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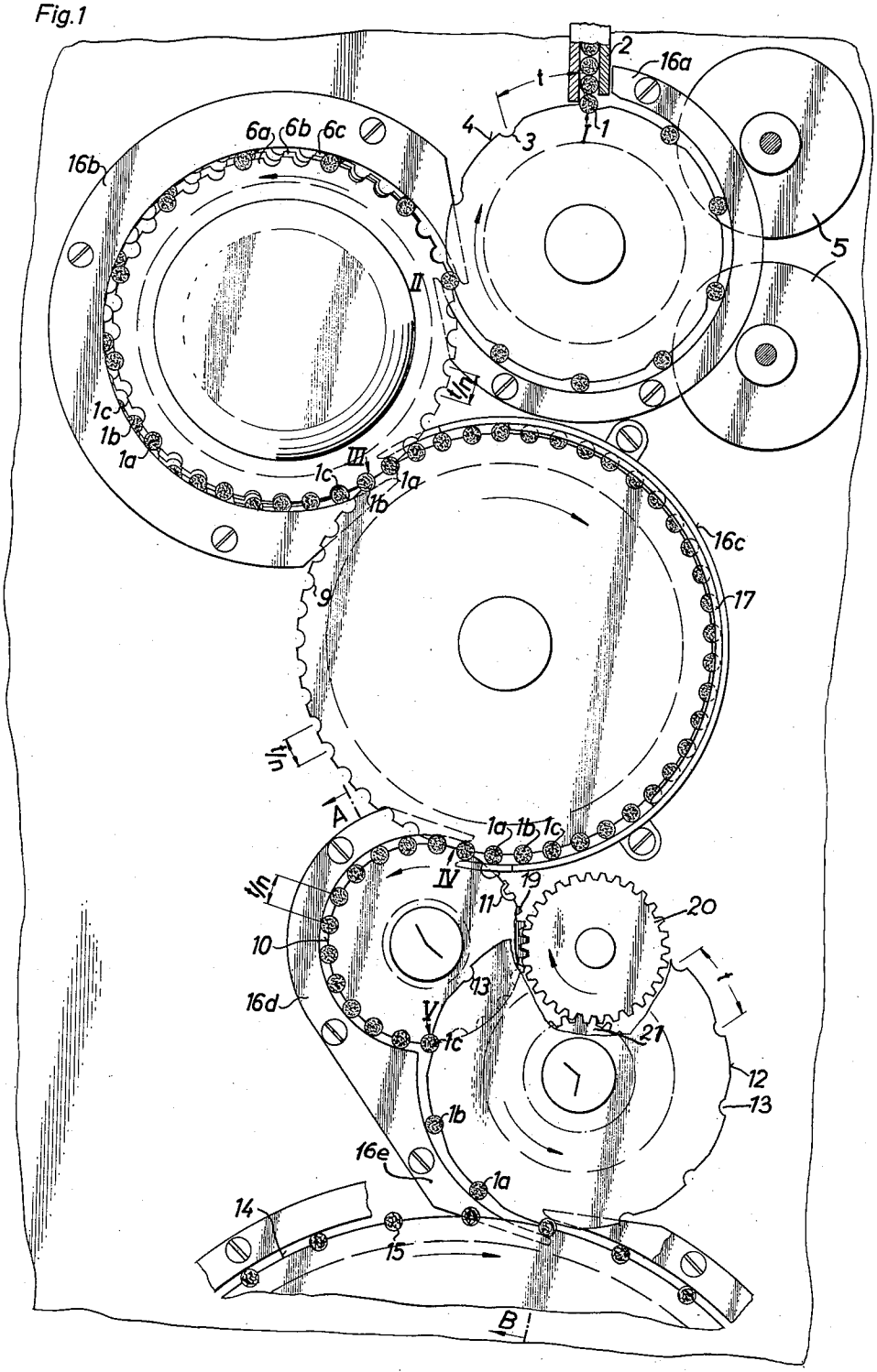
3,104,752

