Aug. 14, 1956 D. W. MOLINS 2,759,108

MACHINES FOR MANIPULATING CUT TOBACCO

Filed Oct. 16, 1952

4 Sheets-Sheet 1

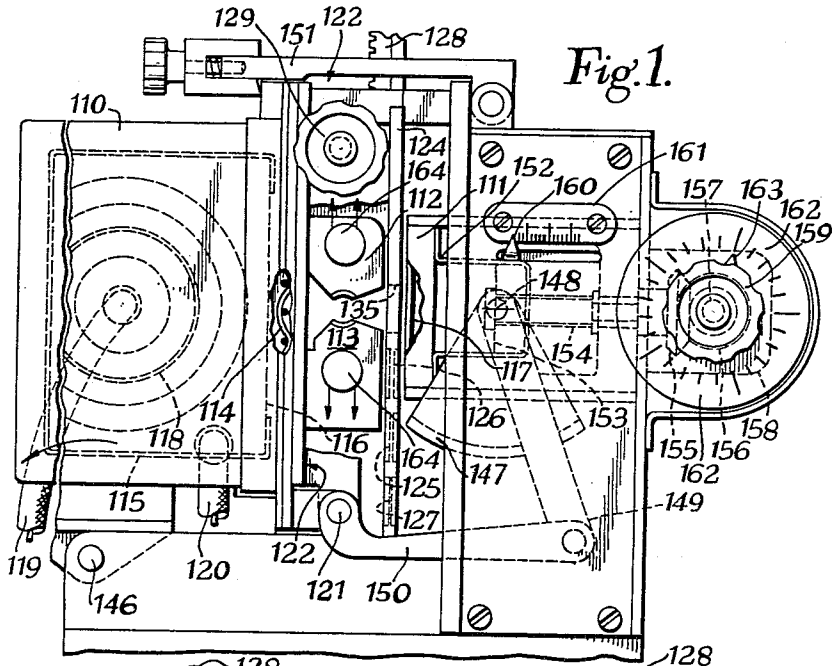


Fig. 1.

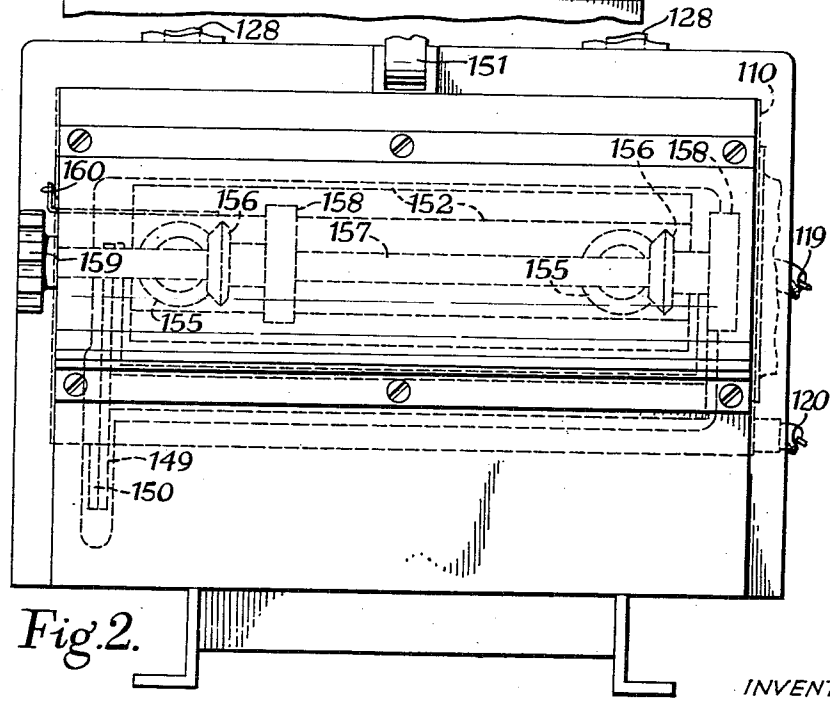


Fig. 2.

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Filed Oct. 16, 1952 4 Sheets-Sheet 2

Fig.3.

