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(54) **System for chamfering manufactured articles for building constructions**

(57) The system chamfers substantially prism-shaped manufactured articles (2) for building constructions and comprises a loading station (3) for the manufactured articles (2) onto a working surface (7) and a cutting station (5), in which a first chamfering step of the peripheral edges of a vertical face of the manufactured

article (2) is carried out. The main feature of the present invention consists in the cutting station (5) comprising a cutting assembly (18) defined by four cutters (31) which are aimed at being simultaneously operated during the step of cutting in order to chamfer respective edges of the aforesaid face of the manufactured article (2).

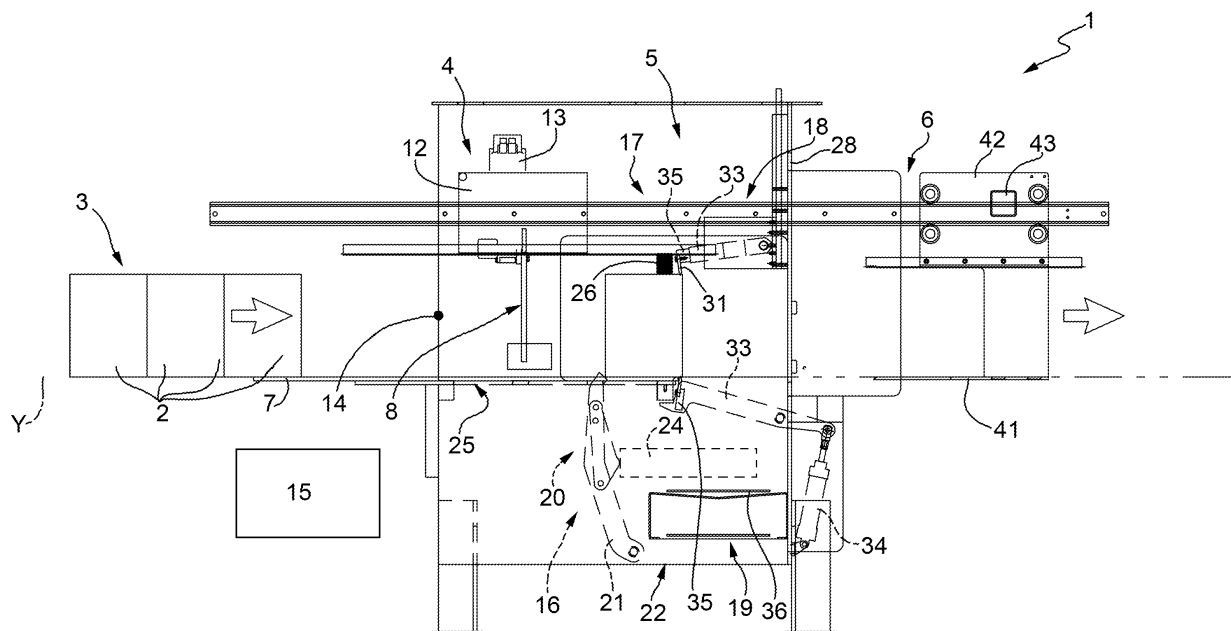
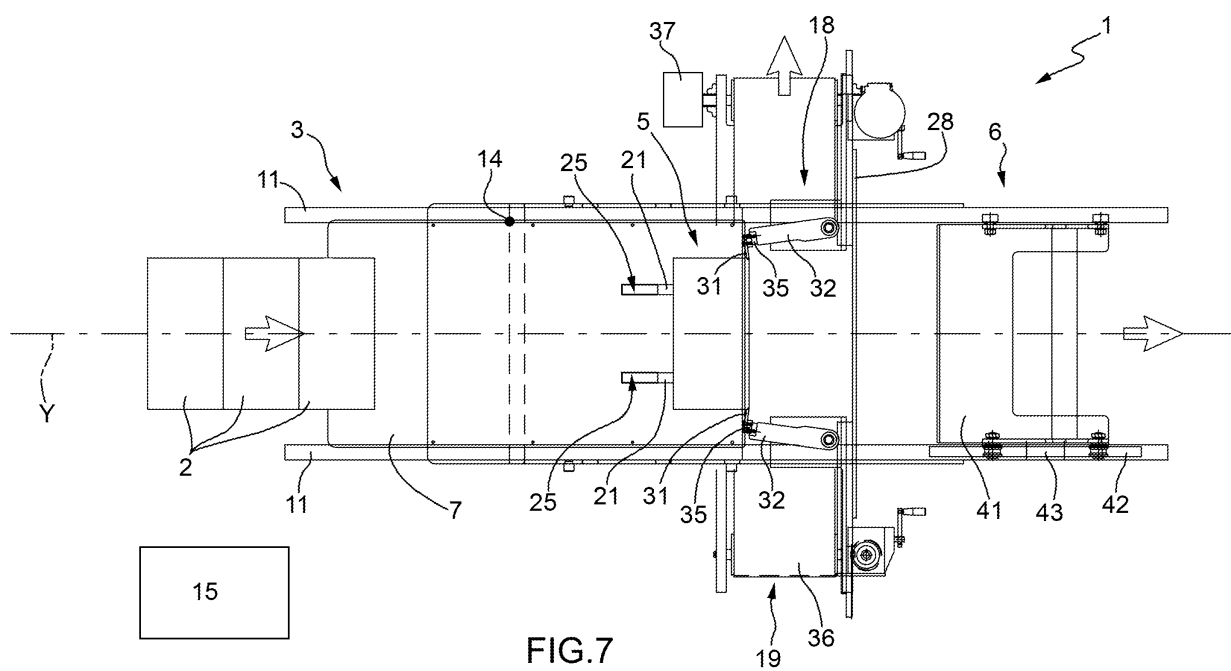


FIG.6



Description

[0001] The present invention relates to a system for chamfering manufactured articles for building constructions, such as for example manufactured articles made of concrete.

[0002] It is known the use of manufactured articles on at least one face of which the peripheral profile of such a manufactured article is chamfered. Some years ago, the chamfering was manually carried out by a stonemason. At present, the chamfering is performed by means of a cutter operated by a specific device which acts in sequence on the peripheral edges of the visible face of the manufactured article. It is apparent that the step of chamfering carried out as described above implies a series of drawbacks. Indeed, the manufactured article should be handled to sequentially present one side of the peripheral edge to the chamfering cutter, with all the problems occurring with regards to the different length of the various sides of the peripheral edge. Furthermore, one of the main problems consists in the complexity of aligning the manufactured article with respect to a reference in order to then perform a correct, accurate cutting operation. It is thus apparent that such a step of chamfering implies long production times, which negatively affect the costs of the manufactured article, which besides is made of a so simple material to the extent that the chamfering costs may be a considerable fraction of the total production cost of the manufactured article.

[0003] It is the object of the present invention to provide a system for chamfering manufactured articles for building constructions, which is free from the above-mentioned drawbacks and, in particular, provides a simple, efficient, rapid and cost-effective chamfering system.

[0004] According to the present invention, a system for chamfering substantially prism-shaped manufactured articles for building constructions is provided, comprising a station for loading said manufactured articles onto a working surface and a cutting station in which a step of chamfering the peripheral edges of a vertical face of said manufactured article is carried out, **characterized in that** said cutting station comprises a cutting assembly defined by four cutters adapted to be simultaneously operated during the step of cutting for chamfering respective edges of said face of said manufactured article.

