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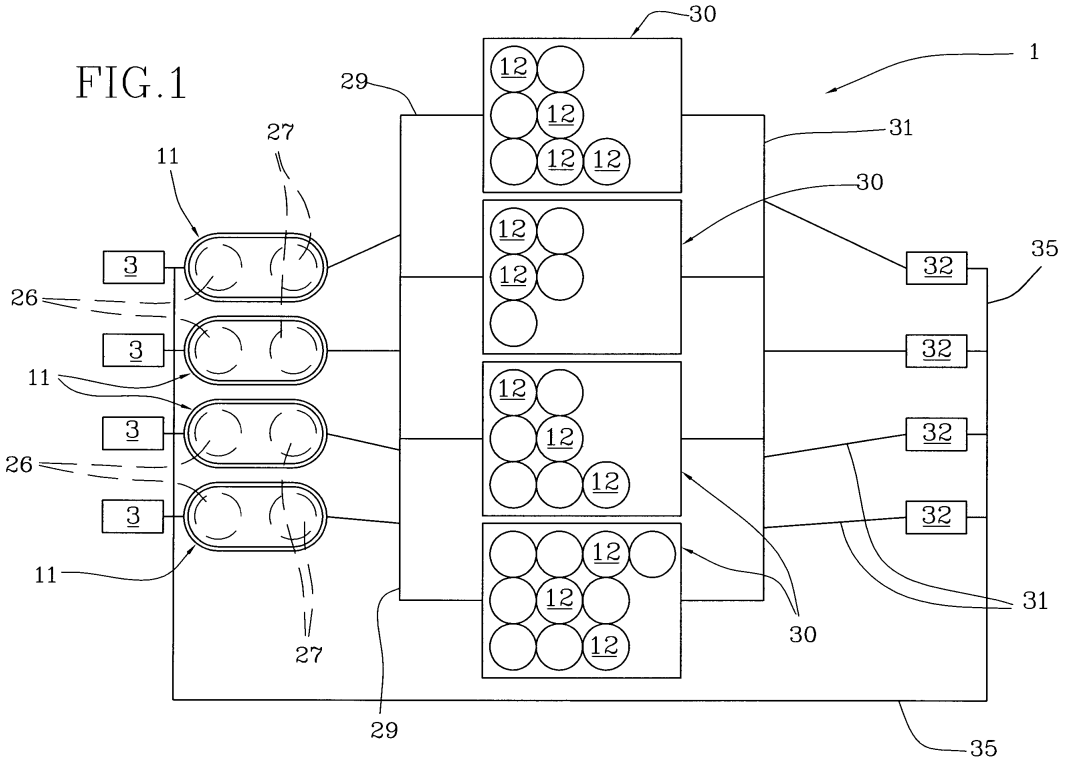
(54) A device and a method for storing and making available semi-manufactured tobacco products

(57) Semi-manufactured tobacco products are stored and made available by a device comprising a plurality of storage units (2) filled directly from a maker machine (3), at least one bin (11) containing the storage units (2) in ordered arrangement, and at least one mobile collection unit (12) by which a given number of storage units (2) can be taken up from the bin (11). Operating in conjunction with first, second and third guidance systems (29, 31, 35), the collection unit (12) can be moved from the bin (11) to at least one holding store (30), from the store (30) to at least one machine (32) by which the semi-manufactured tobacco products (4) are processed further, and from this machine back to the bin (11); accordingly, the device is able to link any given number of machines turning out semi-manufactured items to any given number of machines for subsequent processing of the semi-manufactured items.

FIG.1



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Description

[0001] The present invention relates to a device and a method for storing and making available semi-manufactured tobacco products. More particularly, the invention finds application in the tobacco industry, wherever a situation arises in which a machine turning out semi-manufactured tobacco products, referred to conventionally as a maker, needs to be linked operationally with a machine by which the semi-manufactured items are processed further, referred to conventionally as a packer.

[0002] The operational link between maker and packer is embodied generally as a conveyor belt along which the semi-manufactured items are directed from the outfeed of the maker to the infeed of the packer.

[0003] In practice however, this type of link offers no operational flexibility at all, since any break in production at the maker or the packer translates inevitably into a stoppage of the entire system.

[0004] Devices and methods have therefore been developed for storing and making available semi-manufactured tobacco products, such as will ensure that the maker or packer can continue to operate as normal, regardless of interruptions.

[0005] In particular, certain prior art devices take the form of storage units interposed and connected between the maker and the packer, which function as buffers able to compensate any imbalances in output of the maker and the packer. This means, by way of example, that in the event of a malfunction or of reduced demand for semi-manufactured items at the infeed of the packer, excess output from the maker will be taken up by the buffer and made available subsequently to the packer when required.

[0006] Likewise in this instance, however, these in-line devices for storing and making available semi-manufactured tobacco products do not always afford sufficient operational flexibility.

[0007] In effect, when there is a need to increase the output of finished tobacco products, two or more packers must be supplied with semi-manufactured items simultaneously. Again, if the intention is to increase the output of semi-manufactured items, for example to avoid the risk that batches of tobacco kept in storage for prolonged periods could suffer loss of aroma and flavour, then two or more makers will need to be kept in operation simultaneously.

[0008] Whichever the case, prior art devices for storing and making available semi-manufactured tobacco products as mentioned above are unable either to accommodate the output from a plurality of makers or to supply a plurality of packers, or both.

[0009] In the light of the foregoing, the object of the invention is to provide a device and a method for storing and making available semi-manufactured tobacco products, such as will be unaffected by the drawbacks mentioned above.

[0010] One particular object of the invention is to set forth a device and a method for storing and making available semi-manufactured tobacco products, able to offer a high level of operational flexibility.

[0011] A further object of the invention is to provide a device and a method for storing and making available semi-manufactured tobacco products, such as can be used to link any given number of machines turning out semi-manufactured tobacco products, with any given number of machines for subsequent processing of these same semi-manufactured items.

[0012] The stated objects are substantially realized in a device and a method for storing and making available semi-manufactured tobacco products, of which the features are recited in one or more of the appended claims.

[0013] The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 is a schematic representation of a device for storing and making available semi-manufactured tobacco products, in accordance with the present invention;
- figure 2 shows a first detail of the device in figure 1, illustrated in section;
- figure 3 shows a second detail of the device in figure 1, illustrated in section;
- figure 4 shows a third detail of the device in figure 1, illustrated in section;
- figure 5 shows the detail of figure 3 in a view from above, with certain parts omitted better to reveal others;
- figure 6 is a schematic representation of a device for storing and making available semi-manufactured tobacco products, in accordance with the present invention;
- figures 7 and 7a show a storage unit of the device in figure 6, illustrated in perspective;
- figure 8 shows a first detail of the device in figure 6, illustrated in perspective;
- figure 9 shows a second detail of the device in figure 6, illustrated in section;
- figures 10 to 14 are schematic representations illustrating the device of figure 6 in operation.

[0014] With reference to the accompanying drawings, numeral 1 denotes a device, in its entirety, for storing and making available semi-manufactured tobacco products, in accordance with the present invention.

[0015] The device 1 comprises a plurality of storage units 2 linked directly to a machine 3 (indicated schematically in figures 1 and 2) by which tobacco products are made; the storage units 2 are designed to accommodate a plurality of semi-manufactured tobacco products 4 turned out by the machine 3.

[0016] In the context of the present specification, a semi-manufactured tobacco product is taken to mean any given item of elongated appearance, such as a filter plug, a cigarette stick or a finished filter tipped cigarette.

A finished tobacco product, in this latter instance, is a packet containing a plurality of cigarettes.

[0017] More particularly, as illustrated in figure 5, each storage unit 2 comprises a preferably flat, spiral track 5 accommodating a plurality of tobacco products 4 lying parallel to the plane occupied by the track 5. The storage unit 2 further comprises means 6 by which the tobacco products 4 are loaded onto and unloaded from the spiral track 5. Such loading and unloading means 6 comprise a flexible belt 7 coupled slidably with the spiral track 5, on which the tobacco products 4 are positioned. The flexible belt 7 is allowed two degrees of freedom, and more exactly, able to bend along two axes perpendicular one to another and both to the predominating length dimension of the belt itself. The flexible belt 7 is extractable from the spiral track 5 in order to allow of directing the tobacco products 4 out of or into the storage unit 2. The function of the flexible belt 7 and the manner of its extraction from the spiral track 5 will be made clear in the course of the present specification.

[0018] Referring to figure 3, the storage unit 2 further comprises means 8 by which the tobacco products 4 are retained on the flexible belt 7. The retaining means 8 in question take the form of an inflatable spiral coil 9 positionable directly on the tobacco products 4, extending parallel with and distanced from the flexible belt 7. The spiral coil 9 is anchored to a top wall 10 of the storage unit 2, so that when inflated it will apply a compressive force to the tobacco products 4, which are thus held in place and prevented from shifting out of position when the storage unit 2 is set in motion.

[0019] In effect, the device 1 also comprises at least one bin 11 designed to accommodate a plurality of storage units 2, in ordered arrangement, and at least one unit 12 by means of which to collect a plurality of storage units 2 from the bin 11.

[0020] Referring to figure 2, each collection unit 12 comprises means 13 by which the storage units 2 are stacked in ordered sequence, and means 14 by which the units 2 are released in ordered sequence. In the preferred embodiment shown, more exactly, the stacking means 13 comprise four vertical rods 15 insertable through holes 2b afforded by the storage units 2 (see also figure 5).

[0021] Each collection unit 12 is able to stack twelve storage units 2. Release means 14 will comprise an elevator (not illustrated) by which the storage units 2 occupying the collection unit 12 can be lifted either singly or together. Also forming part of the collection unit 12 are motion-inducing means denoted 16, indicated schematically as wheels 17 in the drawings, such as will allow the unit 12 to be transferred from one location to another.

[0022] When the storage units 2 are taken up by the collection unit 12, moreover, each flexible belt 7 is extracted from the relative storage unit 2 through the agency of appropriate motion-inducing means 18 (indicated schematically in figure 3). In particular, such means 18 of inducing motion in the flexible belt 7 could take the form of an electric motor 19 mounted to a base portion 12a of the collection unit 12 and connected to a shaft 20 extending perpendicular to the planes on which the storage units 2 occupying the collection unit 12 are aligned. The shaft 20 is coupled by way of clutches and/or suitable electronic components (not illustrated) to a portion of the flexible belt 7 projecting beneath a bottom wall 21 of the storage unit 2 in such a way that the flexible belt 7 associated with a single storage unit 2 can be set selectively in rotation. Thus, according to the direction of rotation of the shaft 20, the flexible belt 7 can be extracted from the unit 2, that is to say removed from the spiral track 5, or inserted into the unit 2, hence directed onto the track 5.

[0023] The collection unit 12, to reiterate, takes up a plurality of storage units 2 from the bin 11. In the example illustrated, a bin 11 is associated with each machine turning out semi-manufactured tobacco products of a given type. The bin 11 presents a first opening 22 through which storage units 2 are admitted, and a second opening 23 through which storage units 2 are released. Each bin 11 further comprises means 24 by which the storage units 2 are transferred in ordered sequence from the first opening 22 to the second opening 23. Such transfer means 24, illustrated schematically in figure 2, are located at the opposite end of the bin 11 from the openings 22 and 23, in such a way as to engage the tops of the stacks of storage units 2 aligned respectively on the first opening 22 and on the second opening 23. The bin 11 also comprises a flow compensating buffer 25 that allows the operations of loading and unloading the storage units 2 to take place out of phase.

[0024] In particular, the operations in question take place at respective loading and unloading stations denoted 26 and 27, of which the loading station 26 is located between the bin 11 and the machine 3 turning out semi-manufactured tobacco products 4.

[0025] Referring to figure 2, the loading station 26 comprises a conveyor 28 connected to the outfeed of the machine 3 making the semi-manufactured tobacco products 4, and to an empty storage unit 2, that is to say containing no tobacco products 4, afforded by a collection unit 12 positioned immediately below the first opening 22 of the bin 11.

[0026] The manner of loading the tobacco products 4 into the storage unit 2 will be described in due course.

[0027] The unloading station 27 is located between the bin 11 and a collection unit 12 carrying no storage units 2 initially. This collection unit 12 is positioned immediately below the second opening 23 of the bin 11 and, in the example illustrated, comes directly from the loading station 26 where all the storage units 2 carried previously by the selfsame collection unit 12 will have been taken up previously into the bin.

[0028] The device 1 further comprises first guidance means 29 serving to guide and transfer collection units 12 carrying storage units 2, taken from the bins 11, to at least one holding store 30. In the preferred embodiment illustrated, the holding stores 30 are installed in number

identical to the number of the types of semi-manufactured tobacco products turned out by the machines 3.

[0029] Also included are second guidance means 31 departing from the holding stores 30 and serving to connect the selfsame stores 30 to at least one downstream machine 32 by which further processing steps are performed on the tobacco products 4.

