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DESCRIPTION

[0001] The invention relates to a device for packaging substantially flat products in a box in accordance with the preamble of claim 1 and a method for packaging substantially flat products in a box in accordance with claim 14. Such a device and method is disclosed in US 2009/031955 A1.

[0002] In particular the invention relates to packaging paper booklets or folded papers in a carton box, said box having the width and height of one product, and a length so as to contain a multitude of said products, for instance at least 20, 50 or more products.

[0003] Traditionally such paper booklets or folded papers are put in the carton boxes manually. A need therefore exists for a low cost, high speed, reliable and/or efficient method.

[0004] According to the invention the device comprises a frame having a moving endless stack conveyor, a guide for supporting the products at one side of the guide during transport from a entry end to an exit end of said guide, which guide extends parallel to said conveyor, means for holding a box at the exit end of said guide such that the opening of the box extends parallel to said guide at the other side thereof, said stack conveyor having support members spaced apart at regular intervals along said conveyor, extending perpendicular to the conveyor and towards said guide when they move along said guide, a feeder for feeding said products at the entry end of said guide between two spaced apart support members in an orientation wherein said products are stacked parallel to said support members, means for moving said stack of products at the exit end in a direction perpendicular to said guide and past the edge of said exit end into said box, and means for transporting the box in a direction parallel to said guide in order to make room for a next stack of products.

[0005] Preferably said endless conveyor comprises two parallel spaced apart chains, and said support members are elongated beams, one end of each of said beams being attached to said chains.

[0006] Preferably said feeder comprises at least one pair of endless feeder conveyors, parts of which run parallel against each other from a feeder entry end to a feeder exit end, said feeder exit end being located near the edge of the entry end of said guide. Said pairs of endless feeder conveyors preferably each comprise at least two endless cords.

[0007] Preferably said guide comprises a pair of parallel spaced apart rails.

[0008] Said means for moving a stack of products into the box is a reciprocating push member.

[0009] Preferably a temporary guide is located at the exit end of said guide, extending in line with said guide, said temporary guide being provided with means for moving the temporary guide out of line with said guide to allow the stack of products past the edge of the guide into said box. Said temporary guide is preferably formed such that said stack of products pushes said temporary guide out of line with the guide when said stack of products is moved into the box. Said temporary guide preferably comprises two spaced apart parallel rails, which are hinged along an axis parallel to and substantially in line with the outer sides of the guide.

[0010] Said means for transporting the box comprises a reciprocating hook, which is arranged to move over a stack of products in a box, and pull the stack with the box in said direction. Said transport direction of the box is preferably counter the direction of movement of the products on the guide.

[0011] Preferably the device comprises an end guide for guiding a stack of products into a box, which end guide extends perpendicular to the guide, at a distance from the edge of the exit end of said guide and during use extends into the box, said distance being equal to the distance between the support members.

[0012] Preferably the device comprises means for exchanging a filled box with an empty box.

[0013] Preferably the device comprises digital input means for inputting the number of products that fit between two support members. Preferably the device comprises counting means, preferably an optical sensor, for counting the number of products being fed at the entry end of the guide, and means for accelerating said stack conveyor when the correct number of products is fed between two support means, and for slowing down said stack conveyor when said support means have past. Preferably the device comprises means for calculating and regulating the speed of the stack conveyor in dependency of the number of products that fit between two support members.

[0014] The invention also relates to a method for packaging substantially flat products in a box, wherein products are transported in stacks from an entry end to an exit end of a guide, said guide supporting the products at one side thereof, said products being transported by a stack conveyor having support members spaced apart at regular intervals along said conveyor and extending perpendicular to the conveyor and towards said guide while they move along said guide, wherein a feeder feeds said products at the entry end of said guide between two spaced apart support members in an orientation wherein said products are stacked parallel to said support members, wherein a box is held at the exit end of said guide such that the opening of the box extends parallel to said guide at the other side thereof, and said stack of products are moved at the exit end in a direction perpendicular to said guide and past the edge of said exit end into said box, and wherein the box is transported in a direction parallel to said guide in order to make room for a next stack of products.

