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(54) **CONTINUOUS SEALING AND CUTTING MACHINE**

MASCHINE FÜR KONTINUIERLICHE ABDICHTUNG UND SCHNEIDUNG

MACHINE DE DÉCOUPE ET DE SCELLAGE CONTINUS

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Description

Technical Field

[0001] The present invention relates to a kind of film sealing apparatus for containers, and more specifically relates to a kind of continuous sealing and cutting machine which allows continuous transmission of template during heat sealing and cutting.

Background Art

[0002] A heat sealing machine used nowadays according to existing prior arts such as the machine disclosed in patent US3965656, generally comprises a drive device, a filling device, a film covering device and a heat sealing and cutting device etc. In general, these devices are components independent from one another. In other words, they are independent in terms of their operation during processing. During processing, the drive device stops after it has transported a container to a position below the filling device; after the container is filled, the drive device starts again to transport the container to a position under the heating sealing and cutting device and then stops again for film covering onto the container by the film covering device and for heat sealing and cutting by the heat sealing and cutting device. Since the filling device, the film covering device and the heat sealing and cutting device are not associated with one another, frequent stops occur during the entire processing procedures and thereby lowering the processing efficiency. Therefore, this kind of heat sealing machine is not suitable for voluminous production. Also, material wastage is somewhat caused by failure of the film covering device to accurately control feeding of the film according synchronously to the actual length of film required by practical situation. Further, since the mould of the heat sealing and cutting device according to existing prior arts is in general fixedly provided, it is difficult to change the mould and also the cutting tool during processing in order to process objects of different shapes; the lack of adaptability increases processing costs when objects of different shapes and specifications are to be processed.

Disclosure of the Invention

[0003] In view of the problems existing in the prior arts, the present invention provides a continuous sealing and cutting machine which allows continuous transmission during filling, film covering, sealing and cutting. According to the present invention, continuous transmission can be maintained during filling, film covering, sealing and cutting; film can be accurately prepared for feeding; and mould and cutting tool for heat sealing and cutting can be replaced anytime as desired. The present invention significantly increases the working efficiency of the production line, and it also saves time and lowers production costs.

[0004] The present invention comprises a machine frame, a synchronous filling device, a film covering device, a synchronous sealing and cutting device and a film collecting device, wherein:

The machine frame is provided with guiding rails, a drive device and a template rack. The drive device comprises an active drive chain wheel, a drive chain and a passive drive chain wheel. The drive chain is mounted on the active drive chain wheel and the passive drive chain wheel. The active drive chain wheel is connected with an output end of a motor for motion transmission. The drive chain and the template rack are fixedly connected. The template rack is used for placing templates of different specifications. A template is fixed on the template rack. The film collecting device is provided on the machine frame. The active drive chain wheel drives the drive chain connected therewith to move the template forward. The active drive chain wheel is connected with the motor via a drive axis.

[0005] Preferably, in order to replace the template conveniently, the template is provided with a fixing slot. The fixing slot has a larger opening at one end and a smaller opening on another end. Correspondingly, the template rack is provided with a T shaped bolt. The T shaped bolt enters the fixing slot through the larger opening and moves the template so the bolt is positioned at the end with the smaller opening. The bolt fixes the template via its cap.

[0006] The synchronous filling device comprises a material storage unit and a material feeding unit. The material storage unit is fixedly provided on the machine frame. The material feeding unit is mounted to the material storage unit via sliding rods and is fixedly connected to the synchronous sealing and cutting device via a connecting rod. The material storage unit communicates with the material feeding unit via soft tubes.

[0007] Preferably, the material storage unit is provided with a material feeding valve for material replenishment.

[0008] The material feeding unit comprises material inlets and material outlets. The material inlets communicate with the material storage unit via soft tubes. The material feeding unit is provided with cylinders. The cylinders control the opening and closing of the material outlets via pistons.

[0009] The film covering device is fixedly provided on the machine frame. The film covering device comprises a film supply unit and a film feeding unit. The film supply unit comprises a film supply motor and a film supply shaft connected to the film supply motor for motion transmission. The film feeding unit comprises a transmission mechanism and a control mechanism. The transmission mechanism comprises an active transmission axis, a passive transmission axis, a light probe and a second servo motor. The active transmission axis and the second servo motor are connected together for motion transmis-

sion. The passive transmission axis is in surface contact and coordinates with the active transmission axis. The control mechanism comprises a movable shaft, a movable shaft groove and a proximity switch. The movable shaft can slide along the movable shaft groove.

[0010] When the second servo motor rotates, the active transmission axis rotates and drives the passive transmission axis to rotate. Friction created at the contact surface between the surfaces of the two axes drives the packaging film to move forward.

[0011] The second servo motor controls the film feeding unit to achieve accurate film feeding.

[0012] It should be noted that, in order that the length of the film being fed is more accurate so as to save material, the film feeding unit is provided with the light probe for identifying identifiers on the packaging film to further control the length of the film being fed accurately.

[0013] Preferably, the light probe can move back and forth along a transmission direction of the template.

[0014] Preferably, the light probe is translatable along a direction perpendicular to the transmission direction of the template in order to adapt to templates of different widths.

[0015] Preferably, the proximity switch comprises an activation switch and a deactivation switch. The activation switch is positioned at an upper end of the movable shaft groove. The deactivation switch is positioned at a lower end of the movable shaft groove.

[0016] Preferably, the control mechanism is also provided with a film guiding axis. The film guiding axis is positioned higher than the deactivation switch in terms of vertical height, and is positioned between the movable shaft groove and the transmission mechanism.

[0017] It should be noted that, when the film supply unit is positioned lower than the activation switch in terms of vertical height, a second film guiding axis is also provided between the movable shaft groove and the film supply unit. The second film guiding axis is positioned higher than the activation switch in terms of vertical height. The packaging film runs over an upper end surface of the second film guiding axis, down through a sectional surface thereof, past below a lower end surface of the movable shaft and finally out from an upper end surface of the film guiding axis. The packaging film forms an included angle at the movable shaft. When the transmission mechanism transmits the packaging film, the packaging film is tightened. Due to tensional force of the packaging film, the movable shaft moves upwardly along the movable shaft groove until it reaches the same position as the activation switch. After the activation switch has detected the presence of the movable shaft, the film supply motor is energized and the film supply unit starts to supply film. Since film supply by the film supply unit is faster than film feeding by the film feeding unit, the packaging film goes slack and tensional force disappears. The movable shaft therefore slides downwardly along the movable shaft groove because of its own weight. When the movable shaft slides down to the deactivation switch,

the film supply motor stops rotating and the film feeding unit continues to feed the film, thereby tightening the packaging film again. The above processes of supplying film will be repeated.

[0018] Preferably, the transmission mechanism also comprises a flat platform. The flat platform is used for flat and smooth covering of the packaging film on the template to prevent crinkle.

[0019] The film collecting device comprises a tightening mechanism, a film collecting reel and a motor. The motor is provided with a clutching mechanism. The tightening mechanism is connected with the motor for motion transmission and is also connected with the film collecting reel via a transmission belt for motion transmission.

[0020] The motor drives the film collecting reel to rotate to collect remaining packaging film after sealing and cutting.

[0021] The material feeding unit is driven by the connecting rod to follow the synchronous sealing and cutting device to slide reciprocally along the sliding rods. The cylinders control the opening and closing of the material outlets. When the material feeding unit moves in the same direction as the template, the material outlets open and the material feeding unit fills material to the template; on the contrary, after filling material to the template, the material feeding unit slides along the guiding rails in a direction opposite to the moving direction of the template, and the material outlets also closes.

[0022] It should be noted that, the sliding speed of the material feeding unit along the sliding rods is the same as the moving speed of the template; during the entire process of material filling, the material feeding unit and the template are maintained in a constant relative position.

[0023] The synchronous sealing and cutting device comprises a first servo motor and a heat sealing and cutting mechanism. The heat sealing and cutting mechanism comprises a heat sealing and cutting unit and a heat sealing unit. The heat sealing and cutting unit and the heat sealing unit are mounted on a sliding board. The sliding board is slidably connected to the machine frame via the guiding rails. The sliding board is fixedly provided with a transmission gear rack. The first servo motor is fixedly provided on the machine frame and is engagingly connected with the transmission gear racks. When the first servo motor rotates, the transmission gear racks engaged thereto drives the sliding board to move along the guiding rails so that the heat sealing and cutting unit, the heat sealing unit and the material feeding unit are driven to move synchronously under the driving force of the first servo motor.

[0024] The heat sealing and cutting unit comprises a support, a cylinder and a heat sealing and cutting module. The support is mounted on the sliding board and is slidable along the guiding rail of the machine frame. The cylinder is mounted on the sliding board. The heat sealing and cutting module is connected with a piston rod of the cylinder. A sustainer plate is provided at a position cor-

responding to the heat sealing and cutting module at a lower end of the support. The heat sealing and cutting module and the sustainer plate are positioned above and below the template rack respectively.

