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(54) **Packaging machine**

(57) Packaging machine in which a conveyor apparatus (T) transfers batches of products (p) from a grouping area (10) to a packing station (20) through two independent sliders (40, 41) operating in parallel; the sliders are arranged to operate with alternate back and forth movements, with equal translation stroke (L), between said grouping area (10) and packing area (20).

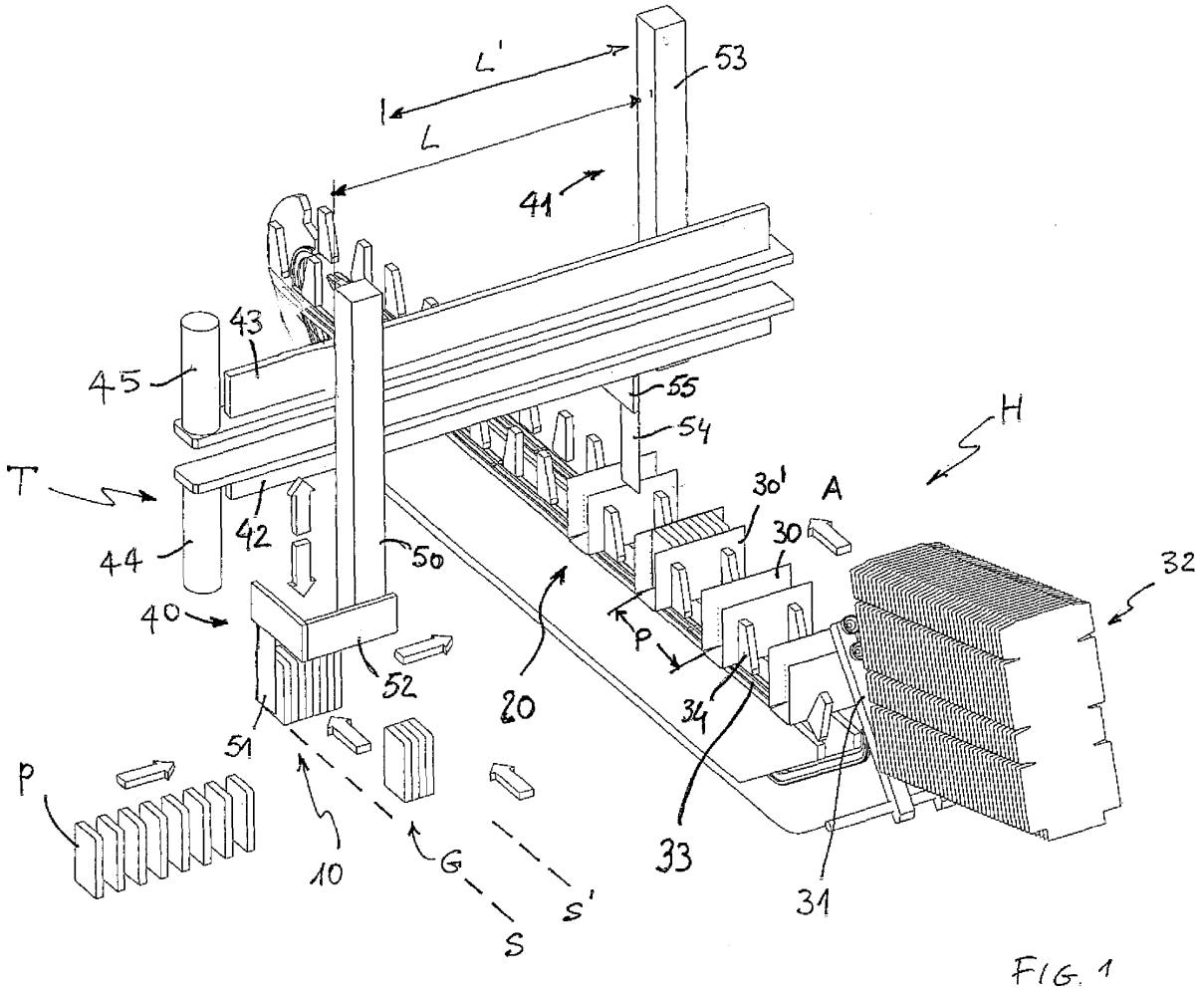

FIG. 1

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Description

Field of application

[0001] The present invention refers to the field of packaging machines equipped with at least one translating member suitable for transferring batches of products from a grouping area to an area for loading and inserting into cardboard boxes. The invention has an application in particular, but not exclusively, in the field of food and drink.

