United States Patent

[11] 3,526,233

[72] Inventor **Colin S. McArthur**
Winston-Salem, North Carolina

[21] Appl. No. **752,876**
[22] Filed **Aug. 15, 1968**
[45] Patented **Sept. 1, 1970**
[73] Assignee **R.J. Reynolds Tobacco Company**
Winston-Salem, North Carolina
a corporation of New Jersey

[54] **HEAT SEALING MEANS FOR FILTER TIPPING OF CIGARETTES**
5 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **131/94**
[51] **Int. Cl.** **A24c 5/52,**
A24c 5/58
[50] **Field of Search** 131/94

[56] **References Cited**

UNITED STATES PATENTS

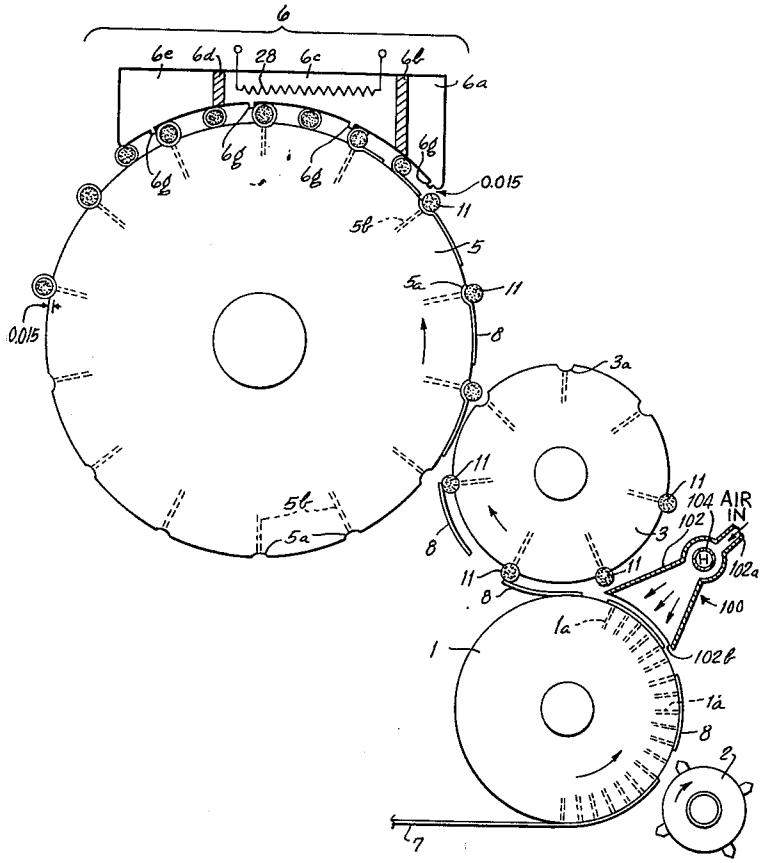
3,094,128	6/1963	Dearsley	131/94

FOREIGN PATENTS

731,964	4/1966	Canada	131/94
782,415	9/1957	Great Britain	131/94
1,046,489	10/1966	Great Britain	131/94

Primary Examiner—Samuel Koren
Assistant Examiner—James H. Czerwonky
Attorney—Robert S. Dunham, P. E. Henninger, Lester W. Clark, Thomas F. Moran, Gerald W. Griffin, Howard J. Churchill, R. Bradlee Boal, Christopher C. Dunham and John F. Ohlandt, Jr.

ABSTRACT: Apparatus for the sealing and securing of tipping material to a filter cigarette. The tipping material, fed as a continuous web, is cut into the form of individual patches by a cutting means, the web being coated with heat-activatable adhesive. The cut patches are then heated only downstream of the cutting means by a hot-air heating means. A heated patch has its leading edge applied to the periphery of an assembled cigarette unit so as to span the abutting ends of the tobacco rod and filter sections that comprise the unit. The heating means has an outlet directing a stream of hot air onto each patch at a point immediately preceding its application to the unit. Extremely simple equipment is required and no unnecessary heating is supplied.



