Jan. 13, 1959 W. RICHTER ET AL 2,868,211

TOBACCO ROD MAKING MACHINES

Filed July 15, 1957 2 Sheets-Sheet 1

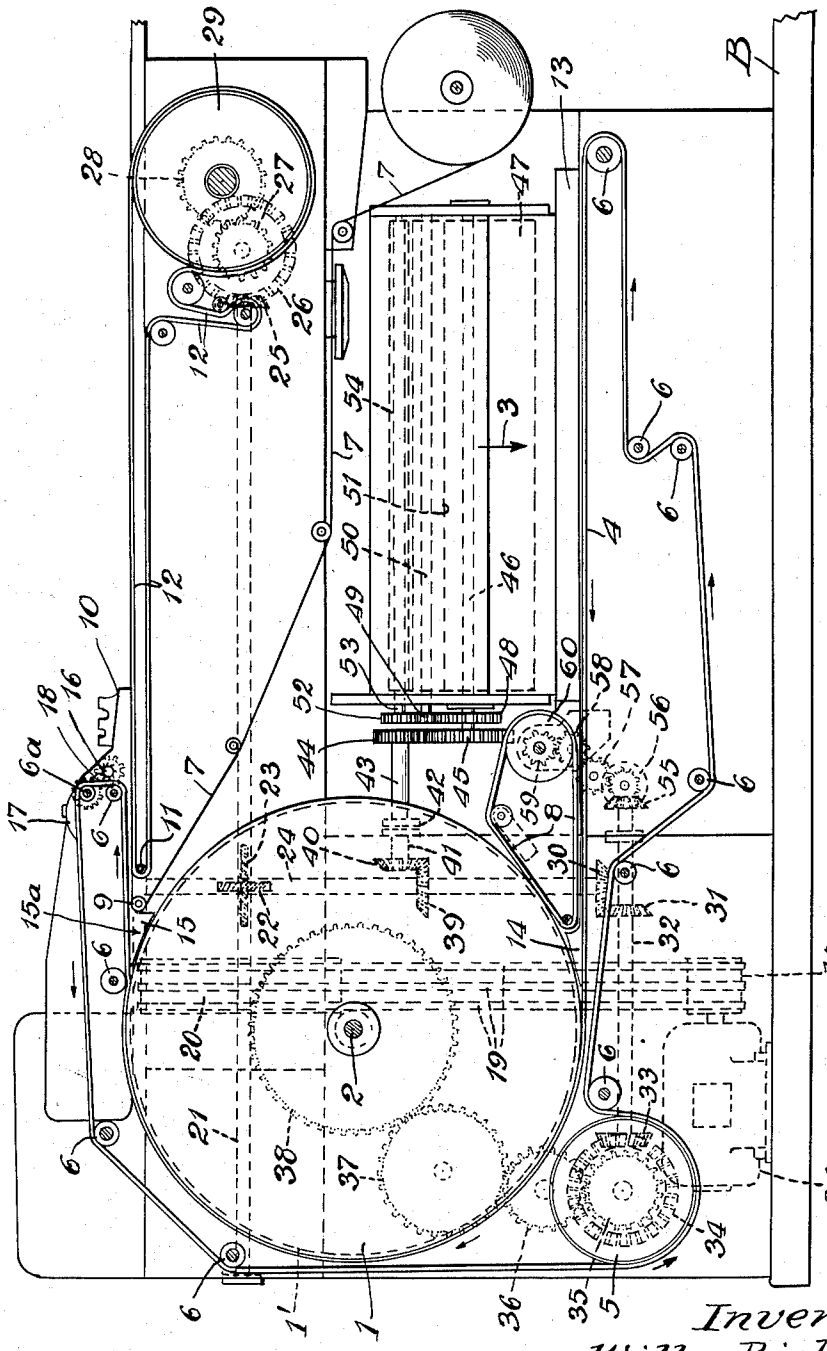


Fig. 1

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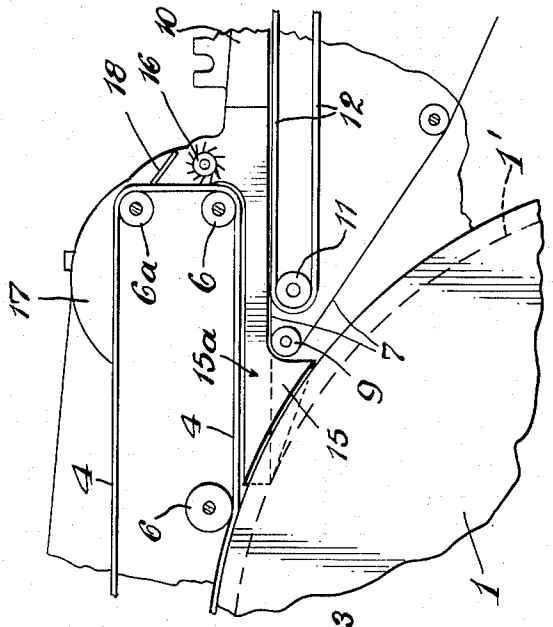


