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David

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[54] **PACKING MACHINE FOR CIGARETTES OR THE LIKE**

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[51] **Int. Cl.²** **B65B 11/32**

[58] **Field of Search** ..... 53/148, 234, 236, 225, 53/375; 93/12 C

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[57] **ABSTRACT**

A cigarette packing machine wherein an intermittently driven adhesive-drying drum carries at its periphery an annulus of equally spaced pockets for open-ended packs which are filled with arrays of cigarettes. The drum is driven by steps each of which is a whole multiple of the distance between two neighboring pockets to advance the pockets into register with a first transfer station where the pockets receive open-ended packs from a feeding conveyor, and thereupon into register with a second transfer station where the packs are removed from the respective pockets. The distance between the second and first stations, as considered in the direction of rotation of the drum, is a whole multiple of the distance between two neighboring pockets, and the distance between the first and second stations equals or is a whole multiple of the distance between two neighboring pockets but is unequal to *n* steps wherein *n* is a whole number including one. This insures that each pocket which receives a pack at the first station completes more than one revolution prior to being removed at the second station. One or more folding devices are disposed at one or more additional stations which are located between the second and first stations and include instrumentalities for closing the open ends of packs.

10 Claims, 8 Drawing Figures

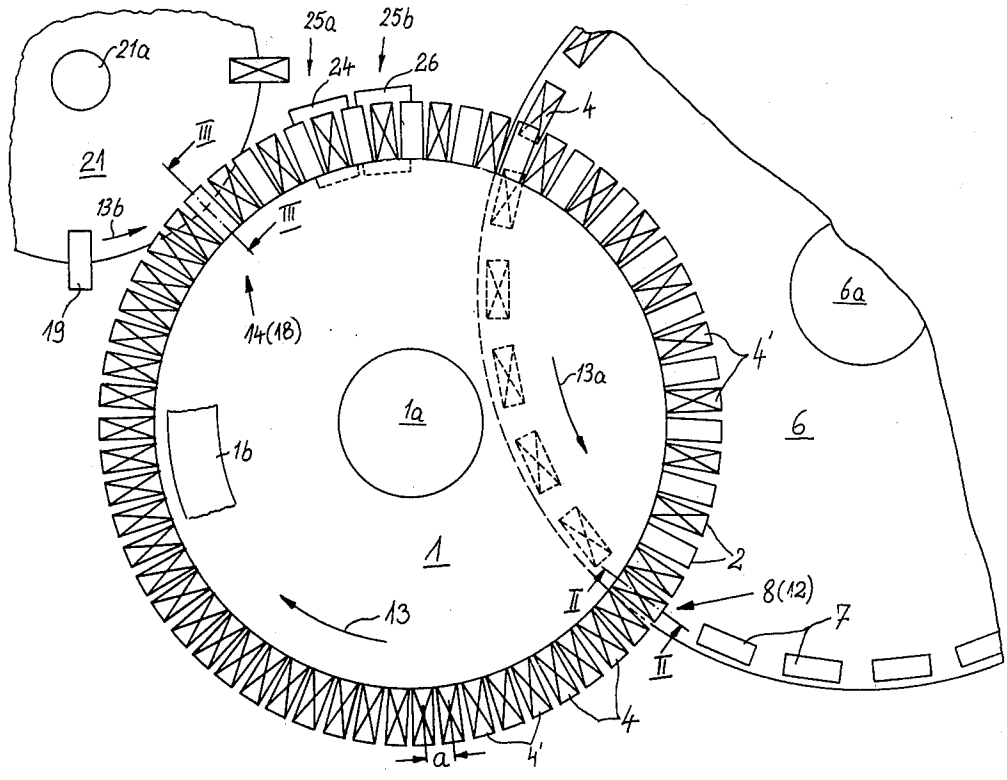


Fig.1

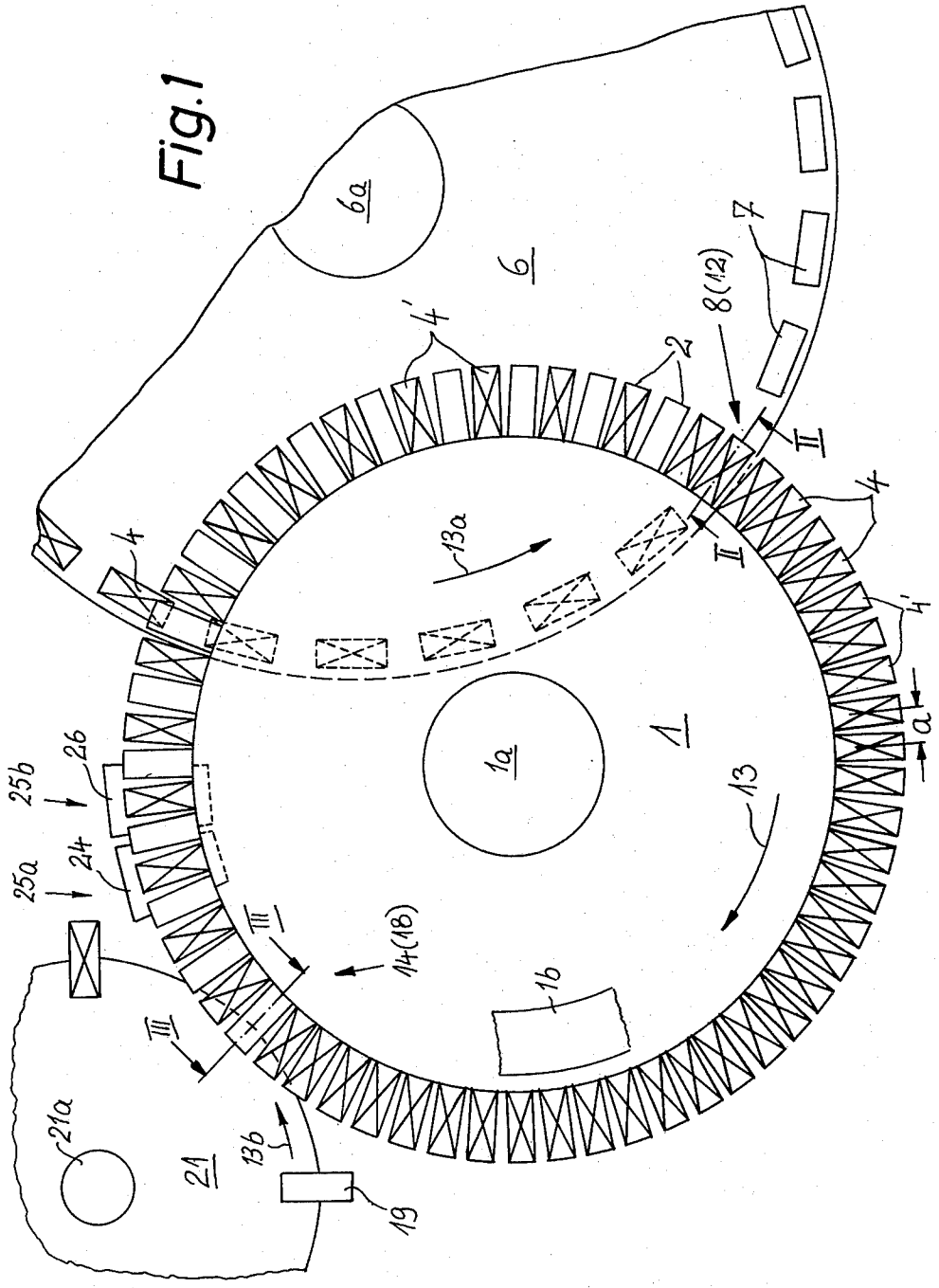

6a
6
7
8(12)
4'
2
II
4
13a
II
4
4'
a
1a
1
13
25b
26
25a
24
III
14(18)
1b
III
21a
21
13b
19

Fig.2

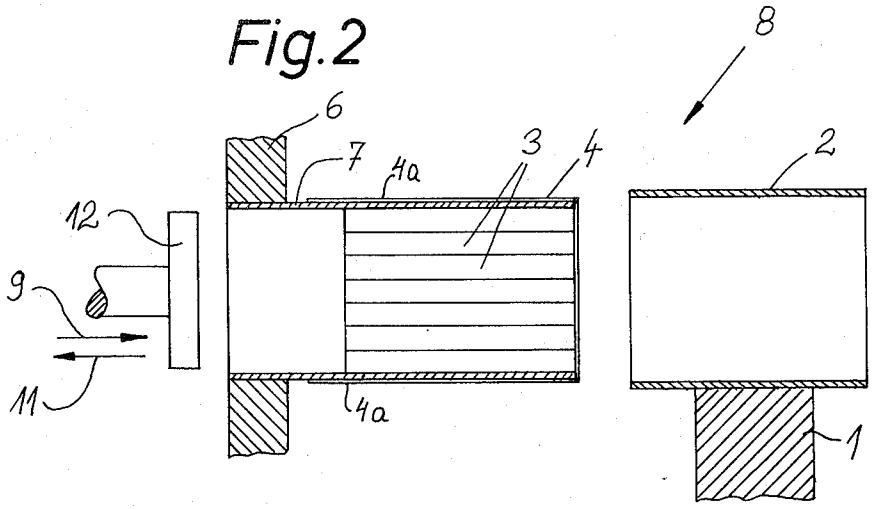
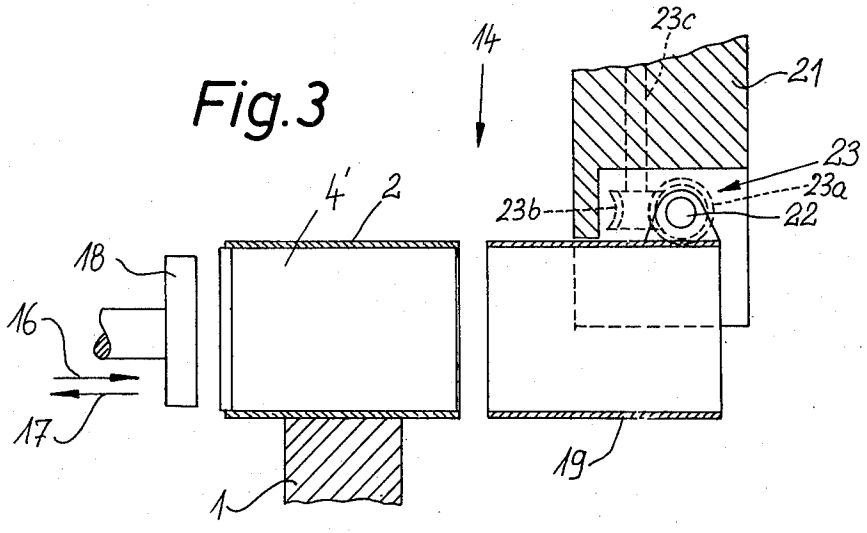


