

Improvements Relating to the Extrusion of
Tobacco Containing Materials

The subject invention relates to the extrusion of tobacco containing materials to provide web form extrudates.

As is disclosed in Patent Specification GB 2 201 080, it has been proposed to extrude from an extruder die a continuous web of tobacco containing material. The tobacco used for this purpose is suitably of fine particulate form and it may, for example, be prepared by grinding waste tobacco materials.

In GB 2 201 080 there is described and diagrammatically illustrated an extruder die the outlet orifice of which is of slit form and circular configuration. The extrudate which issued from the die was initially of near-tubular cross-section, the extrudate being then opened to a flat web form. A circular configuration of die outlet orifice was adopted in pursuance of the objective of a uniform flow of the tobacco containing material throughout the orifice. In the course of subsequent developmental work it was found that by careful design of the flow channel extending to the outlet orifice, taking into account the rheological characteristics of the tobacco containing material, it is possible to operate generally satisfactorily using a die provided with a linear slit form outlet orifice. When use was made of such a die it was found that from time to

time a particle, of for example tobacco stem, would lodge in the die in the region of the outlet orifice and that there resulted a line of weakening in the web form extrudate, or even a line of separation. In order to rectify this fault condition it was necessary to stop the extruder and to disassemble the die in order to remove the over size particle.

By use of the subject invention, over size particles lodged in the die during the extrusion of tobacco containing web can be removed without the necessity of stopping the extrusion process.

The subject invention provides a method of extrusion of a tobacco containing web, wherein a tobacco containing material is extruded from an extruder through a die provided with a web forming outlet orifice, characterised in that a die portion bounding a longer side of the outlet orifice is adjustable in position in a direction transverse of the outlet orifice, and, when a particle in said material which particle is too large to pass through the outlet orifice, becomes lodged in the region of the outlet orifice, the said die portion is adjusted in position to provide for a widening of the die at said die portion thereby permitting passage of the particle through and from the outlet orifice.

After the particle has passed from the die, the die portion may be re-adjusted to the original position thereof.

By preference, there is employed a die in which the position adjustable die portion is one of a number of die

portions which are positioned at a longer side of the die outlet orifice, each of which portions is adjustable in position in a direction transverse of the outlet orifice. Suitably, all of the just mentioned die portions are positioned at the same longer side of the die outlet orifice.

Apparatus for carrying out the method of the invention, comprises an extruder die comprised of an upper section and a lower section, which sections are releasably secured together, and a material flow channel extending within the die from an inlet bore to a linear, slit form outlet orifice.

Dies employed for the purposes of the subject invention may be generally in accordance with the dies which are disclosed in United States Patent Specifications Nos. 3,940,221; 3,985,845; 4,003,689; 4,055,389; 4,125,350; 4,252,519 and 4,281,980.

In order that the subject invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the diagrammatic drawings herewith, in which:-

Figure 1 shows a cross-sectional view of an extruder die, the section being taken on line III-III of Figure 3;

Figure 2 shows a front elevation of the die of Figure 1 (looking in the direction of arrow A); and

Figure 3 shows a view of the die of Figure 1 looking in the direction of arrow B.

In carrying into effect the subject invention the extruder die of Figure 1, which is generally designated by reference numeral 1, is mounted at the outlet end of the barrel of an extruder by means of an adapter unit 7. It may be noted that the section plane of Figure 1 is a vertical plane containing the axis of the extruder barrel.

The steel body of the die 1 is comprised of an upper section 2 and a lower section 3, which sections are releasably secured together by means of bolts (not shown). A material flow channel 4 extends within the die 1 from an inlet bore 5, which bore is coaxial with the extruder barrel, to a wide, linear, slit form outlet orifice 6.

The gap between the flat surfaces bounding the channel 4 immediately upstream of the orifice 6 as indicated in the drawings is, for the sake of clarity of illustration, exaggerated.

