

May 26, 1942.

C. BEST

2,284,117

TREATMENT OF CIGARETTES

Filed May 20, 1938

3 Sheets-Sheet 1

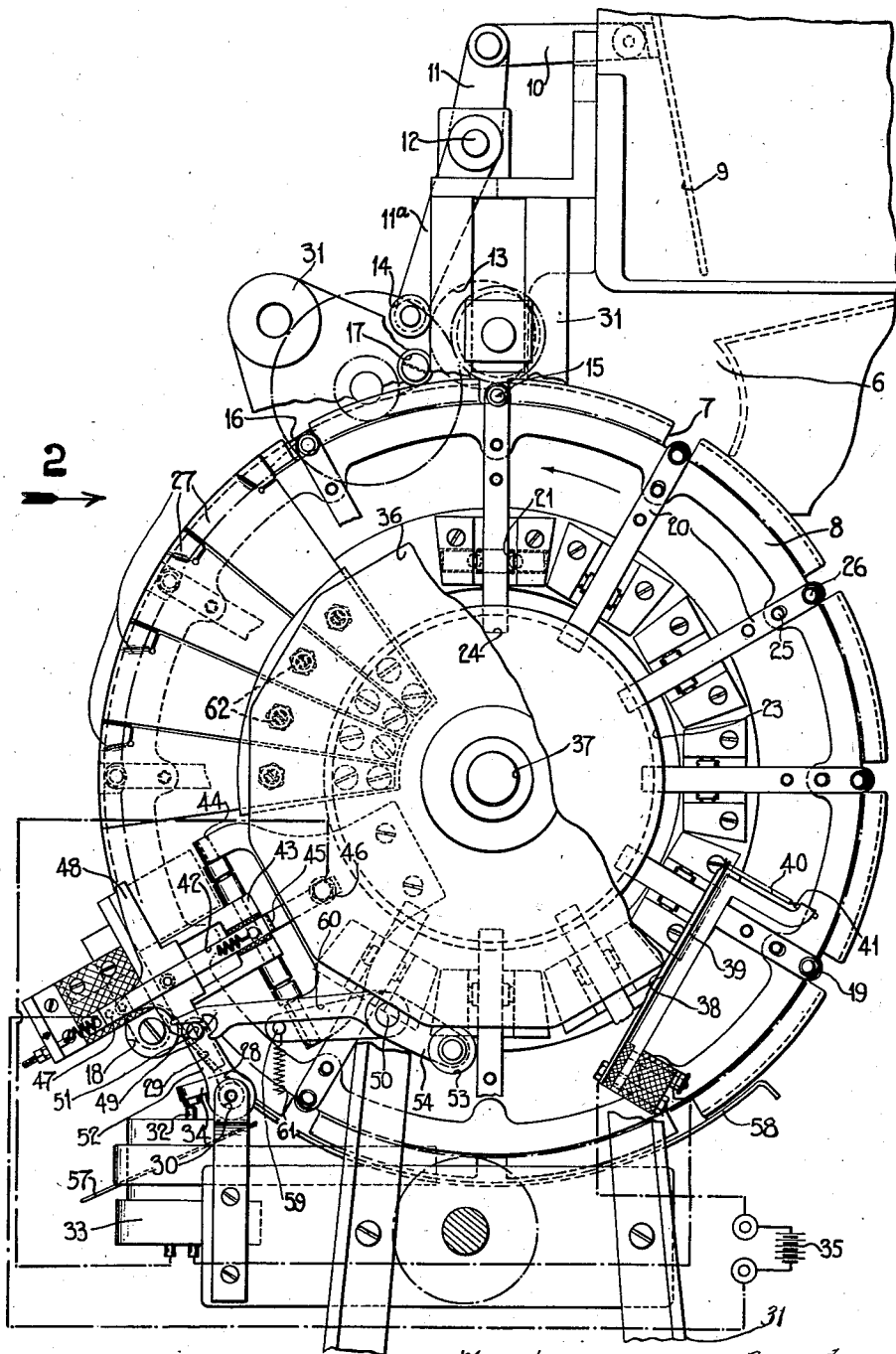


Fig. 1.