Fig.3



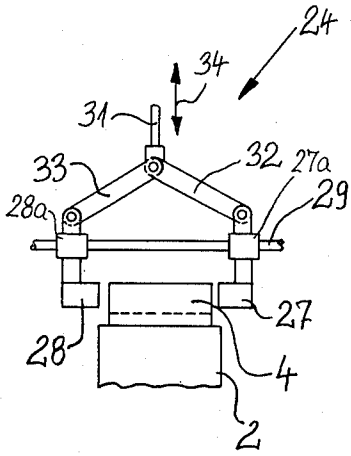


Fig.4

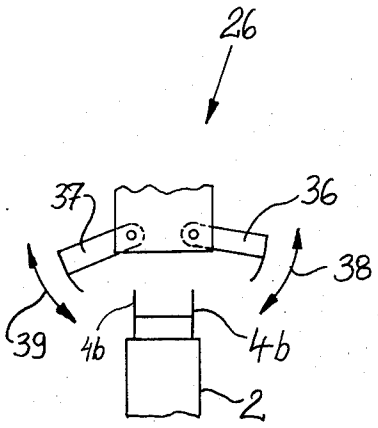


Fig.5

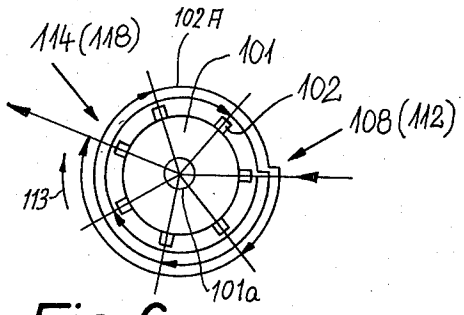


Fig.6

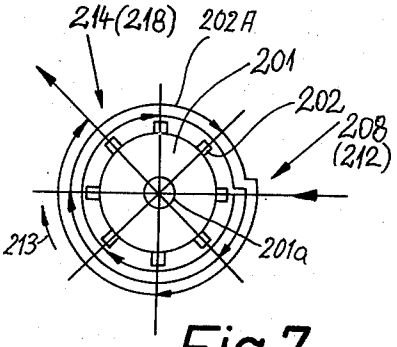


Fig.7

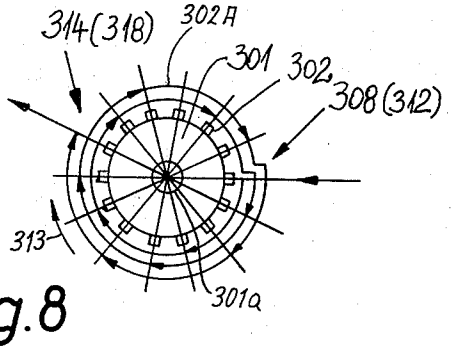


Fig.8

PACKING MACHINE FOR CIGARETTES OR THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to machines for manipulating smokers ' products in general, and more particularly to machines wherein portions of and/or entire smokers' products (such as discrete cigarettes, cigars or cigarillos, blanks for the making of packs for cigarettes or the like, partially finished or complete packs for cigarettes or the like, filter rod sectons and/or others) are transported in stepwise fashion, for example, past one or more treating stations. A typical example of a machine which can embody the present invention is a packing machine for cigarettes wherein arrays of cigarettes are introduced into open-ended packs and the packs are thereupon closed and labelled prior to introduction into a further packing machine which provides each pack with a transparent outer envelope (with or without a customary tear strip), into a baling machine, into a carton filling machine or to storage.

In certain presently known high-speed packing machines, open-ended packs containing arrays of cigaretttes or other rod-shaped tobacco-containing articles are introduced into pockets or analogous receiving means of a drying or conditioning conveyor which comprises means for heating the contents of pockets so as to insure that the adhesive which bonds the overlapping portions of the packs to each other can set within a short period of time. In many instances, the drying conveyor is a drum or wheel which carries at its periphery an annulus of equally spaced pockets and is indexed by steps each of which has a length corresponding to the distance between the centers of two neighboring pockets. The pockets receive open-ended packs at first transfer station and are relieved of their contents at a second transfer station. The length of the arc along which a filled pocket travels is invariably less than 360 degrees, normally between 180 and 270 degrees. During travel from the first to the second transfer station, the pockets can be moved into register with one or more treating devices, for example, with devices which close the open ends of packs before the respective pockets reach the second transfer station. This leaves relatively little time for the drying of adhesive which is applied to the overlapping portions of flaps and/or tucks at the previously open ends of the packs. Moreover, the total time for the drying of adhesive in other parts of the packs is also relatively short since a pack must leave the drying conveyor before the respective pocket covers a distance of 360 degrees.

Attempts to promote the setting of adhesive within a short period of time (i.e., while the respective pocket covers a distance of less than 360 degrees) by intensifying the heating action (normally by resorting to electrical heaters) have met with little success. This is due to the fact that the heating action must be regulated with a very high degree of accuracy in order (a) to insure a satisfactory setting of adhesive and (b) to avoid charring of packs during the intervals of dwell of the drying conveyor and/or to avoid the expulsion of moisture from cigarettes, cigars or cigarillos in the packs. Therefore, the heating action must be reduced or interrupted whenever the drying conveyor is brought to a halt or is driven at less than normal speed because even short-lasting interruptions in the operation of the packing machine can entail substantial losses in output due to

charring or disfiguration of packs and/or excessive drying of confined tobacco-containing articles.

It was further proposed to insure a satisfactory setting of adhesive without resorting to a very intensive heating action by employing large and bulky drying conveyors which are provided with very large numbers of pockets or otherwise configurated receiving means for cigarette packs or the like. These pockets can receive and transport open-ended packs or finished packs and can support such packs for relatively long periods of time if the number of pockets is very high and if the angular distance between the first transfer station (where the packs enter the pockets) and the second transfer station (where the packs leave the pockets) is rather long. Such distance depends on the number of pockets in the drying conveyor and on the position of the second transfer station relative to the first transfer station.