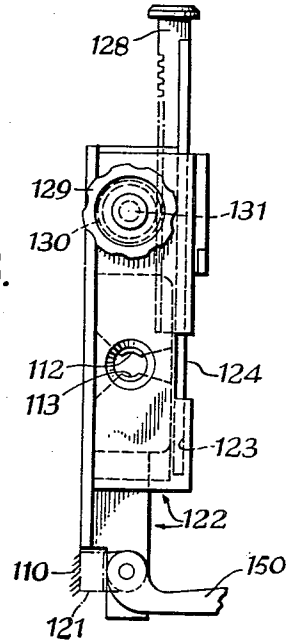
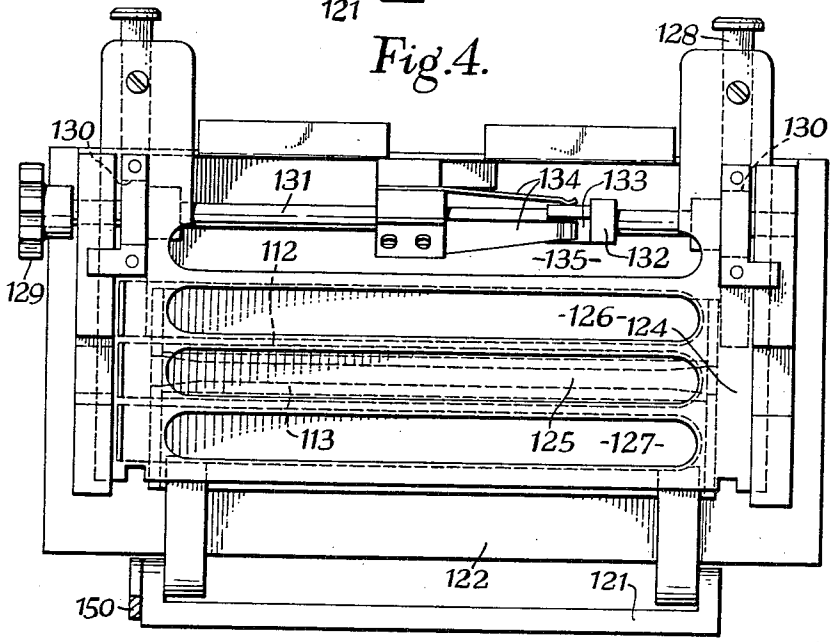


Fig.4.



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MACHINES FOR MANIPULATING CUT TOBACCO

Filed Oct. 16, 1952 4 Sheets-Sheet 3

Fig. 5.

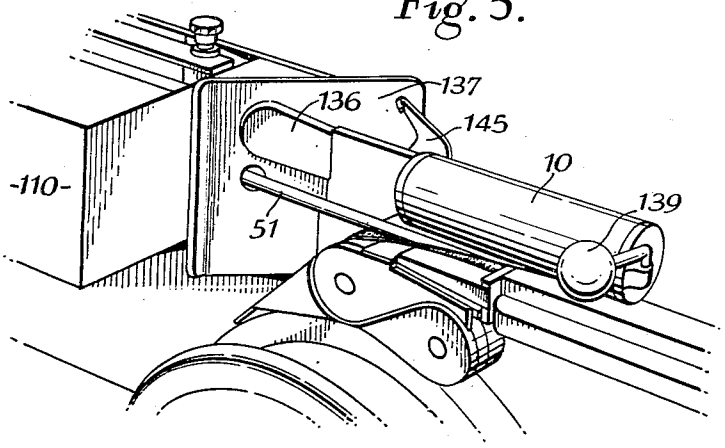
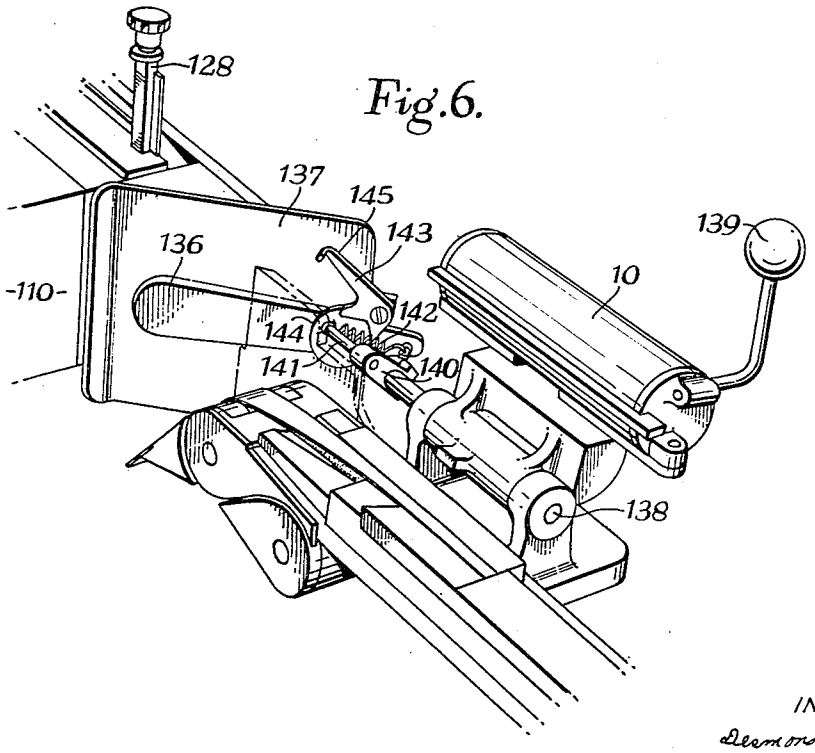


