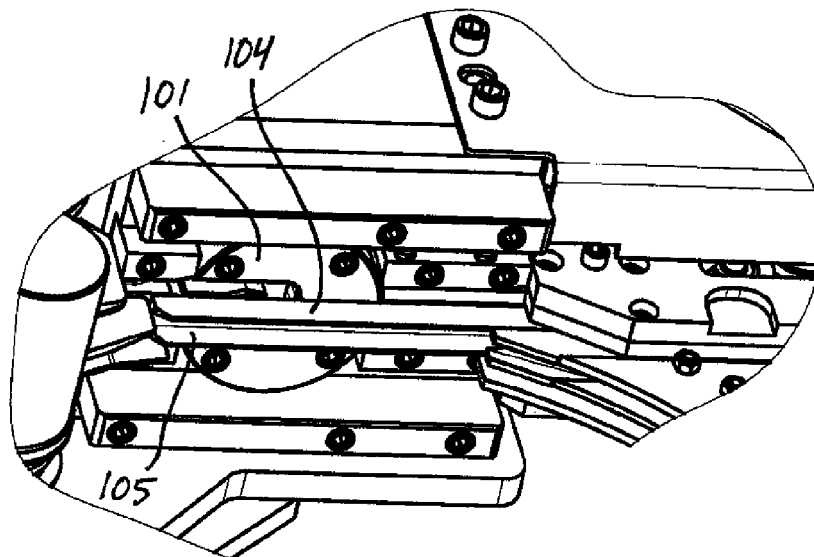
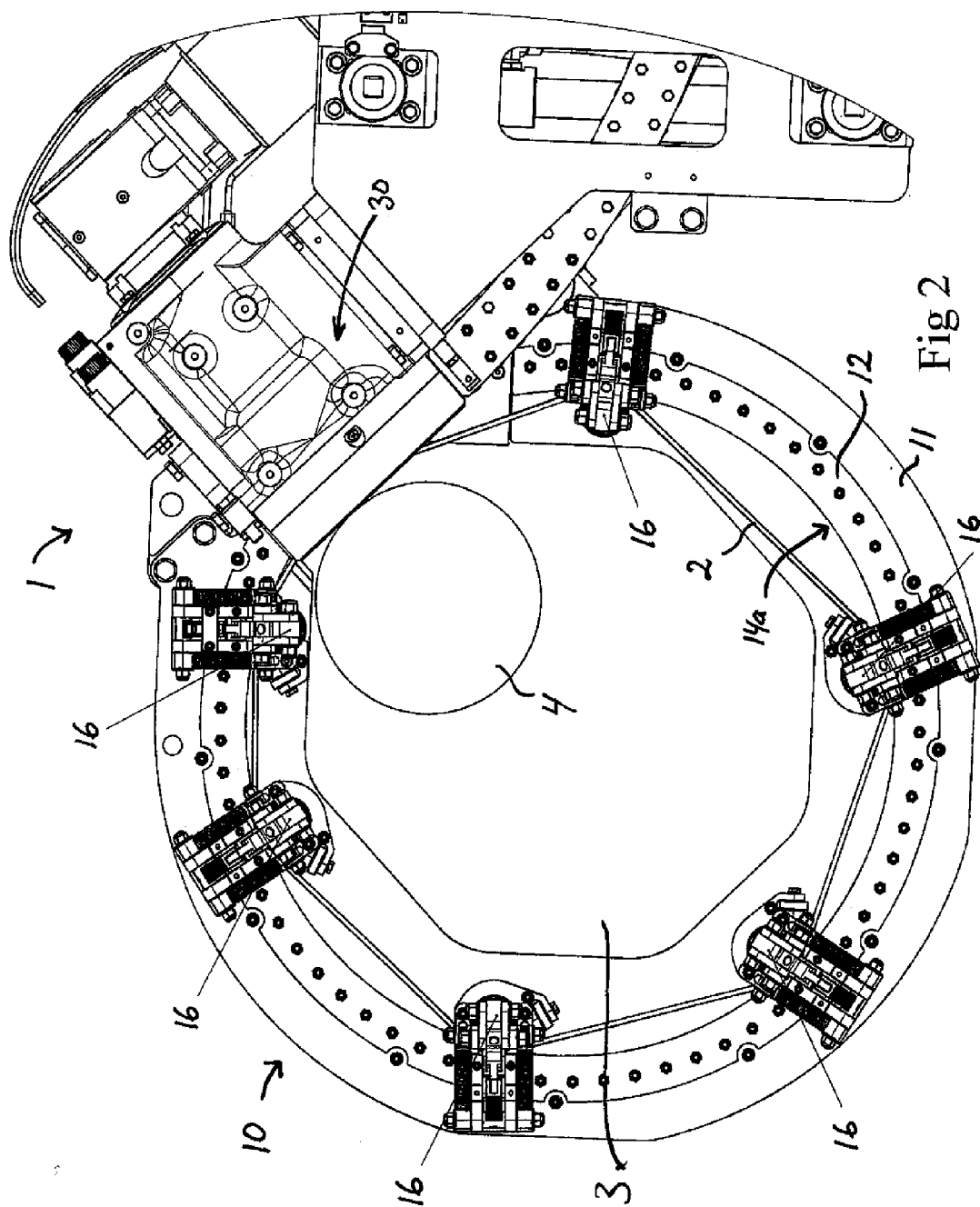
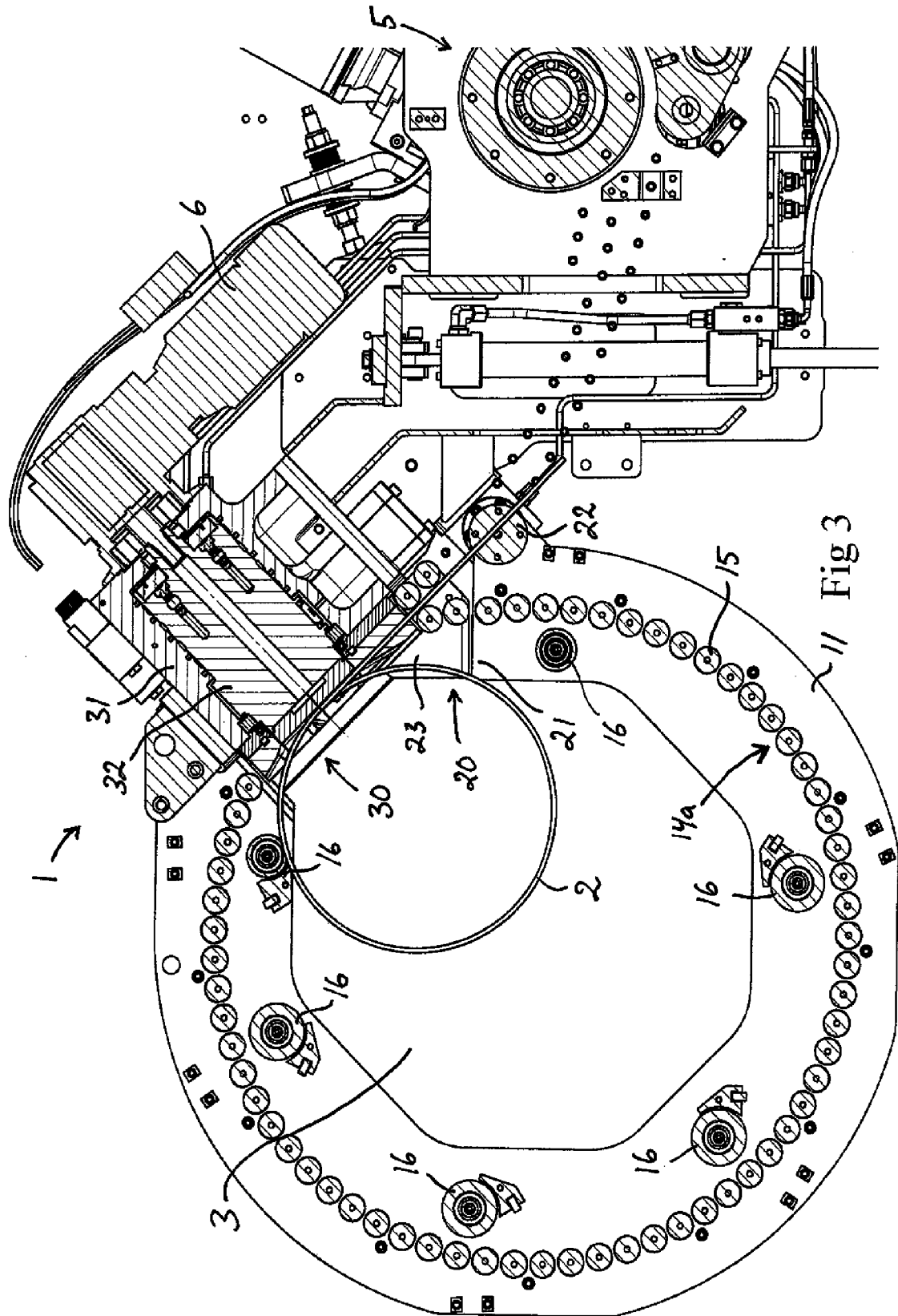


Fig 1b





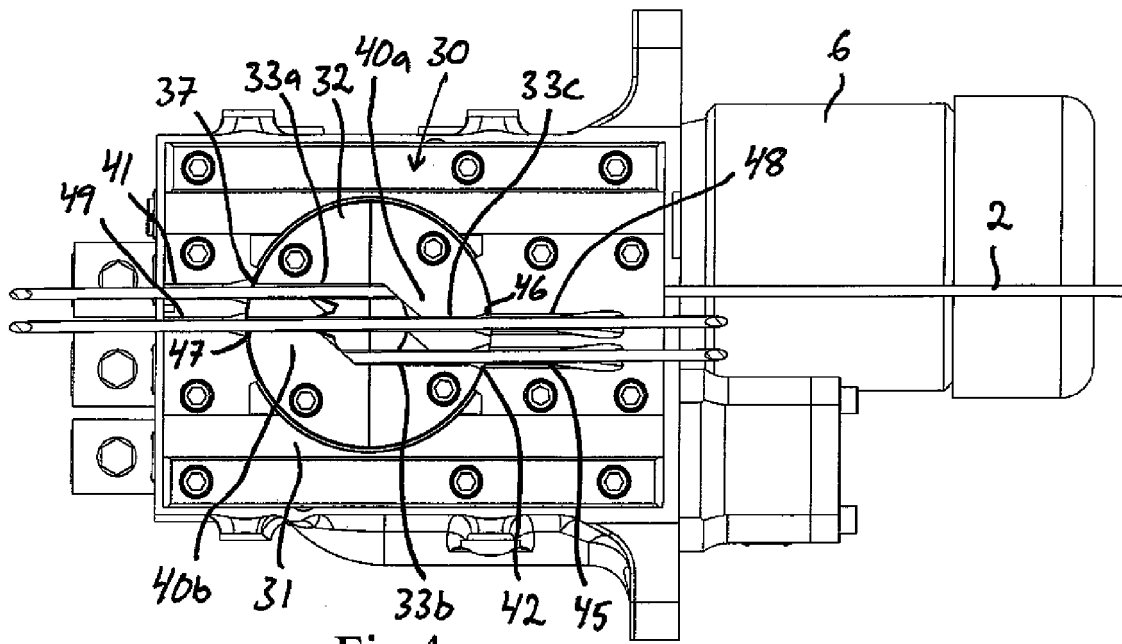


