United States Patent [19]

Powell

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[54] **ROD GUIDE ASSEMBLY FOR CONTINUOUS ROD MAKING MACHINES**

[75] Inventor: **Gordon Francis Wellington Powell,** London, England

[73] Assignee: **Molins Limited,** London, England

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[21] Appl. No.: **283,297**

[30] **Foreign Application Priority Data**

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Aug. 26, 1971 Great Britain 04167/71
Aug. 26, 1971 Great Britain 40168/71

[52] **U.S. Cl.** ..... **250/358,** 131/21 B, 250/252, 250/308

[51] **Int. Cl.** **G01t 1/16**

[58] **Field of Search**... 250/83.3 D, 83.6 FT, 43.5 D, 250/252, 308, 358, 359, 360; 131/21 B

[56] **References Cited**

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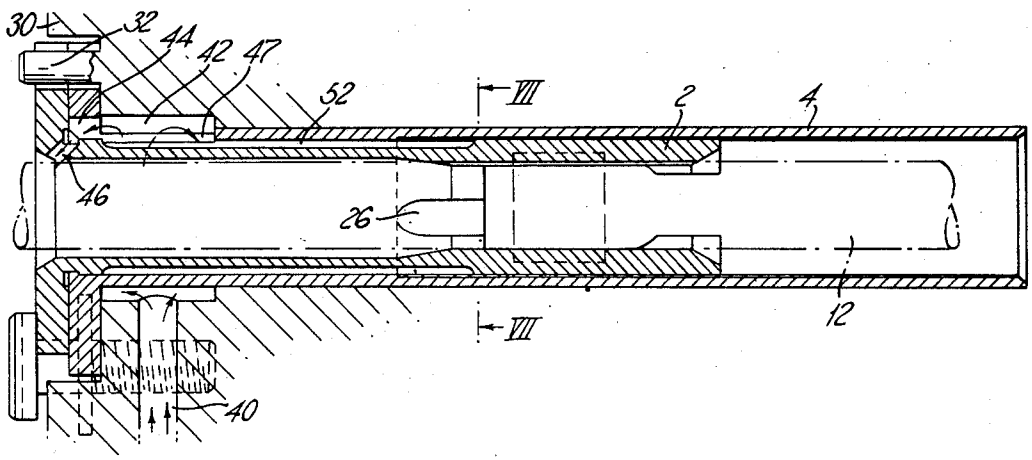
Primary Examiner—James W. Lawrence
Assistant Examiner—Davis L. Willis
Attorney, Agent, or Firm—Craig & Antonelli

[57] **ABSTRACT**

A cigarette making machine has a scanning system for monitoring the weight of the cigarette rod, which is guided in the scanning region by means of a rod guide member formed with windows through which passes the radiation beam used for scanning. Air is blown inwards through the windows to blow out tobacco or other particles which may be caught between the rod and the rod guide member. The rod guide member is removable so that different guide members can be used on cigarettes of various diameters.

12 Claims, 11 Drawing Figures



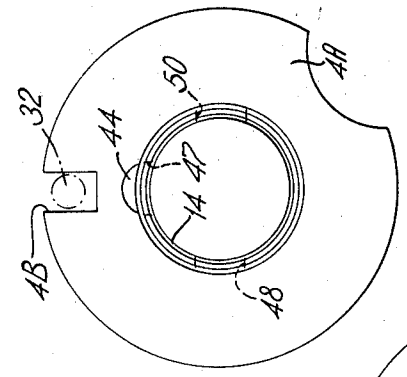


FIG. 3.

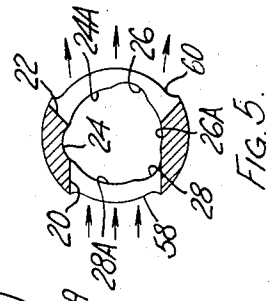


FIG. 5.

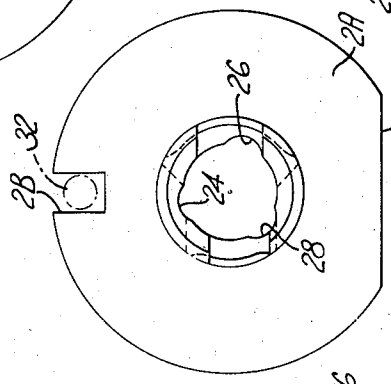


FIG. 4.

