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(71) Applicant: **Lopez Velazquez, Jose Vicente**
03630 Sax, Alicante (ES)

(72) Inventor: **Lopez Velazquez, Jose Vicente**
03630 Sax, Alicante (ES)

(74) Representative: **Urizar Anasagasti, José Antonio**
Puerto Rico 6A, Bajo
28016 Madrid (ES)

(54) Method and machine for automatic packaging, transportation and delivery of strip plates and the like

(57) Packaging, transport and automatic unloading procedure and machine for packages of slats and the like that consists of a structure on which cradle arms (2) are located and which the cardboard (5) outlining (3), cutting (4), packager and package sealer (6) rest upon, which can be provided with an additional gluing system located on the upper part of the machine, a lifting section to lift and lower the already sealed package (6), a transporter, mounted on the lifting platform (22), a transport train, whose function is to move the whole machine, along with the package (6), on rails (11), along which move the wheels (10) of the different elements located on the platform of the machine, up to where the container (25) is located, and return to its initial position.

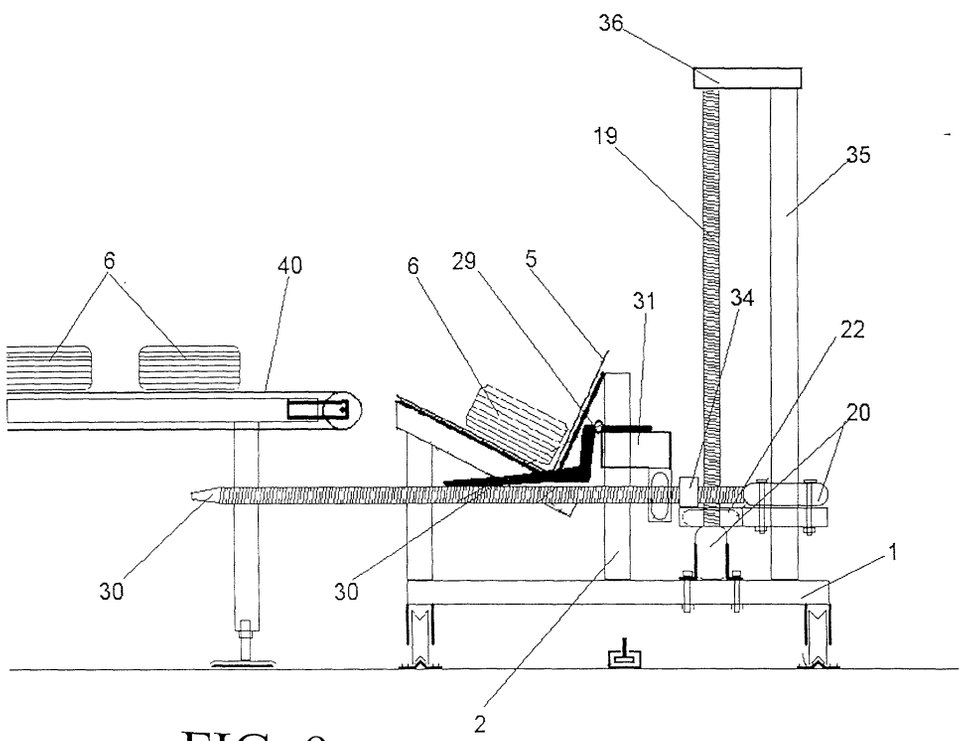

FIG. 9

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Description

Object of the invention

[0001] The present packaging, transport and unloading procedure and machine for slats and the like, object of the present invention, is based on a series of mechanisms that take the ready-made package, package it in cardboard, transport it to the chosen place and unload it, depositing it in pre-existing containers located strategically on the ground, without need for the intervention of workers, with just several buttons for controlling the apparatus, but automatically, without any physical effort.

Background of the invention

[0002] Up to the present, no mechanism nor machine that avoids the operator's effort of loading considerably large, long, narrow and thin packages, such as those of outlined slats for blinds or any other materials with the same or similar characteristics. Therefore, these tasks of packaging and slat package transporting to the (deposit or storage) container have to be carried out manually.

[0003] Due to the excessive weight of each package containing slats, which can vary between 40 and 50 Kg. each, they cause a number of physical dangers to workers, especially hernias which force workers to take sick leave for between three and four months, with the drawbacks that this leads to for both the company and the worker. Other very common consequences are backaches that the transporting of excessive weight causes.

[0004] On the other hand, with the current system for storing and transporting supposing for instance three chains, a worker for putting the slat making machine is needed, as well as at least two more workers to transport each package (one on each side), thus making it necessary to pay more attention to the packaging and transport processes than to checking the state in which the slat comes out of the production process in.

Description of the invention

[0005] With the packaging, transport and automatic unloading procedure and machine for packages of slats and the like, object of the present invention, it is expected that all of these drawbacks will be avoided or eliminated, for which this apparatus includes several sections:

- Cardboard outliner, which shapes the sheets of cardboard to facilitate packaging later.
- Cardboard cutter, which cuts the sheets of cardboard to fit once outlined.
- Package sealer, seals the cardboard package completely as soon as the product is inside it, this section being adjustable as needed.
- Transporter, which is the mechanism whose function is to move and later unload the package into the container.
- Transport train, whose function is to transport the machine over rails, together with the package to where the container is located and return to its original arrangement.

[0006] This machine consists of a cart which outlines and cuts out sheets of cardboard to an exact fit, so that later it is unloaded into a kind of cradle of the cardboard mould in which the machine (which it is associated with) deposits its final product. This product is automatically packaged by the present machine. In this situation a traction system situated at the end of the outliner makes the cardboard extend along the cradle arms, pushing it to the desired fit, regulated by a sensor, and activates the cutting mechanism. The stretch of the base on which the corresponding cardboard outliner and cutter sections, can be divided from the rest of the base of the machine in order to facilitate its transport, although it will still hold all of its parts. On the other hand, the cardboard outliner section, which includes a motor that moves a cart with a blade for cutting the cardboard, can be modified so that there are two blades crossways to the cardboard, of equal or longer length than the width of the same. The blade located on the bottom part of the cardboard is fixed and the top one is activated by pneumatic cylinders that on descending cut the cardboard, and also by the action of other small blades activated by the same pneumatic mechanism they make other cuts in order to facilitate the packaging of the ends of the package.

[0007] The cutting section also has a turning pin that makes the cardboard advance, before and after passing through the cutting blades. In this way the supply of cardboard is not interrupted after each cut.

[0008] In its package sealing section, glue can be applied by way of small drums located on the cradle arms in order to seal the ends of the package, although the machine also includes a glue supply assembly located on the upper part of the machine in order to pressure apply thermoplastic glue to the cardboard flaps of the packages. The main components of this machine are the following:

- Glue cart: This cart has a platform that takes the whole glue assembly, together with a set of pneumatic arms and which slides on rails along the whole package to be glued by the action of a motor that moves said platform.
- Drum system: It includes a deposit of thermoplastic glue and an electrical resistance that warms the glue until it is liquid, as well as pressurising it.
- Heating hose: The hot glue that circulates inside it is maintained in liquid state due to the thermal energy transmitted to it by an electrical resistance.

This hose connects the warming assembly to the glue gun.

- Glue gun, this gun operates by pneumatic action and is capable of expulsing thermoplastic glue to a distance of several centimeters, pulsating or continuously.

- Set of pneumatic cylinders, which undergo two movements, the first lowers the glue gun to locate it near the cardboard flap to be glued, and the second moves this assembly forwards and backwards, this last movement being achieved when the cart is in the appropriate position for gluing the flaps of the ends of the package.

- Set of cylinders and pneumatic arms that wrap the packet in cardboard pressing and folding all of its flaps.

- Photoelectric sensors with reflectors and end points, which are responsible for applying the glue on the necessary areas and automate the whole assembly.

[0009] The transport system can consist of threaded pins pushed by a motor or by a series of high powered pneumatic cylinders that bring about both horizontal movement of the platform and unloading the package lifter. The location where the package has to be unloaded within the container is determined by capacitive sensors situated on the bottom of the package lifter. The bottom of the platform which holds both the headstock and the package lifter includes dovetail guides, so that the whole assembly slides smoothly.

[0010] The machine of the invention can store packages in a container, and it can also store them in several containers. In the latter case they should be put in lengthways, following the line of the first. When the machine detects that the first container is full, it automatically directs itself towards the second one, and so forth. This multiple storage gives the machine much greater autonomy.

[0011] The machine can wrap packages proceeding from a single slat producing machine. A variation of this machine facilitates wrapping packages proceeding from several slat producing machines. The necessary extensions for this variation of the wrapping machine to work with two slat producing machines situated in parallel are the following:

- Two sets of rails are to be mounted fixed to the floor having the initially planned length plus the length that allows the machine to completely bypass the position of the package container.
- In the area where the machine bypasses the position of the package containers, a set of crossways rails are laid out which join the two sets of lengthways rails.
- Each wrapping line includes its own cardboard outlining and cutting section, and also its own container situated in the same place as the original machine.
- The transport train that moves the machine along the rails changes, so that it has a motor that makes the lengthways motor wheels turn and another one that moves the crossways motor rails, without need for the motor that was used in the past with its rack-and-pinion drive.
- It has a hydraulic system for lowering crossways motor wheels, lifting the machine to facilitate changing from the lengthways to the crossways rails.

[0012] The last cradle arm can also move to modify its position. In this way the machine can wrap packages of different lengths, for which the positioning system consists of a set of two threaded pins that by twisting transmitted from one pin to the other by way of pulleys and a notched belt, the arm moves; one of the threaded pins holds a steering wheel for manual use.

[0013] The machine is totally automatic, and the functioning sequence of all of its sections is controlled by a programmable automaton. The control panel also includes a selector with two positions: manual / automatic. With the selector in manual position, the machine can be run step by step, when the selector is in automatic position, the automaton takes command of all of the operations of the machine.

[0014] Since the machine moves in order to carry out its work, in other words, it is mobile, except the cardboard outliner and cutter sections, all of the wiring and input tubes whether electrical, pneumatic, hydraulic or of any other kind, travel through the inside of articulated conducts of plastic material, which carry said conductors in movement.

[0015] In all of the activation motors of this machine, whenever necessary, the speed is controlled with frequency changers, as occurs with the motor that moves the tail equipment cart.

[0016] Starting from when said package has been sealed, the machine moves along rails while elevating the package in order to avoid the arms that containers used for storing and transporting this merchandise usually have. Upon arriving at the height of the container, the machine with a transport system that situates the package in the centre of the container lowers until, by way of a pass photocell, it detects the location of the last package stored, or otherwise to the bottom of the container and unloads said package into it, after which the machine returns to the position for new packaging and totally automatic transport.

[0017] As can be seen from its functioning, this machine only needs one operator in charge of controlling the system, all other weighty tasks being carried out by the machine, so that considerable physical effort is avoided, gaining in work related health, comfort, etc., while this operator is able to examine the recently fin-

ished product that has been manufactured, thus facilitating greater quality control for these products, and longer shifts since the tasks done at work are much less strenuous.

Description of the drawings

[0018] In order to provide an improved understanding of this description and as an integral part of the same, a series of figures are attached in which, as non-limiting illustrations, the following is represented:

[0019] Figure 1.- Schematic overview of the base (1) on which all of the sections are assembled.

[0020] Figure 2.-Schematic view of the cradle arms.

[0021] Figure 3.- Schematic view of the container arms of the roll of cardboard and of the barrier of outlining pins of the cardboard outlining section.

[0022] Figure 4.- Cardboard profiling and cutting sections, excluding the cardboard roll sustainer arms, seen from above.

[0023] Figure 5.- Plan view of the cardboard cutting section.

[0024] Figure 6.- Schematic view of the package lifting section.

[0025] Figure 7.- Schematic view of the transporter section situated on the package lifting platform.

[0026] Figure 8.- Packaging and package lifting section, profile view.

[0027] Figure 9.-Package mover and depositor section, profile view.

[0028] Figure 10.- Package mover and depositor section, profile view, with the lifting section in elevated position.

[0029] Figure 11.- Overall back view of the whole machine in elevated position.

[0030] Figure 12.- View of figure 11 in position lowered over container.

[0031] Figure 13.- Schematic profile view where the transport section is seen in elevated position and the cart at the end of the threaded pin on which it circulates.

[0032] Figure 14.- Schematic profile view of figure 13 in lowered position.

[0033] Figure 15.- Schematic profile view of figure 14 in cart position at the end of the pin where the package is deposited.

[0034] Figure 16.- Profile view of the machine, once the package has been wrapped, with the transport section in higher position and the translation cylinder (46) totally contracted, or in other words, in rest position. The main components that can be observed are the following: base (1), cradle arm (2), package (6), threaded rod (19), container (25), hinge (29), lengthways packaging cylinders (27), package pick-up fork (30), backing bar (35), lateral packaging cylinders (43), headstock (44), platform (45), translation cylinder (46) of the package pick-up fork (30), package unloading cylinder (47), lifting platform (22), capacitive sensor (49), glue cart (50).

[0035] Figure 17.- Profile view of the machine, once the package has been wrapped, with the transport section in raised position and the translation cylinder (46) totally extended. The main components that can be observed are the following: base (1), cradle arms (2), package (6), threaded rod (19), container (25), hinge (29), lateral packaging cylinder (43), package pick-up fork (30), package unloading cylinder (47), lifting platform (22), capacitive sensor (49), glue cart (50).

