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W. RUDSZINAT ETAL

3,091,245

MEANS FOR WRAPPING CONNECTING LEAVES AROUND THE
ABUTMENT REGIONS OF ASSEMBLIES COMPRISING
CIGARETTES AND FILTER PLUGS

Filed Dec. 23, 1960

2 Sheets-Sheet 1

Fig. 1

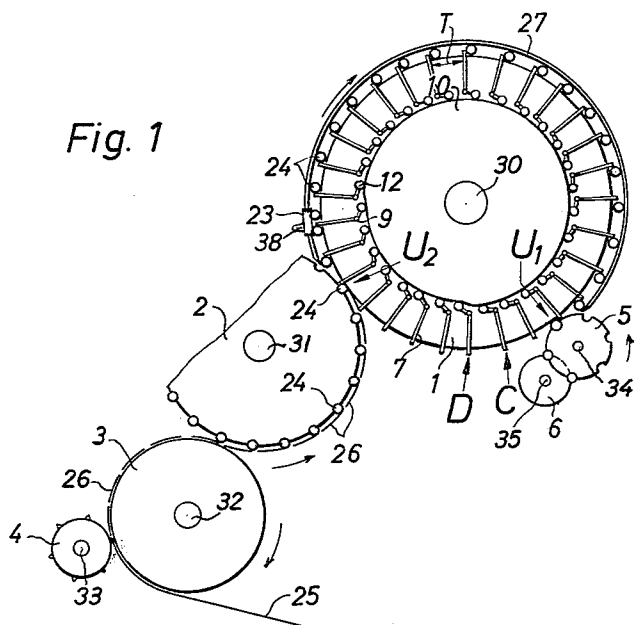
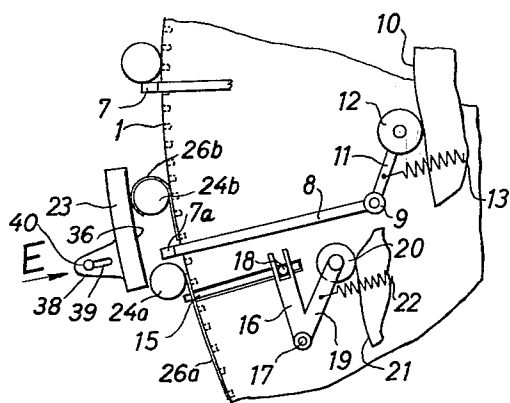


Fig. 2



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Fig. 3

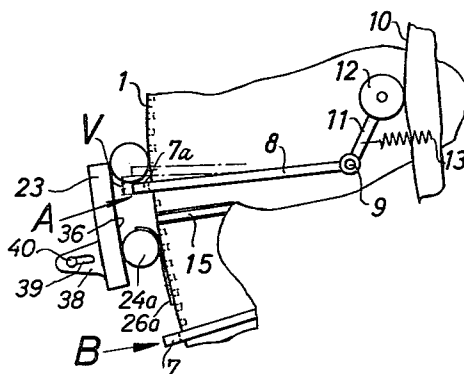
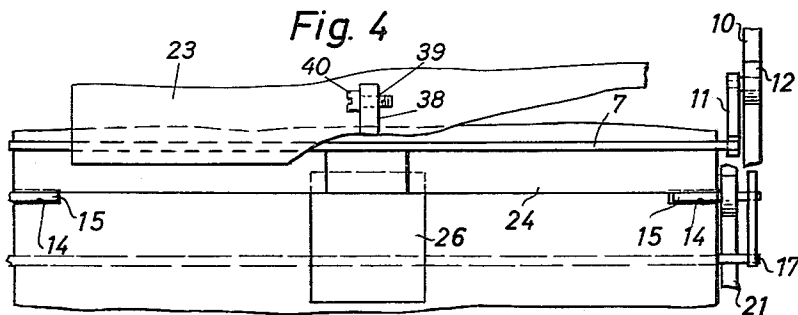


Fig. 4



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MEANS FOR WRAPPING CONNECTING LEAVES AROUND THE ABUTMENT REGIONS OF ASSEMBLIES COMPRISING CIGARETTES AND FILTER PLUGS