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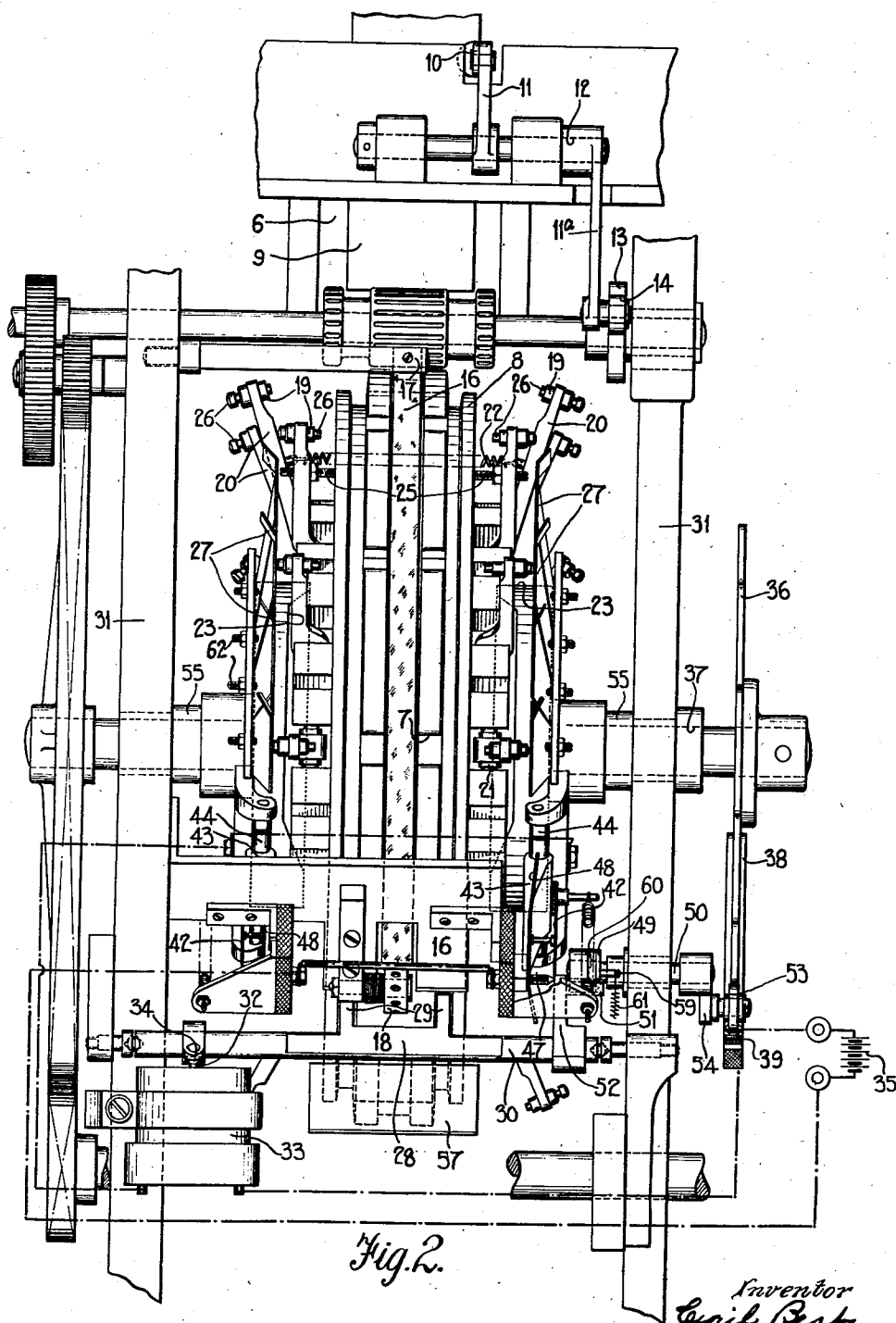
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