Patented Sept. 1, 1970 3,526,233

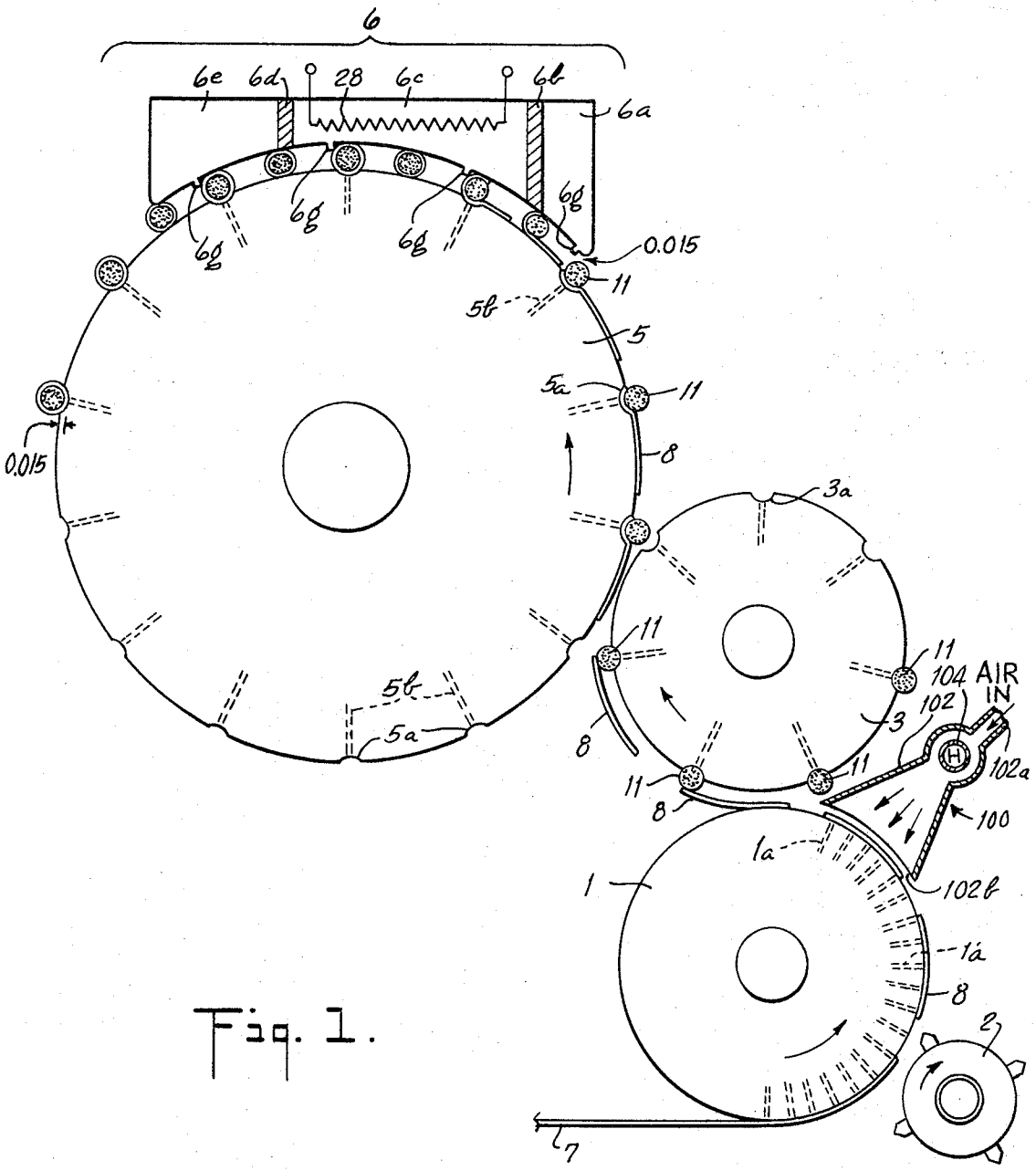


Fig. 1.

INVENTOR.
COLIN S. McARTHUR
BY Lester H. Clark
ATTORNEY

Fig. 2.

