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(54) **HOODING MACHINE WITH FILM CHANGING SYSTEM**

(57) A hooding machine (10) comprises a zone (19) for receiving a package (18) to be hooded and a hooding head (17) to which a strip of film (42) is fed from an initial zone (15) of a feeding path (14) and which is intended to form a hood (60) to be fitted onto the package.

A magazine (12) has a carousel (22) which supports a plurality of reels of film (23) and which is movable so as to bring alternately one of the reels of film (23) into an operating position. A dispensing device (30) is associated with each reel of film (23) and receives a free end of the film of the corresponding reel (23), and the carousel (22) comprises seats (31) for removably receiving each dispensing device (30). A transfer device (32) is movable between a first position and a second position and is designed, in the first position, to take from one of said receiving seats (31) the dispensing device (30) associated with the reel (23) which is in the operating position and, in the second position, is designed to move said dispensing device (30) into the initial zone (15) of the feeding path so as to feed to this path the film of the reel (23) which is in the operating position.

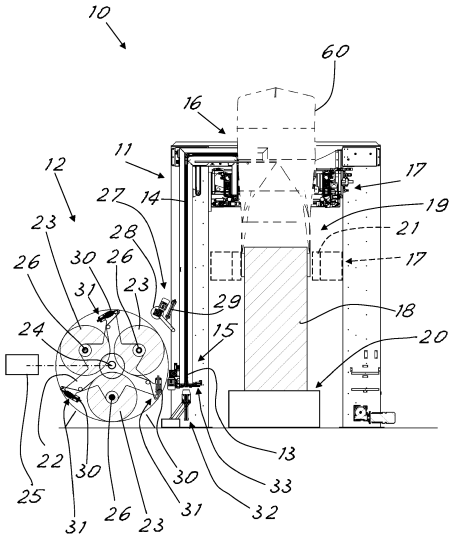

Fig.1

EP 3 686 111 A1

Description

[0001] The present invention relates to a machine of the so-called "hooding" type, namely a machine which performs the wrapping of a package by fitting onto it from above a hood of plastic film (which usually consists of extendable or heat-shrinkable material).

[0002] The known hooding machines remove the film from a supply reel and cyclically cut it transversely, weld it to form a tube section or "hood" and convey it along a feeding path until it is brought with its mouth directed downwards into an insertion head. The insertion head expands radially the hood above the package to be wrapped and then moves vertically downwards so as to fit the hood onto the package and complete the wrapping process.

[0003] In a particular type of such machines, the insertion head may also curl up the hood along its longitudinal axis so as to receive it all on the head and then unroll it over the package gradually as the head is lowered.

[0004] In order to facilitate the production of the hood, often the film is already formed as a continuous flattened tube which is rolled up onto the supply reel so that, to form the hood, it is sufficient for the machine to cut and weld transversely a section of unwound film and expand the tube radially.

[0005] In the known machines, changing of the film (namely replacement of one reel of film with another one) involves a fairly long downtime of the machine.

[0006] In the case where frequent change-overs must be performed, for example owing to the need to wrap limited series of packages with the same film before changing to a different film (for example a film with a different colour, format, physical characteristics, printed surface, etc.), it is often advantageous, from the point of view of time, to use different machines with the various films, rather than a single machine where the reel of film must be changed.

[0007] This obviously results in not insignificant additional costs both owing to the need for additional machines and because of the complication of providing the lines for conveying the packages to and from the various machines.

[0008] The general object of the present invention is to provide a hooding machine which allows different reels of film to be used in simple and fast manner.

[0009] In view of this object, the idea which has occurred is to provide, according to the invention, a hooding machine comprising a zone for receiving a package to be hooded and a hooding head to which a strip of film, intended to form a hood to be fitted onto the package, is fed from an initial zone of a feeding path towards the hooding head, characterized in that it comprises: a magazine with a carousel which supports a plurality of reels of film and which is movable so as to bring alternately one of the reels of film into an operating position; a dispensing device which is associated with each reel of film and which receives a free end of the film of the associated reel, the carousel comprising receiving seats for each dispensing device; a transfer device which is movable between a first position and a second position and is designed:

- in the first position to take from one of said receiving seats a dispensing device with the free end of the film of the associated reel which is in the operating position;
- in the second position to move said dispensing device into the initial zone of the feeding path so as to feed to said path the film of the reel in the said operating position.

[0010] In order to illustrate more clearly the innovative principles of the present invention and its advantages compared to the prior art, an example of embodiment applying these principles will be described below with the aid of the accompanying drawings. In the drawings:

- Figure 1 shows a partially sectioned schematic front elevation view of a hooding machine according to the invention;
- Figure 2 shows a schematic enlarged view of a zone of the machine according to Figure 1 with a transfer device;
- Figure 3 shows a partially cross-sectioned, schematic, side view of a device for dispensing the film of the machine according to Figure 1;
- Figure 4 shows a schematic front elevation view of the dispensing device according to Figure 3 in a rest position;
- Figure 5 shows a partial, enlarged, schematic, side view of the transfer device according to Figure 2 in a position for picking up the dispensing device from its rest position;
- Figures 6 and 7 show schematic front elevation views of the transfer device during the movement of the dispensing device;
- Figure 8 shows a view of the machine according to Figure 1 during an operating step;
- Figures 9 and 10 show schematic views of a possible engaging/disengaging mechanism in the engaged and disengaged position, respectively.

[0011] With reference to the figures, Figure 1 shows a hooding machine according to the invention, indicated generally by 10.

[0012] The machine 10 comprises a system 11 for forming a hood 60 from a strip of film which is wound on a reel and is supplied from a magazine 12.

[0013] Preferably, the strip of film may be already formed as a tube in a flattened condition which is extended transversely inside the machine so as to be fitted onto a package to be wrapped.

[0014] Usually the tube of film in its flattened condition has side edges which are fan-folded inwards so as to form four side rims on the edges. This form of the tube

of film wound up on a reel is well-known in the sector and therefore will not be further described or shown here.

[0015] Alternatively, the tube of film may be formed directly in the machine by means of folding and longitudinal welding of a strip of film wound on a reel, again using a method which is well-known to the person skilled in the art and which therefore will not be further described or shown here. In this case, the system 11 for forming the hood will comprise known means for folding, at the halfway point, the strip of film along its longitudinal extension so as to arrange its side edges facing each other, and means for welding together these two side edges so as to obtain the tube of film. These means are also well-known to the person skilled in the art and will not be further described or illustrated.

