

(19)



(11)

EP 3 248 773 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.11.2017 Bulletin 2017/48

(51) Int Cl.:
B31B 70/98 (2017.01) B65H 15/02 (2006.01)

(21) Application number: **17173149.0**

(22) Date of filing: **26.05.2017**

(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:
MA MD

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(30) Priority: **27.05.2016 IT UA20164420**

(54) **AUTOMATIC UNLOADING SYSTEM FOR BAG MAKING MACHINES**

(57) The present automatic unloading system makes packages of paper bags or bags made of paper with a strip of transparent film, having variable sizes according to the bag making machine with which it is matched, the packages consisting of a quantity or number of bags which is preset by the user.

Said system consists of two complementary sets,

the first referred to as a spreader, which separates the desired package of bags in the continuous production of the bag making machine, and the second which takes said package with a movable pliers system, separates it from the production line and sends it to the binding section at the end of the system, always during the continuous production.

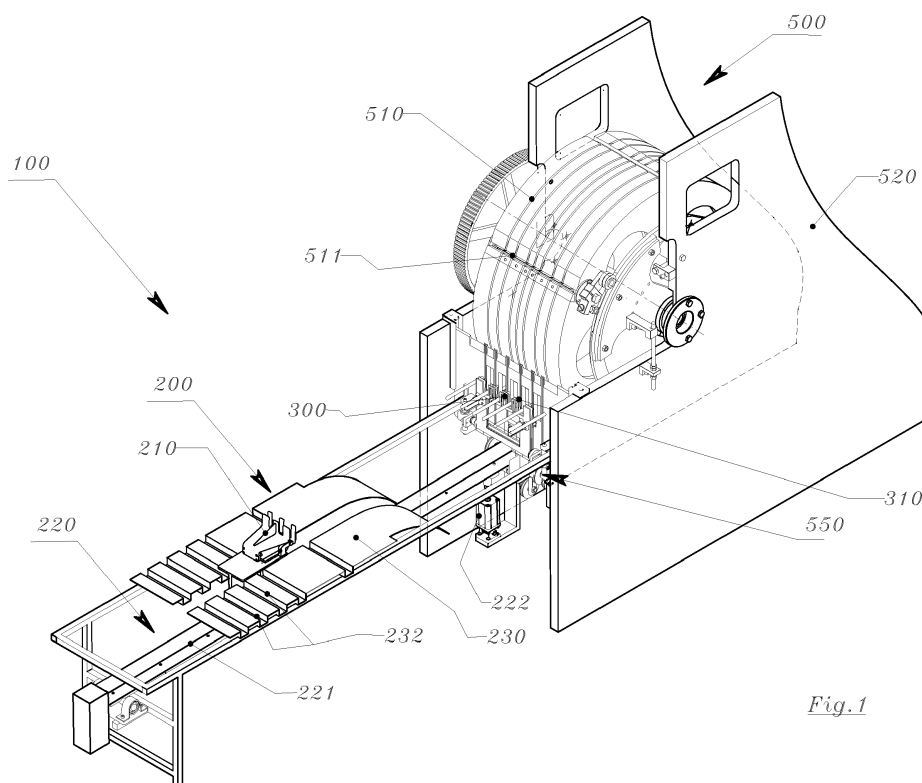


Fig. 1

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Description

[0001] The present Patent for Industrial Invention relates to an automatic unloading system at the outlet of machines for producing paper bags or paper and plastic film bags.

[0002] The present automatic unloading system is the missing element in the production lines of paper bags or also paper bags with a transparent strip; such a system performs the automatic unloading in "packages" of desired dimensions or number of bags, generally from 50 to 100 pieces each, automatically, i.e. without the presence of an operator. Indeed, currently one or also two operators are to be present in line on the bag making machine to remove the packages of bags produced and then bind them manually or with manual strapping tools or with simple elastic rings of the traditional type.

[0003] Indeed, starting from the simple general paper tape or with a strip of transparent plastic film, during the path that starts from the roll of paper to the formed bag, bag making machines perform a series of processing operations of pre-perforation, forming the tubular body, and both longitudinal and transverse gluing, up to the complete production of the finished paper bag, then at the end of the processing path, the finished bag is stacked according to a horizontal axis on an unloading plane in almost radial direction with respect to the forming drum of the machine. Proceeding in the unloading of the bags one after the other against a contrast abutment parallel to the plane of the bag, a continuous stack of bags arranged orthogonally to the support plane is formed with the opening of the bags upwards; to allow the successive taking at the outlet by an operator, at the wanted number of bags, for example, every fifty bags, the fifty-first, by means of a suitable preset counter, is released by the pliers of the drum slightly in advance and is unloaded into the stacker, protruding from the stack itself like a bookmark, the reason for which a characteristic horizontal stack is formed with said "bookmarks" clearly visible to the operators appointed to unloading, who remove them in packages equal to the distance between one bookmark and the next, and equal, like in the example mentioned, to the number of fifty bags each.

[0004] Since said machines are very fast, also up to productions equal to 800 bags per minute, it is understood how often a single operator is not capable of dealing with said productions by completing the binding or in any case a packaging, as required.

[0005] Another element of difficulty in packing the final production of these bags is the presence in many current productions of long and narrow bags, such as for example the ones intended for packaging bread such as traditional *baguettes*, which are difficult to keep stacked also for very short stacking paths.

[0006] The present system resolves both the noted problem of high production speeds and of the dimensions of said long bags with a single solution by operating both quickly and while not undergoing any conditioning due

to the length.