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10 Claims. (Cl. 131-94)

This invention relates to means for wrapping connecting leaves around the abutment regions of assemblies comprising cigarettes and filter plugs. More particularly, the invention relates to a wrapping drum provided with a plurality of axially disposed and circumferentially spaced boundary bars which extend over the entire length of the drum and between each pair of which one of said assemblies with an adhering wrapper leaf is placed and then, as the drum rotates, rolled against a smooth stationary guide surface, thereby wrapping the leaves around said assemblies in the abutment regions of said cigarettes and filter plugs. Ordinarily, each such assembly comprises two aligned cigarettes with a double length filter plug therebetween so that upon cutting the wrapped filter plug at its middle two filter cigarettes are obtained.

Cigarette machines of this type customarily include a cutting and coating drum upon which a strip of wrapping material is cut into leaves of suitable size and provided with some adhesive coating and delivered to a transfer drum where said wrapper leaves are attached with their front end portion to cigarette and filter plug assemblies of the kind indicated. Said assemblies are carried on the transfer drum in axially extending equally spaced grooves and delivered one by one to the spaces between said boundary bars on the wrapping drum where they, together with the wrapper leaves, are initially retained by suction in a manner well known per se. When the wrapping has been completed on said wrapping drum, the wrapped assemblies are delivered one by one to a second cutting drum provided with grooves similar to those of said transfer drum where each assembly is cut to form two cigarettes as indicated above.

It is obvious, therefore, that it is of importance that the wrapped assemblies arrive at said second cutting drum with reasonably accurate spacing so that they can be properly transferred to their respective grooves in said second cutting drum. Such accurate spacing is not always easy to achieve in the prior art machines where the wrapping procedure depends entirely upon the rolling of the assembly with the wrapper leaf against the aforementioned smooth stationary guide surface. Furthermore, the wrapping itself often becomes incomplete in such machines in that either the front edge or the rear edge of the wrapper leaf, or both edges, are inadequately pressed into adherence, whereby air pockets are left which are very unpleasantly noticeable in the smoking of the cigarette.

It is an object of the invention to overcome these and other disadvantages of the prior art cigarette machines so as to ensure fault free mass production of filter cigarettes which are perfectly wrapped and free from detrimental air pockets.

Another object of the invention is to provide a novel and improved wrapping drum of the kind indicated in which the circumferential distance between said boundary bars is automatically increased during the wrapping procedure to ensure complete wrapping of the assemblies without jeopardizing the accurately spaced delivery to said second cutting drum.

Still another object of the invention is to provide a

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novel and improved wrapping drum of the kind indicated in which the circumferential spacing of said boundary bars is automatically variable to accommodate wrapper leaves of various lengths without the necessity of exchanging transfer drums and cutting drums for every change of wrapper leaf size.

Other objects and advantages of the invention will become apparent from the following description of an embodiment thereof with reference to the accompanying drawings, in which:

FIG. 1 is an end view of a wrapping drum according to the invention, with associated transfer drum and cutting drums,

FIG. 2 is a similar end view of a part of the wrapping drum of FIG. 1 on an enlarged scale,

FIG. 3 is a view similar to FIG. 2 but with certain parts in a different operative position, and

FIG. 4 is a partial view of the wrapping drum seen in the direction of the arrow E in FIG. 2.

In FIG. 1, a wrapping drum 1 is rotatably mounted on a shaft 30 for cooperation in a manner known per se with a transfer drum 2 mounted for rotation on a shaft 31, a cutting and coating drum 3 rotatably mounted on a shaft 32, a cutter 4 rotatably mounted on a shaft 33, a cutting drum 5 mounted for rotation on a shaft 34, and a circular knife 6 rotatably mounted on a shaft 35. The shafts 30-35 are parallel and the directions of rotation of the drums are indicated by arrows adjacent the respective drums in FIG. 1. As in prior art cigarette machines, cigarette and filter plugs 24 of the kind indicated above are supplied to the grooves in the transfer drum 2 by any suitable means (not shown), and a strip of wrapper material 25 is supplied to the drum 3 upon which it is cut into pieces, or leaves, 26 by means of the cutter 4, the leaves being provided while on the drum 3 with a coating of an adhesive material by suitable means (not shown).