[0005] The present invention will now be described with reference to the accompanying drawings illustrating a preferred embodiment thereof, in which:

- figure 1 is a side view of a system made according to the dictates of the present invention in a first step of machining;
- figure 2 is a side view of the system in figure 1 in a second step of machining;
- figure 3 is a plan view of the system in figure 1 in a third step of machining;
- figure 4 is a side view of the system in figure 1 in a fourth step of machining;

- figure 5 is a side view of the system in figure 1 in a fifth step of machining;
- figures 6 and 7 are a side view and a plan view of the system in figure 1, respectively, in a sixth step of machining;
- figure 8 is a side view of the system in figure 1 in a seventh step of machining;
- figure 9 is a side view of the system in figure 1 in an eighth step of machining;
- figures 10 and 11 are front and side views of the system in figure 1, respectively;
- figure 12 is a perspective view of a manufactured article entering the system in figure 1; and
- figure 13 is a perspective view of the manufactured article exiting from the system in figure 1.

[0006] It is worth noting that some details have been omitted from the aforesaid figures for clarity purposes.

[0007] With reference to figure 1, numeral 1 indicates as a whole a system for chamfering manufactured articles 2 for building constructions; the manufactured articles 2 are generally made of concrete or stone material or natural stone and are substantially prism-shaped.

[0008] The system 1 comprises:

- a station 3 for loading the manufactured articles 2;
- a station 5 in which a chamfering step of the peripheral edges of a vertical face of the manufactured article 2 is carried out; and
- a station 6 for unloading the manufactured articles 2.

[0009] A system which firstly moulds a body and then cuts such a body into several parts which define the aforesaid manufactured articles 2, is arranged upstream of system 1, in a manner not shown because known.

[0010] Station 3 is defined by a working surface 7 on which the manufactured articles 2 are placed to be reciprocally aligned along a horizontal axis Y. An assembly 4, which by means of a pliers device 8 grips a manufactured article 2, is installed at a higher level of the surface 7. Such an assembly 4 (figure 2) transfers the manufactured article 2 from station 3 to station 5, and if required rotates the manufactured article 2 by 180° about a vertical axis X (figure 3). The assembly 4 is supported by a pair of rails 11 having a horizontal axis parallel to axis Y and is provided with an electric motor 12, which allows the assembly 4 itself and thus the pliers device 8 to be translated along the rails 11, and with an electric motor 13 which is used to control the rotation of the pliers device 8 about axis X. The possible rotation of the manufactured article 2 by 180° is achieved in a zone comprised between stations 3 and 5 where there is installed a sensor 14 adapted to detect the type of the vertical face of the manufactured article 2 gripped by the pliers device 8 and to detect the exact position of the manufactured article 2 on the surface 7. It is known that chamfering is preferably carried out on the face of the manufactured article 2 being cut, and so if a smooth face is detected, the sensor 14

enables the motor 13 by means of an electronic control unit 15 to determine the rotation of the manufactured article 2, as diagrammatically shown in figure 3; the control unit 15 being adapted to manage the assembly 4.

[0011] Once the orientation of the manufactured article 2 has been determined, the assembly 4 transfers such a manufactured article 2 to station 5, where the manufactured article 2 rests on surface 7, and in particular with the face to be chamfered being at the axial end of the surface 7, as shown in figure 4.

[0012] An aligning assembly 16, a locking assembly 17, a cutting assembly 18 and an assembly 19 for evacuating the machining scraps are installed in station 5.

[0013] As shown in figure 5, the aligning assembly 16 comprises an aligning device 20 consisting of a pair of levers 21 hinged to a part of frame 22 of the system 1 at a lower end thereof. A pneumatic actuator 24, diagrammatically shown and controlled by the control unit 15, is adapted to determine the rotation of the levers 21 from a resting position, in which the upper end thereof remains below the surface 7, to a working position, in which the upper end of the levers 21 extends over the surface 7 through a respective slot 25 obtained in such a surface 7. Indeed, once the manufactured article 2 has been placed in the cutting station 5, the control unit 15 controls the rotation of the levers 21 of the aligning device 20, which abut on the face of the manufactured article 2 opposite to the face on which the chamfering should be carried out. Thereby, the manufactured article 2 is precisely aligned for a later, accurate and effective chamfering.

[0014] With reference to figures 6, 10 and 11, the locking assembly 17 comprises a horizontal beam 26 adapted to translate by means of two pneumatic actuators 27 controlled by the control unit 15 from a resting position, in which it is at a higher level and spaced from the upper face of the manufactured article 2, to a locking position, in which it evenly presses to such an upper face of the manufactured article 2; the actuators 27 being applied at the axial ends of the beam 26. The locking assembly 17 locks the manufactured article 2 once the aligning assembly 16 has aligned the manufactured article 2.

[0015] With reference to figures 6 and 7, the cutting assembly 18 comprises a substantially frame-shaped, supporting structure 28. A respective lever is installed along the four inner edges of the frame-like structure 28, which lever is hinged to the structure 28 at a first end by means of a slide and which supports a cutter 31 defined by a cutting blade at a second end. Two levers indicated by numeral 32 (figure 7) are adapted to rotate about a respective vertical axis and, by means of their cutters 31, are adapted to chamfer the vertical edges of the aforesaid face of the manufactured article 2. Two levers indicated by numeral 33 (figure 6) are adapted to rotate about a respective horizontal axis and by means of their cutters 31 are adapted to chamfer the horizontal edges of the aforesaid face of the manufactured article 2. Each lever 32 and 33 is operated by means of a pneumatic actuator

34, only one of which is shown for simplicity. At the ends of the levers 32 and 33 which support the cutters 31, these levers 32 and 33 are provided with a respective body 35 made of a material having a high specific weight.

[0016] In use, once the manufactured article 2 has been aligned and locked in the cutting station 5, the control unit controls the simultaneous operation of the levers 32 and 33, which by means of the cutters 31 strike the edge of the face to be chamfered of the manufactured article 2 (as shown in figures 6 and 7). Due to the mechanical stresses that the manufactured article 2 undergoes by the cutters 31 during the cutting action, such a manufactured article 2 slightly retracts towards the loading station 3, thus being able to so retract by the minimum rotation allowed to the levers 21 by the actuator 24. Indeed, being of the pneumatic type, it behaves like an elastically deformable spring. During the cutting action, the levers 21 retract and then realign the manufactured article 2. It is worth noting that the cutting edge of the cutters 31 has an angle of incidence on the manufactured article 2 according to a plane which is oblique to a horizontal plane, for the cutters 31 carried by levers 33, and according to a plane which is oblique to a vertical plane, for the cutters 31 carried by levers 32. It is apparent that the retraction of the manufactured article 2 during the step of cutting, the mass (body 35) applied to the levers 32 and 33 and the high rotation speed of these levers 32 and 33 facilitate such a cutting action for defining the chamfers on the manufactured article 2.

