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(54) **Packaging machine and tray packaging method**

Verpackungsmaschine und Verpackungsverfahren für Schalen

Machine d'emballage et procédé d'emballage pour barquettes

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EP 1 577 216 B9

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Description

[0001] The present invention relates to packaging machine.

[0002] In particular, reference will be made hereinafter to packaging machines for trays containing food products; there trays are often sealed by a protective plastic film after being previously filled with an inert gas different from air, such as nitrogen or carbon dioxide.

[0003] Packaging machines currently exist consisting of a conveyor which feeds the already filled trays for sealing to a sealing unit, where the trays are closed by the film after the air has been replaced by an insert gas.

[0004] The conveyor is usually of the slat type, presenting slats disposed transversely to the tray advancement direction, the slats being connected both together and to a drive system.

[0005] Advancement is hence achieved by translationally moving the slats, which by their movement drag the tray.

[0006] This conveying system has proved very effective because it enables high precision to be achieved in positioning the tray within the sealing unit.

[0007] However the productivity which can be achieved using traditional packaging machines with a slat conveyor is very limited, because after the slat conveyor has conveyed the trays into the sealing unit, it has to move back (so freeing the sealing unit) to enable the sealing unit to close.

[0008] Hence in practice the machine operation is discontinuous, its productivity being limited by the fact that the conveyor can only feed one tray at a time to the sealing unit, after which the slat conveyor has to withdraw, and while the sealing unit is working, the conveyor has to remain at rest waiting for the sealing unit to terminate its work and reopen.

[0009] To overcome this drawback machines have been developed provided with several sealing units working in parallel; hence the trays all pass through the filling machine in a line, after which their overall path is divided into several paths, each feeding one sealing unit.

[0010] These machines are evidently very complicated and costly because of the multiplication of the sealing units and the presence of a tray distributor to deviate the trays along different paths.

[0011] To further improve machines of the described type, packaging machines have been developed presenting several in-line sealing units and provided with slat conveyors (in which the trays are inserted manually) arranged to feed one tray to each of the sealing units; hence in practice the machine is able to simultaneously seal several trays while being free of the complex deviator device of the previously described solution.

[0012] EP 0 680 880 discloses a machine according to the pre-characterising portion of claim 1.

[0013] Notwithstanding the high productivity obtainable with such a packaging machine, it presents certain drawbacks deriving mainly from the considerable idle

time between one sealing stage (simultaneous for several trays) and the next.

[0014] In this respect, when the sealing units are working to seal the trays, the conveyor must necessarily remain at rest as the conveyor (and in particular its constituent transverse slats) would not have space to move and would interfere with the sealing unit structure.

[0015] These idle times are hence again a cause of limited productivity and possible high costs due to the need to multiply the number of sealing machines in order to be able, within a reasonable time, to wrap all those trays continuously supplied by the filling machines.

[0016] The technical aim of the present invention is therefore to provide a packaging machine by which the stated technical drawbacks of the known art are eliminated.

[0017] Within the scope of this technical aim, an object of the invention is to provide a packaging machine achieving very high overall productivity.

[0018] Another object of the invention is to provide a machine which are very economical and do not require the use of a large number of machines to clear (package) all the trays supplied by the filling machine (for closure).

[0019] A further object of the invention is to provide a packaging machine which is simple and reliable and enable conveyors of traditional type to be used to insert the trays into the sealing units for closure.

[0020] The technical aim, together with these and other objects, are attained according to the present invention by a packaging machine according to claim 1.

[0021] Other characteristics of the present invention are defined in the other claims.

[0022] Advantageously, the machine of the present invention allow the second conveyor to move while the first remains at rest during the operation of the sealing units.

[0023] Further characteristics and advantages of the invention will be more apparent from the ensuing description of a preferred but non-exclusive embodiment of the packaging machine and ray packaging method of the invention, the machine being illustrated by way of non-limiting example in the accompanying drawings, in which:

Figure 1 is a schematic view of a machine according to the present invention;

Figure 2 is a side perspective view of the machine of the invention;

Figure 3 is a front perspective view of the machine of the invention and

Figure 4 is an enlarged detail of Figure 3.

[0024] Said figures show a packaging machine indicated overall by the reference numeral 1.

[0025] The packaging machine 1 comprises a first conveyor 2 for discontinuously feeding trays 3 for closure to two or more in-line sealing units 4.

[0026] The first conveyor 2 is a traditional slat conveyor, but in other embodiments it may be a belt conveyor, plate conveyor, etc.

[0027] The machine also comprises, upstream of the first conveyor 2, a second conveyor 5 connectable to a tray filling machine (of which only the exit conveyor 6 for the filled trays is shown).

[0028] The machine also comprises means 7 for transferring the trays 3 from the second conveyor 5 to the first conveyor 2.