[0036] Figure 18.- Profile view of a section of the machine, once the package has been wrapped (6), with the transporting section in raised position, and the translation cylinder (46) and the package unloading cylinder (47) totally extended, at the moment when the package is being unloaded. The main components that can be observed are the following: base (1), cradle arm (2), threaded rod (19), container (25), hinge (29), lateral packaging cylinders (43), headstock (44), platform (45), translation cylinder (46) of the package pick-up fork (30), package (6) unloading cylinder (47), raising platform (22), capacitive sensor (49), glue cart (50).

[0037] Figure 19.- Enlarged view of the glue cart (50), in which its main components are seen: glue deposit (51), heating hose (52), glue gun (53), vertical movement cylinder (54), horizontal movement cylinder (55), both of which are for the glue gun (53).

[0038] Figure 20A.- Plan view of the packaging machine, in which the following components are seen: base (1), cradle arm (2), backing bar (35), glue cart (50), movement motor (56) for the glue cart (50).

[0039] Figure 20B.- Enlarged view of the structure of the gluing machine, in which can be seen the glue cart (50), the movement motor (56) of the glue cart (50), the chain (57) and the pinion (48).

[0040] Figure 21A.- Profile view of the position adjuster of the last mobile cradle arm (59), in which can be seen the cradle arm (2), the metal support (60), the base (1), the fixed bolts (62), the cardboard sensor (63), the bearings (64), the notched belt (65) and the movement pins (66).

[0041] Figure 21B.- Plan view of the mobile cradle arm (59), in which can be seen the lateral packaging cylinders (43), and the fixed bolts (62).

[0042] Figure 22.- Plan view of the whole slat manufacturing and wrapping assembly, in which can be seen the slat producing machines (67), the outlining section (3), the cutting section (4), the conveyer belts (68), the packaging machine (69), the lengthways rails (70), the crossways rails (71) and the initial, unwrapped product (72).

Preferred embodiments of the invention

Embodiment 1

[0043] As can be seen in the attached figures, in the first place, a base (1) can be seen, preferably made of metal, for mounting the different sections of the machine onto, on which are resting a number of cradle arms (2),

as well as the cardboard (5) outlining (3) and cutting sections (4); said arms (2) have the function of being used as a cradle in which the packaging of the packages (6) is carried out more comfortably after the cardboard has been outlined and cut out. The cardboard outlining section (3) carries a number of preferably nylon rollers (7), with regulators for adapting the cardboard fold. This roller (7) barrier is mounted on a slanted structure (9) from the exit of the cardboard roll to before the start of the cutting section (4); so that these rollers facilitate moulding.

[0044] The roll of cardboard (5) is situated held in an axis resting on two arms (8), of adjustable height depending on the type and size of the roll, which also include a brake. And all of this outlining (3) and cutting (4) section is assembled on the base (1), which in turn rests on wheels (10), which roll along guides or rails (11). Along from the outlining section (3), the cutting section is arranged (4), being made up of a motor (12) that transmits the movement of a threaded rod (13), crossways to the cardboard (5), this rod including a cutting cart (14) with fixed bolts (15) as screws and a blade (16), with end stoppers (17) on each end controlling the edges of the cart movements, and aiding this movement with a rod (18) that prevents the cutting cart (14) from spinning, where the cardboard cutter incorporates nearby several rollers, some lower or underneath and others upper or on top of the outlined cardboard (5) in order to facilitate the work of the cutting cart (14).

[0045] Another section of this machine is the packaging section, which has the function, once the moulded cardboard (5) is in the cradle arms (2) and the package of slats (6) is inserted, this section, by way of a set of horseshoe arms (26) moved by corresponding pistons (27) and including a drum or glue deposit (28) for application on the sides or flaps of the cardboard in order for these ends to stay joined together to create a package wrap (6). Likewise, these arms (26), pistons (27), and glue drums (28) are arranged so that they obtain the creation of this total wrapping of the package, that is, both lengthways and on the sides of the same.

[0046] The lifting section picks up the package (6) of the cradle arms (2), and essentially consists of several threaded metal rods (19), transmissions (20) with incorporated reduction gears, that are connected to a motor (21) which transmits movement to them, also including a lifting platform (22) that moves vertically as an effect of the bolts (23) or nuts that it includes. This lifting section adds, in turn, to the assembly a means for detecting the presence of packages (6) such as a photocell (24), which marks by way of a barrier of infrared lights that cross through the container (25) that is being filled at the time, detecting the last package (6) deposited or continues descending to the lowest position.

[0047] Another section of the present machine is the movement section, which is mounted on the lifting platform, and has horizontal action rather than vertical, whose function is to move the packet (6) from where it is resting to over the centre of the container (25), and in the second place has the function of a depositary on this. This section includes, as well as the threaded rods (19), angled transmissions (20) similar to those used in the lifting section (30), collecting cart (31) and movement rods (32) with lowered tips (33) and at a slant, these rods (32) being joined to the lifting platform (22) by way of the angled transmissions (20) and by anchored bearings (34). In the same way, in order to better hold and support this section a backing bar (35) is included to hold the rod (19) at its upper end by way of a bearing and a connection and holding part (36) thus preventing swinging or a larger turning radius than corresponds to this pin.

[0048] This machine also includes a transporting section, which has the function of moving the whole machine along rails (11) on which the wheels (10) of the different elements situated on the platform of the machine move, which carry a built-in motor gear (37) that fits into a rack or the like (38) affixed to the ground, the movements of which are controlled by their respective end points.

[0049] The cradle arms (2) form an angle of preferably 90° with the metal structure, whose measurements vary in function of the product to be packaged and transported; they include if necessary on the upper part some small nylon rollers (39) so that the product slides better and does not suffer any damage from the corners of the structure. The frame of the cardboard (5) outlining section, thanks to the roller regulators (7), adapt the fold of the cardboard produced by said rollers, pushing the cardboard by appropriate machines by the action of a drawing-out motor; these rollers mould it until, for example, it achieves a fold in the middle of the cardboard so that an angle is made in which the packaging of the product is made easier.

[0050] The outlining section (3) ends in rollers that are activated by any means, such as a motor, which extend the cardboard (5) along the cradle arms (2) without any need for human intervention. For this purpose, the rollers push the edges of the cardboard towards the cradle arms, which include plates (41) as guides that prevent the edges of the outlined cardboard from banging into the arms, since this would interfere with said function. At the end of this section there is a stopper device, made up of a length regulator, a threaded rod, a steering wheel and with a photoelectric sensor located on the pin, so that, depending on how the steering wheel is turned, the sensor moves forward or back, lengthening or shortening, respectively, the length of the already cut cardboard (5). This sensor is situated on a cradle arm, specifically the last one.

[0051] The package (6) container (25) includes on the rear of its side, a catadioptric panel on which a barrier of infrared beams sent out by the photocell (24) of the lifting section are reflected, these beams crossing through the container that is being filled, while the beams are not interrupted, the lifting section descends

to its lowest position in order to deposit the package (6) it is carrying, but when the beams are interrupted by an previously deposited package, the cell makes the descending movement of the lifter and begins unloading the package onto the previous one.

[0052] The pick-up fork (30) consists of a part that picks up the already wrapped package (6) from the cradle arms (2). When the transporter situates the package in the centre of the container (25), after the lifter has lowered to the ideal height, the forks (30) approach the tip of the rod (32) lead by the cart (31), that thanks to the slant on this tip (33), the tip is inclined with the forward movement and due to the weight of the package (6) it is carrying, until this package is deposited in the container (25); for the stage of returning to the initial position, the cart (31) starts its route in the opposite direction, the fork being freed from the effect of the tip (33), as well as the hinge (29) with the recuperation springs return this apparatus to its original position.

[0053] The pick-up cart (31) is preferably a threaded rod, similar to those of the lifting platform (19), with the particularity of including metal support bases that hold hinges (29) and, therefore, the pick-up forks (30), the cart (31) moving in the same way when the threaded rods (32) turn, which are held to the lifting platform (22) by transmissions at 90° (20) with reduction gear, as well as the bearings (34) affixed to the lifting platform.

[0054] On the other hand, the sealers of the packaging section are arranged to the left or right of the cradle arms (2), affixed to the base (1). For example, the arms (26) that seal the ends of the package (6), consist of two pistons (27) and two drums (28) for each end of the package, of adaptable length. The movement of the arms (26) moved by the pistons (27) is used to inject the glue ration into one of the cardboard flaps (5), it is instantly dried sealing the package (6), this adhesive substance being the one which best meets these demands.

[0055] Its application and functioning is very simple, the management of which can be carried out by way of two systems one manual, and the other automatic; in the manual mode, the operator works the machine from a control panel that said machine includes and a ledge on which the operator stands so that they do not have to move along beside it when it goes down the rails. In the automatic mode, on the other hand, the operator only has to push a button when everything is ready and the machine carries out its functions. Or when the machine unloads the package (6) on the cradle arms (2) the process begins.

[0056] Once the slats are manufactured, piles of them are generally moved on a conveyer belt (40) that takes them to the cradle arms (2). Before this, depending on the shape and size of the packages to be formed (6), the cardboard (5) is unrolled from its roll held by the cardboard container arms (8) and it is sent through the outlining section (3), in which the rollers (7), as the cardboard advances, and strategically positioned for the specific shape, mould and create folds in the cardboard (5), which reaches the cutting section (4). The machine, after stretching the already outlined cardboard situated on the cutter, is activated so that the motor (12) acts on the threaded rod (13) which provokes the movement of the cutting cart (14) along its axis, which, as it carries the blade (16), cuts the cardboard to the desired measure during this movement. The turning of the cart (14) is prevented by the action of the bolts (15) affixed to the cart and the rod (18) that maintains the cart on the same level.

[0057] In order to determine the size of the cardboard, the steering wheel of the stretching section is used, which moves the sensor located on the pin situated adjacent to the steering wheel, specifying the point at which once the cardboard (5) arrives, it obstructs the beams sent out by the sensor and stops the stretching motor (42). In order to facilitate this step, the cradle arm (2) carries sheeting (41) on its sides that guides the cardboard so that it does not collide with the arm.

[0058] This measure of already cut cardboard (5) is deposited on the cradles (2) to await having a package of slats (6) put on top of it, proceeding from the machine. Then one of the packages is deposited, which can be helped by a roller (39) as it passes to the cradle from the belt (40). In this situation the packaging system is activated, where the arms (26) moved by the corresponding pistons (27), are articulated provoking the closing of the cardboard around the package (6), during whose closing the drums (28) inject a quantity of adhesive on the corners and joining flaps of the cardboard, the fast drying of which creates a wrapping for said package that will be deposited on the bottom of these cradle arms (2) by gravity. By this time, the pick-up forks (30) are just underneath these packages.

[0059] Then the lifting platform (22) goes up to the shifting section together with the package (6) deposited on its forks (30) up to a height slightly over the highest point of the container (25). Meanwhile, when the threaded rods (32) of the shifting section have passed the height of the cradle arms (2), this section will situate the transporter cart (31), by the turning of the rods (32), to the intermediate point.

[0060] Once the lifting section has raised the sealed package (6) and the shifting section has located the cart (31) at the intermediate point, the transporter section situates the machine on the rails (11) parallel to the container (25) of packages. For this purpose, the ENGRANE (37) fixed to the structure with the rack (38) affixed to the floor is activated, these gears being what sets the structure and the machine in movement along the rail (11) to the desired position parallel to the container.

[0061] In this position, the lifting section starts the descent until the photocell (24) detects the first level of packages, or if there were no package (6) it would be stopped at zero level (this is the lowest level that the lifting section can reach). For this descent the pins (19) are made to turn in an inverse direction. During this

stage, the shifting section locates the transporter cart (31), which contains the pick-up forks (30) and the package on top (figure 13), at a point where the cart is in a position to descend freeing the arms of the container (25). With the machine parallel to the container and the cart (31) situated at the intermediate point in the container, it starts to descend until the photocell detects the first level of packages (6).

[0062] Finally, the transporter cart (31) is located nearer to the end of the threaded rod (32), and since this rod has a slanted tip (33), as it approaches the end of the pick-up forks (30), by the action of gravity and the hinge (29) mechanism that it includes, it is inclined until the package (6) is gently unloaded into the bottom of the container (25) or if there should be more packages in the container, it would rest on top of them. Therefore, the care with which the package is put down also depends on the inclination of the slant on the tip (33) of the rods (32).

[0063] After carrying out this task the machine returns through each of its stages until reaching its initial position that would be parallel to the conveyer belt (40) of the slat producing machine, prepared to transport another package (6).

Embodiment 2

[0064] In this preferred embodiment, the package sealing section and the transporter section have modified in configuration and functioning with respect to embodiment 1. Embodiment 2 will be described below only in the aforementioned parts that are modified with respect to Embodiment 1, therefore without repeating what refers to the cardboard outlining and cutting section, which remain unchanged.

[0065] When the packaging process starts, depending on the length of the package (6), the position of the mobile cradle arm (59) that holds it must be modified first, by action of the steering wheel (58) that turns the shifting rods (66) resting on the bearings (64), by way of the notched belt (65). The assembly of all of these parts is mounted on the base (1). In this figure the penultimate cradle arm (2) can also be observed.

[0066] The package sealing section (6) includes additional gluing equipment, that as well as being able to apply glue by way of drums located on the cradle arms (2) in order to seal the flaps of the package (6), also includes a glue cart (50) located on the upper part of the machine in order to apply the thermoplastic glue to the flaps of the cardboard of the packages (6). This glue cart (50) that moves to apply the glue along the flap of the package (6) is activated by the shifting motor (56) the chain (57) and the pinion (48).