Fig. 4



Fig. 5

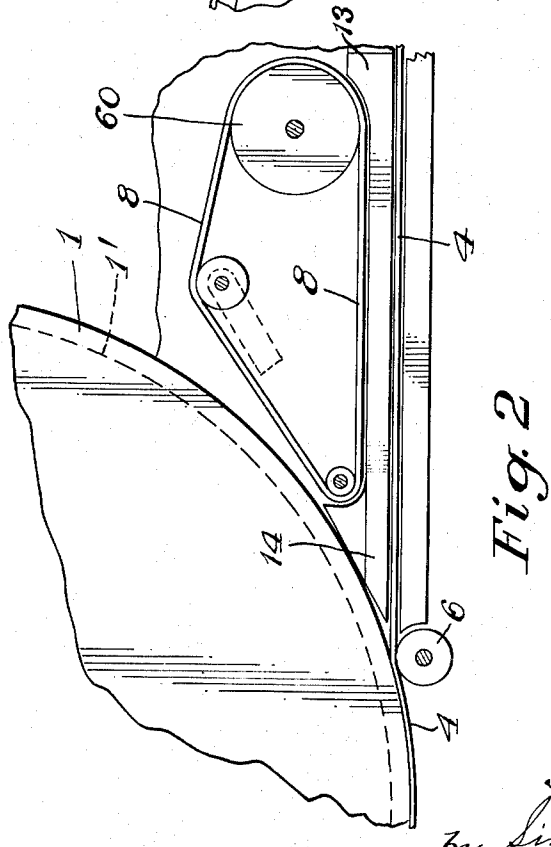


Fig. 2

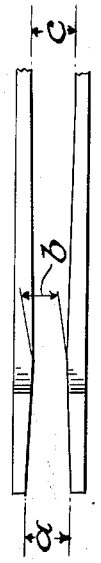


Fig. 3

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TOBACCO ROD MAKING MACHINES

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2 Claims. (Cl. 131—66)

The invention to cigarette making machines and particularly to a tobacco rod forming machine for making cigarettes, cigarillos and the like, in which the tobacco distributor is arranged below the tobacco rod forming mechanism and in which the tobacco discharged by the distributor is conveyed by a conveyor band to a conveyor disc rotating in a vertical plane. This conveyor disc is provided on its circumference with a groove for receiving the tobacco and conveying it upwardly and in an opposite direction as the feed direction to a higher level and then feeding it into the tobacco rod forming mechanism.

It is known that such machines are not suitable for handling juiced cut tobacco and torn tobacco leaves because the tobacco would pack itself in front of the entrance point of the conveyor disc where the wedge shape feeding nozzle is arranged owing to the friction along the walls of the passage and at the entrance point. This packing of the tobacco is particularly enhanced because of the fact that the tobacco to be introduced into the groove of the conveyor disc has already been compacted previously and that this previously compacted tobacco has a tendency to expand. The mentioned previous compacting of the tobacco is, however, necessary in order to reduce the cross section of the tobacco stream as it comes from the distributor to the cross section of the groove of the conveyor disc. Similar packing conditions appear also at the point of the conveyor disc where the tobacco leaves the groove of the conveyor disc and comes within the range of the conventional doctor blade which engages the wall of the groove, because also at this point the tobacco has a similar tendency to expand.

In order to obtain at these points a practically unhampered transfer of the tobacco it has been proposed heretofore in cigarette rod making machines to conduct the cigarette paper band alone or the cigarette paper band and a supporting band replacing the forming band around the conveyor disc. It was discovered, however, that particularly at the lower entrance point of the conveyor disc it was impossible to eliminate reliably any compacting of the tobacco, because the cigarette paper band alone or the cigarette paper band and its supporting band move at the same time with the tobacco into the groove of the conveyor disc. It also has to be considered that it is very difficult to provide a paper band or a supporting band, respectively, of such a length as it is required for reversing the tobacco stream and to move is without interruption or trouble. Furthermore, the wear on such long and heavily stressed supporting bands is very substantial.