A drawback of relatively large, bulky and heavy drying conveyors is that they must be indexed or otherwise moved in stepwise fashion by powerful drives which consume substantial amounts of energy and whose parts are subjected to extensive wear, especially in a high-speed packing machine wherein the indexing of the drying conveyor and other conveyors must be completed within extremely short intervals of time. The accelerating and decelerating forces which arise during indexing of a large and bulky drying conveyor cannot be controlled with a requisite degree of accuracy so that the conveyor is likely to be indexed by steps of unequal length.

It was further proposed to reduce the diameters of drum-shaped drying conveyors in packing machines without reducing the number of pockets by placing the pockets close or immediately adjacent to each other. This reduces the problems which arise due to sudden acceleration or deceleration of the conveyor but creates additional problems if the packs which are supported by the drying conveyor are to be treated by folding, tucking and/or analogous devices. Such devices take up a certain amount of space so that a pack which is adjacent to a pack in register with a folding, tucking or other treating device is likely to interfere with movements of component parts of the device and to thereby undergo deformation and/or other damage. Consequently, a relatively small drying conveyor which carries a large number of closely or immediately adjacent pockets for open-ended packs must be followed by a further conveyor whereon the open ends of the packs are closed and sealed before the packs are ready for introduction into a labelling, cellophanizing or carton filling machine.

SUMMARY OF THE INVENTION

An object of the invention is to provide a machine for manipulating parts of and/or entire smokers' products or analogous commodities wherein the commodities can remain in the receiving means of a drum-shaped or otherwise configurated conditioning conveyor for long periods of time without affecting the output of the machine and without necessitating the use of a bulky and heavy conveyor.

Another object of the invention is to provide a novel and improved drying or conditioning conveyor for open-ended and/or closed packs which contain cigarettes, cigars, cigarillos or other smokers' products.

A further object of the invention is to provide a drying conveyor which can be installed in existing packing machines as a superior substitute for conventional dry-

ing conveyors.

An additional object of the invention is to provide a drying conveyor wherein the pockets and/or otherwise configurated receiving means for parts of and/or entire smokers' products can be placed close or immediately to each other without interfering with the operation of one or more devices which must fold, tuck, seal, label or otherwise treat the commodities during transport with the drying conveyor.

Still another object of the invention is to provide a packing machine which embodies the improved drying conveyor and wherein the drying conveyor cooperates with other parts of the machine in a novel energy- and space-saving way.

The invention is embodied in a machine for manipulating cigarettes, cigarette packs and/or other commodities forming part of or constituting smokers' products, particularly in a packing machine for arrays of cigarettes, cigars or cigarillos. The machine comprises conveyor means (e.g., a rotary drum which is indexible to turn stepwise about a fixed axis) having an annulus of equally spaced pockets or otherwise configurated receiving means for commodities, with the neighboring receiving means of the annulus spaced apart from each other by a predetermined distance *a*, drive means for moving the conveyor means stepwise in a predetermined direction and through second distances each of which is a whole multiple (*x*) of a first distance *a* (for example, the second distance *x* times *a* may equal **2***a* or **3***a*) whereby the receiving means travel along an endless path past spaced-apart first and second transfer stations. The distance between the second and first transfer stations, as considered in the direction of movement of the receiving means, equals at least one full second distance *x* times *a*, and the distance between the first and second transfer stations (again as considered in the direction of movement of the receiving means) is equal to *m* first distances wherein *m* is a whole number including one. However, the distance *m* from the first to the second transfer station is unequal to *n* second distances (each second distance corresponds to the length of a step performed by a receiving means in response to movement of the conveyor means between two successive intervals of dwell) wherein *n* is a whole number including one.

The machine further comprises means for feeding commodities to receiving means in register with the first transfer station during intervals between successive movements of the conveyor means, and means for accepting commodities from receiving means which register with the second transfer station during intervals between successive movements of the conveyor means. The aforementioned relationship between various distances insures that, if the conveyor means is a drum, wheel or chain having an annulus of receiving means which form a circle and thus travel along an endless circular path, each commodity which is fed into a receiving means at the first transfer station completes more than one full revolution prior to being removed from the respective receiving means at the second transfer station. In fact, each commodity can complete two or more full revolutions.

One or more treating devices which serve to fold, tuck, label and/or otherwise treat the commodities on the conveyor means can be disposed adjacent to the path of commodities from the second toward the first transfer station.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved packing machine itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a fragmentary schematic side elevational view of a cigarette packing machine which embodies the invention;

FIG. **2** is an enlarged fragmentary sectional view as seen in the direction of arrows from the line II—II of FIG **1**;

FIG. **3** is an enlarged fragmentary sectional view as seen in the direction of arrows from the line III—III of FIG. **1**;

FIG. **4** is an enlarged side elevational view of a first folding unit in the packing machine of FIG. **1**;

FIG. **5** is an enlarged front elevational view of a second folding unit in the packing machine of FIG. **1**;

FIG. **6** is a schematic side elevational view of the drying or conditioning conveyor in a second packing machine;

FIG. **7** is a similar schematic side elevational view of the drying conveyor in a third packing machine; and