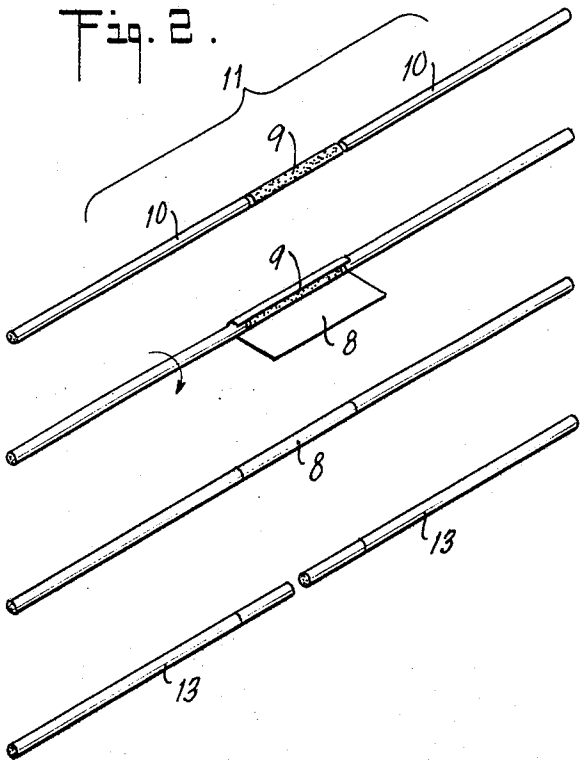
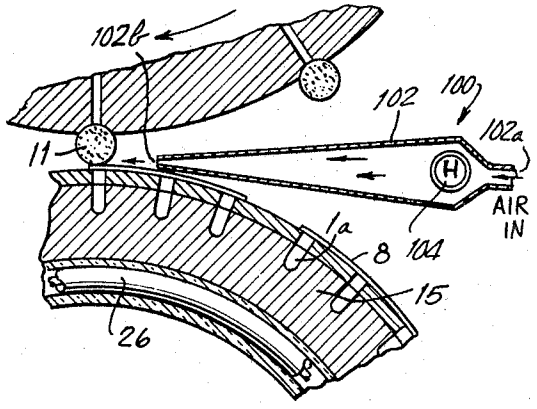


Fig. 3.



INVENTOR.
COLIN S. MC ARTHUR
BY Lester W. Clark
ATTORNEY

HEAT SEALING MEANS FOR FILTER TIPPING OF CIGARETTES

BACKGROUND, OBJECTS AND SUMMARY OF THE INVENTION

The present invention relates to an improvement in the manufacture of filter tip cigarettes; more specifically, the present invention improves upon the apparatus and method previously disclosed in application Ser. No. 607,539 now U. S. Pat. No. 3,420,243, filed in the name of the present inventor and assigned to the same assignee as the present application. The above-noted copending application describes the use of patches of tipping material coated with heat-activatable adhesive. Such an adhesive had not theretofore been used in the manufacture of filter tip cigarettes because of the lack of machinery suitably adapted to heating the adhesive before bonding, and cooling it thereafter.

Before the development above described, it has been the practice to connect a cigarette rod with a section of filter material by wrapping around their abutting ends a patch of tipping material coated with a liquid bonding agent. The bond is set by drying the liquid bonding agent after connection is completed. The application of a liquid bonding agent involves a number of drawbacks, one of which is the fact that some spilling of the bonding agent almost always occurs necessitating frequent clean-up. Furthermore, it is difficult to achieve even application of the liquid bonding agent, and defective cigarette units result when the bonding agent is applied unevenly.

The technique described in copending application 607,539 now U.S. Pat. No. 3,420,243 has succeeded in overcoming the drawbacks which attend the use of a liquid bonding agent and has enabled the secure bonding of the patch to the cigarette unit. This has been accomplished by first tacking one edge of the heated patch to an assembled filter cigarette unit but without attempting to roll the cigarette unit and to wrap it in the tipping material immediately following the tacking of the patch. Instead, the cigarette unit has been allowed to travel along an unheated path for a distance sufficient to cool the bonding material and to allow the initial tack to set. Thereafter a sequence of rolling operations is performed and the cigarette unit is heated so that the heat-activatable adhesive is made tacky throughout the patch of tipping material and finally the complete bond is set.

Despite the afornoted advantages of the described technique it has been found that the desired heating of the patches, prior to their initial tacking to the cigarette unit, can be accomplished in a simpler and more efficient way.