[0017] The assembly 19 for evacuating the machining scraps comprises a conveyor belt 36 arranged at a lower level than that of the surface 7, so that the machining scraps are deposited thereon during the step of cutting. An electric motor 37 controlled by the control unit 15 is then adapted to move the belt 36 so as to channel the scraps towards a collecting container (not shown).

[0018] The loading station 6 comprises a tray 41 carried by a slide 42 which may be translated along the rails 11 by means of an electric motor 43 controlled by the control unit 15. In use, once the cutting action has been performed, the approaching of the tray 41 to the cutting station 5 is controlled, while the assembly 4 takes a second manufactured article 2, which during its translation towards the cutting station 5 pushes the newly chamfered manufactured article 2 at such a station 5 towards the tray 41 underneath.

[0019] The operation of system 1 is apparent from the above disclosure. In particular, once the manufactured articles 2 have been loaded, the first manufactured article 2 is taken by the assembly 4, which provides for its rotation when chamfering is desired on the face opposite to that of the feeding direction towards the cutting station 5 and which transfers the manufactured article 2 to the cutting station 5. Once the manufactured article 2 has been deposited in such a station 5, the assembly 4 takes a second manufactured article 2. In the cutting station 5, the manufactured article 2 is firstly aligned with respect to a cutting line, which is simply the outermost edge of

surface 7, and is then locked in such a position, and finally the step of cutting is carried out at the same time on all the edges of the manufactured article 2 to be chamfered. During such a step, the manufactured article 2 slightly retracts, thus facilitating the cutting action. After the step of cutting, the next manufactured article 2 presses the newly machined manufactured article towards the tray 41, which channels it towards a store (not shown).

[0020] The advantages obtained by implementing the present invention are apparent and numerous from the above disclosure.

[0021] In particular, there is provided a system which automatically and simply chamfers a manufactured article 2. In addition to selecting the face of the manufactured article 2 to be chamfered, system 1 achieves a perfect alignment to the cutting line. The operation of the cutters 31 is simultaneous and a retraction of the manufactured article 2 occurs during the step of cutting, thus effectively improving the cutting action. Furthermore, the newly machined manufactured article 2 is unloaded, again automatically.

Claims

1. System for chamfering substantially prism-shaped manufactured articles (2) for building constructions, comprising a station (3) for loading said manufactured articles (2) onto a working surface (7) and a cutting station (5) in which a step of chamfering the peripheral edges of a vertical face of said manufactured article (2) is carried out, **characterized in that** said cutting station (5) comprises a cutting assembly (18) defined by four cutters (31) aimed at being simultaneously operated during the cutting step for chamfering respective edges of said face of said manufactured article (2).
2. System according to claim 1, **characterized in that** said cutters (31) are supported by a respective first lever (32 and 33) operated by means of first handling means (34).
3. System according to claim 2, **characterized in that** said first lever (32 and 33), in correspondence of its own area supporting said cutter (31), supports a body (35) made of a material having a high specific weight.
4. System according to claim 2 and/or 3, **characterized in that** the cutting edge of said cutters (31) has an angle of incidence on said manufactured article (2) according to a plane which is oblique with respect to the surface thereof to be cut.
5. System according to at least one of the claims from 2 to 4, **characterized in that** two of said first levers (32) are aimed at rotating about a respective vertical

axis, and by means of their said cutters (31) are aimed at chamfering the vertical edges of the aforesaid face of said manufactured article (2), and other two of said first levers (33) are aimed at rotating about a respective horizontal axis, and by means of their said cutters (31) are aimed at chamfering the horizontal edges of the aforesaid face of said manufactured article (2).

6. System according to at least one of claims from 1 to 5, **characterized in that** said cutting station (5) comprises an aligning assembly (16) having at least one aligning device (20) which comprises a second lever (21) aimed at rotating, by means of second handling means (24), from a resting position, in which the upper end of said second lever (21) remains below said working surface (7) on which said manufactured article (2) rests, to a working position, in which the upper end of said second lever (21) extends over said surface (7), and by acting on said manufactured article (2) aligns the face thereof to be machined along a predetermined cutting line.
7. System according to claim 6, **characterized in that** said second handling means (24) are defined by a pneumatic actuator (24) aimed at allowing a minor retraction of said aligning device (16) during the cutting step.
8. System according to claim 6 or 7, **characterized in that** said cutting station (5) comprises a locking assembly (17) provided with a horizontal beam (26) aimed at translating by means of third handling means (27) from a resting position, in which it is at a higher lever and spaced from the upper face of said manufactured article (2), to a locking position, in which it presses to such an upper face of said manufactured article (2); said locking assembly (17) acting once the aligning step defined by said aligning assembly (16) has been ended.
9. System according to at least one of the preceding claims, **characterized in that** said loading station (3) comprises a pliers device (8) aimed at gripping said manufactured article (2) and, by means of third handling means (12, 11), transfer it towards said cutting station (5).
10. System according to claim 9, **characterized in that** it comprises a sensor (14) aimed at detecting the type of face of said manufactured article (2) facing said cutting station (5) and the exact position of said manufactured article (2) on said surface (7), means (13) for rotating said manufactured article (2) by 180° about a vertical axis (X) used for orienting said manufactured article (2) towards said cutting station (5) with a predetermined type of face.

11. System according to at least one of the preceding claims, **characterized in that** it comprises an unloading station (6) downstream of said cutting station (5) comprising a tray (41), which by means of fourth handling means (43, 11) is aimed at translating between a resting position, in which it is at a predetermined distance from said cutting station (5), to a working position, in which it is close to said working surface (7) in order to receive said newly machined manufactured article (2).