[0030] In particular, the holding stores 30 are linked by the second guidance means 31 to a station 33 from which the tobacco products 4 are delivered to the downstream machine 32. The delivery station 33 comprises a conveyor belt 34 connected to the entry point of the downstream machine 32 and positionable in alignment with one of the storage units 2 stacked on the collection unit 12 coming from the store 30 (see figure 4). The tobacco products 4, as will shortly be made clear, are taken up from the storage units 2 by the conveyor belt 34 and transferred to the downstream machine 32.

[0031] Numeral 35 denotes third guidance means departing from the downstream machines 32, by which these same machines are linked to the loading station 26 of the bins 11. Thus, the collection units 12 carrying empty storage units 2, from which tobacco products 4 have been removed and delivered to the downstream machine 32, can be transferred to the loading stations 26 of the bins 11; it will be recalled, in effect, that the loading operation requires storage units 2 containing no tobacco products 4.

[0032] The first, second and third guidance means 29, 31 and 35 are able to operate in conjunction with the motion-inducing means 16 of the collection units 12 for the purpose of moving these same units between the various stations mentioned. By way of example, such means 29, 31 and 35 might take the form of electromechanical tracks, rails or the like, and accordingly, the motion-inducing means illustrated schematically as wheels in the accompanying drawings might equally well be embodied as electromagnetic shoes, for example, or the like.

[0033] In operation, a collection unit 12 parks or is positioned at the loading station 26 of the bin 11, in alignment with the first opening 22. At this stage the collection unit 12 carries a plurality of storage units 2 containing no tobacco products 4.

[0034] Semi-manufactured tobacco products 4 emerging from the machine 3 by which they have been made are transferred by the conveyor 28 toward a storage unit 2 at the top of the stack of units 2 carried by the collection unit 12. This topmost storage unit 2 contains no tobacco products and has no flexible belt 7. At this juncture, the flexible belt 7 occupying the next storage unit 2 down from the topmost unit is extracted at least in part from the spiral track 5 and positioned at the mouth of the spiral track 5 presented by the topmost storage unit 2. The conveyor 28 begins to advance tobacco products 4, which come to rest on the portion of the flexible belt 7 positioned previously on the spiral track 5 of the topmost storage unit 2. At the same time, the flexible belt 7 is advanced along the spiral track 5 by the motion-inducing means 18, thereby conveying the tobacco products 4 into the storage unit 2. Once the flexible belt 7 has been taken up completely by the spiral track 5, the storage unit 2 will be filled with tobacco products 4.

[0035] The storage unit 2 is now elevated by the release means 14 and directed through the first opening 22 into the bin 11.

[0036] The procedure described thus far is repeated until the penultimate storage unit 2 of the stack carried by the collection unit 12 has been directed into the bin 11. As regards the last storage unit 2 of the stack, the sequence remains the same except for the fact that the flexible belt 7 is supplied by an operator or from a special magazine (not illustrated) rather than being transferred from a storage unit 2 beneath.

[0037] Internally of the bin 11, the storage units 2 are advanced by the transfer means 24 from the first opening 22 toward the second opening 23.

[0038] The collection unit 12 from which the storage units 2 were supplied to the loading station 26 is now transferred to the unloading station 27 of the bin 11. In this position, a plurality of storage units 2 will descend onto the stacking means 13 of the collection unit 12.

[0039] Once this operation has been completed, the collection unit 12 passes along the first guidance means 29 into the store 30 and will remain there until such time as the downstream machine 32 calls for further tobacco products 4 to process.

[0040] Thereupon, the collection unit 12 advances along the second guidance means 31 and parks, or is positioned, near to the station 33 from which the tobacco products 4 are delivered to the downstream machine 32 for further processing.

[0041] During this step, in particular, the conveyor belt 34 connected to the infeed of the downstream machine 32 is positioned in alignment with the last of the storage units 2, that is to say the unit farthest from the topmost storage unit 2, so as to take up the tobacco products 4 contained in this same unit 2.

[0042] The flexible belt 7 of the storage unit 2, along which the tobacco products 4 are arranged, it will be recalled, is extracted from the spiral track 5 by the relative motion-inducing means 18.

[0043] Thus, as the flexible belt 7 emerges, the tobacco products 4 are transferred from the storage unit 2 onto the conveyor belt 34 serving the downstream processing machine 32. Once the flexible belt 7 is completely free, it will be returned to the loading station 26 of the bin 11 in readiness for a further loading operation, as described previously.

[0044] The operation of emptying further storage units 2 in the collection unit 12 is brought about in like manner to the filling operation already described, with the sole difference that the flexible belt 7 extracted from each storage unit 2 emptied in turn is inserted into the storage unit 2 immediately beneath.

[0045] Once all the storage units 2 carried by the col-

lection unit 12 are empty, the unit 12 returns or is taken to the loading station 26 of the bin 11 and the entire sequence is repeated.

[0046] The foregoing description refers notionally to a sequence of steps in which tobacco products 4 are transferred from a single machine 3 turning out semi-manufactured products to a single downstream machine 32 for the further processing of such products, whereas in the preferred embodiment of the present invention illustrated schematically in figure 1, a plurality of machines 3 turning out semi-manufactured products would be connected to a plurality of downstream processing machines 32. In other words, the device 1 disclosed guarantees appreciable flexibility in the transfer of tobacco products 4, inasmuch as one or more machines 3 turning out semi-manufactured tobacco products can be connected to any given number of machines 32 for further processing such products.

[0047] Figures 6 and 7 of the drawings illustrate an alternative embodiment of the device 1, comprising a plurality of storage units 36 (figure 7) filled directly from a machine 37 (figure 6) turning out semi-manufactured tobacco products 4, and positioned on a transporter unit 38.

[0048] In particular, the single storage unit 36 appears preferably as a disc and presents a spiral track 39 such as will accommodate a plurality of tobacco products 4 lying parallel to the plane occupied by the track 39, as illustrated in figure 7a.

[0049] With reference to figure 7, the spiral track 39 presents two side walls 40 and a bottom wall 41 by which the tobacco products 4 are contained and supported, respectively.

[0050] Departing from the peripheral rim of the storage unit 36 and working toward the centre, the spiral track 39 commences with an inclined portion 42 serving as a ramp 43 and merging with the bottom wall 41, of which the function will be made clear in due course.

[0051] The single storage unit 36 also presents a centre hole 44 designed to engage with stacking means 45 afforded by each transporter unit 38.

[0052] As illustrated in figure 8, the storage units 36 are stacked one on top of another on a transporter unit 38, their centre holes 44 occupied, with a measure of radial clearance, by a column 46 of the aforementioned stacking means 45. More exactly, as discernible in figure 8, the diameter of the centre hole 44 is significantly greater than that of the column 46, for reasons that will be made clear in due course.

[0053] To guarantee faultless alignment of the storage units 36 when stacked, advantageously, each one will incorporate a locating groove 47 that extends entirely around the base portion presented by the outermost periphery of the single unit 36. The locating groove 47 of each storage unit 36 engages with a matched locating tongue 48 extending around top of the peripheral rim presented by the single unit 36 beneath.

[0054] The transporter unit 38 comprises motion-inducing means 49 operating between the above noted stacking means 45 and each storage unit 36, of which a part is insertable into the centre hole 44 of the single unit 36, as will be made clear in due course with reference to figures 10...14.

[0055] More exactly, the motion-inducing means 49 in question comprise a passive supporting element 50 and an active supporting element 51, illustrated schematically in figure 9.

[0056] The passive element 50 and the active element 51 are substantially cylindrical in shape and present a maximum diameter matched substantially to the diameter of the centre hole 44 presented by the storage units, so that both elements are insertable into the centre hole 44.

[0057] The passive supporting element 50 is furnished with coupling means 52 by way of which the selfsame element 50 and a storage unit 36 can be anchored one to another. In practice, such coupling means 52 comprise at least one pin 53 insertable into a corresponding groove or slot (not illustrated) on the storage unit 36. In a preferred embodiment, the pin 53 will be actuated electromechanically, albeit in other embodiments the pin 53 might be actuated mechanically.

[0058] In any event, the pin 53 is capable of movement between an at-rest position, lodged entirely within the passive element 50, and an operating position lodged partly within the passive element 50 while also engaging the storage unit 36.

[0059] In addition, the passive supporting element 50 is equipped with locking means 54 by which the selfsame element 50 can be clamped to the stacking means 45. Such locking means 54 might be mechanical or electrical or electromechanical. Thus, any one storage unit 36, and indeed all of the units 36 stacked above this same unit, can be clamped at a given height, that is to say a selected position, on the column 46 of the stacking means 45.

[0060] The active supporting element 51 is furnished with coupling means 55 identical to those of the passive supporting element 50 described previously. Moreover, the active element 51 comprises first and second drive means denoted 56 and 57 respectively. In particular, the first drive means 56 operate between the active supporting element 51 and the column 46 of the stacking means 45, in such a way that the active element 51, hence also a relative storage unit 36, can be moved along the stacking means 45 of the transporter unit 38. The second drive means 57 operate likewise between the active supporting element 51 and the column 46 of the stacking means 45, in such a way that the active element 51, hence also a relative storage unit 36, can be set in rotation about the stacking means 45.

[0061] The active supporting element 51 is positioned beneath the passive supporting element 50 on the stacking means 45. Advantageously, moreover, the active element 51 presents a cylindrical portion 58 projecting from the main body of the element. The diameter of this cylindrical portion 58 is smaller than the maximum diameter of the active element 51 and designed to locate in recess

59 afforded by the passive element 50 when the two elements 50 and 51 are positioned one on top of the other.

[0062] Likewise to advantage, as will become clear, the motion-inducing means 49 comprising the passive supporting element 50 and the active supporting element 51 are designed such that the operation of loading and unloading tobacco products 4 to and from the storage units 36 is made swift and simple.

[0063] The transporter units 38, to reiterate, are designed to carry a plurality of storage units 36.

[0064] More particularly, the transporter units 38, with the storage units 36 full of tobacco products 4, are directed along first guidance means 60 linking the machine 37 turning out semi-manufactured items to at least one holding store 61. In the preferred embodiment illustrated, the holding stores 61 are installed in number identical to the number of the types of semi-manufactured tobacco products turned out by the machines 37.

[0065] Also included are second guidance means 62 departing from the holding stores 61 and linking them to at least one downstream machine 63 by which the tobacco products 4 are processed further.

[0066] In particular, the holding stores 61 are linked by the second guidance means 62 to a station 64 from which tobacco products 4 are delivered to the downstream machine 63. The delivery station 64 comprises take-up means 65, shown schematically in figure 6, connected to the infeed of the downstream machine 63; the tobacco products 4, as will shortly be made clear, are taken up by these same means 65 and transferred to the downstream machine 63.

[0067] Numeral 66 denotes third guidance means by which the downstream machines 63 are linked to loading stations 67 operating between each machine 37 turning out semi-manufactured tobacco products 4 and the transporter units 38. Thus, transporter units 38 carrying empty storage units 36, from which tobacco products 4 have been removed and delivered to the downstream machine 63, can be transferred to the loading stations 67 where they are refilled by supply means 68 (see figures 10 and 14) forming part of the selfsame stations 67.

[0068] The first, second and third guidance means 60, 62 and 66 are designed to operate in conjunction with motion-inducing means 69, illustrated schematically as wheels 70 in the accompanying drawings, by which the transporter units 38 are moved between the various stations mentioned. By way of example, such guidance means 60, 62 and 66 might take the form of electromechanical tracks, rails or the like, and accordingly, the motion-inducing means illustrated schematically as wheels in the drawings might equally well be embodied as electromagnetic shoes, for example, or the like.

[0069] In operation, a transporter unit 38 with storage units 36 parks or is positioned at the loading station 67. At this stage, all the storage units 36 except one are stacked and elevated above the base of the transporter unit 38. One storage unit 36, conversely, is positioned on the base of the transporter unit 38, as illustrated in figure 10.

[0070] The passive supporting element 50 is offered, or rather anchored by way of the coupling means 52, to the storage unit 36 facing the unit positioned on the base of the transporter unit 38 and supports the stack of units distanced from the unit 36 positioned on the base, with which the active supporting element 51 is associated.

[0071] At this juncture, the active element 51 is lifted marginally by the first drive means 56, and with it the storage unit 36 positioned on the base of the transporter unit 38, sufficiently for the unit 36 to clear the base.

[0072] Next, the supply means 68 are activated, setting in motion a double conveyor 71 preferably of belt type, which will proceed to advance a plurality of semi-manufactured tobacco products 4 turned out by a corresponding machine 37. One end of the double conveyor 71 is placed in alignment with the ramp 43 of the storage unit 36 coupled to the active supporting element 51 whereupon the element 51, and with it the storage unit 36, is set in rotation by the second drive means 57. The double conveyor 71 now begins directing tobacco products 4 into the spiral track 39 of the storage unit 36 which, in the course of its rotation, will pull the end of the conveyor 71 across the spiral until the entire track 39 has been filled with tobacco products 4.