In machines in which the tobacco distributor is arranged above the tobacco rod forming mechanism, one has attempted to solve the problem of eliminating a packing of the tobacco at the entrance point of the forming disc in such a manner that the forming groove or channel is formed by means of two discs which are arranged inclined with respect to each other so that there is produced a channel profile which above at the entrance point of the forming disc has the greater dimension and

toward the lower positioned exis point becomes gradually smaller. In such an arrangement the bottom of the forming channel is usually formed by a rubber ring, while outwardly the channel is limited by an arc-shaped cover.

Even if in such an arrangement the packing of the tobacco at the entrance of the forming disc may be avoided, it nevertheless has been proven that this solution will not eliminate the packing of the tobacco at the discharge point. In fact, when the tobacco rod engages the cover guide blades or the like, the tobacco movement has the result that the tobacco is formed into a ball which is prevented from moving ahead, the more so since the forming channel becomes narrower toward the exit point. In addition it has been experienced that the substantial speeds cause a quick wearing of the rubber or other elastic material which forms the bottom of the channel and that as a consequence a penetration of the tobacco by rubber dust cannot be avoided. This, of course, is a condition which cannot be tolerated at all in view of the very sensitive taste of a cigarette. At any rate such a solution is not at all possible in which the tobacco is conveyed in a reverse direction from a lower plane to a higher plane by the forming disc.

It is, therefore, an important object of the invention to eliminate with certainty the packing of the tobacco in a machine not only at the entrance point of the forming disc but also at the exit point arranged above the entrance of the tobacco and this is accomplished in such a manner that the cross section of the tobacco feed channel within the range of a wedge-shape feed nozzle which is arranged at the entrance of the conveyor disc and the cross section of the tobacco conveying channel within the range of a doctor blade in the exit portion of the channel or groove increases in the direction of the movement of the tobacco stream. This arrangement has the result that the compacted tobacco is able to expand again within the range of the entrance nozzle and also in the range of the doctor blade which extends into the exit portion of the groove. It is, of course, understood that within the range of the entrance to the conveyor disc the pre-compacting of the tobacco stream takes place to a cross-section which is smaller than the cross-section of the groove in the conveyor disc.

Another object of the invention is to employ for such a pre-compacting of the tobacco an endless steel band of such type as it is employed in cigarette rod machines with an upper distributor arranged in front or within the range of the entrance nozzle. In such machines the compacting of the tobacco, when using a channel having parallel walls, is effected by arranging the compacting band inclined within the channel, or by arranging the compacting band parallel to the bottom of the channel in which last mentioned case the channel walls are arranged inclined or arranged conically within the range of the compacting band.

Since now according to the invention the size of the tobacco feed channel increases again between the steel band and the conveyor disc, the previously compacted tobacco stream is able to expand when it is introduced into the groove of the conveyor disc, and therefore enters the groove without packing and is moved forward. It is to be noted that there will take place no friction on the side walls of the groove. The most favorable dimensions of the cross sections of the conveying grooves are then present when the loosened tobacco during its transfer has expanded just sufficiently to a size which corresponds exactly to the cross-section of the groove of the conveyor disc. When now according to the invention also the cross-section of the upper tobacco conveying groove at the discharge point of the conveyor disc, where the doctor blade engages the groove, is suitably enlarged

in the direction of movement of the tobacco then there takes place also at this point a transfer of the tobacco from the groove of the conveyor disc on to the doctor blade and to the forming band without any packing. Before the tobacco enters the entrance nozzle of the forming mechanism it is compacted along a suitably long path by the extended superimposed conveyor band before the latter is reversed in its movement and returns to its lower starting point. In order that during this reversing of the conveyor band it does not take along any tobacco which may adhere to it there is arranged within the range of the reversing roller a doctor blade which, however, in the conventional arrangements heretofore employed has the disadvantage that the tobacco scrapped from the bands is formed into balls which then drop upon the tobacco rod and cause stoppages in front of the entrance nozzle. It would be wasteful to remove this portion of the tobacco consisting of usable tobacco threads by suction because the suction air used for this purpose would influence disadvantageously the uniformity of the tobacco rod. For this reason the present application has also as one of its objects to arrange below the doctor blade and above the tobacco rod a rotary grooved roller which is in slight engagement with the conveyor band and removes on the one hand even the longer tobacco threads from the tobacco band and conducts the same together with the tobacco removed by the doctor blade to the tobacco rod without the formation of any tobacco balls.