Fig 4

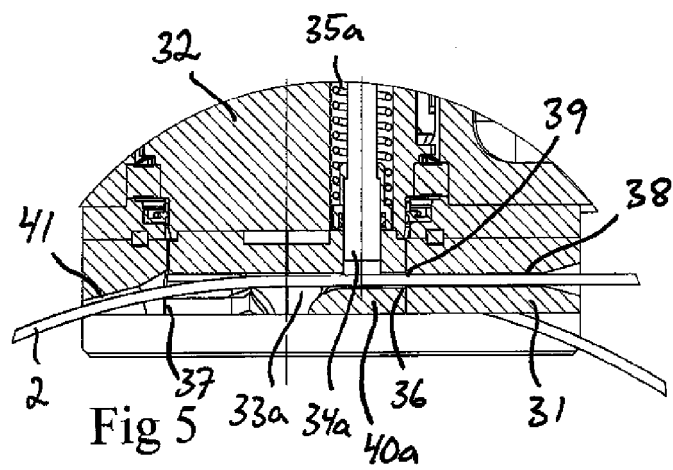


Fig 5

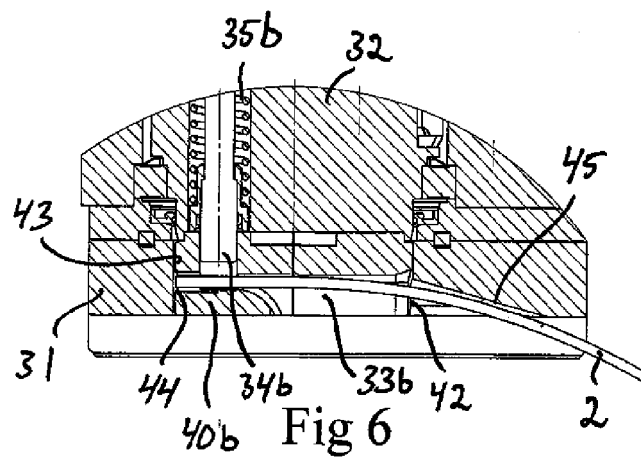
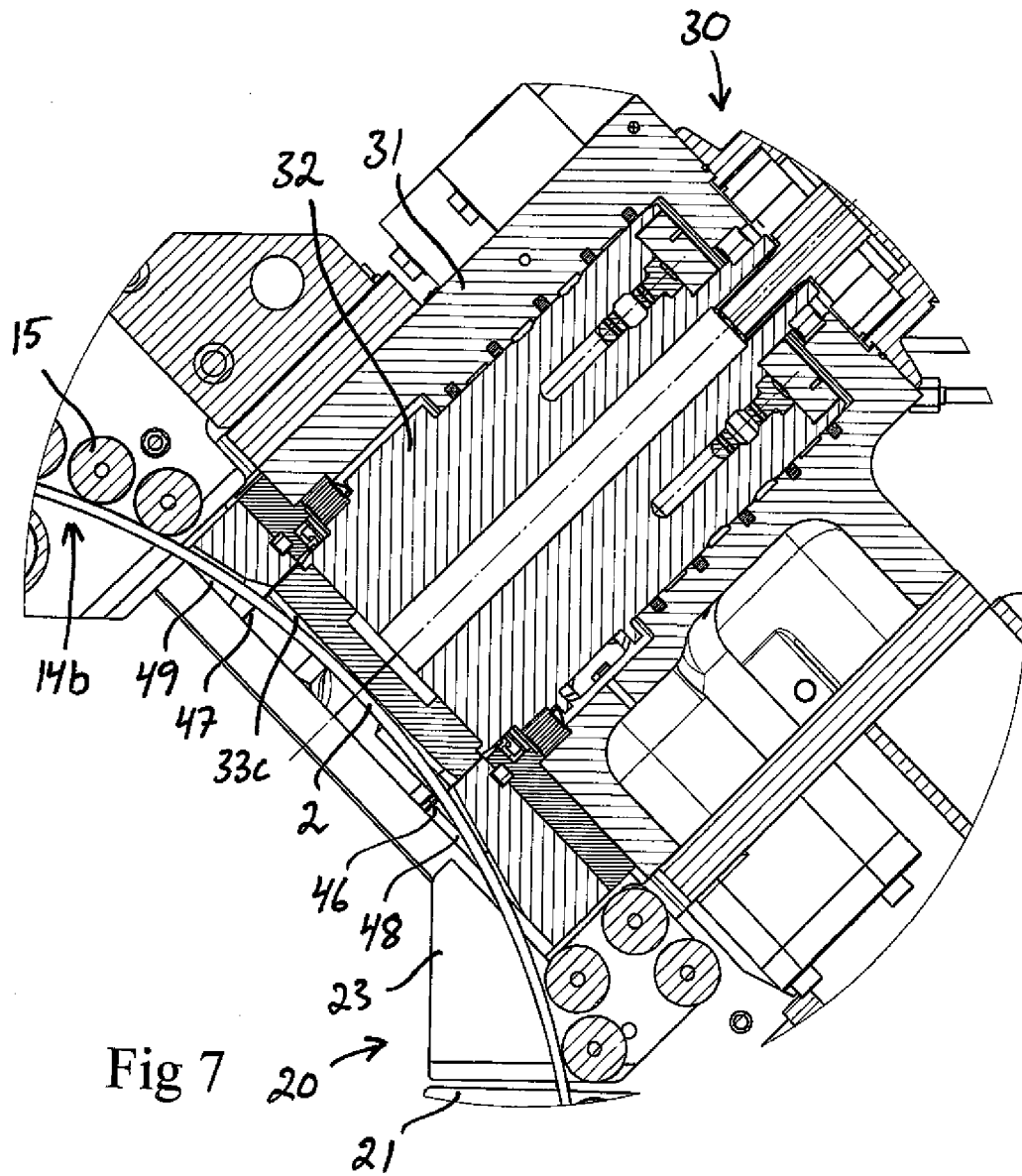
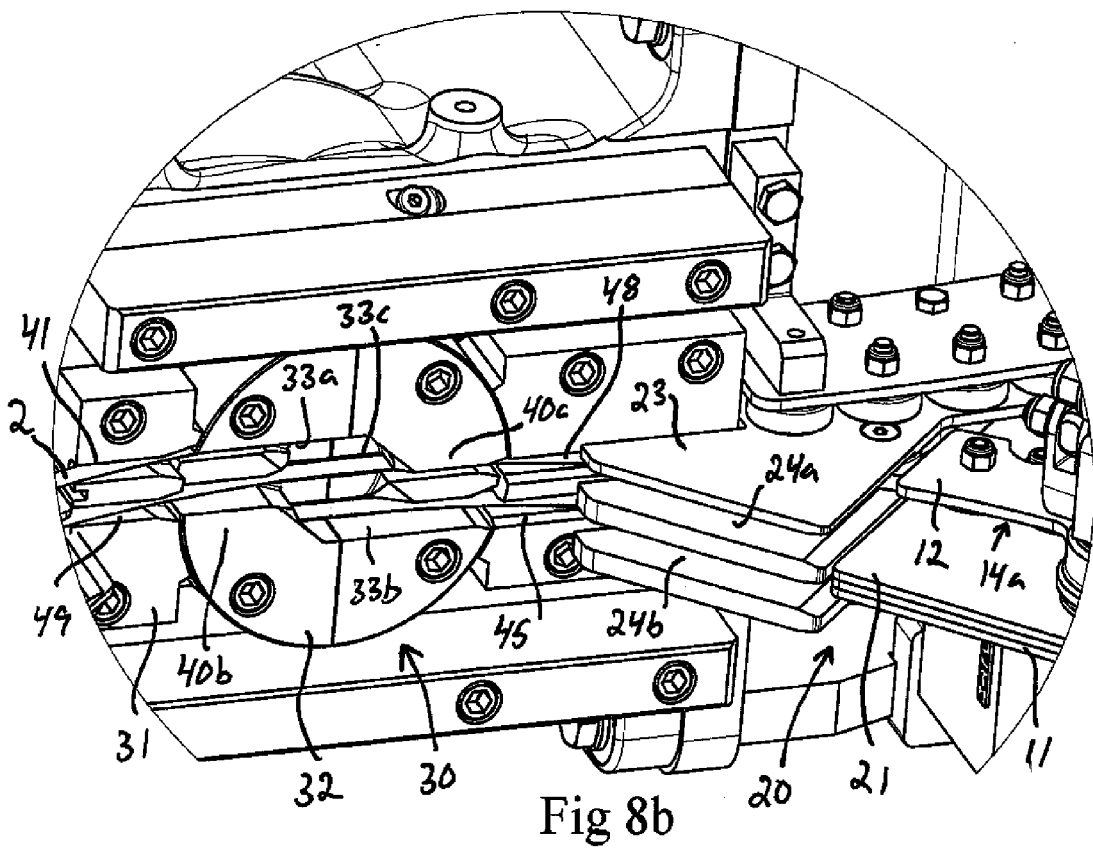