[0029] The trays 3 are fed continuously to the packaging machine 1 by the second conveyor 5, and are fed discontinuously to the sealing units 4 by the first conveyor 2; this enables the second conveyor 5 to be operated (to receive the trays) even while the sealing units are operating and the first conveyor 2 is at rest.

[0030] The transfer means 7 are arranged to move the trays 3 in a direction substantially transverse to the axis 10 of the first conveyor 2.

[0031] For this reason the first and second conveyor 2, 5 present a portion 11a, 11b side-by-side each other to enable the trays to slide from the second to the first conveyor 2, 5.

[0032] Advantageously, the transfer means 7 comprise a pusher 12 movable above the second and first conveyor 5, 2 in correspondence with their side-by-side portion 11 a, 11b.

[0033] The pusher 12 is rigid with an actuator 13 slidable on a shaft 14; the actuator is of the hydraulic, pneumatic or electrical type according to requirements.

[0034] The machine 1 also comprises means 15 for controlling the number of trays 3 fed to the second conveyor 5.

[0035] These control means 15 comprise a third conveyor 16 positioned upstream of the second conveyor 5, and a sensor 18 for sensing the presence and/or passage of a tray 3 on the third conveyor 16.

[0036] The sensor 18 is connected to an electronic processor 19 for controlling the movement of the first, second and third conveyor 2, 5, 16 and of the transfer means 7.

[0037] In a preferred embodiment the machine 1 comprises a first stop 21 positioned upstream of the third conveyor 16; this first stop 21 is movable between a non-operative position 21 b (shown by dashed lines in Figure 4) in which it allows the trays 3 originating from the filling machine to pass, and an operative position 21a in which it prevents this passage.

[0038] Advantageously, the machine 1 also comprises a second stop 23 located downstream of the sensor 18; the second stop is movable between a non-operative position 23b in which it allows the trays 3 to pass (this position is shown by full lines in Figure 4), and an operative position 23a in which it prevents passage of the trays 3.

[0039] The operation of the packaging machine of the invention is apparent from that described and illustrated, and is substantially the following.

[0040] In an initial stage the first conveyor 2 and second conveyor 5 are at rest while the third conveyor 16 moves and receives the trays which are continuously fed to it by the conveyor 6 of the filling machine.

[0041] The trays 3 are advantageously guided on the conveyor 6 by fixed tracks 25 along which the trays 3 slide.

[0042] When a tray 3 is dragged onto the third conveyor 16 (which moves at a speed equal to or slightly greater than the conveyor 6 of the filling machine), the sensor 18 senses its presence and causes the first stop 21 to pass from the position 21b (in which it does not hinder tray passage) to the position 21a (in which it prevents passage of further trays originating from the conveyor 6 towards the conveyor 16); this constitutes mainly a safety factor; in other examples the first stop 21 could also be absent.

[0043] The second stop 23 (if present) lies initially in the position 23a (i.e. ready to prevent passage of the trays 3 from the third conveyor 16 to the second conveyor 5).

[0044] When the sensor senses the presence of a tray 3 on the third conveyor 16 the second stop 23 is made to pass from the position 23a to the position 23b (in which it allows the trays to pass from the third conveyor 16 to the second conveyor 5); in practice the second stop 23 is operated simultaneously with or immediately after the first stop 21.

[0045] The second conveyor 5 is then driven (at the same speed as the third conveyor 16) so that the tray 3 abandons the third conveyor 16 and passes onto the second conveyor 5; the second conveyor 5 then halts while awaiting a further tray from the third conveyor 16.

[0046] When the sensor 18 no longer senses the presence of the tray 3 on the third conveyor 16 (because the tray 3 has passed onto the second conveyor 5), the second stop 23 is lowered from the position 23b to the position 23a; simultaneously (or after a certain time from when the sensor 18 no longer senses the presence of the tray 3 on the third conveyor 16) the first stop 21 passes from the position 21a to the position 21 b, allowing a further tray 3 to pass from the conveyor 6 of the filling machine to the third conveyor 16 of the packaging machine 1.

[0047] The trays 3 which have passed from the third conveyor 16 to the second conveyor 5 remain aligned on the conveyor 5, as shown for example in Figure 1 which shows two trays aligned on the conveyor 5.

[0048] The data obtained by the sensor 18 are transmitted to the electronic processor 19 which counts the trays 3 passing in succession from the third conveyor 16 to the second conveyor 5.

[0049] When the electronic processor 19 has counted a predetermined number of trays (preferably corresponding to the number of sealing units 4, which in the present example are four in number), the second conveyor 5 does not merely allow a tray 3 to be conveyed onto it and then stop (allowing the third conveyor 16 to completely abandon it), but continues in its travel until the trays 3 are brought into a position aligned with seats 28 of the first slat conveyor 2 as indicated by the axes 27 of Figure 1; meanwhile the third conveyor 16 continues to operate as

described.