[0007] In the current art, there is no machine or equipment on the market intended to grip packages outcoming from the production line of a bag making machine. The present automatic unloading system is combined with a traditional bag making machine and in particular, in the final area, immediately after the outlet drum of the bags, where normally a plate with wheels with abutment pins is arranged, where the bags just formed are collected. Applied on said outlet plate is a spreader equipped with two oscillating movements, a primary one for positioning the whole system and a secondary one for opening two shaped plates such as to separate the end of one package just produced from the beginning of the following one, all during the continuous production of the bags outcoming from the drum. The whole set carrying the spreader is also provided with a vertical movement for allowing the cycle start repositionings. During the opening of the spreader, pliers with shaped teeth are inserted into the spreader between two separate packages of bags, i.e. the flat teeth of the pliers find room between similar alternate teeth of the spreader so as to seize, from below, the stacked bags with glued bottom downwards. Once a pre-counted package of bags is seized, the pliers begin spacing themselves apart from the new package being formed by moving towards the outlet of the machine with the pliers upwards, i.e. in the same direction towards which they were detached. As soon as the pliers have travelled a few centimeters, they rotate by ninety degrees, thus causing the last bag of the package to rest on a sliding plane or slide and then said pliers pull the package towards the end of the machine, thus allowing to keep it taught and supported on an almost continuous plane, whatever the length of the model of the bag produced. From here, a transverse cylinder sends the package towards an automatic binding device. Due to reasons of practicality in the successive handling operations, said packages are made with a number of bags varying from 50 to 100 pieces, generally the bags are made of paper or of paper and transparent film so the contents may be viewed. During the movement towards the unloading of the pliers with their package of bags, the spreader, passing below the package being produced, is repositioned towards the drum where the bags produced continuously are formed and are outlet, waiting for the set quantity to be made and also for the pliers, which are arranged on a linear actuator, they also oscillating downwards, to return below the package being produced in open position to seize the new package formed at the proper count.

[0008] The device herein referred to as a spreader is fundamental to the present unloading system, which spreader divides two adjacent packages with certainty, the spreader being provided with two oscillations which are fundamental to the whole assembly, a primary one where the whole spreader is arranged towards the drum behind the first bag of the package being produced, and a secondary one where at the end of the package, moved forwards, it opens on itself like scissors to allow the grip-

ping of the pliers.

[0009] As already mentioned, these machines have high productions which reach 800 pieces produced per minute, with variable dimensions of the different types of bags which, in a common machine, vary for example, from dimensions of 8cm x 18cm up to 30cm x 75cm. This apparatus formed by spreader and pliers may operate indifferently on all the sizes.

[0010] The different indexes, generally numerical, in the accompanying drawings have been attributed with the meanings hereinafter indicated for easier reading of said drawings.

[0011] **100** Assembly of the outlet set and automatic unloading system of a machine called a bag making machine, said set is formed by the outlet drum of the finished bags, its load-bearing structure formed by a pair of lateral sheets, the unloading set, with wheeled plate and outlet plate, with following a spreader system **300**, a gripping system **200** with sliding pliers for recovering and transporting the bags and the possible overturning of the package of bags at the unloading stop.

[0012] **200** Assembly of the complete gripping system, provided with trolley sliding linearly with pliers, rotating by 90°, for gripping bags produced in preset number and horizontally transported, after said rotation of 90 degrees, up to unloading onto an unloading plane with possible movement and lateral binding.

[0013] **300** Assembly of the mechanical set forming the spreader, i.e. the mechanism selected for separating the packages of bags, which one-by-one are picked by the pliers to be moved away from the unloading system, packages with a predetermined number of bags, the present spreader depicts the operating fulcrum of the present automatic unloading system because it decides on the order and operating frequency between the production drum and the packages of bags outcoming from the machine.

[0014] **210** Mechanical pliers provided with two flat gripping teeth, a fixed one and a movable one by means of a pneumatic actuator, mounted with a hinge on the sliding trolley and provided also with rotation, always by means of a second pneumatic cylinder.

[0015] **211** Pneumatic cylinder with sliding axis parallel to the closing direction of the pliers themselves.

[0016] **215** Linear sliding trolley anchored to the movable slide of actuator **221**.

[0017] **215/A, 215/B and 215/C** Three positions of the pliers holder trolley are indicated during the movement thereby from the gripping area **A**, in motion **B**, and rotated at stop for unloading in **C**.

[0018] **216** Cylinder for the rotation of the pliers in order to spread the package taken over the sliding plane.

[0019] **220** Transport assembly, actuator with trolley.

[0020] **221** Electric linear actuator, system with speed, acceleration and stop that can be adjusted by the user.

[0021] **222** Pneumatic actuator, raises and lowers actuator **221** with complete trolley and pliers.

[0022] **230** Sliding plane of the package of bags trans-

ported to the unloading system by the pliers **210**.

[0023] **232** U-shaped tracks on plane **230** to facilitate the lateral right-hand or left-hand unloading of the package of bags towards a possible external binding device such as e.g. a strapping tool.

[0024] **305** Vertical cylinders or actuators for completely lifting and lowering the spreader set **300**.

[0025] **310** Shaped plates or in any case opening planes of the spreader or in any case spacers of two adjacent packages of bags outcoming from the plate of the forming drum.

