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(71) Applicant: **Industrias Penalver, S.L.**
30500 Molina de Segura (Murcia) (ES)

(72) Inventor: **PEÑALVER GARCÍA, José**
E-30500 Molina De Segura (Murcia) (ES)

(74) Representative: **Ungria López, Javier**
Avda. Ramón y Cajal, 78
28043 Madrid (ES)

(54) INTERMITTENTLY ROTATING SIZING-EDGING MACHINE FOR MULTI-FORM, LARGE-SIZE METAL COVERS

(57) The machine is characterized in that it comprises an upper platform (51) as a working table provided at its center with a cap-holder rotating disk (1) with intermittent rotation and equipped with several radial windows (61) into which respective caps (56) are housed, four workstations symmetrical and complementary being provided around the rotating disk (1) and placed with an offset angle of 90° there between, which includes:

A cap feeder device (2), a flanging device (3), a gluing device (4) and a device for evacuating (5) said caps (56).

It further comprises characteristic means for transmitting synchronized motions in order to perform various operations on the caps (56).

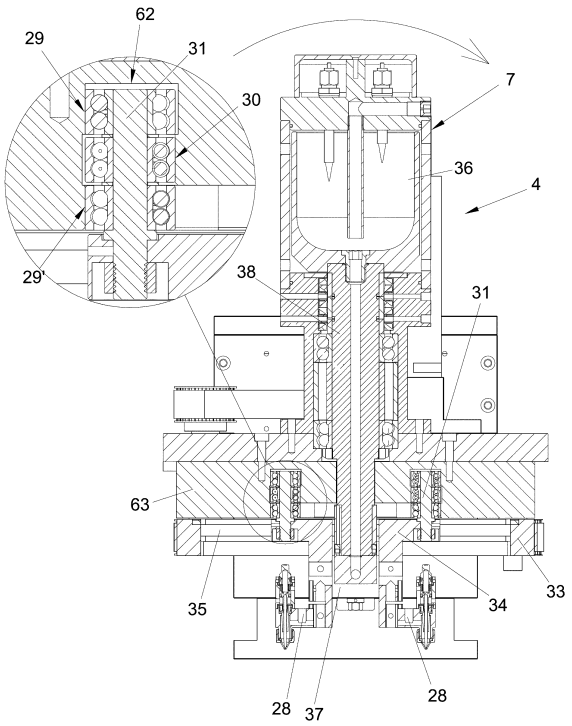

FIG. 6

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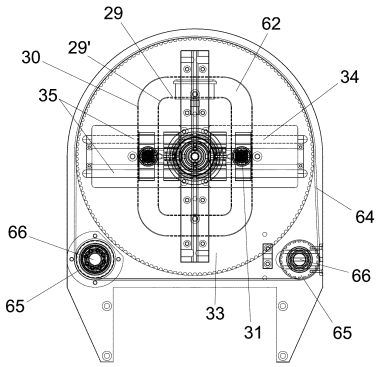


FIG. 6a

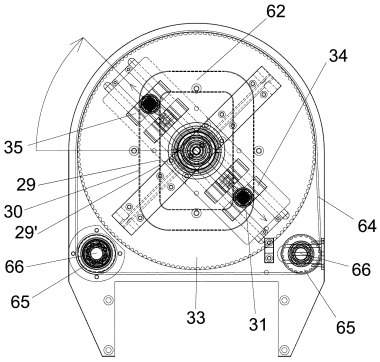


FIG. 6b

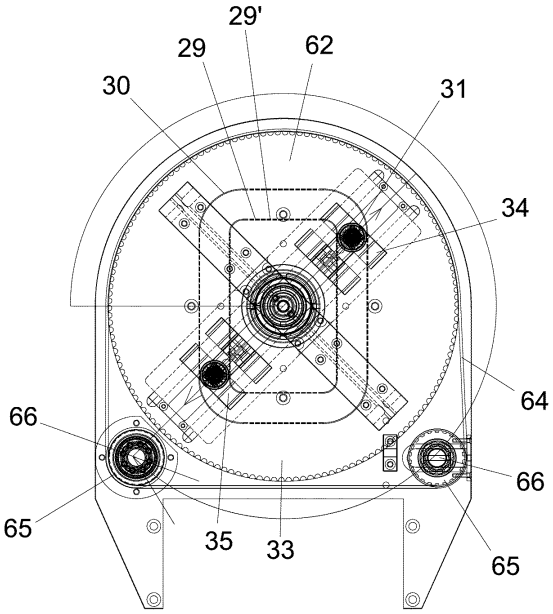


FIG. 6c

Description

OBJET OF THE INVENTION

[0001] The present invention, as the title of this specification states, refers to an intermittent rotating gluing-flanging machine for large format multiform metal caps with a non-circular geometry and with a mid-size format including geometries of the oval, rectangular, square types, etc.

[0002] The machine of the invention is intended to combine into a single device the gluing and flanging operations, and to cover a very specific field in the market concerning the production of mid/large size format caps. It is important for the manufacturer of caps to have a unit wherein the interchangeability between different formats can be done in a quick and easy way, taking into account that for large size caps the productions are much smaller than for other more standard caps.

[0003] In order to make the production cost profitable, the downtimes between the format changes must maximally minimized. Therefore, a simple, practical and easy interchangeability between formats machine has been developed. By joining the flanging and gluing applications in a single device, the money and space saving is significant.

[0004] Moreover, by performing the two tasks without evacuating the cap from the machine, the downtimes between machines and the need for storage or packaging the caps from one to another operation are eliminated.

BACKGROUND OF THE INVENTION

[0005] Currently, in the market are different types of machines that are capable of performing the functions for which the machine of the invention has been conceived, but these work at low speeds (40/50 caps per minute) and are not integrated into a single unit. So far there is only known a machine that is specifically intended to manufacture small format caps and which is impractical to be adapted to large formats. Therefore, we are unaware of the existence in the market for a gluing- flanging machine with a non- circular geometry adapted to such cap sizes.

[0006] Therefore, the new invention comes to fill a gap in the needs of the cap manufacturer.

DESCRIPTION OF THE INVENTION

[0007] In order to achieve the objectives and avoid the drawbacks mentioned in the preceding paragraphs, the invention proposes an intermittent rotating gluing-flanging machine for large format multiform metal caps that has a prismatic geometry, and which is equipped with different driving means in order to develop the applications required for flanging and gluing caps.

[0008] It has at its top an upper platform as a working table with an essentially square geometry and provided at its center with an intermittent rotation cap-holder rotating disk with at least four substations capable of producing over one hundred and fifty caps per minute in cap sizes up to 300 mm in diagonal and more than two hundred and fifty caps per minute in cap sizes with a diagonal around 150 mm.

[0009] The number of substations will depend on the size of the cap so, for example as a guideline, for medium-sized caps it will have eight substations and for large sizes will have four. Along the periphery of the disk and located at 90° there between, four workstations symmetrical and complementary are arranged for performing the process by using a cap feeder device, a flanging device, a gluing device and a device for evacuating the caps from the machine. The substations are corresponded to radial openings or windows in the rotating disk into which the caps are housed for their rotating displacement using the aforementioned disk.

[0010] To facilitate the synchronization of the mechanism, the cap-holder rotating disk is driven by an indexer, giving it an intermittent motion composed by a continuous rotation of 90°, 45°, 22.5°, and so on (depending on the number of substations) for displacing the cap from one station to another, and a stop for implementing the appropriate application: feeding, flanging, gluing or evacuating the caps from the unit through the conveyor. The forward and down times of each substation are distributed at 50%, i.e., the time each substation takes in making a rotation of a certain angular range, is the same as the downtime used for the applications of flanging, gluing, feeding or evacuating the caps from the machine unit.

[0011] The four application devices of the machine are arranged at 90° apart from each other around the periphery of the cap-holder disk. The order of the processes applied to the cap is the following: feeding, flanging, gluing and transportation. Throughout the process, the cap makes a total distance of 270° before being evacuated from the unit. Each of the various processes performed on the cap is performed on separate workstations.

[0012] By using the means for transmitting synchronized motions the cap-holder rotating disk is rotated with stops at four workstations for simultaneously performing different operations on the respective caps that are arranged in correspondence with such workstations, performing at least some of these working operations also through such synchronized transmission means having continuous motion.

[0013] The means for transmitting synchronized motions are based on a motor element which transmits its motion to a camshaft and the rotation of it is transmitted to an indexer by using a chain coupled to a lower pinion integral with said camshaft and a upper pinion integral with a side axis of the indexer, this incorporating an upper output shaft that transmits the motion to the cap-holder rotating disk.

[0014] The flanging device is characterized by comprising a matrix-holder casing as a female element faced to a punch as the male element that alternately moves

up and down against the inner cavity of the matrix to form the cap, such punch being moved through a connecting rod-crank mechanism that receives the motion from the camshaft.

[0015] The camshaft is characterized in that it has an anterior eccentric appendix through which an anterior swivel joint is coupled, this being connected to a threaded end section that hingely connects at its free end with a cylindrical body attached to a base integral with the mentioned punch.

[0016] On the other hand, the hinged connection between the threaded shaft and the cylindrical body is a ball joint.

[0017] The upward and downward motion of the punch is secured by at least two shanks wherein the base of the punch is guided, said shanks being joined through one of their ends to the upper platform as a working table.

[0018] The matrix-holder casing is characterized in that is foldable and therefore is coupled to it a transverse shaft, while having a locking shaft to secure its active position.

[0019] The anchoring means for blocking the matrix-holder casing comprise the locking shaft an outer head housed inside an inner box of the matrix-holder casing while such locking shaft is associated with a gear provided with a locking/ unlocking crank.

[0020] The gluing device is characterized in that it comprises a copying mechanism determined from at least one car that incorporates at the bottom at least one rubber material injector, car coupled and guided in parallel rods, said car being at the top provided with a roller follower housed inside a closed contour groove according to the path of the perimeter channeling of the caps that will be filled with the corresponding rubber material, said groove being performed in a static cam body disposed above a main pulley incorporating the parallel rods and cars.

[0021] The rotational motion of the gluing device is transmitted via a servomotor with the interposition of a major cogged belt coupled on a perimeter cog of the main pulley and on minor pulleys coupled to side axes.

[0022] Another feature of the invention is that the main pulley rotates around a main shaft linked at the top to a frictionless rotating joint that includes a reservoir for containing the rubber material in liquid state, which reservoir is connected to a distributor associated with guns incorporating the injectors, which guns are independently fed with liquid rubber and air.

[0023] The cam groove is characterized in that it comprises an eccentric channel composed of three cam profiles: an upper one that acts as a cam, an intermediate profile that performs the function of countercam and a lower profile which also acts as a cam, said eccentric channel being complemented with three rollers of the follower, so that the upper and lower rollers rest on the inner face of the upper and lower cam profiles, while the intermediate roller makes contact on the outer face of the intermediate cam profile.

