(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 056 483 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
14.09.2022 Bulletin 2022/37

(21) Application number: **22161434.0**

(22) Date of filing: **10.03.2022**

(51) International Patent Classification (IPC):
B65B 11/02 *(2006.01)* ***B65B 11/04*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B65B 11/025; B65B 11/045; B65B 2011/002; B65B 2210/14

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **11.03.2021 ES 202130501 U**

(71) Applicant: **Aranguren Comercial del Embalaje, S.L.U.**
46130 Massamagrell Valencia (ES)

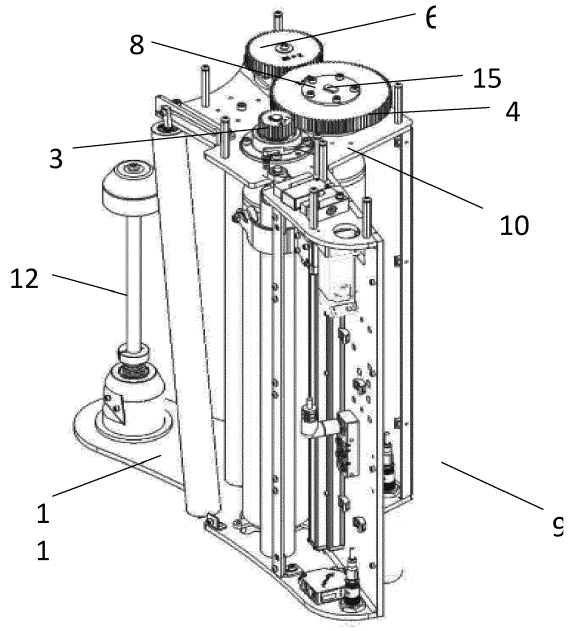
(72) Inventors:
- **Rubio Casalta, Valentín**
  46019 Valencia (ES)
- **Bereber Goiricelaya, Roberto**
  46410 Sueca (ES)
- **López Carrillo, Luis Miguel**
  46021 Valencia (ES)

(74) Representative: **Soler Lerma, Santiago**
Vitoria de Lerma Asociados
International Department
C/Poeta Querol nº 1 pta 10
46002 Valencia (ES)

(54) FILM PRE-STRETCHING AND BRAKE DEVICE FOR REEL CARRIAGE ON A WRAPPING MACHINE

(57) The invention relates to a device for supplying and tensioning the packaging film of a wrapping machine with a reel carriage comprising a set of rollers engaged to each other by a gearing associated to a motor where the gearing comprises pinions with different rotation speed and a connection/disconnection element that allows to link one of the pinions with the rotating shaft of one of the rollers, transferring in this way the rotation speed difference of the pinions to the rollers, which causes the stretching of the film running on the rollers and, conversely, allows to uncouple that pinion from that rotating shaft of the roller by not transferring the rotation speed of the pinions to the roller, in such a way that it does not generate stretching of the film.

FIG. 1



EP 4 056 483 A1

Description

[0001] The invention, as its name indicates, relates to a device for supplying and tensioning the packaging film of a wrapping machine with a reel carriage comprising a set of rollers engaged to each other by a gearing associated to a motor where the gearing comprises pinions with different rotation speed and a connection/disconnection element that allows to link one of the pinions with the rotating shaft of one of the rollers, transferring in this way the rotation speed difference of the pinions to the rollers, which causes the stretching of the film running on the rollers and, conversely, allows to uncouple that pinion from that rotating shaft of the roller by not transferring the rotation speed of the pinions to the roller, in such a way that it does not generate stretching of the film.

[0002] It belongs to the art sector of wrapping machines.

BACKGROUND

[0003] In the process of wrapping palletized loads, wrapping machines generally incorporate a reel carriage that, moving around the load to be wrapped, has a system for tensioning and supplying the packaging material.

[0004] Film tension can be produced by the difference in speed between the orbital displacement of the carriage around the load and the film dosing speed from the reel carriage, or due the film pre-stretching during its passage through the reel carriage. A combination of both can also occur depending on the requirements.

[0005] The following patent documents present clear examples of these provisions.

[0006] Patent ES2000870 relates to a process for stretching a packaging band in a wrapper, combining a helical movement around the goods with a vertical displacement.

[0007] Patent ES2082902 relates to a method and apparatus for stretching packaging material in the transverse direction when supplying and wrapping the packaging material over a load to be wrapped.

[0008] Patent ES0268272 relates to a device for supplying stretching plastic sheeting for wrapping loaded pallets, which has two parallel vertical rollers of crazy rotation, one of larger diameter in relation to the other and with elements inside controlled from the upper part of the device.