Fig. 6.



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Aug. 14, 1956 D. W. MOLINS 2,759,108

MACHINES FOR MANIPULATING CUT TOBACCO

Filed Oct. 16, 1952 4 Sheets-Sheet 4

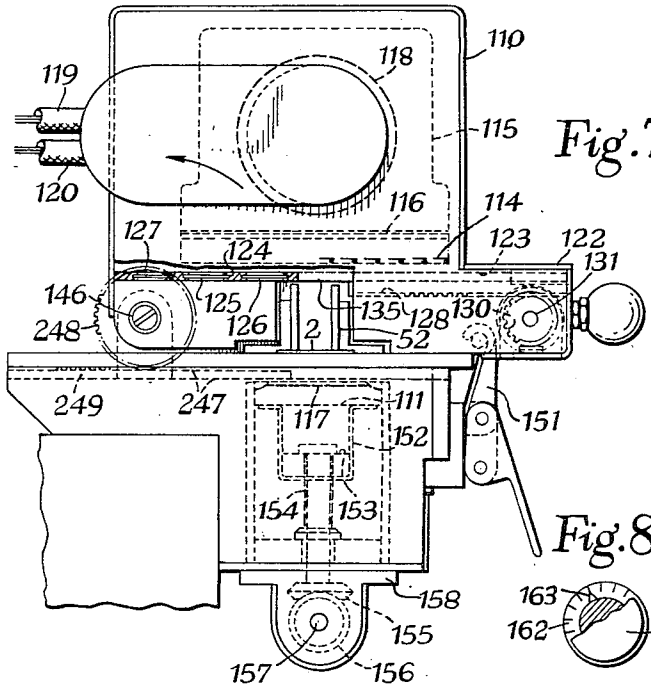


Fig. 7.

Fig. 8.

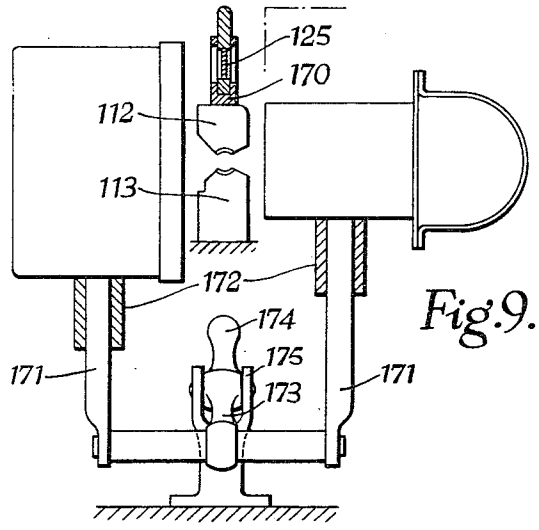


Fig. 9.

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United States Patent Office 2,759,108 Patented Aug. 14, 1956

2,759,108

MACHINES FOR MANIPULATING CUT TOBACCO

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Application October 16, 1952, Serial No. 315,022

Claims priority, application Great Britain October 25, 1951

6 Claims. (Cl. 250—83.6)

This invention concerns improvements in or relating to machines for manipulating cut tobacco.

It has already been proposed in United States applications, Serial No. 303,636, filed August 11, 1952, and Serial No. 304,412, filed August 14, 1952, to employ a beta-ray device in such a machine (in that case a cigarette machine) for the purpose of measuring the mass of tobacco occupying a given space.