Prior art

[0002] A packaging machine of the type considered essentially receives products from one or more chutes, forms groups of products and transfers them to a packing section, for example with insertion into open or preglued cardboard boxes. Wrap around machines are machines of this type.

[0003] According to the prior art, the machine generally comprises the following apparatuses.

[0004] A loading apparatus is dedicated to the phasing and grouping of the product. Said loading apparatus is such as to sort a continuous flow of products, arriving from the supply chute(s), into a series of batches each comprising a predetermined number of products.

[0005] A transportation apparatus is dedicated to handling the packing. For example, in a machine that works with cardboard packages, said transportation apparatus comprises: a sub-system for storing, separating and forming cardboard boxes or trays; a sub-system for conveying said trays; a sub-system for closing possibly with a lid.

[0006] Said transportation apparatus operates with a machine pitch P that corresponds to the distance between two contiguous packages in the conveying subsystem. Said pitch P is directly proportional to the size of the packaging formats to be mechanised. The maximum working speed (expressed in cycles per unit time) that can be obtained by the transportation apparatus, and in particular by the relative conveying sub-system, is inversely proportional to the pitch P. The increase in pitch P, indeed, for the same cycles/min, requires that the conveying speed be increased, and a conveying speed that is too high risks compromising the handling of the packages (e.g. damaging the box) and/or the mechanical strength of the apparatus itself.

[0007] The sub-systems of the transportation apparatus, as described above, interact with one another in an intermittent sequential manner.

[0008] A conveyor apparatus acts as a link between the loading apparatus and the transportation apparatus. Said conveyor apparatus transfers a predetermined group or batch of products into or onto the package suitably positioned in a loading station of the transportation apparatus.

[0009] The conveyor apparatus is commonly made up of a horizontal slider comprising a thrusting member, which conveys the batches of product from a grouping position to a loading position into packages. Said slider thus moves back and forth, horizontally, for a length L that depends upon the format of the packages.

[0010] The maximum working speed of said conveyor apparatus, again in cycles/min, is inversely proportional to said length L since a greater length implies a greater speed and, therefore, more severe stresses on the products than on the machinery. In particular, the integrity of the product must be preserved and therefore a speed that is too high is unacceptable. Moreover, the cyclical speed of such an apparatus must be equal to the number of packages passing in the transportation apparatus, for reasons of synchronisation.

[0011] A packaging machine of this type must face up to an ever-increasing need for flexibility. In the field of food and drink, for example, in some cases it is required to decrease the number of products per package, both to make them easier to present to the consumer through special display packs and to group the sales units in batches. In other cases, contrarily, there is the opposite need to increase the number of products per package for cost-effective transportation and/or for a different presentation/sales policy of the product itself. Another requirement is compatibility with extremely flexible loading apparatuses, capable of group together different types of products in different configurations.

[0012] In practice, it has been found that the limit to the overall capacity of the machine is set by the slider of the conveyor apparatus. Indeed, the slider cannot exceed a certain speed of movement to avoid damaging the product and for reasons of reliability, and therefore there is an incentive to decrease the stroke L; however, said stroke L cannot fall below a minimum value. For example, operating with cardboard packages, cardboard technology of the package itself sets limits to the configuration of the boxes and, consequently, does not allow the system to fall below a certain value of said stroke L.