[0073] Once the storage unit 36 has filled completely, the double conveyor 71 is shifted away to a point outside the dimensional compass of the transporter unit 38, whereupon the unit 36 can be repositioned on the base of the transporter unit 38 and the active supporting element 51 uncoupled.

[0074] The active element 51 is now raised by the first drive means 56 toward the passive supporting element 50, which continues to hold the stack of empty storage units 36 in the elevated position as illustrated in figure 11.

[0075] Once the active supporting element 51 reaches the passive element 50, the cylindrical portion 58 of the one will locate in the recess 59 afforded by the other, as illustrated in figure 12.

[0076] At this point, the coupling means 52 of the passive element 50 release the storage unit 36 to which it is anchored currently, and the unit 36 drops, coming to rest on the active supporting element 51. In effect, the coupling means 55 of the active supporting element 51 will now be in the operating position, hence able to arrest the fall of the storage unit 36 and indeed of the entire stack of empty units, which is held as illustrated in figure 13.

[0077] The first drive means 56 of the active element 51 are now activated again, and the stack of empty storage units 36 is raised by a distance equivalent to the depth of one such unit 36. Once the stack is at the appropriate height, the locking means 54 and the coupling means 52 of the passive element 50 are again activated to secure the storage unit 36 in position, clamped to the stacking means 45 of the transporter unit 38 immediately above the unit 36 now engaged by the active element 51.

[0078] At this juncture, the first drive means 56 of the active supporting element 51 are activated, and the emp-

ty storage unit 36 is lowered onto the storage unit 36 filled previously.

[0079] Once the empty storage unit 36 makes contact with the full storage unit 36, the steps described thus far will be repeated and another unit 36 is filled, as illustrated in figure 14.

[0080] The sequence is repeated until all the storage units 36 have been filled.

[0081] With the operation concluded, the transporter unit 38 passes along the first guidance means 60 into the store 61 and will remain there until such time as the downstream machine 63 calls for further tobacco products 4 to process.

[0082] Thereupon, the transporter unit 38 advances along the second guidance means 62 and parks, or is positioned, near to the station 64 from which the tobacco products 4 are delivered to the downstream machine 63 for further processing.

[0083] During this step, more exactly, a double conveyor identical to the double conveyor 71 described above and connected to the infeed of the downstream machine 63, is positioned in alignment with one of the storage units 36 and proceeds to take up the tobacco products 4 contained therein.

[0084] More precisely, one end of the double conveyor is offered to the ramp 43 of the storage unit 36, whereupon the unit 36 is set in rotation and the tobacco products 4 are unloaded directly onto the double conveyor.

[0085] The storage unit 36 to which the double conveyor of the take-up means 65 attaches at the unloading station 64 is the unit positioned on the base of the transporter unit 38, whereas all the remaining storage units 36 are distanced from the bottom unit and held in the elevated position by the passive supporting element 50, in exactly the same manner as occurs when the tobacco products 4 are loaded.

[0086] Motion is induced in the storage units 36 for the purpose of unloading the full complement of tobacco products 4 in exactly the same way as occurs when the products are loaded, that is to say, releasing the storage units 36 singly from the stack held by the passive supporting element 50 and attaching the double conveyor to each one in turn.

[0087] The direction in which the storage units 36 are caused to rotate when emptying, self-evidently, is opposite to the direction of rotation induced when the selfsame units 36 are being filled.

[0088] Once all the storage units 36 carried by the transporter unit 38 are empty, the unit 38 returns or is taken to the loading station 67 and the entire sequence is repeated.

[0089] The foregoing description refers notionally to a sequence of steps in which tobacco products 4 are transferred from a single machine 37 turning out semi-manufactured products to a single downstream machine 63 for the further processing of such products, whereas in the preferred embodiment of the present invention illustrated schematically in figure 6, a plurality of machines 37 turning out semi-manufactured products would be connected to a plurality of downstream processing machines 63. In other words, the device 1 disclosed guarantees appreciable flexibility in the transfer of tobacco products 4, inasmuch as one or more machines 37 turning out semi-manufactured tobacco products can be connected to any given number of machines 63 for further processing such products.

Claims

1. A device for storing and making available semi-manufactured tobacco products,
characterized
in that it comprises:

   a plurality of storage units (36) fed directly by a machine (37) turning out semi-manufactured tobacco products (4);
   at least one transporter unit (38) serving to carry the plurality of storage units (36), in ordered arrangement;
   first guidance means (60) by which the transporter unit (38) is directed to at least one holding store (61) ;
   second guidance means (62) by which the transporter unit (38) is directed from the at least one holding store (61) to at least one machine (63) by which the semi-manufactured tobacco products (4) are processed further.

2. A device as in claim 1, comprising third guidance means (66) by which the transporter unit (38) is transferred from the at least one machine (63) for further processing of the tobacco products (4) to the machine (37) turning out semi-manufactured tobacco products (4).

3. A device as in claims 1 and 2, comprising a loading station (67) operating between the machine (37) turning out semi-manufactured tobacco products (4) and the transporter unit (38), at which semi-manufactured tobacco products (4) are fed to the storage units (36).

4. A device as in preceding claims, comprising an unloading station (64) operating between the machine (63) by which semi-manufactured tobacco products (4) are processed further, and a transporter unit (38), at which semi-manufactured tobacco products (4) are transferred to the further processing machine (63).

5. A device as in claims 3 and 4, wherein the loading station (67) comprises means (68) by which to supply a storage unit (36) with semi-manufactured tobacco products (4) and the unloading station (64) comprise

means (65) by which tobacco products (4) are taken up from a storage unit (36).

6. A device as in claim 5, wherein take-up means (65) and supply means (68) comprise a respective double conveyor (71) preferably of belt type, of which a first end is positionable relative to a storage unit (36) in such a way that tobacco products (4) can be taken up from or supplied to the selfsame unit.

7. A device as in claim 6, wherein each transporter unit (38) comprises means (49) by which motion is induced selectively in each storage unit (36) in such a way as to present the selfsame units (36) to the first end of the double conveyor (71) in ordered sequence.

8. A device as in claim 7, wherein motion-inducing means (49) comprise a passive supporting element (50) by which at least one storage unit (36) can be retained in a position distanced from the first end of the double conveyor (71), and an active supporting element (51) by which at least one storage unit (36) can be retained in a position of interaction with the first end of the double conveyor (71).

9. A device as in claim 8, wherein the active supporting element (51) comprises first drive means (56) by which at least one storage unit (36) is transferable through a plurality of operating positions along the transporter unit (38).

10. A device as in claim 9, wherein the passive supporting element (50) and the active supporting element (51) are equipped with respective coupling means (52, 55), such that each can be anchored to a respective storage unit (36).

11. A device as in preceding claims, wherein each transporter unit (38) comprises stacking means (45) by which the storage units (36) are ordered one on top of another.

12. A device as in preceding claims, wherein each storage unit (36) comprises a spiral track (39) accommodating the tobacco products (4).

13. A device as in claims 10, 11 and 12, wherein the active supporting element (51) comprises second drive means (57) by which the spiral track (39) is set in rotation relative to the stacking means (45).

14. A method of storing and making available semi-manufactured tobacco products,
characterized
in that it includes the steps of:

feeding semi-manufactured tobacco products (4) to a plurality of storage units (36), unit by unit, placed on a plurality of transporter units (38);
transferring the transporter units (38) to at least one holding store (61);
transferring the transporter units (38) selectively from the holding stores (61) to at least one machine (63) for further processing of the semi-manufactured tobacco products (4); and
unloading the tobacco products (4) from the storage units (36) to supply the further processing machine (63).

15. A method as in claim 14, including the step of transferring each transporter unit (38) from the further processing machine (63) to at least one machine (37) turning out semi-manufactured tobacco products (4), in readiness for the step of feeding semi-manufactured tobacco products (4) into the storage units (36).

16. A method as in claim 14 or 15, wherein the step of feeding semi-manufactured tobacco products (4) to the storage units (36) includes the steps of positioning one end of a double conveyor (71) carrying tobacco products (4) on an inclined portion (42) presented by a spiral track (39) of a storage unit (36), and simultaneously setting the spiral track (39) of the storage unit (36) in rotation.

17. A method as in claim 16, wherein the step of unloading the tobacco products (4) from the storage units (36) includes the steps of positioning one end of a double conveyor (71) on the inclined portion (42) presented by the spiral track (39) of the storage unit (36), and simultaneously setting the spiral track (39) of the storage unit (36) in rotation.

18. A method as in claim 17, wherein the step of feeding tobacco products (4) to the storage unit (36) involves causing the spiral track (39) to rotate in the direction opposite to that in which the selfsame track (39) is caused to rotate when unloading tobacco products (4) from the storage unit (36).

19. A method as in claim 16, wherein the step of positioning the end of a double conveyor (71) carrying tobacco products (4) on the inclined portion (42) presented by the spiral track (39), in order to load tobacco products (4) into the storage unit (36), includes the steps of lowering one empty storage unit (36) onto the storage unit (36) last filled with tobacco products (4) and holding other empty storage units (36) in an elevated position, distanced from the unit (36) about to be filled, so that the end of the double conveyor (71) can be offered to the spiral track (39) of the unit about to be filled.

20. A method as in claim 17, wherein the step of positioning the end of a double conveyor (71) carrying

tobacco products (4) on the inclined portion (42) presented by the spiral track (39), in order to unload tobacco products (4) from the storage unit (36), includes the steps of lowering a full storage unit (36) onto the storage unit (36) last emptied of tobacco products (4) and holding other full storage units (36) in an elevated position, distanced from the unit (36) about to be emptied, so that the end of the double conveyor (71) can be offered to the spiral track (39) of the unit about to be emptied.

21. A storage unit for tobacco products, comprising a spiral track (39) along which tobacco products (4) are accommodated in ordered arrangement.

22. A storage unit as in claim 21, wherein the spiral track (39) comprises an inclined portion (42) such as will receive the end of a double conveyor.

23. A storage unit as in claim 22, wherein the inclined portion (42) comprises a ramp (43) allowing the end of a double conveyor to locate internally of the spiral track (39).

24. A storage unit as in claim 23, wherein the spiral track (39) affords a centre hole (44), by which the relative storage unit (36) is rendered positionable on a column and stackable with other storage units.

25. A device for storing and making available semi-manufactured tobacco products,
characterized
in that it comprises:

a plurality of storage units (2) fed directly by a machine (3) turning out semi-manufactured tobacco products (4);
at least one bin (11) containing the plurality of storage units (2) in ordered arrangement;
at least one collection unit (12) in receipt of a plurality of storage units (2) from the bin (11);
first guidance means (29) by which a collection unit (12) filled from the bin (11) is directed to at least one holding store (30);
second guidance means (31) by which the collection unit (12) is directed from the at least one store (30) to at least one machine (32) by which the semi-manufactured tobacco products (4) are processed further.

26. A device as in claim 1, comprising third guidance means (35) by which the collection unit (12) is transferred from the at least one machine (32) for further processing of the tobacco products (4), to the bin (11).

27. A device as in claim 25 or 26, comprising a plurality of bins (11) each associated with a machine (3) turning out semi-manufactured tobacco products (4) of one type.

28. A device as in claims 25 to 27, wherein the bin (11) comprises a first opening (22) through which the storage units (2) are received, a second opening (23) through which the storage units (2) are released, and means (24) by which the storage units (2) are transferred in ordered sequence from the first opening (22) to the second opening (23).

29. A device as in claims 25 to 28, comprising a loading station (26) operating between the machine (3) turning out semi-manufactured tobacco products (4) and the bin (11), at which the storage units (2) are filled with semi-manufactured tobacco products (4).

30. A device as in claims 25 to 29, comprising an unloading station (27) operating between the bin (11) and one of the collection units (12), at which the storage units (2) are transferred to the collection unit (12).

31. A device as in claims 25 to 30, wherein the collection units (12) comprise means (13) by which to stack the storage units (2) in ordered sequence, and means(14) by which the selfsame storage units (2) are released in ordered sequence, so that the plurality of storage units (2) can be loaded and unloaded in ordered sequence.

32. A device as in claim 29, wherein the loading station (26) is supplied with empty storage units (2) by collection units (12) redirected from the machine (32) for further processing of the tobacco products (4) by way of the third guidance means (35).

33. A device as in claims 30 and 32, wherein the unloading station (27) is supplied with empty collection units (12) from which storage units (2) have been released at the loading station (26).

34. A device as in claims 25 to 33, wherein the collection unit (12) comprises motion-inducing means (16) interacting with the first, second and third guidance means (29, 31, 35) to the end of transferring the collection unit (12).

35. A device as in claims 25 to 34, wherein each storage unit (2) comprises a spiral track (5) accommodating the tobacco products (4), and means (6) by which the tobacco products (4) are loaded onto and unloaded from the spiral track (5).

36. A device as in claim 35, wherein loading and unloading means (6) comprise a flexible belt (7) engaging slidably with the spiral track (5), and the tobacco products (4) are placed directly on the flexible belt

(7).