[0067] The glue cart (50) includes a glue deposit (51) connected to an isothermal heating hose (52) that by means of an electrical resistance supplies thermoplastic glue in liquid form to a glue gun (53) with pneumatic action capable of expulsing thermoplastic glue several centimetres by pulsation or continuously.

The glue gun (53) is situated in its exact application position due to a vertical shifting cylinder (54) and a horizontal shifting cylinder (55).

A set of photoelectric sensors and end points are responsible for the glue being applied in the appropriate places and automate the whole assembly.

Once the glue application process is finished, the set of lengthways packaging cylinders (27) and the set of lateral packaging cylinders (43) are activated, which wrap the package (6) pressing and folding all of the flaps of the cardboard covering (5).

[0068] Once the package has been wrapped (6), the shifting section starts up, which by means of the motorised system of the threaded rod (19), lifts the lifting platform (22) to its maximum height. Later, the machine moves to the container (25) position. Once the machine is in unloading position, the translation cylinder (46) of the package pick-up fork (30) is activated, which shifts the package (6) until it comes to an appropriate place determined by the capacitive sensor (49), with the objective of the container (25) being correctly filled and making the most of its volume. At that moment the package pick-up fork (30) articulated by the hinge (29), turns, pushed by the package (6) unloading cylinder (47), unloading the package (6) in the optimum place within the container (25).

[0069] Once the process has finalised, the machine returns to its initial position.

[0070] The variation of the packaging machine (69) that facilitates working for several slats producing machines (67), can be seen schematically in Figure 22, in which are noteworthy the lengthways rails (70) and the crossways rails (71) along which the packaging machine (69) travels. The outlining section (3) and the cutting section (4) of each of the packaging machines (69), the conveyer belts (68) and the initial unwrapped product (72) can also be seen in this figure.

[0071] All of the movements of the packaging machine are controlled by a programmable automaton, which, by means of a computer program, determines the working sequence of all of its sections and the working time for each one of them.

[0072] Having sufficiently described the nature of the present invention, as well as a practical embodiment of it, it only needs to be added that it is susceptible to modifications in its shape as well as the materials and implementation, as long as they do not substantially affect the characteristics that are claimed below:

Claims

1. Packaging, transport and automatic package unloading machine for packages of slats and similar, specifically for narrow, long and products with low thickness, for packaging in cardboard, **characterised in that** it consists of a preferably metal base

(1), for mounting different sections of the machine onto, on which rest a series of cradle arms (2), on which rests the package (6), thus facilitating its wrapping, where the machine includes the following sections:

- Cardboard (5) outliner (3), which shapes the sheets of cardboard in order to facilitate packaging later where the roll of cardboard (5) is arranged held on an axis resting on arms (8) of adjustable height, which also include brakes; the whole outlining (3) and cutting (4) structure being mounted on the base (1), which, in turn, rests on wheels (10), that roll on guides or tracks (11).
- Cardboard stretching section.
- Cardboard cutter (4), which cuts the measured out sheets of cardboard once they are outlined.
- Packager and package sealer (6), with the function of packaging and sealing the package with cardboard completely as soon as the product is inside it, once the cardboard (5) has been moulded in the cradle arms (2) and the package of slats (6), deposited in it.
- Lifter, responsible for lifting and lowering the sealed package (6).
- Transporter, that is mounted on the lifting platform, and has horizontal action instead of vertical, whose function is to shift the package (6) from where it is resting to over the centre of the container (25), and in the second place has the function of depositing it in the container.

Transport train, or transport section, which is responsible for moving the whole machine together with the package (6) along rails (6), along which travel the wheels (10) of the different container parts (25) and returning to its original position.

2. Machine according to the first claim, **characterised in that** the cardboard (5) outlining section (5) includes several means with regulators in order to adjust the fold of the cardboard.

3. Machine according to the previous claim, **characterised in that** these means consist of rollers (7) arranged so that some work above the cardboard and others, below it.

4. Machine according to the previous claim, **characterised in that** these rollers (7) are mounted on a slanted structure (9) from the outlet of the roll of cardboard up to before reaching the cutting section (4).

5. Machine according to the previous claim, **characterised in that** at the end of these rollers (7) of the outlining section (3), the stretching section is arranged, which consists of rollers activated by a motor (42) and a length regulator that stretch the cardboard.

6. Machine according to the previous claim, **characterised in that** the length regulator includes a photoelectric sensor located on a threaded rod and a steering wheel.

7. Machine according to the previous claim, **characterised in that** the steering wheel is located on the end of the threaded rod, through which the rod is made to turn, moving the photoelectric sensor.

8. Machine according to the previous claim, **characterised in that** the photoelectric sensor is located on the last one of the cradle arms (2).

9. Machine according to the previous claim, **characterised in that** the cradle arm (2) includes a guide sheet (41) on which the cardboard rests while being moved.

10. Machine according to the previous claim, **characterised in that** the cutting section (4) consists of a motor (12) that transmits movement to a threaded pin (13), crossways to the cardboard (5), and the pin includes a cutting cart (14); controlling the ends during the movement of the cart by way of two end points (17).

11. Machine according to the previous claim, **characterised in that** the cutting section includes means to prevent the cart from turning (14).

12. Machine according to the previous claim, **characterised in that** these means consist of a pin (18) and also thanks to the action of the bolts (15) affixed to the cart that prevent the cutting cart (14) from turning around and maintain the cart on the same level, and where the cardboard cutter (4) includes near to it several rollers, some lower or underneath and another upper or over the outlined cardboard (5), in order to facilitate the work of the cutting cart (14).

13. Machine according to the previous claim, **characterised in that** the packaging and sealing section consists of horseshoe arms (26), moved by corresponding pistons (27), also including a glue drum or deposit (28) that apply a quantity of adhesive on the edges or flaps of the cardboard (5) in order that these edges should be joined by folding to create a wrap for the package (6), both lengthways as well as along its sides.

14. Machine according to the previous claim, **characterised in that** the sealers of the packaging section

are situated to the left or to the right of the cradle arms (2).

15. Machine according to the previous claim, **characterised in that** the lifting section picks up the package (6) from the cradle arms (2) and essentially consists of several threaded rods (19), transmissions (20) with incorporated reduction gear, which are connected to a motor (21) that transmits movement to them, it also includes a lifting platform (22) that moves vertically thanks to the effect of the bolts (23) or nuts.

16. Machine according to the previous claim **characterised in that** this lifting section adds package (6) detection means to the assembly.

17. Machine according to the previous claim, **characterised in that** the package detection means (6) consists of a photocell (24) which checks, by way of a beam of infrared lights that cross through the container (25) that is being filled at the time, to detect the last package (6) deposited or continues its descent to the lowest position.

18. Machine according to the previous claim, **characterised in that** the transporter section includes, as well as the threaded rods (19), angled transmissions (20) similar to those used in the lifting section, another motor (21), hinges (29) with pick-up fork (30) recovery springs, a collecting cart (31) and shifting pins (32).

19. Machine according to the previous claim, **characterised in that** the free end of the rod (32) shapes the tip (33) with a downward slant, with an inclination in this slant by which the package (6) is deposited.

20. Machine according to the previous claim, **characterised in that** these rods (32) are joined to the lifting platform (22) by way of angled transmissions (20) and anchored bolts (34).

21. Machine according to the previous claim, **characterised in that** for holding and supporting this shifting section it includes a backing bar (35) that holds the rod (19) at its top end by way of a bearing and a connection and fastening part (36).

22. Machine according to the previous claim, **characterised in that** the transporting section includes as a built-in part of its structure a motor gear (37) that fits into a rack or similar (38) affixed to the floor, whose movements are controlled by corresponding end points.

23. Procedure for packaging, transport and automatic unloading of packages of slats and the like, **characterised in that** the cardboard (5) unrolls from its roll held by the cardboard container arms (8) and is sent to the outlining section (3) in which the means (7), as the cardboard advances, mould and create folds in the cardboard (5), which reaches the cutting section (4) of the stretching section after proceeding to stretch the outlined cardboard situated on the cutter, this is activated so that the motor (12) acts on the threaded rod (13) which provokes the movement of the cutting cart (14) along its axis, which, as it carries the blade (16), during this movement cuts the cardboard to the desired size, this measure of cut cardboard (5) is deposited on the cradles (2) to await a package of slat (6) to be put on top of it, proceeding from the machine by way of the conveyer belt (40), then one of these packages is deposited, which can be aided by a roller (39) as it passes to the cradle from the belt (40); once in this situation the packaging system is activated, where the arms (36) moved by the corresponding pistons (27), are articulated to make the cardboard close around the package (6), during the closing of which the drums (28) inject a quantity of adhesive on the corners and joining flaps of the cardboard which, by its rapid drying, creates a wrapping for said package, which will be deposited in the bottom of these cradle arms (2) by gravity, the pick-up forks (30) being just below these packages and raising the lifting platform (22) together with the package (6) to the shifting section, depositing on its forks (30) to a height slightly above the highest point of the container (25); so that when the threaded rods (32) of the shifting section have reached to above the height of the cradle arms (2), this section situates the shifting cart (31), by turning the rods (32), at the mid-point, then the transport section locates the machine, on the rails (11), parallel to the container (25) of packages. For this purpose the gear (37) affixed to the structure with the rack (38) affixed to the floor is activated, this gear provoking the movement of the structure and of the machine along the rail (11) to the desired position parallel to the container, while the lifting section starts the descent until the photocell (24) detects the first level of packages, or if there should be no packages (6) it would stop at zero level, where the rods (19) are turned in reverse direction for this descent; at this stage the shifting section locates the shifting cart (31), which contains the pick-up forks (30) and the package on them, in a position so that the cart is situated ready to lower, freeing the container arms (25). With the machine parallel to the container and the cart (31) located at the mid-point of the container, it starts to lower until the photocell detects the first level of packages (6) and the transporter cart (31) situates itself nearer to the end of the threaded rod (32); as it moves towards the slant-tipped end (33), the pick-up forks (30), by the action

of gravity and the hinge (29) mechanism it includes, starts to incline itself until the package (6) is gently unloaded into the bottom of the container (25) or if there were more packages in the container, it would be placed on top of them.

24. Machine according to claim 20, **characterised in that**, after carrying out this action the machine returns through each one of its stages until it reaches its initial position, which is parallel to the conveyer belt (40) of the slats manufacturing machine, prepared to transport another package (6).

25. Packaging, transport and automatic package unloading machine for packages of slats and the like, according to claim 1, **characterised in that** the shifting section consists of the following components:

- A lifting platform (22) that by way of the threaded rod (19) motorised system lifts it to its maximum height.
- A translation cylinder (46) for the package pick-up forks (30).
- A package (6) unloading cylinder (47).
- A capacitive sensor (49) of empty spaces in the container (25), incorporated into the package pick-up fork (30).

26. Packaging, transport and automatic package unloading machine for packages of slats and the like according to claim 1, **characterised in that** the package sealing section (6) includes an additional mobile gluing assembly for the lengthwise flaps of the packages (6) consisting of the following components:

- A gluing cart (50).
- A glue deposit (51).
- A heating hose (52).
- A glue applying gun (53).
- Photoelectric position detectors and end points.
- A vertical moving cylinder (54) for the glue applying gun (53).
- A horizontal moving cylinder (55) for the glue applying gun (53).
- A movement motor (56) for the glue cart (50).
- A chain (57) and some pinions (48).
- A frequency changer for the movement motor (56).

27. Packaging, transport and automatic package unloading machine for packages of slats and the like according to the previous claims, **characterised in that** it includes a translation system composed of lengthways rails (70) and crossways rails (71), in order to wrap packages (6) proceeding from several slats producing machines (67).

28. Packaging, transport and automatic package unloading machine for packages of slats and the like according to the previous claims, **characterised in that** it includes a system for process and timing control by way of a programmable automaton.