FIG. **8** is a similar schematic elevational view of the drying conveyor in a fourth packing machine.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** illustrates a portion of a cigarette packing machine which comprises a drum-shaped drying or conditioning conveyor **1** for cigarette packs **4** (see FIG. **2**) containing arrays of cigarettes **3**, for example, twenty cigarettes in the customary distribution including two outer layers of seven cigarettes each and a median layer of six cigarettes which are staggered with respect to the cigarettes of the outer layers. The conveyor **1** has at its periphery an annulus of equally spaced receiving means or pockets **2** each of which is dimensioned to receive a filled pack **4**. The distance *a* between the centers of neighboring pockets **2** is uniform along the entire circumference of the conveyor **1**. The drive means for intermittently moving the conveyor **1** in the direction indicated by arrow **13** comprises a geneva movement or an analogous transmission including a shaft **1***a* on which the conveyor **1** is mounted and which is installed in the frame of the packing machine. The drive means is arranged to advance the conveyor **1** by steps having a length *x* times *a* wherein *x* equals **2** whereby the pockets **2** advance along an endless circular path extending past a first transfer station **8** where the pockets **2** which register with this station receive open-ended packs **4**, and past a second transfer station **14** where finished packs **4** are removed from the registering pockets **2**. The adhesive which has been applied to the packs **4** and **4'** prior and eventually subsequent to introduction into the respective pockets **2** is heated and is thereby caused to set by a heating device a portion of which is shown at **1***b*.

The conveyor **1** is provided with **63** pockets **2**, the distance between the transfer stations **8, 14** (as considered in the direction of arrow **13**) is **33***a* and, therefore, the distance between the transfer stations **14** and **8**

(again as considered in the direction of arrow **13**) is **30***a*.

The means for feeding packs **4** and arrays of cigarettes **3** to those pockets **2** which register with the first transfer station **8** druing intervals between successive stepwise advances of the drying conveyor **1** comprises a second drum-shaped conveyor **6** which is driven intermittently in the direction indicated by arrow **13***a* and has an annulus of equally spaced hollow mandrels **7** (see also FIG. **2**) each of which can receive an array of **20** cigarettes **3** and is surrounded by an open-ended pack **4.** The open-ended packs **4** are formed on the respective mandrels **7** in a manner not forming part of the present invention. Reference may be had to the commonly owned U.S. Pat. No. 3,750,676 granted Aug. 7, 1973 to Kruse et al.

The means for transferring open-ended packs **4** and arrays of cigarettes **3** from the mandrels **7** at the transfer station **8** into the registering receiving means or pockets **2** of the drying conveyor **1** comprises a pusher **12** (see particularly FIG. **2**) which is reciprocable in directions indicated by arrows **9** and **11.** When moving in the direction indicated by arrow **9** (while the conveyors **1** and **6** are at a standstill), the pusher **12** expels the adjacent array of cigarettes **3** from the mandrel **7** and causes the cigarettes to strip the open-ended pack **4** off the mandrel so that the pack (with the array of cigarettes **3** therein) enters the registering pocket **2.**

A finished pack **4'** which dwells at the second transfer station **14** during an interval between two successive stepwise movements of the drying conveyor **1** is expelled from the respective pocket **2** by a second transfer member or pusher **18** (see FIG. **3**) and is accepted by a third drum-shaped conveyor **21** which is indexible in the direction indicated by arrow **13***b*. The conveyor **21** has containers or pockets **19** which are pivotably mounted thereon, as at **22,** and serve to receive and hold finished packs **4'** during the application of customary revenue labels (not shown). Each pocket **19** is pivotable through 90 degrees between a receiving position (shown in FIG. **3**) in which it extends in parallelism with the axis of the conveyor **21** and a second position in which it extends radially of the conveyor **21.** The means for moving the pockets **19** between such positions comprises transmissions **23** each of which may include a worm wheel **23***a* on the pivot member **22** for the respective pocket **19** and a worm **23***b* meshing with the worm wheel **23***a* and mounted on a worm shaft **23***c* which is rotated back and forth in certain angular positions of the conveyor **21.** One of several satisfactory methods of applying revenue labels (or other types of labels) to finished packs is disclosed in the aforementioned U.S. Pat. No. 3,750,676 to Kruse et al.

The pusher **18** of FIG. **3** transfers a finished pack **4'** from the pocket **2** at the transfer station **14** into the registering pocket **19** of the conveyor **21** while moving in the direction indicated by arrow **16.** The pusher **18** is thereupon retracted (arrow **17**) and is ready to perform a further forward stroke (arrow **16**) as soon as another filled pocket **2** reaches and is arrested at the transfer station **14.** Due to the aforementioned number of pockets **2,** the length of steps performed by the drying conveyor **1,** and the distance between the transfer stations **8** and **14,** each pocket **2** which receives an open-ended pack **4** at the first transfer station **8** completes more than one revolution (about 1½ revolutions) before it comes to a halt at the second transfer station **14.**

Two treating stations **25***a* and **25***b* are adjacent to the path of pockets **2** on the conveyor **1.** These treating stations are located between the transfer stations **14** and **8,** as considered in the direction of arrow **13.** The distance between the stations **14, 25***a* equals **5***a*, and the distance between the stations **14, 25***b* equals **7***a*, i.e., the distances between the first transfer station **8** and the treating stations **25***a*, **25***b* respectively equal **38***a* and **40***a*.

A first folding unit **24** which is installed at the treating station **25***a* is shown in FIG. **4.** This folding unit comprises instrumentalities **27, 28** for folding over the two small tucks **4***a* (FIG. **2**) at the open ends of the respective packs **4.** The instrumentalities **27, 28** are small blocks having sleeves **27***a*, **28***a* which are slidable along a stationary guide rod **29** at the treating station **25***a*. The upper ends of the blocks **27, 28** are articulately coupled to inclined links **32, 33** which are articulately coupled to a rod **31** movable in directions indicated by a doubleheaded arrow **34.** When the rod **31** moves upwardly, as viewed in FIG. **4,** the blocks **27, 28** fold the respective tucks **4a** over the adjacent ends of cigarettes **3** in the pack **4** at the treating station **25***a*.

