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F. ALLSEITS ET AL

3,396,733

CIGARETTE TIP

Filed March 23, 1966

FIG. 1.

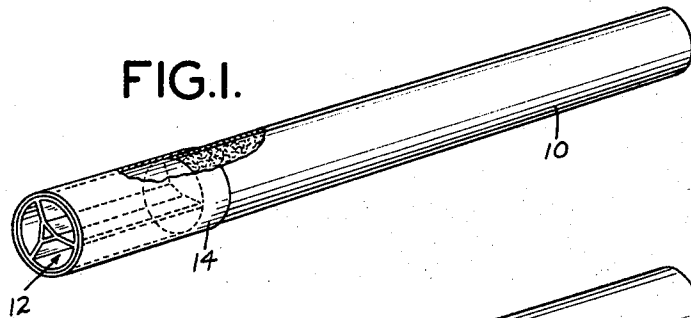


FIG. 7.

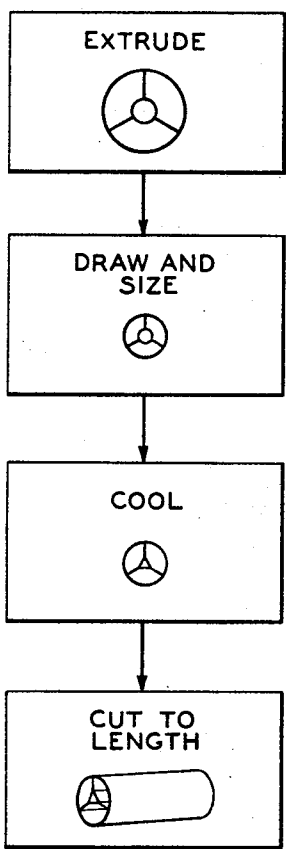
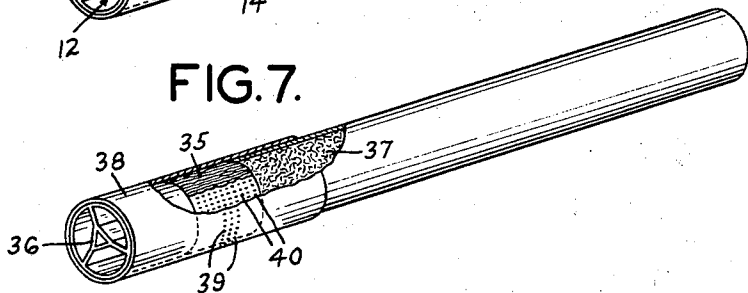


FIG. 2.

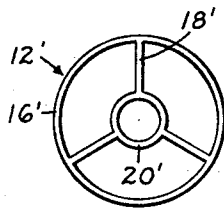


FIG. 3.

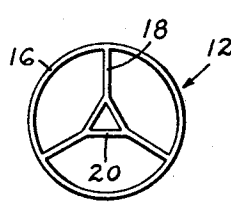


FIG. 5.

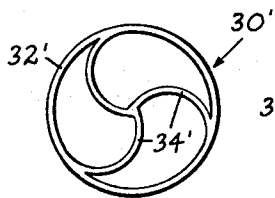


FIG. 6.

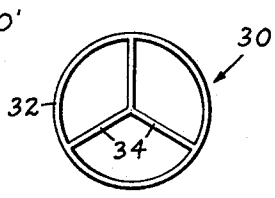


FIG. 4.

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CIGARETTE TIP

Frank Allseits, Mount Prospect, and Jay Doblin, Chicago, Ill., assignors to P. Lorillard Company, New York, N.Y., a corporation of New Jersey
Continuation-in-part of application Ser. No. 519,780, Jan. 10, 1966. This application Mar. 23, 1966, Ser. No. 536,671

11 Claims. (Cl. 131—10.5)

ABSTRACT OF THE DISCLOSURE

A smoking article comprising a cigarette, an extruded plastic tip, and preferably, a filter and tiny perforations for admitting air to the smoker's mouth with the smoke. The plastic tip includes a cylindrical tubular body portion having a diameter substantially equal to the diameter of the cigarette, a plurality of substantially radially disposed supporting ribs extending longitudinally of and coextensively with the body, and a yieldable, hollow inner element also extending longitudinally of and coextensively with the body. The radial ribs are joined to the body and to the hollow inner element along joints spaced about the peripheries of the body and element, and the body, ribs and inner element constitute an integrally formed, one-piece structure.