[0026] **312** Cylinders or actuators for the oscillation of the spreader plates **310**, oscillation with respect to the axis of the hinges **316** arranged at the lower end of **310**.

[0027] **315** Cylinders or actuators for opening/closing the two shaped plates **310** in the manner of scissors.

[0028] **316** Oscillating and opening hinge of the spreader, i.e. of the plates **310**.

[0029] **325** Cylinder or actuator for positioning the whole spreader set for the start and end loading cycle of the bags in the package of desired measurement.

[0030] **326** Hinge with spreader supports, thereon oscillating the whole set **300**, moved by cylinder 325, which positions, as mentioned, the set at packing cycle start.

[0031] **400** Indication of the general package of bags completed.

[0032] **410** Package of bags during the formation of **400** not yet completed.

[0033] **500** Machine or set for producing bags, in particular the outlet drum of the finished bags, said bag making machine with guides and supports of the bags.

[0034] **510** Outlet drum.

[0035] **511** General puller of the bags produced.

[0036] **520** Structure of machine **500**.

[0037] **550** Outlet and unloading set with wheels, plate, belts and guides for vertically stacking the bags.

[0038] **600** Mechanical feeler that contains the package of bags towards the outlet rack.

[0039] **650** Lateral extraction cylinder of the package of bags towards the strapping or binding device.

[0040] Passing now to a first examination summary of the accompanying drawings, and in particular to the meaning of the different figures therein which depict the following.

Fig. 1 - From a comprehensive view of machine **500** which produces bags of various measures, with drum **510** and the unloading system **550** to which spreader **300** was applied, which separates package **400** of bags outcoming from that under production **410** and allows the pliers **210** to accompany it with the transport to the unloading system and to a possible packing.

Fig. 2 - View of device **300** as a whole.

Fig. 3 - Views, in the orthogonal projections, again of **300** with the detail of the various functional components operating the operating movements of the spreader.

Fig. 4 - Side view of the transport system of the package of bags **400** pulled by the pliers **210** applied on the trolley of actuator **211** and perspective view of **220**.

Fig. 5 and Fig. 6 - Describe the operating steps in sequence of the automatic unloading system of the package of bags **400** operated by spreader **300** and pliers **200**.

[0041] Starting again in detail with Fig. 1, from this first assembly, the operating principle and concept of the subject of the present Patent may be traced back to, which, arranged in line with machine **500** that produces the bags (herein depicted only in the final area, i.e. at the end of the production of the bags themselves) on the unloading drum **510** where there are arranged the pliers of the drum itself which squeeze, transversely to the tubular body, the glued and closed bottom of the bag, up to the collection guides and table. As already mentioned, said machines may work with productions which reach even 800 bags per minute, unloading them continuously with a bag serving as a bookmark protruding at the end of each package, a package formed usually by a number varying between 50 and 100 pieces.

[0042] The present automatic unloading system replaces the operators who manually take the packages while binding them in different manners to tie them with elastics or strapping or automatic binding while always manually supporting the bundle.

[0043] As mentioned, said automatic unloading system consists of two sets which are complementary to each other, i.e. the first, spreader **300** dimensionally prepares the package of bags produced outcoming from the machine, generally it separates from 50 to 100 pieces thereof, holds them vertically, even if they have an increased length like the bags intended for fresh French bread, or *baguette*, also up to 70-75 cm, then once the number of pieces is reached, it "detaches" the completed package from the one being formed and therefore allows the gripping of the first by the pliers set **200** provided with the transport movement, thus causing the package to slide on a specific table **230** up to a final area where an actuator or a general transverse pusher moves it towards a binding system, as used in these processing operations.

[0044] The successive table no. 2 in Fig. 2 notes the assembly mounted in perspective view with all the actuators applied in **300** itself to provide a complete comprehensive depiction of the present set **300**, while the successive Fig. 3 shows the three fundamental graphic views, where there are noted all the actuators selected for the movements, for example of **310**, opening/closing with **315**, oscillating on **316** by means of **312** of **310**, oscillating the whole set by means of **325** and finally, raising/lowering always the whole set by means of **305**.

[0045] The shape of **310**, spreader plates or planes, which are hollowed out in the lower area, towards **316**, may also be noted, in order to allow the passage of the

gripping teeth of the pliers **210** when they grip the bottom of the complete package **400** of the bags outlet from the forming machine.

[0046] The successive Fig. 4 is dedicated to the gripping pliers **210** with the different devices and actuators which characterize it both in the gripping, **211**, and in the transport **221**, indeed, starting from the right, where the spreader can be recognized, the pliers **210** may be recognized facing upwards, **215/A**, in the specific function of gripping and seizing of **400** just formed. Then it moves towards plane **230** in position **215/B**, taking gripped with it package **400** to rotate it, spreading it out, over plane **230** itself and pulling it up to releasing it in position **215/C** of the trolley itself. It is worth noting that by pulling and dragging package **400** to rotate it, the present transport system allows also working on very long packages of bags which, as disclosed below, are carried vertically by a containment feeler, therefore by releasing them therefrom, they rest on plane **230** to be easily unloaded onto a side of the plane for either a manual but also automatic binding into bundles, as used and required in this field.

[0047] All the present description relates to the technical and mechanical structure of the two groups **300** and **200**, components and movements related to the pliers and the spreader selected for the automatic unloading system; indeed to better clarify the continuous operation, hereinafter and in Figures 5 and 6, the sequence of the operations is indicated while noting the positions taken both by the spreader with its components and the pliers with their trolley.