[0024] The gluing device assembly moves upward through a posterior lifting device that includes a linear actuator for dragging the gluing device coupled to vertical guides.

[0025] It should be noted that the rubber material injectors and roller followers are arranged in the same vertical direction.

[0026] The cap evacuation device comprises a reciprocating pusher with an up/down motion that moves the respective cap upwards from its location in the radial opening or window of the rotating disk, also comprising a magnetic conveyor belt coupled to pulleys in order to evacuate the cap outward from the machine when its conformation has been completed.

[0027] The reciprocating motion of the pusher is provided by a rod/crank mechanism transmitted from the camshaft.

[0028] The mentioned rod/crank mechanism to generate said reciprocating motion of the pusher is determined from a posterior eccentric appendix to which a lower swivel joint connected to a shaft is hinged, this being in turn connected through its free end to another higher swivel joint joined to the pusher guided in vertical bars.

[0029] The feeder device is characterized in that it comprises a tower as a hopper for storing stacked and faced caps with the respective radial opening of the rotating disk, the base of such tower incorporating as a bottom and support for the caps, upper blades and lower blades arranged in separate planes, with all these being connected to actuation devices, activation of which causes simultaneous opposite linear displacements of the upper blades with respect to the lower ones and vice versa.

[0030] The machine also includes an anterior lifting device that vertically moves over two guides the cap feeder device assembly, which motion is performed by a linear actuator.

[0031] The machine table includes under the cap-holder rotating disk a set of magnets housed inside of boxes in radial arrangement for fixing the caps.

[0032] Next, to facilitate a better understanding of this specification and being an integral part thereof some figures in which the object of the invention has been represented in an illustrative and not limitative manner are attached.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033]

Figure 1. - Shows a perspective view of the intermittent rotating gluing-flanging machine for large format multiform metal caps object of the invention. It shows four application stations, as well as a chassis and a carp-holder rotating disk. It can also be seen the rotation direction of the cap-holder rotating disk and the linear motion of the cap evacuation device.

Figure 2. - Shows a perspective view of various mechanical transmissions of the machine and can also particularly be seen a transmission chain that pro-

vides motion to the cap-holder rotating disk through an indexer.

Figure 2a. - Represents through an elevational section, the different mechanical transmissions of the machine unit and, in particular, it can be seen the coupling of the cap-holder rotating disk on the indexer shaft.

Figures 3a, 3b and 3c. - Show cross sections of the process for feeding and dispensing the caps into the feeder device through three steps in which the cap to cap separation for their distribution to the machine can be seen. It also includes details of the inner area of the feeder device for further clarification.

Figure 4.- It is an elevational sectional view of the flanging station and camshaft which provides it motion. It shows the arrangement of all the most representative elements.

Figures 4a and 4b. - Show through elevational views part of the process for flanging the cap through two steps wherein the different motions of the mechanism for performing the stamping before and after flanging the cap can be seen. It also includes details of the punch area wherein the most important elements such as a matrix as a female element, a cap and a punch as a male element are represented.

Figure 5. - Shows a perspective view of the gluing device as a partial section. This figure shows the assembly of the most representative of this application for performing the copying of the cap.

Figure 6. - Shows a cross-sectional view of the gluing device with all the most representative elements and a detail thereof wherein the cam-countercam-cam copying system and the three roller follower coupled on an eccentric groove is more clearly reflected.

Figures 6a, 6b and 6c. - Show respective plan views wherein the process for copying the cap can be seen through several steps, in which the different positions of the follower and gun along the cam profile when the main pulley rotates certain degree are seen.

Figure 7. - Shows a detail in the gluing application on the perimeter channel of the cap by using an application gun.

Figure 8. - Shows an elevational section of the station for evacuating the caps in which can be seen the system for lifting the caps consisting of a pusher and conveyor belt for evacuating caps.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0034] Taking the figures in consideration, the invention relates to a gluing-flanging machine 6 for metal caps 56 with non-circular geometry key feature of which is the simultaneous performance into a single unit of the gluing and flanging operations by using a gluing device 4 and a flanging device 3 for medium/large format caps 56, any geometry thereof being able to be adapted using a simple and rapid format change with respect to the cap-holder rotating disk 1, a punch 16-17, a copying cam 63 and a feeding tower 12. The rotating disk 1 is disposed above an upper platform 51 as a working table.

[0035] To give motion to the different transmissions of the gluing-flanging machine, we start from a main driving motor 9 that by using a cogged transmission belt 10 provides motion to a camshaft 11 in turn responsible for performing independent transmissions from the following unit devices: cap-holder rotating disk 1, punch 16-17, pusher 40 and cap evacuation device 5.

[0036] The central device of the gluing-flanging machine 6 consists of the intermittent rotation cap-holder rotating disk 1 provided at least with four substations for housing and distributing the caps 56 to the various stations of the machine unit. It is powered by an indexer 8 in order to provide it an intermittent forward and stop rotation motion, wherein the forward motion is used to move the cap 56 from one station to another and the stop motion for the various applications described herein. Motions between different devices on the machine unit 1 and the cap-holder rotating disk are synchronized such that all the stations work simultaneously.

[0037] A cap feeder device 2 consists of the tower 12 that acts as the hopper 56 for storing caps and supplying thereof to the cap-holder rotating disk. The accumulated caps are separated one by one and housed in the substation of the rotating disk 1 (radial openings or windows 61 inside of which the respective caps 56 are housed), the corresponding radial opening 61 being located immediately below the tower 12), through two assemblies. One of them consists of an upper blade 13, a lower blade 14 and a pneumatically actuated clip 15. The other assembly consists of two upper blades 13, two lower blades 14 and a pneumatic clip 15.

[0038] Each blade moves linearly by being individually coupled on each of the two radial cars provided in the clip 15. These assemblies are located at the bottom of the feeding tower 12 and on opposite sides, thus creating a uniform support for the caps 56 through three contact points in order to thus avoid the oscillation of the same in the tower 12.

[0039] In a first step, the caps 56 rest on the upper blade 13 that is partially positioned in the inner area of the tower 12. Due to the pneumatic actuation of the clip 15, the upper 13 and lower 14 blades are moved in opposite directions simultaneously, so that when the upper blade 13 moves back from the planar area inside the tower 12, the lower blade 14 moves forward inward the same.

[0040] In this way the accumulated caps 56 are deposited on the lower blade 14, which acts as a stop. After this step, a new cycle of the pneumatic clip 15 causes a reverse motion on both blades exchanging their roles, so that the upper blade 13 moves forward into the tower 12 while the lower blade 14 moves back allowing individually passing the caps towards the cap-holder rotating disk 1, which due to a radial arrangement of magnets 47 located in the table 51, allows fixing caps 56 in the substation for feeding the rotating disk 1.

[0041] To simplify the adjustment, maintenance and implementation of format change tasks, the cap feeder device 2 has been provided with a lifting device 48 that greatly helps for performing these operations. The cap 56 feeder device 2 assembly moves vertically on two linear guides provided with bearings thanks of a pneumatic cylinder not shown in the figures, nor are represented the linear guides. All these elements are coupled on the lifting device 48.

[0042] Regarding the format change, it will only be necessary to replace the feeding tower 12 by another having the geometry of the new format of cap to be installed.

[0043] The flanging operation is done using the punch 16-17 by the stamping method. It consists of two complementary bodies, one fixed with female profile so-called matrix 16 and one moving body with male profile so-called punch 17. The cap 56 is flanged in a single hit by the impact generated by being trapped between the inner cavities of the punch 16-17, thus changing the wing profile. This method allows us to obtain an excellent flanging finishing by adjusting the edge line of the cap and thus facilitating the final closure of this in the package.

[0044] The upward and downward vertical movement of the punch 17 is generated through a connecting rod-crank mechanism. The camshaft 11 has at its end an anterior eccentric appendix 54 coupled on a swivel joint 18 into which a threaded shaft 19 with a spherical shape at its upper end is housed. The upper end of said threaded shaft 19 is embedded inside a cylindrical body 20 with spherical cavity 20 thus achieving a new hinging point. The cylindrical body 20 is screwed to a base 21 of the punch 17, such that when the camshaft 11 rotates, the rotation of the anterior eccentric appendix or bulge 54 causes the upward and downward movement of the threaded shaft 19 which in turn pushes the punch 17 into a fixed position at which the matrix 16 is located.

[0045] To ensure the precise verticality of the upward and downward motion of the punch 17, the base 21 of said punch 17 is guided through at least two shanks 22 located thereon. Likewise, the matrix 16 is coupled on a matrix-holder casing 23 available for rotating and folding in order to performance the maintenance processes, and provided on its lower base with a lower box 58 wherein a locking shaft 24 driven by a gear 25 with a relation of one half crank 26 for locking/unlocking device.

[0046] With this fixing system we ensure that during impact suffered by the matrix 16 in the stamping process, this is completely immobilized guaranteeing a perfect finishing in flanging the cap. In the embodiment for changing the format of the cap is only necessary to replace the matrix 16 and corresponding punch 17 by other similar to the new geometry of the cap to be installed in the machine. It is therefore a quick and simple process to execute.

[0047] In the inner box 58 of the matrix-holder casing 23 the locking shaft head 24 is housed while matrix-holder casing 23 is hingely coupled for folding thereof when a transverse shaft 57 is necessary.

[0048] The new gluing device 4 performs the operation by applying liquid rubber directly onto a perimeter channel 60 of the cap 56 with a certain flow rate through at least one injector 27 of a gun 28 designed for the application. It is based on a copying cam mechanism 63 and roller follower 31, but with very interesting particularities and advantages described below.

[0049] For performing this application we start from the disk and grooved stationary copying cam 63 and a roller follower 31 which runs along the profile thereof through the interior of a channel or slot 62 with closed contour. The roller follower 31 is composed of three angular contact bearings. To ensure a continuous contact of the copying cam-follower 63-31, the eccentric groove 62 has been designed consisting of three profiles (inner "cam" profiles 29-29' and outer "countercam" profile 30). The coupling of the three roller follower 31 on each of them is done such that the bearings are forced to press on three contact points opposite to each other, such that two of them rest on the inner cam profiles 29 -29' while the other makes contact on the outer profile of the so-called countercam 30. In the design of cam and countercam 30 profiles, a channel slightly higher than the roller of the roller follower 31 has been machined, wherein the center thereof is on the pitch line of the groove 62.

[0050] Using three rollers in the roller follower 31 coupled on the groove 62 with closed contour and eccentric, gaps and inaccuracies in copying the cam profile 29-29'-30 are prevented, and this produces an effect equivalent to the double-effect disk cam mechanism with the advantage, in this case, of being able to save the manufacture costs of a cam and a follower.

[0051] With this design we can ensure that along the 360° of rotation, the roller follower 31 makes an accurate and precise copying around the cam profiles 29-29'-30 when contacting therewith with a uniform pressure along the entire travel. In the copying mechanism that has been designed is worth noting that the geometric center of the roller follower 31 runs on the contour of cam-countercam-cam 29-30-29' identical to the path run by the application center of the gun 28 through the perimeter channel 60 of the cap 56, therefore it can be verified that the centers of the roller follower 31 and gun 28 are located in the same vertical.