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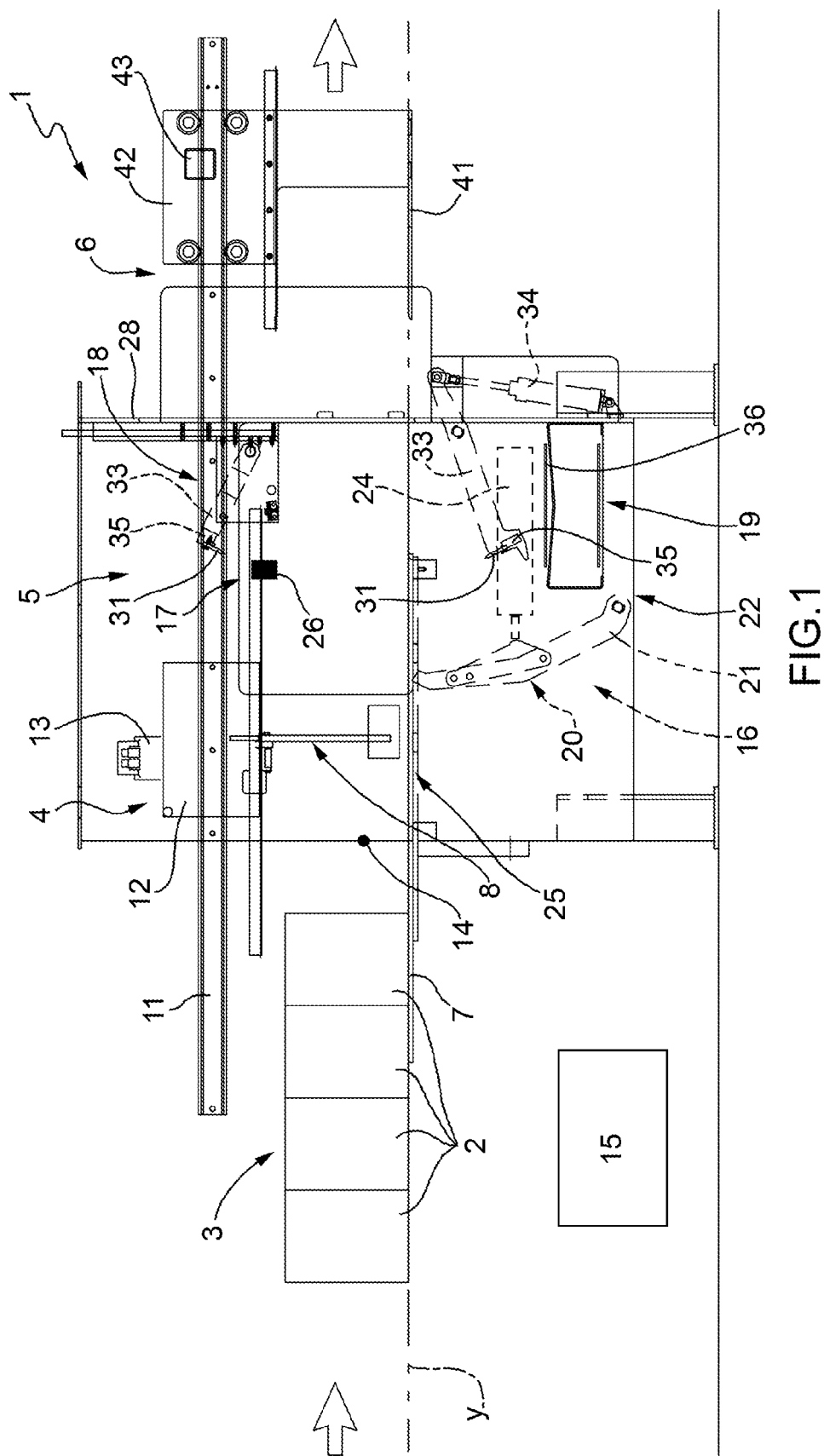
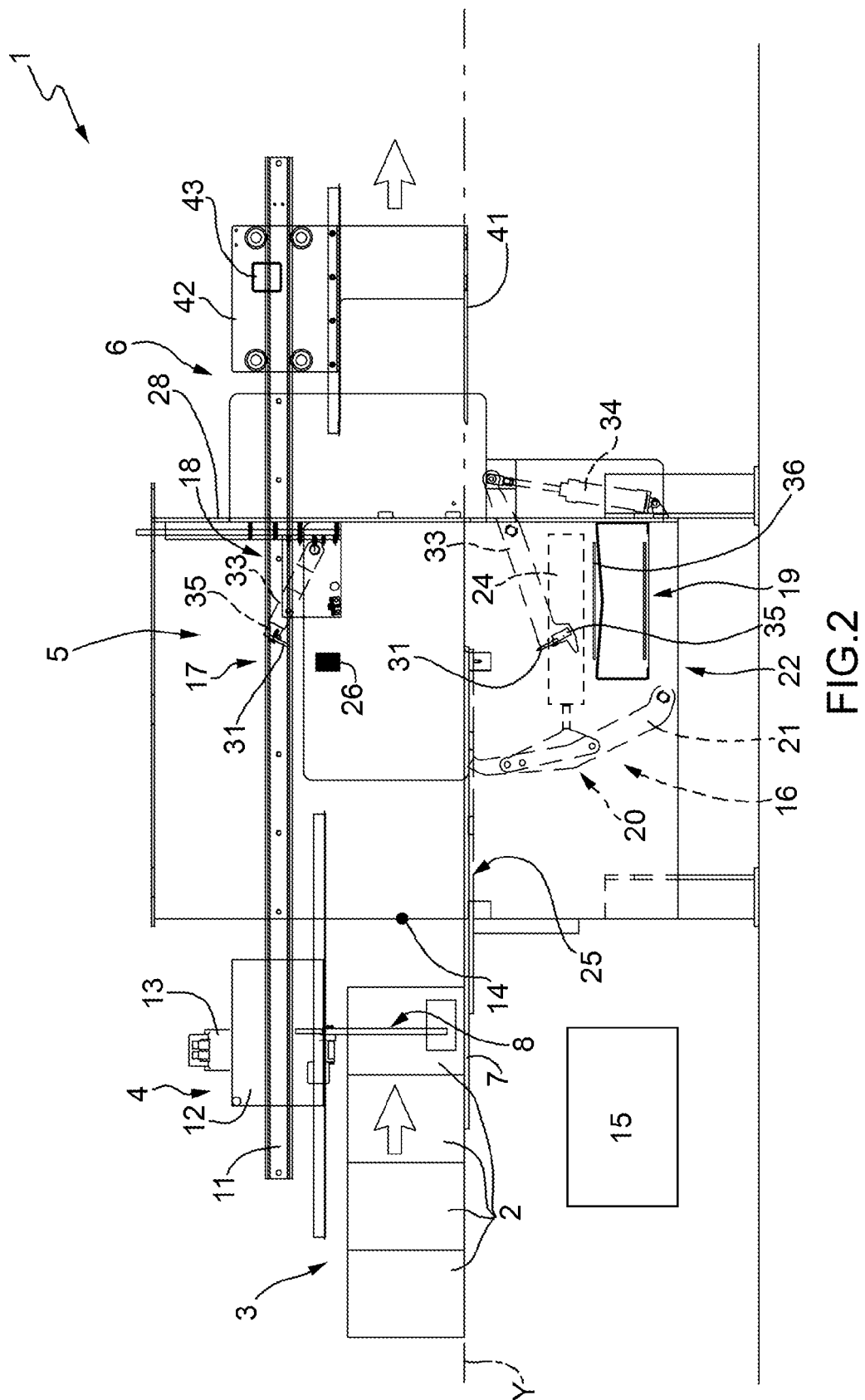
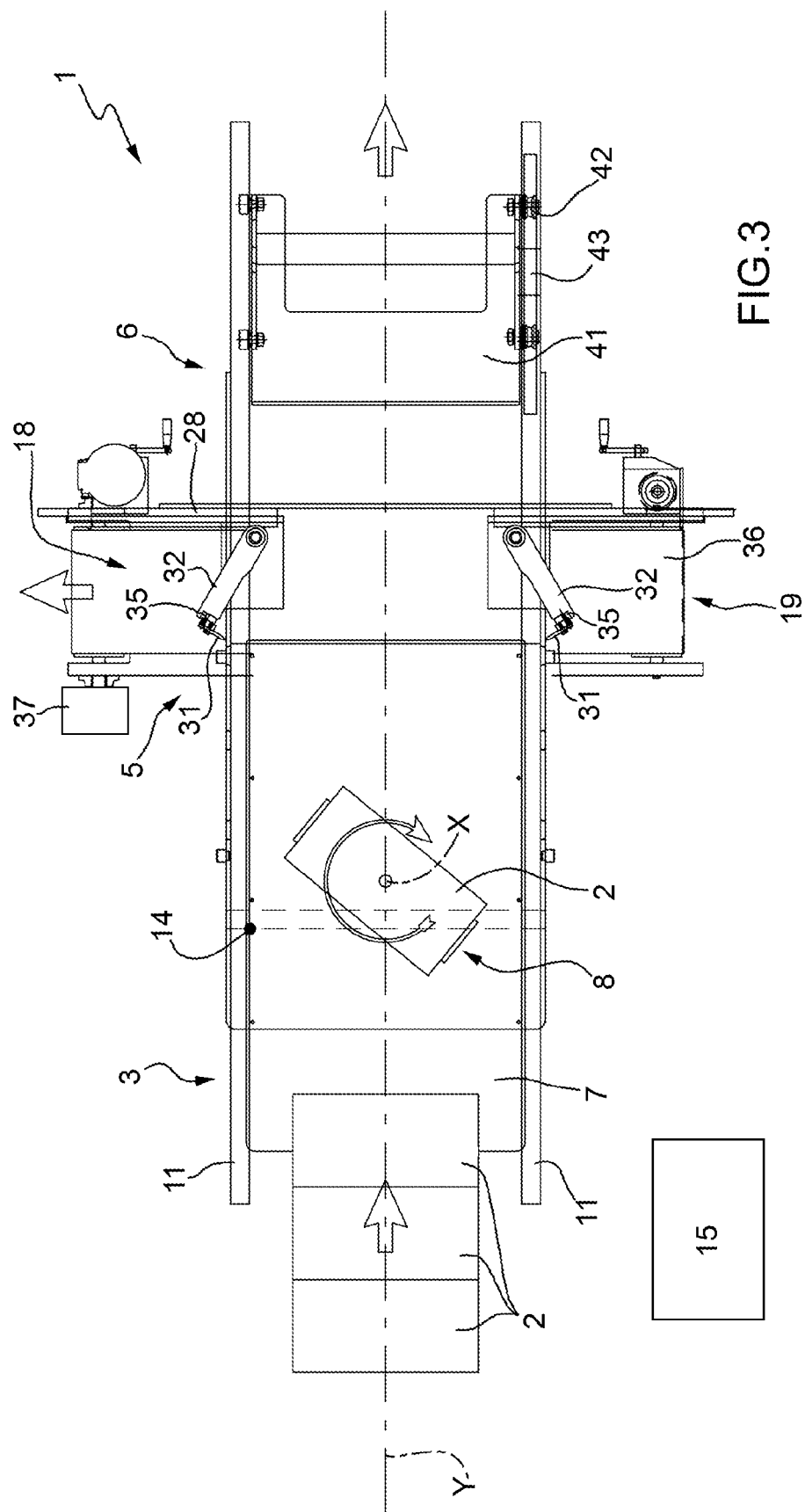