[0009] The rollers of these devices have the essential functions necessary to allow the film to zigzag through them towards the load to be wrapped the arrangement of a reel trolley has typically at least two separate rollers in close proximity that have the function of separating and stretching a connected packaging material in the direction of the supply, producing tension and spreading of the material. The required tension varies depending on the load to be wrapped.

[0010] Patent ES2341209, owned by the applicant itself, relates to a reel carriage located on the vertical branch of the rotating arm and with a vertical displacement on it, surrounding the load to be wrapped and wrapping it. It also uses a motor that calibrates the necessary tension according to the load to be wrapped.

[0011] The relevance of the motor lies mainly in the adjustment of the necessary tension according to various characteristics of the load to be wrapped, in addition to the practicality of disassembling and changing parts.

[0012] In the wrapping process, film rolls are used where the film material is not pre-stretched at the factory, so that the roll carriages carry out the pre-stretching through the rollers, driven by the continuous drive motor.

[0013] When the film material is already pre-stretched by the manufacturer, and it is unnecessary to use the pre-stretching process again, the motor must be disconnected from the rollers so that pre-stretching is not applied.

[0014] Since a wrapping process may have pre-stretched or non-pre-stretched reels, it is wanted to avoid the reel carriage replacements of the wrapping arm when a film suitable for the needs of the load to be wrapped is not available.

DESCRIPTION OF THE INVENTION

[0015] In order to overcome the drawbacks mentioned above, the invention consists of a film stretching device comprising a gear comprising a set of pinions, a motor associated with that gear through a transmission, a set of rollers, and their corresponding turning shafts associated with the pinions.

[0016] The diameter of the pinions is different, generating a different rotational speed between them and, when all the pinions are linked to the rollers, a relative speed differential between the rollers.

[0017] The device comprises at least two rollers, each associated with a pinion.

[0018] In the proposed embodiment, the motor transmits motion to the pinions through a pinion that we will call the motor pinion. Thus, we find a motor pinion and two roller pinions.

[0019] Each roller pinion is linked to a roller - directly or through its rotating shaft - thus conditioning its speed of rotation, although one of the roller pinions can be disconnected from the rotating shaft of its roller and no longer transfer its movement to it.

[0020] Preferably it is the main pinion that can be linked or unlinked to the rotating shaft of its roller.

[0021] In this way, the device will have a pre-stretch film position when all the roller pinions are linked to their respective rollers, and a mere film distribution position when the largest pinion stops transmitting movement to its roller.

[0022] Since all the roller pinions are linked to all the rollers -preferably through their rotating shafts- and there is a main pinion than the others, the roller associated with the larger roller pinion will rotate at a lower speed than the other roller, retaining the film and causing it to be

stretched by the action of the other roller, which will rotate at a higher speed stretching the film.

[0023] The invention is explained here under the premise that the rollers have the same diameter since if the rollers are of different diameters, this difference will have to be taken into account to calculate the perimeter speed of each roller.

[0024] When the main pinion is disengaged from its roller, the roller does not retain the film and stretching does not take place.

[0025] The attachment or detachment of the roller to its corresponding roller pinion occurs simply by means of a connection/disconnection element such as a plate comprising means for attaching to the roller pinion and trapping the roller's rotating shaft transmitting the movement of the pinion to the roller. The fastening means are easily removable allowing the removal of said plate in a quick and simple manner and thus disengaging the roller from its roller pinion.

[0026] In a preferred embodiment the roller and its rotating shaft are always linked and what varies is the linkage or disengagement with respect to its pinion. However, there are other equivalent alternatives where pinion and rotating shaft could always be linked and the variable would be the linking or unlinking of the rotating shaft with respect to the roller.

[0027] Removing the roller pinion plate disengages the roller pinion from its roller's rotating shaft and no longer transmits the movement of the gearing to it.

[0028] The rollers have an adherent surface, by friction, adhesive, gumming or any other way, suitable for the film not to slip on it.

[0029] In a preferred embodiment, the motor, through its motor pinion, transmits the continuous movement to the larger pinion, the one with more teeth and larger diameter, and this transmits it to the smaller pinion, which generates a difference in the speed of rotation between rollers, this allows the operation of the reel carriage to be pre-stretching.

[0030] The concept of pre-stretching for the invention consists of causing the stretching of the film by means of the two close rollers with different rotation speeds.