[0016] In any case, the system 11 for forming the hood comprises advantageously gripping and conveying devices 13 which move along a feeding path 14 from an initial zone 15 of the path, where the film supplied from the magazine 12 arrives with its leading end portion, as will be clarified below.

[0017] The gripping and conveying devices may, for example, comprise suitable grippers for gripping the film and a motorized-chain conveyor system for moving these grippers along the path 14.

[0018] The feeding path 14 has an end zone 16 where there is a head 17 for fitting the hood onto a package 18, which is arranged above the zone 19 of the machine for receiving the package 18 to be hooded.

[0019] The package may be transported manually into the receiving zone 19 or a known transportation system 20 such as a conveyor belt may be provided.

[0020] As can be seen in Figure 1, the path 14 is preferably shaped generally in the form of an inverted L or J, with a first vertical section directed upwards, a second horizontal section and, preferably, a third vertical section directed downwards, as far as the head 17.

[0021] The head 17 is of the type known per se and will not shown and described in detail, since it may be easily imagined by the person skilled in the art based on the description provided hitherto. For example, the head 17 is designed to receive the hood from the gripping and conveying means, stretch it transversely and fit it onto a package which is situated in the receiving zone 19.

[0022] The head 17 may be advantageously of the known type which curls up and stores on itself the tube of film which has been cut into a segment with a length sufficient for performing hooding of the package, before moving downwards and unrolling it along the height of the package (as schematically shown in Figure 1). For example, the head 17 may comprise a horizontal rectangular frame 21 intended to be arranged on the sides of the package and with at least four edges which can be separated on command so that it can be inserted inside the hood and can extend it transversely, allowing it to be fitted onto the package. Motorized rollers (not shown in detail) may curl up the hood along its longitudinal extension so as to arrange it entirely on the frame and then unroll it onto the package during the downwards movement of the frame around the package.

[0023] In the initial zone 15 of the path 14 there is a known device 33 for transversely cutting the strip of film and optionally transversely welding the tube downstream of the cut, so as to form a tube segment which forms a hood.

[0024] The machine may also have the hood forming system 11 and the head 17 which are able to be adapted to different film formats (i.e. transverse dimensions of the hood) fed to the initial zone 15. In particular, the transverse dimensions of the path 14 may be varied for example by transversely moving the guides away from each other and the head may consequently expand, as is known to the person skilled in the art.

[0025] By way of example, the parts of the machine for cutting and welding, transporting the film and hooding may be generally of the known type described in patent application EP 3,335,998, even though other known systems may always be used.

[0026] According to the present invention, the magazine 12 comprises a carousel 22 which supports a plurality of reels of film 23 and which is movable so as to bring alternately one of the reels into an operating position. For example, the carousel advantageously rotates about a horizontal central axis 24 by means of an electric motor 25. As can be clearly seen in Figure 1, the reels of film (for example three) are supported with their axis 26 arranged horizontally and are arranged equally spaced on the carousel (for example around the axis of rotation 24). A motor device 27 can be operated so as to cause rotation of the reel which is brought into the operating position by means of movement of the carousel 22. For example, in the machine shown the reel in the operating position is that at the top on the right in Figure 1.

[0027] The motor device 27 may comprise for example a motorized roller 28 which is pushed on command by means of an actuator 29 against the periphery of the reel which is in the operating position.

[0028] In Figure 1 the motor device is shown in its rest position, namely with the motorized roller which is separated from the periphery of the reel.

[0029] A film dispensing device 30 is associated with each reel 23 and receives the free front end portion of the film wound around the associated reel, as will be explained in greater detail below. Each dispensing device 30 has its receiving seat 31 on the carousel.

[0030] The machine 10 also comprises a transfer device 32 which is motorized so as to move on command between a first position close to the initial zone 15 of the path 14 for feeding the film towards the head 17 and a second position close to the receiving seat 31 of the dispensing device 30 of the reel situated in that moment in the operating position.

[0031] Figure 2 shows in greater detail the zone of the machine with the transfer device 32. This figures shows a possible embodiment of the transfer device with its system for performing movement between the position

(shown in solid lines) close to the zone 15 and the position (shown in broken lines) close to the seat 31 for receiving the dispensing device 30 of the reel 23 which in that moment is in the operating position.

[0032] In the embodiment shown, the transfer device 32 comprises a head 35 for gripping the dispensing device 30 and a motorized mechanism 36 (for example a motorized parallelogram mechanism) for displacing the head 35 between the said two positions.

[0033] The gripping head 35 also comprises an actuator 37 (for example formed by two lateral linear actuators) for the vertical movement of the head 35 and for engaging and moving vertically the dispensing device, as will be clarified below. Figure 2 shows in greater detail also the transverse welding and cutting device 33 and grippers 34 of the gripping and conveying means 13 which are intended to grip a front end portion of the film in order to transport it along the path 14 as far as the head 17.

[0034] For greater clarity, Figure 3 shows a possible embodiment of the dispensing device 30. In this embodiment, the device 30 comprises a body 40 with a transmission roller 41 which is located at a bottom inlet end and onto which the strip 42 of film from the corresponding reel 23 is supplied. The strip of film 42 deviated by the roller 41 passes into a guide passage 43 in the body of the device 30 and exits from the opposite top end 44 with the two faces 42a and 42b of the tube of film which are slightly spaced from each other so that they may be gripped along their side edges by corresponding four grippers 34 of the gripping and conveying means 13 when the dispensing device 30 is brought by the transfer device 32 into the initial zone 15 of the feeding path 14.

[0035] As shown schematically in Figure 3, in the rest position of the dispensing device 30, namely when it is in its seat 31 inside the magazine, the strip 42 projects only slightly from the top of the device 30 with a front end portion of the film.

[0036] In Figure 4 the dispensing device 30 is shown in a schematic front view (namely from the right in Figure 3), inserted in its seat 31 in the carousel 22. The seat 31 comprises on the carousel couplings 45 for receiving in a removable manner the opposite ends 46, 47 of the device 30.