FIG.1





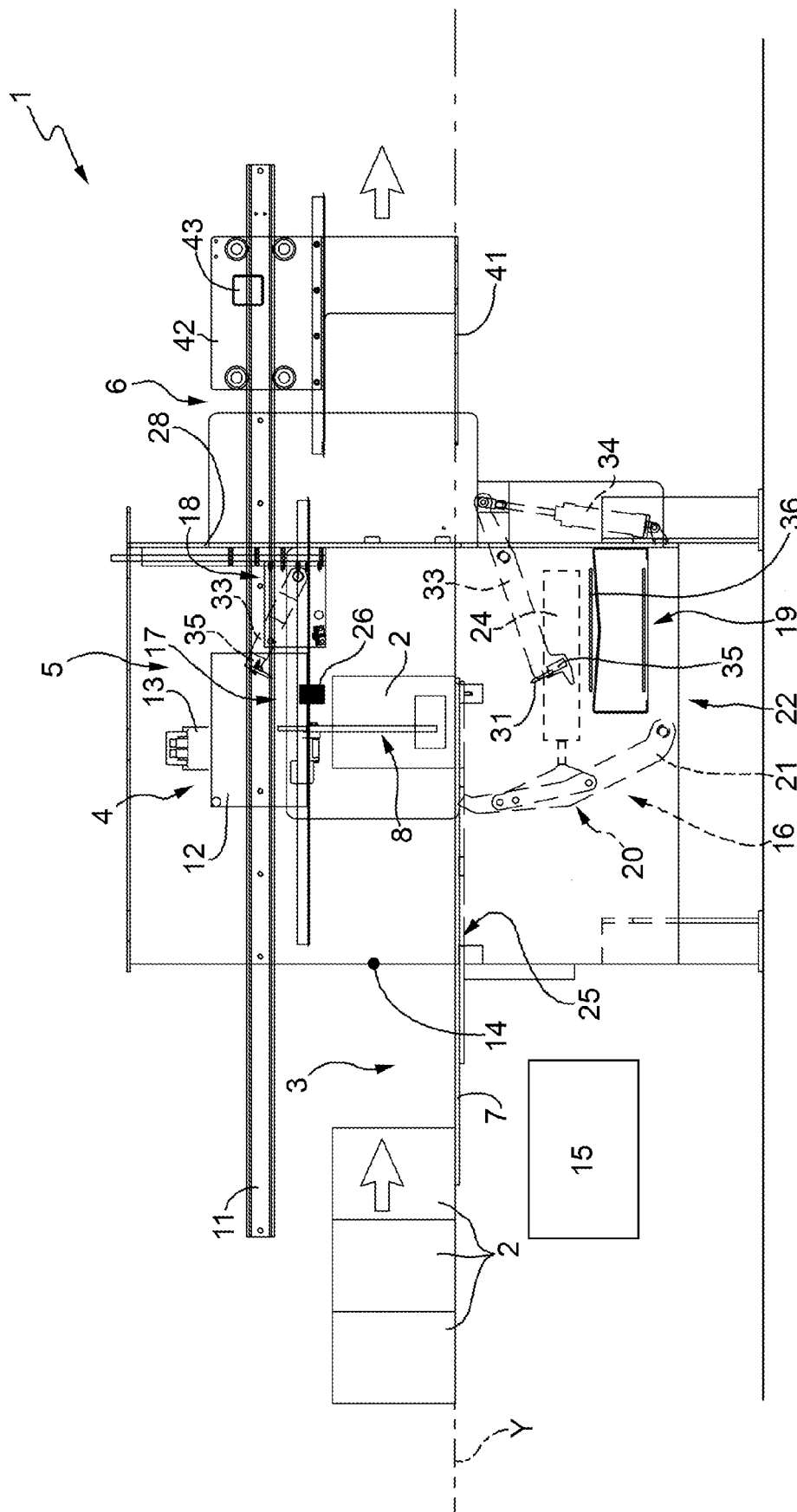


FIG. 4