37. A device as claim 36, further comprising motion-inducing means (18) associated with each collection unit (12) and acting selectively on the storage units (2) occupying the collection unit (12), in such a way that each flexible belt (7) can be extracted from and inserted into the relative storage unit (2).

38. A method of storing and making available semi-manufactured tobacco products,
characterized
in that it includes the steps of:

feeding semi-manufactured tobacco products (4) to a plurality of storage units (2), unit by unit;
loading the storage units (2) in succession into a corresponding bin (11);
transferring a predetermined quantity of storage units (2) from the bin (11) to a plurality of collection units (12);
transporting the collection units (12) to at least one holding store (30);
transporting the collection units (12) selectively from the holding stores (30) to at least one machine (32) for further processing of the semi-manufactured tobacco products (4); and
unloading the tobacco products (4) from the storage units (2) to supply the processing machine (32).

39. A method as in claim 38, comprising the step of transporting each collection unit (12) from the processing machine (32) to at least one bin (11) in order to fill the transported storage units (2) with semi-manufactured tobacco products (4).

40. A method as in claim 38 or 39, wherein the step of filling the storage units (2) with semi-manufactured tobacco products (4) includes the steps of transferring a plurality of storage units (2) in succession from a collection unit (12) to a loading station (26), and transferring the tobacco products (4) from a manufacturing machine (3) to one storage unit (2) at a time.

41. A method as in claim 40, wherein the step of transferring the tobacco products (4) to a storage unit (2) includes the steps of placing the tobacco products (4) on a flexible belt (7) and simultaneously directing the flexible belt (7) along a spiral track (5) of the storage unit (2).

42. A method as in claim 41, wherein the step of transferring a predetermined quantity of storage units (2) from the bin (11) to a plurality of collection units (12) includes the steps of transferring a collection unit (12) from the loading station (26) of the bin (11) to an unloading station (27) of the bin (11) and stacking a predetermined quantity of storage units (2) in ordered sequence on the collection unit (12).

43. A method as in claims 38 to 42, wherein the step of unloading the tobacco products (4) from the storage units (2) to the processing machine (32) includes a step in which a conveyor belt (34) connected to the infeed of the processing machine (32) is positioned in alignment with one of the storage units (2) stacked on the collection unit (12), and a step of taking up the tobacco products (4) from the storage unit (2).

44. A method as in claim 43, wherein the step of taking up the tobacco products (4) from the storage unit (2) includes the steps of extracting a flexible belt (7) on which the tobacco products (4) are positioned, from a spiral track (5) of the storage unit (2), and simultaneously transferring the tobacco products (4) from the extracted portion of the flexible belt (7) to the conveyor belt (34).

45. A storage unit for tobacco products,
characterized
in that it comprises:

a spiral track (5) along which tobacco products (4) are accommodated in ordered arrangement; and
means (6) by which the tobacco products (4) are loaded onto and unloaded from the spiral track (5).

46. A storage unit as in claim 45, of which the loading and unloading means (6) consist in a flexible belt (7) coupled slidably with the spiral track (5), wherein the tobacco products (4) are positioned directly on the flexible belt (7), and motion can be induced in the belt (7) to enable its extraction from and insertion into the storage unit (2).

47. A storage unit as in claim 45 or 46, comprising means (8) by which the tobacco products (4) are retained on the flexible belt (7).

48. A storage unit as in claim 47, wherein retaining means (8) comprise an inflatable spiral coil (9) positioned on the tobacco products (4), extending parallel with and at a distance from the flexible belt (7), and anchored to a top wall (10) of the storage unit (2).

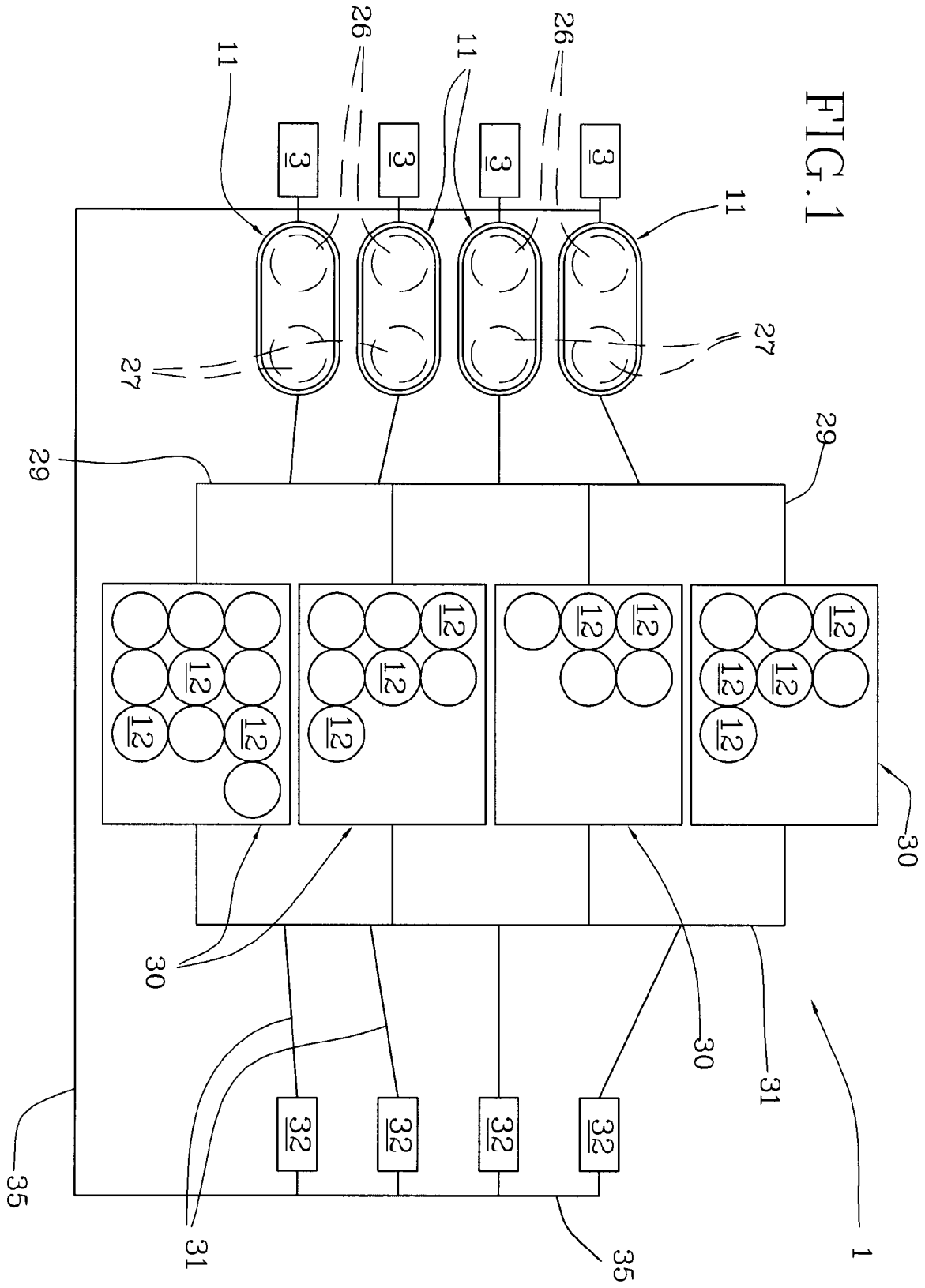

FIG. 1

FIG.2

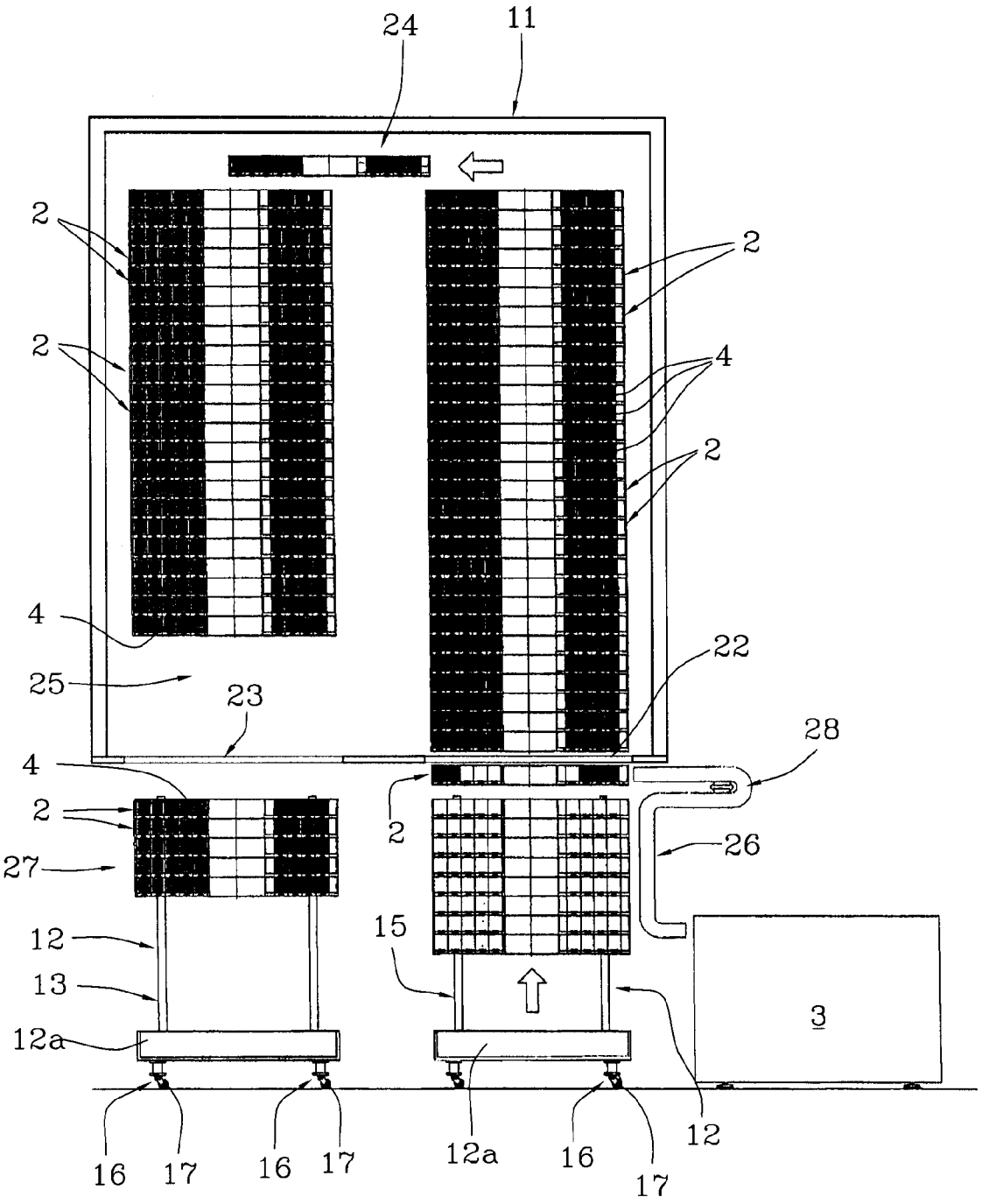
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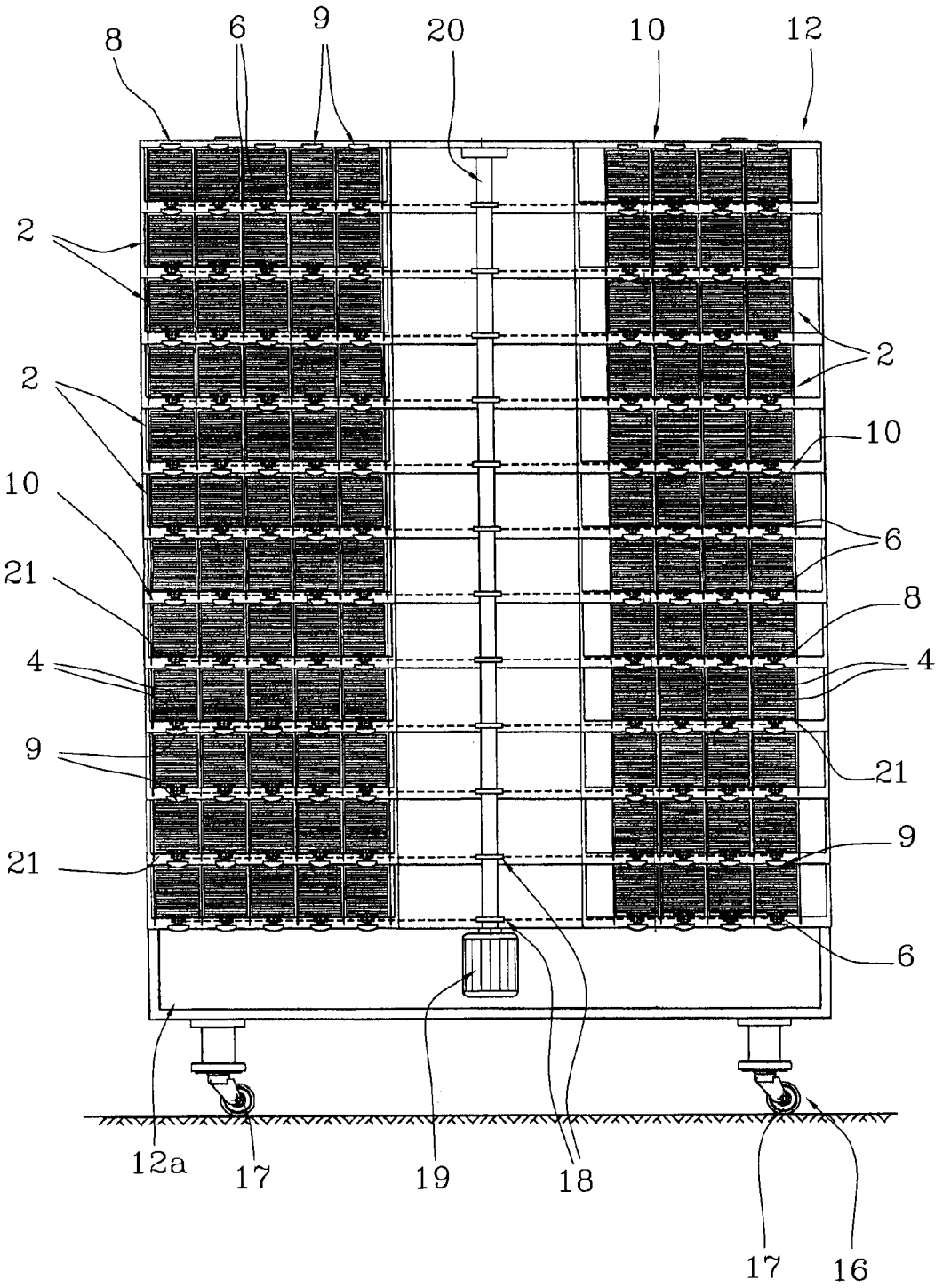
FIG.3