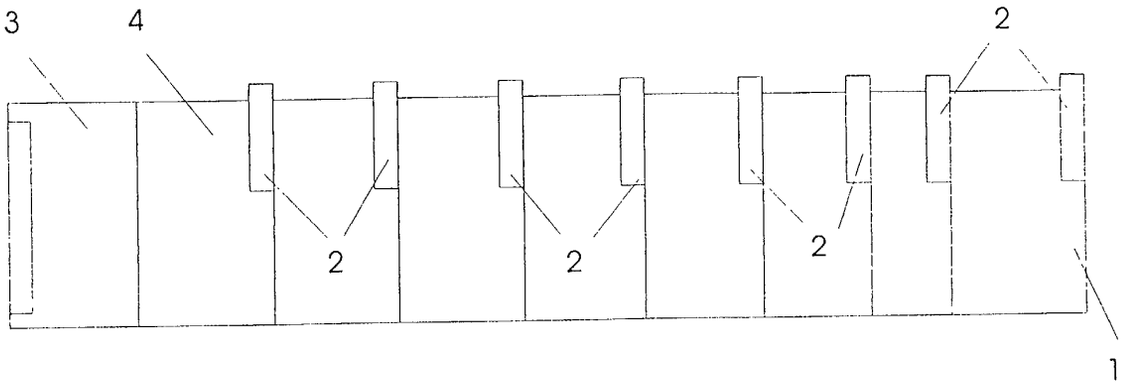


FIG. 1

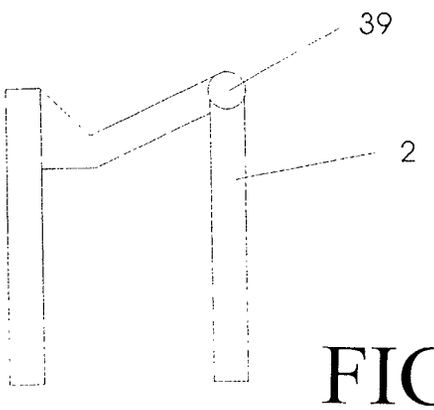


FIG. 2

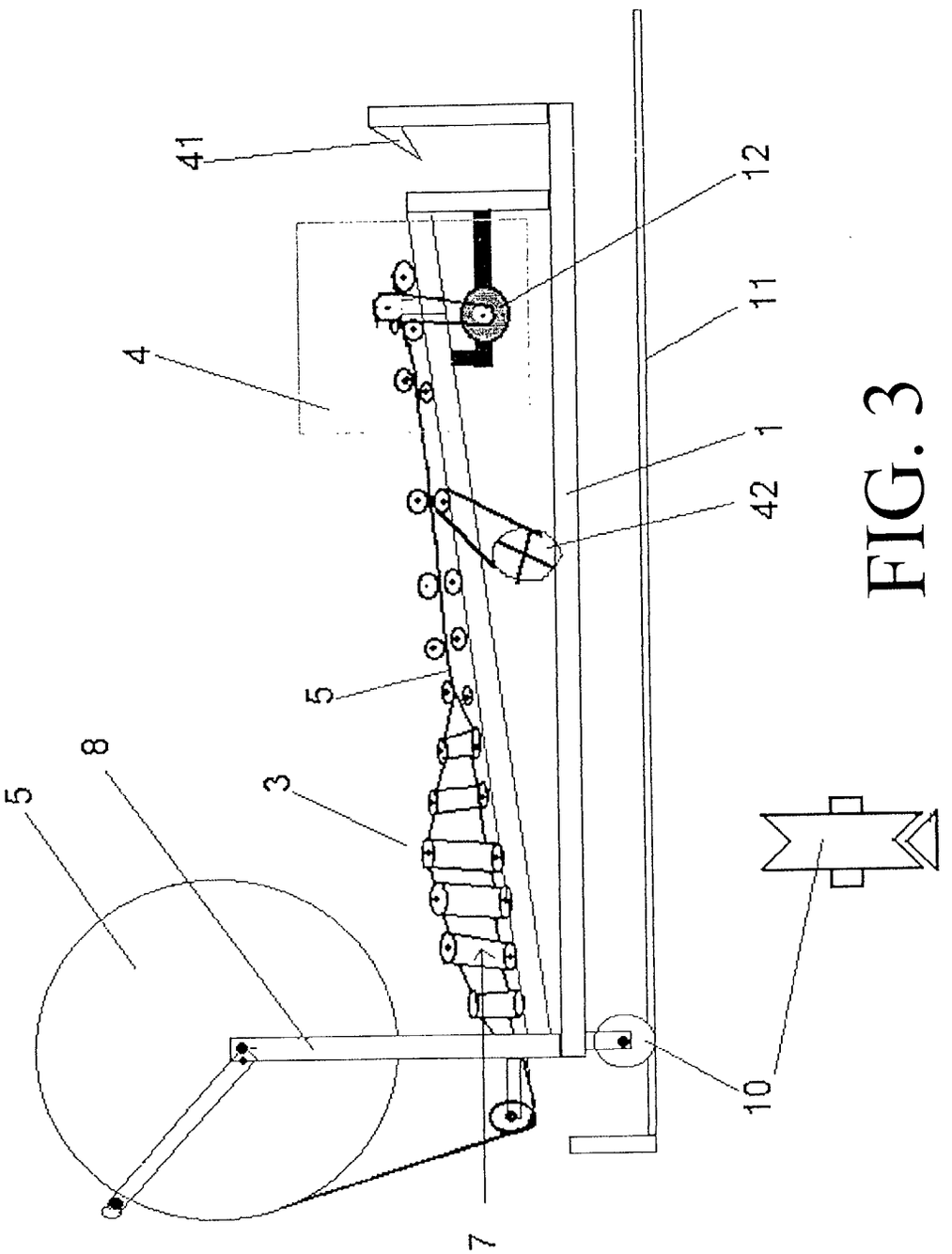


FIG. 3

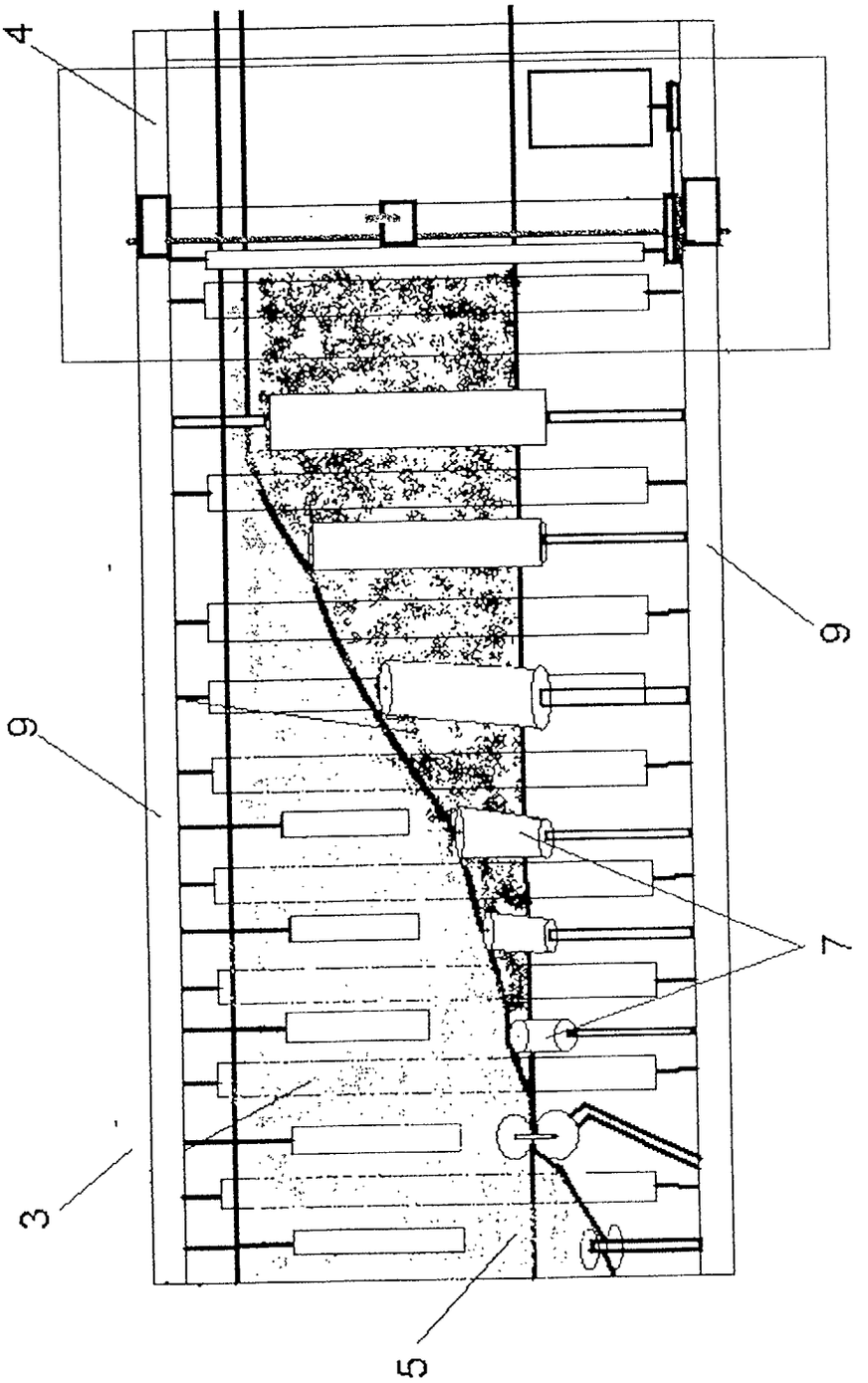


FIG. 4

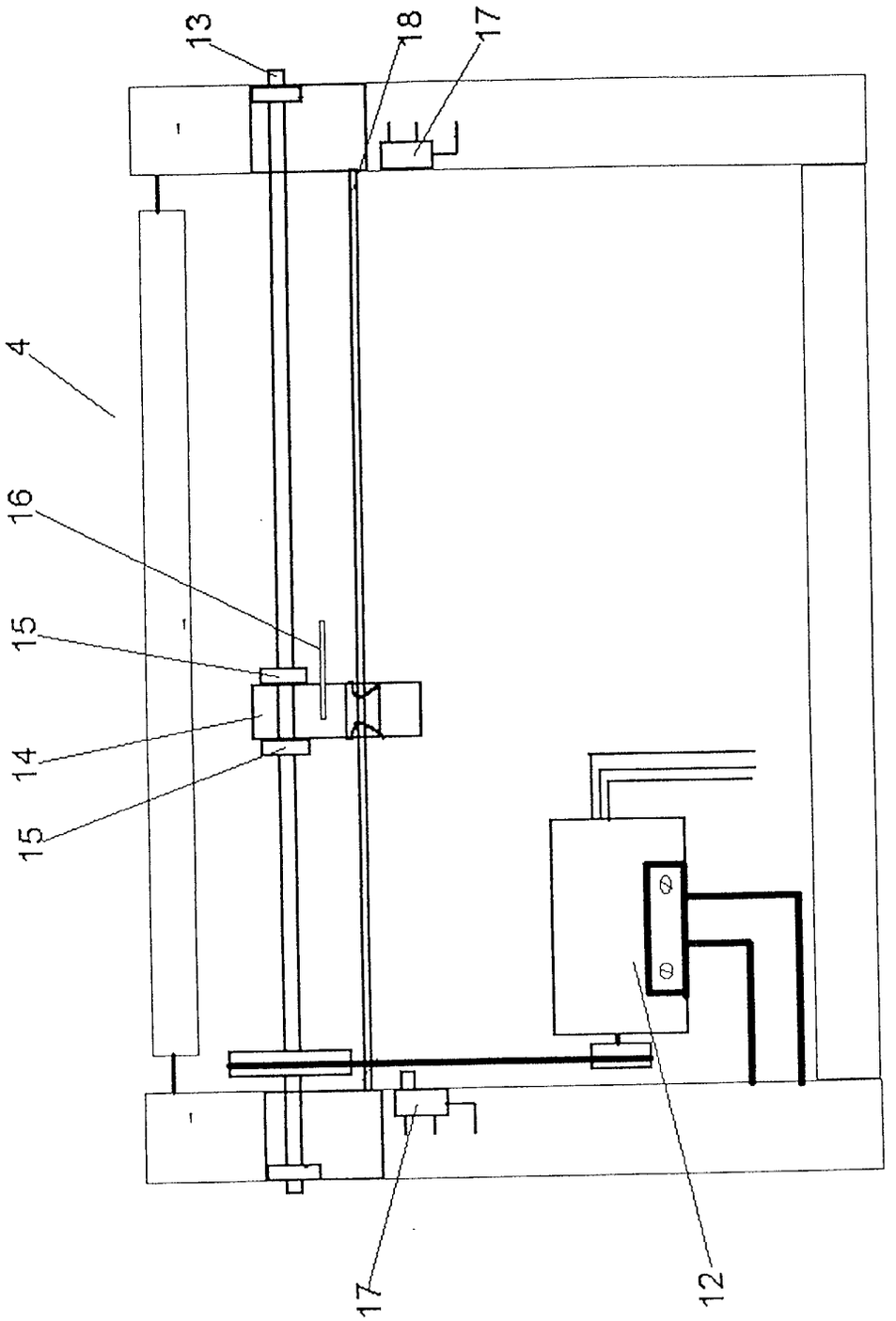