Accordingly, it is a primary object of the present invention to enable heating of the patches that are to be applied to a cigarette unit by eliminating the need for a heating drum, and for the accompanying slip rings and the like that are normally required in connecting an electrical supply to the heating drum. Moreover, undesired heating, that is, wasteful heating of the drum, the shaft bearings, etc. is obviated.

In accordance with the present invention a heating means is provided which is located near the point of tangency of the rotating drums which constitute the mechanism for applying the leading edge of a patch of tipping material. Hot air is directed by this heating means so as to heat at least the leading edge of a patch, thus activating the adhesive coated thereon. The heating means is spaced radially outwardly from the periphery of the supply drum, the patches being held by means of a vacuum on the periphery of this drum and being coated on their outward surfaces with the adhesive. The heating means comprises a duct for conveying hot air and directing a stream thereof onto the patches. In a preferred embodiment, cooler air is brought in at the air inlet, is passed over a heater element, and the air so heated is emitted at an outlet positioned for properly directing the hot air at a single patch as it approaches the tangency point of the drums.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention as illustrated in the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a somewhat diagrammatic view illustrating the apparatus and method of the present invention.

FIG. 2, of course, is a series of four successive perspective views of a cigarette unit as it is handled in the apparatus and method of the invention.

FIG. 3 is an enlarged cross-sectional view of a modification of the patch heating means of the present invention.

DESCRIPTION OF PREFERRED EMBODIMENT

The apparatus illustrated in FIG. 1 includes a tipping material supply drum **1**, a cutter **2**, cooperating with that drum to produce the required patches and a transfer drum **3** to which assembled filter cigarette units are supplied by conventional apparatus not shown.

Also included, as part of the environment in which the present invention is designed to operate, is a rolling drum **5** and a rolling shoe cooperating with the rolling drum generally designated **6**. Also illustrated, and of particular moment, is the unique heating means **100** for cooperation with the aforesaid drums to provide the required heating of the cut patches in a simple and efficient manner.

The tipping material is supplied as a strip or sheet, as illustrated at **7**, and passes around the periphery of the supply drum **1**. The material **7** is coated on its outer surface with a suitable heat-activatable bonding material, e.g. one of the vinyl acetate acrylic-copolymers. The drum **1** is provided with spaced apertures **1***a* which communicate with an evacuated chamber, and which are effective to hold the strip material **7** on the surface of the drum. The drum **1** cooperates with a cutter **2** which cuts the strip material into patches **8** each big enough to wrap a single cigarette. The drum **1** is operated at a peripheral speed slightly greater than the linear speed of the supply of the strip material **7** so that the patches **8** become separated on the surface of the drum **1**, as shown. Each cigarette unit **11** typically consists of a double length filter section, as shown at **9** in FIG. **2** and two cigarette rod sections **10**, with each cigarette rod section having one of its ends abutting an end of the filter section **9**. The term "cigarette unit" as used in this specification is intended to be generic to: (a) such a double length unit; and (b) single length units as shown at **13**.

The transfer drum **3** and the heater drum **1** are so mounted and spaced that each cigarette unit **11** which is held in a recess **3***a* by vacuum means on the periphery of the transfer drum **3**, touches tangentially and with light pressure the leading edge of one of the patches **8** carried by the heater drum **1**. At the same time, the apertures **1***a* under that leading edge pass out of communication with a vacuum manifold **12** so that the tipping patch, whose heat-activatable bonding material has become tacky by the effect of the heat directed at the patch, sticks to the abutting cigarette unit along one elongated cylindrical element thereof. The patch is gradually released from the supply drum as the rotation of that drum and the transfer drum continues, so that the cigarette unit **11** continues with the periphery of the transfer drum **3**, having the patch **8** attached thereto and following behind it. The transfer drum **3** cooperates tangentially with a rolling drum **5** also provided with recesses **5***a* to receive cigarette units. Each recess **5***a* communicates with a passage **5***b*, in which a vacuum is maintained to hold the cigarette units on the periphery of the drum. The recesses **5***a* are somewhat shallower than corresponding recesses **3***a* on the transfer drum, so as to make it easier for the rolling mechanism to begin to roll a cigarette unit out of one of the recesses **5***a*. Preferably, the depth of each recess **5***a* is about 0.015".This depth is exaggerated in the drawing, for purposes of clarity. As the cigarette unit with attached patch **8** approaches the top of the rolling drum **5**, it encounters the rolling shoe **6** which comprises an initial unheated section **6***a* separated by an insulating spacer **6***b* from a heated rolling sec-

tion 6c. The section 6c and the opposite end of the shoe are separated by another heat insulating spacer 6d from a third, unheated rolling shoe section 6e.