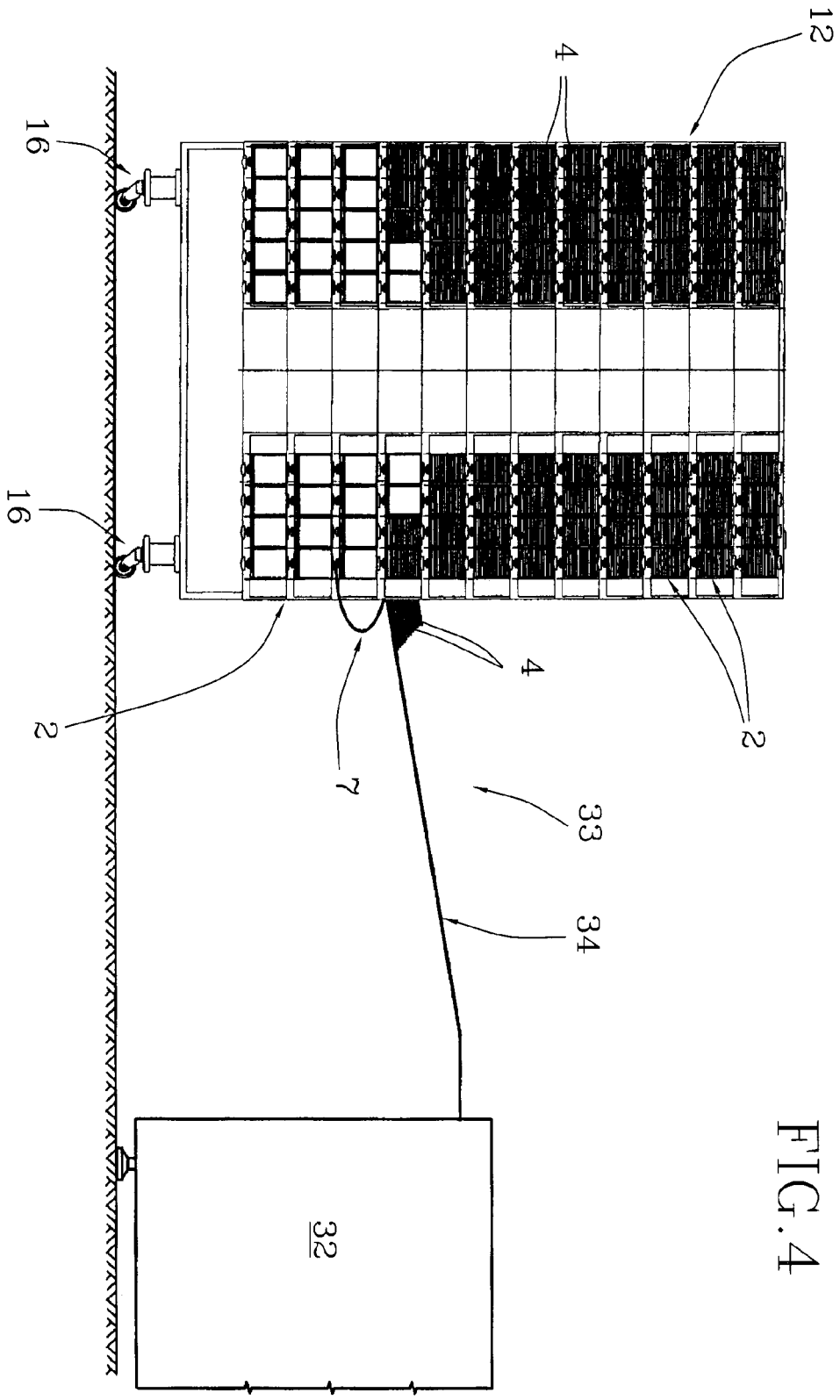
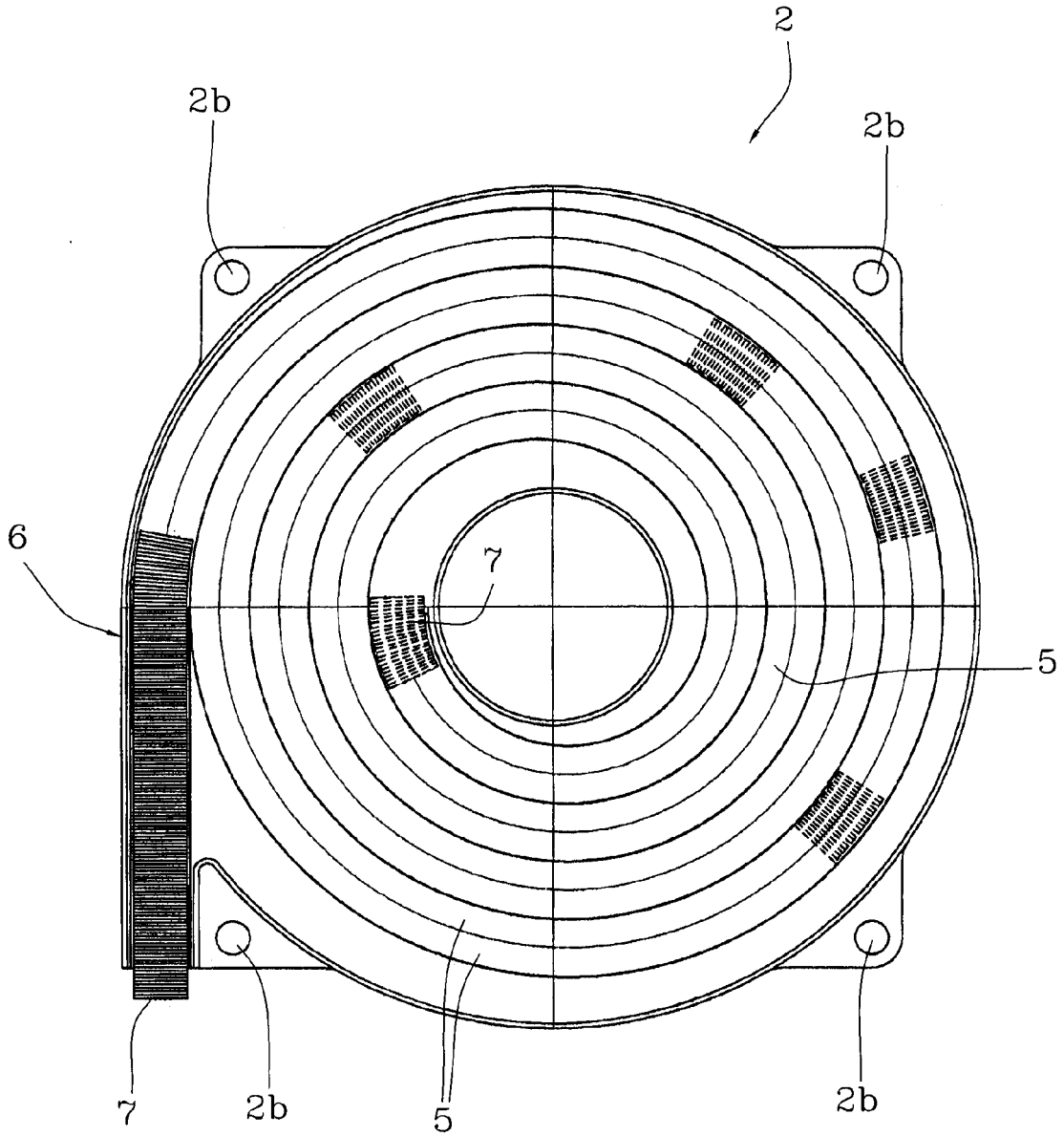