[0050] The pusher 12 then transfers the trays 3 transversely from the second conveyor 5 to the first conveyor 2 by making them slide onto a plate 29 positioned between the side-by-side portions 11 a and 11 b of the conveyors 2 and 5.

[0051] The trays 3 housed on the first slat conveyor 2 are brought into the sealing units 4 in traditional manner and closed.

[0052] Advantageously, while the conveyor 2 conveys the trays into the sealing units 4, then withdraws and remains at rest awaiting completion of tray sealing, the third conveyor 16 continues to receive trays 3 and to convey them onto the second conveyor 5 where they become mutually aligned until, when the predetermined number is attained, they are firstly conveyed into alignment with the axes 27 and then transferred onto the first conveyor 2; this enables very high productivity to be achieved for the packaging machine 1 as the idle times due to sealing (during which the first conveyor 2 has to remain at rest) do not negatively influence the conveyor 5.

[0053] The particular constructional form described takes account of space optimisation, however in other embodiments the second conveyor 5 is proportioned such that when the trays 3 pass from the third conveyor 16 to the second conveyor 5, they are already aligned along the axes 27 and do not require the conveyor 5 to be further moved to bring them into that configuration.

[0054] The present invention also relates to a tray packaging method.

[0055] With this method, by means of a first conveyor 2 moving with discontinuous movement, the trays 3 are conveyed into sealing units 4 where they are closed.

[0056] A predetermined number of trays 3 are also fed in a line to a second conveyor 5 which moves with unidirectional movement to transfer the trays 3 onto the first conveyor 2.

[0057] In this manner, while the first conveyor 2 feeds a tray into each sealing chamber 4 and returns to its initial configuration (then remaining at rest while awaiting termination of sealing), the predetermined number of trays 3 are fed onto the second conveyor 5.

[0058] Preferably the second conveyor 5 moves with discontinuous movement and the first conveyor 32 moves with reciprocating movement.

[0059] With the method of the invention, the trays 3 are moved substantially transversely to their advancement direction onto the first conveyor 2.

[0060] In a preferred embodiment of the method, the number of trays 3 fed onto the second conveyor 5 is counted, and when the number of trays 3 equals the number of sealing units 4, the trays are transferred onto the first conveyor 2.

[0061] Modifications and variants are possible, in addition to those already stated; for example in a different embodiment the machine is without the second conveyor 5; in that embodiment the second conveyor 5 is replaced by the exit conveyor of the filling machine when said pack-

aging machine is in operation.

[0062] The operation of the machine in this embodiment is the same as that already described.

[0063] It has been found in practice that the packaging machine and tray packaging method of the invention are particularly advantageous as they enable very high productivity to be achieved, while using traditional conveyors for example of slat type which ensure high reliability in addition to precision in positioning the trays inside the sealing units.

[0064] The packaging machine and tray packaging method conceived in this manner are susceptible to numerous modifications and variants, all falling within the scope of the claims.

[0065] In practice the materials used, and the dimensions, can be chosen at will according to requirements and to the state of the art.

Claims

1. A packaging machine (1) comprising a first conveyor (2) arranged to discontinuously feed trays (3) for closure to two or more sealing units (4) disposed in-line, and further comprising, upstream of said first conveyor (2), a second conveyor (5) connectable to a machine for filling said trays (3), and means (7) for transferring said trays (3) from said second to said first conveyor (5, 2), in such a manner that said trays (3) are fed continuously to said packaging machine (1) by said second conveyor (5), and are fed discontinuously to said sealing units (4) by said first conveyor (2), **characterised in that** said first and second conveyor (2, 5) present at least one portion (11a, 11b) mutually side-by-side to enable the trays (3) to slide from the second conveyor (5) to the first conveyor (2), said transfer means (7) being arranged to move said trays (3) in a direction substantially transverse to the axis (10) of said first conveyor (2).
2. A machine (1) as claimed in claim 1, **characterised by** being without said second conveyor (5), said second conveyor (5) being replaced by an exit conveyor (6) of a filling machine when said packaging machine (1) is in operation.
3. A machine (1) as claimed in claim 1, **characterised in that** said transfer means (7) comprise a pusher (12) movable above said second conveyor (5) and first conveyor (2) in correspondence with their side-by-side portions (11a, 11b).
4. A machine (1) as claimed in claim 1 or 2, **characterised by** comprising means (15) for controlling the number of trays (3) fed to said second conveyor (5).
5. A machine (1) as claimed in claim 4, **characterised in that** said control means (15) comprise a third con-

veyor (16) positioned upstream of said second conveyor (5), and a sensor (18) for sensing the presence and/or passage of a tray (3) on said third conveyor (16), said sensor (18) being connected to an electronic processor (19) for controlling the movement of the first, second and third conveyor (2, 5, 16) and of said transfer means (7).