[0048] All steps have been indicated with the aid of Roman numerals from **I** to **XVIII**.

[0049] Step **I** shows spreader **300** towards the drum waiting for the load of bags outcoming from the bag making machine, **II** shows the pliers **210** open at the bottom and the plates **310** closed in top position, then in **III** the formation of package **400** and the plates **310** stopped up high up to the completion of **400**.

[0050] In **IV**, the plates are rotated by the cylinders **312** and rotate to contain the end of the formation of **400** and allow the start of a new package **410** continuously but separately from the preceding one, like in **V**, then the cylinders **315** spread the plates **310** as much as required to separate the bottom of the bags, position **VI**. Then in **VII** and **VIII**, while more bags continue reaching the rack of the drum, cylinder **222** is raised with the pliers **210** while **325** executes the primary rotation of spreader **300**.

[0051] In step **IX**, there is the seizing by the gripping pliers of package **400** with feeler **600** which ensures the support towards the outlet of **400** itself, therefore in **X**, **210** retracts and with the aid of **600**, the bags are sent to rotate to the right, towards the drum, as shown in **X**. Then in **XI**, the gripped pliers **210** rotate by 90° towards the drum, actuator **216**, while supporting package **400** on plane **230**, and then **310** they are closed by means of the cylinders **315** and are lowered through the movement of the cylinders **305**.

[0052] From position **V**, a new bundle **410** is being

formed which increments up to the end of step **XII**, indeed at positions **XII** and **XIII**, while the pliers move away with **400**, the lowered spreader rotates by means of **325** towards the drum and is raised again, repositioning itself behind the new package **410** in formation to begin a new cycle of separating the packages, while in **XIV** the pliers **210** continue their operation, releasing their gripping of package **400** which in **XV** is unloaded transversely by a pusher **650** to be bound or strapped here or also simply packaged outside the line for forming the various packages **400**.

[0053] At this point, **210** rotates by means of cylinder **216** (position **XVI**) and travelling plane **230** (in **XVII**), is repositioned in the "low" gripping position (in **XVIII**) with cylinder **222** and the electromechanical actuator **221**, which are arranged like in position **II**, waiting for the unloading of the bags from the bag making machine to be completed to form a package **400** and therefore resume the taking and transport cycle of this package **400**.

[0054] As said many times, these packages of bags have highly variable parameters, from the width to the length of the bag and the number in which they are packaged from 50 to 100. Therefore, this packaging system apparently resolves the problem of the long and narrow bags contained here, at the time of unloading they are pulled by feeler **600** in the high and open area of the bag and by the pliers **210** from below, by individual package **400**, towards the unloading system, while folding themselves naturally during the rotation and pulling as is clearly noted in positions **X** and **XI** of Fig. 5, moreover, said rotation of **210** occurs at 250 mm from the start of the pulling of the bags which are supported on plane **230**.

[0055] It is apparent that what is depicted and described herein notes only one possible practical, preferable but non-limiting embodiment of the present invention, which may be different for arrangements of equipment and actuators, however without departing from the conceptual scope underlying the invention.

[0056] Any reference numerals in the claims serve the sole and unique purpose of facilitating the reading in light of the description and depictions in the accompanying drawings.

Claims

1. Automatic unloading system for bag making machines (100) applied at the outlet of a rotating drum bag making machine for paper bags or bags made of paper and transparent film, provided with a complete shaping system, from die-cutting to the formation of the tubular body and of the finished bag, and provided with the outlet drum, and up to a collection system towards a detachment rack, said unloading system being made up of two sets of mechanisms complementary with respect to each other, the first set (300) called spreader, which, through a sequence of movements of two shaped planes (310)

separates the package of bags (400) just formed by the bag making machine from the following one 410 which is still being produced, the second set (200), called gripping assembly, which comprises movable mechanical pliers (210) with shaped teeth for being able to enter (310) and able to seize and take the package (400) just formed by the bag making machine and separated from (410) by the planes (310), then to perform a first movement away from the drum by one quarter of a metre and rotate the package by 90 degrees, towards the drum, pulling it to the outlet of the gripping assembly (200) itself on a sliding plane (230) by means of the glued part of the bags gripped by (210), this to enable the transverse unloading of the package (400) with respect to the sliding plane of the bags to also enable binding or strapping on machines arranged next to said plane; all the movements of separation of the spreader (300) and of gripping and rotation of the pliers (210) are obtained by means of pneumatic actuators, while a linear actuator (221) for a movement slide of pliers (210) has a motion of electromechanical origin with electronic controls.

2. Automatic unloading system according to the previous claim, **characterized in that** it includes a spreader (300) of packages of bags (400), coming continuously from bag making machines, provided with two shaped metal planes (310) able to spread apart two adjacent packages and allow for the insertion of the conjugated teeth of the pliers (210) from below to take the glued bottoms.
3. Automatic unloading system according to the previous claims, **characterized in that** it includes a spreader (300) of packages of bags (400), wherein the planes (310) can rotate simultaneously by an arc by means of an actuator (325) around the axis (326) to assume two inclinations, one for the gripping by the pliers and one of cycle start towards the production drum of the bags.
4. Automatic unloading system according to the previous claims, **characterized in that** it includes a spreader (300) of packages of bags (400), wherein the planes can open like scissors by means of actuators (315) on (316) to spread apart the end of one package and the beginning of the following one.
5. Automatic unloading system according to the previous claims, **characterized in that** it includes a spreader (300) of packages of bags (400), wherein the planes (310) can further rotate together always around (316) to vary the inclination of the open (310) and to divide the outcoming bags into two packages (400), and the beginning of the new package (410).
6. Automatic unloading system according to the previ-

ous claim, **characterized in that** it includes a spreader (300) of packages of bags (400), wherein the whole set (300) can be lifted and lowered with respect to the support plane of the package (400) with actuators (305).