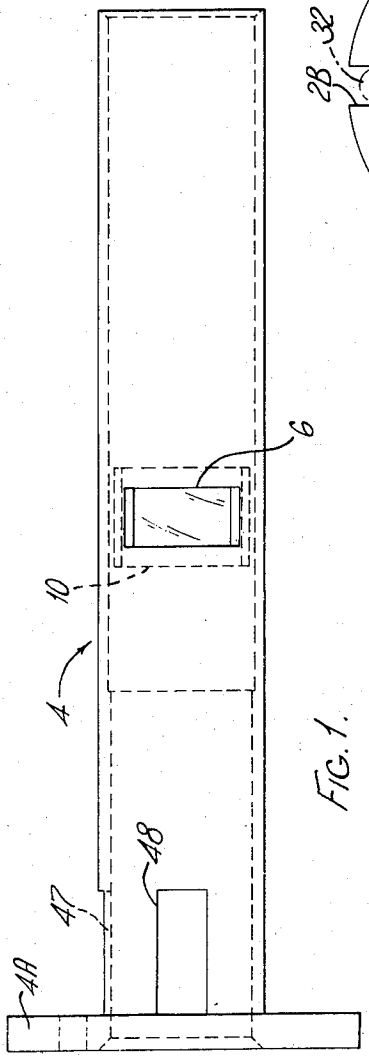


FIG. 1.

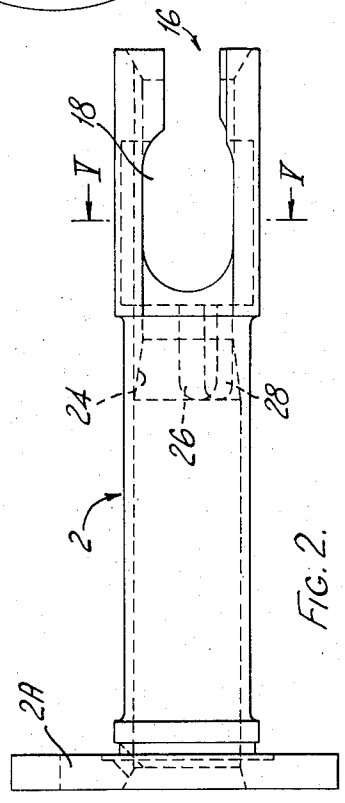


FIG. 2.

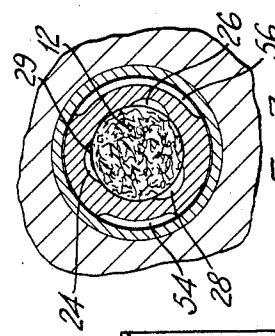


FIG. 7.

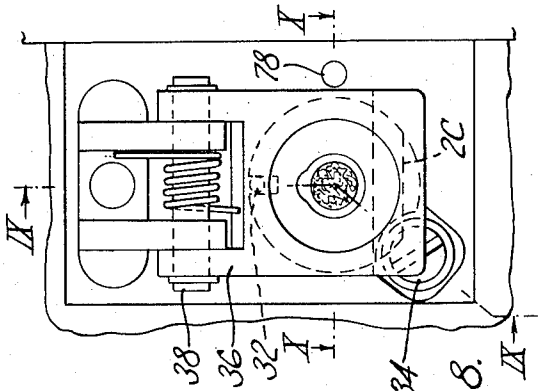


FIG. 8.

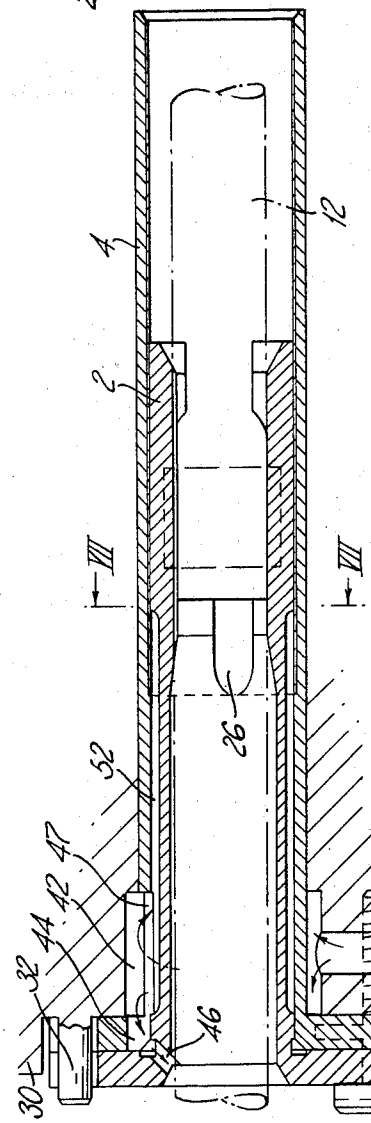


FIG. 6.