[0015] The invention will be illustrated by means of a preferred embodiment as shown in the drawings, wherein identical parts are indicated with identical numerals, and wherein:

Figures 1 and 2 are partially open perspective, respective front and rear, views of a device in accordance with the invention;

Figure 3 is a perspective front view of a part of the device of figures 1 and 2;

Figures 4 and 5 are front views of a part of the device of figures 1 and 2 in two different stages of use; and

Figures 6, 7, 8 and 9 are front views of a part of the device of figures 1 and 2 in four different stages of use.

[0016] According to figures 1, 2 and 3 a device for packaging booklets 1 in carton boxes 2 comprises a frame 3 arranged to stand on a floor. The frame 3 is connected to a feeder 4, through which the booklets 1 are fed in a substantially continuous flow to the device.

[0017] As shown in figures 4 and 5, the feeder 4 comprises two pairs of driven endless cords 41, 42. Said cords 41, 42 of each pair run against each other along a generally sloping track from a lower feeder entry end to an upper feeder exit end, so that booklets which are fed to the feeder entry will be transported therebetween to the feeder exit.

[0018] Guide rails 5 are arranged adjacent the exit end of the feeder, for guiding stacks of booklets 1 from an entry end of the guide rails 5, which is the exit end of the feeder 4, to an exit end of the guide rails 5, where the stacks of booklets 1 are moved down into the boxes 2. The stacks of booklets 1 are built up from the continuously fed booklets 1 between slowly moving pairs of vertical support members 6, as will be described below. Said support members 6 are beam shaped, and are at one outer end attached to a pair of driven endless moving chains 7. Each chain 7 extends on two gears 71, 72, of which gear 72 is driven by a motor 73.

[0019] The upper endless cords 42 are arranged on guide wheels 421, 423, 424, 425. Guide wheel 423 is located at the exit end of the feeder 4 which forms the entry end of the guide rails 5, but the cords 42 extend beyond the entry end of the guide rails 5, substantially perpendicular thereto in upward direction, so that they will keep supporting the back side of the booklets 1 when these enter the space between two pairs of support members 6. Each pair of support members 6 move between the space of these upright parts of upper endless cords 42.

[0020] The lower endless cords 41 are arranged on guide wheels 411, 412, 413, 414 and 422, such that between guide wheels 411, 421 on the feeder entry side and guide wheels 414, 423 on the feeder exit side the cords 41, 42 run against each other, whereby they can hold and move the booklets 1 from the entry to the exit of the feeder 4. Guide wheels 413, 422 are driven by a motor.

[0021] The device further comprises electronic input means for entering the number of booklets 1 that fit in a stack between two pairs of support members 6, as well as an optical sensor 8, which is located near the exit end of the feeder 4, for counting the number of booklets 1 that pass into the space between the pairs of supporting members 6. When the maximum number of booklets 1 in said space is reached, the chain 7 is temporarily accelerated, for allowing the pair of support members 6 to pass the feeder exit before the next booklet 1 exits the feeder 4. In order to allow this first booklet to be guided into the space between the support members 6, the support members 6 have bevelled edges at their backsides.

[0022] The frame is further provided with a box carrying platform 14, which is located under the booklet guide rails 5. The box carrying platform 14 is movable in vertical direction by a pneumatic cylinder, in order to place the boxes 2 in the correct position

under the booklet guide platform 5 for being filled with booklets 1. A sloping feeder 16 with lateral guides is located adjacent the carrying platform 14, on which a carton box 2 to be filled can be placed manually. Movable holding elements 17 hold the box on the sloping feeder 16 until a signal is received that the box can be released onto the carrying platform 14. The holding elements then move upwards so that the box 2 slides down onto the carrying platform 14 and then the box 2 is pushed by pusher elements 18 in the correct position against a guide rail 19. The carrying platform 14 is then moved upwards by the cylinder so that the bent outer end of vertical end guide 51 reaches down into the box 2, as well as the end of hook 52 against the inner front side 21 thereof.