7. Automatic unloading system according to claims 2 to 6, provided with a spreader able to separate the two packages of bags continuously coming out of a bag making machine for paper bags or bags made of paper and a strip of transparent film. 10
8. Automatic unloading system according to the previous claims, provided with a gripping device (210) by means of shaped teeth, which is linearly mobile with variable and adjustable speed, applied to a trolley (215) moved by an electromechanical actuator (211). 15
9. Automatic unloading system according to the previous claims, wherein the gripping pliers (210) have shaped teeth able to enter the conjugated compartments of the planes (310) to seize the package of bags (400) produced by the bag making machine from the side of the glued bottoms, by means of a closing/opening actuator (211). 20 25
10. Automatic unloading system according to the previous claims, wherein the pliers (210) can rotate by 90° on a hinge by means of the actuator (216) in order to orientate according to the unloading plane (230) the package of bags (400), seizing them from the side of the glued bottoms until unloading them onto said plane. 30 35
11. Automatic unloading system according to the previous claims, wherein the pliers (210), applied to a trolley sliding on the actuator (221), can be lifted towards the spreader (300), by means of an actuator (222), to take and pull the package (400) and then be lowered again to return under (300) for a new cycle. 40
12. Automatic unloading system according to the previous claims, provided at the outlet with a smooth sliding plane (230), for directing and support to the transverse unloading towards binding machines. 45
13. Automatic unloading system (100), according to the previous claims, able to take and move with the two complementary sets, the spreader (300) and the gripping set (200), packages of bags (400) in a variable and pre-set number, from the unloading system of a drum bag making machine for bags with folded and glued bottoms. 50 55
14. Automatic unloading system (100) according to the previous claims, able to take packages (400) of 75

cm long baguette bags.

15. Automatic unloading system (100) according to the previous claims, able to take packages (400) of bags made of paper only and bags with strips of transparent film.