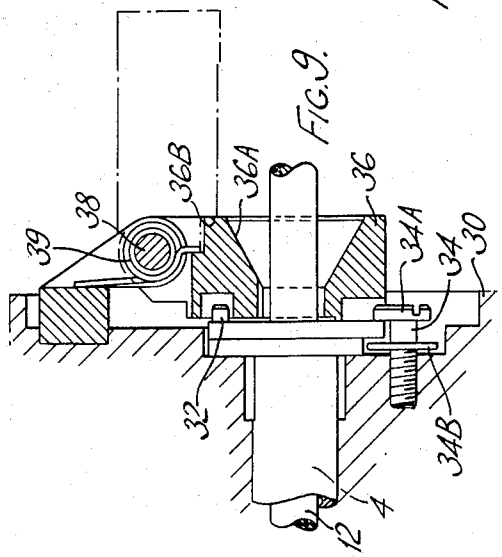


FIG. 9.

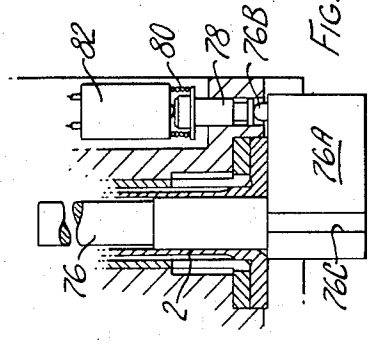


FIG. 10.