6. A machine (1) as claimed in claim 1 or 2, **characterised by** comprising a first stop (21) positioned upstream of said third conveyor (16), said first stop (21) being movable between a non-operative position (21b) in which it allows the trays (3) originating from the filling machine to pass, and an operative position (21a) in which it prevents this passage.
7. A machine (1) as claimed in claim 1 or 2, **characterised by** comprising a second stop (23) located downstream of said sensor (18), said second stop (23) being movable between a non-operative position (23b) in which it allows said trays (3) to pass, and an operative position (23a) in which it prevents passage of said trays (3).
8. A machine (1) as claimed in claim 1 or 2, **characterised in that** said first conveyor (2) is a slat conveyor.

Patentansprüche

1. Eine Verpackungsmaschine (1) mit einem ersten Förderer (2), der angeordnet ist, um Schalen (3) zum Schließen zu zwei oder mehr Siegeleinheiten (4), die geradlinig angeordnet sind, diskontinuierlich zuzuführen und die weiterhin stromaufwärts des genannten ersten Förderers (2) einen zweiten Förderer (5) enthält, der verbindbar ist mit einer Maschine zum Befüllen der genannten Schalen (3), und mit Mitteln (7), um die genannten Schalen (3) von dem genannten zweiten auf den genannten ersten Förderer (5, 2) zu transferieren, in einer solchen Weise, dass die genannten Schalen (3) kontinuierlich durch den genannten zweiten Förderer (5) der genannten Verpackungsmaschine (1) zugeführt werden und diskontinuierlich durch den genannten ersten Förderer (2) den genannten Siegeleinheiten (4) zugeführt werden,
dadurch gekennzeichnet,
dass die genannten ersten und zweiten Förderer (2, 5) wenigstens einen Abschnitt (11a, 11b) aufweisen, die gegenseitig nebeneinanderliegen, um den Schalen (3) zu ermöglichen, von dem zweiten Förderer (5) zu dem ersten Förderer (2) zu gleiten, wobei die genannten Transfermittel (7) angeordnet sind, um die genannten Schalen (3) in eine Richtung im Wesentlichen quer zu der Achse (10) des genannten ersten Förderers (2) zu bewegen.

2. Eine Maschine (1) gemäß Anspruch 1,
dadurch gekennzeichnet,
dass sie ohne den genannten zweiten Förderer (5) ist, wobei der genannte zweite Förderer (5), wenn die genannte Verpackungsmaschine (1) in Betrieb ist, ersetzt wird durch einen Ausgabeförderer (6) einer Befüllungsmaschine.
3. Eine Maschine (1) gemäß Anspruch 1,
dadurch gekennzeichnet,
dass die genannten Transfermittel (7) einen Schieber (12) enthalten, der über die genannten zweiten Förderer (5) und ersten Förderer (2) bewegbar ist in Übereinstimmung mit ihren nebeneinanderliegenden Abschnitten (11a, 11 b).
4. Eine Maschine (1) gemäß Anspruch 1 oder 2,
dadurch gekennzeichnet,
dass sie Mittel (15) enthält zur Steuerung der Anzahl von Schalen (3), die dem genannten zweiten Förderer (5) zugeführt werden.
5. Eine Maschine (1) gemäß Anspruch 4,
dadurch gekennzeichnet,
dass die genannten Steuermittel (15) einen dritten Förderer (16) enthalten, der stromaufwärts des genannten zweiten Förderers (5) angeordnet ist, sowie einen Sensor (18), um die Anwesenheit und/oder den Durchtritt einer Schale (3) auf dem genannten dritten Förderer (16) festzustellen, wobei der genannte Sensor (18) mit einem elektronischen Prozessor (19) verbunden ist, um die Bewegung des ersten, des zweiten und des dritten Förderers (2, 5, 16) und der genannten Transfermittel (7) zu steuern.
6. Eine Maschine (1) gemäß den Ansprüchen 1 oder 2,
dadurch gekennzeichnet,
dass sie einen ersten Anschlag (21) enthält, der stromaufwärts des genannten dritten Förderers (16) angeordnet ist, wobei der genannte Anschlag (21) beweglich ist zwischen einer Nichtbetriebsstellung (21 b), in der er den Schalen (3), die von der Befüllungsmaschine kommen, erlaubt durchzutreten, und einer Betriebsstellung (21a), in der er diesen Durchtritt verhindert.
7. Eine Maschine (1) gemäß den Ansprüchen 1 oder 2,
dadurch gekennzeichnet,
dass sie einen zweiten Anschlag (23) aufweist, der stromabwärts des genannten Sensors (18) angeordnet ist, wobei der genannte zweite Anschlag (23) beweglich ist zwischen einer Nichtbetriebsstellung (23b), bei der er den genannten Schalen (3) erlaubt durchzutreten, und einer Betriebsstellung (23a), in der er das Durchtreten der genannten Schalen (3) verhindert.
8. Eine Maschine (1) gemäß den Ansprüchen 1 oder 2,

dadurch gekennzeichnet,
dass der genannte Förderer (2) ein Plattenförderband ist.