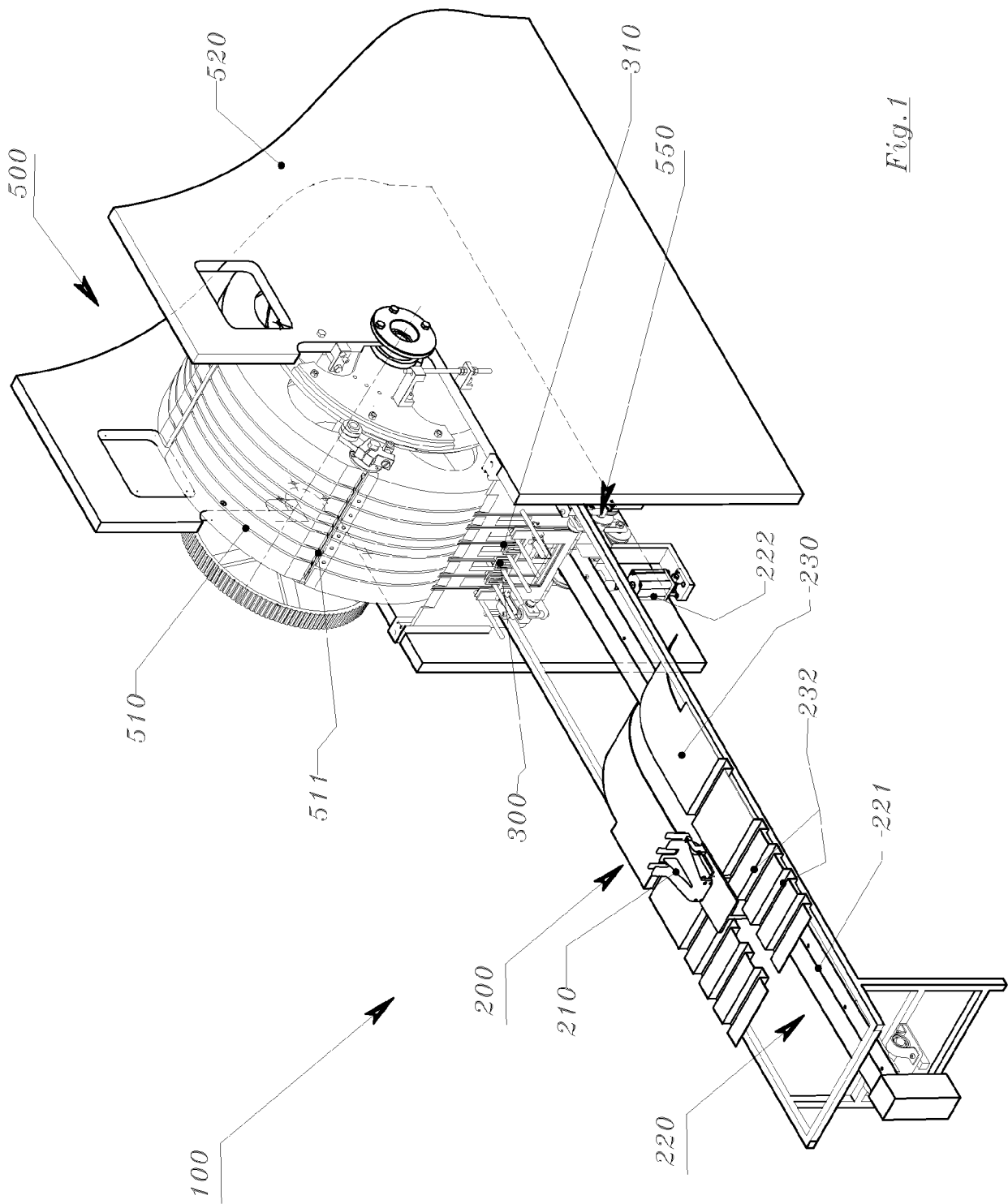


Fig. 1

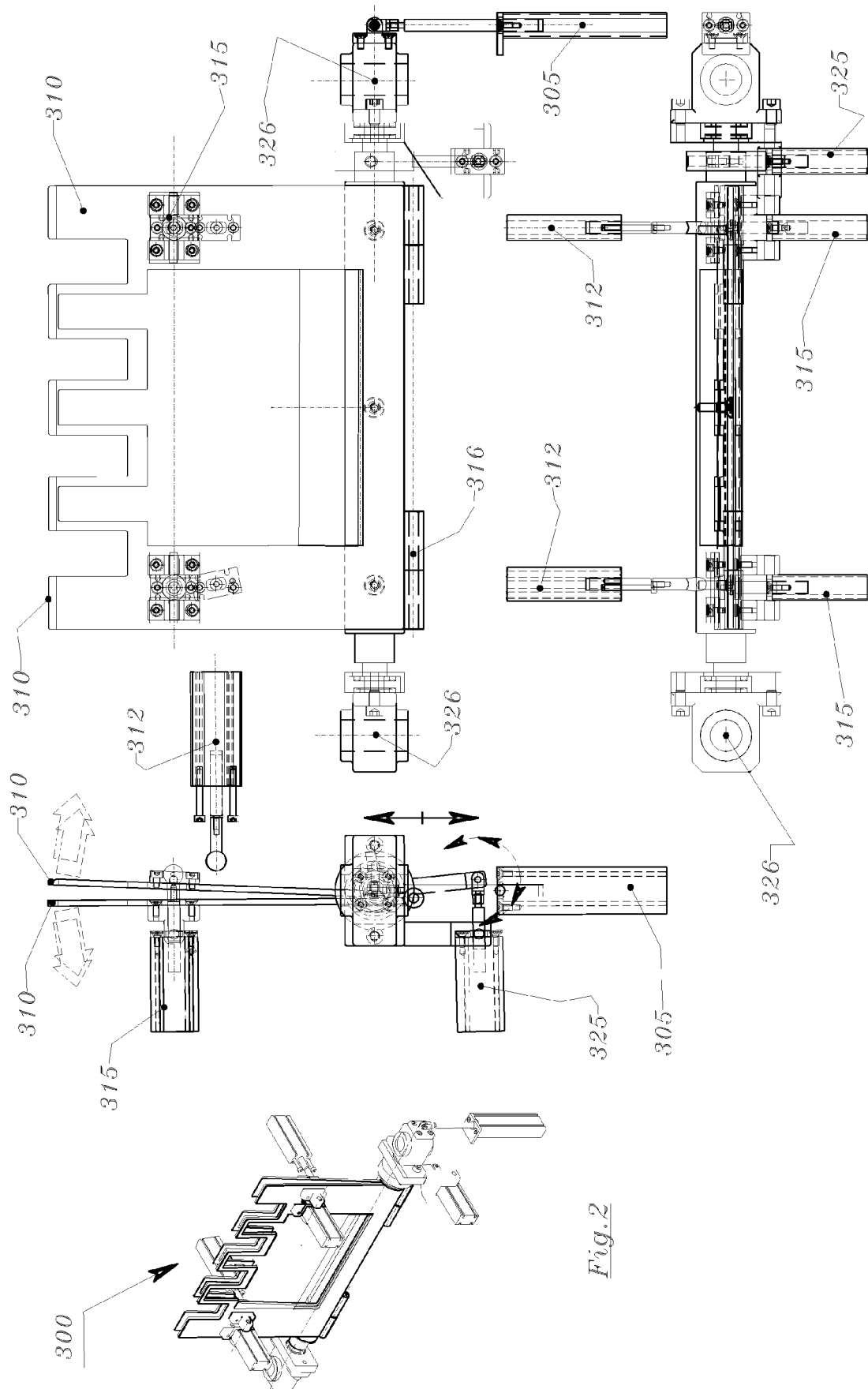