FIG. 4

FIG.5



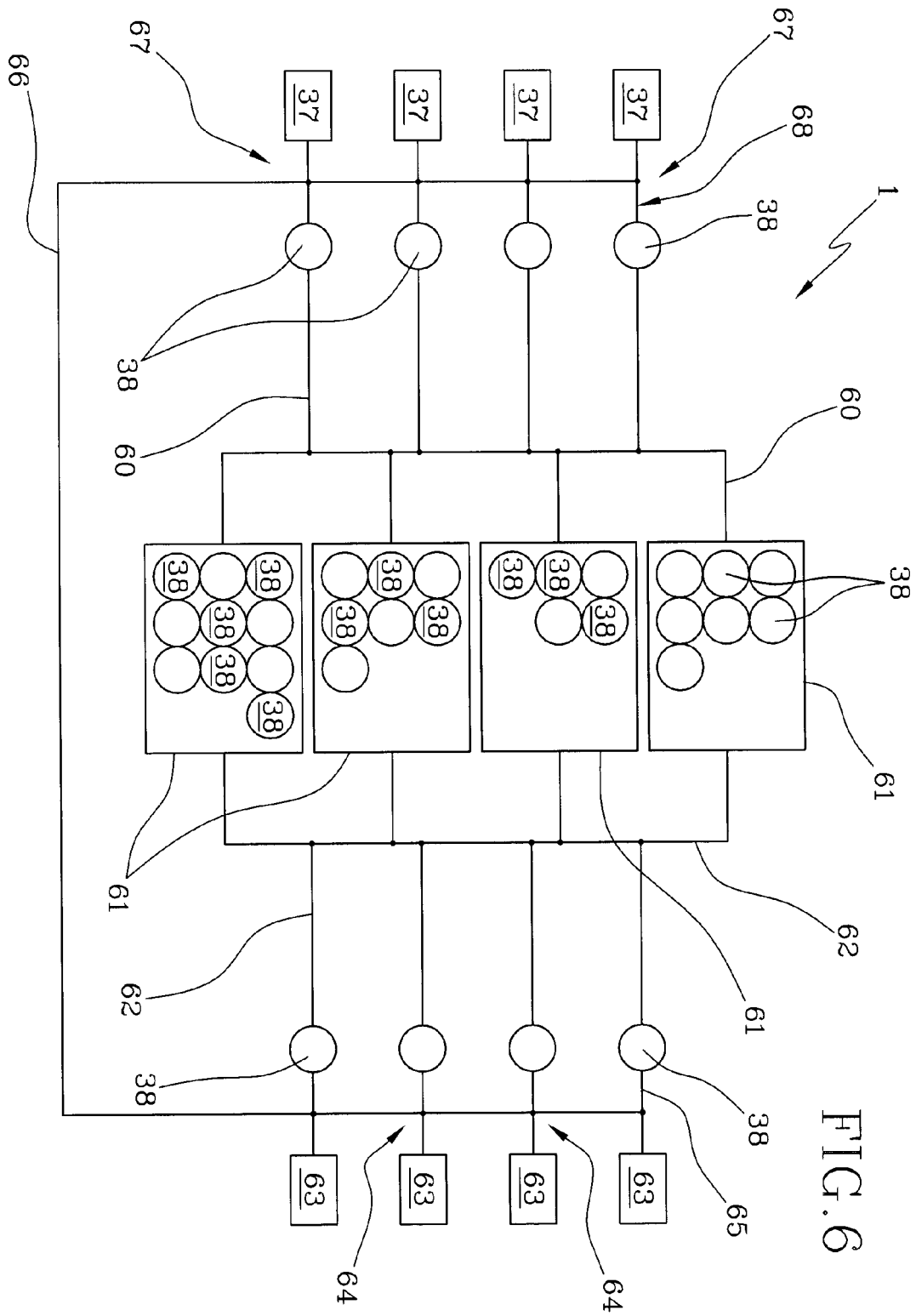


FIG. 6

FIG. 7

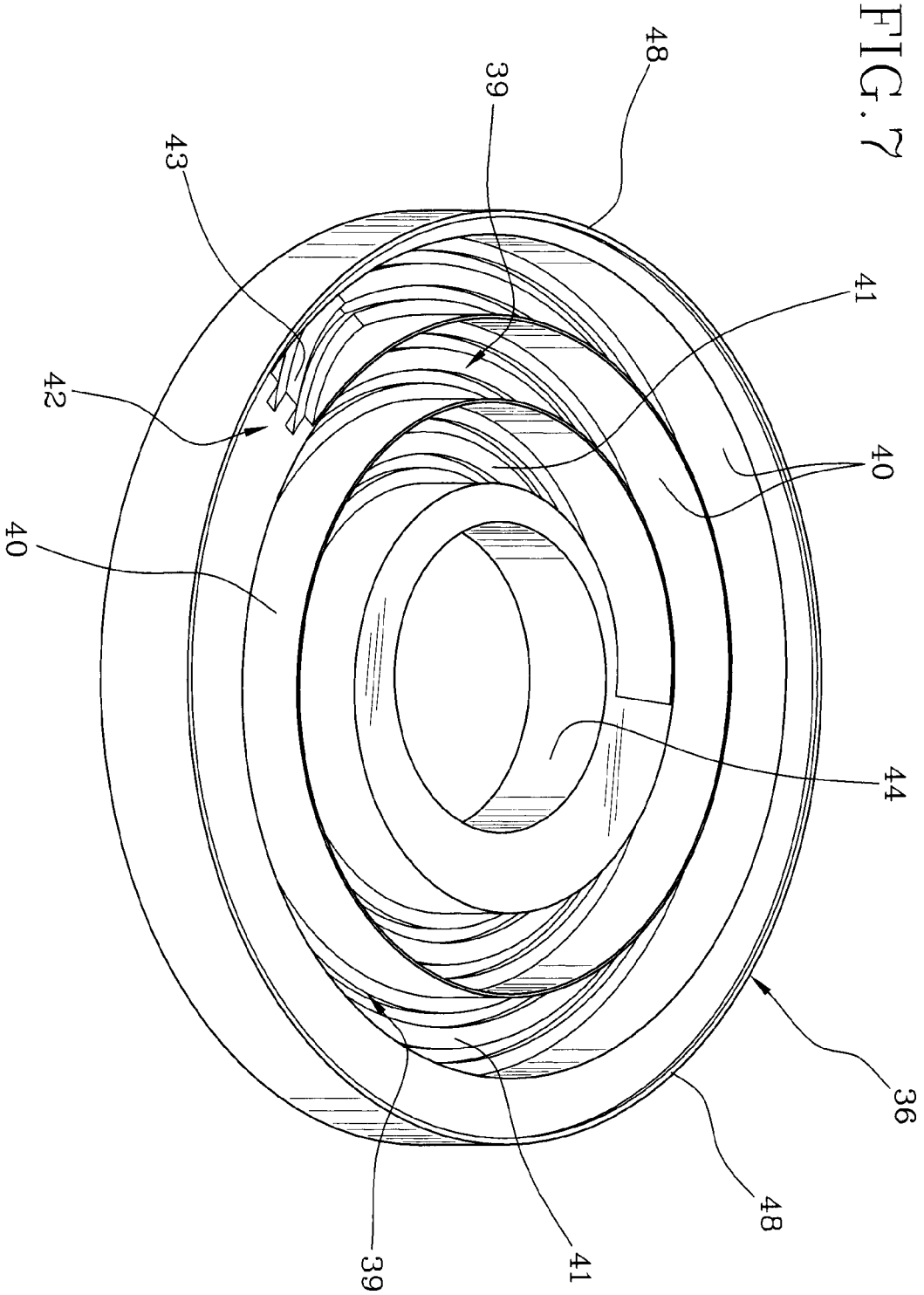


FIG. 7a

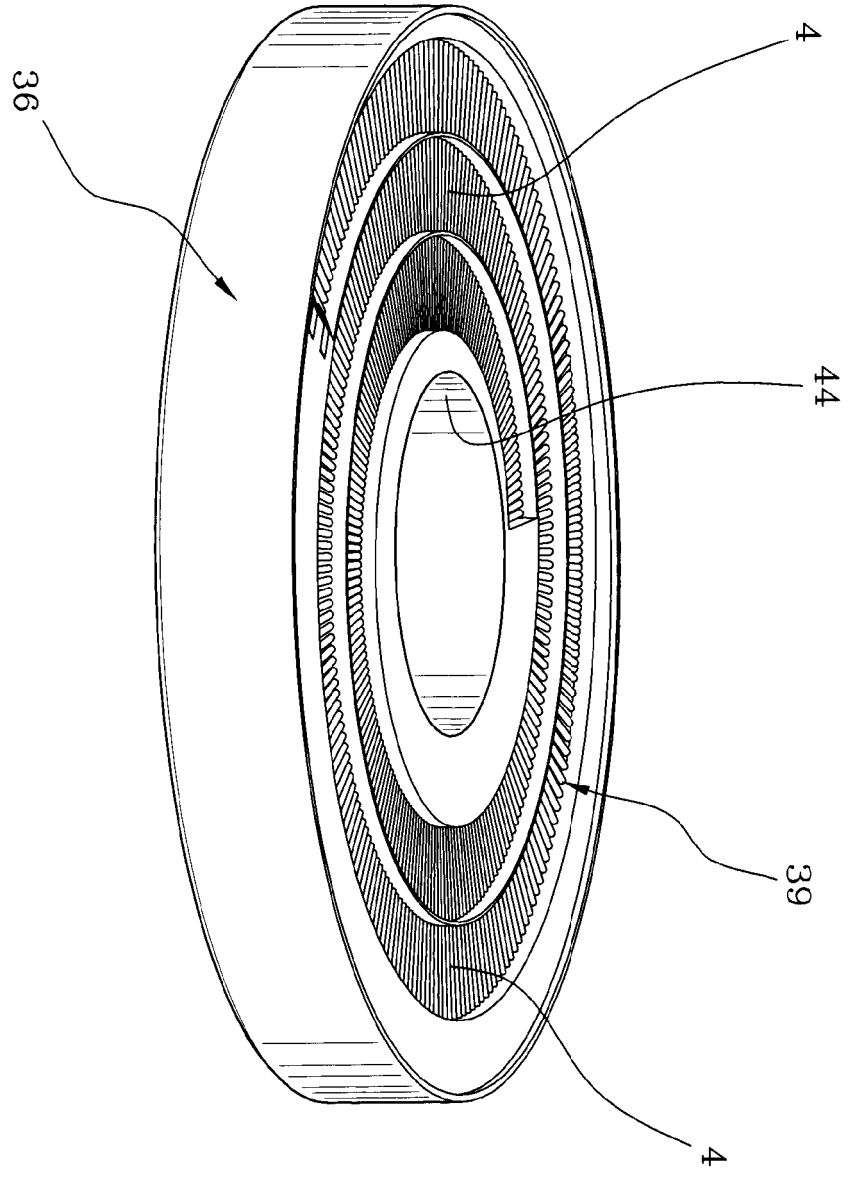


FIG.8

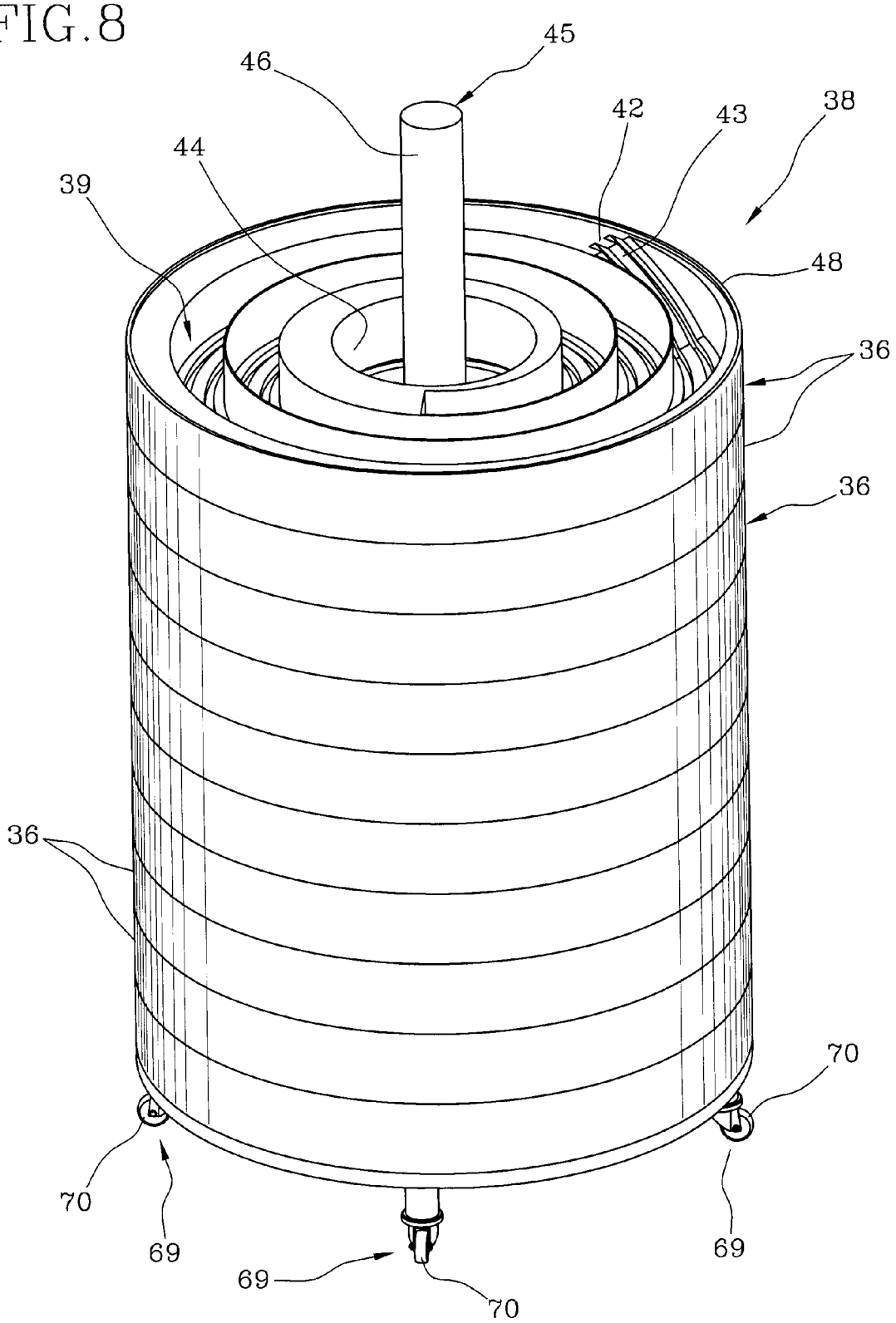


FIG.9

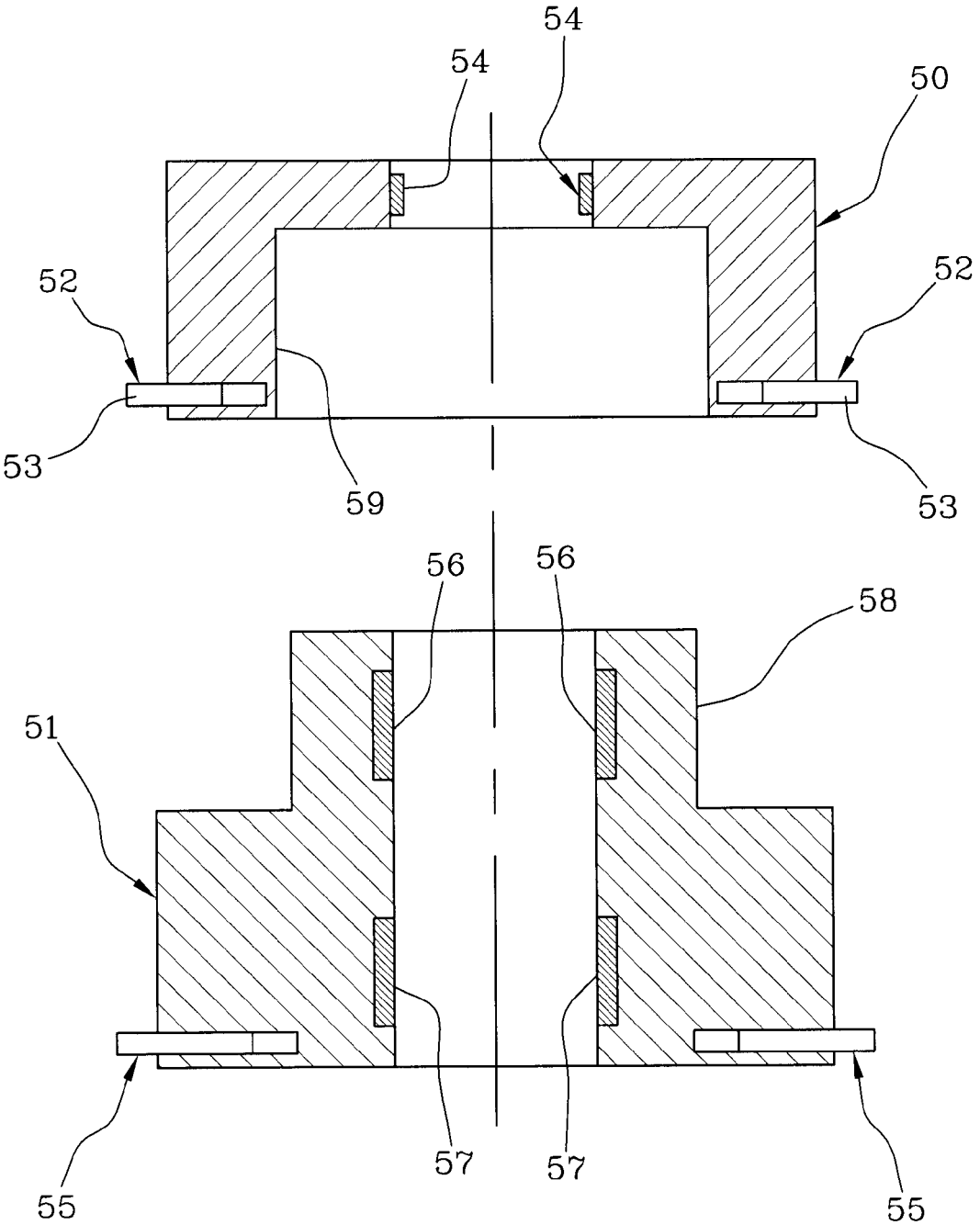


FIG.10