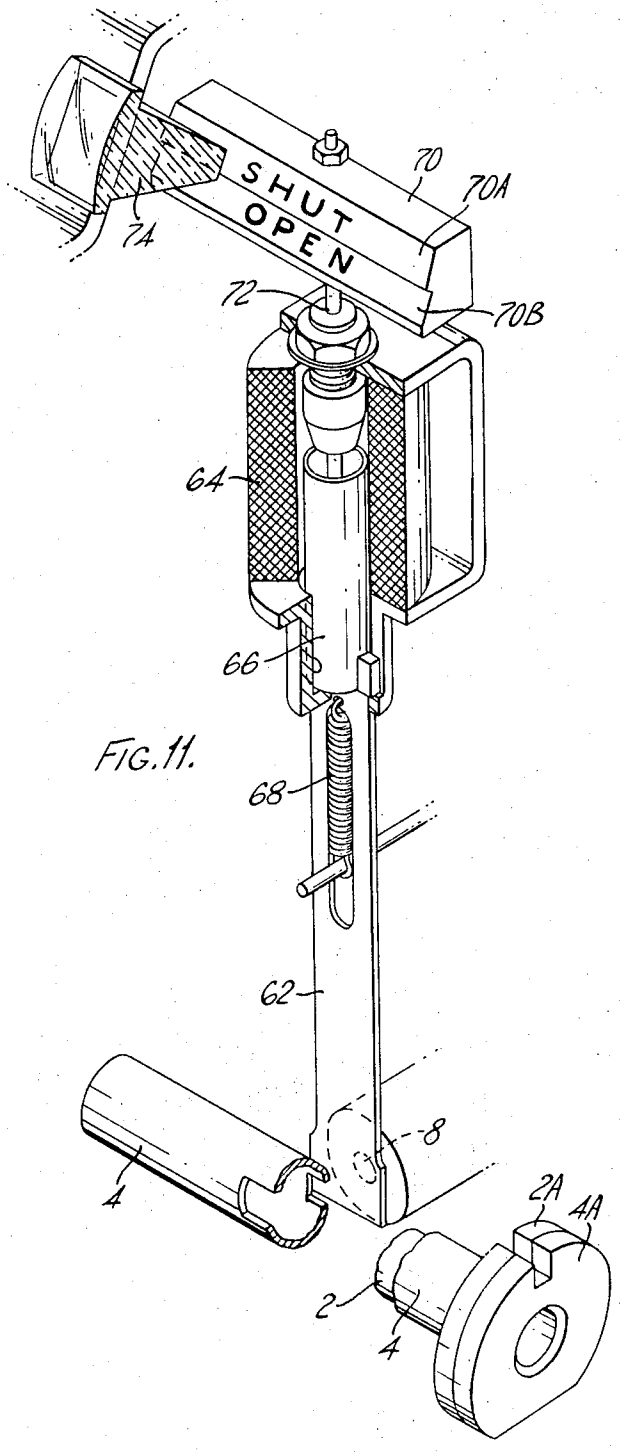


FIG. 11.

ROD GUIDE ASSEMBLY FOR CONTINUOUS ROD MAKING MACHINES

Continuous rod making machines, for example cigarette making machines, frequently include a scanning system, for example comprising a radiation source and an ionisation chamber, which senses the weight per unit length of the continuous rod and controls the formation of the rod so as to maintain the weight as uniform as possible. An example of such a scanning system is described in U.S. Pat. Ser. No. 143,357, filed May 14, 1971. The present invention is concerned with a rod guide assembly for use especially in such a system; that is to say an assembly for guiding the rod in the scanning region.

According to the present invention a rod guide assembly for a scanning system comprises a rod guide member arranged to support the cigarette rod upstream and downstream of a scanning region in which a radiation beam is passed through the rod through windows formed in the rod guide member, and including at least one passage through which air passes during use along the outside of the rod guide member and inwards through the windows to blow out tobacco or other particles which may be caught between the rod and the rod guide member.

Air is preferably also blown on to the lap joint along the rod, that is to say the joint between the longitudinal edges of the wrapper which encloses the tobacco or other material within the rod.

In a preferred arrangement the rod guide member is removably mounted within a fixed outer tube which is formed with windows which are aligned with those of the rod guide member, the windows in the outer tube being covered internally by a thin metal sheet.

An example of a rod guide assembly according to this invention is shown in the accompanying drawings. In these drawings:

FIG. **1** is a side elevation of a fixed tube for holding the rod guide member;

FIG. **2** is a side elevation of the rod guide member which is in the form of an inner tube;

FIGS. **3** and **4** are respectively end views from the right of FIGS. **1** and **2**;

FIG. **5** is a section along the line V—V in FIG. **2**;

FIG. **6** is a longitudinal section in a vertical plane through the assembled tubes;

FIG. **7** is a section on the line VII—VII in FIG. **6**;

FIG. **8** is an end view of the assembly from the left of FIG. **6**;

FIG. **9** is a section on the line IX—IX in FIG. **8**;

FIG. **10** is a section on the line X—X in FIG. **8** and shows an artificial cigarette being inserted into the rod guide, and

FIG. **11** is a diagrammatic perspective view showing the rod guide and a shutter for closing the radiation source.

The rod guide assembly shown in the drawings includes a rod guide member which is in the form of a removable inner tube **2** shown in FIG. **2.** This tube is carried within a fixed outer tube **4** shown in FIG. **1.** The outer tube **4** includes a window **6** through which Beta rays from a radiation source **8** (see FIG. **11**) enter, and a larger window **10** through which the radiation beam leaves the tube after passing through the continuous rod **12** (see FIG. **7**). The windows **6** and **8** are windows only in the sense that a radiation beam can pass through them. They are in fact closed by a thin sheet of Titanium or of Aluminum alloy **14** (see FIG. **3**).

The removable inner tube **2** is shown in FIGS. **2, 4** and **5.** It has a slot **16** with a wide part **18** through which the radiation beam passes. As shown in FIG. **5,** the wide part of the slot forms an inlet window **20** for the radiation beam, and an outlet window **22.** The windows in the two tubes are of dimensions such that the radiation beam passes across substantially the whole width of the rod, thus making the system relatively insensitive to momentary changes in the diameter or cross-sectional shape of the rod; so long as the weight per unit length of the rod remains constant, the weight signal from the scanning system remains substantially constant, in contrast with some prior systems with which a change of rod diameter or shape produced a significant change in the weight signal. Moreover it is important to note that the diameter of the radiation source **8** is smaller than the cigarette rod (for example **2** mm, compared with a rod diameter of about **8** mm); this gives a relatively high source utilisation efficiency. The source is, for example, about **12** mm from the axis of the rod, while the ionisation chamber (not shown) is close to the rod guide assembly on the side opposite to the radiation source.