Steel side plates 8 and 9 are releasably secured to the die body and metal shims (not shown) located between each side plate 8, 9 and the die body ensure that the sides of the flow channel 4 in the region of outlet orifice 6, i.e. that region of the channel 4 which extends to the sides of the die body, are sealed.

The upper section 2 of the die 1 is provided with a deep groove 10 which extends from side to side of section 2. As can be observed from Figure 1, the provision of the groove 10 means that the thickness of metal between the base of the groove 10 and the under surface of the

section 2 is comparatively small and the metal at this region constitutes a neck 11. The part of the section 2 to the right of the neck 11 (as viewing Figure 1) is hereafter referred to as nose 14.

Secured to section 2 of the die 1, by means not shown, is a steel bar 12, which bar extends part way across the groove 10. Nine setting bolts 13 extend through and are threadably engaged with bores in the bar 12. Suitably, each bolt 13 is provided at the head portion with a hexagonally shaped recess, whereby a key of hexagonal section can be used for rotating the bolt. By being rotated, each of the bolts 13 can be brought to bear, at the end remote the head portion, on a side surface of the groove 10, as is indicated in Figure 1 in respect of the central setting bolt 13. Further rotation of the bolts 13 in the same sense causes the neck 11 to flex and the nose 14 to be moved downwards about the neck 11. In this way it is possible to reduce the outlet orifice gap.

During an extrusion operation a tobacco containing material is forced continuously through the channel 4 from the aforesaid extruder barrel, the outlet orifice gap being set to produce a web form extrudate of the desired thickness by use of the setting bolts 13 to exert the appropriate force on nose 14.

The orifice gap may, for example, be 700 μm .

Reference numeral 15 (Figure 1) designates an over size particle, of for example tobacco stem material, which has been conveyed to the indicated location by the

flow of tobacco containing material. The particle 15, being over sized, cannot pass through the exit orifice 6 and so is lodged at the indicated location. The tobacco containing material is diverted to either side of the particle 15 and this results in a continuous fault line being produced in the extrudate web.

In accordance with the subject inventive method, when a fault line becomes established, the setting bolt or bolts 13 nearest aligned with the fault line is/are rotated so as to relieve setting force on that portion of the nose 14 which is aligned with the fault line. This permits that nose portion to flex upwards under the internal pressure of the material flowing through the die. In this manner the width of the outlet orifice 6 is enlarged in alignment with the fault line and thus also in the region at which the particle 15 is lodged, thus permitting passage of the particle 15 through and from the outlet orifice 6 in the flow of the tobacco containing material. After the particle has passed from the die, the die nose portion which has been relieved of pressure is re-adjusted to the original position thereof by operation of the same bolt or bolts 13. In ridding the die of the over size particles there is no requirement to stop the extrusion process or to disassemble the die.



CLAIMS

1. A method of extrusion of a tobacco containing web, wherein a tobacco containing material is extruded from an extruder through a die provided with a web forming outlet orifice, characterised in that a die portion bounding a longer side of the outlet orifice is adjustable in position in a direction transverse of the outlet orifice, and, when a particle in said material which particle is too large to pass through the outlet orifice becomes lodged in the region of the outlet orifice, the said die portion is adjusted in position to provide for a widening of the die at said die portion thereby permitting passage of the particle through and from the outlet orifice.
2. A method according to Claim 1, wherein after the particle has passed from said die, said die may be re-adjusted to the original position thereof.
3. A method according to Claim 1 or 2, wherein the die through which said tobacco containing material is extruded is a die in which the position adjustable die portion is one of a number of die portions which are positioned at a longer side of the die outlet orifice, each of which portions is adjustable in position in a direction transverse of the outlet orifice.
4. A method of extrusion of a tobacco containing web substantially as hereinabove described with



reference to Figures 1, 2 and 3 of the drawings hereof.

5. Apparatus for carrying out the method of the invention substantially as hereinabove described with reference to Figures 1, 2 and 3 of the drawings hereof.