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PATENT SPECIFICATION

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(54) APPARATUS OF THE TOBACCO-PROCESSING INDUSTRY

(71) We, HAUNI-WERKE KÖRBER & CO KG., a German company of Kampchaussee 12-22, 2050 Hamburg 80, Germany (Fed. Rep.) do hereby declare the invention for which we pray that a Patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

The invention relates to an apparatus for changing the spacing between two adjacent rows of rod-like articles of the tobacco-processing industry.

To change the axial spacing between adjacent rows of cigarettes or filter plugs, one generally uses diverging or converging guide plates over the circumference of a feed drum, from whose grooves the articles project somewhat radially, so that they come into contact with the guide plates with part of their end faces. Because this part of the end faces is relatively small, damage may occur at the ends of the articles facing the guide plates, particularly in the case of cigarettes. In order to eliminate this danger, it has already been proposed (German Patent Specification 1,087,502) to provide two pairs of conical grooved drums respectively between a supply conveyor and a discharge conveyor, in which case the pairs of grooved drums diverge such that the peripheral surfaces of the conical pairs of drums at the supply conveyor and at the discharge conveyor are parallel both to each other as well as to the peripheral surfaces of the supply conveyor and discharge conveyor. In this way, any relative movement between the grooves of the conical drums forming the intermediate conveyor and the cigarette rods is eliminated. However, owing to the plurality of its drums, its bearings which are inclined towards each other and the complicated drives required for the latter, this apparatus is complicated and expensive. A simpler solution is shown in German Patent Specification 1,156,008, in which a row of discs rotating on a common shaft are provided as the intermediate conveyor between a supply conveyor and a discharge conveyor, which discs are mounted in an inclined manner with respect to each other. This apparatus is intended for spreading out rows of filter plugs and is suitable solely for this, because the filter plugs are relatively short, so that the angular arrangement of the supply conveyor to the intermediate conveyor or of the intermediate conveyor to the discharge conveyor does not have a disturbing effect when transferring short filter plugs. However, this solution is unsuitable for changing the spacing of two adjacent rows of cigarettes. Furthermore, it is peculiar to both aforementioned proposals that changes in the format i.e. changes in the extent of the alterations of the spacing are not readily possible, but for this the entire intermediate conveyor must be exchanged.

It is an object of the present invention to obviate or mitigate the aforesaid disadvantages.

According to the present invention there is provided apparatus for changing the spacing between two adjacent rows of rod-like articles of the tobacco-processing industry, comprising a continuously rotatable supply conveyor for conveying the articles in two rows at right-angles to their axes in pairs with a first spacing, a continuously rotatable discharge conveyor for conveying the articles in two rows at right-angles to their axes in pairs with a second spacing, and a continuously rotatable intermediate conveyor for conveying the articles in two rows at right-angles to their axes with a constant change in their spacing, said intermediate conveyor comprising two discs of different diameter each with radially extending holders for articles of respective rows, the smaller disc being mounted eccentrically within the larger disc and the plane of rotation of each disc being parallel to the axes of rotation of the supply conveyor and discharge conveyor.

The supply conveyor and discharge conveyor may each be constructed to

convey both cigarette rows, if according to a further feature of the invention, the two discs are arranged in a common plane. A particularly simple and space-saving construction is achieved according to a further feature of the invention if the supply conveyor and discharge conveyor are drums mounted on a common axis and adapted to be driven in opposite directions. When the cigarettes of one pair on the supply conveyor are located so close to each other that their adjacent end faces are in contact, after transfer to the two discs, in the first conveying section, too great a radial relative movement of these end faces should be eliminated in order to prevent tobacco fibres from being rubbed out of the ends of the cigarettes. In a further development of the invention, this object is achieved due to the fact that the number of holders on the larger disc is greater than on the smaller disc and that the speed ratio between the large disc and small disc is proportional to the ratio of the number of their holders. A change in format as regards the change in spacing of the two rows of articles is facilitated by means of a simple adjustment alteration due to the fact that the smaller disc is arranged to be adjustable in a direction parallel to the axis of the supply conveyor and discharge conveyor.

The invention is described in detail hereafter with reference to the drawings illustrating one embodiment:

Figure 1 shows diagrammatically the construction of an apparatus for changing the spacing between two rows of cigarettes,

Figure 2 is a plan view of two conveying discs of the apparatus according to figure 1,

Figure 3 is a section on line III—III through the conveying discs of figure 2, to an enlarged scale.