With apparatus of this kind it has so far been assumed that the apparatus is constant in its operation and the only variable is the quantity of tobacco passing, but it is desirable that a user shall be able to make periodic checks on the functioning of the apparatus so that if anything has gone wrong with the apparatus he will be speedily apprised of the fact.

According to the invention there is provided in or for a machine for manipulating cut tobacco, apparatus comprising a radio-active source and a device responsive to emissions from said source disposed on opposite sides of a wrapped cigarette rod moving through the machine, whereby currents are set up in the ionisation chamber by radiations passing through the tobacco so that the mass of tobacco in the chamber at any given instant can be measured, and means for substituting at desired times a known mass between the source and the chamber for the purpose of checking the performance of the apparatus. Several known masses may be arranged in a frame, the masses offering different resistances to the penetration of the rays and means is then provided for moving the frame so as to bring any one of the known masses into the path of the rays. The said known masses may take the form of thin metal screens and, for example, there may be three, the middle one offering a resistance equivalent to that offered by a tobacco rod or filler of the desired mass while the other two offer resistances of, say, 96% and 104% of this value. In order to position the frame for use the frame may be attached to the chamber and slidable in guides so that the chosen mass may be brought into the path of the rays. As the frame is movable between ray source and chamber it is necessary to stop the passage of the tobacco rod while the checking is done and sundry details described later are provided for this purpose.

In a convenient form which will be described later, the chamber is hinged so that it may be swung away from the source to allow inspection of the frame, later termed the screen frame, and in this case a movable shutter may be provided which is operated by the movement of the chamber so as to cover the window of the ray source and prevent harmful radiations passing to the air.

In an alternative arrangement which may be used without interfering with the performance of the machine a frame having one or more known masses may be fixed above the level of the stream and the ray source and, if necessary, the chamber moved at times (e. g. automatically) to enclose a known mass between them. As the ray source emits rays through a narrow gap while the chamber has a much larger ray receiving area, the question of whether the chamber must be moved as well is purely one of design for if the stream guides or like are small, only the ray source need be moved. In this case the known mass is substituted for the moving tobacco stream, without having to stop the machine or divert the path of the tobacco stream.

The invention will be more fully described with reference to the accompanying drawings in which:

Figure 1 is an end elevation showing the mounting of an ionisation chamber and ray source and associated devices for manipulating the chamber and source, some parts being omitted.

Figure 2 is an elevation looking at the right-hand side of Figure 1.

Figure 3 shows parts omitted from Figure 1.

Figure 4 is an elevation looking at the right-hand side of Figure 3.

Figure 5 is a perspective view of part of a cigarette making machine looking down at the cigarette rod just before it is cut into cigarettes.

Figure 6 is a view similar to Figure 5 with some parts in a different position.

Figure 7 is an end elevation of an arrangement differing in some respects from that shown in Figure 1.

Figure 8 is a detail appertaining to Figure 7.

Figure 9 is a diagram of a modified arrangement.

Referring first to Figures 1 and 2, these views show the arrangement used with the wrapped cigarette rod. A length of rod of about 6" is scanned and for this purpose an ionisation chamber contained in a casing **110** is supported at one side of the filler or rod and a ray source contained in a box **111** at the other side.

Rod guides **112** and **113** are provided which are so shaped that only the center part of the rod is scanned, to avoid any errors which might occur if the whole rod were scanned as the rod is liable to move up and down slightly. By this arrangement there is as small a change as possible in the length of tobacco through which the rays pass.

As will be seen from Figure 5, the chamber and source are located just beyond a heater **10** which seals the overlap of the paper of the cigarette rod **51**.

The chamber casing **110** has a wire mesh guard **114** over its open side. Inside the casing is an inner casing **115** which constitutes the ionisation chamber and has a thin metal window **116** through which the rays can pass. The chamber also functions as one electrode of the device. The box **111** is similarly provided with a window **117** through which rays can pass. Inside the ionisation chamber **115** is an inner electrode **118**. The chamber is hermetically sealed and contains air. Cables **119** and **120** connect the two electrodes to the electrical apparatus by which the chamber currents are amplified.