[0025] Further, the heat sealing and cutting module comprises a heat sealing and cutting mechanism and cutting blades.

[0026] It should be noted that, the heat sealing unit is structurally the same as the heat sealing and cutting unit except that the heat sealing unit is not provided with the cutting blades.

[0027] The support comprises an upper cover plate, a lower cover plate and support columns. The support columns are each divided into an upper section and a lower section and secured with the sliding board on the machine frame.

[0028] Preferably, a through hole which the cylinder's piston can pass through is provided at the sliding board.

[0029] The cylinder comprises a first cylinder and a second cylinder. Cylinder body of the first cylinder is connected with cylinder body of the second cylinder. A piston rod of the first cylinder is connected to the upper cover plate. A piston rod of the second cylinder is connected with a first pressing plate.

[0030] It should be noted that, in order to further fix and secure the heat sealing and cutting module, multiple support rods are used for connecting the heat sealing and cutting module and the sliding board.

[0031] The piston rod of the second cylinder is connected with the first pressing plate. The first pressing plate is provided with protruding blocks in the shape of an inverted T. A second pressing plate is disposed corresponding to the first pressing plate. The second pressing plate is provided with grooves in the shape of an inverted T corresponding to the first pressing plate. The first pressing plate and the second pressing plate can slide with respect to each other along the grooves.

[0032] It should be noted that, the first pressing plate and the second pressing plate are fixed and secured by screw caps. Handles are also provided so that when it is required to replace components of the heat sealing and cutting module, the second pressing plate can be pulled out by using the handles in a direction perpendicular to the sectional surfaces of the grooves. The components of the heat sealing and cutting module can be adjusted and replaced based on the type of the template on the template rack.

[0033] Preferably, the heat sealing and cutting module is provided with a positioning hole. The template is correspondingly provided with a positioning column. The positioning column is inserted into the positioning hole during sealing and cutting of the template by the heat sealing and cutting module so as to prevent misoperation when there is a deviation of the corresponding position between the heat sealing and cutting mechanism and the template.

[0034] The first servo motor drives the heat sealing and cutting mechanism and the material feeding unit to move

reciprocally. When the sliding direction of the heat sealing and cutting mechanism is the same as the transmission direction of the template, the piston rod punches downwardly. The heat sealing and cutting mechanism performs the process of heat sealing and adhering and also cutting of the packaging film. During this process, the operating speed of the heat sealing and cutting mechanism and the transmission speed of the template are the same, thereby maintaining a constant relative position between the heat sealing and cutting mechanism and the template.

[0035] The film supply unit also comprises a film adjustment device. The film adjustment device comprises springs and a position limiting rod for adapting templates of different specifications.

[0036] The present invention uses servo motors to realize the process of material filling and sealing. The synchronous filling device and the synchronous sealing and cutting device operate in the same speed as the template and therefore maintain a constant relative position with the template during the process of material filling and sealing. Accordingly, the template can be continuously transmitted without pausing, thereby enhancing working efficiency. Furthermore, devices for replacing components of the heat sealing and cutting module and the film adjustment device are provided for adaptation of templates of different specifications, thereby increasing the adaptability of the present invention and saving production input.

Brief Description of Drawings

[0037]

FIG. 1 is a schematic structural view of the continuous sealing and cutting machine according to the present invention.

FIG. 2 is a front view of the continuous sealing and cutting machine according to the present invention.

FIG. 3 is a perspective view of the machine frame of the continuous sealing and cutting machine according to the present invention.

FIG. 4 is a schematic view showing the connection between the drive chain and the template rack according to the present invention.

FIG. 5 is a schematic structural view of the guiding rails of the machine frame and the sliding board according to the present invention.

FIG. 6 is a schematic view showing the structure of the synchronous filling device according to the present invention.

FIG. 7 is a schematic structural view of the material feeding unit according to the present invention.

FIG. 8 is a schematic structural view of the film supply unit according to the present invention.

FIG. 9 is a schematic structural view of the film feeding unit according to the present invention.

FIG. 10 is a schematic structural view of the synchro-

nous sealing and cutting device according to the present invention.

FIG. 11 is a front view of the synchronous sealing and cutting device according to the present invention.

FIG. 12 is a schematic structural view of the partially enlarged area A shown in FIG. 10.

Best Mode for Carrying out the Invention

[0038] The present invention will be further described in detail below with reference to the accompanying drawings for clearer understanding of the objectives, technical features and advantages of the present invention.

[0039] As shown in figures 1 and 2, the continuous sealing and cutting machine of the present invention comprises a machine frame 1, a synchronous filling device 2, a film covering device 3, a synchronous sealing and cutting device 4 and a film collecting device 5.

[0040] As shown in figures 1, 3 and 4, the machine frame 1 is provided with a drive device 13; the drive device 13 comprises an active drive chain wheel 131, a passive drive chain wheel 132, a drive chain 133 and a motor 134; the active drive chain wheel 131 is connected with the motor 134 through a rotation axis 135 for motion transmission; the drive chain 133 is mounted on the active drive chain wheel 131 and the passive drive chain wheel 132; the motor 134 supplies power to realize transmission of the drive chain 133.

[0041] The drive chain 133 is connected to a template rack via a door-shaped connector 136, thereby driving the template rack to move.

[0042] A template 137 is provided with a positioning column 1371 for positioning during sealing and cutting by a heat sealing and cutting mechanism.

[0043] As shown in figures 2 and 5, the machine frame 1 is provided with guiding rails 11; a sliding board 12 is disposed on the guiding rails 11; length of the sliding board 12 is smaller than length of the guiding rail 11; the sliding board 12 can move laterally along the guiding rails 11.

[0044] The sliding board 12 is provided with a screw hole 121 for fixing a heat sealing and cutting unit support and a heat sealing unit support, and a through hole 122 which a cylinder piston can pass through.

[0045] Preferably, the sliding board 12 is also provided with another screw hole 123 for further securing a heat sealing and cutting module.

[0046] As shown in figures 1 and 6, the synchronous filling device 2 comprises a material storage unit 21 and a material feeding unit 22. The material storage unit 21 is fixedly provided on the machine frame 1. The material feeding unit 22 is mounted to the material storage unit 21 via sliding rods 211 and is fixedly connected to the synchronous sealing and cutting device 4 via a connecting rod 212. The material storage unit 21 communicates with the material feeding unit 22 via soft tubes.

[0047] One end of each sliding rod 211 is fixedly con-

nected to the material storage unit 21; another end of which is connected to the material feeding unit 22. The material feeding unit 22 can slide along the sliding rods 211.

[0048] When a first servo motor drives the sliding board to move laterally on the machine frame 1, the synchronous sealing and cutting device 4 connected on the machine frame 1 are therefore driven to move laterally; the material feeding unit 22 fixedly connected to the synchronous sealing and cutting device 4 via the connecting rod 212 is also driven to move along the sliding rods 211.

[0049] Preferably, the material storage unit 21 is provided with a material feeding valve 213 for material replenishment.

[0050] As shown in figure 7, the material feeding unit 22 comprises material inlets 221 and material outlets 222. The material inlets 221 communicate with the material storage unit 21 via soft tubes. The material feeding unit 22 is provided with cylinders 223. The cylinders 223 control the opening and closing of the material outlets 222 via pistons.

[0051] The material feeding unit 22 is driven by the connecting rod 212 to follow the synchronous sealing and cutting device 4 to slide reciprocally along the sliding rods 211. The cylinders 223 control the opening and closing of the material outlets 222. When the material feeding unit 22 moves in the same direction as the template, the material outlets 222 open and the material feeding unit 22 fills material to the template; on the contrary, after filling material to the template, the material feeding unit 22 slides along the guiding rails in a direction opposite to the moving direction of the template, and the material outlets 222 also closes.

[0052] It should be noted that, the sliding speed of the material feeding unit 22 along the sliding rods 211 is the same as the moving speed of the template; during the entire process of material filling, the material feeding unit and the template are maintained in a constant relative position.

[0053] Figure 8 shows a schematic structural view of a film supply unit of the present invention. The film covering device 3 comprises the film supply unit and a film feeding unit. The film supply unit comprises a film supply motor 311 and a film supply shaft 312 connected to the film supply motor 311 for motion transmission.

[0054] The film supply unit also comprises a film adjustment device 313. The film adjustment device 313 comprises springs 3131 and a position limiting rod 3132 for adapting templates of different specifications.

[0055] During replacement of another template, the film supply unit has to be adjusted in terms of its position so that packaging film can fully cover the template. The film adjustment device 313 adjusts the position of the film supply shaft 312 by using the springs 3131 at two ends of the film adjustment device 313, and also uses the position limiting rod 3132 to fix the position thereof.