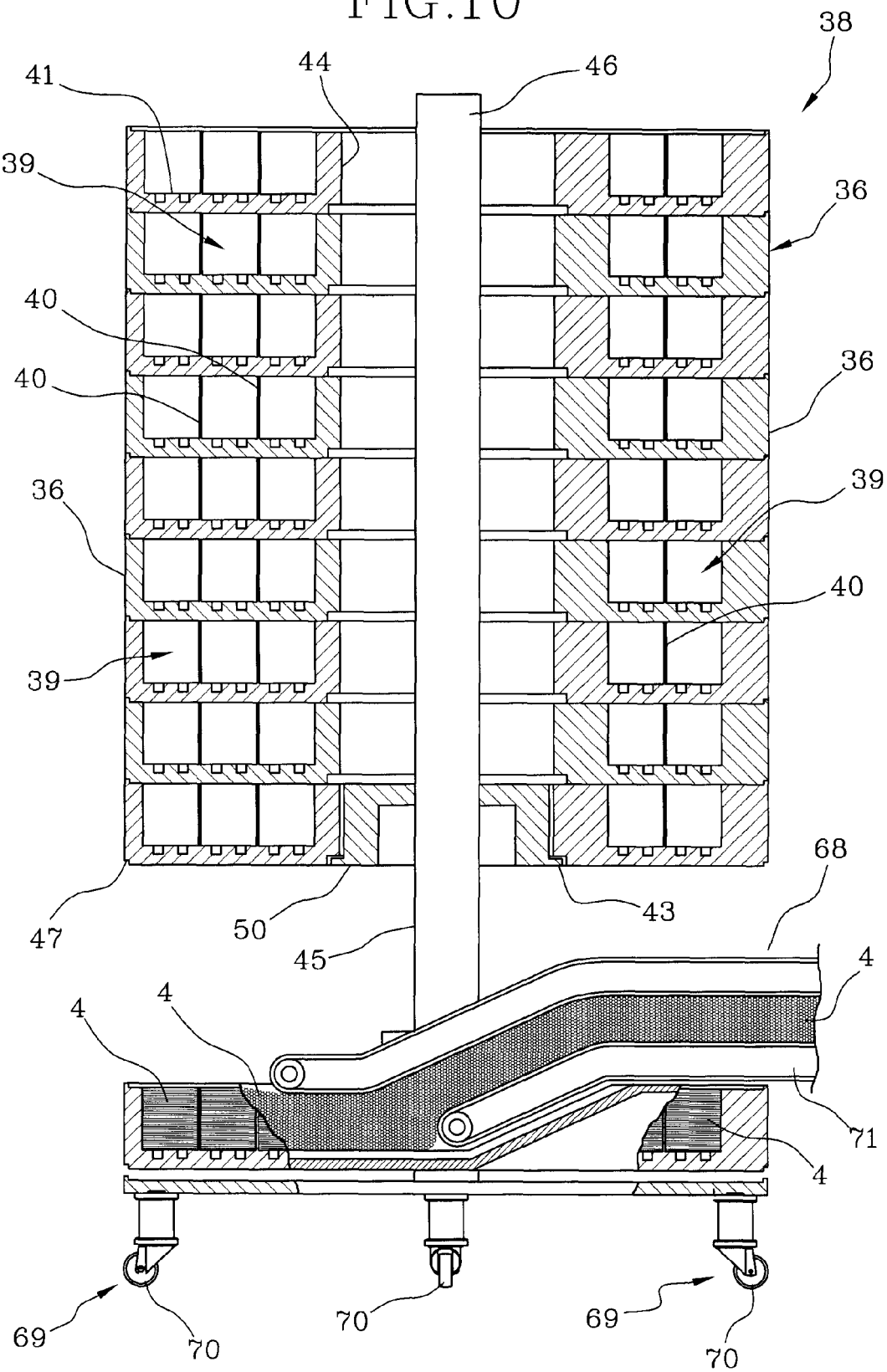

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FIG.11

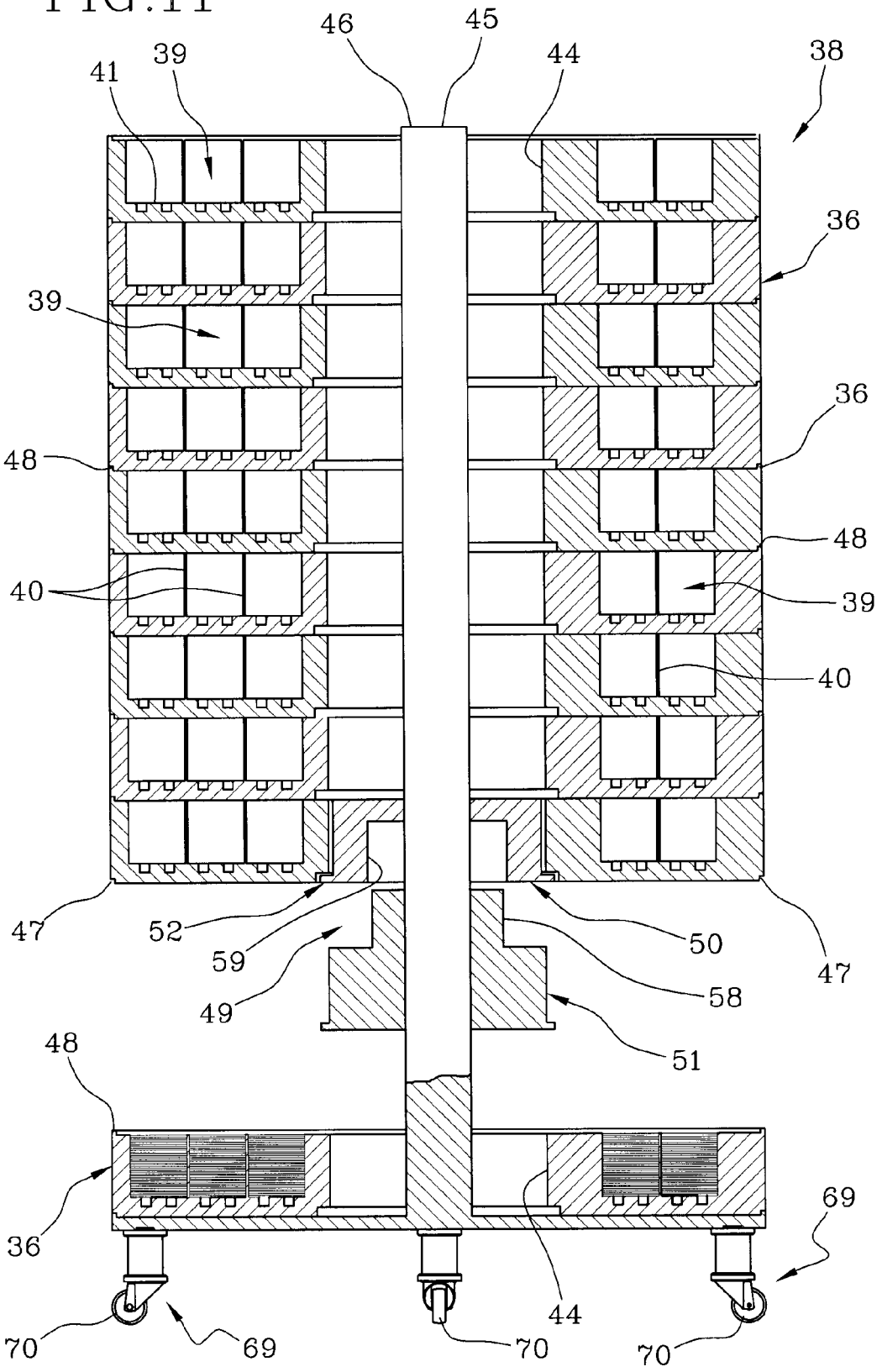
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FIG.12

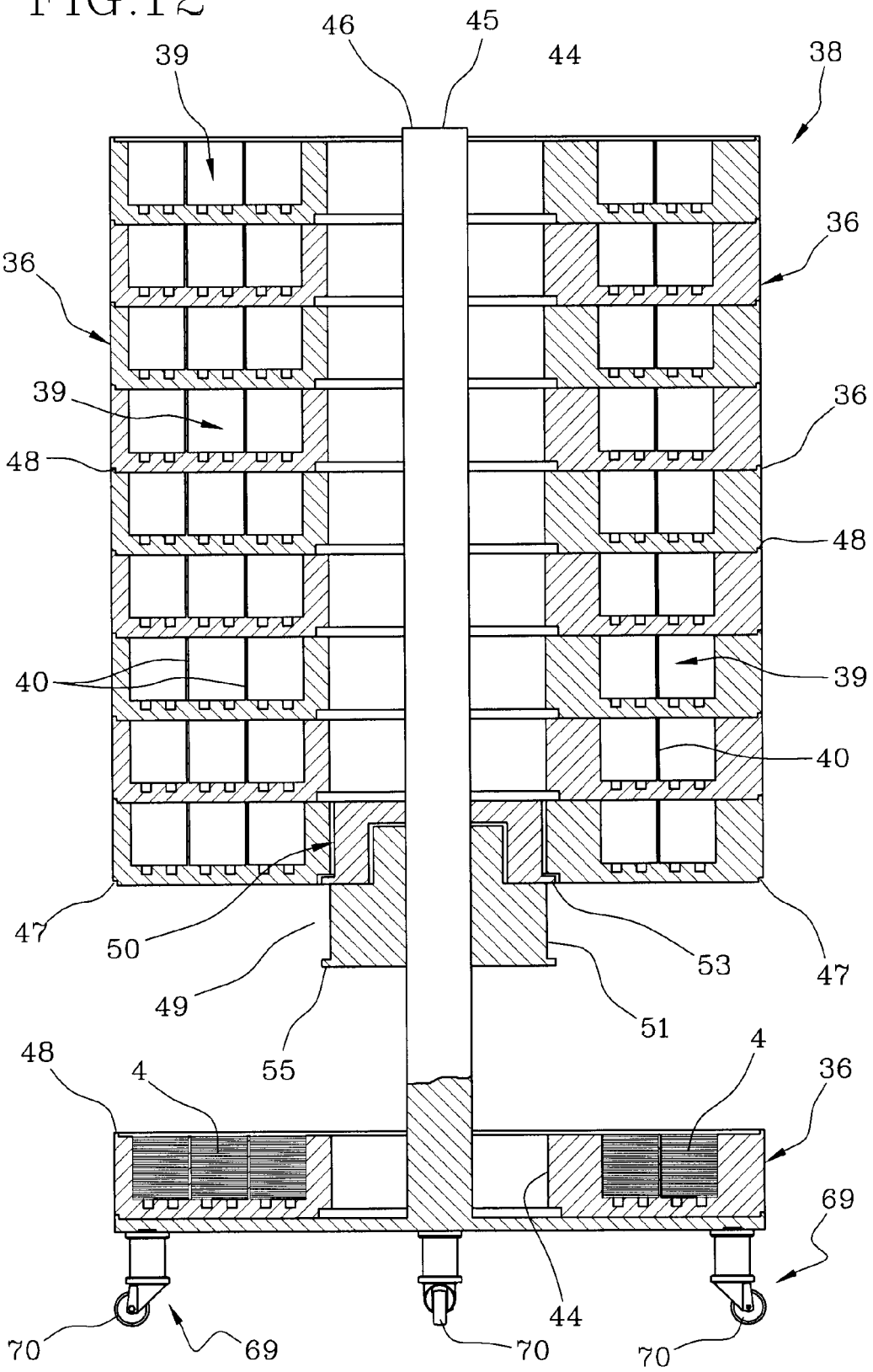
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FIG.13