This is a continuation-in-part of our application Ser. No. 519,780, filed Jan. 10, 1966, and now abandoned. This invention relates to novel and improved tips for cigarettes.

Smokers of unfiltered cigarettes are sometimes bothered by getting tobacco particles from the end of the cigarette into their mouths, particularly when the cigarette has been damaged while the pack is carried in a pocket or purse. Many smokers who prefer unfiltered cigarettes use cigarette holders to avoid this problem. It has also been suggested that cigarettes be provided with tips to help retain the tobacco in the cigarette body and to provide a separation between the smoker's lips and the tobacco so that tobacco particles cannot touch and stick to the lips. However, none of the previously suggested cigarette tips have met with any significant commercial acceptance. It is likely that one reason for the lack of success of previously suggested cigarette tips is the relatively high cost of manufacturing them; for example, some tips have been formed from strip material by rolling or bending; others have required the fabrication and assembly of two or more parts. Both of these construction techniques require elaborate equipment and are relatively expensive.

The foregoing and other disadvantages of cigarette tips and the methods of making them are overcome, in accordance with the invention, by a novel and improved extruded plastic cigarette tip which comprises a cylindrical tubular body having a diameter substantially equal to the diameter of the cigarette and an internal supporting structure for imparting rigidity to the body and for preventing the tobacco particles from becoming loosened and falling out of the end of the cigarette. In particular, the supporting structure includes a plurality of substantially radially disposed ribs extending longitudinally of and coextensively with the body and extruded integrally with the body. The inner ends of the ribs are interconnected, such as by a tubular, generally triangular-shaped interconnecting element extending coaxially of the body. The interconnecting element joining the inner ends of the ribs is substantially weaker than the body of the tip so that relative shrinking of the ribs during cooling is compensated for by deformation of the interconnecting element between

its original cross-sectional shape, which is preferably cylindrical, and final shape.

The individual tips are made by cutting them from a continuous extruded member. The member is initially extruded so that all parts have initial dimensions substantially larger than their final dimensions. The extruded member is drawn from the extrusion die and, while it is at a temperature above the setting point of the plastic, is increased in length and drawn down to reduce the diameter of the body and dimensions of the supporting structure. The tubular body is sized by applying a differential gas pressure to it so that the final diameter is accurately controlled. During the drawing and sizing of the extrusion, it is permitted to cool; the body cools faster than the interiorly located supporting structure, and accordingly the supporting structure shrinks to a greater extent than the body. The greater relative shrinkage of the ribs is, however, compensated for by deformation in the cross-sectional shape of the deformable interconnecting element.

The manufacture of cigarette tips by extrusion and the use of the geometrical form described above provide a number of important advantages. First of all, extrusion enables the manufacture of the tips at a high rate of speed and at a low cost, thus making the use of the tips of the invention economically feasible and not significantly increasing the cost of making the cigarettes. In this regard, conventional tipping machinery of the type used to make up filter cigarettes can be used to assemble the tips of the invention on the cigarettes. The fact that the interconnecting portion of the supporting structure is weaker than the body enables accurate roundness to be achieved without costly precision control of the extrusion process. In this regard, any changes in the cooling rate from time to time, which can affect the degree of shrinking of the radial ribs, is taken up by deformation in the shape of the interconnecting element.

For a better understanding of the invention, reference may be made to the following description of an exemplary embodiment, taken in conjunction with the figures of the accompanying drawings, in which:

FIGURE 1 is a pictorial view of a cigarette which incorporates an extruded plastic tip according to the invention;

FIG. 2 is an end elevational view of the tip used in the cigarette of FIG. 1 as initially extruded from the dies;

FIG. 3 is an end view of the completed tip of FIG. 1, the view being on a larger scale than FIG. 1;

FIG. 4 is a flow diagram of the method of making the tips;

FIG. 5 is an end view of another embodiment of the tip as it is initially extruded from the dies;

FIG. 6 is an end view of the tip of FIG. 5 in its final form; and

FIG. 7 is a perspective view of a cigarette including a plastic tip embodying the invention and a tobacco smoke filter.

Referring to FIG. 1, reference number 10 designates a conventional cigarette consisting of an elongated, cylindrical body of ground tobacco wrapped in cigarette paper. The extruded plastic tip 12 of the invention is disposed in end-to-end abutting relation to one end of the cigarette 10 and is attached to it by a strip of tipping paper 14 wrapped around and adhered to the tip and to the end portion of the cigarette. If desired, a filter element can be located between the cigarette 10 and the tip 12, though the tip is generally intended for use on a non-filtered cigarette.