As the drums rotate in the directions indicated by the arrows, the front edge portions of the leaves 26 are successively applied to the assemblies 24 on the transfer drum 2, as shown, and said assemblies 24 with the attached wrapper leaves 26 are then successively transferred to the wrapping drum 1 and held in place thereon by suction, as indicated in FIGS. 2 and 3, and hence after wrapping to the cutting drum 5 where the two filter cigarettes in each groove are separated by the knife 6. As indicated, this general arrangement and function are old in the art, and the present invention is in the structure and function of the wrapping drum 1 which will now be described in detail.

Extending axially across the wrapping drum 1 are a plurality of axially spaced boundary bars 7, each secured at its ends to levers 8 which are pivotally mounted on shafts 9 connected with the drum 1 and parallel with the shaft 30. An arm 11 of each lever 8 is provided at its free end with a rotatably mounted cam follower 12 which is maintained in engagement with a stationary cam disc 10 by means of a spring 13 secured to the arm 11 and to the drum 1.

At a circumferential distance behind each of said boundary bars 7 the drum 1 is provided with a slot 14 at each end of said drum 1. Each of said slots 14 extends axially for a short distance inwardly from the end of the drum 1 (compare FIG. 4) and radially from the periphery thereof (FIGS. 2 and 3), and in each of said slots 14 a stop bar 15 is slidably mounted and provided with a pin 18 projecting axially from the end of the drum 1. A bell crank 16, 19 is pivotally mounted on an axially extending shaft 17 adjacent each of said slots 14 in the end of the drum 1, and said bell crank has one arm 16 bifurcated and straddling the pin 18 while the other arm 19 at its free end carries a pivotally mounted cam follower 20 biased toward engagement with a stationary

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cam disc 21 by means of a spring 22 secured to the arm 19 and to the drum 1. The members 13-22 are omitted from FIG. 1 in order to avoid confusion. The circumferential distance between each boundary bar 7 and its two coordinated trailing stop bars 15 is approximately equal to the diameter of a cigarette and filter plug assembly 24, although variable within limits, as will be explained. A wrapping member 23 having an arcuate wrapping surface 36 is adjustably mounted forwardly of the transfer station U_2 between the transfer drum 2 and the wrapping drum 1 and at a radial distance from the peripheral surface of said drum 1 substantially equal to the diameter of the cigarettes to be wrapped. The wrapping member 23 is adjustably held in place by a bracket 38 having a slotted opening 39 adapted to be attached to the machine frame (not shown) by means of the threaded fastener 40. At about the same radial distance from the drum 1, an arcuate shield 27 surrounds the drum 1 from adjacent said transfer station U_2 to adjacent the transfer station U_1 , between the drum 1 and the cutter drum 5, as shown in FIG. 1.

In the operation of the machine, as described in general terms above, when the transfer of an assembly 24 from the transfer drum 2 to the wrapping drum 1 is taking place the cam follower 12 is at a low region of the cam disc 10 so that the boundary bar 7 immediately forwardly of the transfer point U_2 occupies a position as far forwardly in the direction of rotation of the drum 1 as it can move. The transfer drum 2 places the wrapper leaf and the assembly on the drum 1 against said boundary bar which in FIG. 2 is designated 7a while the corresponding wrapper leaf and assembly are there designated 26a and 24a respectively. At the transfer moment the cam follower 20 is on a high part of the cam disc 21 so that the stop bar 15 projects beyond the periphery of the drum 1, as indicated in FIGURE 2. In this position, the projecting stop bars prevent any movement in a direction opposite to the direction of drum rotation of the free end portions of the cigarettes in the assembly 24a so that accurate alignment of the two cigarettes in said assembly is ensured at the beginning of the wrapping operation. In FIG. 2 the assembly 24a is shown a moment after the beginning of said wrapping operation and it will be noted that at that time the assembly 24a has engaged the rear end of the guide surface 36 and rolled in a direction opposite to the direction of drum rotation a small distance from the boundary bar 7a, while the stop bars 15 are about to be retracted into the slots 14 to permit free rolling movement of the assembly 24a. Obviously, said retraction of the stop bars 15 is due to the fact that the corresponding cam followers 20 have entered upon a low region of the cam discs 21.