[0037] Figure 5 shows in greater detail the interaction between a dispensing device 30 in its seat 31 on the carousel and the transfer device 32. Figure 5 also shows a film clamping buffer 50 which is present in the seat 31, for retaining the free end portion of the film when the dispensing device 30 is in its seat 31.

[0038] As can be seen again in Figure 5, when the transfer device is moved into its position close to the seat 31, the head 35 is located underneath the dispensing device. In this way, when the head 35 is moved upwards by the actuator 37, it engages with the dispensing device, releases it from its seat 31 and removes it from the carousel. This is visible also in the front view of Figure 6 where the dispensing device 30 is shown released by the couplings 45 of the seat 31 and engaged by the head 35 of the transfer device 32 which supports the dispensing device 30 by its two opposite ends 46 and 47.

[0039] Figure 7 shows a front view of the dispensing device 30 which has been moved by the transfer device 32 into the position close to the initial zone 15 of the hood feeding path 14.

[0040] Once the transfer device has brought the dispensing device 30 into this position underneath the initial zone 15 (as shown in solid lines in Figure 7), the actuator 37 raises the dispensing device so as to move it towards the initial zone 15 (as shown in broken lines) and thus allow the grippers 34 of the transport system to grip the free end portion of the film and convey it towards the hooding head 17. Figure 8 shows the machine during a hooding operation.

[0041] In order to facilitate unrolling of the film during conveying along the path 14, the motor device 27 is moved into its operating position and causes rotation of the reel.

[0042] Once the quantity of film needed to form a hood has passed by the means 33, these means are operated so as to separate the hood and if necessary weld the bottom thereof. A new leading end portion of the film is thus ready in the initial zone 15 for a subsequent hooding operation.

[0043] The hood formed by the separated strip of film is taken up by the hooding head 17, which opens it and fits it onto the package, as shown in Figure 8. The head 17 may also use air jets to inflate the hood and facilitate introduction thereof onto the package, according to a method known per se.

[0044] Once the package has been hooded and the head has returned into its raised position, the package may be removed from the receiving zone 19 of the machine and replaced with a new package to be hooded and the hooding operations may be repeated with the new package. The hood may also if necessary be heat-shrunk by means of the head 17, if this function is provided (for example with thermal heaters on the head 17 which retract the hood during the upward return movement of the head).

[0045] If it is required to use the film of a different reel from among those in the magazine 12 then the transfer device 32 will bring the dispensing device 30 in use back into the corresponding seat 31 on the carousel 22 and will engage it again into the seat before with withdrawing.

[0046] The motor device 27 will be moved to allow the carousel 22 to rotate and bring the desired different reel 23 into the operating position.

[0047] The operations of loading the new film will then be repeated in the same way as already described above for the previous reel and the hooding operations may be resumed with the new film.

[0048] By way of example, Figures 9 and 10 show in schematic form in greater detail a possible embodiment of the couplings 45, which are designed with a spring and with a releasing actuator 61 arranged on the pick-up head

35 for performing disengagement of the couplings. For simpler illustration the coupling on the lefthand side of the dispensing device and the pick-up head 35 has been shown, but the same structure will be advantageously present also on the opposite side.

[0049] In particular, as can be seen in Figure 9, the couplings 45 may comprise on each of the two ends 46 and 47 of the dispensing device 30 at least one engaging bolt 62 which is resiliently pushed outwards by springs 63.

[0050] Each seat 31 on the carousel comprises corresponding seats 64 for receiving the engaging bolts 63 so that each bolt 62 enters into the corresponding seat 64 when a dispensing device 30 is located in its corresponding seat 31 and the dispensing device 30 is thus fixed to its seat 31, as can be clearly seen again in Figure 9.

[0051] In the case where it is required to perform such fixing also for the dispensing device in the operating position in the zone 15, corresponding seats 64 may also be provided in the zone 15 which receives the ends 46, 47 of the dispensing device 30 in the operating condition.

[0052] When the head 35 receives and supports the dispensing device 30, the releasing actuator 61 is brought up to the bolt mechanism and can be operated so as to move the bolt towards the disengaged position against the action of the springs and release it from the corresponding seat 64, as shown in Figure 10. The transfer device may thus move freely the dispensing device as already described above.

[0053] At this point it is clear how the objects of the invention are achieved.

[0054] With a machine according to the invention it is possible to switch quickly and automatically from one reel of film to another one so as to be able to use different films (having a different colour, size, print, physical characteristics, etc.) depending on the needs at any one time. For example, reels with film having a different format may be inserted in the reel magazine so that the machine may be adapted rapidly to the format of the package to be hooded, with selection of the suitable film from among those present in the magazine 12. For example, it may also be possible to provide a suitable known sensor which detects the format of the package and causes the machine to be set up for that format. Furthermore, changing a reel in the magazine (for example because empty or because it is required to use a new type of film not in the magazine) is facilitated by the fact that the plurality of reels in the magazine may be kept at a relative low height easy for extraction and reinsertion of the reels, reducing the fatigue and risks for the operator who must perform the change-over and making the operation quicker. The mobile (in particular rotating) carousel also allows the reel which is to be changed to be moved into a convenient position for extraction and reinsertion. For example, in the case of a rotating carousel as shown by way of example in the drawings attached here, the position for change-over may be that of the reel shown at top on the left in Figure 1.

[0055] Obviously the above description of the embodiments applying the innovative principles of the present invention is provided only by way of example of these innovative principles and must therefore not be regarded as limiting the scope of the rights claimed herein.

[0056] For example, the magazine may be designed with dimensions suitable also for a greater number of reels than that shown, by increasing the dimensions and/or varying the form of the carousel, as may be now be easily imagined by the person skilled in the art.

[0057] The transfer device may also be designed with a movement mechanism different from that shown. For example, instead of a parallelogram mechanism, a carriage sliding on rails (advantageously but not necessarily horizontal) may be used to move between the first position and second position of the transfer device.

[0058] A machine according to the principles of the invention may obviously be designed so as to be able to treat film of any type used for wrapping packages. For example, the film may be heat-shrinkable or not, elastic or non-elastic, etc. Depending on the type of film, the machine may have suitable known devices for treating the particular film used (for example heat-shrinking frames or ovens, systems for guiding and moving the elastic film, winding systems, etc.) as may be easily imagined by the person skilled in the art.

[0059] Moreover, the machine may comprise other known mechanisms and systems for this type of machine, such as systems for raising the package towards the head above the hooding zone, for example for allowing the hood to be fitted as far as underneath the bottom of the package.