Referring to FIG. 3, the tip 12 is of uniform cross-section along its entire length and includes a thin-walled cy-

lindrical tubular outer body 16, having a diameter substantially equal to that of the cigarette 10, and a supporting structure which is coextensive with the body and includes a plurality of longitudinally extending, radial ribs 18 and a deflectable, tubular generally triangular-shaped inner supporting member 20 extending coaxially within the tubular body portion 16. A preferred plastic for the tip is a low density polyethylene, for example, 0.92 specific gravity, but other suitable plastics can, of course, be used.

The tips 12 are cut from a continuous extrusion made using suitable standard extruding equipment. The diameter of the body 20' and the dimensions of the other parts of the extrusion are, as extruded from the dies, substantially larger, say, twice as large, than the final dimensions. The extrusion is then drawn by suitable drawing apparatus so that the final dimensions are closely approached. Accurate sizing of the extrusion is obtained by using a vacuum sizer, for example, or by maintaining an air pressure inside the extrusion. For linear polyethylene, for example, air under pressure of about 70 p.s.i.g. can be used, whereas a pressure of about 5 p.s.i.g. can be used for low density (0.92 specific gravity) polyethylene.

During the drawing and sizing operations, the radial walls 18' and supporting element 20' cool more slowly than the body 16' and therefore shrink in an amount somewhat greater than the decrease in diameter of the body. The differential shrinkage is compensated for by deformation of the initially cylindrical-shaped element into the triangular shape shown in FIG. 3.

After cooling to a temperature somewhat below the setting point of the plastic, the extrusion may be cut into convenient lengths for shipping or can be coiled onto a reel. If desired, the individual tips may be formed immediately upon completion of extrusion, although it is usually preferable that the final cutting be accomplished as a part of the procedure of assembling the tips into the cigarettes.

The extrusion technique enables a close control over the geometrical and dimensional uniformity of the tips. Thus, the design of the internal structure to account for greater relative shrinkage of the ribs during cooling enables roundness of the body to be maintained. On the other hand, variations in process conditions, particularly the cooling rate and temperatures at various points, can cause some irregularities in the dimensions of the extrusion. Thus, it is an important feature of the invention that a deformable element be provided in the supporting structure of the tips.

A further advantage of the deformable portion is that it provides what can be termed a shock-absorber function. Although the purpose of the ribs is to impart rigidity to the tubular body, an undesirable hardness in the tip would be uncomfortable to the smoker, it being preferable that a certain yieldability or suppleness be provided. Thus, it will be observed that this portion permits the ribs and, of course, the body of the tip, to be deflected radially to a degree. Thus, the tip is not undesirably rigid but has a suppleness which makes it more comfortable to the smoker. Another way of providing the desired degree of yieldability is to limit the number of ribs 18 so that they are spaced relatively far apart and to use an odd number of ribs. Any even number of ribs would result in rigid, diametrical planes which would render a tip of uneven suppleness. In the preferred construction of the tip, three radial ribs at 120° spacing are used but it will be understood that 5 ribs, for example, will closely approach the optimum conditions.

As incorporated into the cigarette, as shown in FIG. 1, the tip 12 accomplishes a number of functions. For one thing, it imparts rigidity to the ends of the cigarette and prevents the tobacco from being loosened by damage occurring while the cigarette packs are carried in pockets or purses. Further, it provides a comfortable surface for the smoker's lips, being resistant to moisture and being

rigid enough to permit the cigarette to be comfortably held and yet sufficiently flexible to yield to pressure of the smoker's lips. In addition, the ribs and the supporting element 20 engage the end of the cigarette 10 and retain the tobacco against loosening and falling out. The tip affords a wide spacing between the tobacco in the cigarette and the smoker's lips, and thus the tobacco cannot become wet nor can the lips touch and pick up particles of it.