For the removal of any dust remaining on the conveyor band there is arranged above the doctor blade a suction nozzle approaching closely the casing of the doctor blade, so that at this point the influence of the suction air upon the tobacco stream is eliminated.

In like manner as it is done at the entrance, at the conveyor disc it is also possible to provide at the exit of the conveyor disc in front of the entrance nozzle an endless steel band which compacts a tobacco stream again to the size of the entrance aperture of the entrance nozzle.

It is also an object of the invention to adjust and regulate the circumferential speed of the conveyor band, the steel band, the conveyor disc and also the supporting band and the forming band individually, so that always the tobacco is moved in accordance with the most favorable conditions which may be selected.

Ordinarily, the speeds of the conveyor band and the forming band and also the speeds of the conveyor disc and the steel band are alike. However, it has been discovered that the speeds of the conveyor band and the conveyor disc may be different, for instance, when it is desired to compensate any non-uniformities caused by the tobacco distributor. The invention will now be described by way of example with reference to the accompanying drawing which illustrates diagrammatically one preferred embodiment:

Figure 1 is a side elevation view of a tobacco rod machine;

Figure 2 illustrates in an enlarged scale the lower entrance portion to the conveyor disc with the compacting band;

Figure 3 is a top plan view of the portion of the tobacco feed channel within the range of Figure 2;

Figure 4 is an enlarged view of the upper exit portion of the conveyor disc; and

Figure 5 is a top plan view of the tobacco conveying channel within the range of the doctor blade engaging the tobacco conveyor groove.

Referring to the drawings, the circular conveyor disc 1 rotating in a vertical plane is provided on its circumference with a groove 1' and is secured to a horizontal drive shaft 2. The arrow 3 indicates the tobacco feed on to the horizontal portion of an endless conveyor band 4. The tobacco is supplied by a distributor described hereinafter in more detail. The conveyor band 4 is threaded over a drive roller 5 which causes a movement

of the conveyor band 4 in the direction indicated by the small arrows. The conveyor band 4 is also threaded over a number of idle rollers 6 and 6a in such a manner that it surrounds approximately one half of the conveyor disc 1, and finally returns to the lower portion of the machine. At the top portion of the conveyor disc 1 the conveyor band 4 is extended toward the right beyond the highest point of the conveyor disc 1 into the range of the roller 11 of the rod forming mechanism. This roller 11 supports one end or loop of the forming band 12.

The paper band 7 which is supplied by the roller 9 passes together with the forming band 12 and the tobacco rod in well known manner into the inlet nozzle 10 and is wrapped in conventional manner around the tobacco rod.

At the lower entrance of the conveyor disc 1 (see Figs. 2 and 3) is arranged above the tobacco feed channel 13 and in front of the wedge-shaped entrance nozzle 14 the compacting band 8 which engages the top of the tobacco. Within the range of this compacting band 8 in the direction of movement of the tobacco rod the width of the tobacco feed channel is reduced from the dimension *c* to the dimension *b*. Within the range of the entrance nozzle 14, however, the tobacco feed channel 13 is again increased in size from the width *b* to approximately the width *a* and therefore the tobacco enters the groove 1' of the conveyor disc 1 smoothly and without packing.

When the tobacco leaves the upper portion of the conveyor disc 1 (see Figs. 4 and 5) the tobacco channel 15a within the range of the doctor blade 15 engaging the groove 1' increases in width from *a* to *d* so that the tobacco leaves the conveyor disc without packing in loose condition. Thereupon, the tobacco rod is again compacted to the dimension *e* when it enters the forming nozzle.

Below the upper reversing roller 6a for the conveyor band 4, is arranged a grooved roller 16 and above the latter a doctor blade 18 is arranged in a common casing which is positioned adjacent another casing 17 provided with a non-illustrated nozzle and conduit for removing the tobacco dust by suction. The roller 16 and the doctor blade 18 engage a vertical portion of the upwardly moving conveyor band 4 to remove therefrom any adhering tobacco particles which are deposited upon the tobacco which enters the forming nozzle.