APPARATUS FOR MAKING FILTER PLUGS FOR FILTER TIP CIGARETTES

Filed Oct. 6, 1960

2 Sheets-Sheet 1

Fig.1



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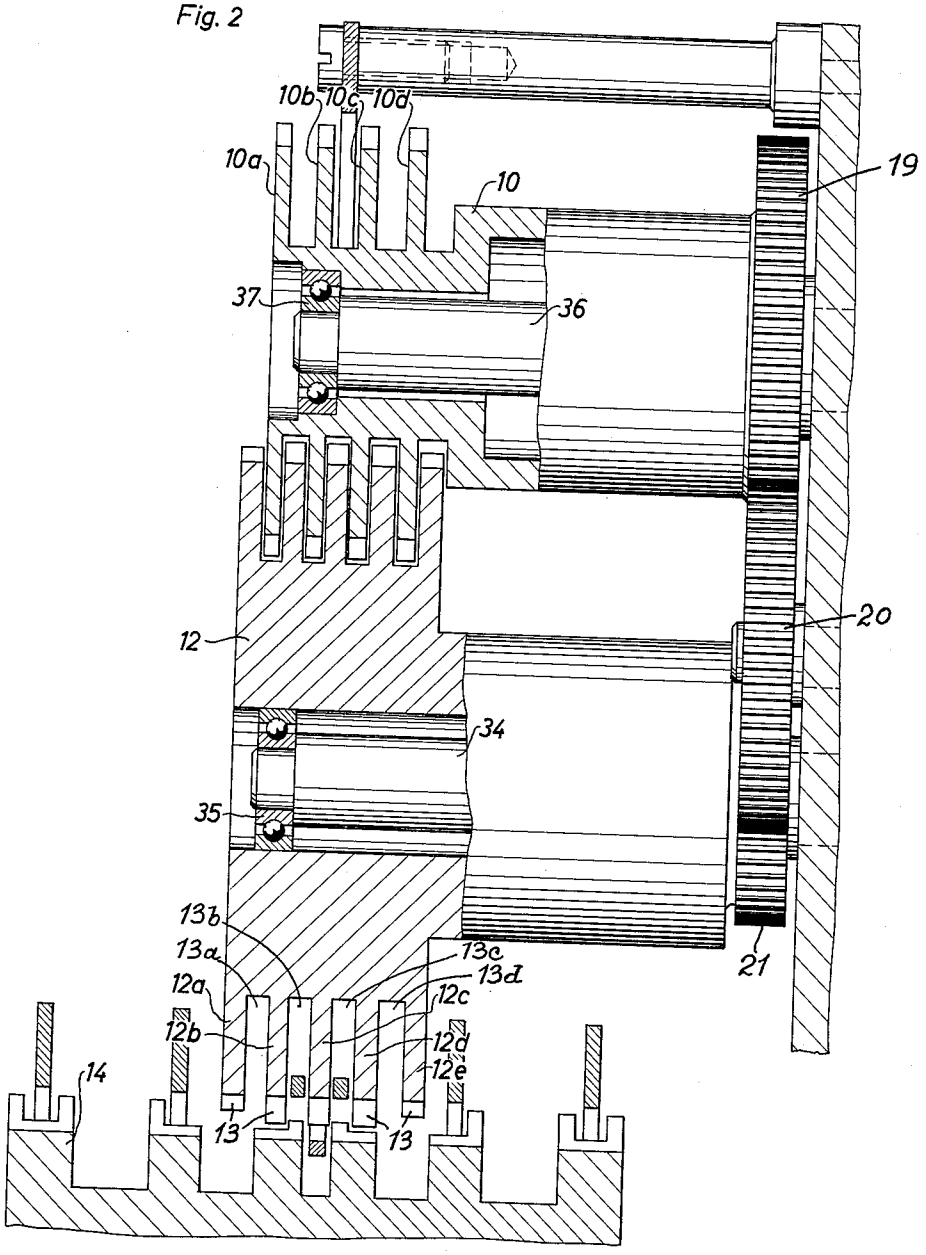
2 Sheets-Sheet 2

Fig. 2



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APPARATUS FOR MAKING FILTER PLUGS FOR FILTER TIP CIGARETTES

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8 Claims. (Cl. 198—22)

The invention relates to filter tip cigarette making and particularly to an apparatus for making filter plugs for filter tip cigarettes.

During the production of filter plugs for filter tip cigarettes, the filter rods from which the filter plugs are made are moved transversely to their longitudinal axes and are transferred from one endless travelling conveyor means to a second conveyor means moving in the same direction. Such known conveyor means may consist of grooved drums or several adjacently arranged circumferentially grooved circular discs arranged parallel to one another and rotating about the same axis.