FIG. 3 may be considered to show the situation a moment later than FIG. 2. As shown, the assembly 24a is some distance further in beneath the guide surface 36 and an additional amount of wrapper leaf 26a has been wrapped around the assembly 24a. The cam follower 12 of the boundary bar 7a has entered upon a high portion of the cam disc 10 so that the boundary bar 7a has been moved from the position of FIG. 2, which is indicated by broken lines in FIG. 3, rearwardly a distance V to the position shown in full lines at A in FIG. 3. It will be seen in FIG. 2 that the wrapper leaf 26b preceding the wrapper leaf 26a on the drum 1 has its rear edge disposed rather closely to the bar 7a and, considering the cylindrical shape of the assemblies 24, it is apparent that the danger exists that the rolling and adhering of the rear edge portion of the wrapper leaf may be incomplete. The shifting of the bar 7a in a direction opposite to the direction of drum rotation, as indicated in FIG. 3, avoids this danger and ensures complete wrapping of said rear edge portion of the leaf and tight adherence thereof without possibility of any air pockets being left.

The boundary bars 7, after having been successively shifted in a direction opposite to the direction of drum

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rotation as at A, remain in this position during the continued rotation of the drum 1 until they have passed the transfer station U_1 so that the spacing T (FIG. 1) remains unchanged during this time and correct for the transfer to the cutting drum 5 at U_1 . At some point between C and D in FIG. 1, the cam followers 12 again enter upon a low portion of the cam disc 10 so that the bars 7 are successively returned to the position indicated by broken lines in FIG. 3 before they reach the transfer station U_2 . It should be obvious that the described shifting of the boundary bars 7 makes it possible to have the distance T and also the distance between the grooves in the drums 2 and 5 less than the rolling distance of the assemblies 24 on the drum 1 required for perfect wrapping. This fact naturally increases the production speed with unchanged diameters and rotary speeds of the drums. Thus, it will be seen that at the moment the assemblies are transferred to the drum 1 the adjacent bars 7 are in their advanced position, and said bars 7 in their advanced position receive the assemblies and convey them in the direction of drum rotation. Before the assembly has reached the wrapping surface 36 of the member 23 the bars 7 are in their initial position and after they have moved away from the rolling surface 36 the bars 7 are moved in a direction opposite to the direction of drum rotation so that the trailing end of the wrapper will be spaced from a correspondingly located bar 7 and thus permit the assembly to be completely rolled along a greater rolling path or a space of increased length. The bars 7 then convey the wrapped assemblies to the roller 5 at the station U_1 and the bars 7 are moved to their advanced position before reaching the assembly transfer station U_2 .

While there has been described and illustrated a particular embodiment of the invention, it will be understood that changes and modifications may occur to those skilled in the art. It is, therefore, intended in the appended claims to cover any such changes and modifications as fall within the true spirit and scope of the invention.

What we claim is:

1. Means for wrapping a connecting leaf around the abutment regions of an assembly of rod-shaped articles arranged in end to end abutting relation, comprising a rotary transfer drum having a series of grooves for receiving partially assembled rod-shaped articles and connecting leaves, a rotary wrapping drum having end walls, a plurality of boundary bars dividing said wrapping drum into a series of wrapping spaces, an arcuate guide member adjacent said wrapping drum engageable with said assembly so that relative movement between said rotary wrapping drum and said arcuate guide member will cause the wrapper leaf to be wrapped around said assembly, means for transferring said assembly from said transfer drum to said wrapping drum, a lever secured to each end of each of said boundary bars, means pivotally mounting said levers on the end walls of said wrapping drum, an arm projecting from each of said levers, cam follower means mounted on said arms, cam means stationarily mounted for engagement with said cam follower means, and means biasing said cam follower means toward engagement with said cam means, said cam means being so shaped as to cause movement of the boundary bar trailing the assembly in a direction away from said adjacent wrapper leaf being wrapped during the final portion of the wrapping procedure.