[0056] Figure 9 is a schematic structural view of the film feeding unit of the present invention. The film feeding

unit comprises a transmission mechanism 321 and a control mechanism 322. The transmission mechanism 321 comprises an active transmission axis 3211, a passive transmission axis 3212, a light probe 3213 and a second servo motor 3214. The active transmission axis 3211 and the second servo motor 3214 are connected together for motion transmission. The passive transmission axis 3212 is in surface contact and coordinates with the active transmission axis 3211. The control mechanism 322 comprises a movable shaft 3221, a movable shaft groove 3222 and a proximity switch 3223. The movable shaft 3221 can slide along the movable shaft groove 3222.

[0057] When the second servo motor 3214 rotates, the active transmission axis 3211 rotates and drives the passive transmission axis 3212 to rotate. Friction created at the contact surface between the surfaces of the two axes drives the packaging film to move forward.

[0058] The second servo motor 3214 controls the film feeding unit to achieve accurate film feeding.

[0059] Preferably, the proximity switch 3223 comprises an activation switch 32231 and a deactivation switch 32232. The activation switch 32231 is positioned near to an upper end of the movable shaft groove 3222. The deactivation switch 32232 is positioned near to a lower end of the movable shaft groove 3222.

[0060] Preferably, the control mechanism 322 is also provided with a film guiding axis 3224. The film guiding axis 3224 is positioned higher than the deactivation switch 32232 in terms of vertical height, and is positioned between the movable shaft groove 3222 and the transmission mechanism 321.

[0061] Preferably, when the film supply unit is positioned lower than the activation switch 32231 in terms of vertical height, a second film guiding axis 3225 is also provided between the movable shaft groove 3222 and the film supply unit. The second film guiding axis 3225 is positioned higher than the activation switch 32231 in terms of vertical height. The packaging film runs over an upper end surface of the second film guiding axis 3225, down through a sectional surface thereof, past below a lower end surface of the movable shaft 3221 and finally out from an upper end surface of the film guiding axis 3224. The packaging film forms an included angle at the movable shaft 3221. When the transmission mechanism 321 transmits the packaging film, the packaging film is tightened. Due to tensional force of the packaging film, the movable shaft 3221 moves upwardly along the movable shaft groove 3222 until it reaches the same position as the activation switch 32231. After the activation switch 32231 has detected the presence of the movable shaft 3221, the film supply motor is energized and the film supply unit starts to supply film. Since film supply by the film supply unit is faster than film feeding by the film feeding unit, the packaging film goes slack and tensional force disappears. The movable shaft 3221 therefore slides downwardly along the movable shaft groove 3222 because of its own weight. When the movable shaft 3221 slides down to the deactivation switch 32232, the film

supply motor stops rotating and the film feeding unit continues to feed the film, thereby tightening the packaging film again. The above processes of supplying film will be repeated.

[0062] Preferably, in order that the length of the film being fed is more accurate so as to save material, the film feeding unit is provided with the light probe 3213 for identifying the identifiers on the packaging film to further control the length of the film being fed accurately. The light probe is provided near to the film guiding axis 3224. When the film feeding unit stops feeding film and the light probe 3213 can meanwhile detect the preset color identifier of the packaging film, there is no error regarding the length of film being fed by the film feeding unit. However when the film feeding unit stops feeding film and the light probe 3213 cannot meanwhile detect the preset color identifier of the packaging film, there is an error regarding the length of film being fed by the film feeding unit. In case of an error, the apparatus stops and an alert is triggered.

[0063] Preferably, the light probe 3213 is also provided with a sliding rod 32131. The light probe 3213 can move along the sliding rod 32131 and it can move back and forth along a transmission direction of the template and is translatable along a direction perpendicular to the transmission direction of the template in order to adapt to templates of different widths.

[0064] Preferably, the transmission mechanism also comprises a flat platform 3215. The flat platform 3215 is used for flat and smooth covering of the packaging film on the template to prevent crinkle.

[0065] As shown in figures 2, 5, 10 and 11, the synchronous sealing and cutting device 4 comprises the first servo motor 41 and the heat sealing and cutting mechanism. The first servo motor 41 is fixedly provided on the machine frame. The first servo motor 41 and the heat sealing and cutting mechanism are connected for motion transmission. The heat sealing and cutting mechanism is mounted on the sliding board 12. The heat sealing and cutting mechanism can follow the sliding board 12 to slide along the guiding rail 11 of the machine frame when driven by the first servo motor 41.

[0066] The heat sealing and cutting mechanism comprises a heat sealing and cutting unit 421 and a heat sealing unit 422. The heat sealing and cutting unit 421 and the heat sealing unit 422 are mounted on the sliding board 12. The sliding board 12 is slidably connected to the machine frame 1 via the guiding rails 11. The sliding board 12 is fixedly provided with a transmission gear rack 121. The first servo motor 41 is fixedly provided on the machine frame 1 and is engagingly connected with the transmission gear racks 121. When the first servo motor 41 rotates, the transmission gear racks 121 engaged thereto drives the sliding board 12 to move along the guiding rails so that the heat sealing and cutting unit 421, the heat sealing unit 422 and the material feeding unit are driven to move synchronously under the driving force of the first servo motor 41.

[0067] The heat sealing and cutting unit 421 comprises a support 4211, a cylinder 4212 and a heat sealing and cutting module 4213. The support 4211 is mounted on the sliding board 12 and is slidable along the guiding rail 11 of the machine frame. The cylinder 4212 is mounted on the sliding board 12. The heat sealing and cutting module 4213 is connected with a piston rod 421221 of the cylinder 4212. A sustainer plate 4214 is provided at a position corresponding to the heat sealing and cutting module 4213 at a lower end of the support 4211. The heat sealing and cutting module 4213 and the sustainer plate 4214 are positioned above and below the template rack respectively.

[0068] The support 4211 comprises an upper cover plate 42111, a lower cover plate 42112 and support columns 42113. The support columns are each divided into an upper section and a lower section and secured with the sliding board 12 on the machine frame.

[0069] Preferably, in order to further fix and secure the heat sealing and cutting module 4213, multiple support rods 42131 are used for connecting the heat sealing and cutting module and the sliding board 12.

[0070] The cylinder comprises a first cylinder 42121 and a second cylinder 42122. Cylinder body of the first cylinder 42121 is connected with cylinder body of the second cylinder. A piston rod of the first cylinder is connected to the upper cover plate. A piston rod 421221 of the second cylinder is connected with a first pressing plate 4215.

[0071] The piston rod 421221 of the second cylinder is connected with the first pressing plate 4215. The first pressing plate 4215 is provided with protruding blocks 42151 in the shape of an inverted T. A second pressing plate 4216 is disposed corresponding to the first pressing plate 4215. The second pressing plate is provided with grooves in the shape of an inverted T corresponding to the first pressing plate 4215. The first pressing plate 4215 and the second pressing plate 4216 can slide with respect to each other along the grooves 42161.

[0072] Preferably, the first pressing plate 4215 and the second pressing plate 4216 are fixed and secured by screw caps. Handles 4217 are also provided so that when it is required to replace the components of the heat sealing and cutting module 4213, the second pressing plate 4216 can be pulled out by using the handles 4217 in a direction perpendicular to the sectional surfaces of the grooves 42161. Components of the heat sealing and cutting module 4213 can be adjusted and replaced based on the type of the template on the template rack.

[0073] As shown in figure 12, the heat sealing and cutting module 4213 comprises a heat sealing and cutting mechanism 42132 and cutting blades 42133.

[0074] The heat sealing unit 422 is structurally the same as the heat sealing and cutting unit 421 except that the heat sealing unit 422 is not provided with the cutting blades.

[0075] The first servo motor drives the heat sealing and cutting mechanism 42132 and the material feeding unit

to move reciprocally. When the sliding direction of the heat sealing and cutting mechanism 42132 is the same as the transmission direction of the template, the piston rod 421221 punches downwardly. The heat sealing and cutting mechanism 42132 performs the process of heat sealing and adhering and also cutting of the packaging film. During this process, the operating speed of the heat sealing and cutting mechanism 42132 and the transmission speed of the template are the same, thereby maintaining a constant relative position between the heat sealing and cutting mechanism and the template.

[0076] The above disclosure is only a preferred embodiment of the present invention and therefore is not intended to limit the scope of the claims of the invention. All equivalent changes made on the basis of the claims of the present invention should also fall within the scope of the present invention.