As shown particularly in FIGS. **4, 5** and **7,** the inner tube **2** is machined with three longitudinally extending recesses **24, 26** and **28.** These leave between them three lands **24A, 26A** and **28A** which closely guide the rod **12** immediately before and after the scanning position. The top recess **24** contains the lap **29** (FIG. **7**) along which the adjoining edges of the wrapper of the rod are secured, so that any adhesive which may ooze out of the lap will tend not to touch the tube. Moreover, the three recesses allow the rod to bulge outwards slightly into the recesses in the event of the diameter of the rod becoming momentarily larger than normal.

The outer tube **4** includes a flange **4A** by which the tube is secured in a bore in a housing **30** (see FIG. **6**). The angular position of the tube is determined by a pin **32** (see particularly FIG. **9** but also FIGS. **3** and **4**) which engages in a notch **4B** in the flange. Similarly the inner tube has a flange **2A** which is formed with a notch **2B** in which the pin **32** engages to determine the correct orientation of the inner tube about its axis.

During use, the inner tube is held in position by a screw **34** which has a threaded shank screwing into the casing **30,** a slotted head **34A** and a flange **34B** which has a larger diameter than the head. In order to remove the inner tube, the screw **34** is screwed partly out of the casing **30,** so that the flange **34B** engages the flange **2A** of the tube to displace the tube axially; when the tube has moved far enough for the notch **2B** to be clear of the pin **32,** the tube can be rotated in a clockwise direction until a flat cut away part **2C** of the flange is aligned with the screw, whereupon the tube can be pulled axially all the way out of the outer tube. When the inner tube (or a similar tube with different internal dimensions) is placed into the outer tube, it must first be pushed into the tube with an orientation such that the flat **2C** on the flange can pass the head **34A** of the screw, until the flange **2A** of the tube engages the flange **34B,** after which the tube is twisted to a position in which the notch **2B** is aligned with the pin **32,** and the tube can then be pushed all the way into position by screwing in the screw **34.**

Before the inner tube can be removed from the outer tube, a cover piece **36** (FIG. **9**) is swung in an counter-clockwise direction about a pivot **38** against the action of a torsion spring **39** to carry the cover piece to the chain-dotted position. The cover piece includes a conical mouth **36A** which helps to guide the continuous rod **12** initially into the rod guide when the machine is started.

As shown in FIG. **6**, there is a passage **40** in the housing **30** through which compressed air is fed during use to an annular space **42**. From this annular space **42** air can flow through an opening **44** in the flange of the outer tube (see also FIG. **3**) and into an oblique passage **46** through the flange of the inner tube, so that the air from the passage **46** is directed towards the lap of the wrapper, thus helping to cool and clean the lap joint. Air also passes from the annular space **42**, via a top slot (aligned with the opening **44**) and through side slots **48** and **50** in the outer tube (FIGS. **1** and **3**) and into an annular space **52** (FIG. **6**) through which the air flows towards the windows. From the annular space **52** the air flows through two side channels **54** and **56** (FIG. **7**) defined by the outer tube and by recesses **58** and **60** in the outer surface of the inner tube, as shown in FIG. **5**. From the channels **54** and **56** the air blows in through the windows **20** and **22** of the inner tube and then passes between the inner tube and the rod so as to clear away any tobacco or other particles caught in the inner tube.

As shown in FIG. **11**, a shutter plate **62** lies with its lower end covering the radiation source **8** when the system is not in use, thus preventing any excessive escape of radiation. When the machine is started, a solenoid **64** is energised and pulls up a tube **66** which is connected to the plate **62**, thus raising the lower end of the plate **62** above the radiation source. When the solenoid is de-energised the shutter plate falls downwards with the aid of a spring **68**. A bar **70** carried by a post **72** connected to the shutter plate has faces **70A** and **70B** bearing legends indicating whether the shutter is SHUT or OPEN, these legends being visible through a magnifying window **74**.