Figure 1 shows diagrammatically the co-ordination of a supply conveyor in the form of a grooved drum 1, which is preceded by an insert drum 2 of a rod machine, an intermediate conveyor 3 consisting of two discs 4, 6, which are mounted eccentrically with respect to each other, the smaller disc 6 being arranged inside the larger disc 4, as well as a discharge conveyor in the form of an assembly drum 7, with which a supply drum 8 for filter plugs and a discharge drum 9 for cigarette-filter plug-cigarette groups are associated. The directions of rotation of the individual conveyors are indicated by arrows.

Apart from the intermediate conveyor 3 and the nature of the drum arrangements, the individual parts of the apparatus are known per se. By means of the latter, in filter attachment machines, two cigarettes are aligned axially and arranged with a mutual spacing such that a double length filter plug can be placed in the gap therebetween. The description is therefore limited essentially to the intermediate conveyor 3 and as regards details of an insert drum, reference may be made to the Applicant's German Offenlegungsschrift 1,912,652 and as regards details of a filter plug supply, to their German Offenlegungsschrift 2,250,267.

The lines shown in dot-dash line in Fig. 1 represent the feed paths of the cigarettes at Z1 and Z2 and the feed path of the filter plugs at F.

The construction of the intermediate conveyor 3 is shown in detail in figure 3, whereby stationary parts have been drawn with broader shading and rotating parts with narrower shading, for the purpose of greater understanding. Mounted on a machine bracket 11 is a support 12, which comprises a duct 13 for an intake air connection. A support ring 14 with an air duct 16 and a flanged bush 17 with an air duct 18 are attached to the support 12, eccentrically with respect to each other. The lines 19 and 21 drawn in dot-dash line represent the central axes of the support ring 14 and flanged bush 17.

Mounted to rotate on the support ring 14 by means of a four-point ball bearing 22 is the disc 4, which supports a ring 24 with grooves 26 for receiving cigarettes 27 and to which a toothed belt disc 29 is attached by way of the plate ring 28, around which disc a toothed belt 31 is guided. Each groove 26 can be connected by way of bores 32, 33, 34 to a control slot 36 in the support ring 14, so that in the conveying region, the cigarettes 27 can be retained in the grooves 26 by suction.

The second disc 6 with grooves 38 for receiving cigarettes 39 is mounted to rotate in the flanged bush 17 by a shaft 41 by means of ball bearings 42, 43. Attached to the shaft 41 is a toothed belt disc 44, around which a toothed belt 46 is guided. Each groove 38 can be connected by way of a bore 47 to a control slot 48 in the flanged bush 17, so that in the conveying region, the cigarettes 39 are retained in the grooves 38 by suction.

To adjust the format (adaptation to the length of cigarettes and filter plugs encountered) the flanged bush 17 on the support 12 can be moved in the direction of a common spindle 49 for the grooved drum 1 and the assembly drum 7. As shown in figure 2, two rows of threaded bores 51 for securing screws 52 and associated slots 53 in the flanged bush 17 are provided for this in the support 12.

The spindle 49 contains gearing for driving the grooved drum 1 and assembly drum 7 in opposite directions.

Figure 2 also shows that the larger disc 4 is provided with eighteen grooves 26, so that

the angle of separation α between these grooves amounts to

$$\frac{360°}{18},$$

whereeas the smaller disc 6 comprises fourteen grooves 38, so that the angle of separation β between the latter amounts to

$$\frac{360°}{14}.$$

By means of the gear unit (not shown) of the filter attachment machine, the toothed belts 31 and 46 can be driven at speeds such that the speed ratio of the discs 4 and 6 is proportional to the ratio of the angle of separation between their holders, i.e. in the example illustrated 14:18.

The apparatus according to figures 1 to 3 operates as follows: Cigarettes are inserted in pairs in the grooves of the insert drum 2 in known manner from a cigarette rod machine and transferred to the grooved drum 1.