2. Means as set forth in claim 1, in which said cam means is so shaped as to cause each successive boundary bar to return to its initial position prior to reaching the transfer drum.

3. Means as set forth in claim 1, in which the wrapping drum is provided with a pair of aligned slots extending radially and axially from the end edges of the circumferential surface of said wrapping drum, a stop bar slidably mounted in each of said slots, and means

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connected with said stop bars for temporarily and successively projecting an aligned pair of said stop bars radially from said slots prior to the beginning of the wrapping of the corresponding cigarette and filter plug assembly to prevent misalignment of said assembly.

4. Means as set forth in claim 3, in which said means for projecting each pair of aligned stop bars comprises a bell crank having a pair of arms arranged at each end of said wrapping drum, means pivotally mounting said bell cranks on the end walls of said wrapping drum, means pivotally and slidably connecting an arm of said bell cranks with said stop bars, cam follower means on the other arm of said bell cranks, cam disc means for engagement with said cam follower means, and means biasing said cam follower means toward engagement with said cam disc means.

5. In a cigarette machine, a rotatably mounted wrapping drum for wrapping connecting leaves about the abutment regions of aligned cigarette and filter plug assemblies, a plurality of spaced boundary bars extending axially across the peripheral surface of said wrapping drum to define a plurality of circumferential drum sections, means adjacent the peripheral surface of said wrapping drum for successively supplying one of said cigarette and filter plugs with attached wrapper leaf to each of said drum sections at the end thereof which is forward in the direction of rotation of said wrapping drum, stationary guide means at a distance from the peripheral surface of said wrapping drum for successive engagement by said cigarette and filter plug assemblies and attached wrapper leaves to cause rearwardly rolling movement of said assemblies and thereby wrapping of said wrapper leaves therearound, lever means secured to the ends of said boundary bars, means pivotally mounting said lever means on the ends of said wrapping drum for pivotal movement on axes parallel with the axis of said wrapping drum, arms non-pivotally connected with said lever means, cam follower means carried by said arms, stationary cam means mounted in position for engagement by said cam follower means, means connected with said arms biasing said cam follower means toward engagement with said cam means, said cam means being adapted to shift said boundary bars in a direction opposite to the direction of drum rotation during a portion of each revolution of said wrapping drum to thereby temporarily and successively enlarge said drum sections circumferentially of the wrapping drum to provide increased space for said rolling movement of said assemblies after said assemblies have been fed to said drum, and means adjacent to said wrapping drum for removing and cutting said assemblies subsequently to the wrapping thereof.

6. In a cigarette machine, a rotatably mounted wrapping drum for wrapping connecting leaves about the abutment regions of aligned cigarette and filter plug assemblies, a plurality of spaced boundary bars extending axially across the peripheral surface of said wrapping drum to define a plurality of circumferential drum sections, means adjacent the peripheral surface of said wrapping drum for successively supplying one of said cigarette and filter plugs with attached wrapper leaf to each of said drum sections at the end thereof which is forward in the direction of rotation of said wrapping drum, stationary guide means at a distance from the peripheral surface of said wrapping drum for successive engagement by said cigarette and filter plug assemblies and attached wrapper leaves to cause rearwardly rolling movement of said assemblies and thereby wrapping of said wrapper leaves therearound, lever means secured to the ends of said boundary bars, means pivotally mounting said lever means on the ends of said wrapping drum for pivotal movement on axes parallel with the axis of said wrapping drum, arms non-pivotally connected with said lever means, cam follower means carried by said arms, stationary cam means mounted in position for engagement by said cam follower means, means connected