[0060] The dimensions and the proportions of the various parts of the machine may also vary depending on the specific practical requirements. For example, the vertical section of the path will be designed so as to be suitable for the maximum height of the packages which are to be processed, and the length of the horizontal section will also depend on the corresponding maximum horizontal dimension of the packages which are to be processed, etc.

Claims

1. A hooding machine (10) comprising a zone (19) for receiving a package (18) to be hooded and a hooding head (17) to which a strip of film (42), designed to form a hood (60) to be fitted onto the package, is fed from an initial zone (15) of a feeding path (14) towards the hooding head (17), **characterized in that** it comprises:

   - a magazine (12) with a carousel (22) which supports a plurality of reels of film (23) and which is movable so as to bring alternately one of the reels of film (23) into an operating position;
   - a dispensing device (30) which is associated with each reel of film (23) and which receives a

free end of the film of the associated reel (23), the carousel (22) comprising seats (31) for receiving each dispensing device (30);
- a transfer device (32) which is movable between a first position and a second position and is designed:
- in the first position to take from one of said receiving seats (31) a dispensing device (30) with the free end of the film of the associated reel (23) which is in the operating position;
- in the second position to move said dispensing device (30) into the initial zone (15) of the feeding path (14) so as to feed to this path (14) the film of the reel (23) in said operating position.

2. Hooding machine (10) according to Claim 1, **characterized in that** the film on the reel is in form of a tube of film in a flattened folded condition so as to be extended transversely by the hooding head (17).

3. Hooding machine (10) according to Claim 1, **characterized in that** the carousel (22) is movable by rotation about its horizontal central axis (24) so as to bring alternately one of the reels of the plurality into said operating position.

4. Hooding machine (10) according to Claim 3, **characterized in that** the reels (23) are arranged horizontally with parallel axes around the central horizontal axis (24) of the carousel (22).

5. Hooding machine (10) according to claim 1, **characterized in that** the transfer device (32) has a head (35) which is movable vertically by means of an actuator (37) and which is designed to receive the dispensing device (30) to be moved between said first and second positions.

6. Hooding machine (10) according to Claim 1, **characterized in that** the transfer device (32) is movable between the first and second positions by means of a parallelogram mechanism (36).

7. Hooding machine (10) according to Claim 1, **characterized in that** the seats (31) have couplings (45) for gripping and supporting removably the corresponding dispensing device (30) on its opposite side ends (46, 47).

8. Hooding machine (10) according to Claim 1, **characterized in that** each seat (31) has an associated buffer (50) for clamping the film of the dispensing device (30) when it is in the seat (31).

9. Hooding machine (10) according to Claim 1, **characterized in that** it comprises a motor device (27) which engages the reel (23) in the operating position so as to rotate it on command.

10. Hooding machine (10) according to Claim 2, **characterized in that** in the initial zone (15) of the feeding path (14) there is a device (33) for cross- cutting the strip of film and if necessary for performing a transverse weld downstream of the cut so as to form a tube segment which forms a hood (60) to be fed to the hooding head (17).

11. Hooding machine (10) according to Claim 1, **characterized in that** each dispensing device (30) comprises a body (40) with a transmission roller (41) which is located at an inlet end and on which the strip (42) of film is supplied from the corresponding reel (23) and then passes through a guide passage (43) in the body (40) and exits from an upper end (44) of the body (40).

12. Hooding machine (10) according to Claim 2, **characterized in that** the dispensing device (30) is designed to separate from each other two opposite faces (42a and 42b) of the free end of the tube of film (42) therein, so that when the dispensing device is displaced into the initial zone (15) of the feeding path (14), said two faces can be gripped near their side edges by grippers (34) which are motorized for sliding along the feeding path (14).

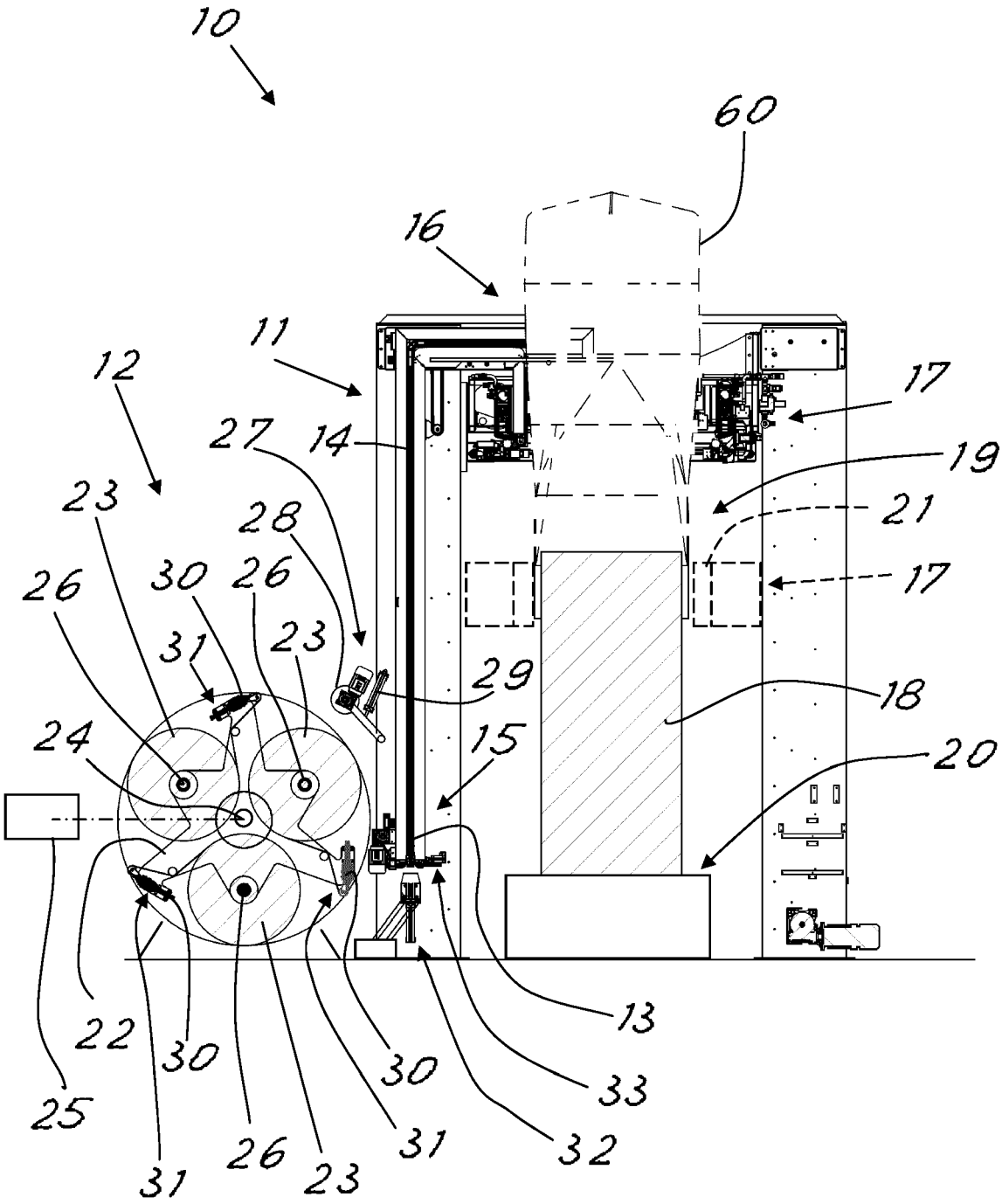
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Fig.1