FIG. 5

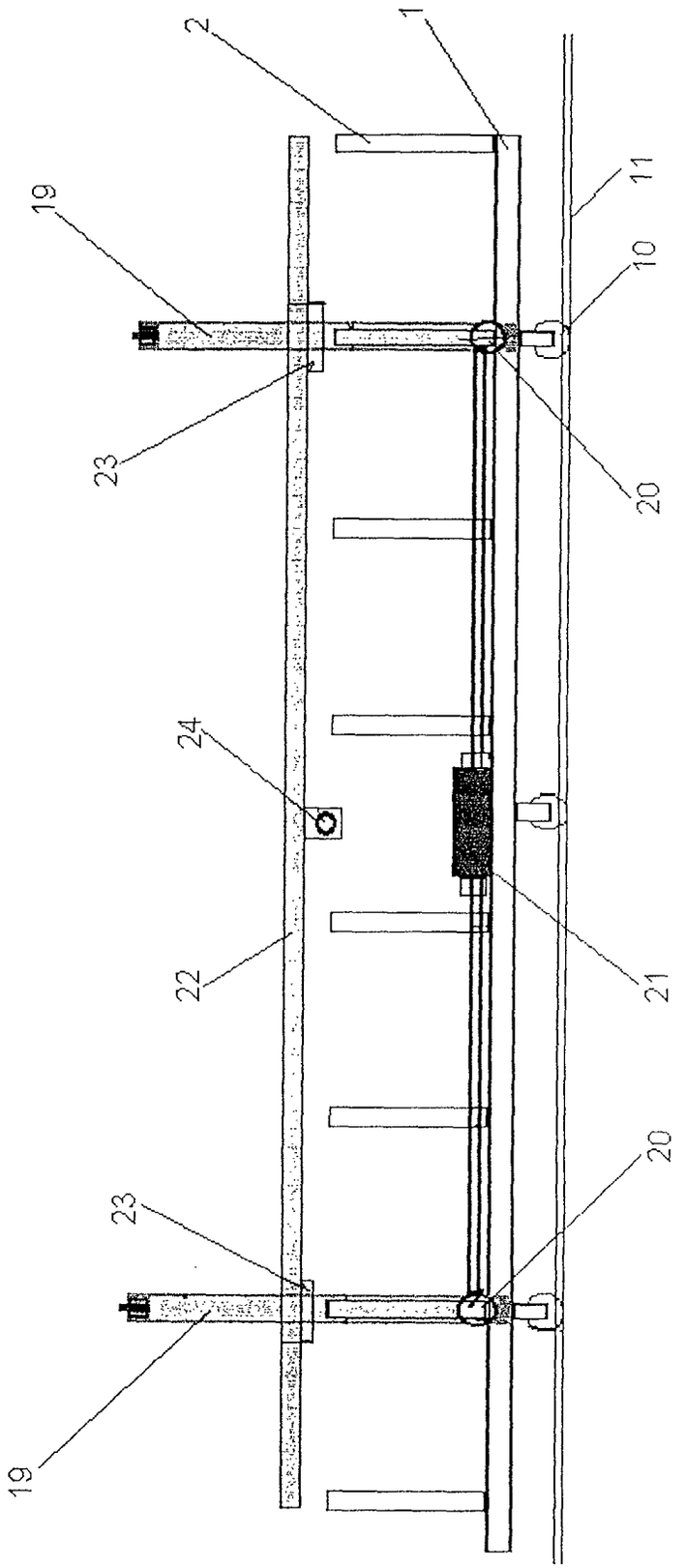


FIG. 6

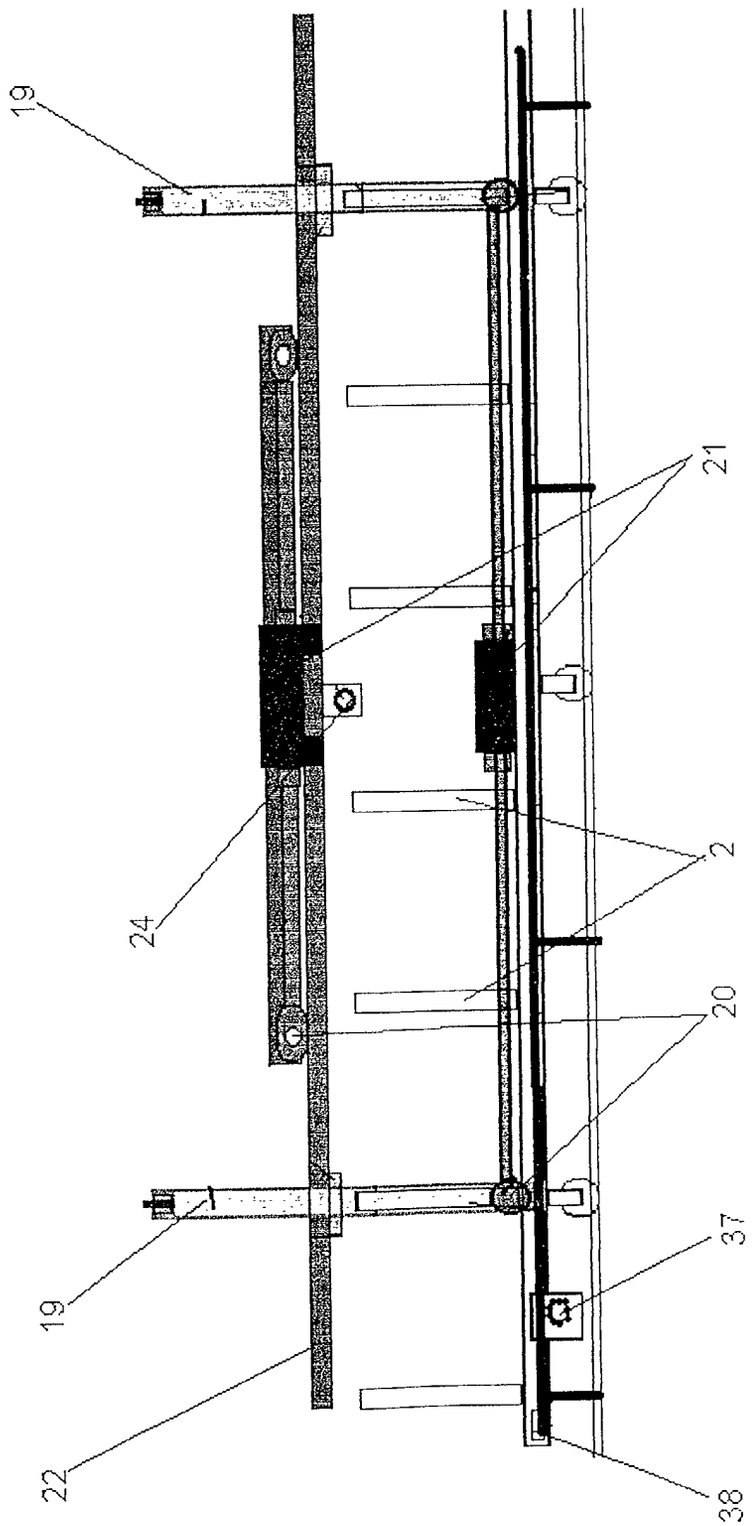


FIG. 7

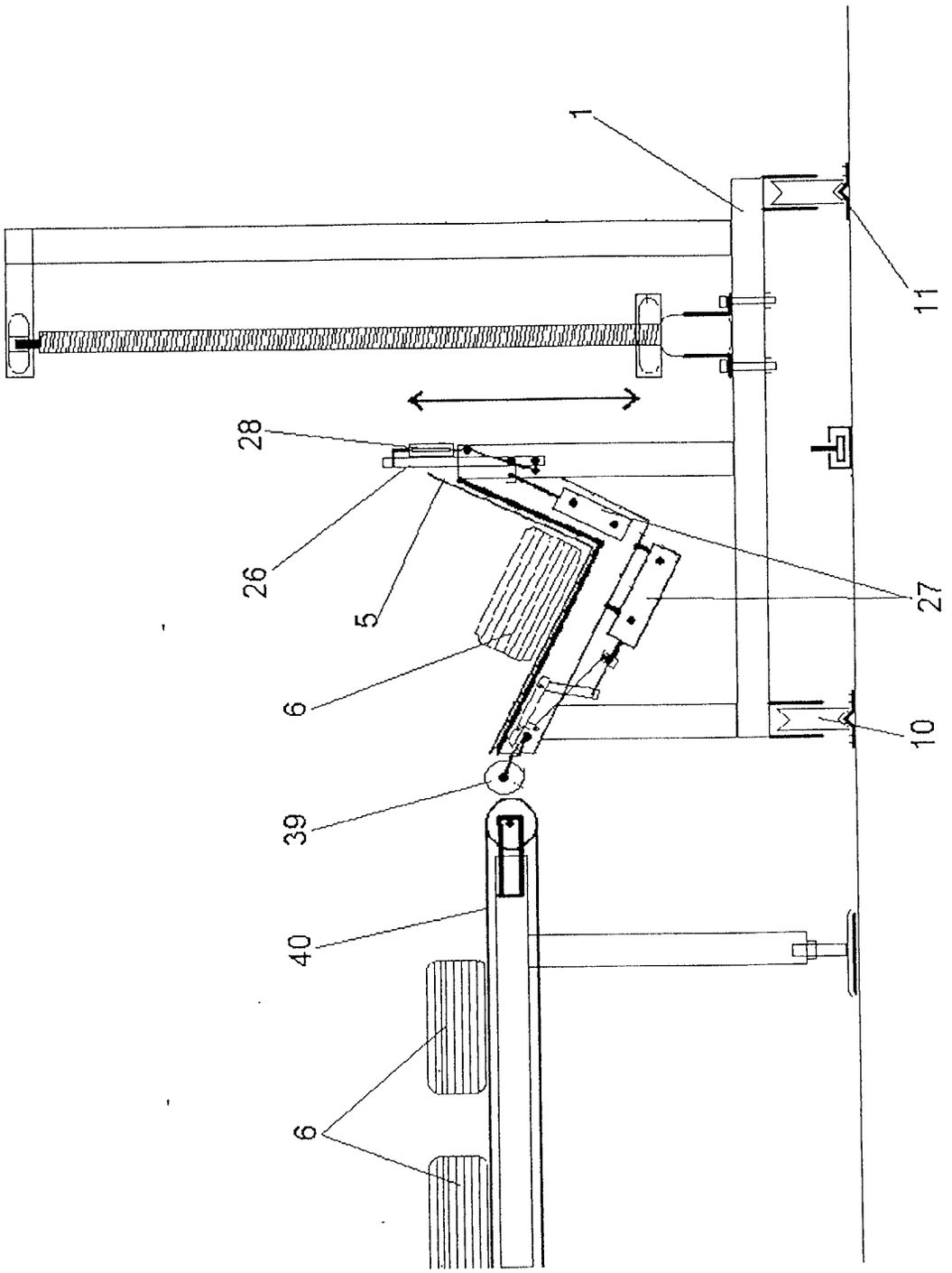


FIG. 8

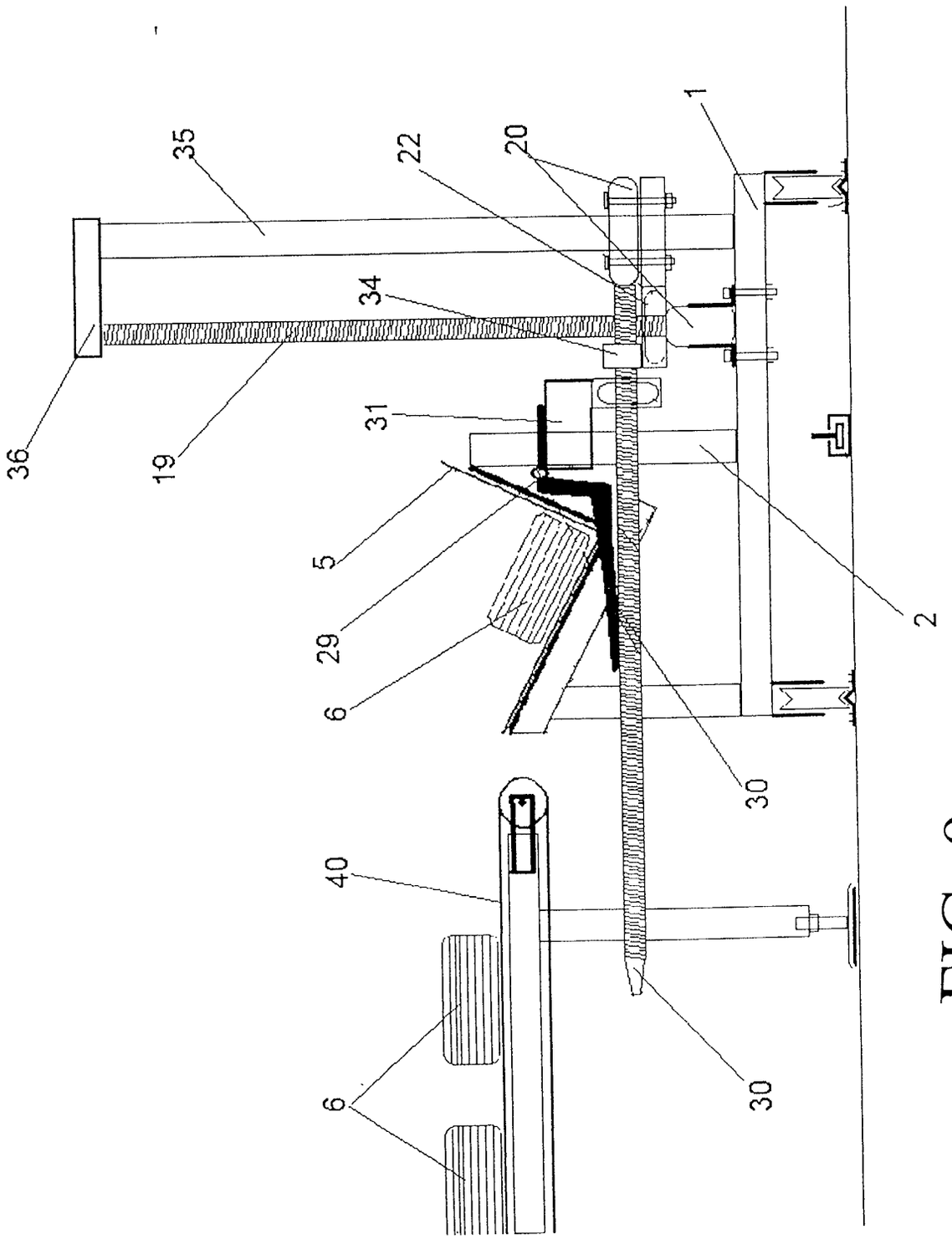


FIG. 9