[0013] In the prior art, it has been attempted to find a compromise between these requirements in the following ways:

- by making machines that operate with continuous instead of intermittent motion: they represent a different type of machine, which does not suffer from the problems linked to intermittent motion, but they have drawbacks of cost, bulk and/or lower flexibility of the loading apparatus;
- by using a first and a second thrusting member on two respective horizontal conveyors, operating in series to thus divide the horizontal stroke L into two parts, but with the drawback of an intermediate passage of product between one thruster and the other; said intermediate passage makes this solution unfeasible for unstable products or groups, for example food products with non-stiff primary packaging;

- by dividing the production flow over two packaging machines, doubling costs.

[0014] Such solutions are not entirely satisfactory both for technical and cost reasons.

Summary of the invention

[0015] The invention has the purpose of overcoming the limitations of the prior art outlined above.

[0016] The purpose is accomplished with a packaging machine comprising at least:

- one loading apparatus suitable for receiving at least one flow of products and forming batches each comprising a predetermined number of said products, in a grouping area;

- a conveyor apparatus suitable for transferring said batches of products from said grouping area to a packing area into cartons;

characterised in that said conveyor apparatus comprises a first slider and a second slider, said two sliders being independent and operating in parallel between said grouping area and said packing area, with intermittent movement.

[0017] The term batches of products, in this description and in the attached claims, mean batches of any number, according to requirements, or even formed by a single product unit.

[0018] The two sliders are controlled independently and preferably have respective dedicated motors. Said first and second slider are arranged to operate with alternate back and forth movements between the grouping area and packing area. According to different applications of the invention, the machine comprises a control system that can control the first and the second slider with a working and/or cyclical stroke (speed in cycles/min) respectively equal for said two sliders, or else different between first and second slider.

[0019] In preferred embodiments, the machine comprises an apparatus for handling packages, and said packing area is represented by a loading station of said apparatus.

[0020] The sliders are equipped, according to a preferred embodiment, with respective thrusting members of the batches of products. A first thrusting member is associated with the first slider, and is able to transfer a batch of products from a given point of the grouping area to a given point of the loading station; a second thrusting member is associated with the second slider, and is equally able to transfer a batch of products from said given point of the grouping area to said given point of the loading station.

[0021] Preferably, each of said two sliders moves horizontally, and comprises a respective thrusting member equipped with vertical movement. Said vertical movement avoids the thrusting members, operating in parallel, interfering with one another. A thrusting member in the return stroke does not mechanically interfere with the other thrusting member in the forward stroke, and vice-versa.

[0022] In a preferred embodiment, a slider essentially comprises a column with translation movement on a horizontal guide, extending above the grouping area and the loading area. The top part of the column is forced to run on said guide; the bottom part carries a suitable thrusting means, equipped with vertical movement along the column itself. The two sliders are moved, along the same horizontal trajectory, on respective parallel guides, with intermittent back and forth movement.

[0023] The working stroke of the sliders can be varied according to the grouping of the products. Preferably, a smaller grouping corresponds to a shorter working stroke, with a starting point closer to the packing area, and consequently a faster cycle. The first and second slider can operate with the same working stroke, or else with a first and second working stroke, respectively, different to one another. The variation of the stroke takes place through the control system, i.e. without needing substantial mechanical modifications.

[0024] A machine according to the invention, in particular, can operate with input represented by two independent flows of products, for example coming from two lanes possibly also with different frequency (pcs/min). The working stroke and/or the cycle of each of the two sliders, operating in parallel, can be specifically adapted to the flow of products arriving from the respective lane.

[0025] The invention can also operate with input represented by two flows of products that of different type and/or shape, to be packed in the same carton, for example a food product and a respective dressing, or different food products in a single package. For this, each of the two thrusting members is preferably specifically adapted to the respective type of product to be conveyed.

[0026] For example, the machine can be fed by two independent flows of first products and second products, different in type and/or shape; said first slider comprises thrusting members specifically adapted to convey said first products, and said second slider comprises thrusting members specifically adapted to convey said second products. The machine in this way can carry out the packaging of at least one unit of said first products and one unit of said second products in the same cardboard package, with the sliders operating in parallel on the products of both types.

[0027] A preferred application consists of packaging batches of products in cardboard boxes or trays.