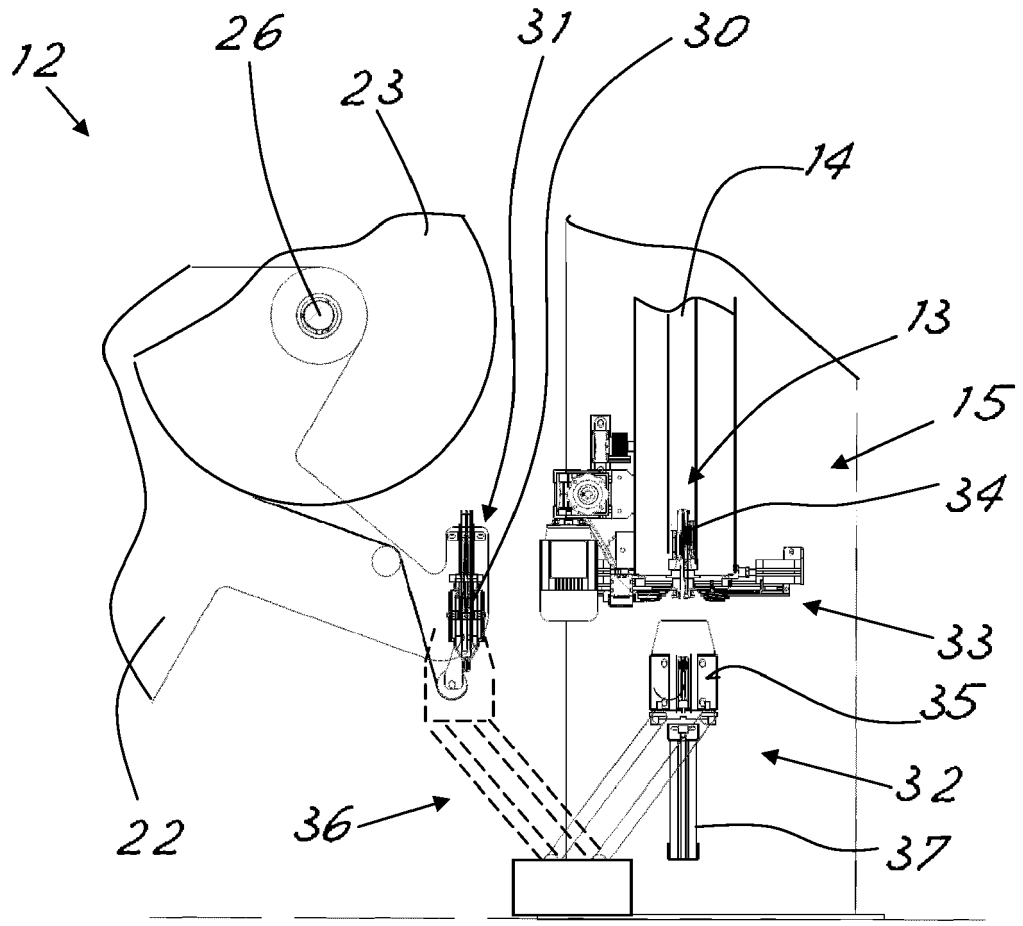

Fig.2

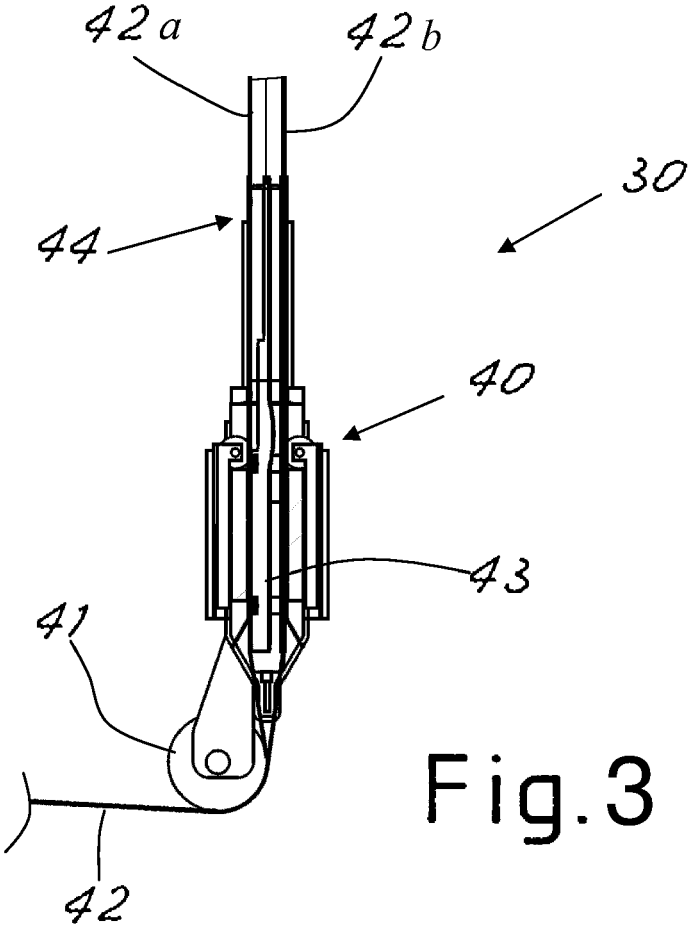

Fig.3

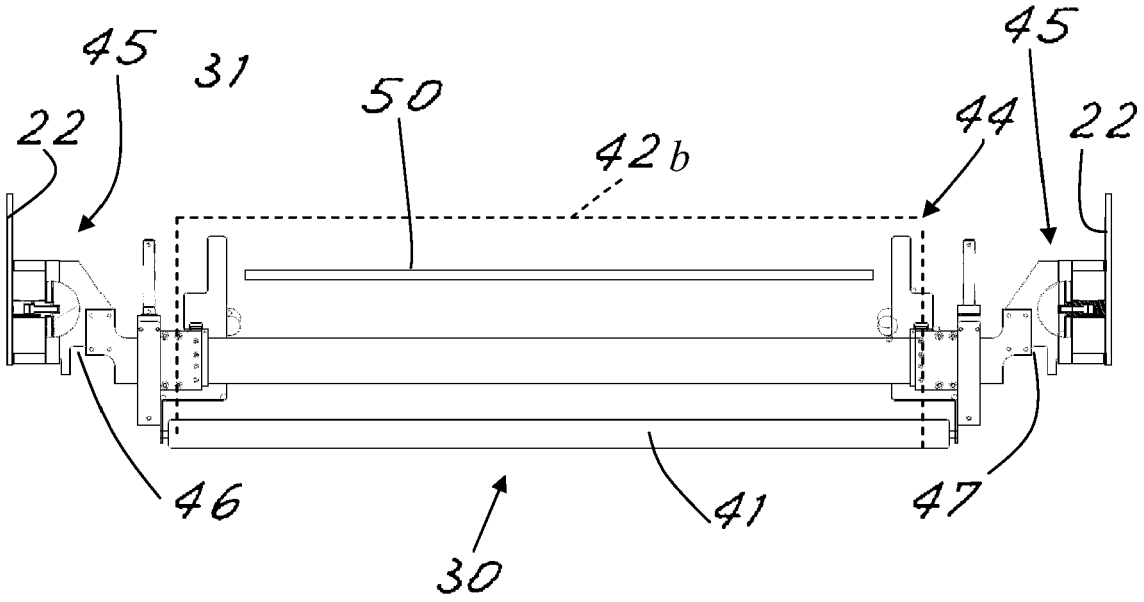