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with said arms biasing said cam follower means toward engagement with said cam means, said cam means being adapted to shift said boundary bars in a direction opposite to the direction of drum rotation during a portion of each revolution of said wrapping drum to thereby temporarily and successively enlarge said drum sections circumferentially of the wrapping drum after said assemblies have been fed to said drum to provide increased space for said rolling movement of said assemblies, a plurality of pairs of stop means movably mounted in axially aligned slots in the end portions of said wrapping drum, said stop means being adapted to be reciprocated in said slots to extend above the periphery of said drum and then retracted below the periphery at the beginning of the rearwardly rolling movement of the assemblies, bell cranks mounted on the ends of said wrapping drum for pivotal movement on axes parallel with the axis of said wrapping drum and each having two angularly related arms, means pivotally and slidably connecting one of said bell crank arms with one of said stop means, cam follower means carried by the other of said arms, cam means stationarily mounted in position for engagement with said cam follower means, means biasing said cam follower means toward engagement with said cam means, a pair of said stop means being located in trailing relationship to each of said boundary bars at a distance therebehind sufficient to accommodate one of said assemblies between each of said boundary bars and pairs of stop means prior to the rearwardly shifting of said boundary bars whereby said stop means prevent misalignment of said assemblies at the beginning of their rolling movement, and means adjacent to said wrapping drum for removing and cutting said assemblies subsequently to the wrapping thereof.

7. Means for wrapping leaf members around substantially rod-shaped elements, comprising carrier means having a rolling path for carrying one of said leaf members and one of said rod-shaped elements in engagement with each other, means for holding said rod-shaped elements on said carrier, engagement means spaced from said carrier means for engagement with said rod-shaped element, said carrier means and engagement means being movable in relation to each other substantially transversely of said rod-shaped element to impart a rolling movement to said rod-shaped element on said leaf member, boundary means associated with said carrier means transversely of the direction of movement thereof and defining a forwardly and a rearwardly boundary of the rolling path of said rod-shaped element, and means for temporarily moving said rearwardly boundary means rearwardly to prolong said rolling path so as to ensure complete wrapping of said leaf member around said rod-shaped element.

8. In a device for applying wrapper leaves around assembled rod-shaped articles arranged in end to end abutting relation, comprising a cylindrical wrapping member having a continuously moving surface, a plurality of circumferentially spaced boundary bars dividing said surface into a plurality of wrapping areas, means for feeding said rod-shaped articles with a wrapper leaf partially attached to the abutting ends of said articles to said wrapping areas, means for holding said articles on said cylindrical wrapping member, an arcuate guide member adjacent said wrapping member to engage said rod-shaped articles and roll the same on said wrapper leaf, and means for moving said dividing bars in a direction opposite to the direction of the moving surface of said wrapping member as the rod-shaped articles approach the end of said arcuate guide member.

9. In a device for applying wrapper leaves around assembled rod-shaped articles arranged in end to end abutting relation, comprising a rotary wrapping drum having a means to hold said articles on said drum, a plurality of circumferentially spaced boundary bars dividing the surface of said drum into a plurality of wrapping areas, means for feeding said rod-shaped articles with a wrapper leaf partially attached to the abutting ends of said articles

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to said wrapping areas, an arcuate guide member adjacent said wrapping drum to engage said rod-shaped articles and roll the same on said wrapper leaf, lever means on the boundary bars for permitting movement of said bars in a direction of the rotary wrapping drum and in another direction opposite to the direction of rotation of the wrapping drum, cam means for moving said boundary bars and levers in each of said directions, said boundary bars being moved to their second named position by said cam means to permit complete wrapping of said rod-shaped articles and the movement of the boundary bar away from the trailing edge of said wrapper leaf.

10. In a device for applying wrapper leaves around assembled rod-shaped articles arranged in end to end abutting relation, comprising a rotary wrapping drum having means to hold said articles thereon, a plurality of circumferentially spaced boundary bars movably mounted on said rotary drum and dividing said drum into a plurality of wrapping areas, means for feeding assembled rod-shaped articles with a partially attached wrapper leaf to said wrapping areas with the wrapper leaf oc-

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cupying substantially the entire wrapping area, an arcuate guide member engageable with said articles for rolling the same on said wrapper leaf, said boundary bars being movable in a direction with the direction of drum rotation and in a direction opposite to the direction of drum rotation, means for maintaining said boundary bars in their first-named position when the assembled rod-shaped articles and wrapper leaves are deposited in the wrapping areas, and means for moving said boundary bars to their second named position as the rod-shaped articles approach the end of their rolling movement on said wrapper leaves.

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