Fig. 3

Fig. 2

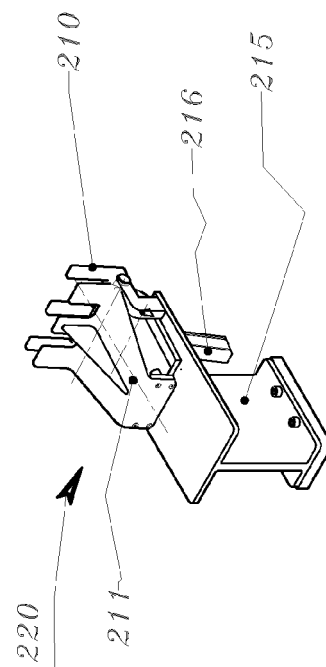
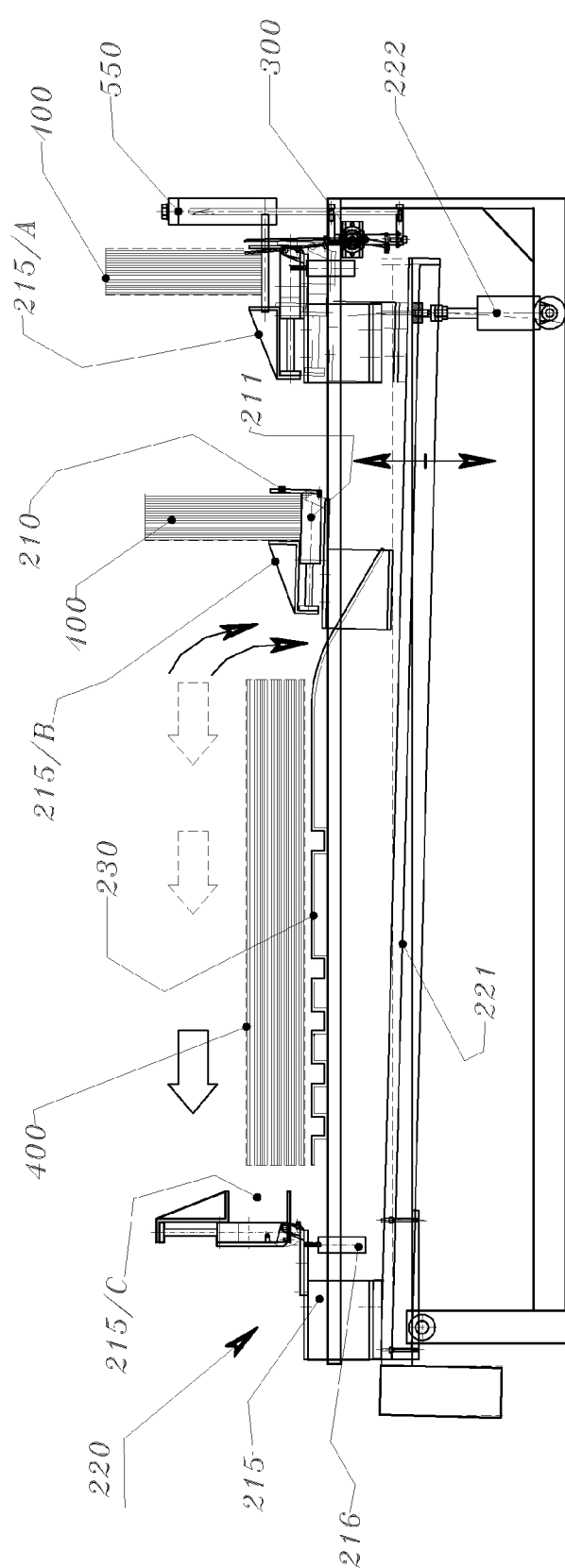