Claims

1. A continuous sealing and cutting machine comprising a machine frame (1), a drive device (13), a synchronous filling device (2), a film covering device (3), a synchronous sealing and cutting device (4) and a film collecting device (5); the drive device (13) drives a template rack to move forward; the template rack is used for placing templates (137) of different specifications; the synchronous filling device (2), the film covering device (3) and the film collecting device (5) are provided on the machine frame (1); wherein:

the synchronous filling device (2) comprises a material storage unit (21) and a material feeding unit (22); the material storage unit (21) is fixedly provided on the machine frame (1); the material feeding unit (22) is mounted to the material storage unit (21) via sliding rods (211) and is fixedly connected to the synchronous sealing and cutting device (4) via a connecting rod (212); the material storage unit (21) communicates with the material feeding unit (22) via soft tubes; **characterized in that:**

the synchronous sealing and cutting device (4) comprises a first servo motor (41) and a heat sealing and cutting mechanism; the heat sealing and cutting mechanism comprises a heat sealing and cutting unit (421) and a heat sealing unit (422); the heat sealing and cutting unit (421) and the heat sealing unit (422) are respectively mounted on a sliding board (12); the sliding board (12) is slidably connected to the machine frame (1) via guiding rails (11); the sliding board (12) is fixedly provided with a transmission gear rack (121); the first servo motor (41) is fixedly provided on the machine frame (1)

- and is engagingly connected with the transmission gear racks (121); the heat sealing and cutting unit (421), the heat sealing unit (422) and the material feeding unit (22) are driven to move synchronously under driving force of the first servo motor (41).
2. The continuous sealing and cutting machine as in Claim 1, **characterized in that:** the heat sealing and cutting unit (421) comprises a support (4211), a cylinder (4212) and a heat sealing and cutting module (4213); the support (4211) is mounted on the sliding board (12); the cylinder (4212) is mounted on the sliding board (12); the heat sealing and cutting module (4213) is connected with a piston rod (421221) of the cylinder (4212); a sustainer plate (4214) is provided at a position corresponding to the heat sealing and cutting module (4213) at a lower end of the support (4211); the heat sealing and cutting module (4213) and the sustainer plate (4214) are positioned above and below the template rack respectively.
 3. The continuous sealing and cutting machine as in Claim 2, **characterized in that:** the piston rod (421221) of a second cylinder (42122) is connected with a first pressing plate (4215); the first pressing plate (4215) is provided with protruding blocks (42151) in the shape of an inverted T; a second pressing plate (4216) is disposed corresponding to the first pressing plate (4215); the second pressing plate (4216) is provided with grooves (42161) in the shape of an inverted T corresponding to the first pressing plate (4215); the first pressing plate (4215) and the second pressing plate (4216) are slidable with respect to each other along the grooves (42161).
 4. The continuous sealing and cutting machine as in Claim 1, **characterized in that:** the material feeding unit (22) comprises material inlets (221) and material outlets (222); the material inlets (221) communicate with the material storage unit (21) via soft tubes; the material feeding unit (22) is provided with cylinders (223); the cylinders (223) control opening and closing of the material outlets (222) via pistons.
 5. The continuous sealing and cutting machine as in Claim 1, **characterized in that:** the film covering device (3) comprises a film supply unit and a film feeding unit; the film supply unit comprises a film supply motor (311) and a film supply shaft (312) connected to the film supply motor (311) for motion transmission; the film feeding unit comprises a transmission mechanism (321) and a control mechanism (322); the transmission mechanism (321) comprises an active transmission axis (3211), a passive transmission axis (3212), a light probe (3213) and a second servo motor (3214); the active transmission axis (3211) and the second servo motor (3214) are connected together for motion transmission; the passive transmission axis (3212) is in surface contact and coordinates with the active transmission axis (3211); the control mechanism (322) comprises a movable shaft (3221), a movable shaft groove (3222) and a proximity switch (3223); the movable shaft (3221) is slidable along the movable shaft groove (3222).
 6. The continuous sealing and cutting machine as in Claim 5, **characterized in that:** the proximity switch (3223) comprises an activation switch (32231) and a deactivation switch (32232); the activation switch (32231) is positioned at an upper end of the movable shaft groove (3222); the deactivation switch (32232) is positioned at a lower end of the movable shaft groove (3222); the activation switch (32231) and the deactivation switch (32232) control activation and deactivation of the film supply motor (311).
 7. The continuous sealing and cutting machine as in Claim 1, **characterized in that:** the drive device (13) comprises an active drive chain wheel (131), a drive chain (133) and a passive drive chain wheel (132); the drive chain (133) is mounted on the active drive chain wheel (131) and the passive drive chain wheel (132); the active drive chain wheel (131) is connected with an output end of a motor (134) for motion transmission; the drive chain (133) and the template rack are fixedly connected; the template (137) is fixed on the template rack.
 8. The continuous sealing and cutting machine as in Claim 1, **characterized in that:** the film collecting device (5) comprises a tightening mechanism, a film collecting reel and a motor; the motor is provided with a clutching mechanism; the tightening mechanism is connected with the motor for motion transmission and is also connected with the film collecting reel via a transmission belt for motion transmission.
 9. The continuous sealing and cutting machine as in any one of Claims 1-8, **characterized in that:** the film supply unit also comprises a film adjustment device (313); the film adjustment device (313) comprises springs (3131) and a position limiting rod (3132); a corresponding position between the film supply unit and the template (137) is adjusted by using the springs (3131) in association with the position limiting rod (3132).

Patentansprüche

1. Maschine für kontinuierliche Abdichtung und Schneidung mit einem Maschinenrahmen (1), einer Antriebsvorrichtung (13), einer synchronen Füllvorrichtung (2), einer Folienabdeckvorrichtung (3), ei-

ner synchronen Abdicht- und Schneidevorrichtung (4) und einer Foliensammelvorrichtung (5); die Antriebsvorrichtung (13) treibt ein Schablonengestell vorwärts; das Schablonengestell wird zum Platzieren von Schablonen (137) verschiedener Spezifikationen verwendet; die synchrone Füllvorrichtung (2), die Folienabdeckvorrichtung (3) und die Foliensammelvorrichtung (5) befinden sich auf dem Maschinenrahmen (1); wobei:

die synchrone Füllvorrichtung (2) eine Materiallagereinheit (21) und eine Materialzuführungseinheit (22) umfasst; wobei die Materiallagereinheit (21) auf dem Maschinenrahmen (1) befestigt ist; die Materialzuführungseinheit (22) an die Materiallagereinheit (21) mittels Gleitstangen (211) montiert ist und fest mit der synchronen Abdicht- und Schneidevorrichtung (4) über eine Verbindungsstange (212) verbunden ist; die Materiallagereinheit (21) steht mit der Materialzuführungseinheit (22) durch Schläuche in Verbindung;

gekennzeichnet dadurch das die synchrone Abdicht- und Schneidevorrichtung (4) umfasst einen ersten Servomotor (41) und einen Verschweißungs- und Schneidemechanismus; der Verschweißungs- und Schneidemechanismus umfasst eine Verschweißungs- und Schneideeinheit (421) und eine Verschweißungseinheit (422); die Verschweißungs- und Schneideeinheit (421) und die Verschweißungseinheit (422) sind jeweils auf eine Verschiebeplatte (12) montiert; die Verschiebeplatte (12) ist durch Führungsschienen (11) gleitend mit dem Maschinenrahmen (1) verbunden; die Verschiebeplatte (12) ist mit einer Übertragungszahnstange (121) fest verbunden; der erste Servomotor (41) ist auf dem Maschinenrahmen (1) befestigt und greift in die Übertragungszahnstangen (121) ein; die Verschweißungs- und Schneideeinheit (421), die Verschweißungseinheit (422) und die Materialzuführungseinheit (22) werden unter Antriebskraft des ersten Servomotors (41) synchron in Bewegung versetzt.

2. Die Maschine für kontinuierliche Abdichtung und Schneidung wie in Anspruch 1, **gekennzeichnet dadurch dass:** die Verschweißungs- und Schneideeinheit (421) einen Träger (4211), einen Zylinder (4212) und ein Verschweißungs- und Schneidemodul (4213) umfasst; der Träger (4211) ist auf die Verschiebeplatte (12) montiert; der Zylinder (4212) ist auf die Verschiebeplatte (12) montiert; das Verschweißungs- und Schneidemodul (4213) ist mit einer Kolbenstange (421221) des Zylinders (4212) verbunden; eine Stützplatte (4214) ist an dem Ort des Verschweißungs- und Schneidemoduls (4213) an einem unteren Ende des Trägers (4211) vorge-

sehen; das Verschweißungs- und Schneidemodul (4213) und die Stützplatte (4214) sind oberhalb bzw. unterhalb des Schablonengestells positioniert.

3. Maschine für kontinuierliche Abdichtung und Schneidung wie in Anspruch 2, **gekennzeichnet dadurch, dass:** der Kolbenstab (421221) eines zweiten Zylinders (42122) mit einer ersten Pressplatte (4215) verbunden ist; die erste Pressplatte (4215) mit vorspringenden Blöcken (42151) in Form eines umgekehrten Ts ausgestattet ist; eine zweite Pressplatte (4216) entsprechend der ersten Pressplatte (4215) angebracht ist; die zweite Pressplatte (4216) mit Nuten (42161) in Form eines umgekehrten Ts entsprechend der ersten Pressplatte (4215) ausgestattet ist; die erste Pressplatte (4215) und die zweite Pressplatte (4216) untereinander entlang den Nuten (42161) gleiten.