Revendications

1. Machine de conditionnement (1) comportant un premier convoyeur (2) agencé pour acheminer en discontinu des plateaux (3), pour fermeture, vers deux ou plus de deux unités de scellage (4) disposées en ligne, et comportant de plus, en amont dudit premier convoyeur (2), un deuxième convoyeur (5) pouvant être relié à une machine destinée à remplir lesdits plateaux (3), et des moyens (7) pour transférer lesdits plateaux (3) depuis ledit deuxième vers ledit premier convoyeur (5, 2), d'une manière telle que lesdits plateaux (3) sont acheminés de manière continue vers ladite machine de conditionnement (1) par ledit deuxième convoyeur (5) et sont acheminés de manière discontinue vers lesdites unités de scellage (4) par ledit premier convoyeur (2), **caractérisée en ce que** lesdits premier et deuxième convoyeurs (2, 5) présentent au moins une partie (11a, 11b) mutuellement côte à côte pour permettre aux plateaux (3) de coulisser depuis le deuxième convoyeur (5) vers le premier convoyeur (2), lesdits moyens de transfert (7) étant agencés pour déplacer lesdits plateaux (3) dans une direction sensiblement transversale par rapport à l'axe (10) dudit premier convoyeur (2). 30
2. Machine (1) selon la revendication 1, **caractérisée en ce qu'elle** ne comporte pas ledit deuxième convoyeur (5), ledit deuxième convoyeur (5) étant remplacé par un convoyeur de sortie (6) d'une machine de remplissage lorsque ladite machine de conditionnement (1) est en fonctionnement. 35
3. Machine (1) selon la revendication 1, **caractérisée en ce que** lesdits moyens de transfert (7) comportent un poussoir (12) mobile au-dessus dudit deuxième convoyeur (5) et dudit premier convoyeur (2) en correspondance avec leurs parties côte à côte (11a, 11b). 40
4. Machine (1) selon la revendication 1 ou 2, **caractérisée en ce qu'elle** comporte des moyens (15) pour commander le nombre de plateaux (3) acheminés vers ledit deuxième convoyeur (5). 45
5. Machine (1) selon la revendication 4, **caractérisée en ce que** lesdits moyens de commande (15) comportent un troisième convoyeur (16) positionné en amont dudit deuxième convoyeur (5), et un détecteur (18) pour détecter la présence et/ou le passage d'un plateau (3) sur ledit troisième convoyeur (16), ledit détecteur (18) étant relié à un processeur électronique (19) pour commander le mouvement des pre-

mier, deuxième et troisième convoyeurs (2, 5, 16) et desdits moyens de transfert (7).

6. Machine (1) selon la revendication 1 ou 2, **caractérisée en ce qu'elle** comporte une première butée (21) positionnée en amont dudit troisième convoyeur (16), ladite première butée (21) étant mobile entre une position inactive (21b) dans laquelle elle permet le passage des plateaux (3) provenant de la machine de remplissage, et une position active (21a) dans laquelle elle empêche ce passage. 5
7. Machine (1) selon la revendication 1 ou 2, **caractérisée en ce qu'elle** comporte une seconde butée (23) positionnée en aval dudit détecteur (18), ladite seconde butée (23) étant mobile entre une position inactive (23b) dans laquelle elle permet le passage desdits plateaux (3), et une position active (23a) dans laquelle elle empêche le passage desdits plateaux (3). 10
8. Machine (1) selon la revendication 1 ou 2, **caractérisée en ce que** ledit premier convoyeur (2) est un convoyeur à lattes. 15