Figure 3 shows that the cigarettes 27 and 39 on the grooved drum 1 are in contact on their end faces and are transferred in this way into the holders 26, 38 of the discs 4, 6. On the discs 4 and 6, the cigarettes 27, 39 are conveyed in a common plane on different circular paths, whereby owing to the selected angle of separation of the holders 26 and 38 and the speeds of the discs 4 and 6, the cigarettes 27 and 39 are only separated from each other at the beginning of the conveying region, without carrying out a substantial relative movement in axial direction at their adjacent end faces. Only as they travel further along the feed path do the cigarettes 27 and 39 separate from each other so that the pair of cigarettes discharged to the assembly drum 7 is not identical to the pair of cigarettes which was supplied by the grooved drum 1. On the assembly drum 7, filter plugs are placed in the gaps between the cigarettes 27 and 39, which filter plugs are supplied by the supply drum 8.

The cigarette-filter-cigarette groups formed in this way are transferred to the discharged drum 9 and then wrapped in known manner by a wrapping strip and made into individual filter cigarettes by being cut centrally through the filter plug.

The advantage of the invention consists in that with the apparatus according to the invention, which is very simple and economical as regards construction and its drive, the axial spacing of two rows of cigarettes is changed in a manner which does not harm the cigarettes, because during the change in their spacing, the cigarettes are guided in a secure manner in grooves and thus in the grooves cannot carry out any relative movement with respect to the latter.

WHAT WE CLAIM IS:—

1. Apparatus for changing the spacing between two adjacent rows of rod-like articles of the tobacco-processing industry, comprising a continuously rotatable supply conveyor for conveying the articles in two rows at right-angles to their axes in pairs with a first spacing, a continuously rotatable discharge conveyor for conveying the articles in two rows at right-angles to their axes in pairs with a second spacing, and a continuously rotatable intermediate conveyor for conveying the articles in two rows at right-angles to their axes with a constant change in their spacing, said intermediate conveyor comprising two discs of different diameter each with radially extending holders for articles of respective rows, the smaller disc being mounted eccentrically within the larger disc and the plane of rotation of each disc being parallel to the axes of rotation of the supply conveyor and discharge conveyor.

2. Apparatus as claimed in claim 1, wherein the two discs are arranged in a common plane.

3. Apparatus as claimed in claim 1 or 2, wherein the supply conveyor and discharge conveyor are drums mounted on a common axis and adapted to be driven in opposite directions.

4. Apparatus as claimed in any one of the preceding claims, wherein the number of holders on the larger disc is greater than the number of holders on the smaller disc and the speed ratio between the large disc and small disc is proportional to the ratio of the number of their holders.

5. Apparatus according to any one of the preceding claims, wherein the smaller disc is arranged to be adjustable in a direction parallel to the axis of the supply conveyor and discharge conveyor.

6. Apparatus for changing the spacing

between two adjacent rows of rod-like articles of the tobacco-processing industry, substantially as herein described with reference to and as illustrated in the accompanying drawings.

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1578061 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