4. Maschine für kontinuierliche Abdichtung und Schneidung wie in Anspruch 1, **gekennzeichnet dadurch dass:** die Materialzuführungseinheit (22) Materialeinlässe (221) und Materialausgänge (222) umfasst; die Materialeinlässe (221) mit der Materiallagereinheit (21) durch Schläuche in Verbindung stehen; die Materialzuführungseinheit (22) mit Zylindern (223) ausgestattet ist; die Zylinder (223) steuern die Öffnung und Schließung der Materialausgänge (222) mittels Kolben.

5. Maschine für kontinuierliche Abdichtung und Schneidung wie in Anspruch 1, **gekennzeichnet dadurch dass:** die Folienabdeckvorrichtung (3) eine Folienzufuhreinheit und eine Folienversorgungseinheit umfasst; die Folienzufuhreinheit umfasst einen Folienzufuhrmotor (311) und eine Folienzufuhrwelle, die mit dem Folienzufuhrmotor (311) zur Bewegungsübertragung verbunden ist; die Folienversorgungseinheit umfasst einen Übertragungsmechanismus (321) und einen Kontrollmechanismus (322); der Übertragungsmechanismus (321) umfasst eine aktive Übertragungsachse (3211), eine passive Übertragungsachse (3212), einen Lichtleiter (3213) und einen zweiten Servomotor (3214); die aktive Übertragungsachse (3211) und der zweite Servomotor (3214) sind zur Bewegungsübertragung miteinander verbunden; die passive Übertragungsachse (3212) ist in Oberflächenkontakt und koordiniert mit der aktiven Übertragungsachse (3211); der Kontrollmechanismus (322) umfasst eine bewegliche Welle (3221), eine bewegliche Wellennut (3222) und einen Näherungsschalter (3223); die bewegliche Welle (3221) gleitet entlang der beweglichen Wellennut (3222).

6. Maschine für kontinuierliche Abdichtung und Schneidung wie in Anspruch 5, **gekennzeichnet dadurch dass:** der Näherungsschalter (3223) einen

Aktivierungsschalter (32231) und einen Deaktivierungsschalter (32232) umfasst; der Aktivierungsschalter (32231) ist an einem oberen Ende der beweglichen Wellennut (3222) positioniert; der Deaktivierungsschalter (32232) ist an einem unteren Ende der beweglichen Wellennut (3222) positioniert; der Aktivierungsschalter (32231) und der Deaktivierungsschalter (32232) steuern die Aktivierung und Deaktivierung des Folienzufuhrmotors (311).

7. Maschine für kontinuierliche Abdichtung und Schneidung wie in Anspruch 1, **gekennzeichnet dadurch, dass** die Antriebsvorrichtung (13) ein aktives Antriebskettenrad (131), eine Antriebskette (133) und ein passives Antriebskettenrad (132) umfasst; die Antriebskette (133) ist auf das aktive Antriebskettenrad (131) und das passive Antriebskettenrad (132) montiert; das aktive Antriebskettenrad (131) ist mit einem Ausstoßende eines Motors (134) zur Bewegungsübertragung verbunden; die Antriebskette (133) und das Schablonengestell sind fest verbunden; die Schablone (137) ist auf dem Schablonengestell befestigt.
8. Maschine für kontinuierliche Abdichtung und Schneidung wie in Anspruch 1, **gekennzeichnet dadurch, dass** die Foliensammelvorrichtung (5) einen Spannmechanismus, eine Foliensammelhaspel und einen Motor umfasst; der Motor weist einen Kuppelungsmechanismus auf; der Spannmechanismus ist mit dem Motor zur Bewegungsübertragung verbunden und ist auch mit der Foliensammelhaspel durch einen Treibriemen zur Bewegungsübertragung verbunden.
9. Maschine für kontinuierliche Abdichtung und Schneidung nach einem beliebigen der Ansprüche 1-8, **gekennzeichnet dadurch, dass** die Folienzufuhreinheit auch eine Folienanpassungsvorrichtung (313) umfasst; die Folienanpassungsvorrichtung (313) umfasst Federn (3131) und einen Lagebegrenzungsstab (3132); eine entsprechende Position zwischen der Folienzufuhreinheit und der Schablone (137) wird unter Verwendung der Federn (3131) in Verbindung mit dem Lagebegrenzungsstab (3132) angepasst.

Revendications

1. Machine de scellage et de découpe continu comprenant un bâti de machine (1), un dispositif d'entraînement (13), un dispositif de remplissage synchrone (2), un dispositif de recouvrement par film (3), un dispositif de scellage et de découpe synchrones (4) et un dispositif de collecte de film (5); le dispositif d'entraînement (13) amène un support de gabarit à se déplacer vers l'avant; le support de ga-

barit est utilisée pour placer des gabarits (137) de différentes spécifications; le dispositif de remplissage synchrone (2), le dispositif de recouvrement par film (3) et le dispositif de collecte de film (5) sont disposés sur le bâti de machine (1); dans laquelle:

le dispositif de remplissage synchrone (2) comprend une unité de stockage de matière (21) et une unité d'acheminement de matière (22); l'unité de stockage de matière (21) est disposée de façon fixe sur le bâti de machine (1); l'unité d'acheminement de matière (22) est montée sur l'unité de stockage de matière (21) par l'intermédiaire de tiges coulissantes (211) et est reliée de façon fixe au dispositif de scellage et de découpe synchrones (4) par l'intermédiaire d'une bielle (212); l'unité de stockage de matière (21) communique avec l'unité d'acheminement de matière (22) par l'intermédiaire de tubes souples; **caractérisée par le fait que**:

le dispositif de scellage et de découpe synchrones (4) comprend un premier servomoteur (41) et un mécanisme de thermoscellage et de découpe; le mécanisme de thermoscellage et de découpe comprend une unité de thermoscellage et de découpe (421) et une unité de thermoscellage et de découpe (422); l'unité de thermoscellage et de découpe (421) et l'unité de thermoscellage (422) sont respectivement montées sur une plaque coulissante (12); la plaque coulissante (12) est reliée de façon coulissante au bâti de machine (1) par l'intermédiaire de rails de guidage (11); la plaque coulissante (12) est munie de façon fixe d'une crémaillère de transmission (121); le premier servomoteur (41) est disposé de façon fixe sur le bâti de machine (1) et est relié par prise aux crémaillères de transmission (121); l'unité de thermoscellage et de découpe (421), l'unité de thermoscellage (422) et l'unité d'acheminement de matière (22) sont amenées à se déplacer de façon synchrone sous la force d'entraînement du premier servomoteur (41).

2. Machine de scellage et de découpe continu selon la revendication 1, **caractérisée par le fait que**: l'unité de thermoscellage et de découpe (421) comprend un support (4211), un vérin (4212) et un module de thermoscellage et de découpe (4213); le support (4211) est monté sur la plaque coulissante (12); le vérin (4212) est monté sur la plaque coulissante (12); le module de thermoscellage et de découpe (4213) est relié à une tige de piston (421221) du vérin (4212); une plaque de soutien (4214) est disposée à une position correspondant au module de thermoscellage et de découpe (4213) à une extrémité inférieure du support (4211); le module de thermoscellage et de découpe (4213) et la plaque de soutien (4214) sont positionnés au-dessus et au-

dessous du support de gabarit, respectivement.

3. Machine de scellage et de découpe continus selon la revendication 2, **caractérisée par le fait que** : la tige de piston (421221) d'un second vérin (42122) est reliée à une première plaque de pression (4215) ; la première plaque de pression (4215) comporte des blocs en saillie (42151) sous la forme d'un T inversé ; une seconde plaque de pression (4216) est disposée de façon correspondante à la première plaque de pression (4215) ; la seconde plaque de pression (4216) comporte des rainures (42161) sous la forme d'un T inversé correspondant à la première plaque de pression (4215) ; la première plaque de pression (4215) et la seconde plaque de pression (4216) sont aptes à coulisser l'une par rapport à l'autre le long des rainures (42161).
4. Machine de scellage et de découpe continus selon la revendication 1, **caractérisée par le fait que** : l'unité d'acheminement de matière (22) comprend des entrées de matière (221) et des sorties de matière (222) ; les entrées de matière (221) communiquent avec l'unité de stockage de matière (21) par l'intermédiaire de tubes souples ; l'unité d'acheminement de matière (22) comporte des vérins (223) ; les vérins (223) commandent l'ouverture et la fermeture des sorties de matière (222) par l'intermédiaire de pistons.
5. Machine de scellage et de découpe continus selon la revendication 1, **caractérisée par le fait que** : le dispositif de recouvrement par film (3) comprend une unité d'alimentation en film et une unité d'acheminement de film ; l'unité d'alimentation en film comprend un moteur d'alimentation en film (311) et un arbre d'alimentation en film (312) relié au moteur d'alimentation en film (311) pour une transmission de mouvement ; l'unité d'acheminement de film comprend un mécanisme de transmission (321) et un mécanisme de commande (322) ; le mécanisme de transmission (321) comprend un axe de transmission actif (3211), un axe de transmission passif (3212), une sonde de lumière (3213) et un second servomoteur (3214) ; l'axe de transmission actif (3211) et le second servomoteur (3214) sont reliés ensemble pour une transmission de mouvement ; l'axe de transmission passif (3212) est en contact de surface et est en coordination avec l'axe de transmission actif (3211) ; le mécanisme de commande (322) comprend un arbre mobile (3221), une rainure d'arbre mobile (3222) et un commutateur de proximité (3223) ; l'arbre mobile (3221) est apte à coulisser le long de la rainure d'arbre mobile (3222).
6. Machine de scellage et de découpe continus selon la revendication 5, **caractérisée par le fait que** : le commutateur de proximité (3223) comprend un com-

mutateur d'activation (32231) et un commutateur de désactivation (32232) ; le commutateur d'activation (32231) est positionné à une extrémité supérieure de la rainure d'arbre mobile (3222) ; le commutateur de désactivation (32232) est positionné à une extrémité inférieure de la rainure d'arbre mobile (3222) ; le commutateur d'activation (32231) et le commutateur de désactivation (32232) commandent l'activation et la désactivation du moteur d'alimentation en film (311).