Referring now also to Figures 3 and 4, at the lower edge of the chamber casing **110** where it faces the ray source in box **111** there is provided a hinge bracket **121** to which is pivotally attached a holder **122**, hereafter called a screen holder. The hinge bracket is shown hanging down from its pivot for clearness in Figures 3 and 4, but its proper position with relation to the casing **110** is shown in broken lines in Figure 3. The screen holder has grooves **123**, Figure 3, in it in which a screen frame **124**, comprising three screens **125**, **126** and **127** respectively, Figure 4, can slide. The screen holder is broken away in Figure 1 to show inner parts. Normally the screen holder lies against the face of the chamber casing **110**, as in Figure 1, so that the screens are facing the ray source. The screen frame is slid up and down the grooves of the holder by means of rods **128** at each side of the frame which are provided with rack teeth, as shown in Figure 3, and engage pinions **130** on

a small shaft 131 journalled across the screen holder 122 and provided with a knob 129 by which it can be rotated. On the shaft 131 there is fixed a cam or detent device consisting of a cylinder 132 on which three flats 133 have been worked, each flat being a chord of the original circular section. These flats co-operate with stiff flat springs 134, fixed to the holder 122 so that as the knob 129 is rotated and the frame is slid up and down by the pinions and racks, the cam 132—133 rotates and the engagement of the flat springs with the flats on the cam provides a detent which will hold the screen frame in a definite position when the knob 129 is released.

The screen frame comprises a series of apertures for example, three, the middle one of which has a thin metal covering or screen 125 which is equivalent in absorption to the desired tobacco mass while the apertures above and below the middle one are provided with a thicker screen 126 and a thinner one 127 respectively. The thickness chosen depends on circumstances and the requirements of users, but conveniently the upper one 126 offers the same resistance to the passage of rays as a tobacco rod 4% denser than normal would offer while the lower one 127 offers a resistance of 4% less than the normal rod. These screens may be made of Duralumin. There is a fourth aperture 135 without a screen.

In use the apparatus is operated with the fourth aperture in line with the rod and, referring now to Figures 5 and 6, if it is desired to check the functioning of the whole control apparatus the cigarette rod 51 is deflected by manipulation by the operator in the known manner and the passage through the rod guides 112 and 113 is closed by a pivoted shutter 136 whereafter the moving rod is turned aside by an oblique guard plate 137. The screen frame is then moved to bring any desired screen into line with the ray source and a reading on a meter associated with the amplifying devices is taken. Also, if a tape record is being made, the position of the pen on the web or the resultant curve may be noted. When the attendant is satisfied that the apparatus is functioning properly he lifts the shutter 136 to permit the rod to pass through in the ordinary manner and shifts the screen frame back to the fourth aperture position, so that aperture 135 is between the rod and the ray source.

When a machine is being started at the beginning of a run the heater 10 is lifted from the rod engaging position in the usual manner and this movement is utilised to move the shutter 136 automatically to close the passage through the guides 112 and 113 so that rubbish does not accumulate in the guides. For this purpose the pivot or rod 138 on which the heater 10 is supported is fixed to the operating handle 139 of the heater so as to rotate when the heater is swung up or down. At the end nearer to the beta-ray device the pivot rod 138 is provided with a crank 140 at the end of which is a pin 141 to which a spring 142 is attached. The other end of the spring is attached to the pivoted shutter, at one side of the pivot. The upward movement of the heater relaxes the spring and the shutter will drop by gravity to the closed position, see Figure 6.

Assuming the machine is running and a test is desired, the operator breaks the rod and as the heater 10 is down and the spring 142 stretched, the shutter is pushed down manually and held closed by a small catch 143 which engages a notched plate 144 attached to the shutter 136. When the test is over the operator trips the catch by a handle 145 and the shutter swings up, under the tension of the spring 142, to expose the passage.

The chamber casing 110 is pivotally mounted at 146 so that it can be swung in the direction of the arrow, Figure 1, to bring its operative face horizontal and facing upwards, and the consequence of such a movement is that the beta-ray source is emitting rays into the atmosphere and in a direction where they are likely to strike the operator. As a precaution against such an event there is provided an arcuate flap 147 which is pivoted to the ray source at 148 and operated so that in one position the source is exposed while in the other position the window of the source is closed by the flap. A lever 149 is attached to the arcuate flap and connected by a link 150 to the hinge 121 between chamber and holder in such manner that as the chamber casing is opened, the lever is swung and the flap 147 moves up to cover the window 117 of the ray source. When the chamber casing 110 is closed the flap is lowered. The chamber casing is held in the closed position by a clamp 151.