An exemplary tip conforming to the structure illustrated in FIGS. 1 to 3 may be made of low density polyethylene (0.92 specific gravity) with the following final specific dimensions, the original dimensions as it comes from the die being about 30% greater:

	Inch
Body diameter -----	0.306
Body thickness -----	0.012
Inner support member (20), equilateral triangle sides -----	0.072
Inner support member (20) thickness -----	0.008
Rib thickness -----	0.008
Length of tip -----	0.585

FIGS. 5 and 6 show an alternative embodiment of the cigarette tip of the invention, FIG. 5 illustrating the cross-sectional shape of the tip 30' as initially extruded from the extrusion dies and FIG. 6 illustrating the final cross-sectional shape of the tip 30. It will be observed that the ribs 34' are initially curved and joined at their inner ends. As the extrusion cools, the ribs 34' shrink to a greater extent than the body 32', the body being vacuum or pressure sized as in the first embodiment, so that when the extrusion of the member from which the tips 30 are cut has been completed, in their final form, the ribs 34 are substantially straight, as illustrated in FIG. 6. The roundness of the body 32 is thus retained, though the ribs shrink to a greater extent than the body, by initially forming the ribs with a dimension sufficient to account for the proportionately greater shrinkage.

For smokers who prefer a filter-type cigarette, FIG. 7 discloses a cigarette having a filter plug 35 formed of fibers of regenerated cellulose or other synthetic, natural or mineral fibers or mixtures thereof interposed between a tip 36 of any of the types described above and the tobacco 37 of the cigarette. The tipping paper 38 around the plug 35 and the tip 36 may be provided with a plurality of rows 39 of tiny perforations to admit air for cooling the tobacco smoke and condensing condensable components of tobacco smoke. The perforation should be too small to permit jetting of the smoke through them but large enough to admit air during smoking, e.g., about 30 to 80 microns. An inner wrapper 40 for the filter plug is formed of perforated or porous paper.

It will be understood that the above-described embodiments of the invention are merely exemplary and that various modifications and variations of it can be made by those skilled in the art without departing from the spirit and scope of the invention. All such variations and modifications are intended to be included within the scope of the invention as defined in the appended claims.

We claim:

1. An extruded plastic tip for a cigarette, comprising a cylindrical tubular body portion having a diameter substantially equal to the diameter of the cigarette, a plurality of substantially radially disposed supporting ribs extending longitudinally of and coextensively with the body and a yieldable central hollow inner element extending longitudinally of and coextensively with the body, the ribs being joined to the body and the hollow inner element along joints spaced about the peripheries thereof, and the body, ribs and inner element constituting a one-piece integral structure.

2. A tip according to claim 1 wherein the hollow inner element is of substantially lesser wall thickness than the

body and is yieldable upon deformation on the body and deflection of the ribs.

3. A tip according to claim 1 wherein the hollow inner element has substantially straight wall portions between the joints with the ribs.

4. A tip according to claim 3 wherein there are precisely three ribs spaced equally about the axis of the tip and wherein the hollow inner element is substantially triangular in cross-section.

5. An article of manufacture comprising a cigarette, an extruded plastic tip disposed in end-to-end relation to the cigarette, and a strip of material wrapped around and overlapping the cigarette and tip to join the tip to the cigarette, the extruded plastic tip including a cylindrical tubular body portion having a diameter substantially equal to the diameter of the cigarette, a plurality of substantially radially disposed supporting ribs extending longitudinally of and coextensively with the body and a yieldable central hollow inner element extending longitudinally of and coextensively with the body, the ribs being joined to the body and the hollow inner element along joints spaced about the peripheries thereof, and the body, ribs and inner element constituting a one-piece integral structure.

6. An article according to claim 5 further comprising a filter plug of fibrous material interposed between the tip and the cigarette and a plurality of tiny perforations in the strip of material overlapping the plug to admit air into the plug.

7. An article according to claim 6 further comprising a porous inner wrapper for the filter plug, the perforations in the strip of material communicating with the porous inner wrapper.

8. An article according to claim 5 wherein the hollow

inner element is of substantially lesser wall thickness than the body and is yieldable upon deformation of the body and ribs.

9. An article according to claim 5 wherein the hollow inner element has substantially straight wall portions between the joints with the ribs.

10. An article according to claim 9 wherein there are precisely three ribs spaced equally about the axis of the tip and wherein the hollow inner element is triangular in cross-section.

11. A tip for a cigarette comprising a cylindrical tubular body portion having a diameter substantially equal to the diameter of the cigarette and a plurality of spaced longitudinal stiffening ribs extending inwardly from and coextensively with the body and being formed integrally with the body, the tip being a continuous self-supporting plastic extrusion and requiring as extruded no folding, overlapping, shaping and forming.

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