7. Machine de scellage et de découpe continus selon la revendication 1, **caractérisée par le fait que** : le dispositif d'entraînement (13) comprend une roue de chaîne d'entraînement active (131), une chaîne d'entraînement (133) et une roue de chaîne d'entraînement passive (132) ; la chaîne d'entraînement (133) est montée sur la roue de chaîne d'entraînement active (131) et la roue de chaîne d'entraînement passive (132) ; la roue de chaîne d'entraînement active (131) est reliée à une extrémité de sortie d'un moteur (134) pour une transmission de mouvement ; la chaîne d'entraînement (133) et le support de gabarit sont reliés de façon fixe ; le gabarit (137) est fixé sur le support de gabarit.
8. Machine de scellage et de découpe continus selon la revendication 1, **caractérisée par le fait que** : le dispositif de collecte de film (5) comprend un mécanisme de serrage, une bobine de collecte de film et un moteur ; le moteur comporte un mécanisme d'embrayage ; le mécanisme de serrage est relié au moteur pour une transmission de mouvement et est également relié à la bobine de collecte de film par l'intermédiaire d'une courroie de transmission pour une transmission de mouvement.
9. Machine de scellage et de découpe continus selon l'une quelconque des revendications 1-8, **caractérisée par le fait que** : l'unité d'alimentation en film comprend également un dispositif d'ajustement de film (313) ; le dispositif d'ajustement de film (313) comprend des ressorts (3131) et une tige de limitation de position (3132) ; une position correspondante entre l'unité d'alimentation en film et le gabarit (137) est ajustée à l'aide des ressorts (3131) en association avec la tige de limitation de position (3132).