Fig.4

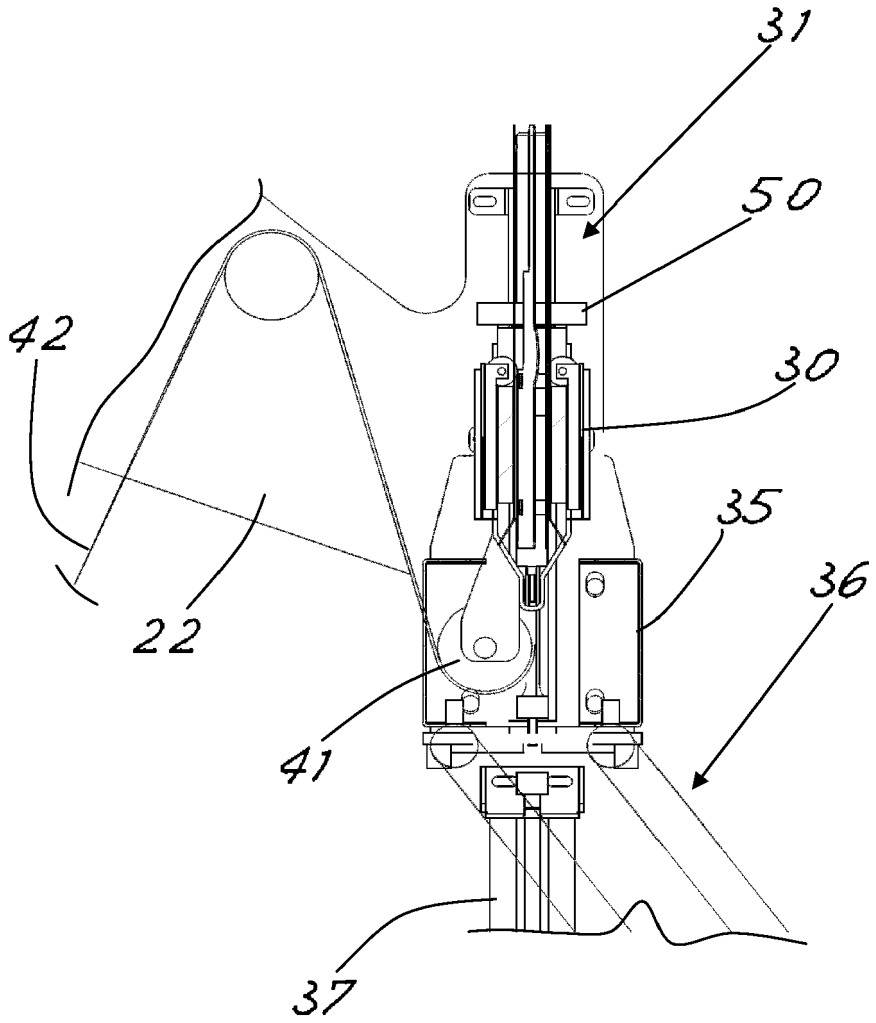

Fig.5

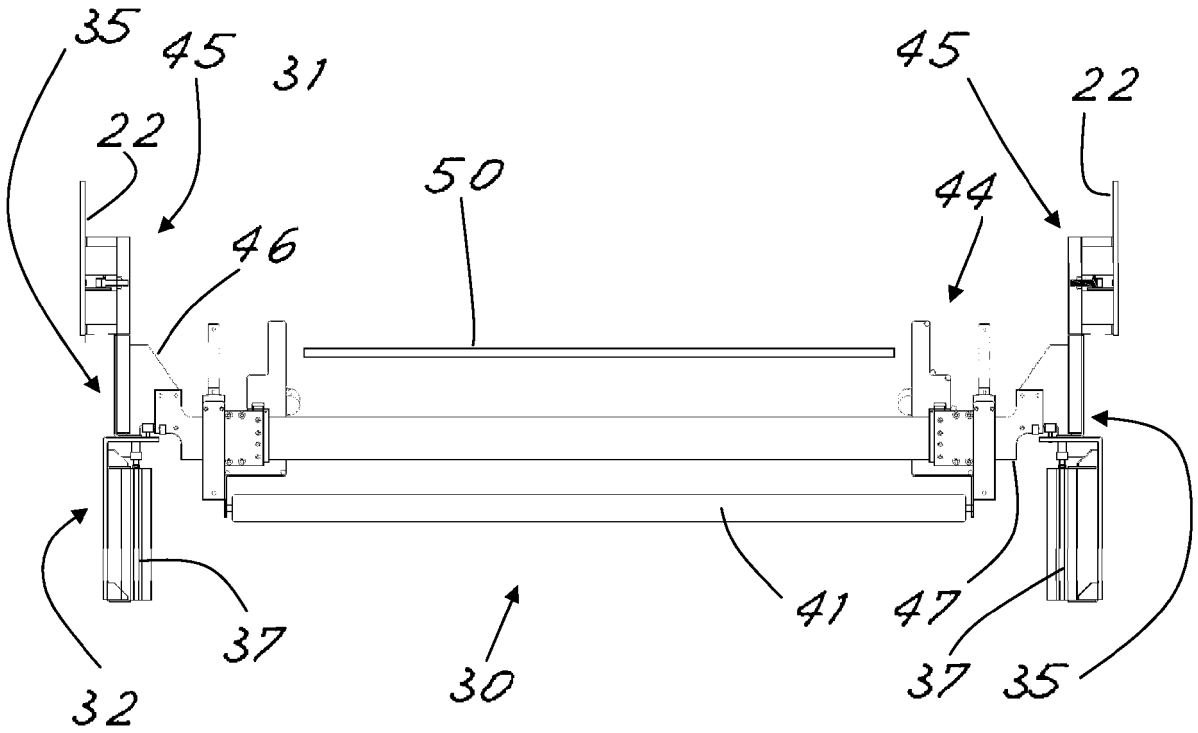
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