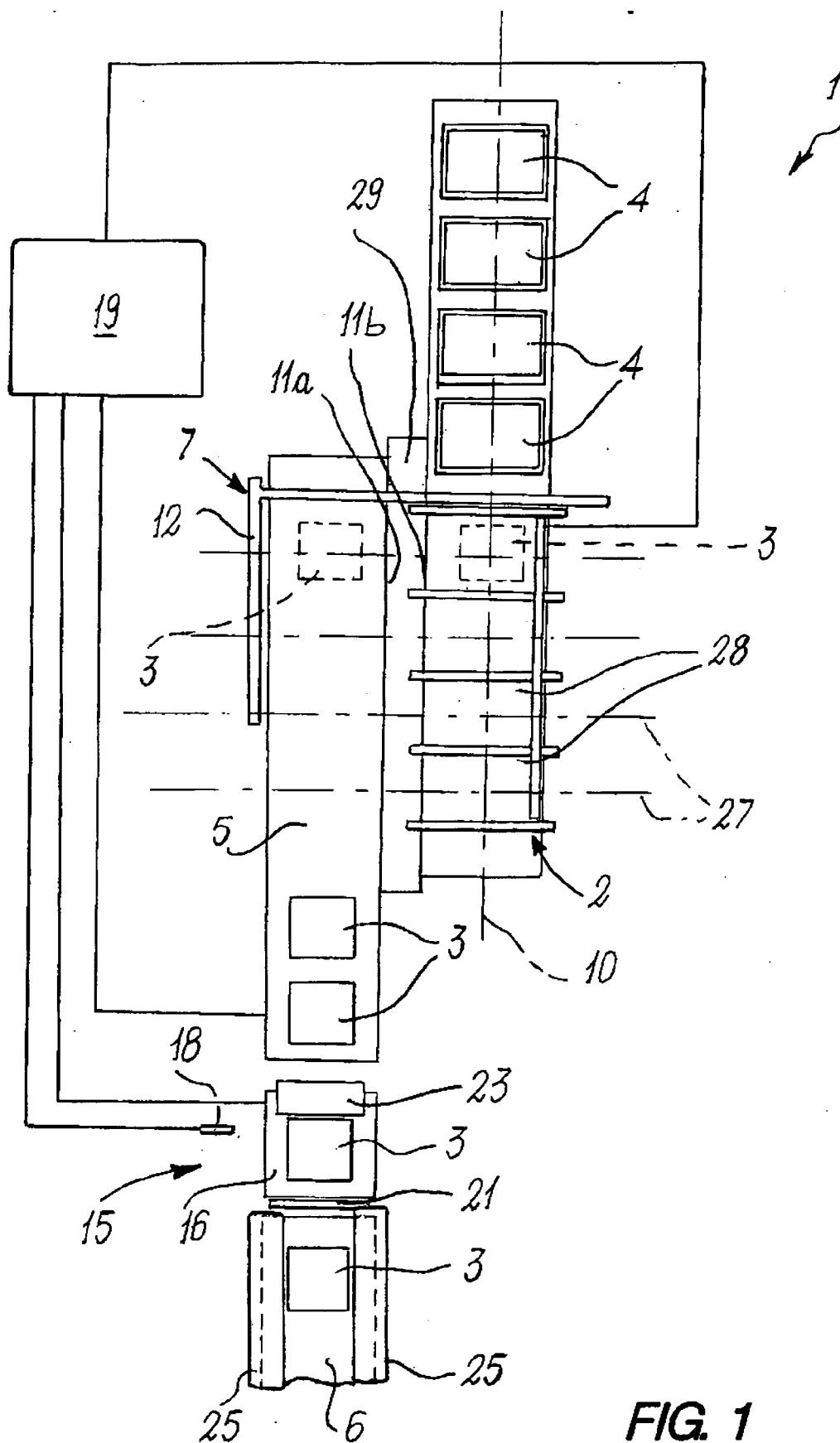