Referring again to Figure 1 it will be noted that the motor M mounted on the base B drives by means of a pulley K and a number of V-belts 19 a pulley 20 attached to the main shaft 21 of the machine. This main shaft 21 drives by means of a pair of worm gears 22 and 23 a transmission shaft 24 and also by means of a pair of bevel gears 25 and 26 and spur gears 27 and 28 the drive roller 29 for the forming band 12. At the lower end of the vertical transmission shaft 24 is attached a bevel gear 30 which drives a bevel gear 31 attached to a countershaft 32 and the latter drives by means of the bevel gears 33 and 34 the drive roller 5, and by means of spur gears 35, 36, 37 and 38 the drive shaft 2 on which the conveyor disc 1 is secured.

The transmission shaft 24 has attached thereto another bevel gear 39 which meshes with a bevel gear 40 on another countershaft 41 and the latter drives by means of a clutch 42 the drive shaft 43 of the distributing device for the tobacco. At the free end of the shaft 43 is attached a spur gear 44 meshing with a spur gear 45 on the roller shaft 46 on which the discharge toothed roller 47 is attached. The roller shaft 46 has also attached thereto adjacent of the spur gear 45 an additional gear 48 which by means of the spur gear 49 drives another shaft 50 on which the beater roller 51 is secured. The spur gear 49 meshes also with a spur gear 52 on a shaft 53 carrying the band roller 54. The endless distributor band threaded over the roller 54 feeds the tobacco to the discharge toothed roller 47. The countershaft 32 also drives by means of the bevel gears 55 and 56 and the spur gears

57, 58 and 59 the drive roller 60 for the compacting band 8.

What we claim is:

1. In a tobacco rod making machine, a circular conveyor disc provided on its circumference with a tobacco receiving groove, means for rotating said disc about its center in a vertical plane, an endless conveyor band having a horizontal portion engaging first the lowest point of said circular conveyor disc and then extending substantially along one-half of the circumference of said disc to cover the groove therein before reversing its direction and returning in spaced relation from said conveyor disc to a position below said horizontal portion of said endless conveyor belt, means for moving said endless conveyor belt to feed cut tobacco into the groove of said conveyor disc during the rotation thereof, means forming a tobacco feeding channel at the lower entrance end of the groove in said disc, said channel being provided with converging walls forming a restricted channelway portion, a tobacco rod forming means at the upper portion of said circular conveyor disc, and means including a tobacco conveying channel for transferring the tobacco discharged at the upper portion of said disc into said tobacco rod forming means, said last mentioned means including a doctor blade entering the groove in said conveyor disc for directing the tobacco into said tobacco conveying channel, said tobacco feeding channel increasing in size from said restricted channelway portion toward the lower entrance portion of said circular disc, and said tobacco conveying channel being provided with divergent walls forming a channelway increasing in size adjacent and leading away from the upper exit portion of said conveyor disc, said tobacco conveying channel being provided with converging walls extending from said divergent walls in the direction of said tobacco rod forming means.

2. In a tobacco rod making machine, a circular conveyor disc provided on its circumference with a tobacco receiving groove, means for rotating said disc about its center in a vertical plane, an endless conveyor band having a horizontal portion engaging first the lowest point of said circular conveyor disc and then extending substantially along one-half of the circumference of said disc to cover the groove therein before reversing its direction and returning in spaced relation from said conveyor disc to a position below said horizontal portion of said endless conveyor belt, means for moving said endless conveyor belt to feed cut tobacco into the groove of said conveyor disc during the rotation thereof, means forming a tobacco feeding channel at the lower entrance end of the groove in said disc, said channel being provided with converging walls forming a restricted channelway portion, a tobacco rod forming means at the upper portion of said circular conveyor disc, means including a tobacco conveying channel for transferring the tobacco discharged at the upper portion of said disc into said tobacco rod forming means, said last mentioned means including a doctor blade entering the groove in said conveyor disc for directing the tobacco into said tobacco conveying channel, said tobacco feeding channel increasing in size from the restricted channelway portion toward the lower entrance portion of said circular disc, and said tobacco conveying channel being provided with divergent walls forming a channelway increasing in size adjacent and leading away from the upper exit portion of said conveyor disc, said conveying channel being provided with converging walls extending from the widest portion of said channelway in the direction of said rod forming means, and an endless steel band arranged with a horizontal portion above the tobacco on said horizontal portion of said conveyor band and in front of a tobacco feeding nozzle arranged adjacent the lower entrance portion of said conveyor disc, said endless steel band compacting said tobacco on said conveyor belt, and means for driving said endless steel band.

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