[0052] During the application, the cap is in a resting position, with the two guns 28 being those running thereon following a set cam profile 29-29'-30. The motion of the gluing device 4 starts via a servomotor 32 which through a transmission by major belt 64 and minor belts 64 supplies motion to the main pulley 33. The minor pulleys 65 are coupled in side shafts 66.

[0053] The main pulley 33 houses into a longitudinal slot a car 34 that serves as a union between the roller follower 31 and the gun 28, and it is followed by two rods 35 located in a parallel and symmetrical arrangement on the center of the main pulley 33. When it rotates, the roller follower 31 moves through the groove 62 of the cam 29-29'- 30 making the car to perform a linear motion 34

through the guide rods 35 and a rotating one due to rotation of the main pulley 33. The groove 62 is located in a copying cam 63 that includes three cam- countercam-cam profiles 29- 30- 29', which copying cam 63 is located above the main pulley 33.

[0054] In this way, by being integral with the car 34, the guns 28 also describe a linear motion combined with other rotating one. It is thus obtained copying the cam 29-30-29' profile that for this type of application coincides with the center of the perimeter channel 60 of the cap 56 to be glued.

[0055] The results obtained by this system are extremely satisfactory, since with a single copying cam body 63 and a roller follower 31, a cam-follower three-contact copying system, free of gaps and torques, guaranteeing a perfect and accurate copying of the profile, ensuring a longer life span of the followers 31, has been achieved.

[0056] Feeding and distributing the filler material (liquid rubber) in the gluing-flanging machine is performed through a frictionless rotary joint 7 located at the top of the gluing device 4. It consists of a reservoir 36 connected to a distributor 37 through a main shaft 38 of the mentioned gluing device. This main shaft 38 has two holes for supplying air and rubber, which are in turn branched into four intakes when reaching the distributor 37. With this distribution, the guns 28 are independently supplied with rubber and air.

[0057] To facilitate the supervision, maintenance and implementation of format changes tasks, the gluing device 4 has been equipped with a posterior lifting device 39 that greatly helps in performing these operations. The gluing device 4 vertically moves on two linear guides provided with bearings thanks to a pneumatic cylinder not shown in the figures, said linear guides have not been represented either.

[0058] It is interesting to emphasize the ease and speed with which a cap format change can be performed, it is only necessary to replace the copying cam 63 by another suitable for the new cap to be installed on machine.

[0059] The device for evacuating 5 caps 56 performs the synchronized output of caps from the unit to a drying oven. Such evacuation device 5 basically comprises two elements: a pusher 40 and a magnetic conveyor belt 41 and pulleys. The pusher 40, with a vertical upward-downward motion lifts the cap from the corresponding substation (radial opening 61) of the rotating disk 1 to the vicinity of the evacuation device 5. With the help of the magnetic field provided by the aforementioned evacuation device 5, the cap is pulled over the evacuation belt 41 being attached thereof in order to be evicted from the machine.

[0060] The upward and downward vertical motion of the pusher 40 is generated through a rod/crank mechanism driven by a cam 42 located at one end of the camshaft 11. The cam 42 which constitutes a posterior eccentric appendage and the pusher 40, are joined together through a shaft 43 which has two upper 44 and lower 44' swivel joints on both ends. By rotating the camshaft 11 the posterior eccentric appendix 42 rotates causing the shaft assembly 43 and swivel joints 44-44' to move through vertical motion to the pusher 40 and this lifts the cap from the substation of the rotating disk 1 to the magnetic conveyor belt 41.

[0061] The pusher 40 is guided in vertical bars 55.

[0062] The device 5 for evacuating caps 56 provides a set of magnets therein that generate a magnetic field and attract the cap preventing it from get off the conveyor belt 41. Also, the evacuation device 5 is actuated through a gear 45 with 1/1 relation, which receives motion from a kinematic chain 50 running from a side output shaft 46 through the right side of indexer 8. This area of the machine does not suffer any modification ahead the possibility of changing the format of the cap.

[0063] The motor element 9 transmits its motion to a camshaft 11 and the rotation of the latter is transmitted to an indexer 8 by using a chain 50 coupled to a lower pinion 53 integral with said camshaft 11 and an upper pinion 52 integral with a side shaft 46 of the indexer 8, this including an upper shaft 49 that transmits motion to the cap-holder rotating disk 1.

Claims

1. Intermittent rotating gluing-flanging machine for large format multiform metal caps, being intended to flange metal caps by stamping and then gluing said caps in proximity to the perimeter contour thereof, **characterized in that** it comprises an upper platform 51 as a working table provided at its center with a cap-holder rotating disk (1) with intermittent rotation and equipped with several radial windows 61 into which respective caps (56) are housed, four symmetrical and complementary workstations being provided around the rotating disk (1) and placed with an offset angle of 90° there between, which include:

    - a feeder device (2) that individually deposits the caps (56) in each of the radial windows (61) of rotating disk (1) when the respective radial window (61) is faced with such a feeder device (2);
    - a flanging device (3) that deforms by stamping the cap (56) in order to configure its final geometry by modifying the perimeter profile in such a cap (56);
    - a gluing device (4) that fills the perimeter channel (60) with an injected rubber material;
    - an evacuation device (5) that removes the caps after being glued;

    further comprising means for transmitting synchronized motions, through which the rotating disk (1) rotates with stops at four workstations in order to simultaneously perform different operations on the

respective caps that are arranged in correspondence with such workstations, at least some of these four work operations being also carried out through the synchronized transmission means having continuous motion.

2. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to claim 1, **characterized in that** the means for transmitting synchronized motions are based on a motor element (9) which transmits its motion to a camshaft (11) and the rotation of the latter is transmitted to an indexer (8) by using a chain (50) coupled to a lower pinion (53) integral with said camshaft (11) and an upper pinion (52) integral with a side shaft (46) of the indexer (8), this including an upper shaft (49) that transmits motion to the cap-holder rotating disk (1).

3. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to claims 1 and 2, **characterized in that** the flanging device (3) comprises a matrix-holder casing (23) to which a matrix (16) as a female element faced with a punch (17) as a male element alternately moving up and down against the inner cavity of the matrix (16) in order to form the cap (56) by stamping is fixed, such punch (17) moving by a connecting rod-crank mechanism that receives motion from the camshaft (11).

4. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to claim 3, **characterized in that** the camshaft (11) has an anterior eccentric appendix (54) to which an anterior swivel joint (18) is attached, this being connected to a threaded end section of a threaded shaft (19) hingely connected at its free end to a cylindrical body (20) attached to a base (21) integral with the punch (17).

5. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to claim 4, **characterized in that** the hinged connection between the threaded shaft (19) and the cylindrical body (20) is a ball joint.

6. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to any one of claims 4 or 5, **characterized in that** the upward/downward motion of the punch (17) is ensured by at least two shanks (22) in which the base (21) of the punch (17) is guided, which shanks (22) connected by one of their ends to the upper platform (51) as a working table.

7. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to any one of claims 3 to 6, **characterized in that** the matrix-holder casing (23) is foldable, for such purpose being coupled to a transverse shaft (57), while having an anchor for locking its active position.

8. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to claim 7, **characterized in that** the anchoring means for locking the matrix-holder casing (23) comprise a lock shaft (24) with an extreme head (59) housed inside an inner box (58) of the matrix-holder casing (23), while such a lock shaft (24) is associated with a gear (25) provided with a locking/unlocking crank (26).

9. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to any one of claims 1 or 2, **characterized in that** the gluing device (3) comprises a copying mechanism determined from at least one car (34) that includes at the bottom an injector (27) of rubber material, which car (34) is coupled and guided (35) in parallel rods, said car being provided at its top with at least one roller follower (31) housed in a groove (62) with closed contour according to the path of the perimeter channel (60) of the caps (56), said groove (62) being made in a static body of copying cam (63) disposed above a main pulley (33) that includes the rods (35) and cars (34).

10. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to claim 9, **characterized in that** the rotational motion of the main pulley (33) is transmitted by a servomotor (32) with the interposition of a major cogged belt (64) coupled to a perimeter cog of the main pulley (33) and minor pulleys (65) coupled to side shafts (66).

11. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to any one of claims 9 or 10, **characterized in that** the main pulley (33) rotates around a main shaft (38) connected at its top to a frictionless rotating joint (7) that includes a reservoir (36) for containing the rubber material in liquid state, which reservoir (36) is connected to a distributor (37) associated with guns (28) including the injectors (27), which guns (28) are independently supplied with liquid rubber and air.

12. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to any one of claims 9 to 11, **characterized in that** the groove (62) of the static body of the copying cam (63) comprises such a groove with an eccentric channel defined by two cam profiles (29-29') according to two upper and lower bearings of the roller follower (31) and an outer countercam profile (30) consistent with an intermediate bearing of the roller follower (31).

13. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to any one of claims 9 to 11, **characterized in that** the assembly of the gluing device (4) moves upward through a posterior lifting device (39) that includes a linear actuator to drag the gluing device (4) coupled to vertical guides.

14. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to any one of claims 9 to 11, **characterized in that** the injectors (27) of rubber material and the roller followers (31) are arranged in the same vertical direction.

15. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to claims 1 and 2 **characterized in that** the device (5) for evacuating caps (56) comprises:

- a pusher (40) with an upward/downward reciprocating motion that moves the respective cap (56) upwards from its location in the respective radial window (61) of the rotating disk (1);
- a magnetic conveyor belt (41) coupled to pulleys.

16. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to claim 15, **characterized in that** the reciprocating motion of the pusher (40) is generated by a connecting rod/crank mechanism transmitted from the camshaft (11).

17. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to claim 16, **characterized in that** the connecting rod/crank mechanism to create the reciprocating motion of the pusher (40) is determined from an outer eccentric appendix (42) wherein a lower swivel joint (44') that connects to a shaft (43) connected at its free end with another upper swivel joint (44) attached to the pusher (40) guided in vertical bars (55) is hinged.

18. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to any one of claims 1 or 2, **characterized in that** the feeder device (2) comprises a tower (12) as a hopper for feeding the caps (56) stacked and faced with the respective radial window (61) of rotating disk (1), the base of such tower (12) including as bottom and support for the caps, upper blades (13) and lower blades (14) arranged in separate planes, with all these being connected to actuation devices, activation of which causes opposite and simultaneous linear displacements of the upper blades with respect to the lower ones and vice versa, such displacements being perpendicular to the gravity displacement of the caps (56) stacked on the tower (12).

19. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to claim 18, **characterized in that** it comprises an anterior lifting device (48) that vertically moves on two guides to the assembly of the device (2) for feeding caps (56), which displacement is performed by a linear actuator.