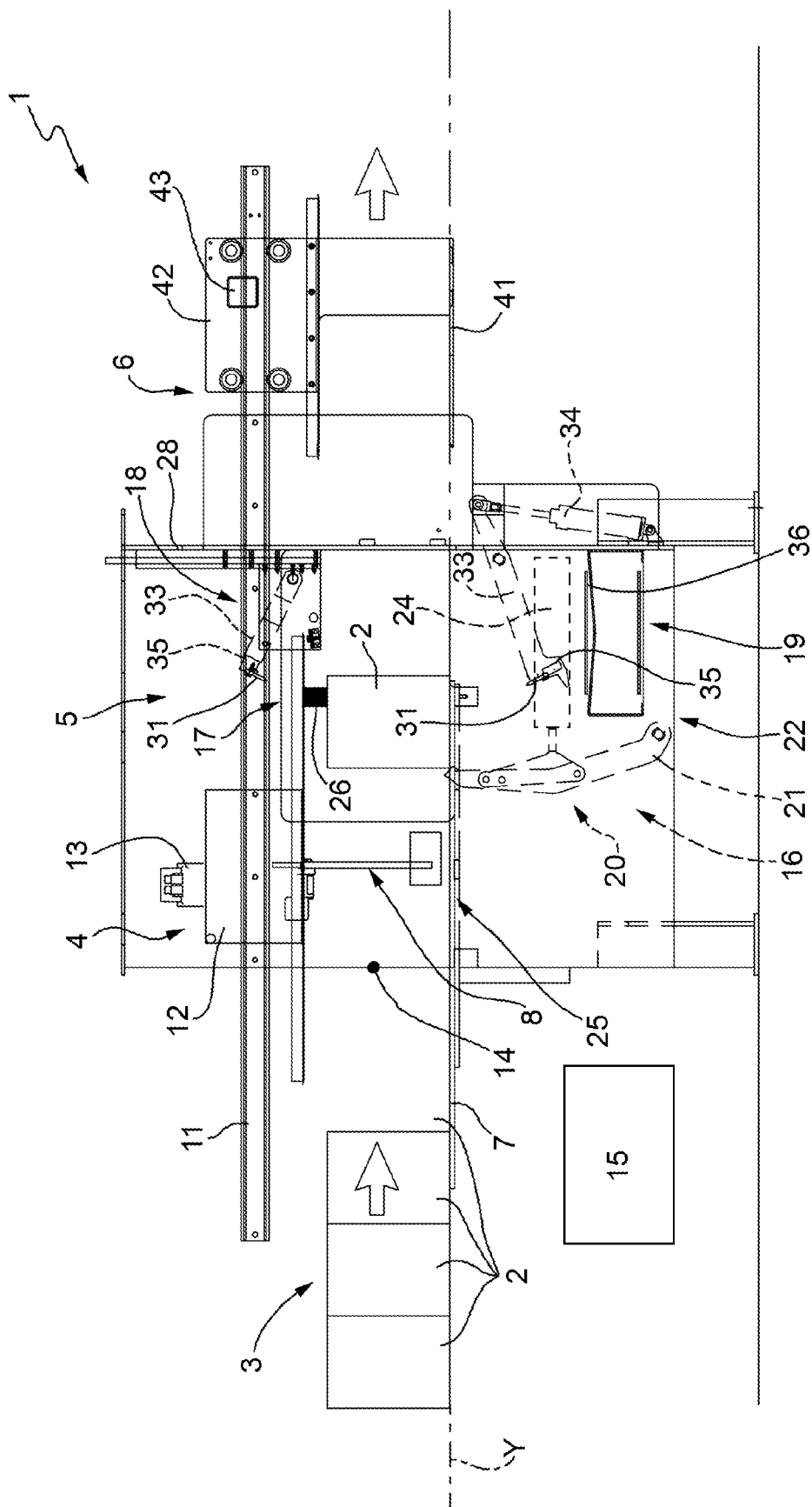


FIG. 5

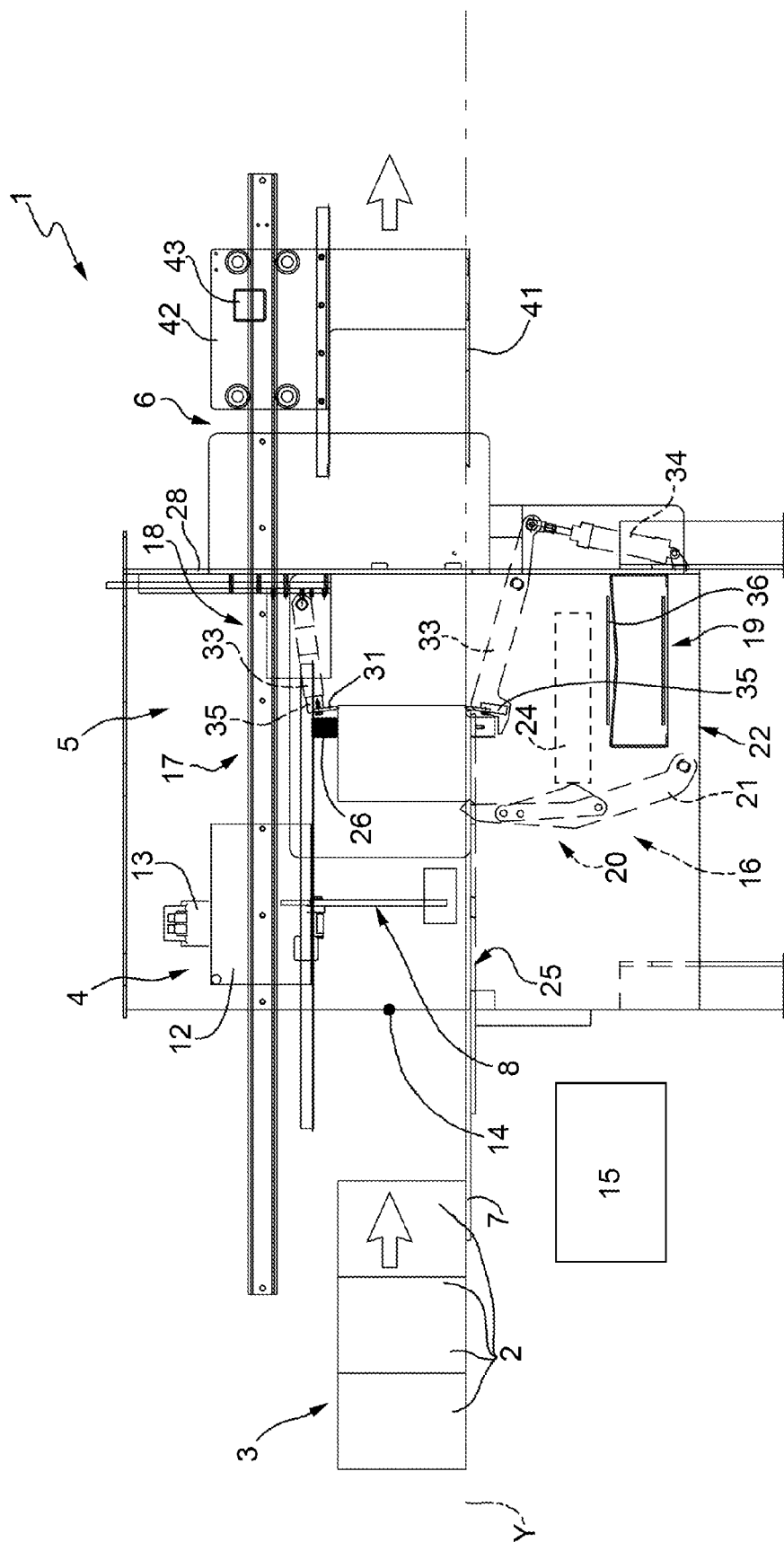


FIG.6