[0028] In the various embodiments of the invention, one or more batches of products, formed in the grouping station, cam ne packaged in a single package.

[0029] Each slider and thruster operates with a lower speed in cycles/min than the prior art, thanks to the fact that it operates in parallel with the other slider/thruster. In other words, the cycle of the machine is divided be-

tween the two sliders, and this can take place in an equal manner or possibly, if appropriate, even in an unequal manner between first and second slider.

[0030] The invention improves the product handling, since it reduces the conveying speed from the grouping area to the loading station, keeping the other conditions the same, and it does not require an intermediate passage like in machines with sliders in series. The machine according to the invention also proves to be flexible to the change in format, through a suitable change of the thrusting members, without the stroke of the translating member, adapted to the larger format, harming the performance of the system or the product handling.

[0031] A machine according to the invention, in the field of secondary packaging of food products, manages to operate at high speeds of the conveying group, for example over 20 cycles/min. A machine according to the invention, according to the type of application, can reach speeds of over 35 cycles/min and of the order of 50 cycles/min.

[0032] Another aspect of the invention consists of a conveyor apparatus, for a packaging machine, **characterised in that** it comprises two independent sliders operating in parallel with intermittent movement between a grouping area and a packing area of the machine.

[0033] In accordance with another aspect of the invention, a method for packaging products into cartons, in a packaging machine fed by at least one flow of said products, comprises the steps of: sorting said at least one flow of products forming batches comprising a predetermined number of products in a grouping area of said machine; transferring said batches of products from said grouping area to an area of said machine for packaging into cartons; the method is **characterised in that** the transferral of the batches of products from said grouping area to said packaging station is carried out by a conveyor apparatus comprising a first slider and a second slider operating in parallel and with intermittent movement.

[0034] If the machine is fed by two flows of products, the first slider and the second slider can operate between the grouping area and the packing area with the same working stroke, or else with a different working stroke and/or speed in cycles/min.

[0035] The advantages of the invention will become clearer with the help of the following description, referring to a preferred embodiment.

Brief description of the figures

[0036]

Fig. 1 schematically shows the main components of a machine for packaging products in cardboard trays, in accordance with a preferred embodiment of the invention.

Detailed description of the invention

[0037] Fig. 1 shows a machine for packaging products p, essentially comprising a loading apparatus, a package transportation apparatus H, in the example represented by cardboard trays 30, and an apparatus T for conveying the products towards said package transportation apparatus.

[0038] The inlet of the machine is represented by the products p arriving from a suitable feeder like for example a conveyor belt or a lane. The single product p is represented, for example, by a food product in a primary package.

[0039] The loading apparatus (not shown) forms batches of products p, of defined number, in an area G arriving from the lane, and conveys them into a grouping area 10, by means of a thruster or equivalent means per se known. The batches formed in said area 10 are then transferred to a loading station 20 of the transportation apparatus H of the trays 30.

[0040] In greater detail, said package transportation apparatus H comprises a feeder 31, which picks up the trays 30 from a storage compartment 32 and sets them down on a transporter member or catenary line 33, equipped with conveying means (or "carriers") 34, with a pitch P. The trays 30, during operation, move forward on the catenary line 33 with intermittent motion in direction A.

[0041] The conveyor apparatus T is suitable for transferring the batches of products from the grouping area 10 to the loading station 20, operating with intermittent linear movement. Said conveyor apparatus essentially comprises a first slider 40 and a second slider 41, the two sliders 40, 41 being mobile with respect to parallel linear guides 42, 43 arranged between the grouping area 10 and the loading station 20.

[0042] Each of the sliders 40 and 41 is controlled independently and is moved linearly, along the guide 42 or 43, by a respective motor 44, 45. The sliders 40, 41 operate in parallel, with alternate forward movement from the grouping area 10 to the loading station 20, and return movement from the station 20 to the area 10. The sliders have a horizontal working stroke L, between the grouping area 10 and the loading station 20. The machine comprises a control system of the motors 44, 45, not depicted, also capable of controlling position and speed of the two sliders independently.