[0031] When the device is in pre-stretch mode, the rollers rotate at different speeds to tension the film in a controlled manner.

[0032] The controlled film tension, which is determined according to the load to be wrapped, allows optimizing the consumption and providing an adequate wrapping for each type of load.

[0033] The reel carriage comprises a lower and upper lamellar part joined together by conventional means.

[0034] Preferably in the lower sheet part of the reel carriage are located means suitable for accommodating the roll shafts and a non-driven support shaft for the film reel.

[0035] Preferably, the upper sheet part of the reel carriage has a series of holes suitable for housing each of the rollers' rotating shafts and a series of pinions geared together and transmitting the movement of a motor.

[0036] The pre-stretching function and its requirement are conditioned by whether the film reel is pre-stretched and the type of load to be wrapped.

[0037] The film leaves the reel on the reel support shaft, passes through the two rollers, and then leaves the reel carriage towards the load to be wrapped.

[0038] In one possible embodiment, the motor is a servomotor that, thanks to its regulation system, provides the functions of an adjustable brake.

[0039] In one possible embodiment, the pinions are interchangeable, allowing a different gear ratio between them.

[0040] In one possible embodiment, the reel carriage includes a housing for the plate when it is not connected to the pinion and the rotating shaft of its roller.

[0041] The linkage between the pinion of the roller and the rotating shaft of its roller is achieved in a simple manner thanks to the geometry of the plate comprising a housing whose geometry traps the rotating shaft and prevents it from being able to roll in the housing so that only the joint rotation of plate and shaft is possible.

DESCRIPTION OF THE FIGURES

[0042]

FIGURE 1. shows a perspective view of the device (9) where the gears (1) comprising the transmission (6) can be seen, in this case a motor pinion, geared to the main pinion (4), which in turn is geared to the minor pinion (3). The upper sheet piece (10) that supports the gear (1) and the lower lamellar piece (11) can be seen. Also shown is the support shaft on which the film reel (12) is located and rotates.
In this figure the connection/disconnection element (8), is a plate that is arranged on the main pinion (4) and trapping the end of the rotating shaft (15) of its roller.

FIGURE 2. shows a side view of the motor (13), the transmission (6), the first roller (5) and the second roller (7).

FIGURE 3. shows the upper sheet piece (10) that supports the transmission (6) in this case a motor pinion geared to the main pinion (4) and this in turn to the minor pinion (6). In this Figure the device is in pre-stretching state and thus the connection/disconnection plate (8) can be seen positioned on the main pinion (4) trapping the rotating shaft (15) and transmitting the movement to it. The main pinion (4) also transmits motion to the minor pinion (3) and the latter to the shaft of the second roller. Also shown is the rest housing (14) suitable for housing the plate when the device is not in pre-stretch position.

FIGURE 4. shows the gearing in a non-pre-stretch

position where the connection/disconnection plate (8) is in its rest housing and the rotating shaft (15) is not trapped but free. The transmission (6), main pinion (4) and minor pinion (3) are engaged. The means of fastening (16) of the pinion to the plate are shown, in this case, threaded holes drilled in the pinion body itself.

FIGURE 5. shows the gearing in a pre-stretch position where the motion transmitted by the transmission (6) on the main pinion (4) is also transmitted to the rotating shaft (15) of the first roller by means of the connection/disconnection plate (8) which is fixed on the main pinion and which is geometrically trapped on the rotating shaft (15) of the first roller. It is also visible at the rest housing (14) of the connection/disconnection plate.

DESCRIPTION OF A WAY OF CARRYING OUT THE INVENTION

[0043] The present invention is neither unique nor limiting but merely expository of the object to be protected hereby.

[0044] The device comprises a gear driven by a motor (13). The gearing comprises a transmission (6) in this case, a motor pinion, a main pinion (4) and a minor pinion (3) all meshed together such that the movement of the motor is transmitted to all the pinions.

[0045] The minor pinion (3) is linked to the second roller (7) in a way that the motion of the minor pinion (3) is constantly transmitted to that second roller.

[0046] The main pinion (4) presents means (16) for fixing a connection/disconnection element, in this case a plate (8) in a removable manner. These means are a plurality of threaded holes in the body of the main pinion.

[0047] When the plate (8) is fixed to the main pinion (4) it traps by geometry to the rotating shaft (15) of the first pinion transmitting the movement so that the first roller rotates in a controlled manner. The action of the motor produces the control since it transmits a constant speed movement to the gears, and it is the differences in size between them that determine the speed of rotation of the rollers.