20. Intermittent rotating gluing-flanging machine for large format multiform metal caps, according to any one of claims 18 or 19, **characterized in that** the upper surface of a table (51) includes some boxes with magnets (47) for fixing the caps (56) in each of the substations wherein it is necessary to transport thereof.

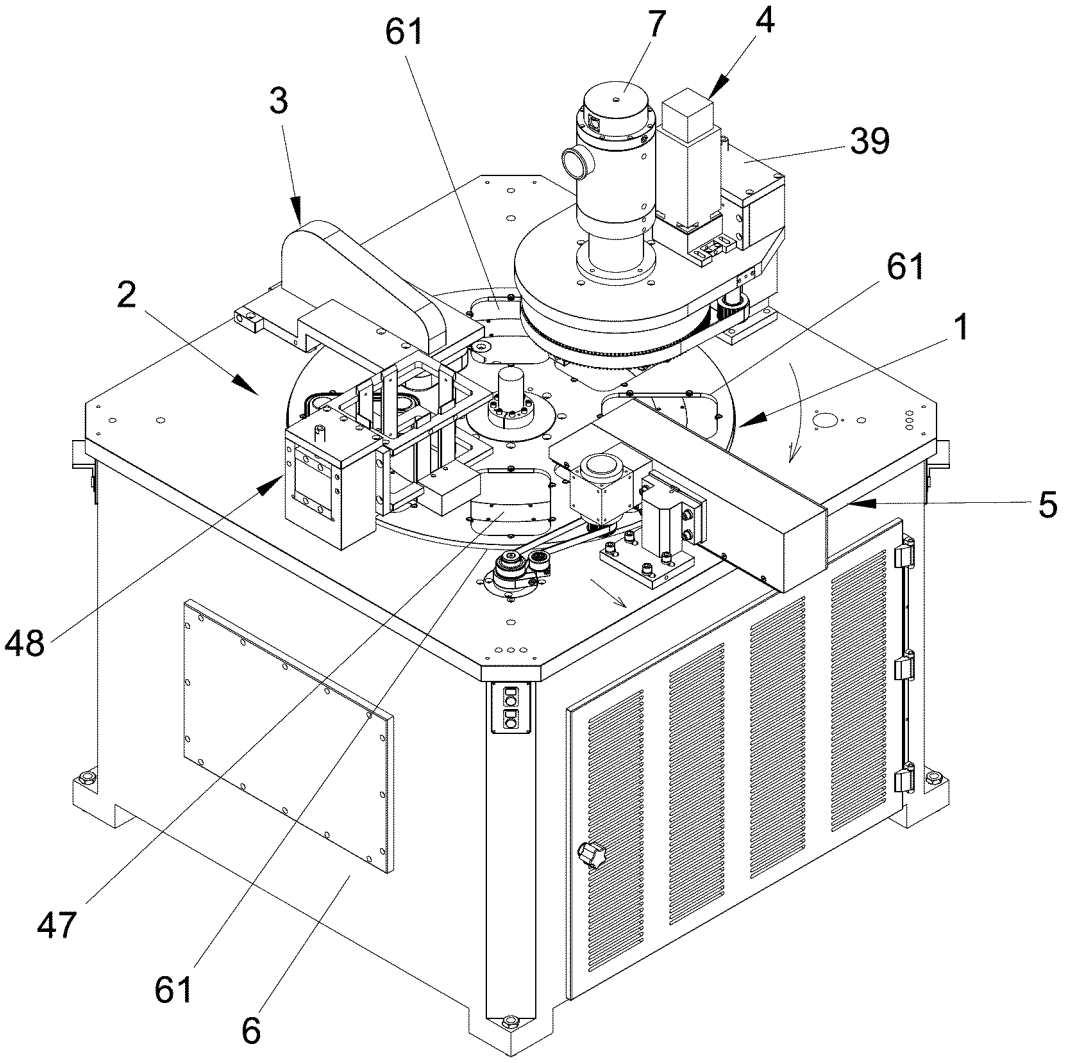


FIG. 1

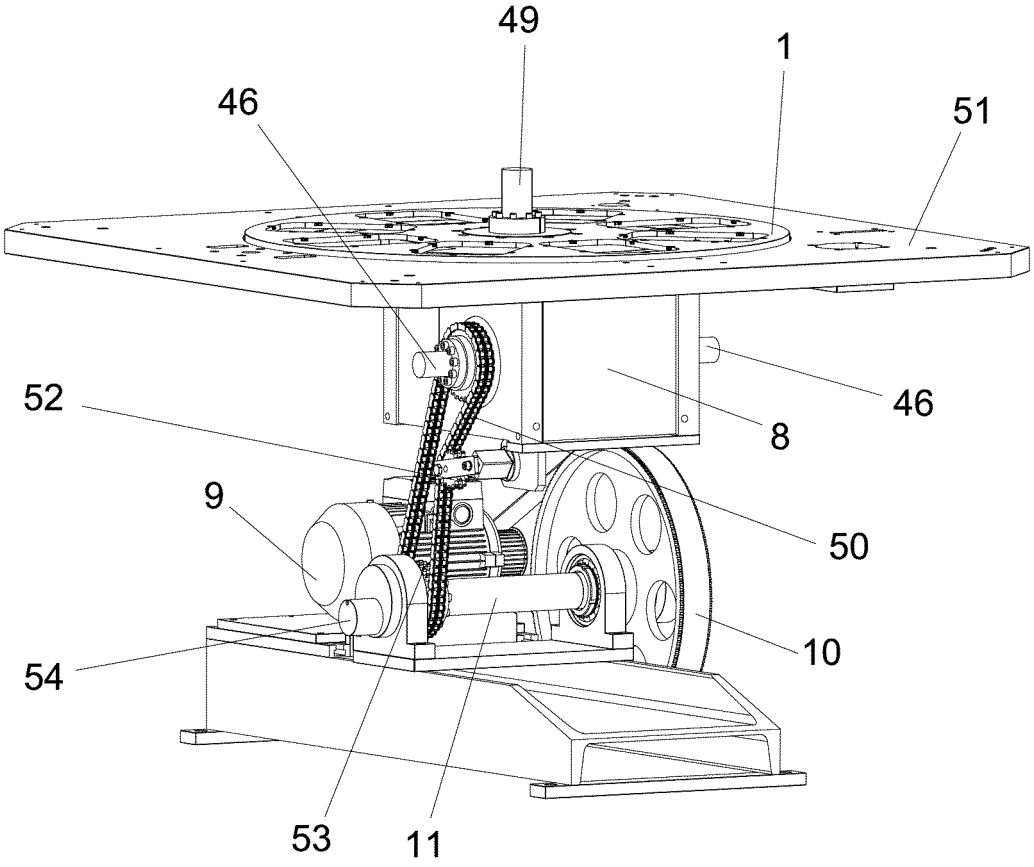


FIG. 2

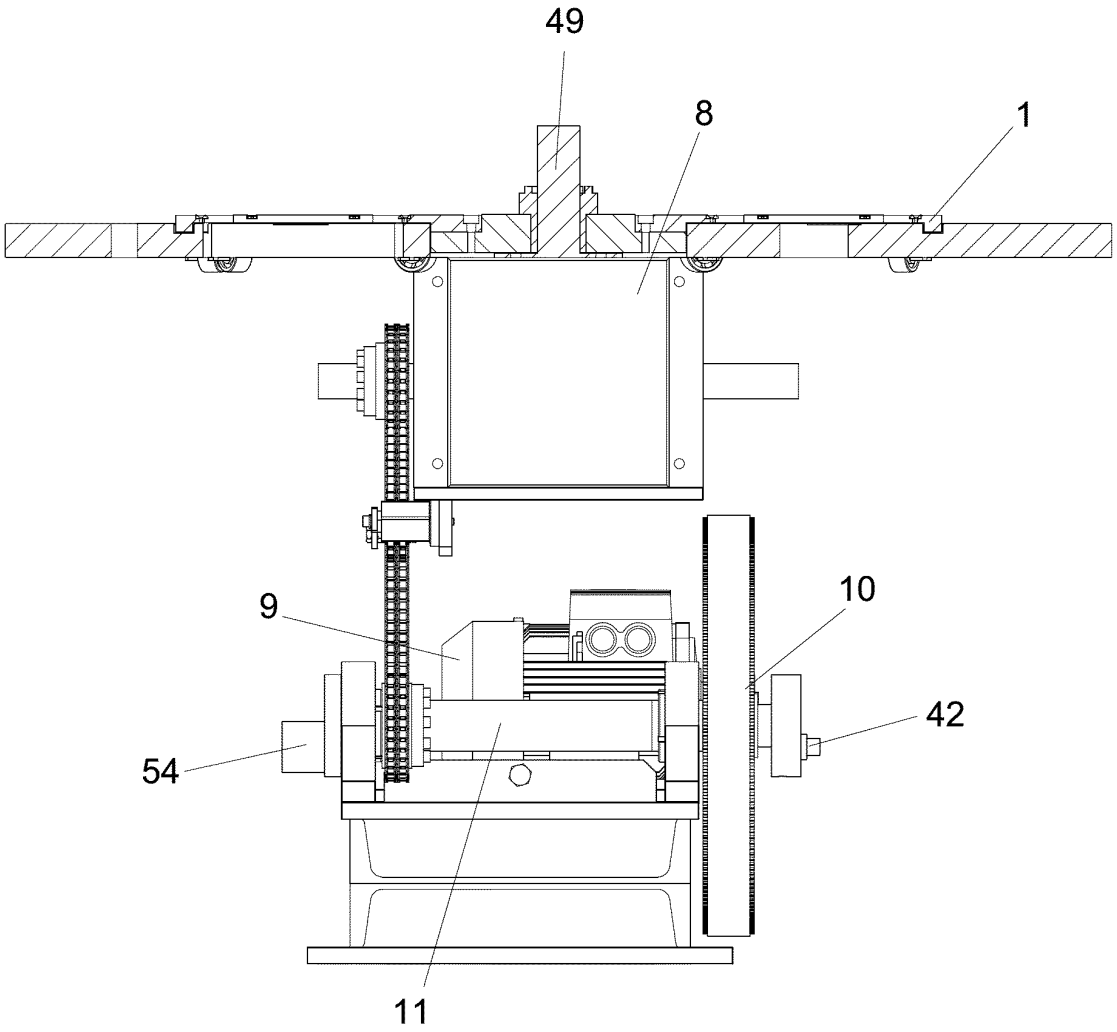


FIG. 2a