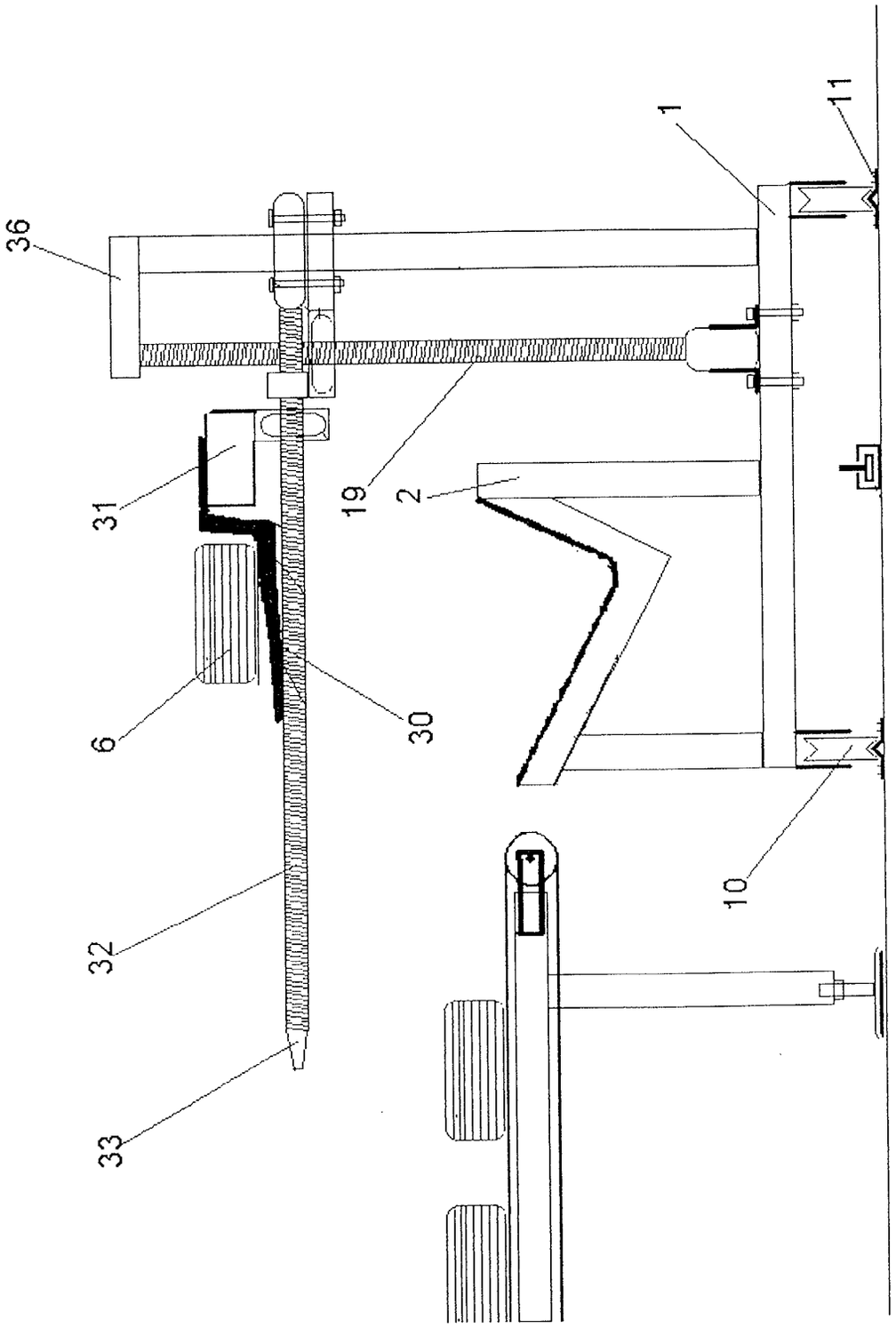


FIG. 10

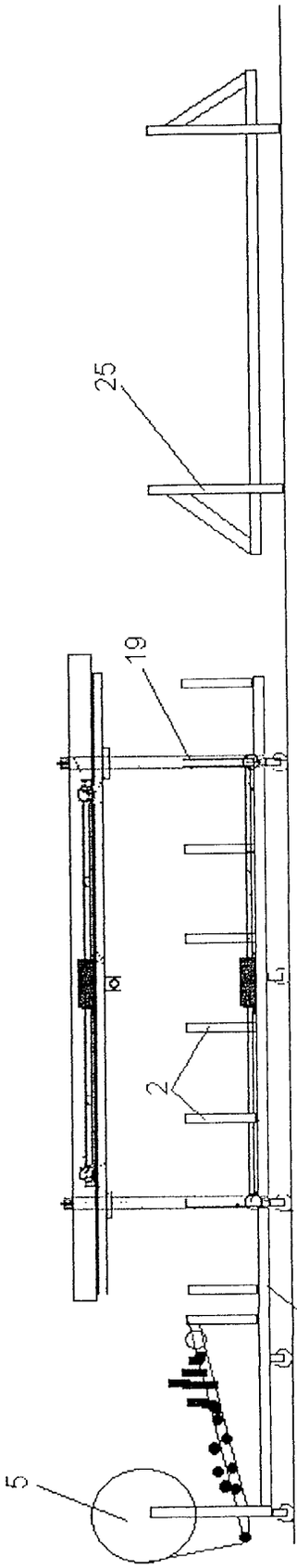


FIG. 11

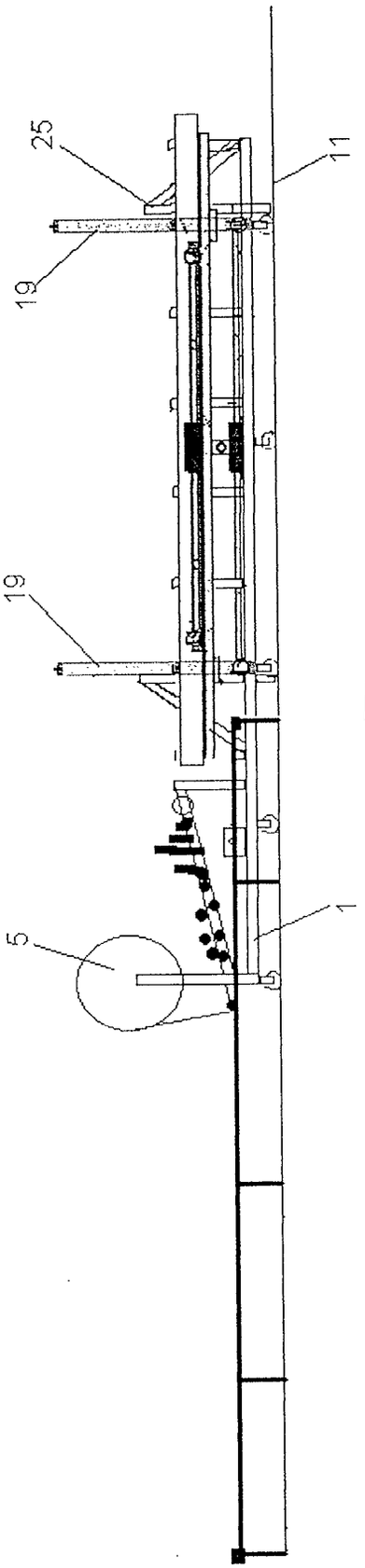


FIG. 12

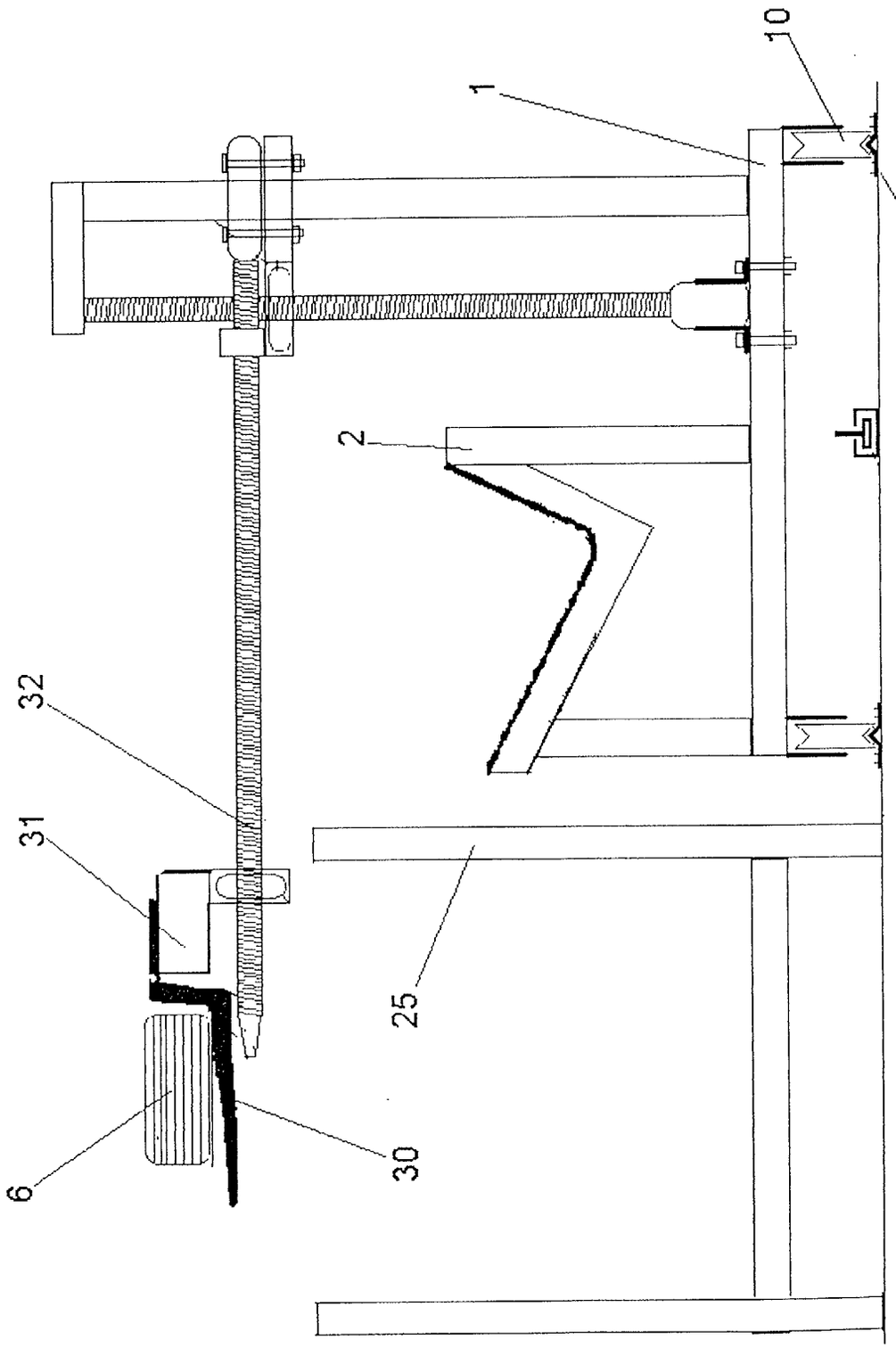


FIG. 13