Fig.6

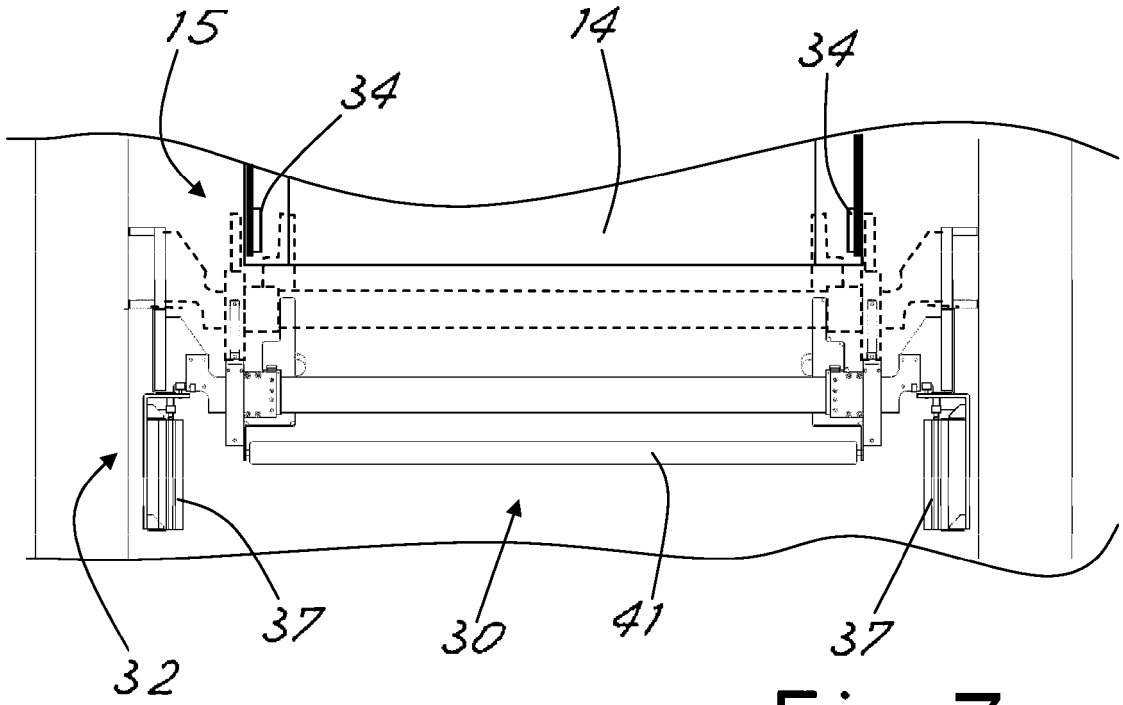
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Fig.7