The conveyor **1** then advances the pocket **2** with the partly finished pack **4** therein to register with folding instrumentalities **36, 37** of the folding unit **26** shown in FIG. **6.** These instrumentalities resemble blades which are pivotable in directions indicated by double-headed arrows **38, 39** so as to fold the flaps **4***b* at the open end of the respective pack **4** over each other and to thus complete the conversion of the pack **4** into a finished pack **4'.** The blade **36** is pivoted clockwise, as viewed in FIG. **5,** prior to counterclockwise pivoting of the blade **37,** or vice versa. That flap **4***b* which is folded over the other flap is coated with adhesive which causes the flaps of the pack **4'** to adhere to each other, and the adhesive is caused to set while the respective pack advances toward, past and beyond the first transfer station **8** on its way into register with the pusher **18** at the second transfer station **14.**

A folding unit closely resembling the unit **24** of FIG. **4** is shown and described in the U.S. Pat. No. 3,750,676 to Kruse et al. This patent also shows and describes a folding unit which is somewhat similar to the folding unit **24** of FIG. **5.**

A heating device which can be used to heat the pockets of the conditioning conveyor is disclosed in thhe commonly owned copending application Ser. No. 331,028 now U.S. Pat. No. 3,802,325 filed Feb. 2, 1973 by Bardenhagen et al.

The operation of the machine including the structure shown in FIGS. **1** to **5** is as follows:

The aforementioned transmission (including the shaft **1***a* for the conveyor **1,** the shaft **6***a* for the conveyor **6** and the shaft **21***a* for the conveyor **21**) drives the conveyors **1, 6** and **21** in stepwise fashion (arrows **13, 13***a* and **13***b*). The length of each step performed by the drying conveyor **1** is **2***a*, the length of each step performed by the conveyor **6** equals the distance between the centers of two neighboring mandrels **7,** and the length of each step performed by the conveyor **21** equals the distance between the centers of two neighboring pockets **19.** Each mandrel **7** which moves into register with an empty pocket **2** at the first transfer station **8** contains an array of twenty cigarettes **3** and is surrounded by an open-ended pack **4.** The pusher **12** is then caused to perform a forward stroke (arrow **9** in FIG. **2**) to transfer the array of cigarettes **3** and the

open-ended pack **4** into the registering empty pocket **2** of the drying conveyor **1**. Such transfer takes place while the conveyors **1** and **6** are at a standstill and results in automatic stripping of the pack **4** off the respective mandrel **7** by the leading ends of cigarettes **3** of the array which is in register with the advancing pusher **12**. The pusher **12** is thereupon retracted (arrow **11** in FIG. **2**) before the transmission advances the conveyors by a step to move the next filled mandrel **7** into register with an empty pocket **2** at the first transfer station **8**. As stated above, the manner in which the arrays of cigarettes **3** are introduced into mandrels **7** and the open-ended packs **4** are assembled on the mandrels **7** upstream of the transfer station **8** forms no part of the present invention. Each open-ended pack **4** is formed by suitable manipulation of one, two or more blanks at least one of which has overlapping portions which are coated with adhesive. Such adhesive is caused to set during transport of the respective pack **4** in a pocket **2** of the conveyor **1**.

The pocket **2** which receives a pack **4** and an array of cigarettes **3** at the transfer station **8** bypasses the second transfer station **14** while the drying conveyor **1** performs its seventeenth step so that such pack cannot be transferred into a pocket **19** of the conveyor **21**. When the conveyor **1** completes its nineteenth step, the pack **4** reaches the first treating station **25***a* and the rod **31** is caused to move upwardly, as viewed in FIG. **4**, so that the blocks **27** and **28** fold the respective tucks **4***a*. The blocks **27, 28** are retracted to the positions shown in FIG. **4** before the drying conveyor **1** is set in motion to advance the partially finished pack into the proper position with respect to the folding unit **26** at the second-treating station **25***b*. The blades **36, 37** then complete the conversion of the pack **4** into a finished pack **4'** and are retracted to the positions shown in FIG. **5** before the conveyor **1** begins to move again to advance the pack **4'** toward the first transfer station **8**. This station is bypassed by the finished pack during the thirtysecond step of the conveyor **1** but the finished pack moves into register with an empty pocket **19** at the second transfer station **14** upon completion of the fortyeighth step of the conveyor **1**. The pusher **18** advances in the direction indicated by arrow **16** and transfers the finished pack **4'** (wherein the adhesive was caused to set under the action of the heating device **1***b*) into the adjacent pocket **19** while the pocket **19** assumes the position shown in FIG. **3**. The pusher **18** is thereupon retracted (arrow **17**) and the conveyor **1** begins to advance the freshly evacuated pocket **2** toward the first transfer station **8**. Such empty pocket bypasses the treating stations **25***a* and **25***b* which is desirable because the packs in pockets **2** flanking a pocket at the treating station **25***a* or **25***b* could interfere with the operation of folding instrumentalities **27, 28** and/or **36, 37**, particularly of the instrumentalities **36, 37** whose pivot axes are parallel to the axis of the drying conveyor **1**. As shown in FIG. **1**, a pocket **2** which has been emptied at the second transfer station **14** remains empty during 15 successive steps of the conveyor **1**. Thus, the length of the interval during which a pocket **2** remains empty (15 steps) is only a small fraction of the length of the interval (48 steps) during which a pack **4** or **4'** dwells in its pocket. This enables the conveyor **1** to insure a satisfactory setting of adhesive in each pack **4** or **4'** without in any way affecting the output of the packing machine since the conveyor **6** delivers a commodity consisting of an open-ended pack **4** and 20 cigarettes **3** during each period of idleness of the conveyor **1** and the conveyor **21** accepts a finished pack **4'** during each period of idleness of the conveyor **1**.