The present invention is of particular importance for the production of filter tip cigarettes in which filter rods are moved transversely to their length and deposited into the axially extending grooves on the circumference of a rotary drum and while in the grooves of this drum are cut into filter plugs of twice the final length. These double length plugs are then transferred successively in staggered order to the wrapping drum of the filter tip cigarette machine. An advantage according to the invention is that it becomes possible for the wrapping drum to operate at the same speed as the rotary drum on which the filter rods are cut into a plurality of double length filter plugs.

This object and other objects of the invention will be described by way of example in the following description with reference to the accompanying drawings in which:

FIG. 1 is an end elevation view of an apparatus which discloses the several rotary drums which transfer the double length filter plugs and cause a predetermined arrangement of the same by the time they are discharged from the apparatus and conducted to a filter tip cigarette assembling machine, and

FIG. 2 is a sectional view of the apparatus along the broken line A—B of FIG. 1, with certain portions shown in elevation.

In a filter tip cigarette making machine as shown in FIG. 1, filter rods 1 having, for example, a length equal to three times the double length of the filter plugs and coming from a magazine discharge duct 2 are deposited into axially extending grooves 3 on the circumference of a drum 4 rotating about a horizontal axis. While in the grooves on the drum 4 the filter rods 1 are cut by means of two circular cutters 5 into three axially aligned double plugs 1*a*, 1*b*, 1*c* which are transferred at the point II to the mutually eccentrically arranged circumferentially grooved rotary rings 6*a*, 6*b*, 6*c*. During the movement of the filter plugs from the transfer point II to another point III, where the rings transfer the plugs to another grooved drum 8, the double plugs 1*a*, 1*b*, 1*c* are so circumferentially shifted that at the transfer point III the double plugs 1*b* are set back relatively to the double plugs 1*a* by a distance equal to one circular pitch of the grooves in the rings, and the double plugs 1*c* are set back relatively to the double plugs 1*a* a distance equal to two circular pitch distances. The double plugs which are staggered in this manner are deposited at the transfer point III into the axially extending grooves 9 of the rotary drum 8 and during their movement to another transfer point IV are displaced axially in such a manner

to form on the drum 8 a single row of plugs which at the point IV is transferred one plug at the time into suitable holding means, such as axially parallel equidistant peripheral grooves 11 of another conveyor, consisting for example of a rotary drum 10 which carries the double length plugs further onward.

This method of producing and transferring double length filter plugs 1*a*, 1*b*, 1*c* is described and claimed in our copending patent application Serial No. 60,929, filed October 6, 1960.

Arcuate guide rails 16*a*, 16*b*, 16*c* and 16*d* prevent the plugs from falling out of the grooves of the drum 4, the rings 6*a*, 6*b*, 6*c*, and the drums 8 and 10, respectively. The plugs are transferred from a sector-shaped portion of the rotary conveyor drum 10 to a sector-shaped portion of an intermediate conveyor 12 which has the form of a rotary drum provided with axially extending holding means on grooves 13 whose pitch circle in accordance with the invention intersects the pitch circle of the grooves 11 at a right angle or at approximately a right angle, while the pitch circle of the grooves 13 is substantially tangential to the pitch circle of the holding means or grooves 15 of another rotary conveyor drum 14, having a sector-shaped portion to which the double length plugs are transferred by a second sector-shaped portion of the rotary drum 12.

The rotary drum 10 is driven at a different, namely a lower peripheral speed than the intermediate conveyor drum 12 and the following rotary drum 14. In the present embodiment of the invention the peripheral speed of the intermediate conveyor drum 12 and also that of the rotary drum 14 is three times as great as the peripheral speed of the rotary drum 10. The same ratio applies to the circular pitch, namely the distance between the axially extending grooves. For facilitating the transfer of the double length plugs 1*a*, 1*b*, 1*c* to the conveyor 12, a deflector blade may be provided in the region of the transfer point V, while the arcuate guide rail 16*d* extends around a portion of the periphery of the intermediate conveyor drum 12.

As shown in FIG. 2, the drum forming the intermediate conveyor 12 is rotatably supported at the outer end of a stationary stub shaft 34 by means of a ball bearing 35. The drum 12 is provided in addition to the axially extending grooves 13 with axially spaced circular grooves 13*a*, 13*b*, 13*c* and 13*d* forming a number of axially spaced portions 12*a*, 12*b*, 12*c*, 12*d* and 12*e*, of which the disc portions 12*b*, 12*c* and 12*d* fit into the circular grooves formed between the disc portions 10*a*, 10*b*, 10*c*, 10*d* of the rotary drum 10 rotatably supported on a stationary stub shaft 36 by means of a ball bearing 37.