[0023] Two hinged temporary guide rails 53 extend from the exit end of guide rails 5, extending in line with said guide 5. Said temporary guide rails are downwardly hingeable. The temporary rails 53 are held in the upward position by spring means 54, such that the stack of booklets 1 is supported by the rails 53. When the stack of booklets has arrived at the position shown in figure 6, where it bumps against the vertical guide 51, a push member 23 is moved up and down between the support members 6, so that it pushes the stack of booklets 1 down, whereby the temporary guide rails 53 are pushed and rotate against the spring force of springs 54 out of line with the guide rails 5, such that a sufficiently wide gap is provided to allow the stack of booklets 1 to move past the edge of the guide 5 into the box 2, as shown in figures 6 and 7.

[0024] As the box 2 is being filled with stacks of booklets 1, the box is being repeatedly moved forward over a distance X, which is equal to the distance X between the pairs of support members 6, by the reciprocating hook 52 as shown in figures 8 and 9. The hook 52 is slightly rotated upward to move the end of the hook 52 upward as it is moved over the last stack of booklets that was pushed into the box 2, as shown in figure 8, and then the hook 52 is moved downward so that it engages this stack and pulls it together with the box 2 in the direction of arrow X. When the box 2 is full and in its end position, the box carrying platform 14 is lowered by the cylinder 15, and a bumper pushes the box towards the front of the device, where it is taken out manually. A new, empty box 2 is simultaneously released from the feeder 16, and placed in the correct position.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US2009031955A1 [0001]

Patentkrav

1. Apparat til pakning af i hovedsagen plane produkter (1) i en kasse (2), og som har en ramme (3) med en bevægelig, endeløs stabel-transportør (7) og
- 5 organer til fastholdelse af kassen (2), hvilken stabel-transportør (7) har støtteorganer (6), som er adskilt med regelmæssige intervaller hen langs transportøren, og som strækker sig vinkelret på transportøren (7), et indfødningsorgan (4) til indfødnung af de nævnte produkter (1) mellem to adskilte støtteorganer (6), idet de nævnte produkter har en orientering og
- 10 produkterne er stablet parallelt med støtteorganerne (6), og hvor der findes et organ (23) til flytning af nævnte stabel af produkter (1) ind i kassen (2),
- kendetegnet ved, at** apparatet yderligere omfatter en føring (5) til ved den ene side af føringen (5) at understøtte produkterne (1) og dette under produkternes transport fra en indgang til en udgang ved nævnte føring (5), hvilken føring (5)
- 15 strækker sig parallelt med transportøren (7), og hvor indfødningsorganet (4) er indrettet til at indføde de nævnte produkter ved indgangsenden af føringen (5), og hvor støtteorganerne (6) er indrettet til at strække sig hen mod føringen (5), idet de bevæger sig langs føringen, og at nogle organer til at holde kassen (2) er indrettet ved udgangen af føringen (5), idet en åbning i kassen (2) strækker
- 20 sig parallelt med føringen (5) ved føringens (5) anden side, og at organet (23) til bevægelse af stablen af produkter (1) er et frem- og tilbagebevægeligt skubbeorgan, som er således indrettet, at det ved udgangsenden kan skubbe stablen af produkter (1) i en retning vinkelret på føringen (5) og forbi kanten af nævnte udgangsende,
- 25 **og at** apparatet yderligere omfatter en frem- og tilbagebevægelig krog (52), som er indrettet til at kunne ligge an mod den seneste stabel af flade produkter (1), som blev skubbet ind i kassen (2) og så trække den enkelte stabel af flade produkter (1) tillige med kassen i en retning, der er parallel med føringen (5) og dette i en sådan afstand, som er lig med afstanden mellem parrene af
- 30 støtteorganer (6), så at der bliver gjort plads til en næste stabel af produkter (1) i kassen (2).