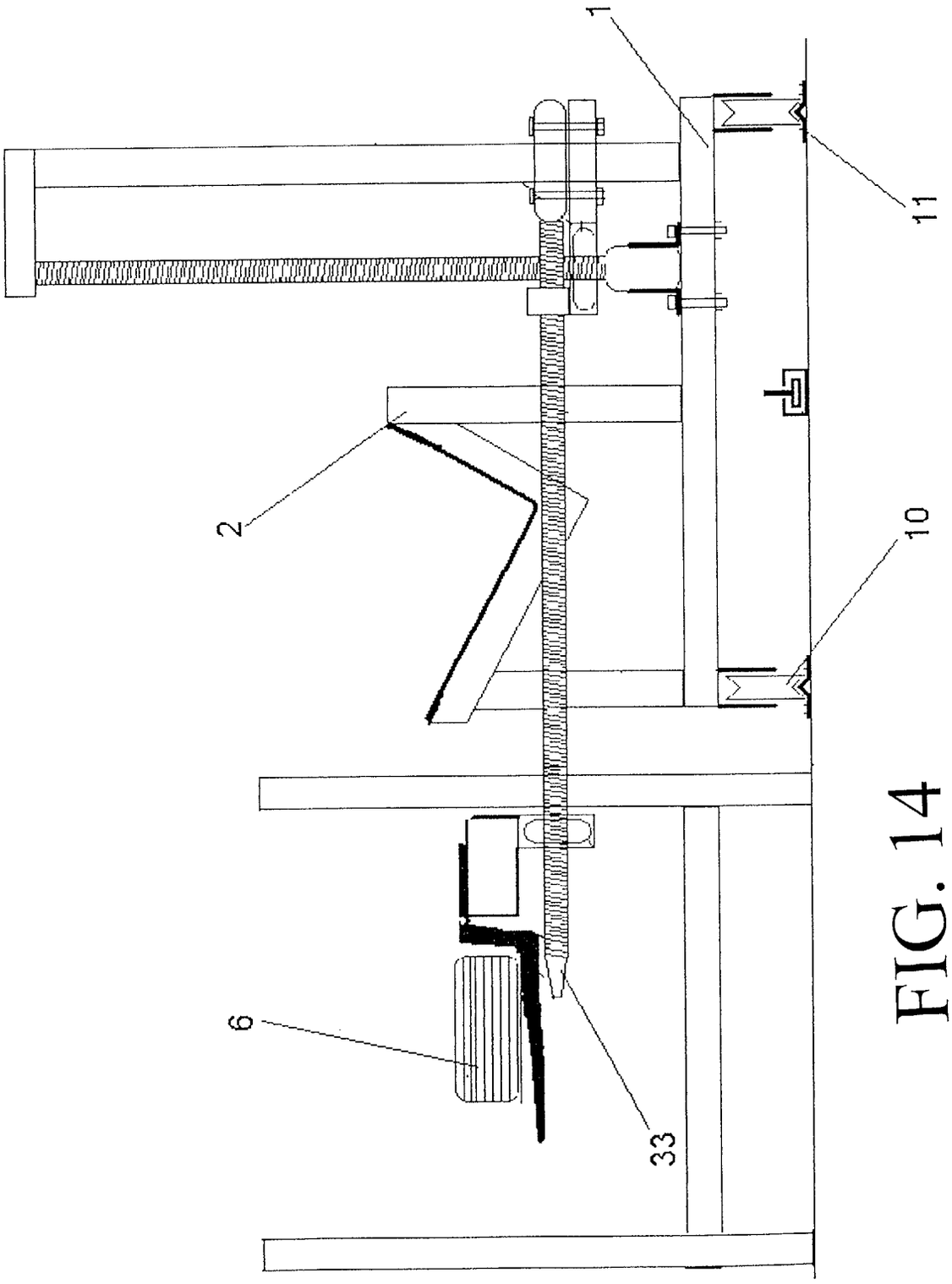


FIG. 14

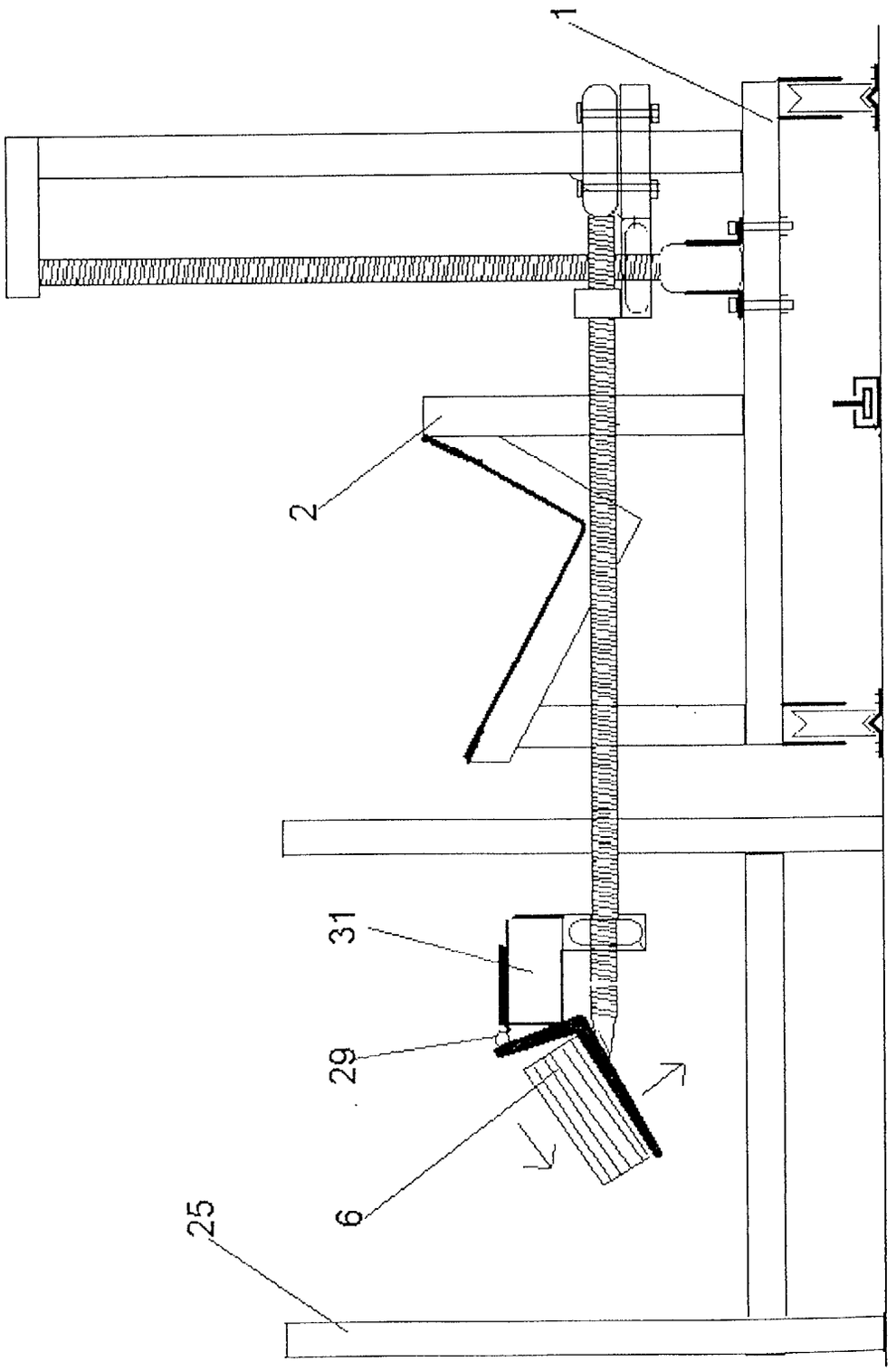


FIG. 15

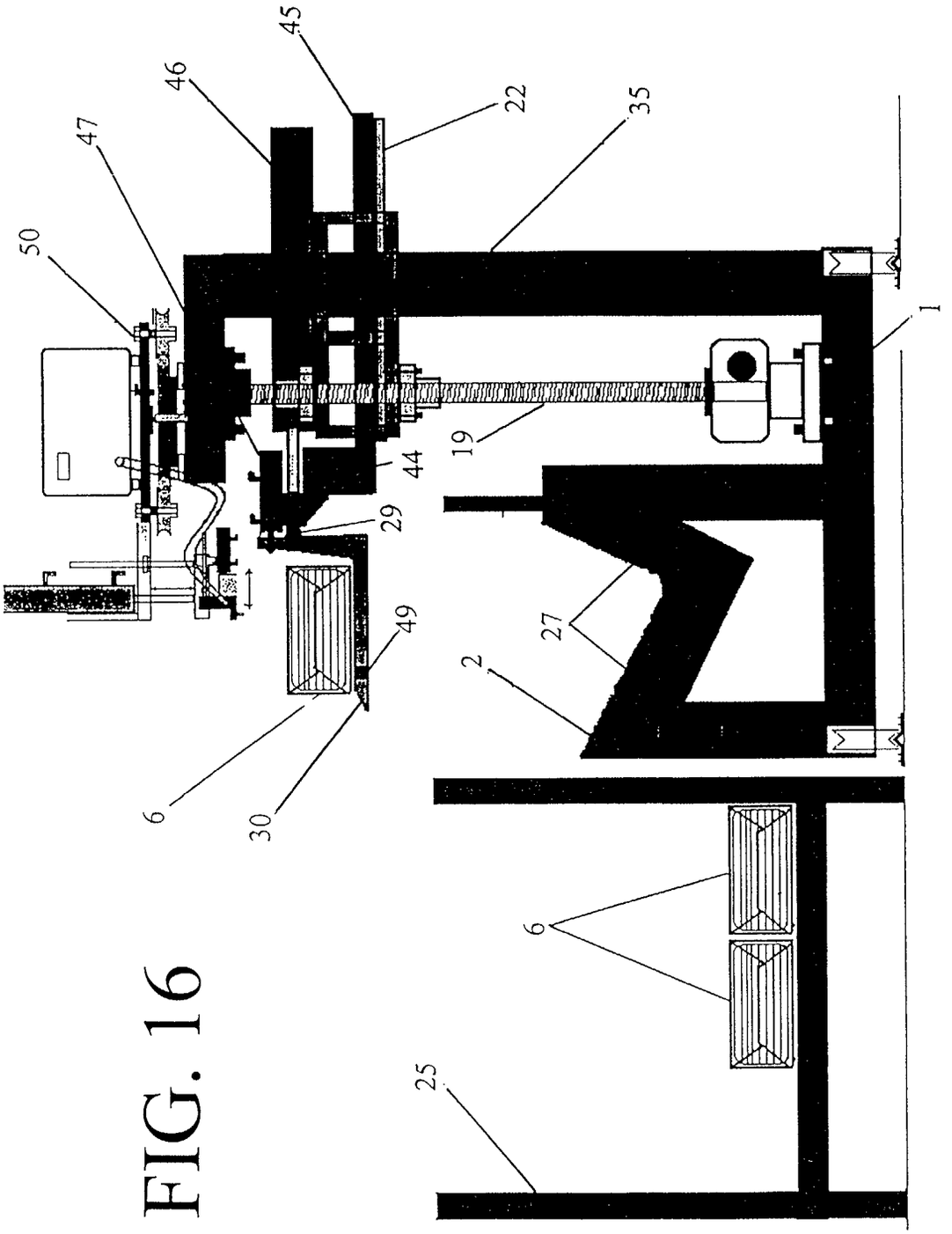


FIG. 16

FIG. 17

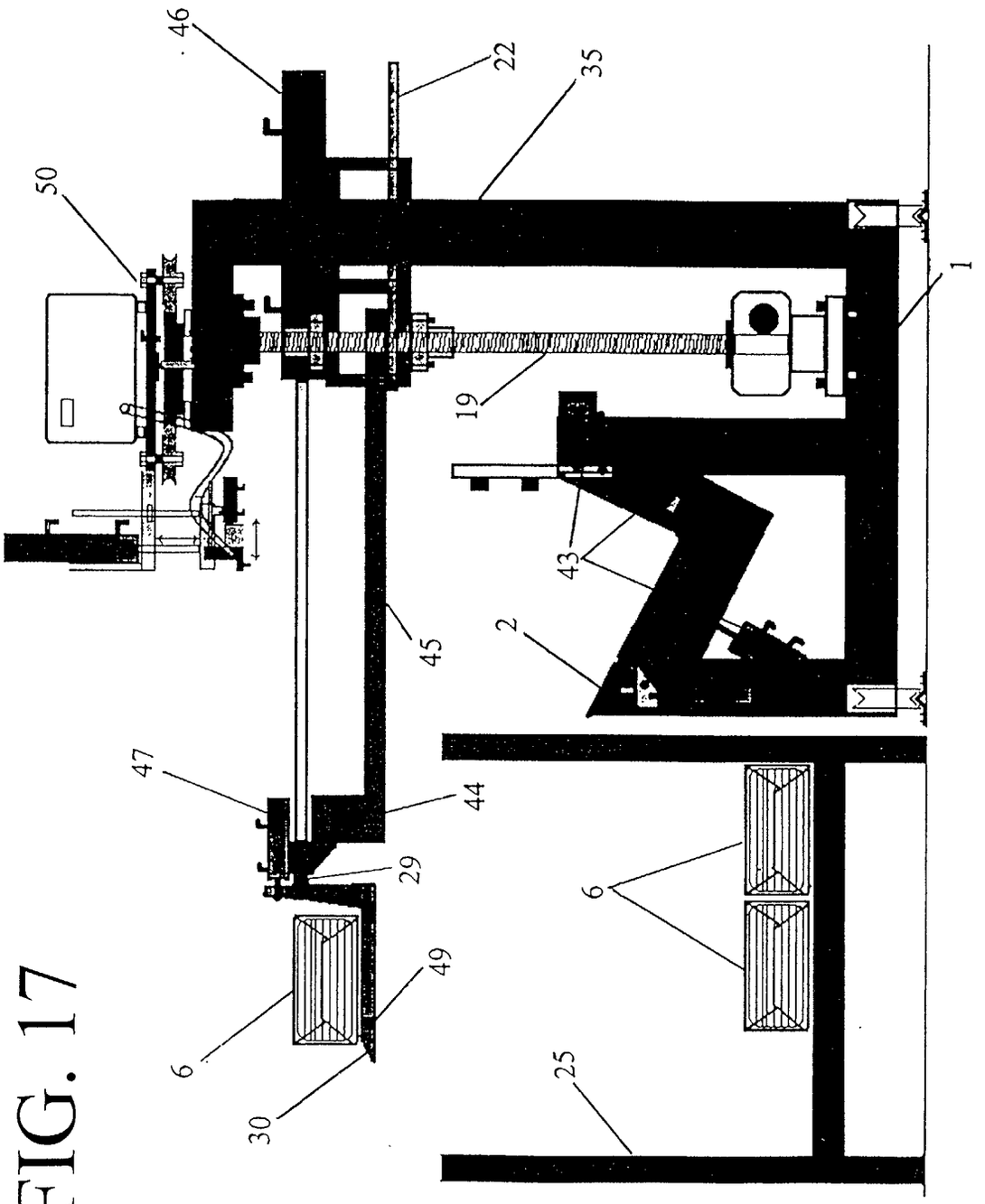
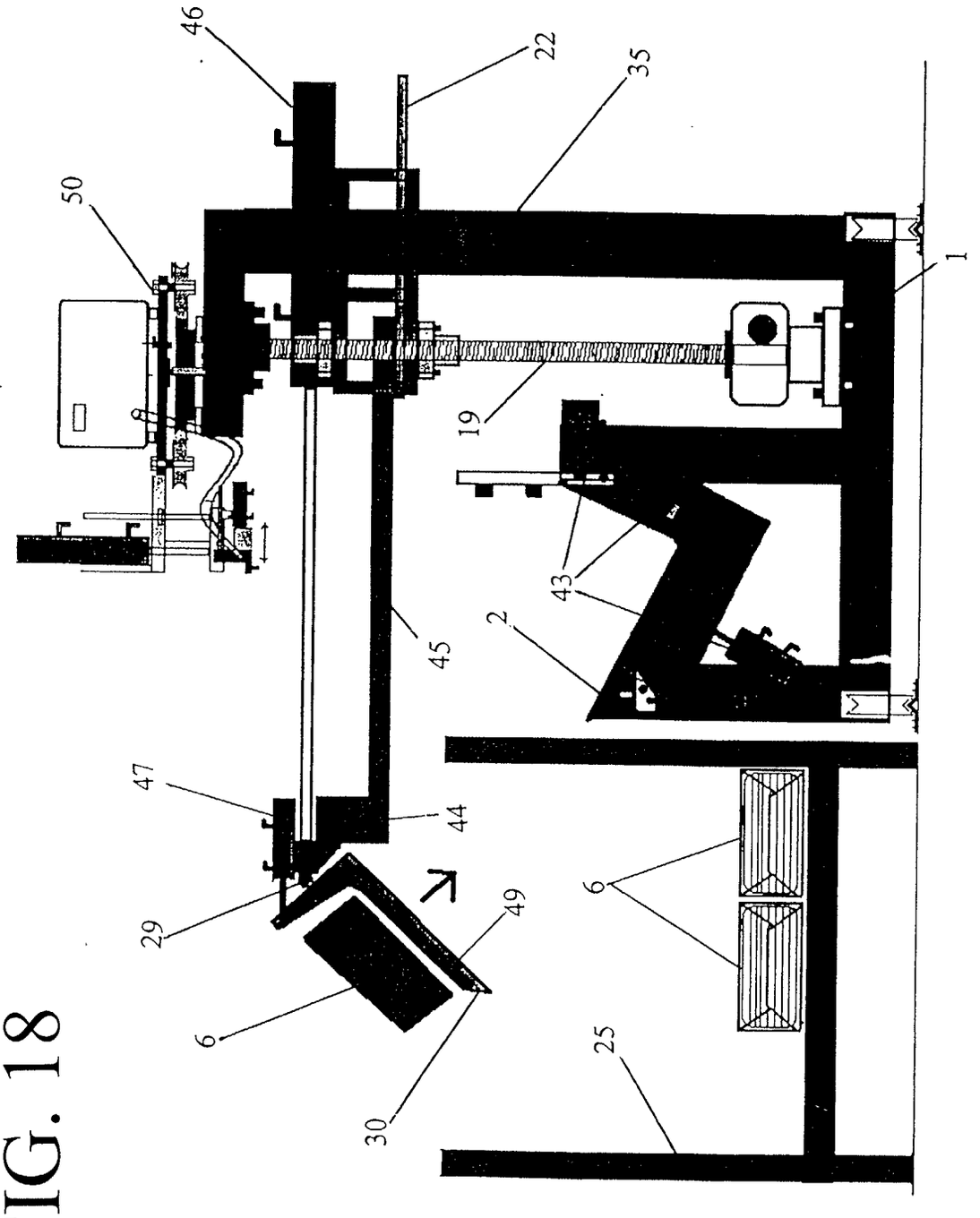