Referring now also to FIG. 1, the rotary drum 10 has mounted thereon a spur gear 19 meshing with an intermediate spur gear 20 which meshes with a spur gear 21 on the rotary conveyor drum 12. The transmission ratio of this gear assembly is such that the drums 12 and 14 will have a peripheral speed which is equal to three times the peripheral speed of the rotary drum 10. As shown by the arrows, the drums 10, 12 rotate in the same direction but the drum 14 rotates in the opposite direction.

The method of operation of the device is as follows:

The double length plugs 1*a*, 1*b*, 1*c* deposited in the grooves 11 of the rotary drum 10 are moved by the latter to the transfer point V and during this movement are prevented from falling out of the grooves 11 by the guide rail 16*c*. At the same time the plugs which are transferred at III to the drum 10 in three axially spaced rows are axially displaced by stationary arcuate guide rails 17 into the formation of a single row which is completed when the plugs reach the transfer point IV. In the region of the transfer point V the individual double length plugs 1*a*, 1*b*, 1*c* are lifted almost radially by the walls of the

grooves 13 of the drum 12 from the grooves 11 of the rotary drum 10, the drum 12 rotating at three times the peripheral speed of that of the drum 10. During the peripheral movement of the plugs 1a, 1b and 1c in the grooves 13 of the intermediate conveyor 12 they are held from falling out of the grooves by the guide rails 16d which have an extension 16e forming a guide for the plugs on the drum 12 for conducting the plugs into the grooves 15 on the drum 14. The plugs are transferred at the contact point of the pitch circle of the grooves on the intermediate conveyor drum 12 and that of the grooves 15 on the rotary drum 14, travelling at the same speed, into the grooves 15 of the latter. Since the peripheral speed of the rotary drum 10 is substantially less than the working cycle of the filter tip cigarette making machine which determines the peripheral speed of the rotary drum 14, it is obvious that sufficient time is available for the above mentioned cutting operation performed by the rotary knives 5 which cut the filter rods 1 into a plurality of double length plugs 1a, 1b, 1c so that clean cuts can be made by the rotary knives 5.

The device according to the invention permits a compact and economical construction particularly as the result of the mutual engagement of the disc-shaped portions of the rotary drums 10 and 12.

What we claim is:

1. In an apparatus for conveying rod-like articles, such as filter plugs for filter tip cigarettes, from one rotary drum provided with axially extending article receiving grooves on its circumference to another rotary drum provided with similar axially extending grooves on its circumference, both said drums being rotatable about spaced horizontal axes, including an intermediate rotary drum rotatable about a horizontal axis arranged parallel to the axes of said two rotary drums and having circumferential spaced grooves extending lengthwise of the drum, said intermediate drum and said first mentioned drum being provided with interfitting axially spaced portions arranged in such a manner that the pitch circle of the grooves on this intermediate drum intersects the pitch circle of the grooves on the first mentioned drum, and that at the same time the pitch circle of the grooves on the intermediate drum touches the pitch circle of the grooves on the second mentioned rotary drum.

2. In an apparatus for conveying rod-like articles, such as filter plugs for filter tip cigarettes, from one rotary drum provided with axially extending article receiving grooves on its circumference to another rotary drum provided with similar axially extending grooves on its circumference, both said drums being rotatable about spaced horizontal axes, including an intermediate rotary drum rotatable about a horizontal axis arranged parallel to the axes of said two rotary drums and having circumferential spaced grooves extending lengthwise of the drum, said intermediate drum and said first mentioned drum being provided with interfitting axially spaced flanges arranged in such a manner that the pitch circle of the grooves on this intermediate drum intersects the pitch circle of the grooves on the first mentioned drum at substantially a right angle, and that at the same time the pitch circle of the grooves on the intermediate drum touches the pitch circle of the grooves on the second mentioned rotary drum.