2. Apparat ifølge krav 1, hvor den endeløse transportør (7) omfatter to parallelle kæder, hvorimellem der er et vist rum, og hvor støtteorganerne (6) er aflangestave, hvis ene ende er fastgjort til kæderne (7).
- 5
3. Apparat ifølge krav 1 eller 2, hvor indfødningsorganet (4) omfatter mindst ét par endeløse indfødningsorgan-transportører (41, 42), hvoraf visse dele forløber parallelt mod hinanden fra en indfødningsorgan-indgangsende til en indfødningsorgan-udgangsende, hvilken indfødningsorgan-udgangsende er anbragt nær kanten af indgangsenden af føringen (5).
- 10
4. Apparat ifølge krav 1, 2 eller 3, hvor de nævnte par endeløse indfødningsorgan-transportører (41, 42) hver omfatter mindst to endeløse kabler.
- 15
5. Apparat ifølge ethvert af de foregående krav, hvor føringen (5) omfatter et par parallelle skinner med indbyrdes afstand.
6. Apparat ifølge ethvert af de foregående krav, hvor en midlertidig føring (53) er anbragt ved udgangsenden af den nævnte føring (5) og strækker sig på
- 20
- linje med sidstnævnte, hvilken midlertidige føring (53) er forsynet med organer til flytning af denne midlertidige føring (53) væk fra den linje, som føringen (5) fastlægger, så at stablen af produkter (1) kan få lov at passere forbi kanten af føringen (5) ind i kassen (2).
- 25
7. Apparat ifølge krav 6, hvor den midlertidige føring (53) er således udformet, at den nævnte stabel af produkter (53) kan skubbe den midlertidige føring (53) ud af linje med føringen (5), når nævnte stabel af produkter (1) skal bevæges ind i kassen.
- 30
8. Apparat ifølge krav 7, hvor den midlertidige føring (53) omfatter to adskilte parallelle skinner, som er hængslet langs en akse, der er parallel med og i hovedsagen ligger på linje med de ydre sider af føringen (5).

9. Apparat ifølge ethvert af de forrige krav, hvor den nævnte frem- og tilbagebevægelige krog (52) er således indrettet, at den kan bevæges over en stabel af produkter (1) i kassen (2).
- 5 10. Apparat ifølge ethvert af de foregående krav, og hvor transportretningen for kassen (2) er modsat bevægelsesretningen for produkterne (1) på føringen (1).
- 10 11. Apparat ifølge ethvert af de foregående krav, og hvor apparatet omfatter en endeføring (51), som er indrettet til at kunne føre stabelen af produkter (1) ind i kassen (2), hvilken endeføring (51) forløber vinkelret på føringen (5) i en afstand fra kanten af udgangsenden af føringen (5) og under sin anvendelse strækker sig ind i kassen (2), hvilken førnævnte afstand er lig med afstanden mellem støtteorganerne (6).
- 15 12. Apparat ifølge ethvert af de foregående krav, hvilket apparat omfatter organer til udskiftning af en fyldt kasse (2) med en tom kasse (2).
- 20 13. Apparat ifølge ethvert af de foregående krav, hvor apparatet omfatter tælleorganer, fortrinsvis en optisk føler (8), til tælling af det antal af produkter (1), som indføres ved indfødningsenden af føringen (5), og organer til acceleration af nævnte stabel-transportør (7), når et korrekt antal produkter er blevet indført mellem to støtteorganer (6), og desuden er indrettet til at sænke hastigheden af stabel-transportøren (7), når støtteorganerne (6) har passeret.
- 25 14. Fremgangsmåde til pakning af i hovedsagen plane produkter (1) i en kasse (2), hvor produkterne (1) transporteres i stabler, og hvor produkterne (1) transporteres ved hjælp af en stabel-transportør (7), som har støtteorganer (6), der er adskilt med regelmæssig afstand hen langs stabel-transportøren (7) og strækker sig vinkelret på sidstnævnte, og hvor et indfødningsorgan (4) kan indføre produkterne mellem to adskilte støtteorganer (6) med en vis orientering, og hvor produkterne (1) stables parallelt med støtteorganerne (6), og hvor
- 30