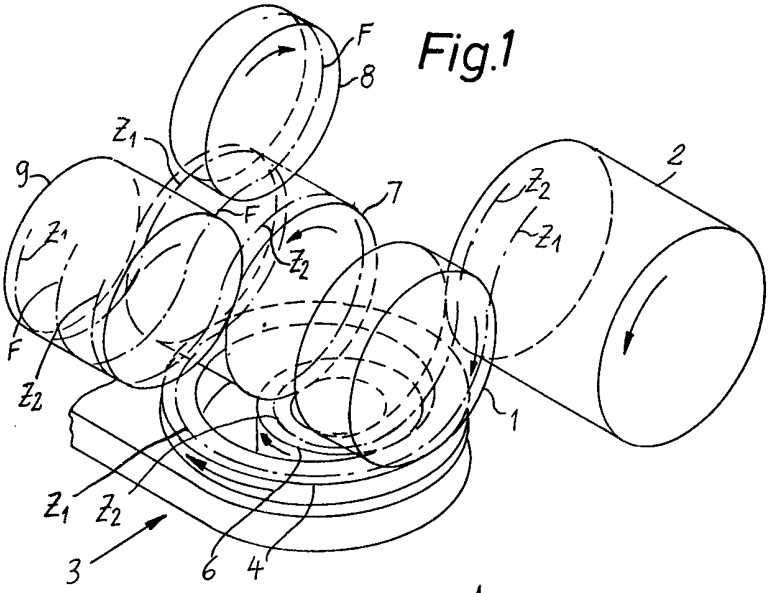

Fig.1

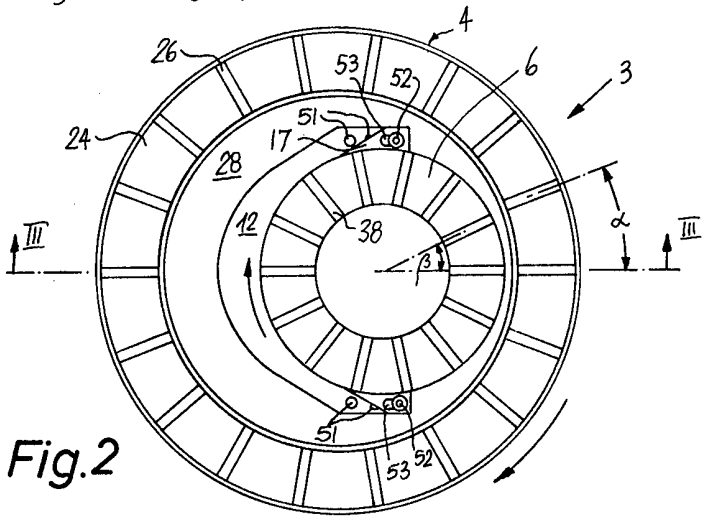

Fig.2

1578061 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 2

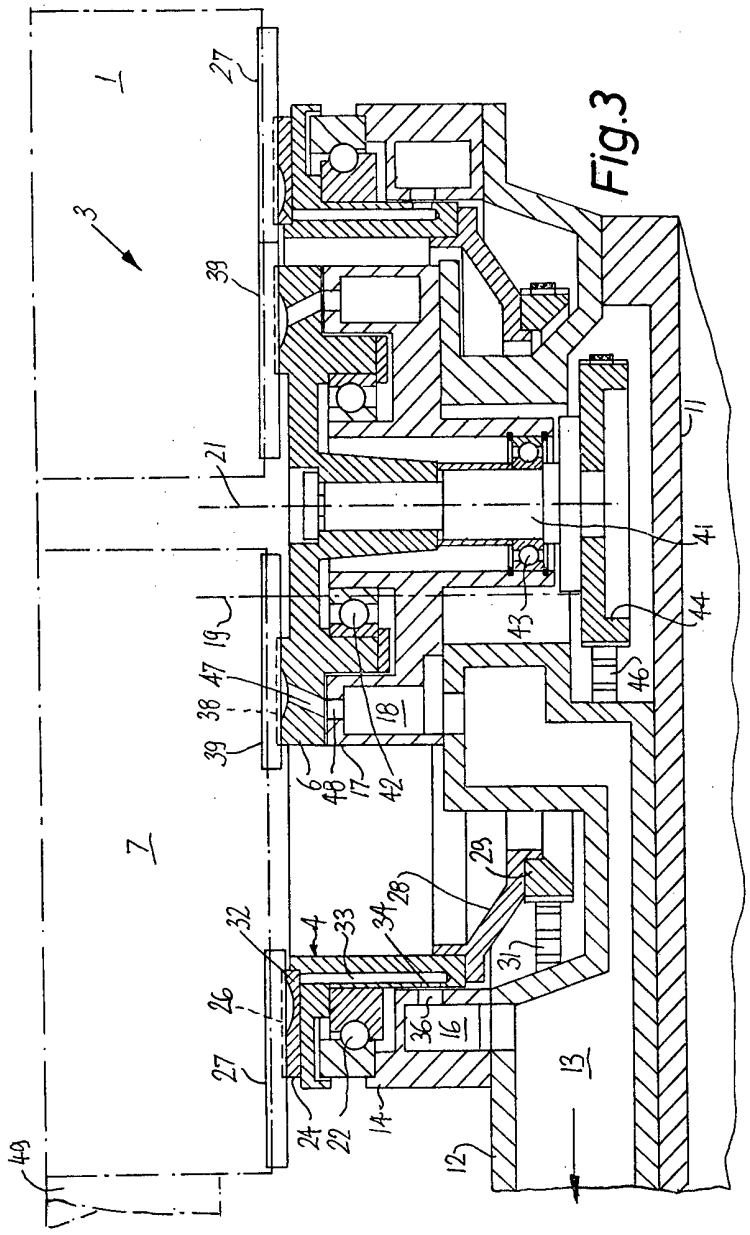

Fig.3