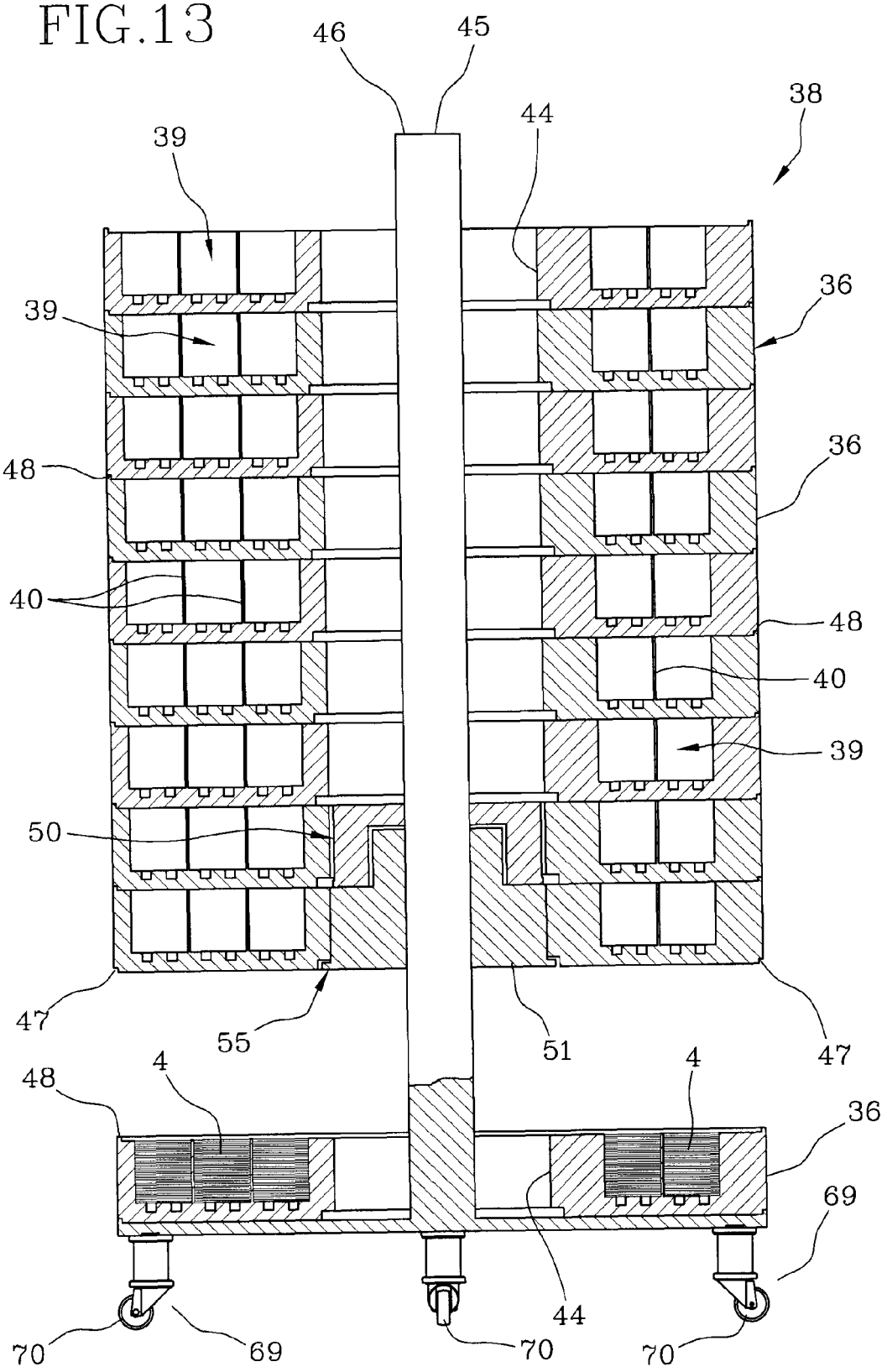
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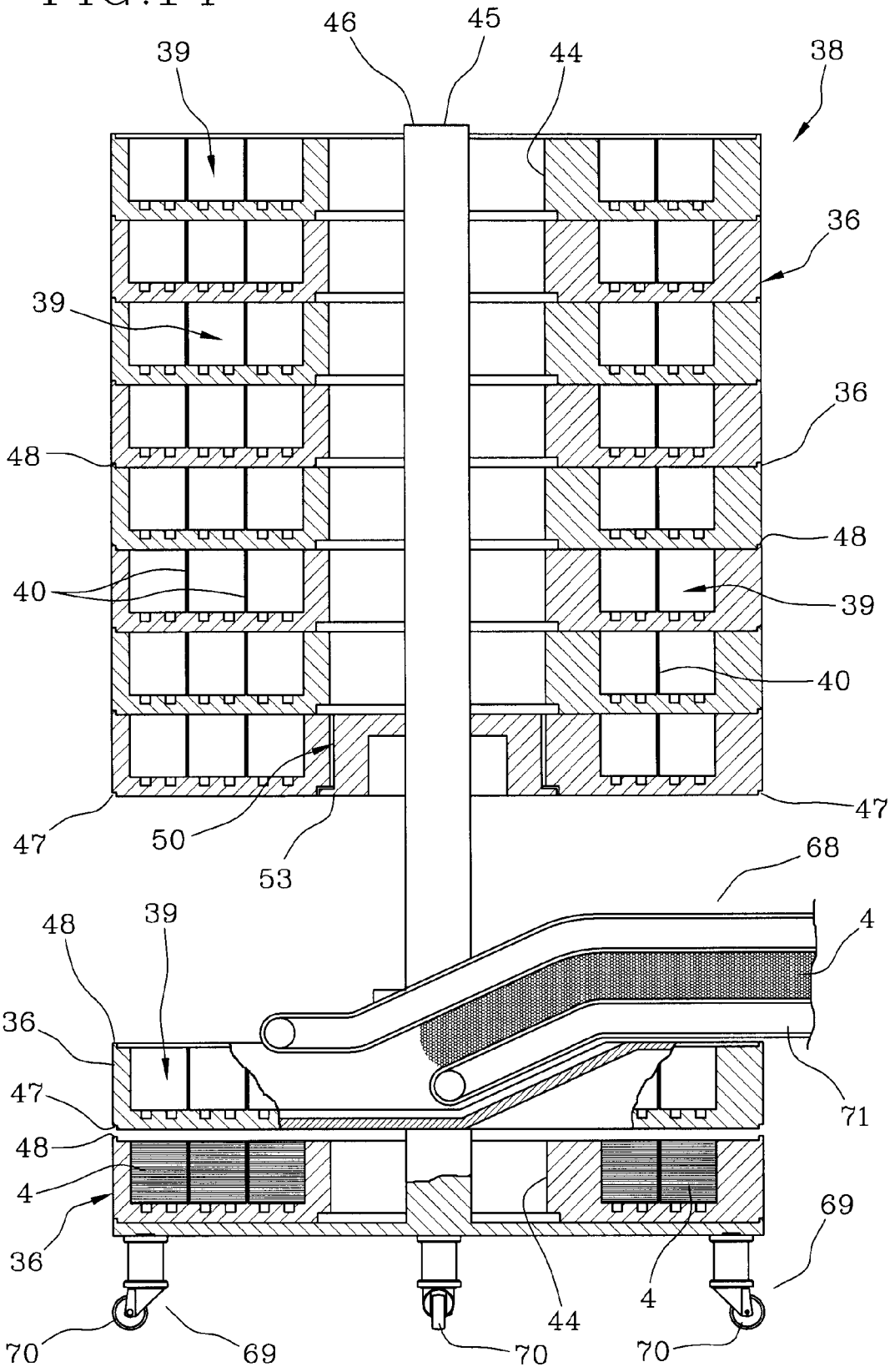
FIG.14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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 10 1709

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	EP 0 923 885 A2 (HAUNI WERKE KOERBER & CO KG [DE]) 23 June 1999 (1999-06-23) * paragraph [0021] - paragraph [0024]; figures * -----	1-6,11, 14,15, 25-34, 38-40	INV. A24C5/352 A24C5/358
X	US 5 628 162 A (KREUSCH CHRISTIAN [DE] ET AL) 13 May 1997 (1997-05-13) * the whole document * -----	1-6,11, 14,15, 25-34, 38-40	
X	GB 2 072 119 A (GD SPA) 30 September 1981 (1981-09-30) * page 1, line 70 - page 5, line 76; figures * -----	1-6,11, 14,15, 25-34, 38-40	
X	DE 43 05 464 A1 (FOCKE & CO [DE]) 25 August 1994 (1994-08-25) * column 2, line 62 - column 4, line 61; figures * -----	1-6,11, 14,15, 25-34, 38-40	TECHNICAL FIELDS SEARCHED (IPC) A24C B65G
X	US 4 365 703 A (HINCHCLIFFE DENNIS ET AL) 28 December 1982 (1982-12-28) * column 5, line 42 - column 11, line 18; figures * -----	1-6,11	
X	WO 98/54988 A (MOLINS PLC [GB]; BAILEY THOMAS WILLIAM [GB]) 10 December 1998 (1998-12-10) * the whole document * -----	21-24, 45-47	
	-/--		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	23 November 2006	MARZANO MONTEROSSO

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EUROPEAN SEARCH REPORT

Application Number
EP 06 10 1709

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	GB 2 135 951 A (GD SPA) 12 September 1984 (1984-09-12) * page 2, line 19 - line 34; figure 1 *	21-24, 45-47	
A	WO 2005/058077 A2 (HAUNI WERKE KOERBER & CO KG [DE]; BUDNY PIOTR [DE]; KAEGELER PETER [DE) 30 June 2005 (2005-06-30) * the whole document *	1,14,25, 38	
A	EP 0 336 897 A1 (TABAC FAB REUNIES SA [CH]) 11 October 1989 (1989-10-11) * the whole document *	1,14,21, 38	
A	US 3 726 383 A (BORNFLETH U ET AL) 10 April 1973 (1973-04-10) * abstract; figures *	1,14,21, 38	

TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
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23-11-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0923885 A2	23-06-1999	DE 19756138 A1	24-06-1999
		JP 11235168 A	31-08-1999
		PL 330271 A1	21-06-1999
		US 6158194 A	12-12-2000
US 5628162 A	13-05-1997	AT 178461 T	15-04-1999
		AU 683115 B2	30-10-1997
		AU 1227495 A	24-08-1995
		CA 2142242 A1	17-08-1995
		CN 1112814 A	06-12-1995
		DE 4404929 A1	17-08-1995
		EP 0670119 A1	06-09-1995
		ES 2131220 T3	16-07-1999
		JP 2991329 B2	20-12-1999
		JP 7267208 A	17-10-1995
GB 2072119 A	30-09-1981	NONE	
DE 4305464 A1	25-08-1994	BR 9400638 A	27-09-1994
		EP 0612481 A2	31-08-1994
		JP 6298215 A	25-10-1994
		US 5567104 A	22-10-1996
US 4365703 A	28-12-1982	GB 2017618 A	10-10-1979
WO 9854988 A	10-12-1998	EP 0984705 A1	15-03-2000
GB 2135951 A	12-09-1984	BR 8400566 A	02-10-1984
		DE 3402775 A1	30-08-1984
		FR 2545457 A1	09-11-1984
		IT 1169176 B	27-05-1987
		JP 1860789 C	27-07-1994
		JP 5071222 B	06-10-1993
		JP 59162867 A	13-09-1984
		US 4641024 A	03-02-1987
WO 2005058077 A2	30-06-2005	DE 10355876 A1	28-07-2005
		EP 1704105 A2	27-09-2006
EP 0336897 A1	11-10-1989	DE 68909656 D1	11-11-1993
		DE 68909656 T2	11-05-1994
		US 4995769 A	26-02-1991
US 3726383 A	10-04-1973	DE 2030515 A1	05-01-1972
		FR 2095381 A7	11-02-1972
		GB 1356011 A	12-06-1974

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