kassen (2) holdes, og den nævnte stabel af produkter (1) så bevæges ind i kassen (1),

kendetegnet ved, at

- 5 de nævnte produkter (1) transporteres i de nævnte stabler fra en indgangsende til en udgangsende af en føring (5), hvilken føring understøtter produkterne (1) i den ene side, og at indfødningsorganet (4) indføder de nævnte produkter ved indgangsenden af føringen (5), og at støtteorganerne (6) strækker sig hen mod føringen (5), alt imens de bevæger sig langs føringen (5), og at nævnte kasse
- 10 (2) holdes ved udgangsenden af føringen (5), så at åbningen af kassen (2) bringes til at strække sig parallelt med føringen (5) ved sidstnævntes anden side, og
- at** den nævnte stabel af produkter (1) ved udgangsenden skubbes ved hjælp af et frem- og tilbagebevægeligt skubbeorgan i en retning vinkelret på føringen (5)
- 15 og forbi kanten af nævnte udgangsende og ind i kassen (2), og at en frem- og tilbagebevægelig krog (52) bringes til at ligge an mod den seneste stabel af flade produkter (1), som er blevet skubbet ind i kassen (2), og trække stabelen af flade produkter (1) samt kassen (2) i en retning, som er parallel med føringen (5) – og dette et stykke, som er lig med afstanden mellem parrene af
- 20 støtteorganer (6) for at gøre plads til en næste stabel af produkter (1) i kassen (2).