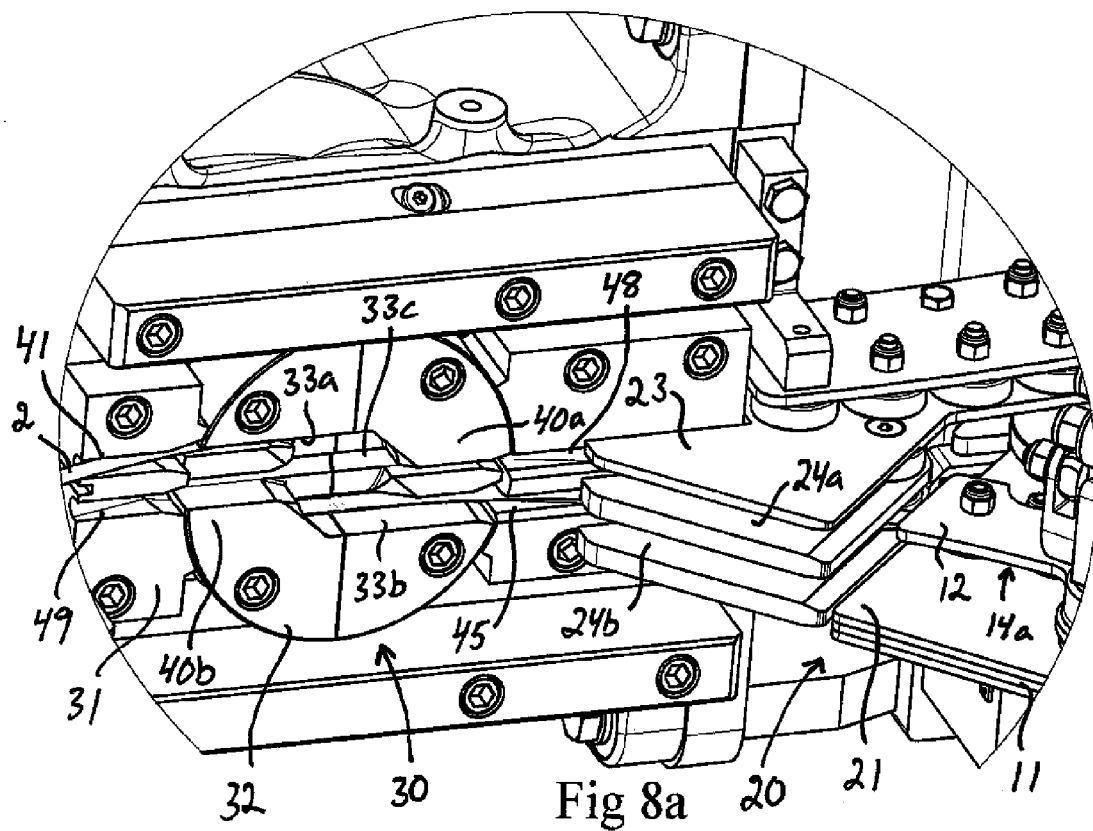


Fig 6







EUROPEAN SEARCH REPORT

Application Number
EP 11 18 3918

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	US 7 255 135 B2 (ISHIKAWA NOBORU [JP] ET AL) 14 August 2007 (2007-08-14) * the whole document *	1-10	INV. B65B13/04 B65B13/28
A	US 3 234 870 A (JEAN MISSIOUX) 15 February 1966 (1966-02-15) * column 6, line 25 - column 8, line 26; figures 10-18 *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 30 March 2012	Examiner Lawder, M
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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The members are as contained in the European Patent Office EDP file on
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