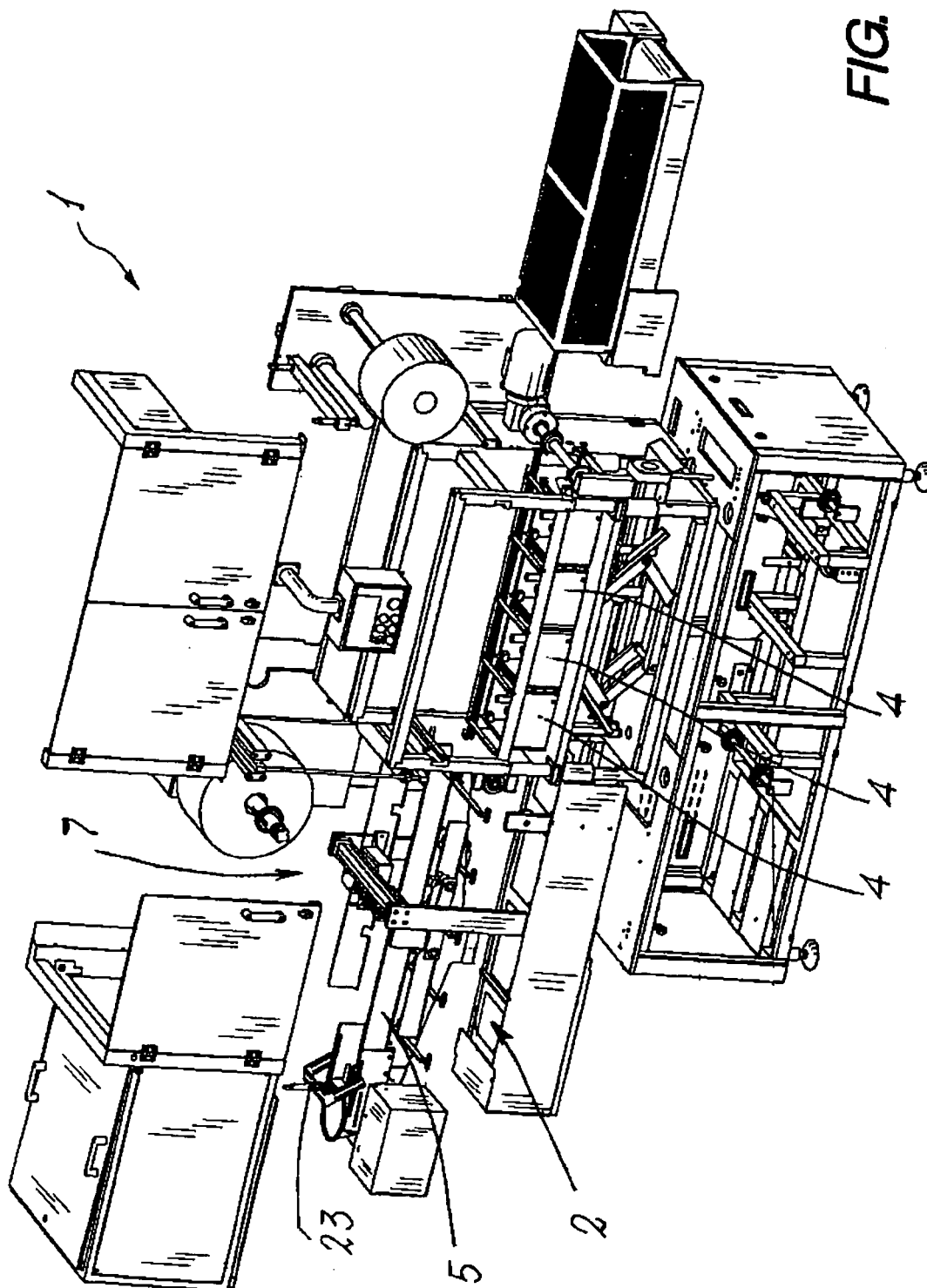