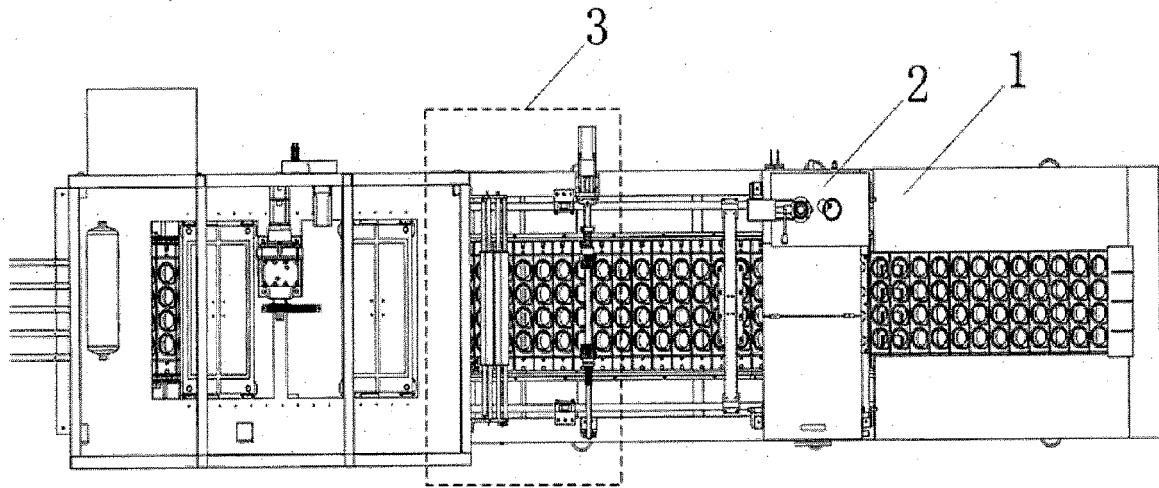


FIG.1

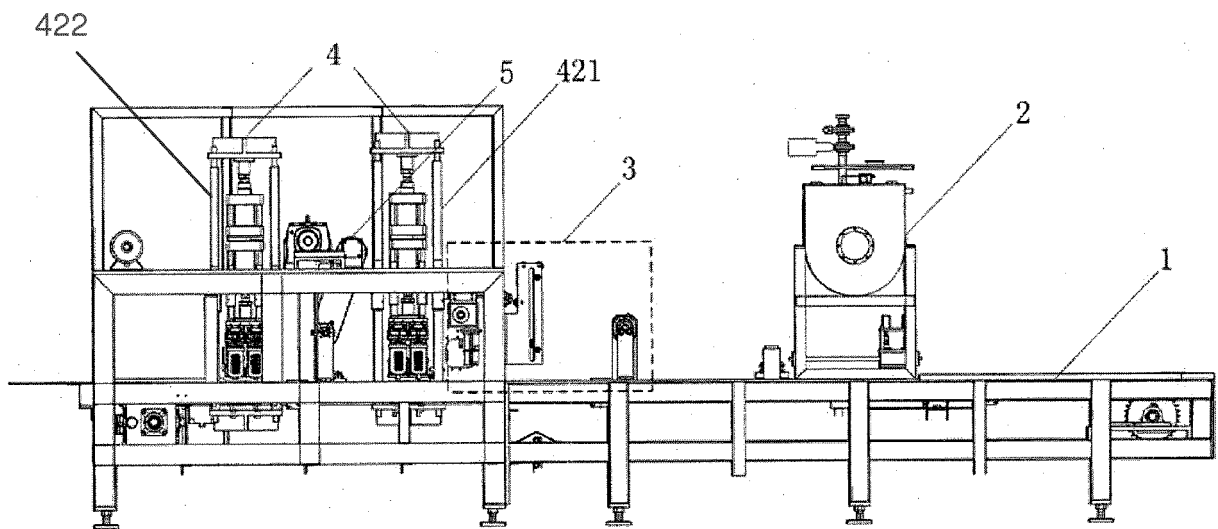


FIG.2

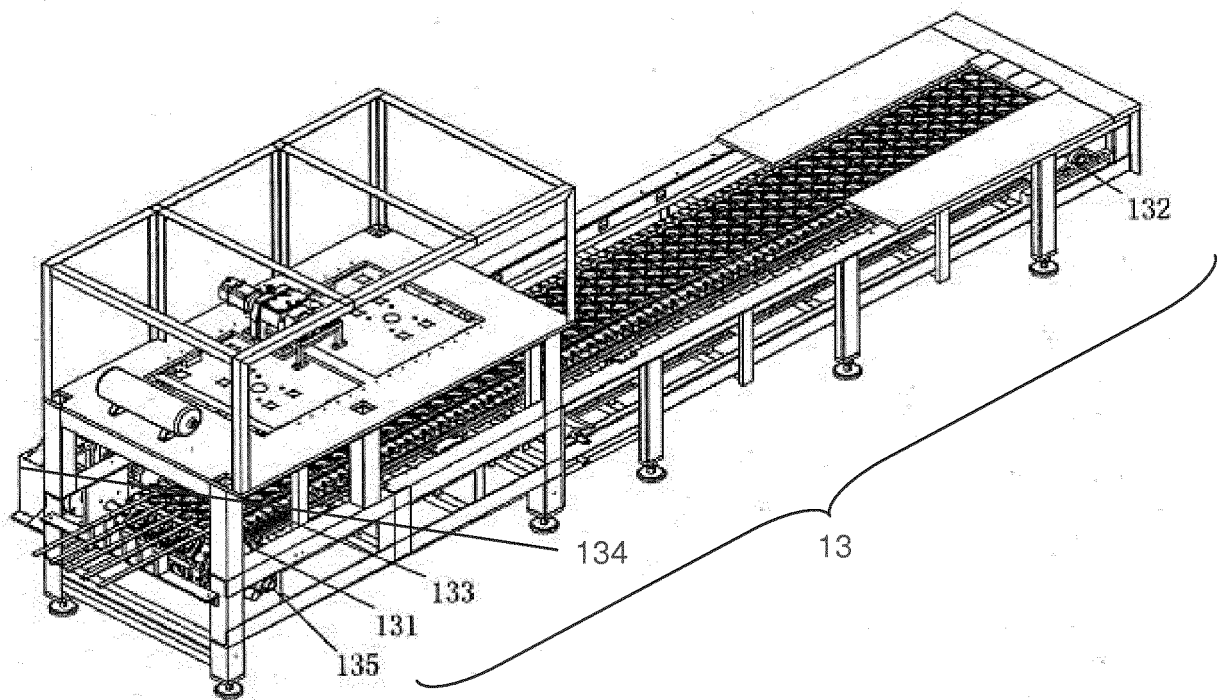


FIG.3

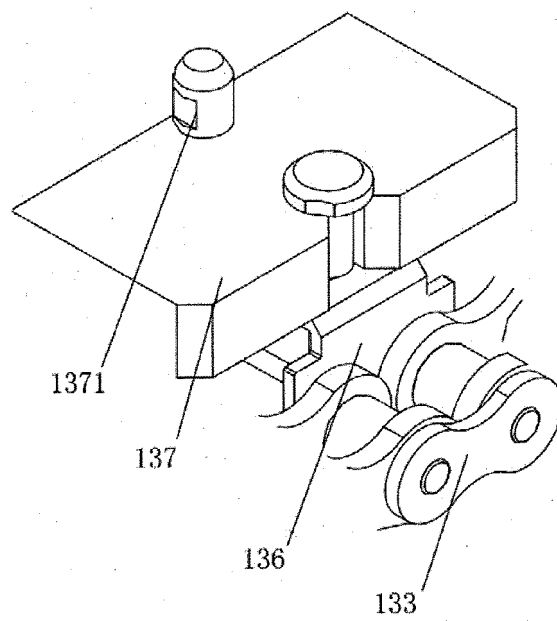


FIG.4

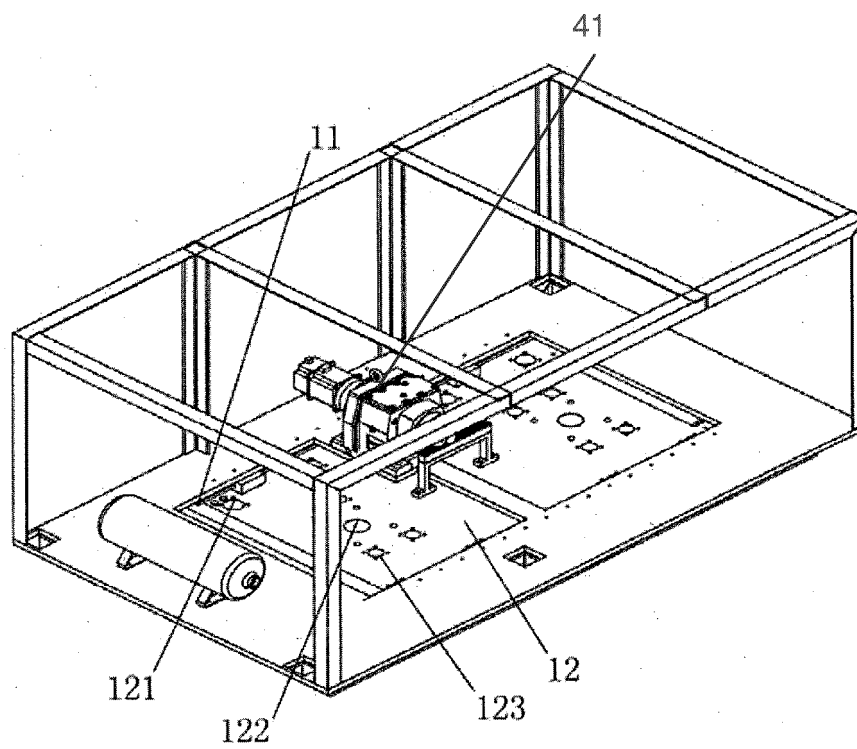


FIG.5

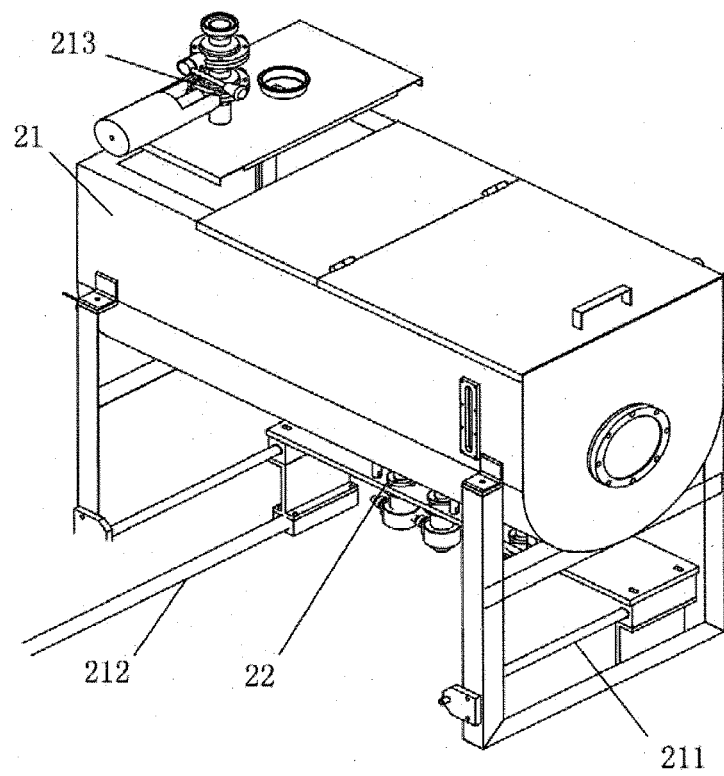


FIG.6

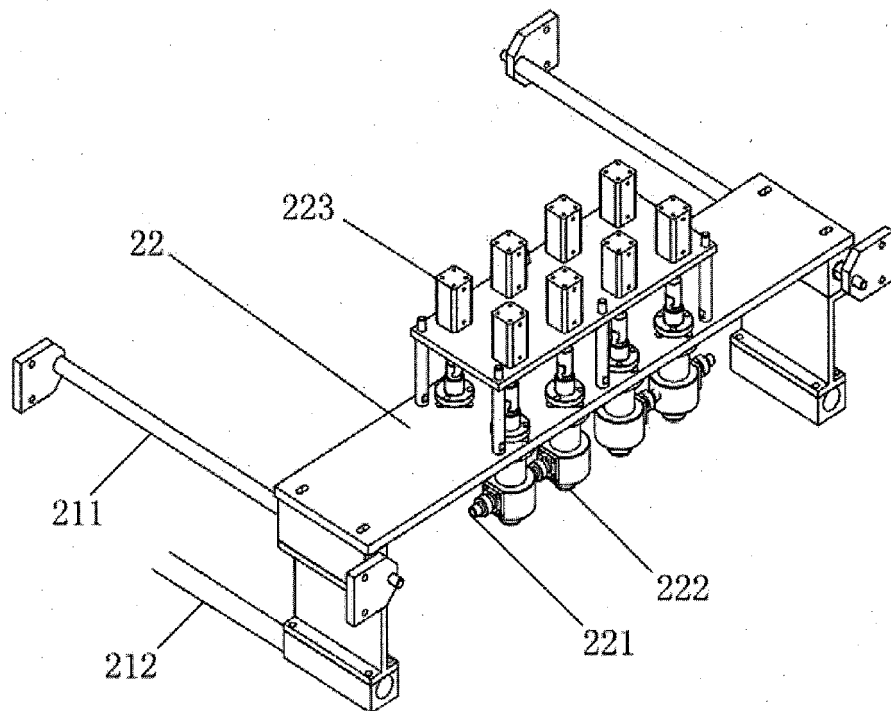


FIG.7