[0043] Fig. 1 shows the sliders 40 and 41 in the start and end of stroke positions, spaced by a quote L. In the example, said quote L corresponds to the working stroke, between a position represented by the line S, and the loading station 20. The working stroke can vary based upon the number of products that, for each cycle, are grouped in the aforementioned area 10. The stroke L corresponds to a certain grouping (e.g. 8x) in the area 10; with a less numerous grouping it is advantageous to reduce the stroke L to a value L' below L, by bringing the starting position of the sliders 40, 41 closer to the loading

station, as indicated in the figures by the line S'. The shorter stroke L' allows the cycles (number of cycles/min) to be increased without changing the other conditions.

[0044] In a preferred embodiment, the first slider 40 substantially comprises a column 50 that carries thrusting members suitable for acting on the batches of products p formed in the grouping area 10. The top part of said column 50 is fixed to a suitable trolley, that runs along the respective linear guide 42, pulled for example by belts that are actuated by a pulley moved by the respective motor 44. The thrusting member is represented in the example by a paddle 51, in turn fixed to a motorised trolley 52 and equipped with translation movement with respect to the column 50.

[0045] The second slider 41 is substantially identical, and comprises a column 53 and a thrusting member 54, also with trolley 55 equipped with motorised vertical movement with respect to the column 53.

[0046] In the example, the columns 50 and 53 are positioned on opposite sides with respect to the axis of the guides 42, 43, to avoid mechanical interference during the alternate back and forth movement between the areas 10 and 20, in particular at the crossing point between one slider going out and the other slider coming back. It should be noted that the thrusting members 51 and 54 are supported by the respective trolleys 52, 55 so that the thrusting members 51 and 54 are positioned substantially in the same start of stroke point in the grouping area 10, corresponding to the position of the member 51 and indicated by the line S of Fig. 1.

[0047] Basically, the thrusting members 51 and 54 operate according to the same lengths, positions and directrices, transferring the batches of products p from the same point of the grouping area 10 to the same point of the loading station 20.

[0048] For this purpose, for example, the thrusting members 51 and 54 are fixed to the trolleys 52 and 55 through respective arms, suitably shaped and different for the two sliders, compensating for the fact that the two sliders move on trajectories that are parallel but not aligned. In the example, the trolleys substantially mirror each other, with a transversal arm of the trolley 55 of suitable length to align the trajectory of the thrusting member 54 with that of the member 51, compensating for the transversal staggering between the sliders or rather between the respective columns 50 and 53.

[0049] According to variants of the invention, the first slider 40 and the second slider 41 can operate with respective working strokes L_1 and L_2, where L_1 is different from L_2. Such a method is advantageous in particular if the machine receives the products from two separate chutes, with different frequency of arrival and/or if the products arriving from said two chutes are different to each other.

[0050] The operation is the following. The products p, arriving from a delivery belt, are grouped in batches and loaded, in the area 10. The slider 40 transfers one of the batches thus formed into the loading station 20, directly inserting the batch into one of the cardboard trays 30. At the same time, the other slider 41 carries out the return movement from the station 20 to the area 10. The trolley 55, in said return movement, is lifted along the column 53, so that the thrusting member 54 on its way back does not interfere with the thrusting member 51 on its way out, at the moment when the two sliders cross over. When the slider 41 ends the return movement, the trolley 55 lowers down positioning the thruster 54 in the grouping area 10, ready to transfer the next batch of products. Meanwhile, the first slider carries out the insertion of the batch of products into the appropriate box 30. At this point the second slider 41 starts the working stroke whereas the first slider 40, following lifting of the trolley 52, starts the return stroke.

[0051] With reference to Fig. 1, the slider 40 is in the starting position of the working stroke, with the member 51 positioned against the batch of products in the grouping area 10. The second slider 41, on the other hand, is in the end of stroke position, immediately after the insertion of a batch of products p in a tray 30'. It can be seen in the figures that the trolley 55 and with it the thrusting member 54 are lifted to allows the return movement of the slider 41, at the same time as the forward movement of the slider 40. The whole thing is synchronised with the forward movement of the catenary line 33 and, in particular, with the machine pitch P.