Fig. 4

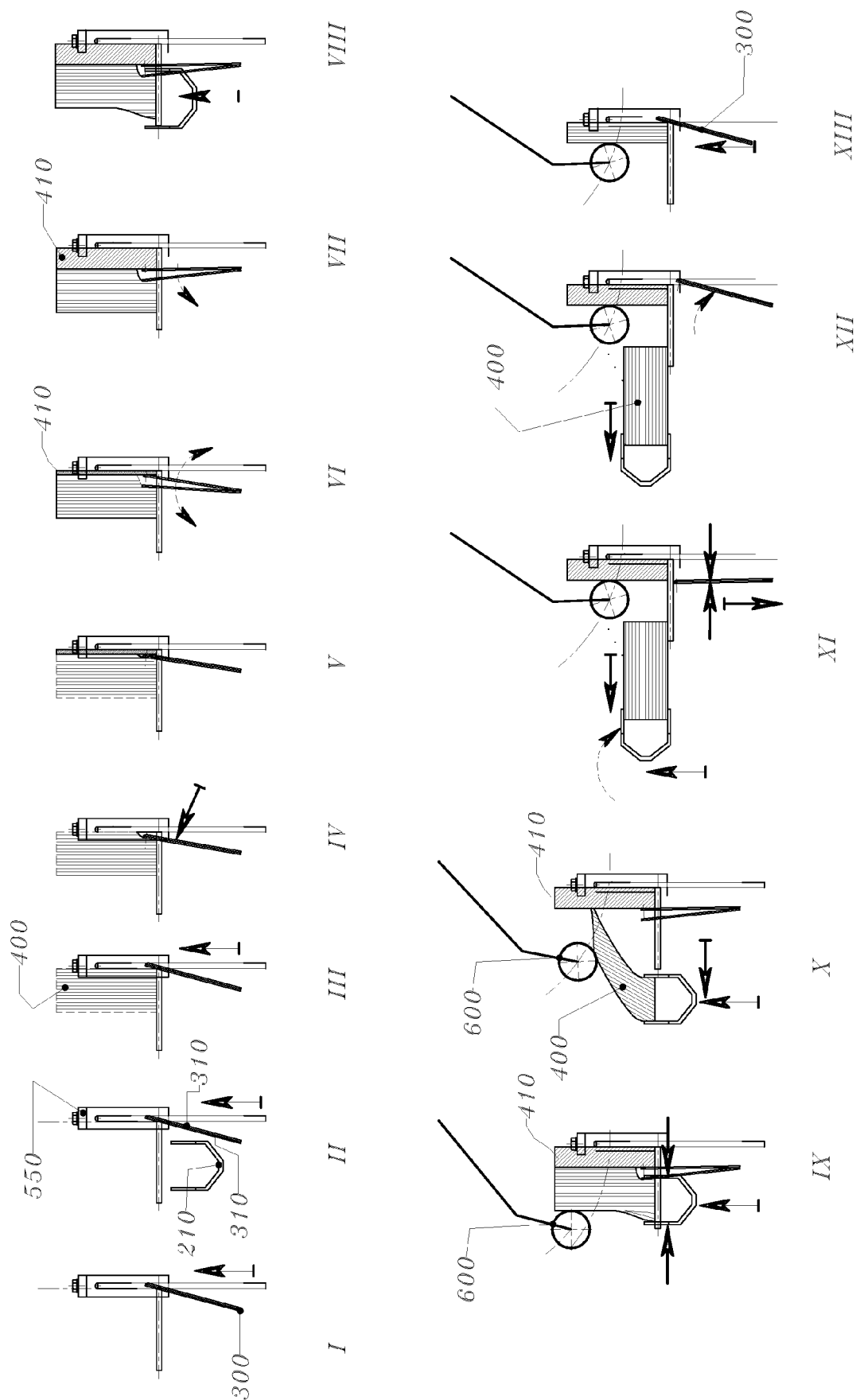


Fig. 5

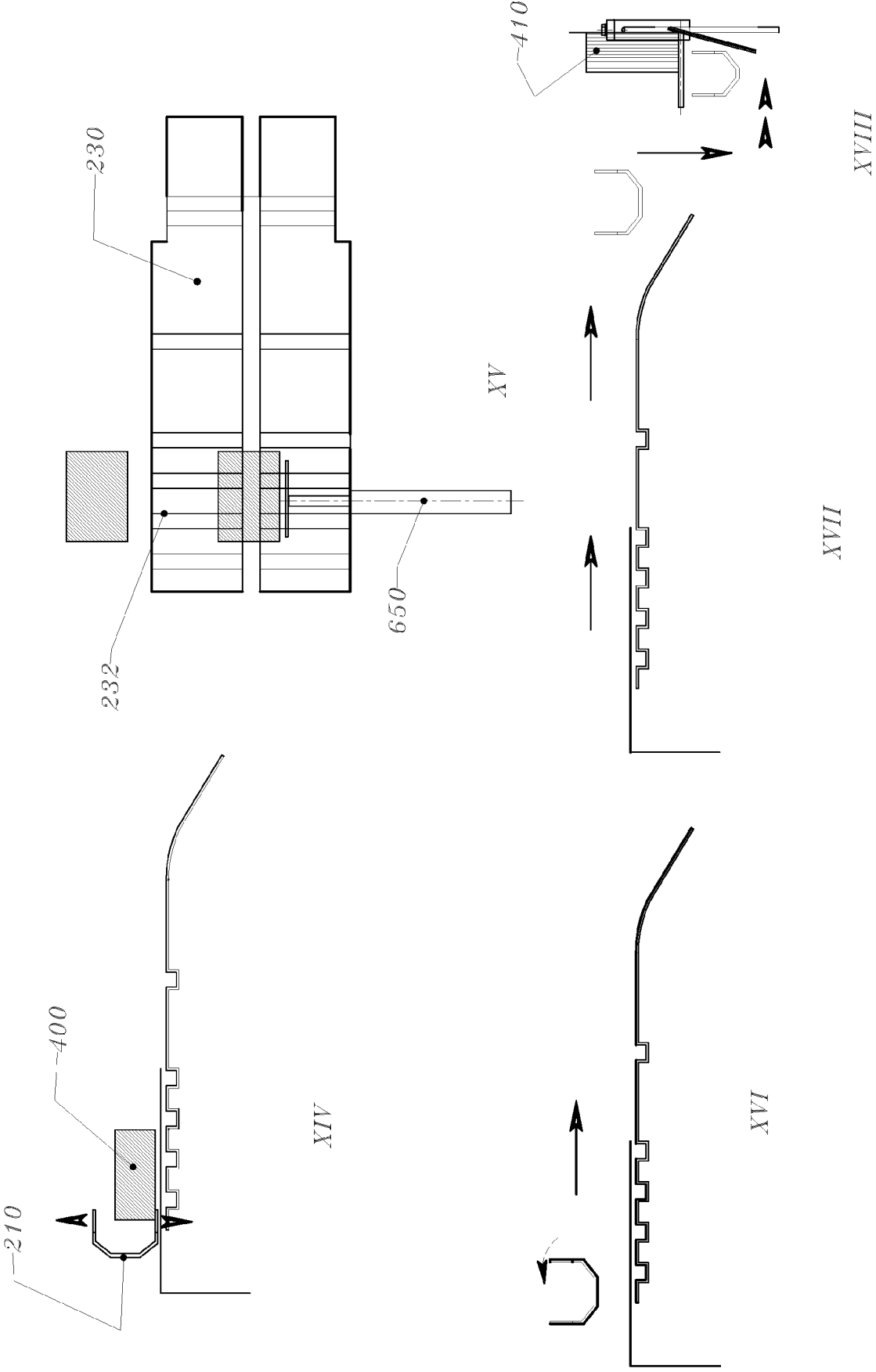


Fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 17 17 3149

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 July 2017	Examiner Lawder, M
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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