[0048] When the plate (8) is not fixed to the main pinion (4) the rotating shaft of the first roller is free and the movement of the main pinion (4) is not transmitted to this rotating shaft. In this case the first roller can move by the action of the film being pulled by the second roller (7) or by the movement of the reel carriage around the load.

[0049] Due to the difference in size - diameter and number of teeth - between the pinions, when the rotation of the first roller is controlled, it is slower than the rotation of the second roller.

[0050] The film, in its path, passes through both rollers and due to the fact that the surface of these rollers is anti-slip (due to the presence of rubber, adhesive, material with high friction index or any other cause) the difference in speed in its rotation in pre-stretching position, produces a tension of the film which is the desired effect of pre-stretching.

[0051] On the contrary, when the first roller does not receive the movement of the largest pinion, there is no tension because there is no speed difference between the first and the second roller. In this case, the motor drives the second roller by regulating its speed to slow it down and maintain the film at a given tension at the time of wrapping in combination with the speed of the rotating arm of the wrapper in which the device is mounted.

[0052] The motor (13), gearing and rollers are mounted on a reel holder carriage (9) comprising a lower (11) and upper (10) sheet piece with the appropriate machining to accommodate the ends of the rollers and pinions rotating shaft. The film reel carriage (9) also includes the film reel support shaft (12).

[0053] The speed difference between the rollers allows the film to run through the reel carriage (9) with a tension that is preset according to the load to be wrapped.

[0054] To fix the plate (8) on the main pinion (4), the latter has a suitable space and means (16) for fastening, in this case some threaded holes in the body of the main pinion (4) suitable for screwing some screws to fasten the plate (8) and the main pinion (4).

[0055] The motor (13) provides continuous motion to the gearing such that when the plate (8) is removed from the first pinion (4) the speed differential between the rollers is interrupted and the first roller (5) is pulled by the displacement of the film caused by the movement of the rotating arm or by the movement of the second roller or by a combination of both, in a state without pre-stretching.

Claims

1. FILM PRE-STRETCHING AND BRAKE DEVICE FOR REEL CARRIAGE ON A WRAPPING MACHINE comprising a reel carriage with a series of rollers with an adherent surface and a support shaft for the film reel and the carriage comprises a lower part (11) and an upper part (10) suitable for housing a gear and the rotating shafts of the first roller (15) and of the second roller **characterized in that** it comprises a motor (13), a transmission (6) that transmits the movement of the motor to the gearing wherein said gearing comprises a main pinion (4) associated with a first roller (5) and a minor pinion (3) associated with a second roller (7) and a removable connection/disconnection plate (8) suitable for transmitting the movement of the main pinion to the first roller, wherein the device has a pre-stretch position in which the plate (8) transmits the motion of the main pinion (4) to the first roller (5) and a non-pre-stretch position in which the motion of the main pinion is not transmitted to the first roller.

2. FILM PRE-STRETCHING AND BRAKE DEVICE

FOR REEL CARRIAGE ON A WRAPPING MACHINE according to claim 1, wherein in the pre-stretching position, the first roller rotates at a slower speed than the second roller.

3. FILM PRE-STRETCHING AND BRAKE DEVICE FOR REEL CARRIAGE ON A WRAPPING MACHINE according to claim 1, wherein the main pinion comprises means (16) for fixing the plate (8) in a removable manner.

4. FILM PRE-STRETCHING AND BRAKE DEVICE FOR REEL CARRIAGE ON A WRAPPING MACHINE according to the above claim, wherein the means of fastening (16) are threaded holes.

5. FILM PRE-STRETCHING AND BRAKE DEVICE FOR REEL CARRIAGE ON A WRAPPING MACHINE according to claim 1, wherein the plate (8) in pre-stretching position, fixed on the main pinion (4), traps by geometry the rotating shaft (15) of the first roller (5).

6. FILM PRE-STRETCHING AND BRAKE DEVICE FOR REEL CARRIAGE ON A WRAPPING MACHINE according to claim 1, wherein the motor (13) is a servomotor.

7. FILM PRE-STRETCHING AND BRAKE DEVICE FOR REEL CARRIAGE ON A WRAPPING MACHINE according to claim 1, wherein the pinions are interchangeable.