The correct operation of the scanning system can be checked by inserting into the rod guide an artificial cigarette **76** (see FIG. **10**) made, for example, of aluminium. When the artificial cigarette is in the rod guide, the weight reading on a dial (not shown) can be checked to see that it gives the correct reading for the artificial cigarette, assuming that the system is operating correctly. The artificial cigarette is made in one piece including a head **76A** a slot **76C** engages the pin **32** to ensure the artificial cigarette is in the correct position. Before the artificial cigarette can be inserted, the cover piece **36** must be lifted, and after the cigarette is inserted, a shoulder **36B** (FIG. **9**) on the cover piece **36** engages the head **76A** of the artificial cigarette to hold the artificial cigarette in position. When the artificial cigarette is placed in position, a projection **76B** on the head **76A** depresses a plunger **78** against the action of a spring **80** so as to operate a switch **82** which energises the solenoid **64** so as to lift the shutter plate **62** and thus allow the scanning system to operate automatically. When the artificial cigarette is removed, the solenoid **64** is automatically de-energised and the shutter moves down to close the radiation source. Thus the radiation source is at all times covered, except when the rod-making machine is operating or when there is an artificial cigarette in the rod guide.

I claim:

1. A rod guide assembly for a scanning system of a cigarette making machine, comprising a fixed tubular member containing a substantially coaxial removable rod guide member having integral internal portions arranged to support the cigarette rod upstream and downstream of a scanning region in which a radiation beam is passed through the rod through aperture windows formed in the rod guide member and through aligned air-impervious windows formed in the fixed tubular member on opposite sides of the rod guide member, and including means defining at least one passage extending between the fixed tubular member and the rod guide member through which air passes during use along the outside of the rod guide member and inwards through the windows of the rod guide member to blow out tobacco or other particles which may be caught between the rod and the rod guide member.

2. A rod guide assembly according to claim **1**, including means defining a passage through which air blows during use on to the lap joint along which the edges of the cigarette wrapper are joined.

3. A rod guide assembly according to claim **2** in which the passage through which air blows on to the lap joint is at the upstream end of the rod guide member.

4. A rod guide assembly according to claim **3** in which the passage through which air blows on to the lap joint directs the air obliquely in an upstream direction so as to clean the lap joint before it enters the rod guide member, in addition to cooling it.

5. A rod guide assembly according to claim **1** in which the outer tube has a substantially smooth cylindrical inside surface, while the rod guide member is externally shaped to provide recesses which, together with the internal surface of the outer tube, define passages through which the air flows towards the windows.

6. A rod guide assembly according to claim **1** in which the rod guide member is formed, both upstream and downstream of the scanning region, with circumferentially spaced internal lands which are intended to fit closely around the cigarette rod and are separated by longitudinally extending recesses.

7. A rod guide assembly according to claim **6** in which one of the recesses in the rod guide member lies over the lap joint of the cigarette rod.

8. A rod guide assembly according to claim **7** in which there are three lands at 120° intervals around the rod.

9. A rod guide assembly according to claim **1** in which the rod guide member comprises a tube which is inserted into position from the upstream side of the rod guide assembly.

10. A rod guide assembly according to claim **9** in which the tube is formed with a slot which extends axially inwards from the downstream end of the tube and has a relatively wide part which forms the windows of the rod guide member.

11. A rod guide assembly for a scanning system of a cigarette making machine, comprising a rod guide member for supporting the cigarette rod during scanning, and an artificial cigarette adapted to be inserted into the rod guide member to check the correct operation of the scanning system, switch means for sensing

the presence of the artificial cigarette in the rod guide member, a shutter which is automatically moved by said switch means to allow a radiation beam to be passed through the artificial cigarette, and means to automatically return said shutter to a position in which it stops the radiation beam when the artificial cigarette is withdrawn from the rod guide member.

12. A rod guide assembly for a scanning system of a cigarette making machine, comprising a fixed outer tubular member of radiation impervious material having a window formed on diametrically opposite sides therein for the passage of a radiation beam therethrough for scanning a cigarette rod passing through the said outer tubular member, and a removable inner tubular member slideably mounted coaxially within the said outer tubular member and having windows formed therein in alignment with the windows of the fixed outer tubular member, the inner tubular member being formed internally with integral cigarette rod supporting lands protruding inwardly immediately upstream and downstream of the windows so as to fit closely around the cigarette rod, said lands being separated by longitudinally extending recesses so as to be spaced at **120°** intervals around the rod.

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