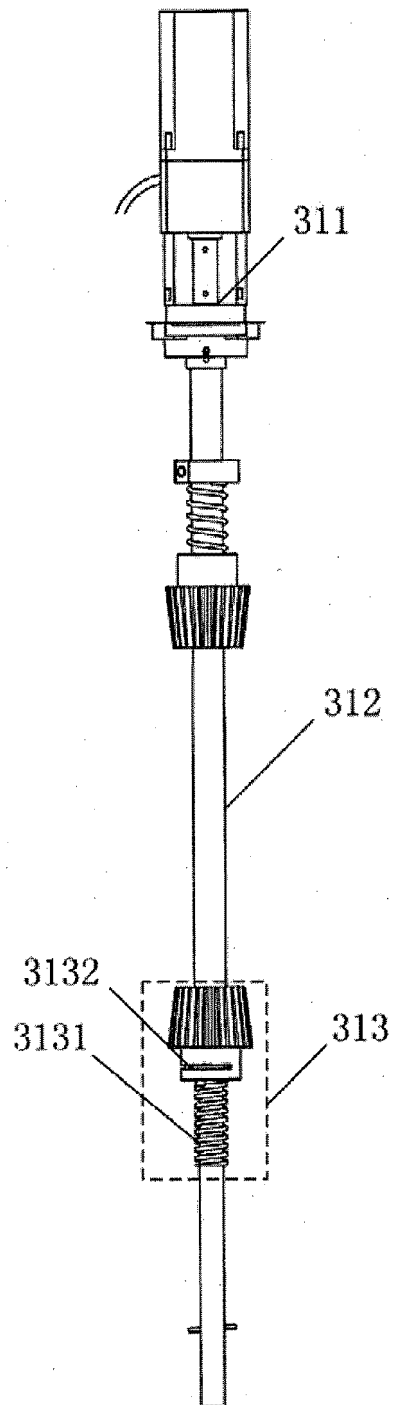


FIG.8

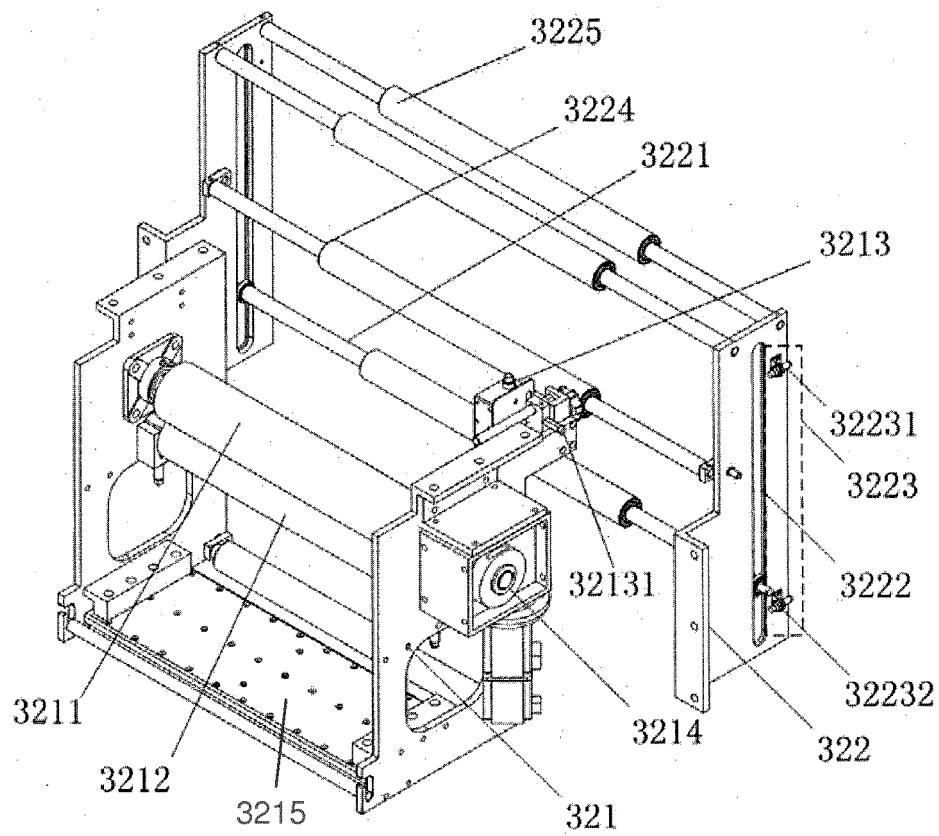


FIG.9

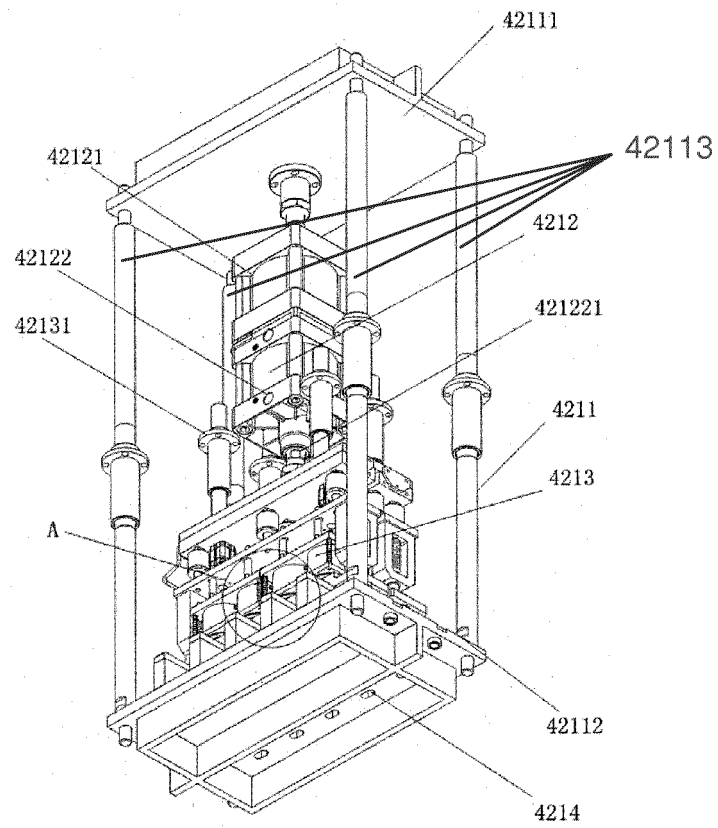


FIG.10

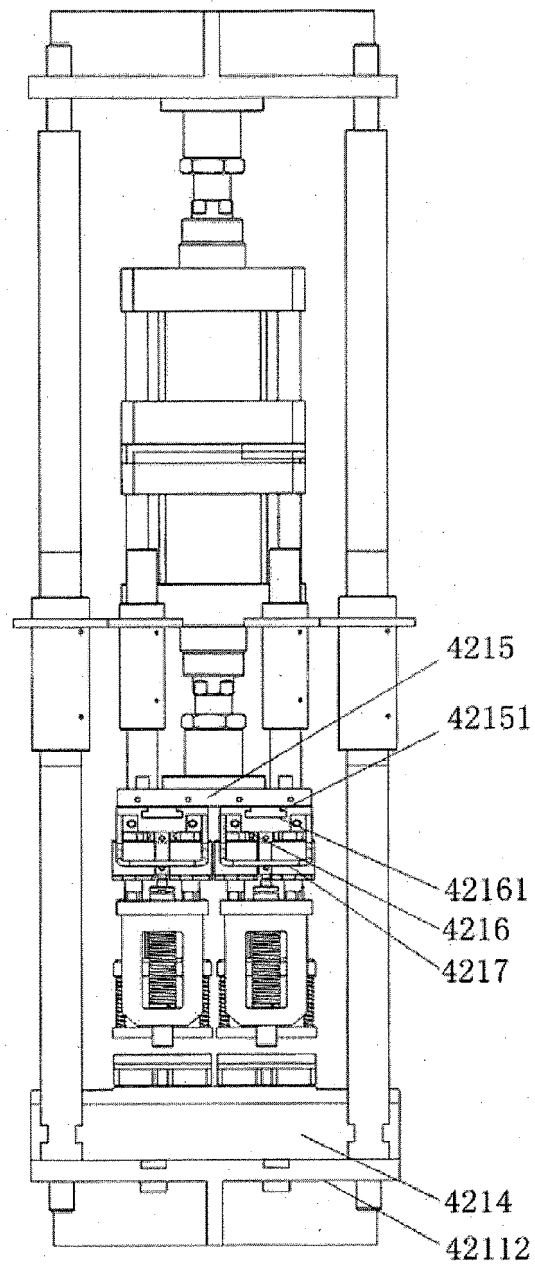


FIG.11

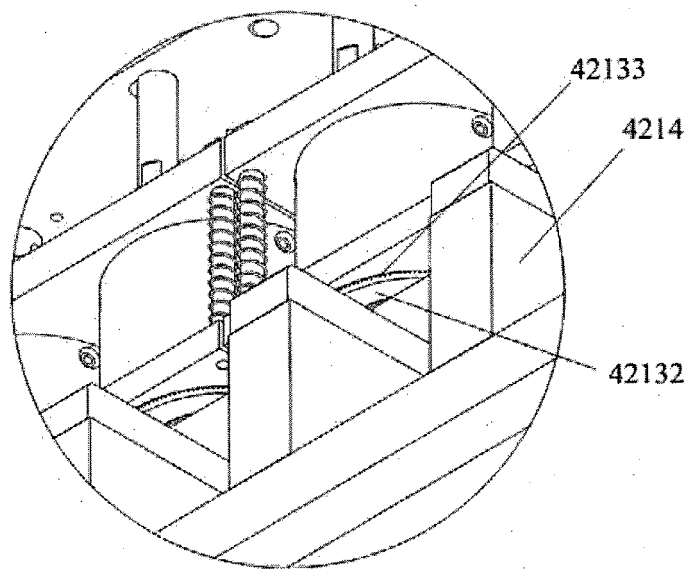


FIG.12

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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