3. In an apparatus for conveying rod-like articles, such as filter plugs for filter tip cigarettes, from one rotary drum provided with axially extending article receiving grooves on its circumference to another rotary drum provided with similar axially extending grooves on its circumference, both said drums being rotatable about spaced horizontal axes, including an intermediate rotary drum rotatable about a horizontal axis arranged parallel to the axes of said two rotary drums and having circumferential spaced grooves extending lengthwise of the drum, said intermediate drum and said first mentioned drum being provided with interfitting circumferential flanges arranged

in such a manner that the pitch circle of the grooves on this intermediate drum intersects the pitch circle of the grooves on the first mentioned drum, and that at the same time the pitch circle of the grooves on the intermediate drum touches the pitch circle of the grooves on the second mentioned rotary drum, means for rotating said intermediate drum at a peripheral speed which is equal to a multiple of the peripheral speed of said first mentioned rotary drum, the circular pitch of the grooves on the circumference of said intermediate drum being selected in accordance with the peripheral speed ratio between said last mentioned two drums.

4. In an apparatus for conveying rod-like articles, such as filter plugs for filter tip cigarettes, from one rotary drum provided with axially extending article receiving grooves on its circumference to another rotary drum provided with similar axially extending grooves on its circumference, both said drums being rotatable about spaced horizontal axes, including an intermediate rotary drum rotatable about a horizontal axis arranged parallel to the axes of said two rotary drums and having circumferential spaced grooves extending lengthwise of the drum, said intermediate drum and said first mentioned drum being provided with axially spaced interfitting flanges arranged in such a manner that the pitch circle of the grooves on this intermediate drum intersects the pitch circle of the grooves on the first mentioned drum, and that at the same time the pitch circle of the grooves on the intermediate drum touches the pitch circle of the grooves on the second mentioned rotary drum, means for rotating both said intermediate drum and said second mentioned rotary drum at the same peripheral speed which is equal to a multiple of the peripheral speed of said first mentioned rotary drum, the circular pitch of the grooves on both said intermediate drum and said second mentioned rotary drum being selected in accordance with the peripheral speed ratio between said intermediate drum and said first mentioned rotary drum.

5. In an apparatus for conveying rod-like articles, such as filter plugs for filter tip cigarettes, from one rotary drum provided with axially extending article receiving grooves on its circumference to another rotary drum provided with similar axially extending grooves on its circumference, both said drums being rotatable about spaced horizontal axes, including an intermediate rotary drum rotatable about a horizontal axis arranged parallel to the axes of said two rotary drums and having circumferential spaced grooves extending lengthwise of the drum, said intermediate drum and said first mentioned drum being provided with axially spaced flanges arranged in interdigitating relation in such a manner that the pitch circle of the grooves on this intermediate drum intersects the pitch circle of the grooves on the first mentioned drum at substantially a right angle, and that at the same time the pitch circle of the grooves on the intermediate drum touches the pitch circle of the grooves on the second mentioned rotary drum, means for rotating both said intermediate drum and said second mentioned rotary drum at the same peripheral speed which is equal to a multiple of the peripheral speed of said first mentioned rotary drum, the circular pitch of the grooves on both said intermediate drum and said second mentioned rotary drum being selected in accordance with the peripheral speed ratio between said intermediate drum and said first mentioned rotary drum.

6. In a conveying arrangement, in combination, a first conveyor comprising a sector-shaped portion having a first peripheral surface; a second conveyor comprising a sector-shaped portion having a second peripheral surface; and a third conveyor comprising a first sector-shaped portion having a peripheral surface which is substantially tangential to said second peripheral surface and second sector-shaped portion having a peripheral surface whose projection in the axial direction of said second sector-shaped portion intersects said first peripheral surface.

7. In a conveying arrangement, in combination, a first

rotary conveying member having a plurality of equidistant peripheral holding means; a rotary conveying element having a plurality of equidistant peripheral holding means whose angular spacing exceeds the angular spacing between said first mentioned holding means; a second rotary conveying member having a plurality of equidistant peripheral holding means whose angular spacing is the same as that and whose pitch circle is tangential to the pitch circle of the holding means on said rotary element, one of said rotary members comprising a pair of axially spaced annular portions and the other of said rotary members comprising an annular portion extending between said pair of annular portions so that the pitch circles of holding means on said rotary members intersect each other; and means for rotating said second rotary member

and said rotary element at a first peripheral speed and for rotating said first rotary member at a second peripheral speed which is less than said first speed, the difference between said speed being proportional to the difference in angular spacing between the holding means of said first and second rotary members.

8. A combination as set forth in claim 7, wherein said rotary element and said first rotary member rotate in a first direction and wherein said second rotary member rotates in the opposite direction.

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