The bottom of the shoe 6 is provided with a series of ridges 6g extending parallel to the axis of rotation of drum 5. The arrangement of these ridges and their purpose have been fully described in application Ser. No. 607,539 now U.S. Pat. No. 3,420,243. It is sufficient to note here that the shoe 6 provides proper rolling and heating of the cigarette unit 11 such that each of the patches 8 is firmly secured so as to connect the filter and cigarette rod sections, and thus complete the formation of a filter tip cigarette.

Referring again to FIG. 1, the technique of activating the coating of bonding material on the outer surface of each of the patches 11 will be appreciated. The heating means 100 for this purpose comprises an enclosure or duct 102 through which hot air is conveyed so as to direct it at the patches as these approach the point of tangency of the supply drum 1 and the transfer drum 3. The duct is provided with an inlet 102a and an outlet 102b. Preferably, cooler air is drawn in through the inlet and a heating element 104 disposed within the duct produces heating of the air to a temperature of approximately 500°F. This temperature is, of course, selected in dependence on the heat seal characteristics. The heating element 104 is connected to a power supply not shown and is rated at approximately 600 watts so as to provide sufficient heating of incoming air. The heating element is constructed of suitable heater wire such as nichrome. The technique as described enables direction of the hot air on the drum surface to melt the heat-activatable material well ahead of the attachment point.

An alternate technique for applying hot air to activate the bonding material is illustrated in FIG. 3. Here the duct 102 is so arranged and constructed that a limited stream of hot air is directed at the point of tangency of the drums 1 and 3, such that only the leading edge of a patch as it approaches that tangency or point of attachment is heated.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to the preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the invention.

I claim:

1. Apparatus for connecting a filter tip to a cigarette, comprising:

1. means for assembling cigarette units for tipping, each unit including a section of cigarette rod and a section of filter rod having one of its ends abutting an end of the cigarette rod section; and

2. means for wrapping around the abutting ends of each assembled unit a patch of tipping material coated with bonding material to form a filter tip cigarette; wherein the improvement comprises:

a. means for feeding a continuous web of tipping material coated with heat-activatable bonding material;

b. means for cutting said web into patches of tipping material;

c. means to heat said patches and located only downstream of said cutting means, thereby activating the bonding material, said heating means having an outlet directing a stream of hot air onto each of said patches at a point immediately preceding its application to a cigarette unit;

d. means to apply the leading edge of each heated patch to the periphery of an assembled, unheated cigarette unit, with the patch spanning the abutting rod ends, thereby locally cooling and setting the adhesive along said leading edge and attaching the patch to the unit along a linear element thereof;

e. first rolling means to roll the unit with the attached patch through a partial revolution without further heating; and

f. second rolling means including:

1. a second heating menas positioned to engage initially a locality of the unit spaced peripherally thereof from said linear element; and

2. means to continue the rolling of the unit for a plurality of revolutions while applying heat to said patch to form a completed filter tip cigarette unit.

2. Apparatus as defined in claim 1, in which a first drum comprises said continuous web feeding means, said first drum carrying said patches downstream of said cutting means, and said means to apply said patches includes a second drum, said first and second drums being spaced such that assembled cigarette units on said second drum and patches on said first drum approach one another tangentially, said heating means being spaced radially outwardly from the periphery of said first drum and having its outlet arranged to heat each of said patches immediately before the patch reaches the point of tangency in its travel on said first drum.

3. Apparatus as defined in claim 2, in which said heating means includes a duct for hot air; a heating element within said duct and an air inlet for directing air over said heating element.

4. Apparatus as defined in claim 2, in which said outlet spans a dimension of the patch relative to the circumference of said first drum so as to heat the entire patch.

5. Apparatus as defined in claim 2, wherein the outlet directs hot air only immediately adjacent the point of tangency of the two drums.