FIG. 18



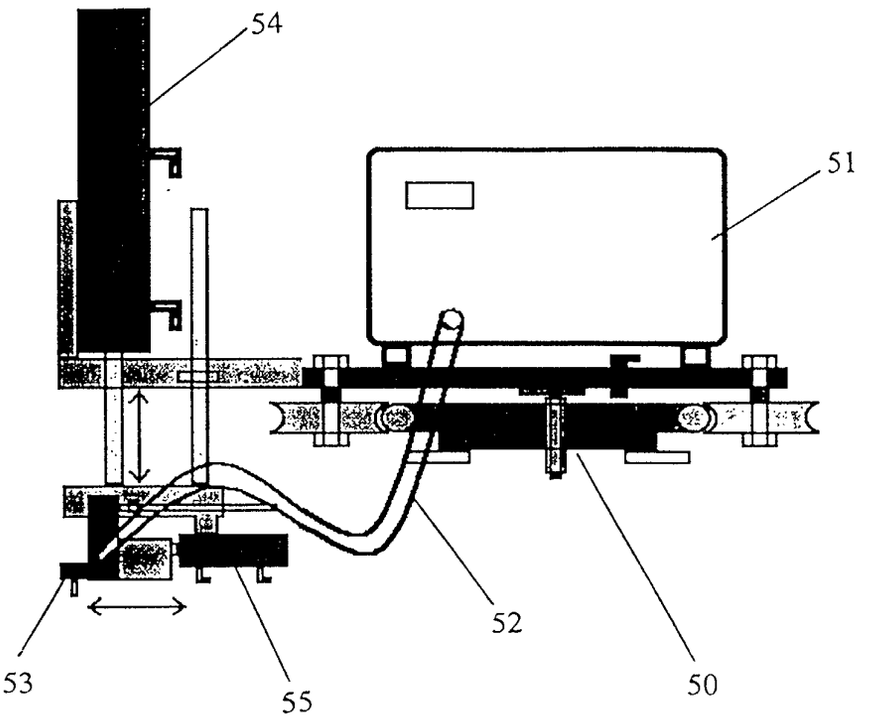


FIG. 19

FIG. 20A

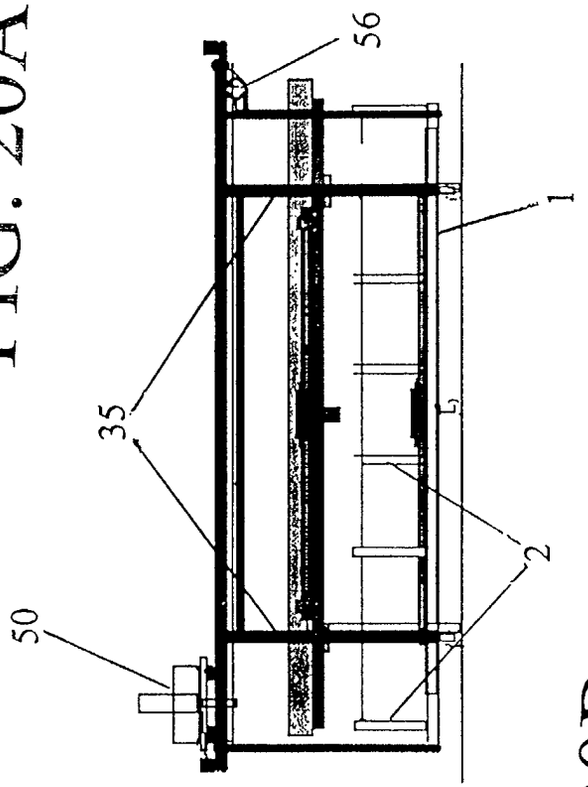
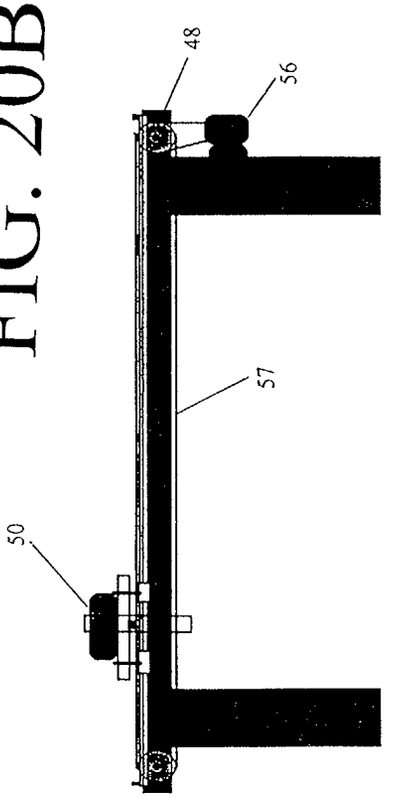


FIG. 20B



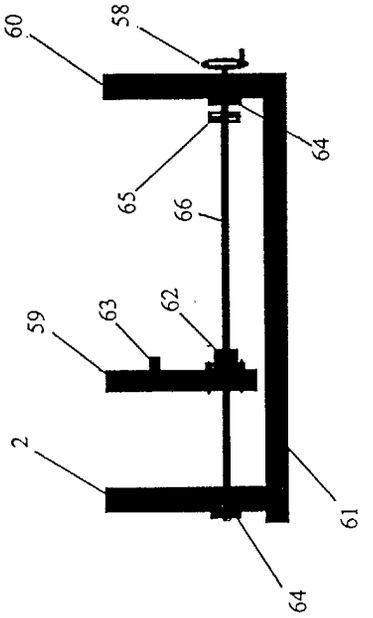


FIG. 21A

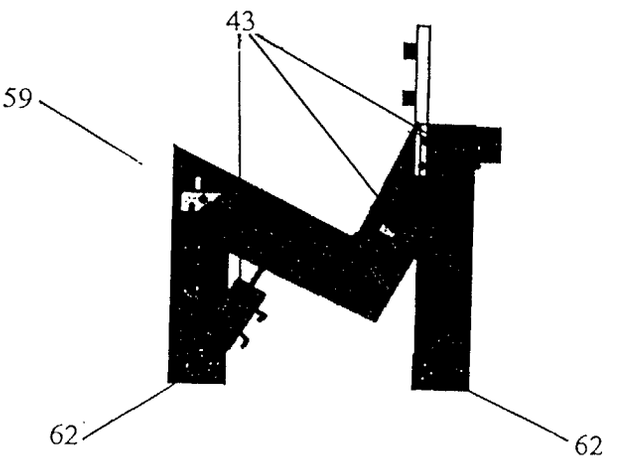


FIG. 21B

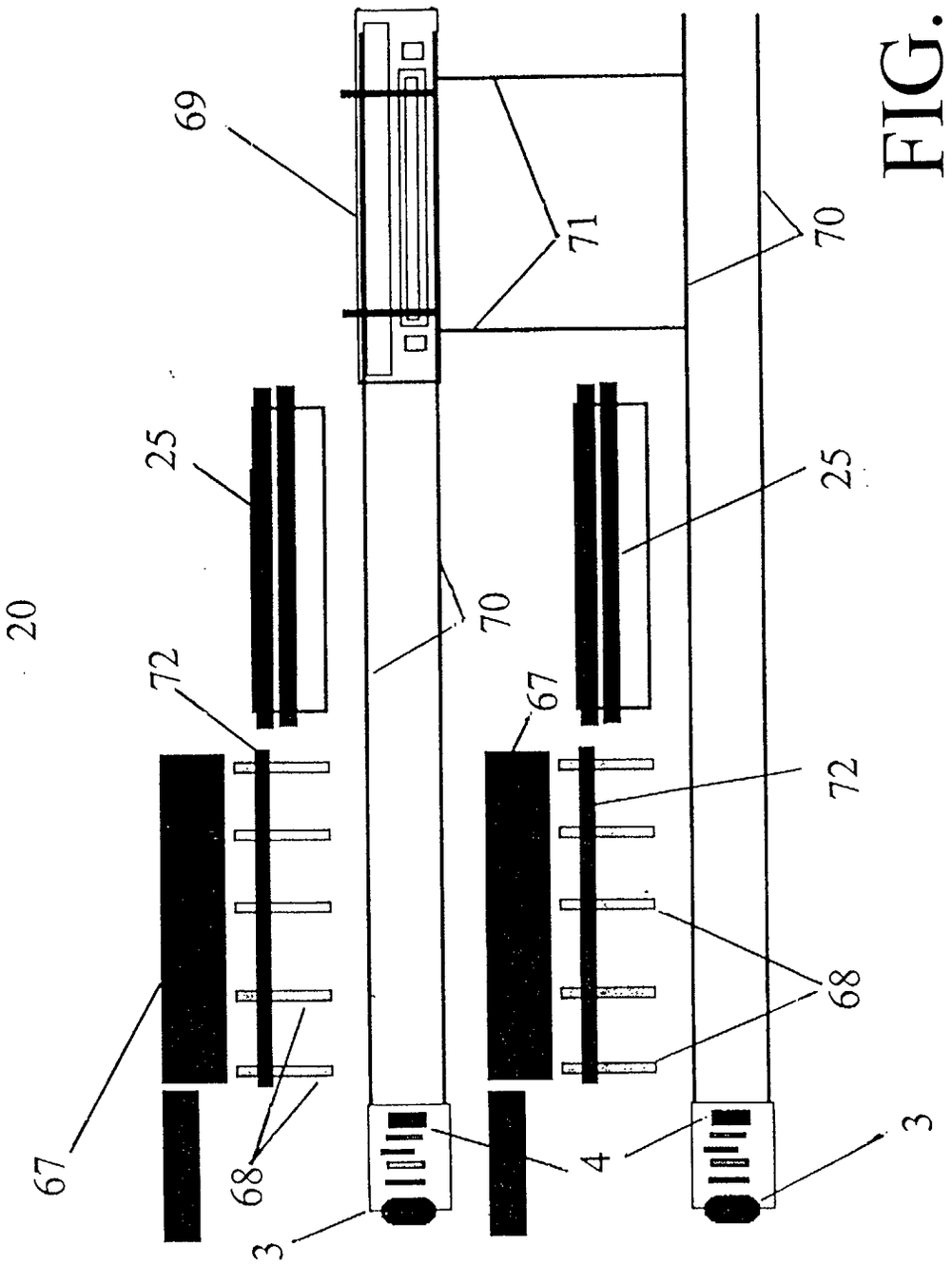


FIG. 22