[0052] The sliders 40 and 41, in this way, alternate with one another in completing the stroke L. Therefore, the machine is able to manage a certain machine pitch P of the finished packages, with a lower number of cycles/min of the conveyor apparatus T compared to the prior art. The cycle of the machine, substantially set by the pitch P of the boxes, can be divided between the two sliders equally or even unequally (for example 1/3-2/3) according to different embodiments of the invention and/or the feeding of the products p on one or two chutes.

Claims

1. Packaging machine comprising at least:

   - one loading apparatus suitable for receiving at least one flow of products (p) and forming batches each comprising a predetermined number of said products (p), in a grouping area (10);
   - one conveyor apparatus (T) suitable for transferring said batches of products from said grouping area to a packing area (20) into cartons (30);

   characterised in that said conveyor apparatus comprises a first slider (40) and a second slider (41), said two sliders (40, 41) being independent and operating in parallel between said grouping area (10) and said packing area (20), with intermittent movement.

2. Machine according to claim 1, said sliders (40, 41) being arranged to operate with alternate back and forth movements between said grouping area (10) and packing area (20), and with a working and/or cyclical stroke (L) respectively equal for said two sliders, or different between first (40) and second slider (41).

3. Machine according to claim 1 or 2, comprising an apparatus (H) for moving packs, wherein said packing area is represented by a loading station (20) of said apparatus.

4. Machine according to any one of the previous claims, wherein said sliders (40, 41) comprise respective thrusting members (51, 53) of the batches of products, a first thrusting member (51) being associated with the first slider and capable of transferring a batch of products from a given point of the grouping area to a given point of the loading station; a second thrusting member (53) being associated with the second slider, and capable of transferring a batch of products from said given point of the grouping area to said given point of the loading station.

5. Machine according to claim 4, wherein each of said two sliders has a horizontal translation movement, and the respective thrusting member is equipped with vertical movement with respect to the slider, to avoid that thrusting members operating in parallel interfere with each other.

6. Machine according to claim 5, wherein each of said sliders essentially comprises a column (50, 52) with translation movement on a horizontal guide (42, 43), extending above the grouping area and the loading area, and said column carries a thrusting means (51, 54), associated with a trolley (52, 55) equipped with vertical movement along the column itself.

7. Machine according to any one of the previous claims, wherein a first slider comprises thrusting members specifically suitable for the translation of a first type of product, and a second slider comprises thrusting members specifically suitable for the translation of a second type of product, the machine being suitable for packaging at least one unit of said first products and one unit of said second products in the same pack.

8. Conveyor apparatus (T) for a packaging machine, arranged to transfer batches of products (p) from a grouping area (10) of said machine, wherein the batches are formed from at least one input flow of said products to an area (20) for packing into cartons (30) of said machine, the conveyor apparatus being **characterised in that** it comprises two independent sliders (40, 41) operating in parallel between said grouping area and said packing area with intermittent movement.

9. Method for packaging products (p) in cartons (30), in a packaging machine fed by at least one flow of said products, comprising the steps of:

   - sorting said at least one flow of products forming batches comprising a predetermined number of products in a grouping area (10) of said machine;
   - transferring said batches of products from said grouping area to an area (20) for packing into cartons of said machine;

   characterised in that the transferral of the batches of products from said grouping area to said packing station is carried out by a conveyor apparatus (T) comprising a first slider and a second slider (40, 41) operating in parallel and with intermittent movement.

10. Method according to claim 9, wherein said machine is fed by two flows of products, and said first slider and said second slider operate between the grouping area (10) and the packing area (20) with the same working stroke (L), or else with a different working stroke and/or speed in cycles/min between said first and said second slider.

11. Method according to claim 9 or 10, wherein the machine is fed by two independent flows of first products and second products, said first and second products being different in type and/or shape; the method comprises the packaging of at least one unit of said first products and one unit of said second products in the same pack; said first slider comprises thrusting members specifically suitable for the translation of said first products, and said second slider comprises thrusting members specifically suitable for the translation of said second products.