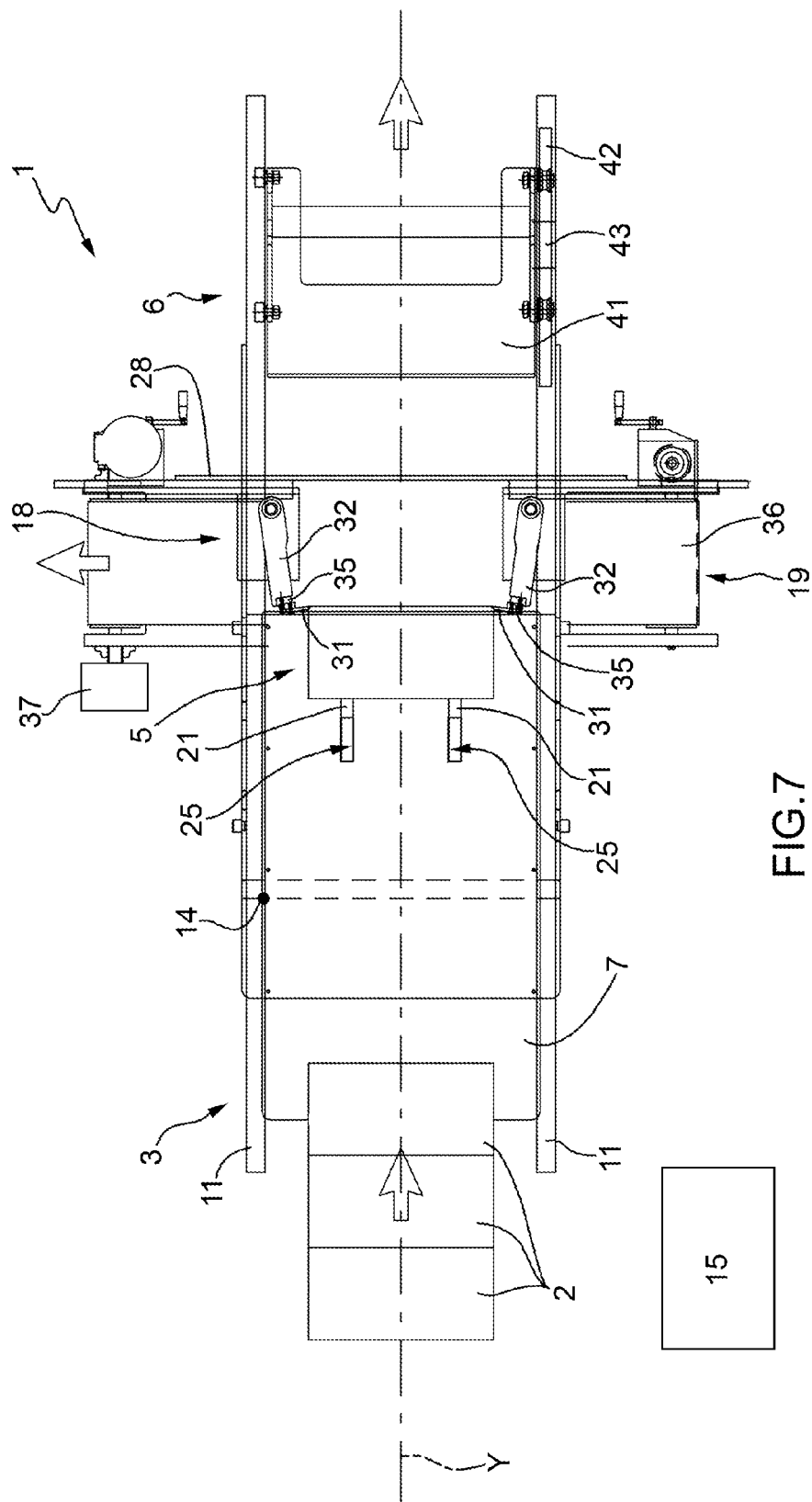
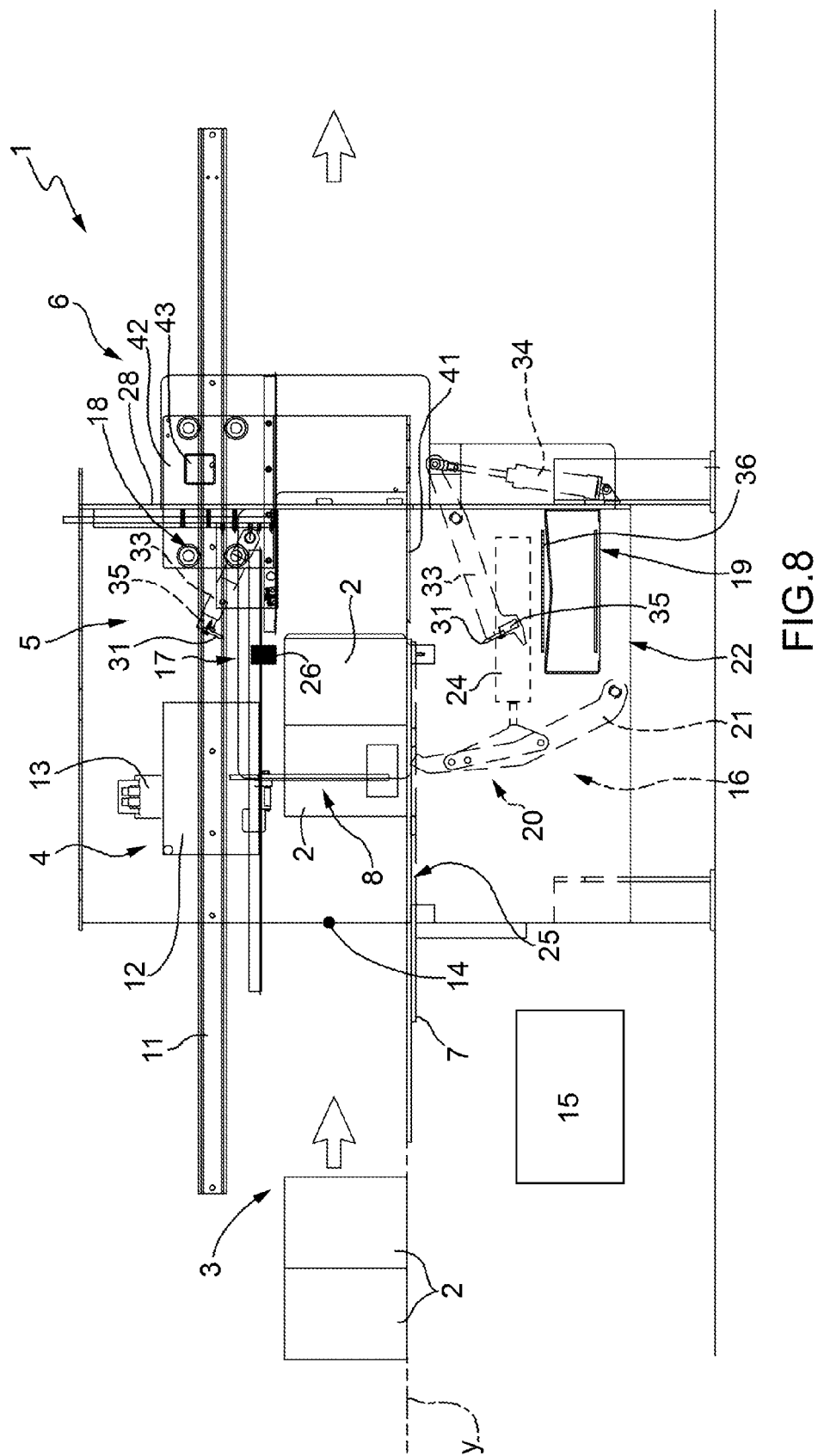