The feature that the filled pockets **2** bypass the second transfer station **14** during a first revolution of their contents about the axis of the drying conveyor **1** is due to the fact that the distance between the transfer stations **8** and **14** equals an odd number of distances *a* and that the length of each step performed by the conveyor **1** equals an even number of distances *a*. Also, and since the total number of pockets **2** is an odd number, each filled pack **4'** bypasses the first transfer station **8** during movement from the second treating station **25***b* toward the second transfer station **14**. Since the distances between the transfer station **8** and the treating stations **25***a*, **25***b* respectively equal **38***a* and **40***a*, each pack **4** moves into register with the folding units **24, 26** during first revolution about the axis of the conveyor **1** so that the adhesive between the flaps **4***b* can set before the respective finished pack **4'** moves into register with the pusher **18** while the conveyors **1** and **21** are idle.

It will be noted that, were the conveyor **1** driven by steps having a length *a*, a pack **4** which is transferred at the station **8** would reach and would be removed at the station **14** after **33** steps. In accordance with the invention, the conveyor **1** completes **48** steps before a pack **4'** is removed at the station **14**.

The conveyor **1** can be provided with a large number of closely adjacent pockets **2** without permitting the packs **4** or **4'** which are adjacent to the treating station **25***a* or **25***b* to interfere with the operation of the folding unit **24** or **26**. This is due to the fact that the treating stations **25***a* and **25***b* are separated from each other by a space which accommodates an empty pocket **2** (see FIG. **1**) and that the pocket which precedes the treating station **25***a* as well as the pocket which precedes or follows the treating station **25***b* is also empty.

Since the length of steps performed by the conveyor **1** is only **2***a*, the accelerating and decelerating forces acting on the conveyor **1** are readily controllable in spite of the fact that the conveyor carries a rather large number of pockets **2** and, therefore, its diameter cannot be reduced at will even if the pockets are immediately adjacent to each other.

Another advantage of the conveyor **1** is that the packs **4** and **4'** can be subjected to a controlled heating action during travel from the transfer station **8** toward, past and beyond the transfer station **14**, thereupon toward, past and beyond the transfer station **8**, and back to the transfer station **14** for removal from the respective pockets **2**. Thus, the drying of adhesive can take longer because each pocket which receives a pack **4** at the station **8** completes more than one full revolution prior to being relieved of its contents at the station **14**.

FIG. **6** illustrates a modified drying or conditioning conveyor **101** which is provided with seven equally spaced receiving means or pockets **102**. The drive means for the conveyor **101** (including the shaft **101a**) is designed to index the conveyor by steps of three times the distance *a* between two neighboring pockets **102**. The distance between the first transfer station **108** and the second transfer station **114** (as considered in the direction of arrow **113** which indicates the direction of rotation of the conveyor **101**) is **4***a* and, therefore, the distance between the station **114** and station **108** is **3***a*. Thus, the distance between the stations **108,**

114 equals an even number of distances *a*, and the length of each step performed by the conveyor **101** is an odd multiple of a distance *a*. It will be seen that a pack (not shown) which is introduced into a pocket **102** at the station **108** by the pusher **112** remains in the respective pocket while the pocket completes a little more than 2½ revolutions (as indicated by the spiral arrow **102A**). This corresponds to six steps of the conveyor **101** whereas the distance from the station **108** to the station **114** is only **4***a*.

The packing machine embodying the drying conveyor **101** can also comprise at least one treating station which is located downstream of the second transfer station **114.** In this packing machine, a filled pocket **102** downstream of the station **114** is separated from the next-following filled pocket by two empty pockets. Therefore, the packs in filled pockets are even less likely to interfere with movements of tucking, folding or like instrumentalities at a treating station which is located downstream of the station **114** but upstream of the station **108.** The conveyor **101** is preferably of lightweight construction because it performs relatively long steps (**3***a*). For example, such conveyor may be made of a synthetic plastic material which may but need not be reinforced by metallic inserts.

In FIG. **7,** the drying conveyor **201** has eight (i.e., an even number of) receiving means or pockets **202;** the distance from the first transfer station **208** to the second station **214** (as considered in the direction of arrow **213**) is five times the distance *a* between two neighboring pockets **202;** and the transmission including the shaft **201***a* is designed to advance the conveyor **201** by steps having a length of **3***a*. A pack which is introduced by pusher **212** into an empty pocket **202** at the transfer station **208** completes more than 2½ revolutions prior to being removed by the pusher **218** at the transfer station **214.** This corresponds to seven steps of the conveyor **201.** The path covered by a freshly filled pocket **202** prior to removal of its contents at the station **214** is indicated by a spiral arrow **202A.**

The drying conveyor **301** of FIG. **8** has **14** (even number) pockets or receiving means **302,** and the transmission including the shaft **301***a* is designed to advance the conveyor **301** by steps having a length **3***a* wherein *a* is the distance between two neighboring pockets **302.** The distance between the first transfer station **308** and the second transfer station **314** (as considered in the direction of arrow **313**) is **8***a* (even number). A pack which is transferred by pusher **312** into an empty pocket **302** at the transfer station **308** completes more than 2½ revolutions prior to removal of its contents by the pusher **318** at the station **314.** Thus, the conveyor **301** completes twelve steps whereas the distance between the stations **308, 314** equals only **8***a*. The path along which a filled pocket **302** advances prior to removal of its contents is indicated by the spiral arrow **302A.**

Each of the conveyors **101, 201, 301** can move filled pockets **102, 202** or **302** into register with one or more folding or other treating units (not shown) corresponding or analogous to the units **24, 26** and located downstream of the second transfer station **114, 214** or **314.** In the structure shown in FIG. **8,** a treating station can be provided at a distance **2***a* ahead of the station **308** so that a filled pocket **302** which dwells at such treating station is separated from the next-following filled pocket by two empty pockets and from the station **308** by one empty pocket. If the number of pockets **302** is increased or if the station **314** is placed nearer to the station **308,** the structure shown in FIG. **3** can readily accommodate two treating stations which are separated from each other and from the station **308** or **314** by at least two empty pockets.