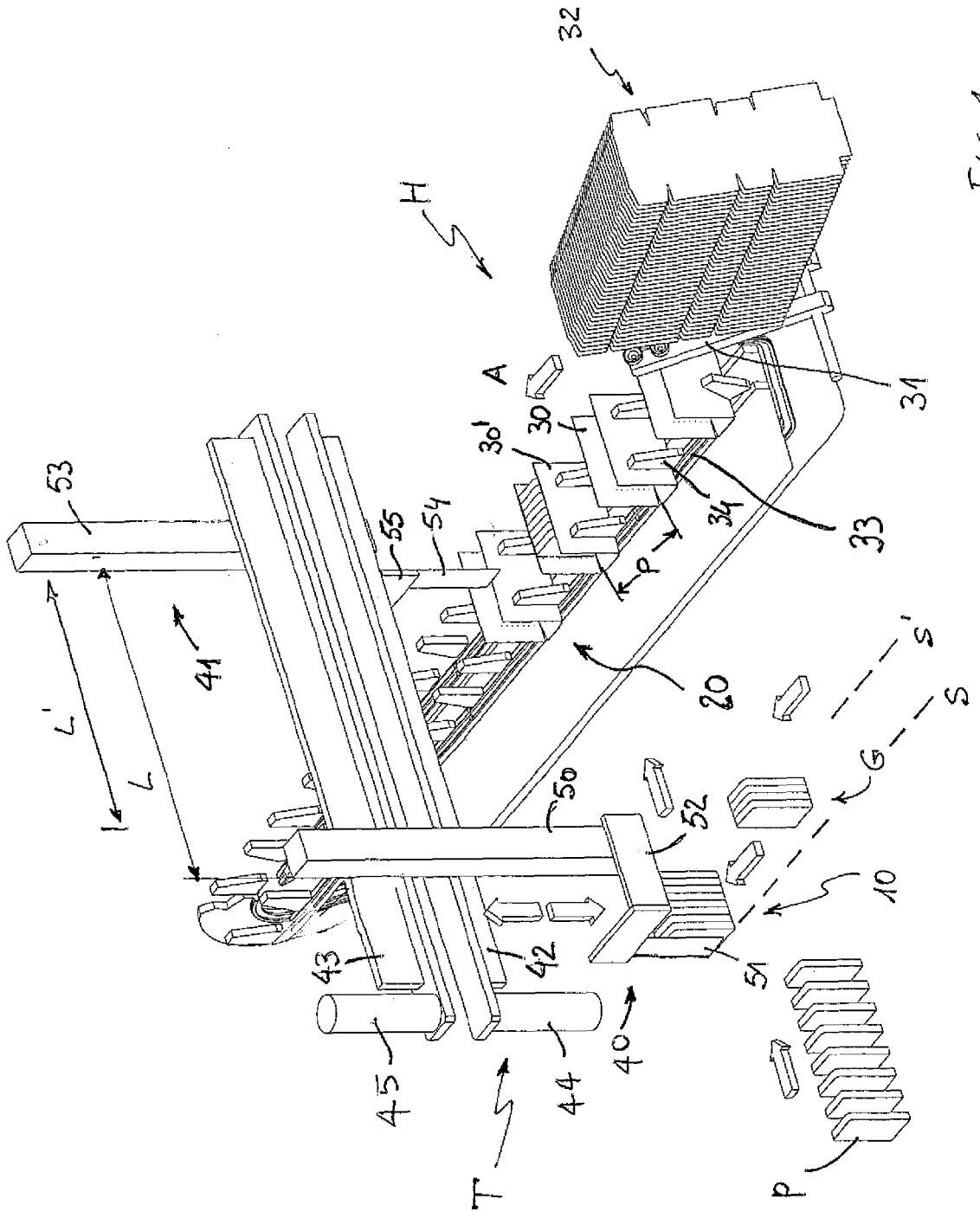
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FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 09 15 9115

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B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 September 2009	Lawder, M

CATEGORY OF CITED DOCUMENTS

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