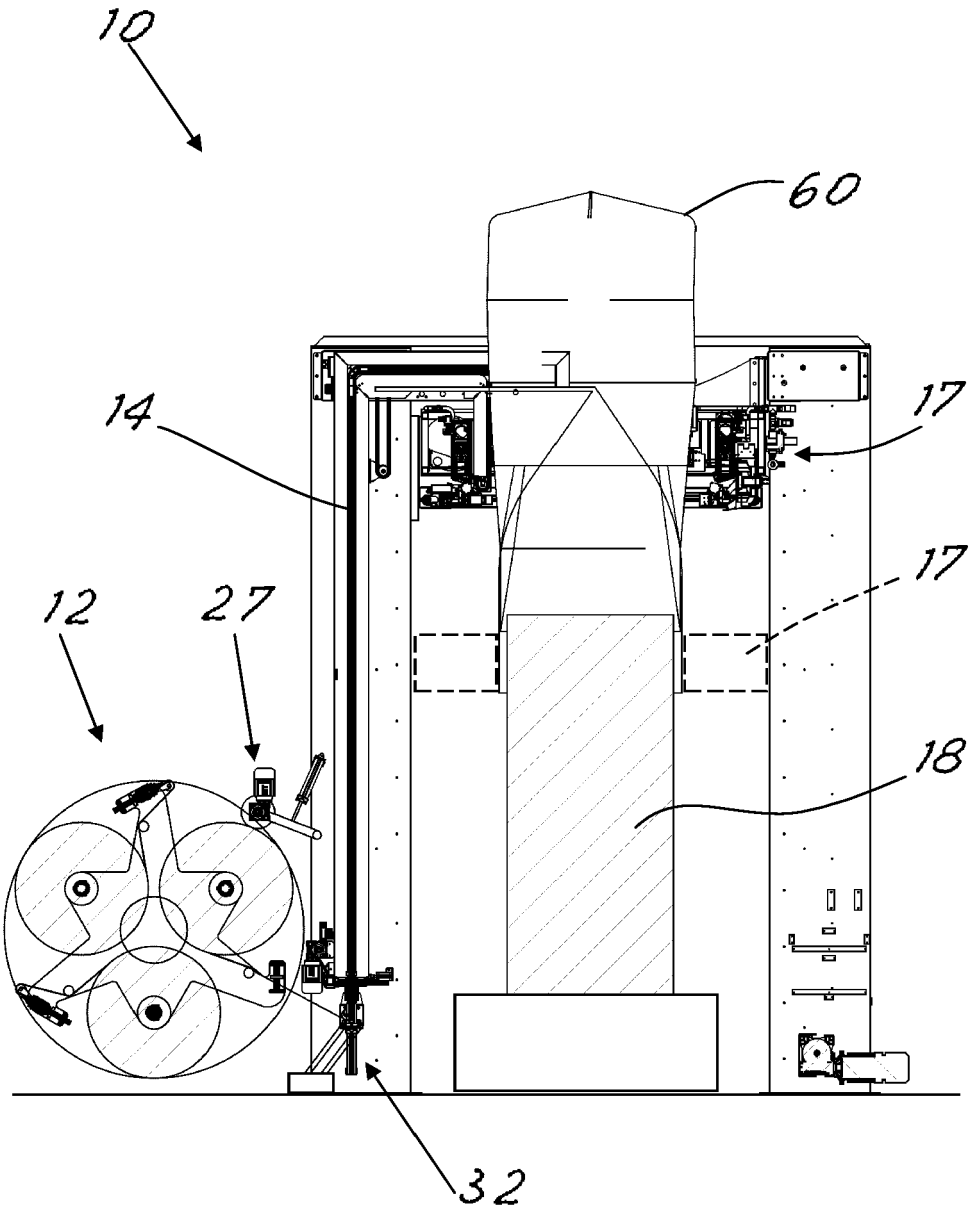

Fig.8

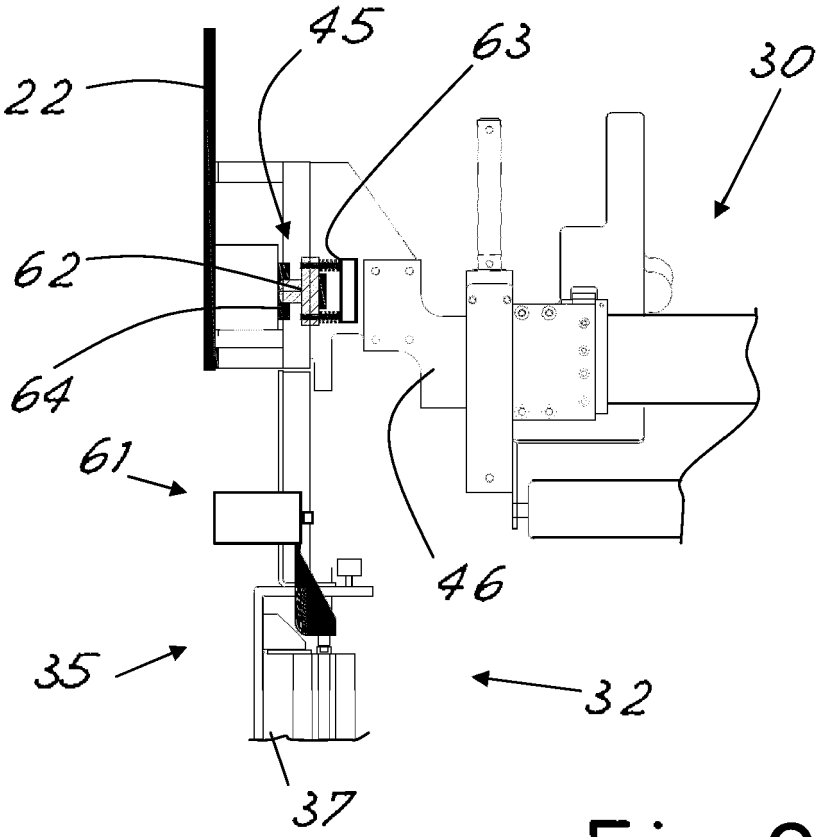

Fig.9

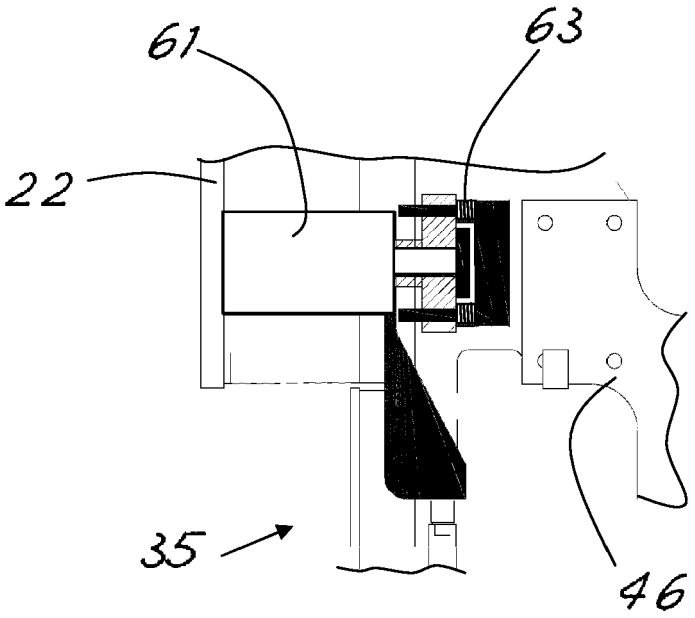

Fig.10

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 February 2020	Cardoso, Victor

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