The numbers of pockets on the drying conveyors **1, 101, 201** and **301** were given only by way of example because the number of combinations with steps having a length of *x* times *a* wherein *a* is the distance between two neighboring pockets and *x* is a whole number exceeding one is practically inexhaustible. In the illustrated embodiments, the drying conveyor can comprise an even number of pockets while the conveyor performs steps of a length which is an odd multiple *x* of the distance *a*, or the drying conveyor can comprise an even or odd number of pockets while the conveyor performs steps of a length which is an odd or even multiple *x* of the distance *a*. However, in each instance, the distance from the first to the second transfer station is *m* times the distance *a* (wherein *m* is a whole number including one) but the distance from the first transfer station to the second transfer station is unequal to *n* lengths of a step wherein *n* is also a whole number including one. As a further rudimentary example, the drying conveyor can be provided with nine pockets, the distance *m* from the first to the second transfer station may *a*, and the conveyor can be indexed by steps having a length *x* times *a* wherein *x* equals 2. In such packing machine, a pocket which receives a pack at the first transfer station completes a little more than one full revolution prior to removal of the pack at the second transfer station. The conveyor must complete five steps *x* times *a* in order to move a filled pocket into register with the second transfer station whereas the distance *m* between the two stations (as considered in the direction of movement of the conveyor) equals the distance *a* between two neighboring pockets.

It is further clear that the invention can be embodied in machines wherein the conveyor which carries an annulus of equally spaced receiving means for commodities which form part of or constitute smokers' products can perform steps of having a length of *x* times *a* wherein *x* is a whole number exceeding three. However, it is presently preferred to utilize drying conveyors which are indexed to perform steps of two or three times the distance *a* because longer steps take up more time or the drying conveyor must be subjected to the action of pronounced accelerating and/or decelerating forces which could adversely affect the useful life of the conveyor, drive means, bearings and/or other parts in a modern high-speed cigarette packing or like machine.

An important advantage of the improved machine is that the total length of periods of dwell of packs and/or other commodities in or on a conditioning conveyor can be prolonged without reducing the output of the machine. Moreover, the receiving means of the conveyor can be placed very close to each other without the danger that such closeness of neighboring receiving means would interfere with the operation of one or more folding or other treating units. This is due to the fact that the treating unit or units (such as those shown in FIGS. **4** and **5**) are installed at stations which are located downstream of the second transfer station but upstream of the first transfer station, as considered in the direction of movement of the receiving means.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for var-

ious applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of my contribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended:

1. In a machine for manipulating cigarettes, cigarette packs and/or analogous commodities forming part of or constituting smokers' products, particularly in a packing machine, a combination comprising conveyor means having an annulus of equally spaced receiving means for commodities, the neighboring receiving means of said annulus being spaced apart from each other by a predetermined distance; drive means for moving said conveyor means stepwise in a predetermined direction through second distances each of which is a whole multiple of said first distance whereby the receiving means travel along an endless path past spaced-apart first and second transfer stations; means for feeding commodities to receiving means at said first transfer station during intervals between successive movements of said conveyor means; and means for accepting commodities from receiving means at said second transfer station during intervals between successive movements of said conveyor means, the distance between said second and first stations, as considered in said direction, being equal to at least one full second distance and the distance between said first and second stations, as considered in said direction, being equal to *m* first distances wherein *m* is a whole number including one and unequal to *n* second distancees wherein *n* is a whole number including one, whereby each commodity which is fed to a receiving means at said first transfer station bypasses said second and first stations at least once prior to coming to a halt at said second transfer station and each receiving means which is relieved of a commodity at said second transfer station thereupon comes to a halt at said first transfer station to receive a fresh commodity.

2. A combination as defined in claim **1**, wherein said annulus consists of an odd number of receiving means and said second distance is twice said first distance.

3. A combination as defined in claim **1**, wherein said annulus consists of an odd number of receiving means and said second distance is three times said first distance.

4. A combination as defined in claim **1**, wherein said annulus consists of an even number of receiving means and said second distance is three times said first distance.

5. A combination as defined in claim **1**, further comprising means for treating the commodities in said receiving means at at least one third station between said second and first stations.

6. A combination as defined in claim **5**, wherein said commodities include deformable wrapping material and said means for treating includes means for deforming the material of commodities in receiving means at said third station.

7. A combination as defined in claim **1**, wherein said conveyor means comprises a rotary drum and said receiving means are disposed at the periphery of said drum.

8. A combination as defined in claim **1**, wherein said conveyor means further comprises means for heat-treating the commodities in said receiving means.

9. A combination as defined in claim **1**, wherein the commodities fed to the receiving means at said first station include open-ended packs and further comprising means for closing the packs at at least one further station located between said second and first stations during intervals between successive movements of said conveyor means.

10. A combination as defined in claim **9**, wherein the commodities fed to the receiving means at said first station further include arrays of rod-shaped articles in the respective packs and said conveyor means further comprises means for heating the packs in said receiving means.

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