The ray source is adjustable towards and away from its ionisation chamber and for this purpose, see Figures 1 and 2, the box 111 has fixed thereto a bracket 152 whose rear comprises a thick plate 153 which is threaded to receive two rotatable screws 154. These screws are fixed to bevel gear wheels 155 which are rotated by other bevel gear wheels 156 fixed on a shaft 157 journalled in bearings 158. A hand knob 159 is fixed to the shaft 157 and when the knob is rotated the box 111 is moved to and fro. A pointer 160 fixed to the bracket 152 travels over a scale 161 and subdivisions of the scale measurement are afforded by a dial 162 marked into suitable divisions, against which moves a pointer 163 fixed to the knob.

Where measurement is made on a wrapped rod, it has been found necessary to provide heaters, shown at 164 Figure 1, which may be thermostatically controlled, in order to prevent condensation in the device due to moisture from the freshly sealed seam of the cigarette paper.

Referring now to Figure 7, this shows an arrangement suitable for use where a loose filler carried on a tape is to be measured. In the figure a flat tape 2, which is loaded with tobacco (not shown) is moved between guides 52 and the chamber 110 is above and the ray source 111 is below the tape. The general arrangement of screens, the adjustment of the source and several other details are so obviously similar to those in Figure 1 that no description is necessary since the parts having substantially the same construction in both arrangements carry the same references. The principal difference is that the screen frame 124 slides horizontally and instead of the flap 147 there is provided a sliding shield marked 247. The chamber 110 and the associated extension comprising the screen holder 122 are pivoted at 146 and to the pivots are fixed toothed wheels 248 which engage racks 249 formed on the shield 247. Thus as the chamber 110 is swung about its pivot 146 the shield 247 is moved to and fro to cover and uncover the ray source.

The same detent device is used to determine the screen frame position as before and the knob for rotating the shaft 157 has the same pointer and dial arrangement 163—162 associated with it as shown in Figure 8. Further, the ray source adjustment comprises a pointer and scale as before.

The arrangements described are very satisfactory for the purpose in view but supposing it is desired to check the device by a screen without stopping manufacture, an arrangement such as that shown in diagram form at Figure 9 may be employed. Here the guides 112 and 113 are fixed in any desired way to the machine bed and a bracket 170 with a single screen marked 125 dropped into it is fixed on the guide 112. The screens can be interchanged readily in this way, or of course a screen frame with several screens can be pivoted or slidable to bring a desired screen into position.

The chamber and source are carried on rods 171 slidable in guides 172 and they can be lifted to the checking position by a double-armed hand lever 173—174 pivoted to a bracket 175. Obviously the movement can be obtained from a cam instead of a hand lever so that the checking of the device takes place at regular periods.

What I claim as my invention and desire to secure by Letters Patent is:

1. Apparatus for use in a tobacco manipulating machine which latter comprises means to form a tobacco stream and thereafter manipulating said stream and enclosing it in paper to form a wrapped rod moving through the machine, a radio-active source and a device responsive to emissions from said source disposed on opposite sides of the rod whereby currents are set up in the responsive device by radiation passing through the rod and are utilized to measure the mass of the rod passing between said source and said responsive device, the said apparatus comprising the combination of a component of known mass, and means for effecting relative movement between said component of known mass and said source to cause the said component to be interposed in substitution for the rod in the space between the said source and the said responsive device and means to prevent the passage of the rod through the space aforesaid when a component of known mass is interposed therein, said means comprising an apertured plate and a shutter to cover the aperture, the said plate being arranged obliquely to the rod axis and serving to deflect the rod when the shutter is closed.

2. Apparatus according to claim 1 having a frame supporting the component of known mass, combined with guides in which the frame is movable into and out from the space aforesaid.

3. Apparatus according to claim 1 having a frame supporting the component of known mass, combined with guides in which the frame is movable, the said guides being positioned to guide the frame in a straight line path into and out from the space aforesaid and transversely with respect to a direct path between the said source and responsive device.

4. Apparatus according to claim 1 having a frame supporting the component of known mass, combined with guides which are carried by the said responsive device and in which the frame is movable into and out from the space aforesaid.

5. Apparatus acording to claim 1 having a frame supporting the component of known mass, combined with guides in which the frame is movable into and out from the space aforesaid, and a member supporting the said source and said guides.

6. Apparatus according to claim 1 in which the component of known mass is one of several such masses offering respectively different resistances to the penetration of the emissions from said source, and the several masses are mounted in a frame which is combined with means to guide it in the space between the said source and the said responsive device and so to locate it that any desired one of such masses can be brought into the path of the said emissions.

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