FIG. 1

FIG. 2



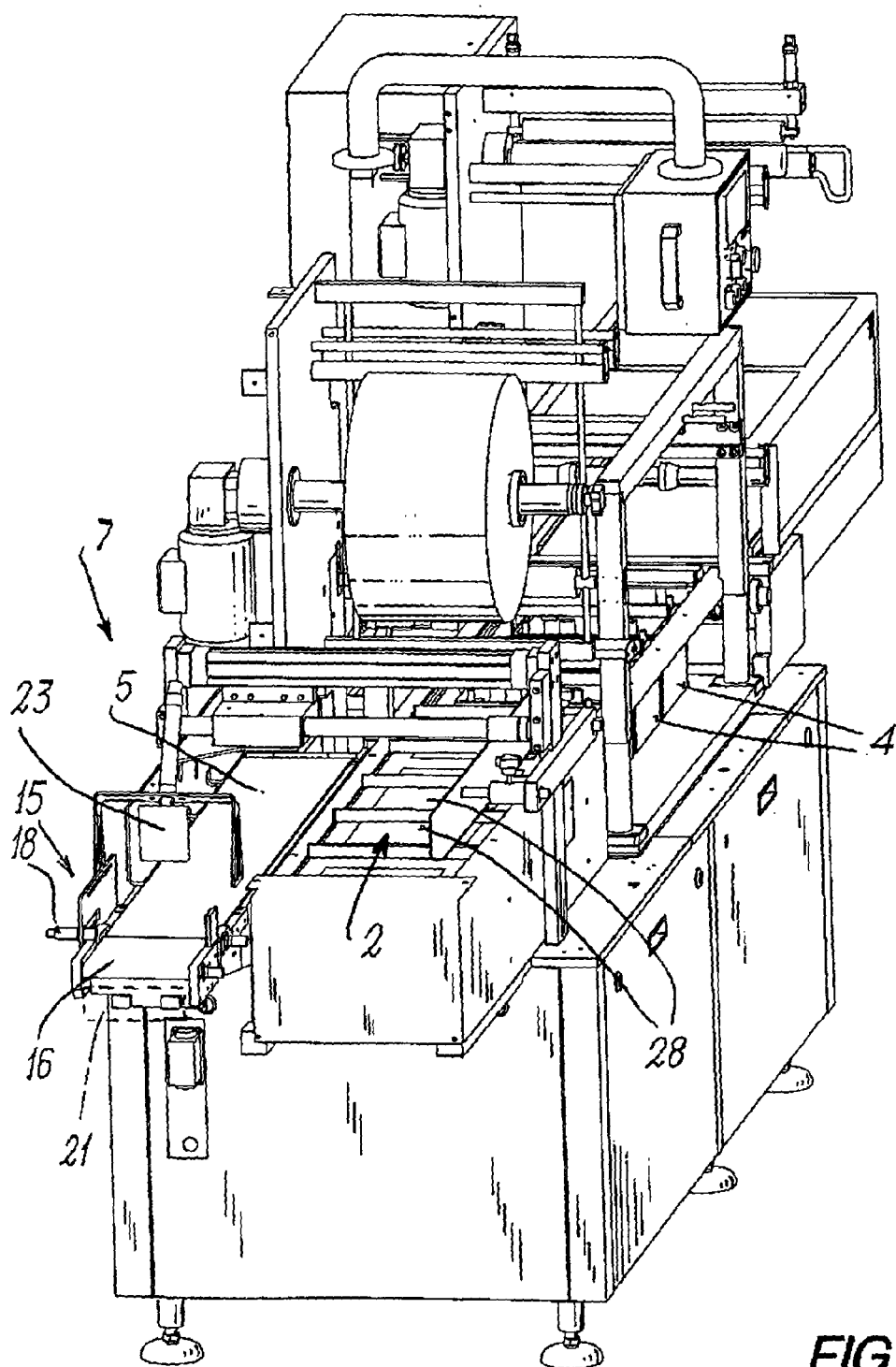


FIG. 3

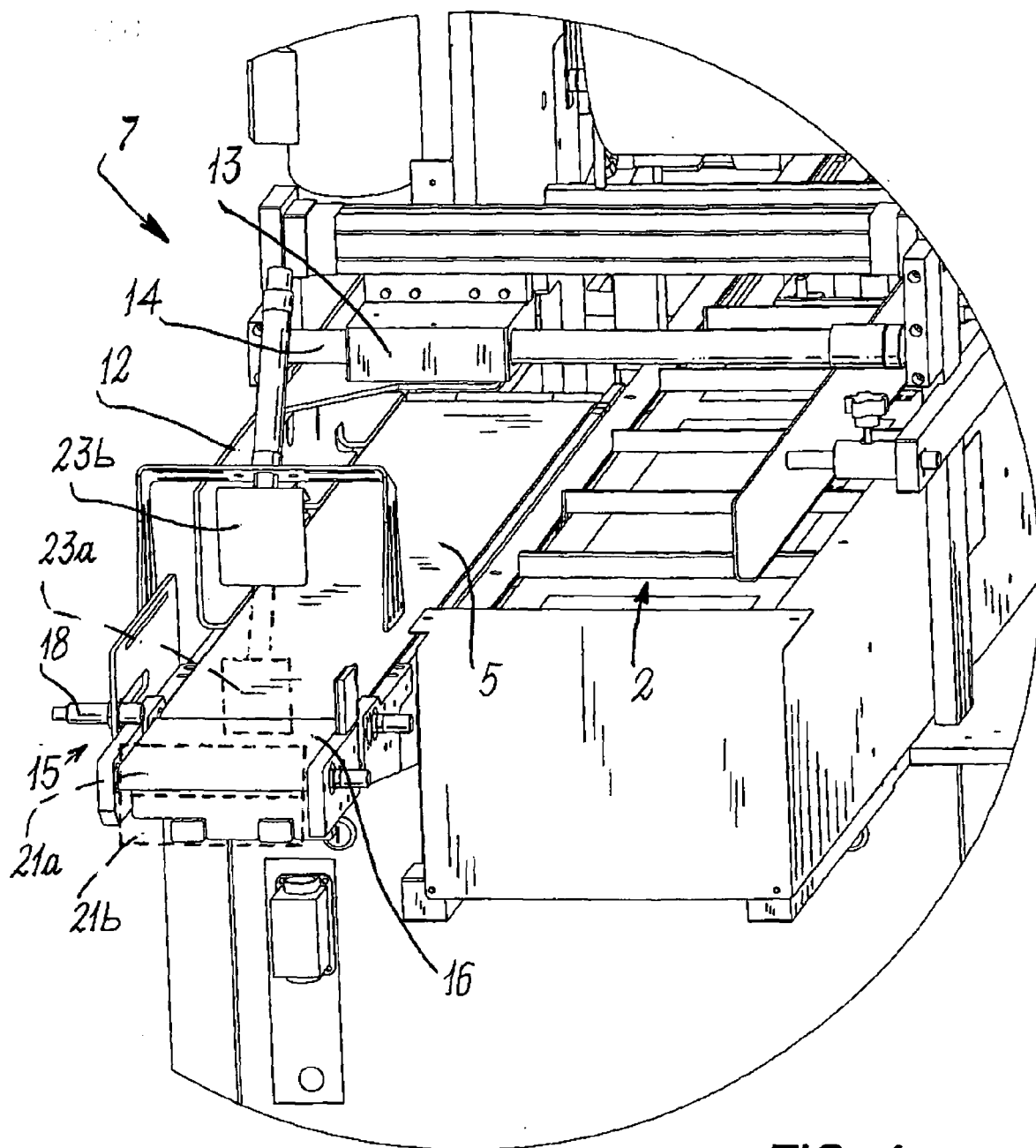


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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