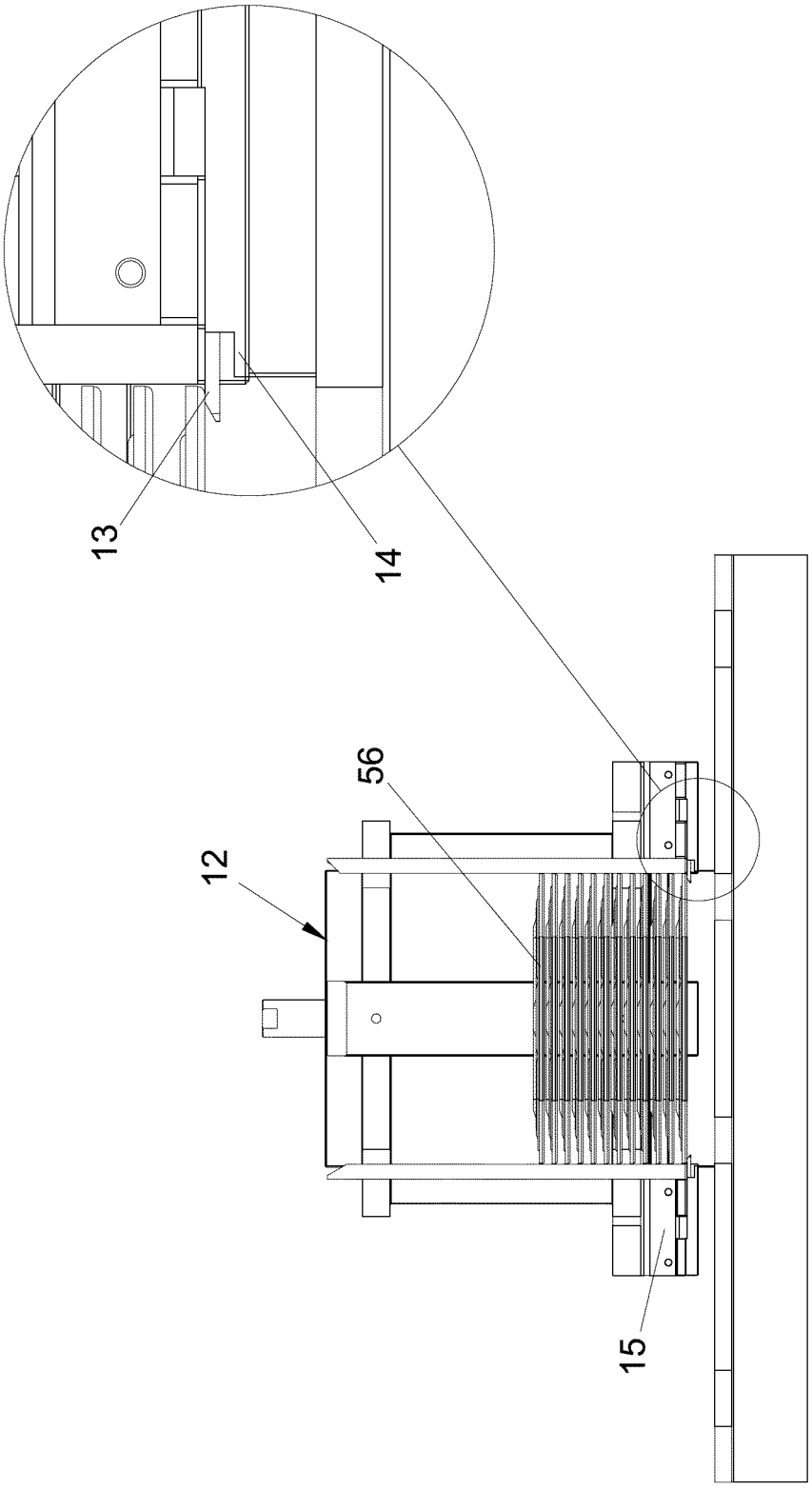


FIG. 3a

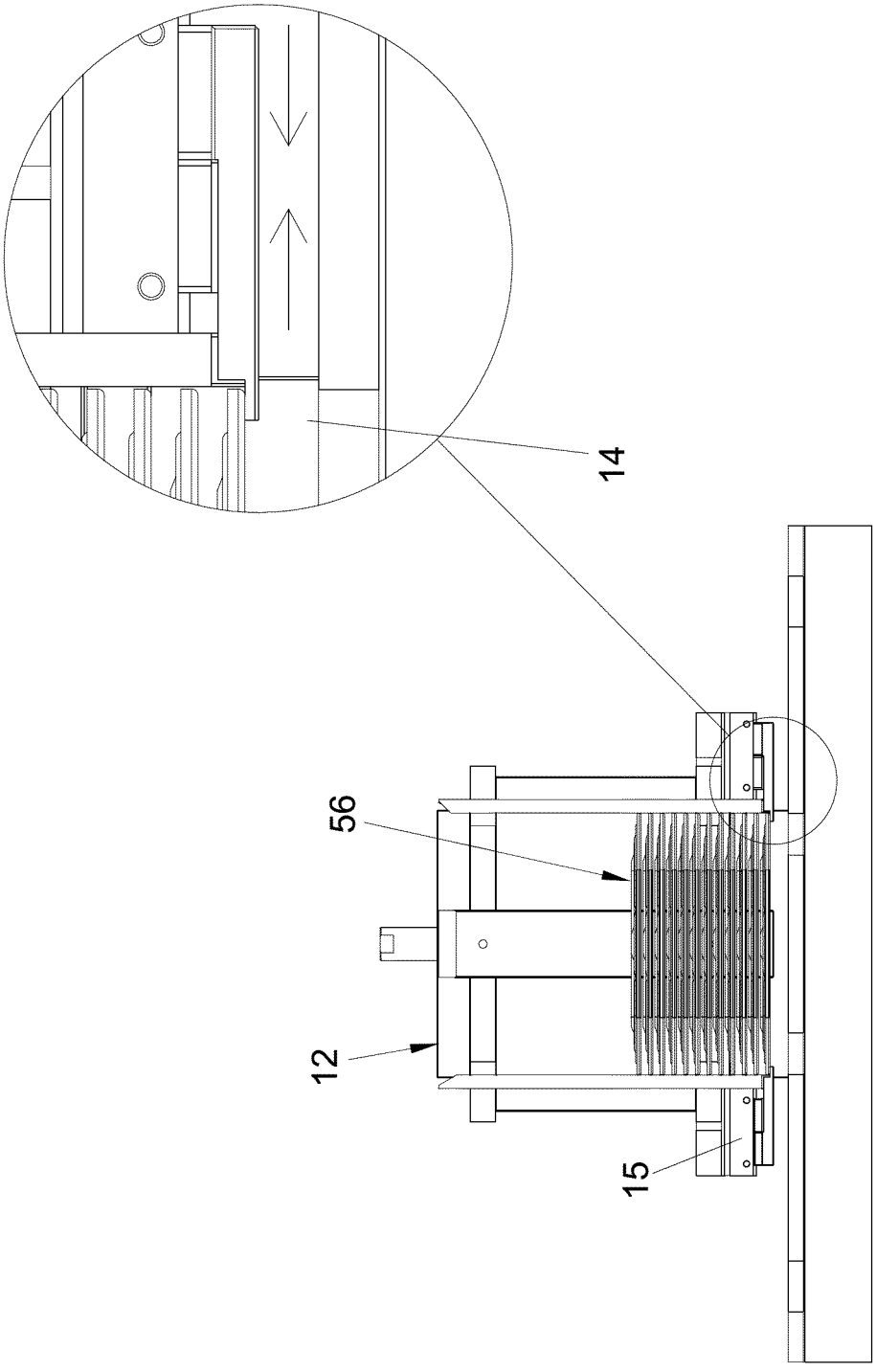


FIG. 3b

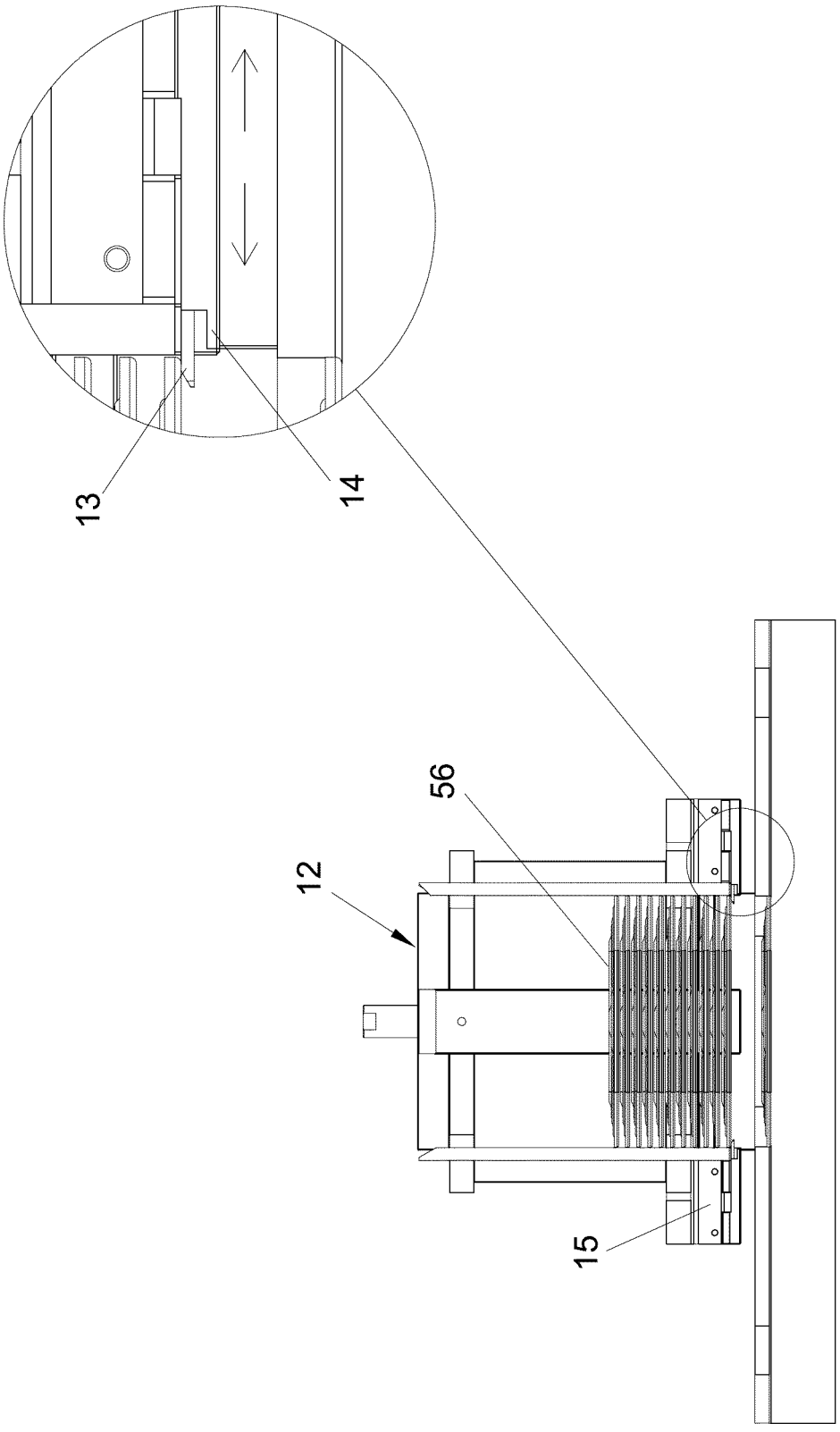


FIG. 3c

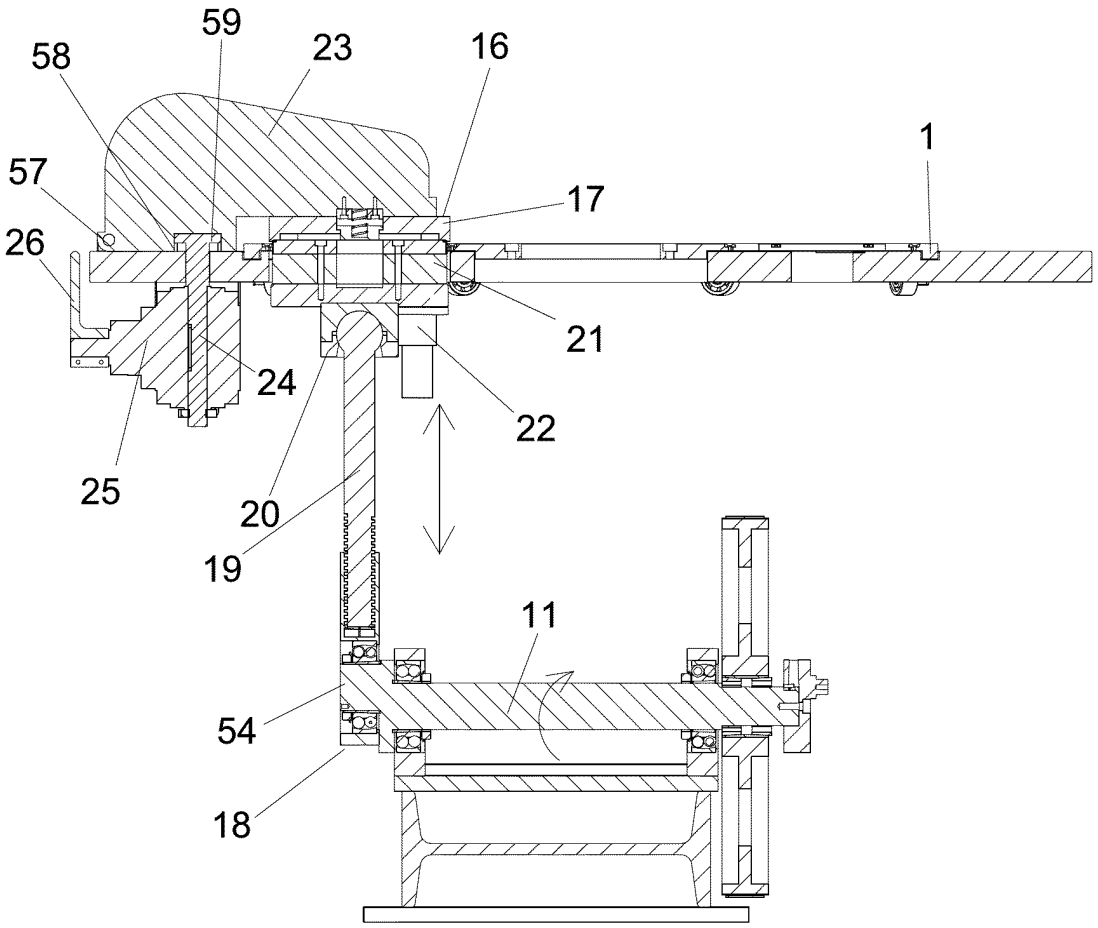


FIG. 4

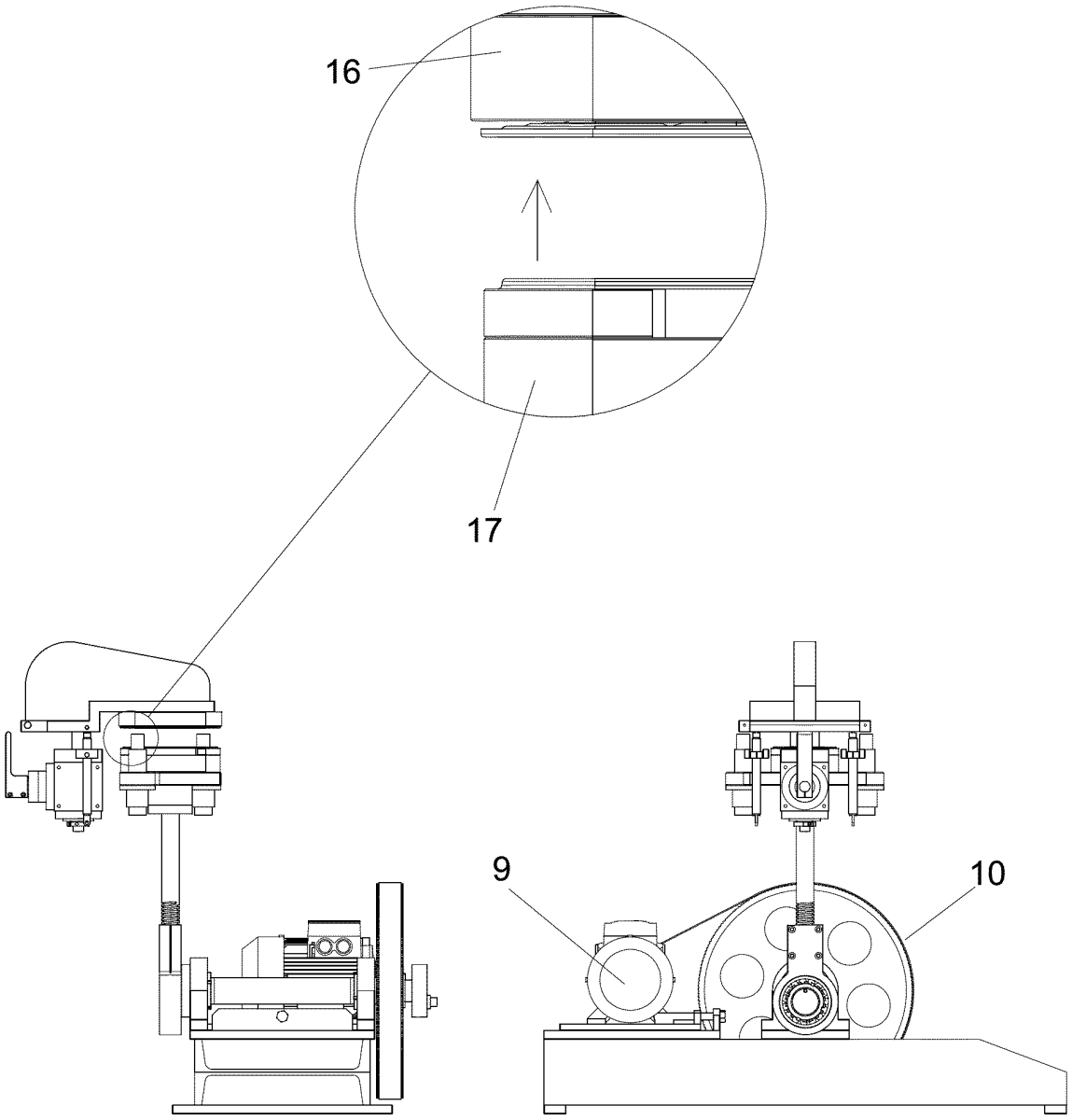


FIG. 4a

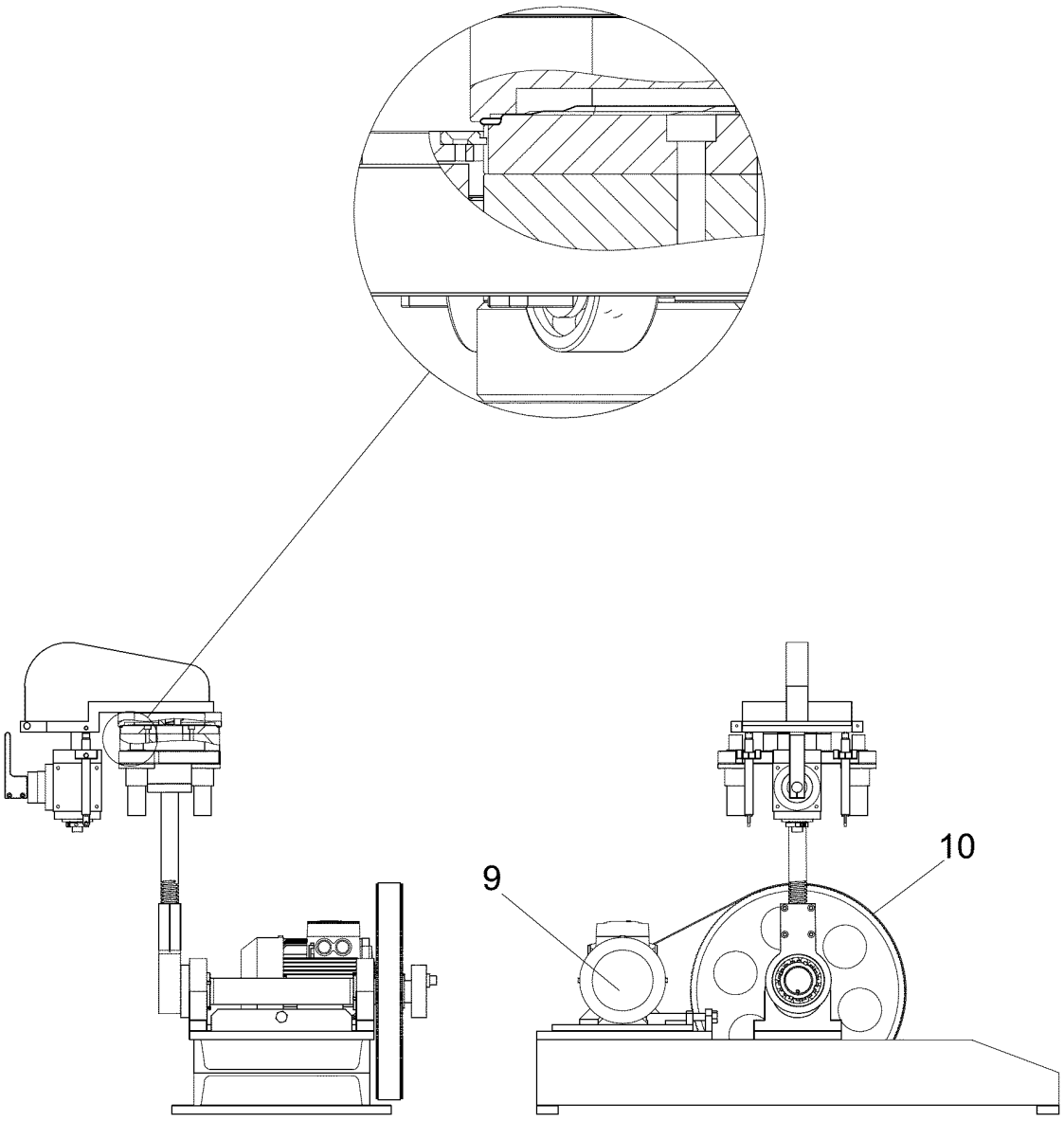


FIG. 4b

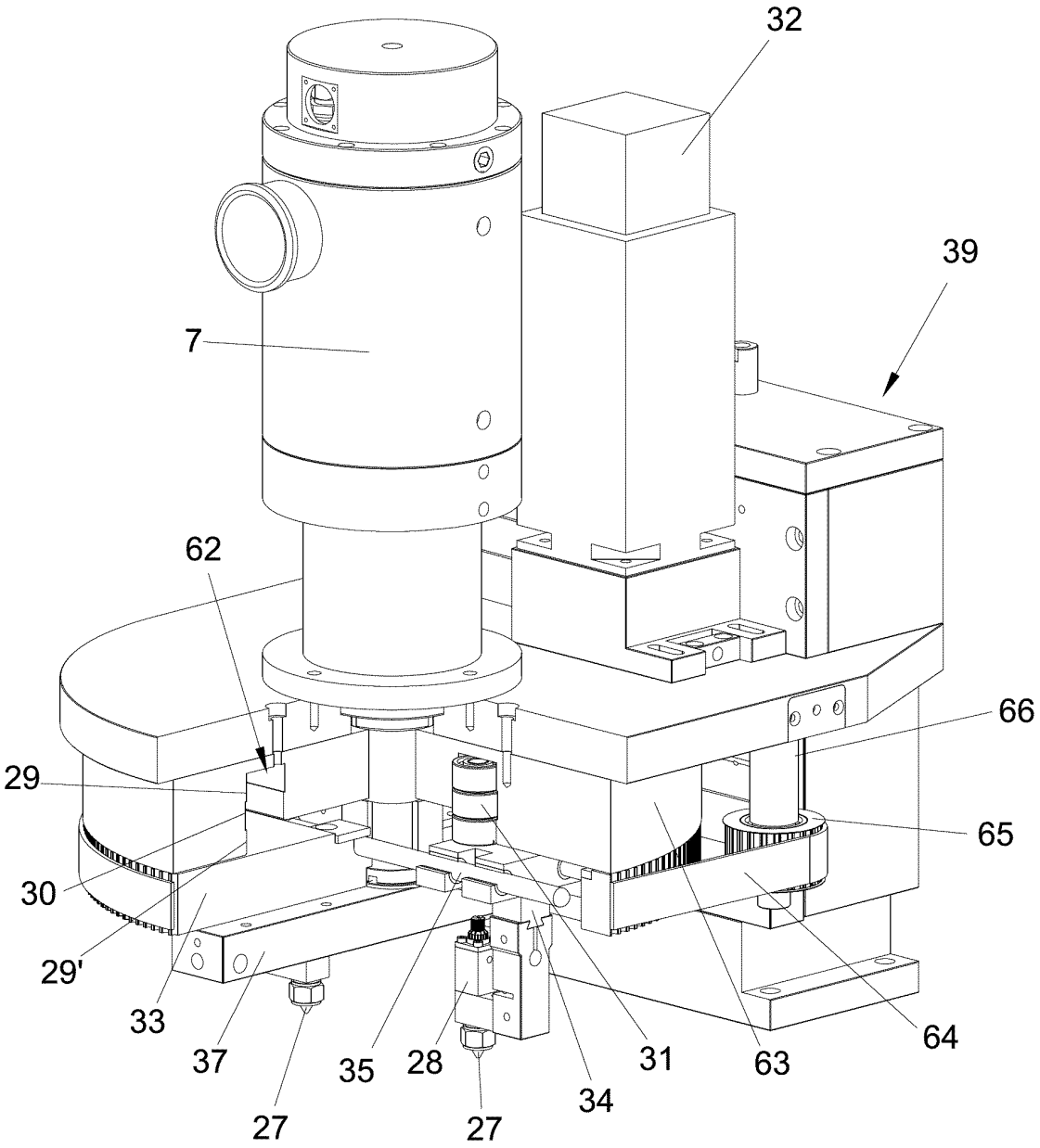


FIG. 5

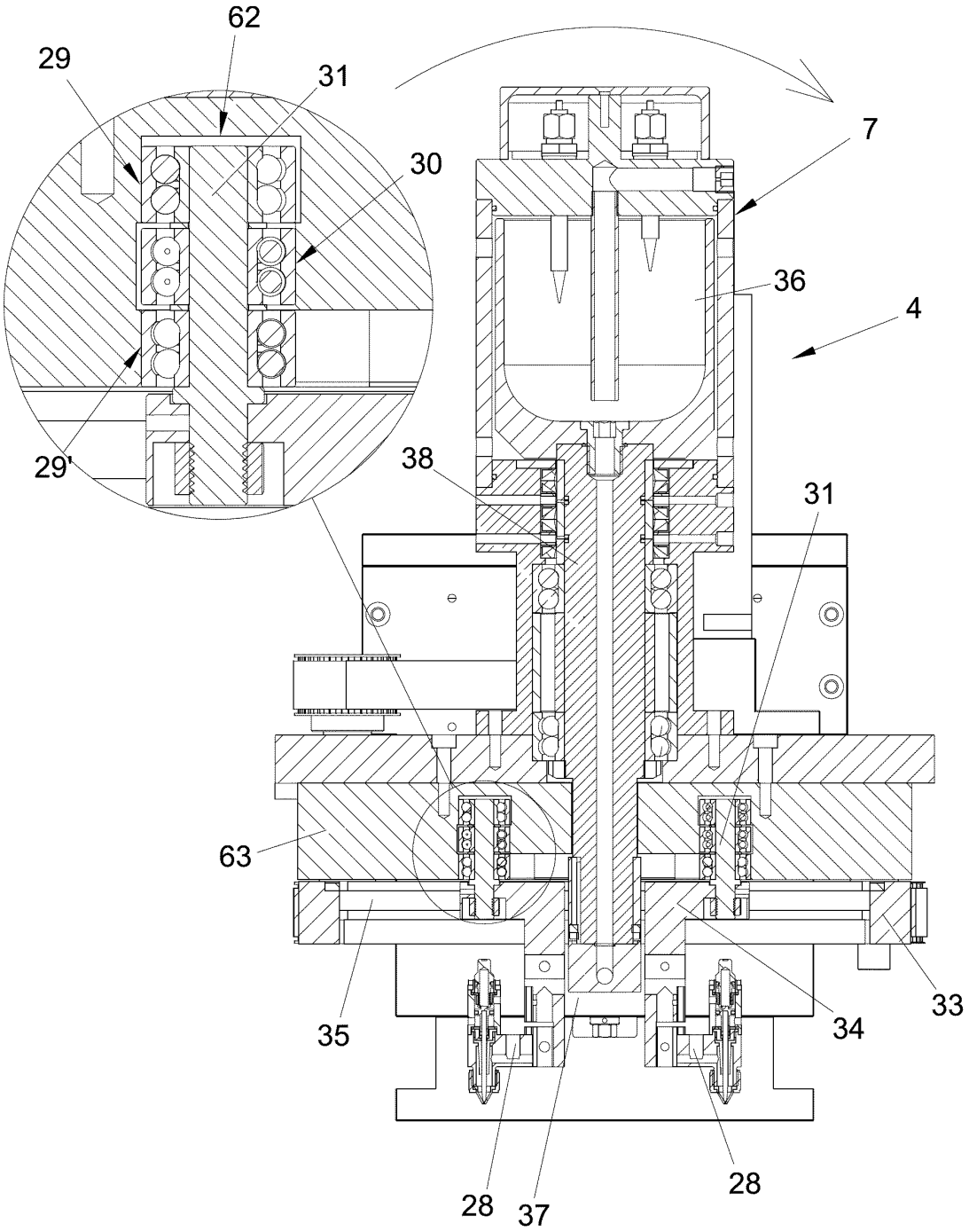


FIG. 6

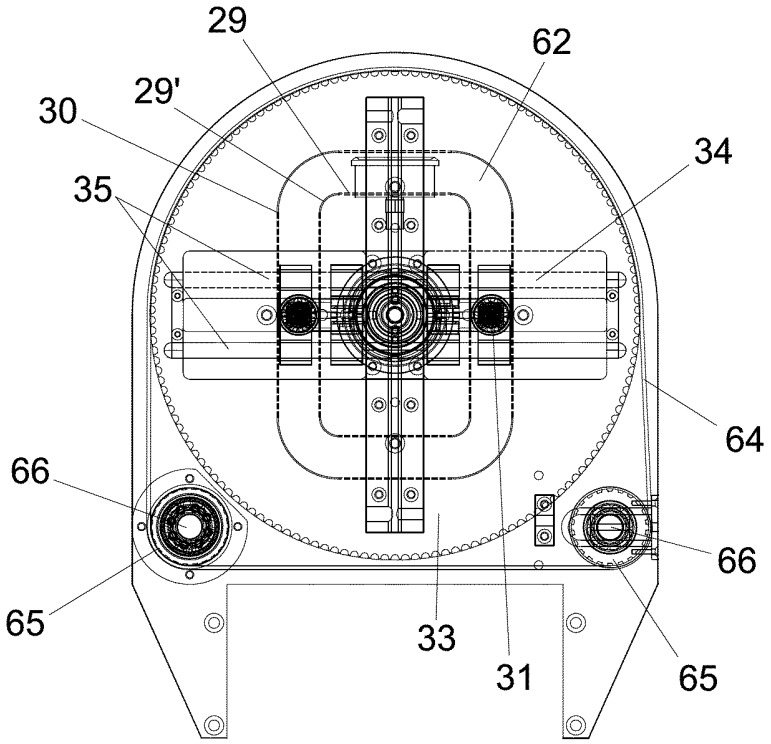

29
62
29'
30
34
35
64