DRAWINGS

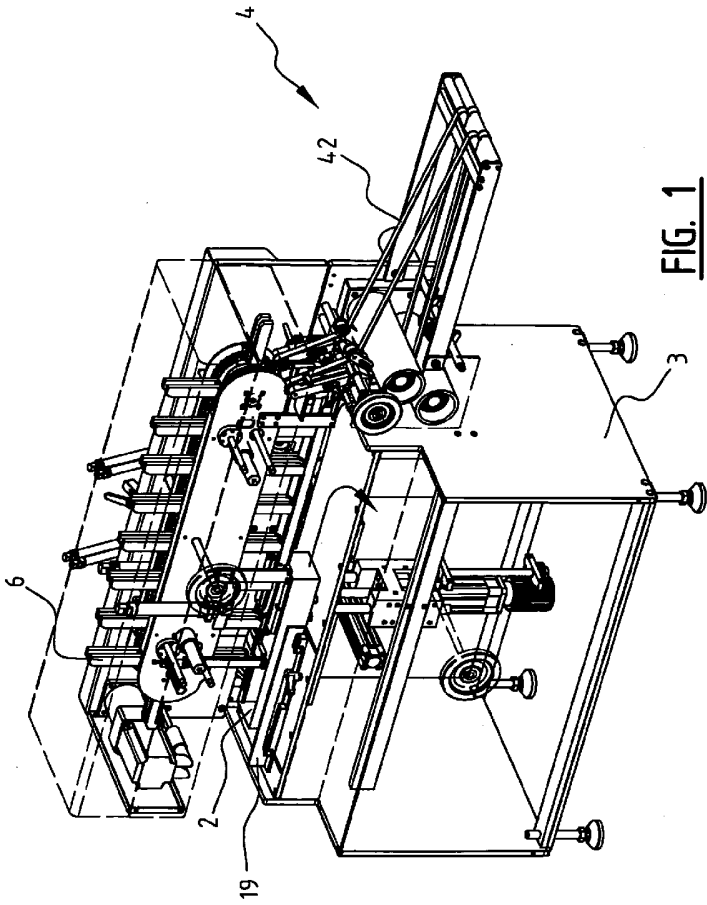


FIG. 1

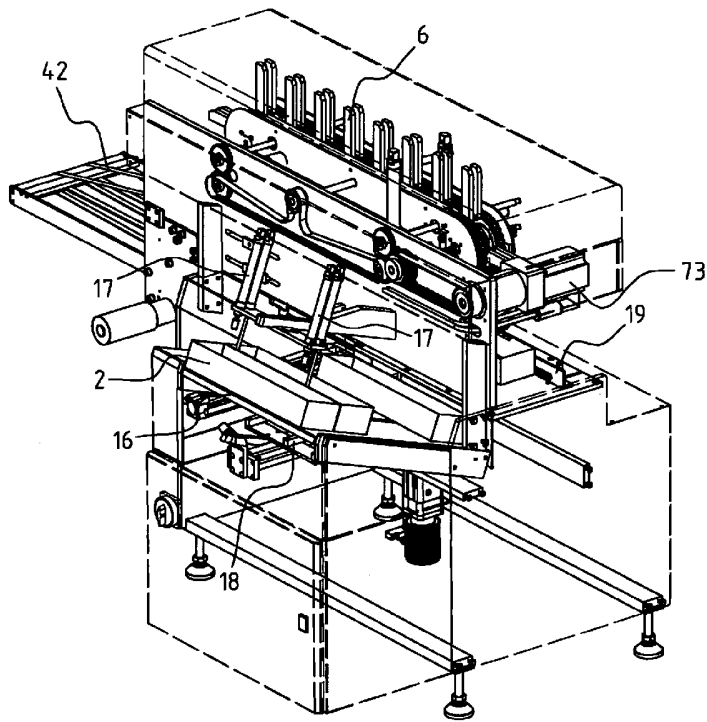


FIG. 2

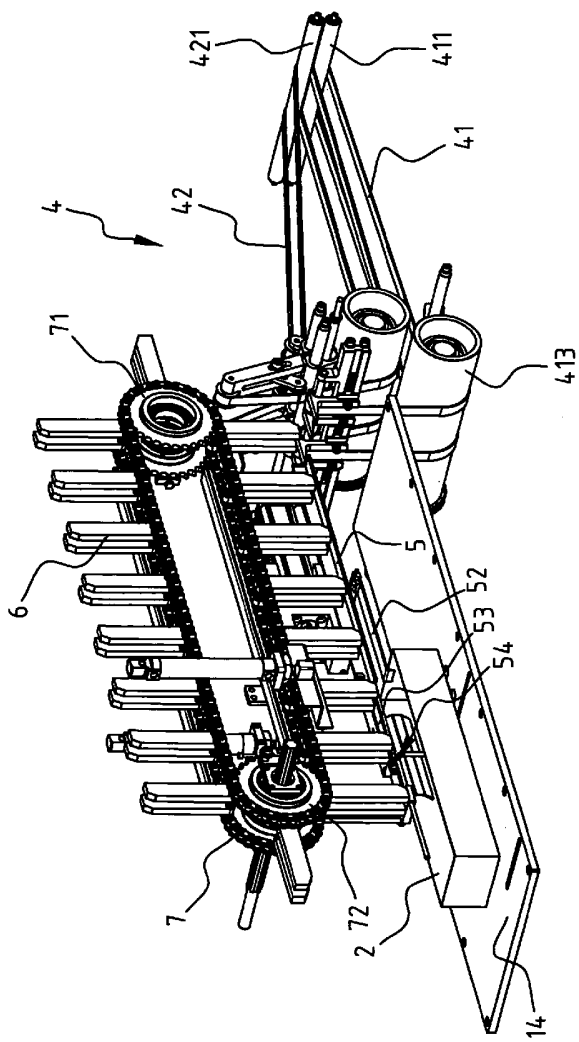


FIG. 3