FIG. 1

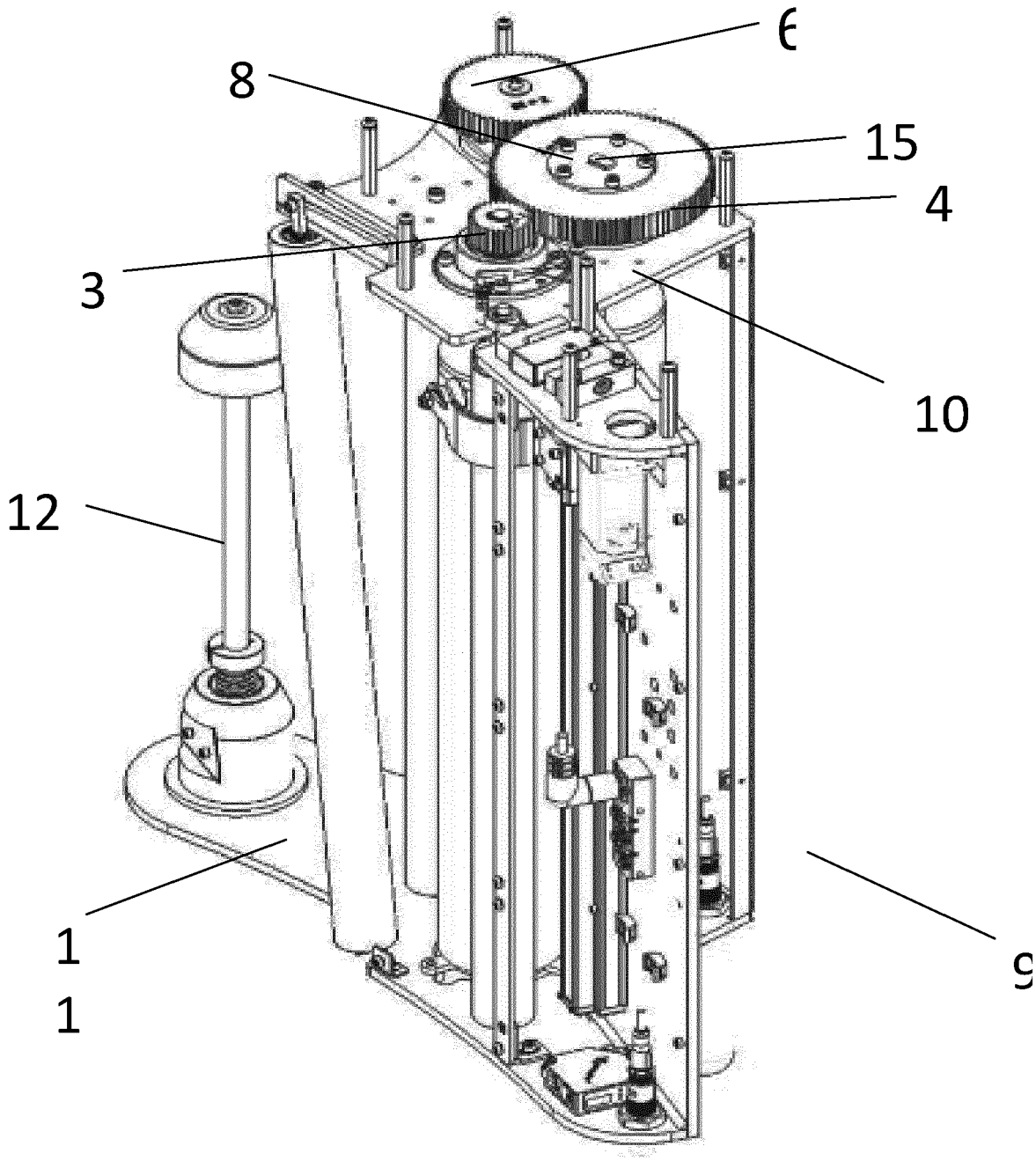


FIG. 2

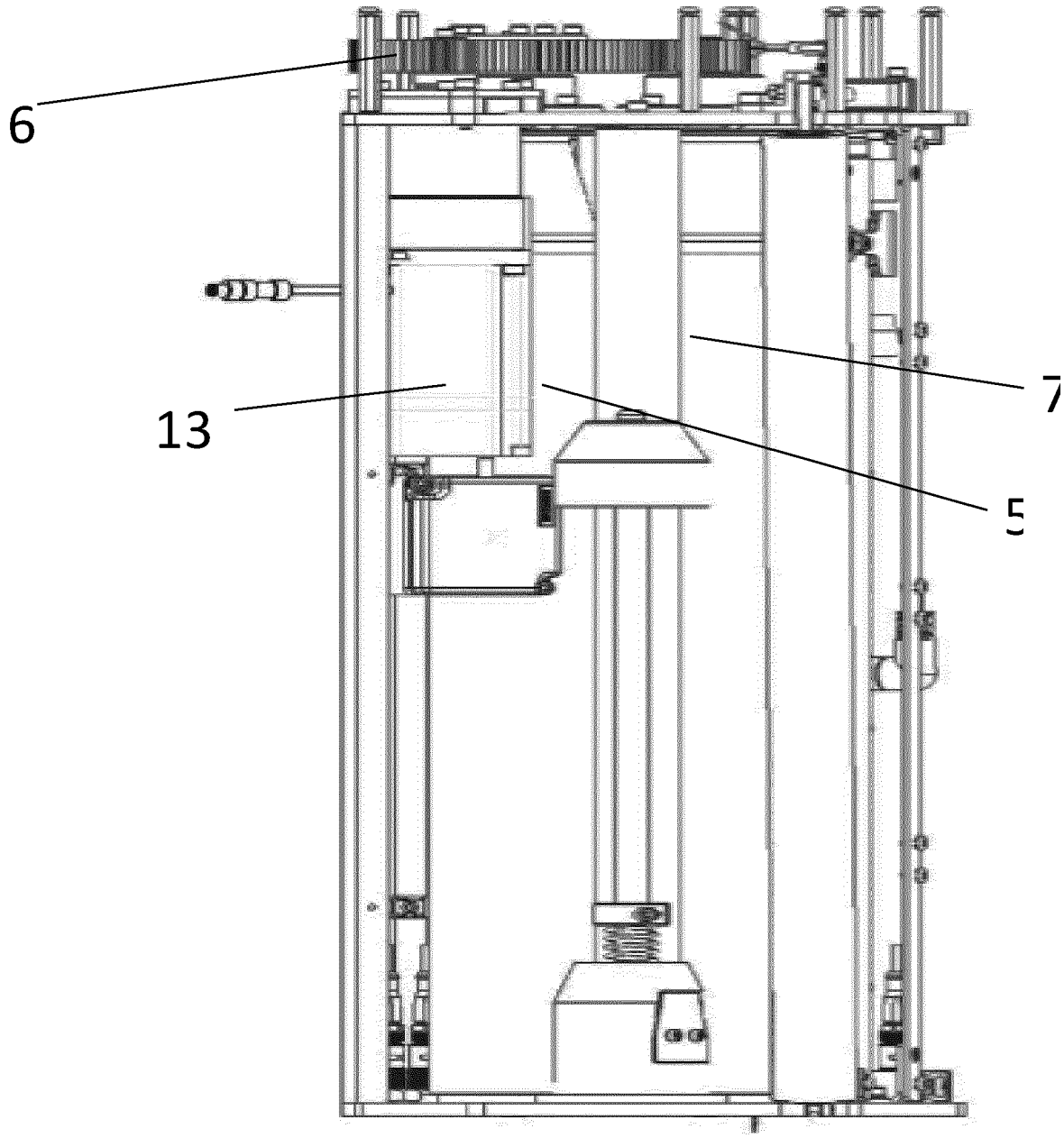


FIG. 3

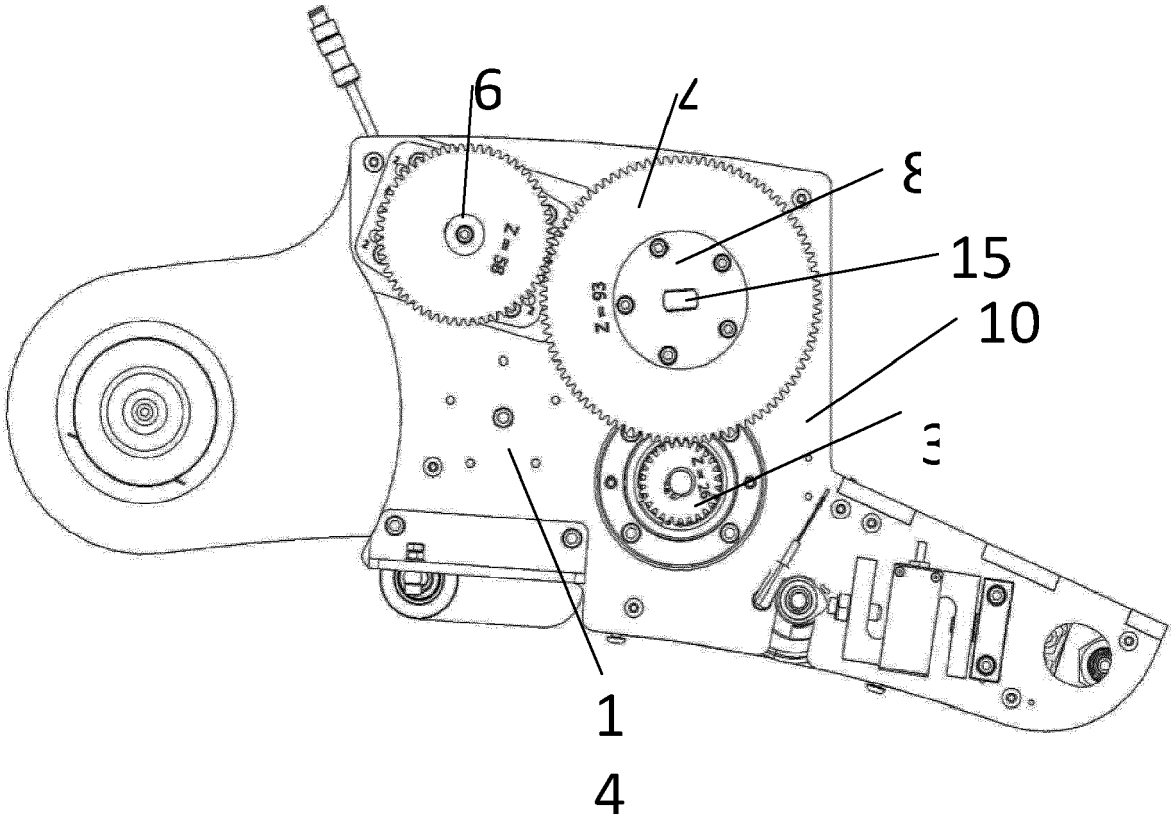


FIG. 4

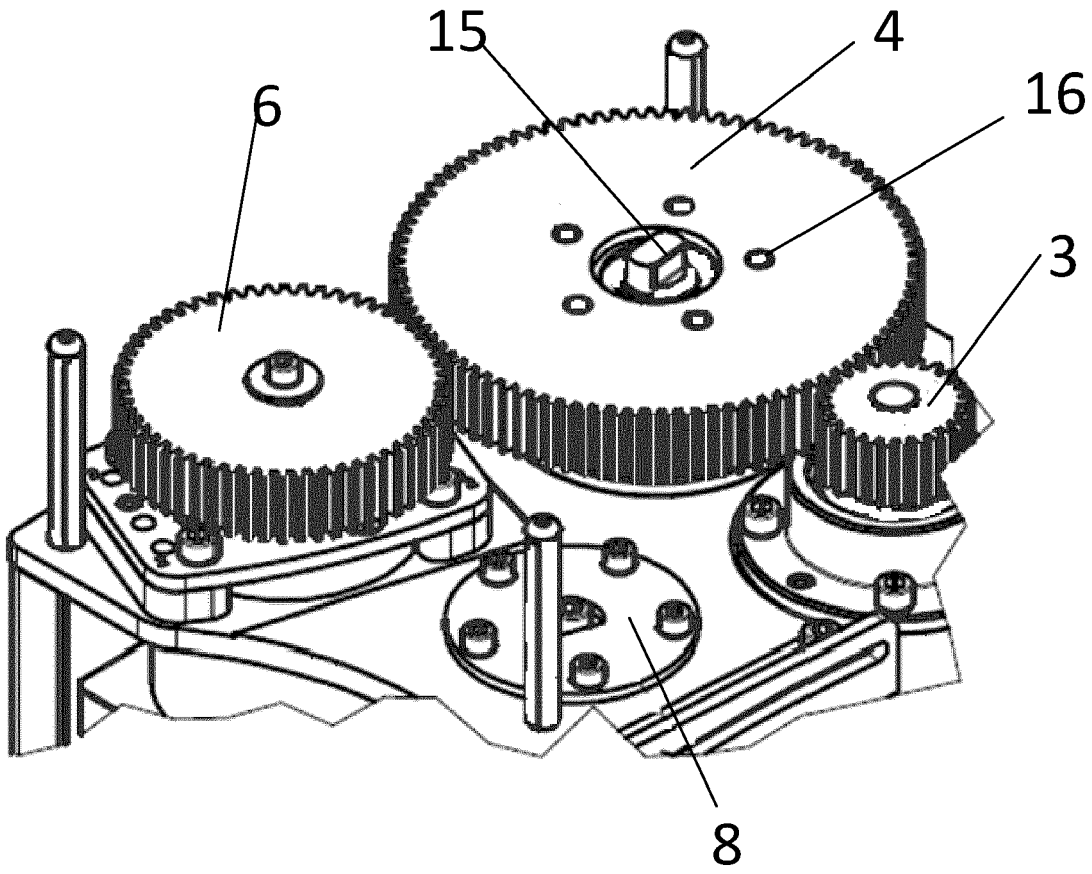


FIG. 5

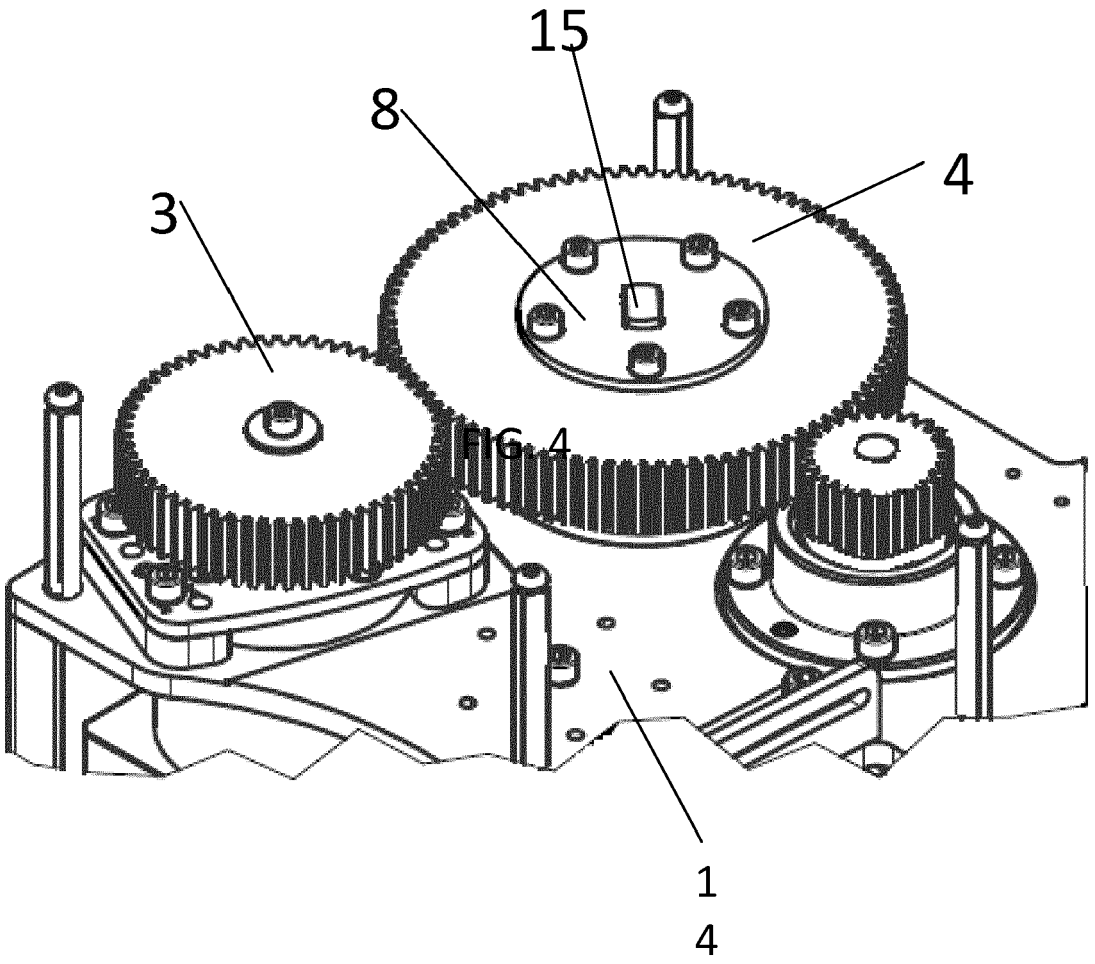


FIG. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 16 1434

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 213 223 A1 (SESTESE OFF MEC [IT]) 12 June 2002 (2002-06-12) * figures 1-3 *	1-7	INV. B65B11/02 B65B11/04

TECHNICAL FIELDS SEARCHED (IPC)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 July 2022	Lawder, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 16 1434

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-07-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1213223 A1	12-06-2002	EP 1213223 A1	12-06-2002
		IT MI20002446 A1	14-05-2002

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- ES 2000870 **[0006]**
- ES 2082902 **[0007]**
- ES 0268272 **[0008]**
- ES 2341209 **[0010]**