66
66
65
33
31
65

FIG. 6a

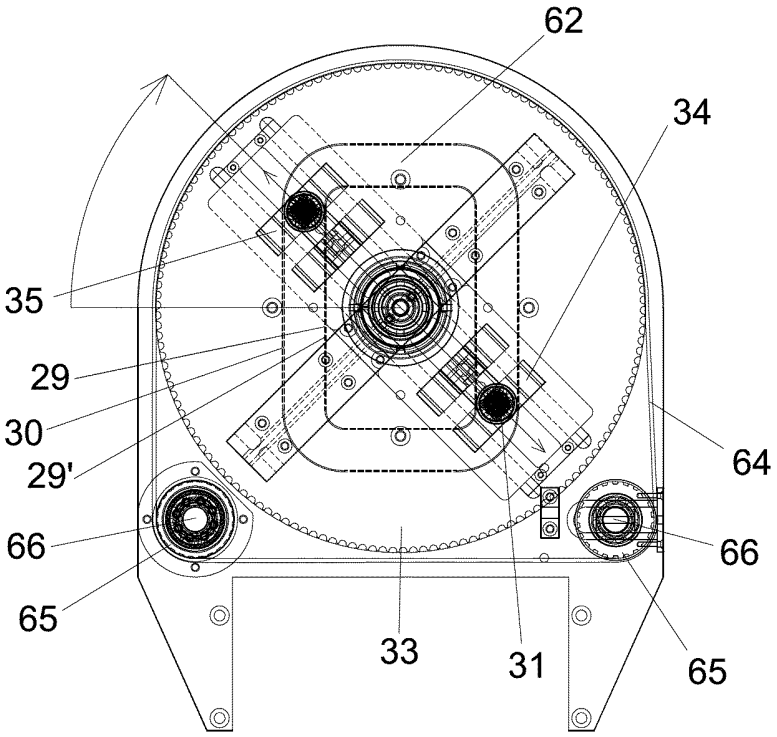

62
34
35
29
30
29'
64
66
66
65
33
31
65

FIG. 6b

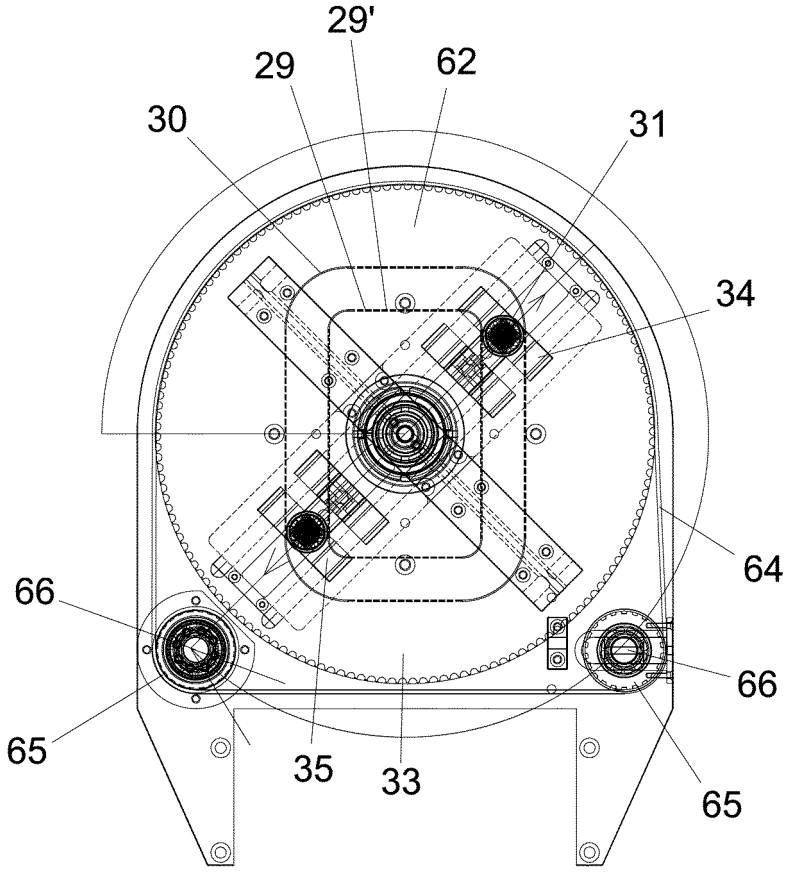
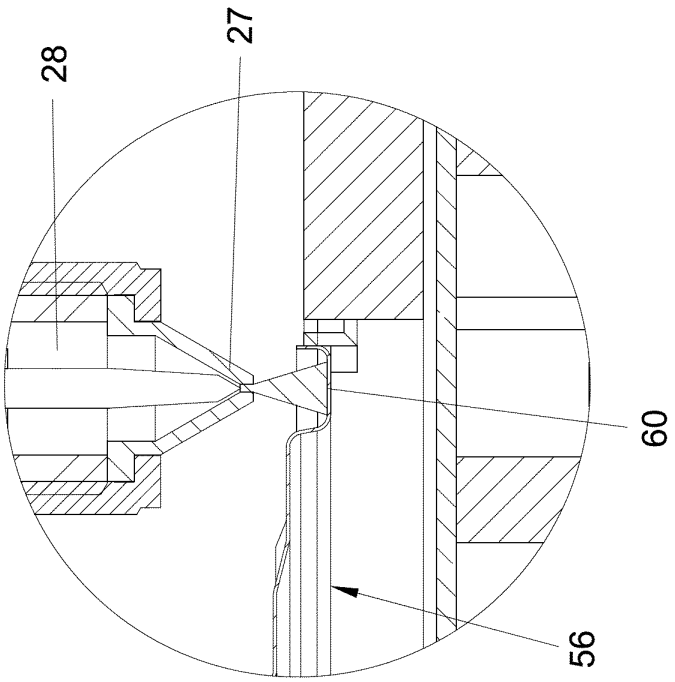


FIG. 6c



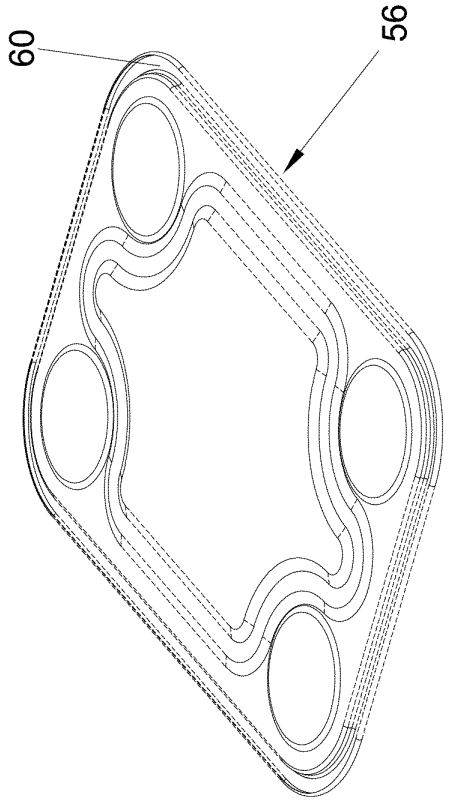


FIG. 7

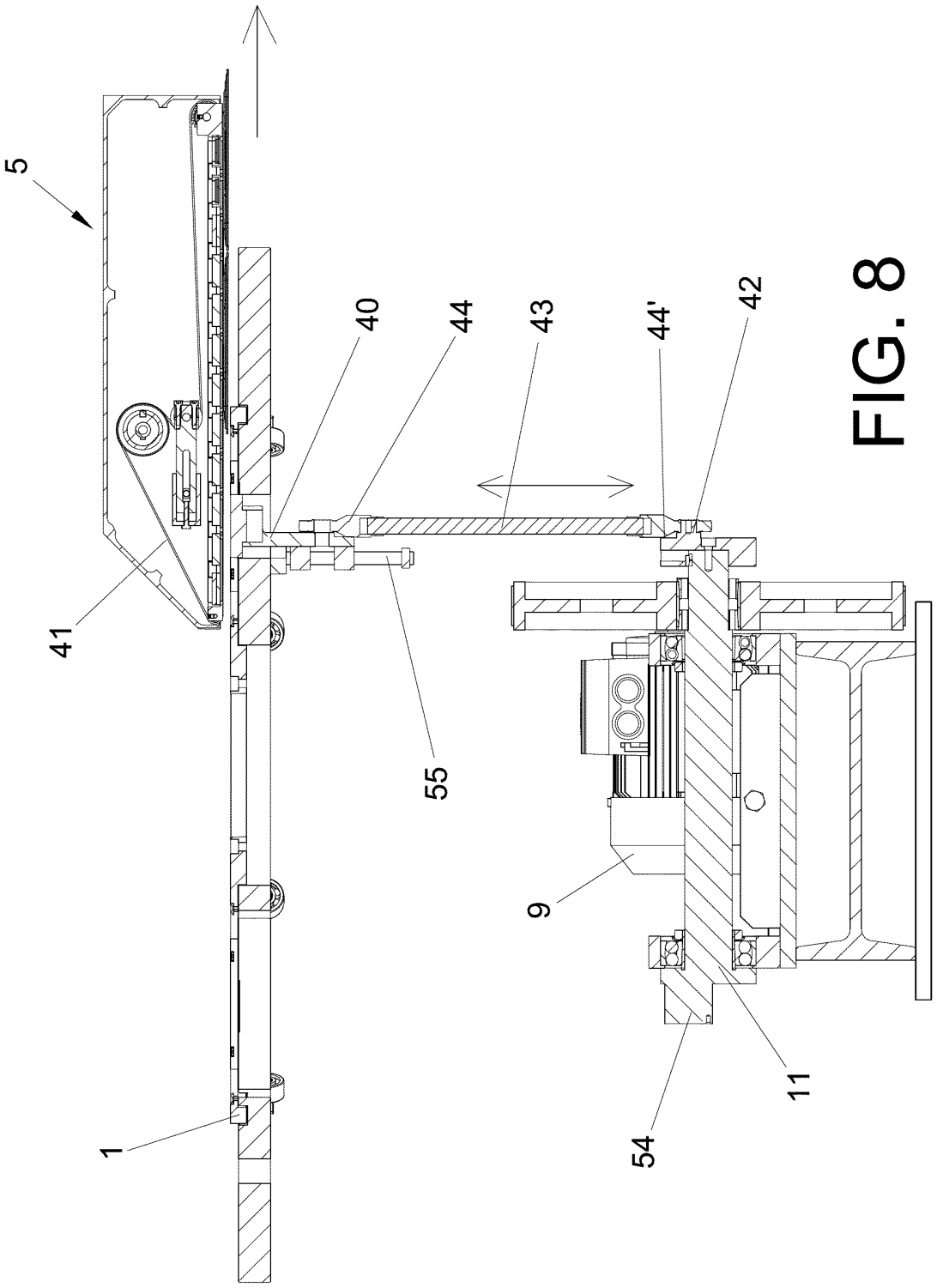


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2010/070822

A. CLASSIFICATION OF SUBJECT MATTER

B21D51/44 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B21D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1410859 A1 (PENALVER GARCIA JOSE) 21/04/2004, the whole document.	1
A	WO 0030769 A1 (PREFERRED MACHINE CORP ET AL.) 02/06/2000, the whole document.	1
A	US 5564877 A (HAMILTON DAVID A) 15/10/1996, abstract, figures.	1
A	US 3745953 A (HURST R) 17/07/1973, abstract, figures.	1

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance.
"E" earlier document but published on or after the international filing date
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"O" document referring to an oral disclosure use, exhibition, or other means.
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents , such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
06/09/2011	**(07/09/2011)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer A. Gómez Sánchez Telephone No. 91 3495326

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/ES2010/070822

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