FIG. 7



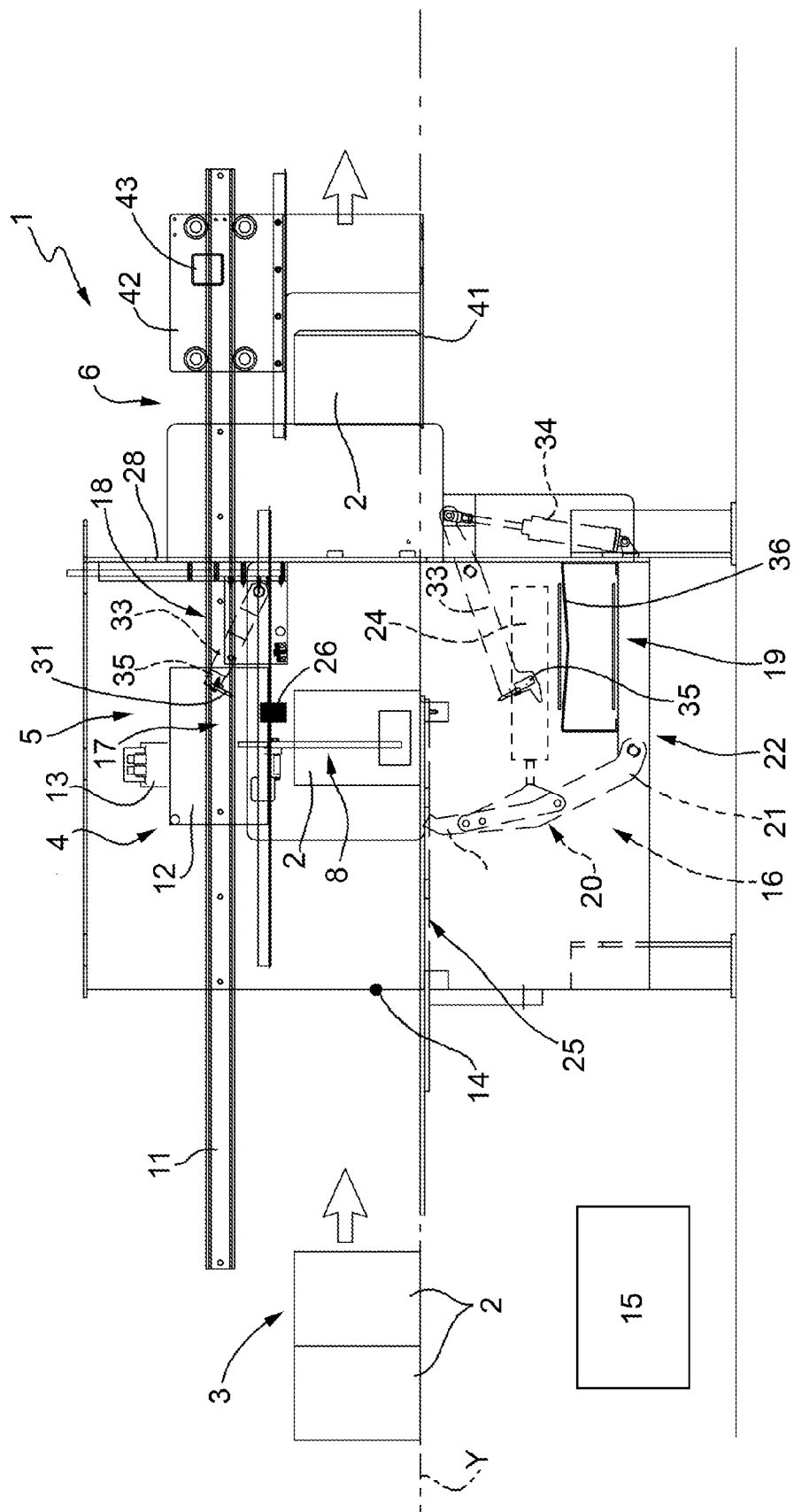


FIG. 9

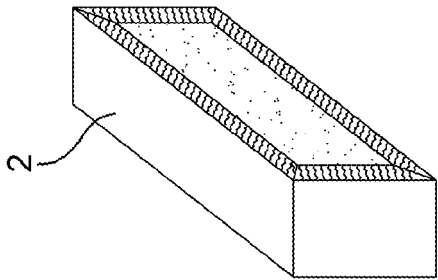


FIG.13

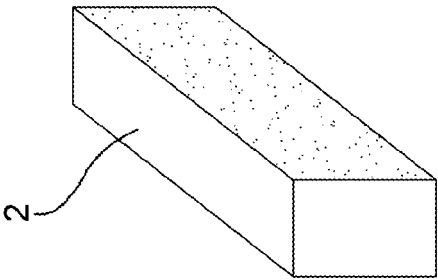


FIG.12

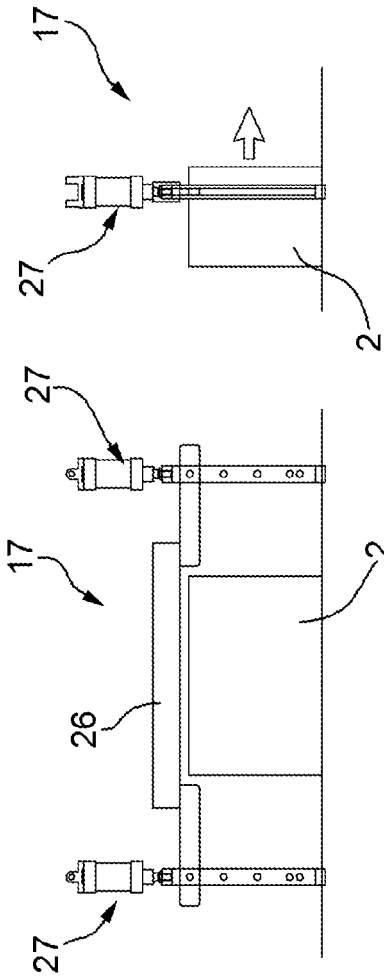


FIG.11

FIG.10



EUROPEAN SEARCH REPORT

Application Number
EP 09 16 0552

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2004/007227 A1 (PEDERSEN HANS [DK] ET AL) 15 January 2004 (2004-01-15)	1,8,9,11	INV. B28D1/26
Y	* paragraph [0034] * * paragraph [0043] * * paragraph [0044] * * paragraph [0053] * * paragraph [0050]; figures * -----	2-7	
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			TECHNICAL FIELDS SEARCHED (IPC)
			B28D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 3 September 2009	Examiner Vaglianti, Giovanni
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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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
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