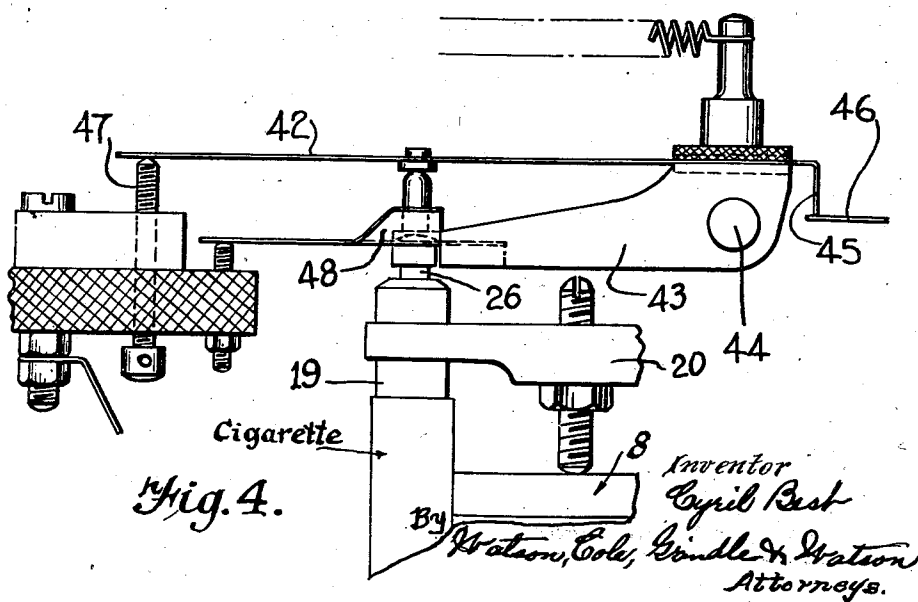
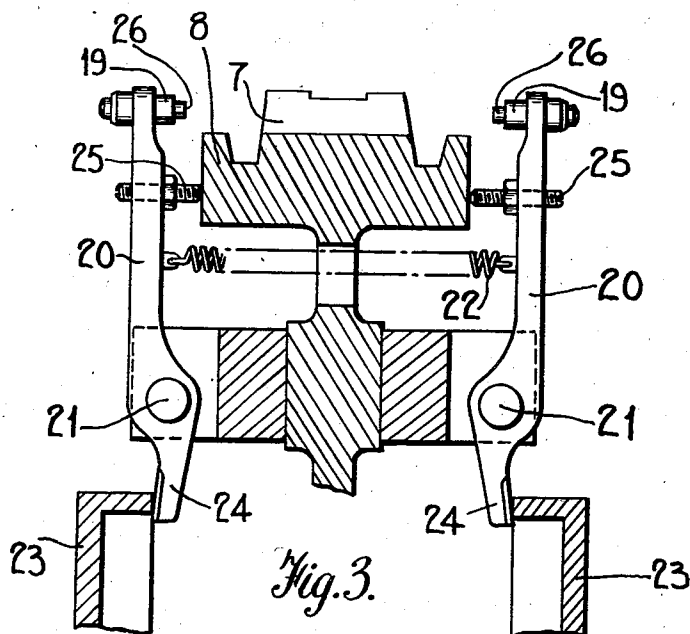
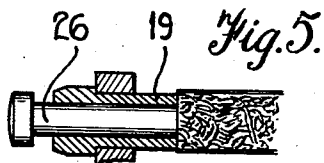


Fig. 4.

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UNITED STATES PATENT OFFICE

2,284,117

TREATMENT OF CIGARETTES

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Application May 20, 1938, Serial No. 209,138
In Great Britain June 3, 1937

11 Claims. (Cl. 131-21)

This invention is for improvements in or relating to the treatment of cigarettes, and has for its object to provide means whereby tobacco at the ends of cigarettes may be compressed and to provide means to feel the ends of the cigarettes to determine whether or not the ends are sufficiently hard.

It is sometimes found in the production of cigarettes that portions of tobacco protrude beyond the ends of the paper tubes enclosing the tobacco core, such portions of tobacco spoiling the appearance of the finished cigarette and being objectionable in that they sometimes become separated from the end of the cigarette whilst it is being smoked and enter the smoker's mouth.

It has been proposed in prior United States Letters Patent No. 1,977,239 to test the ends of cigarettes to determine whether or not the ends are too soft, the mechanism for this purpose comprising a pair of feelers arranged to engage the opposite ends of each cigarette, at least one feeler of each pair being yieldingly mounted to move inwardly towards the other, means to deliver one cigarette at a time between the feelers, and means for releasing the cigarette from the feelers at a different time and/or place according to the movement of the yielding feeler when the particular cigarette is being tested.

According to the present invention there is provided a device for compressing the tobacco at the ends of cigarettes, comprising a pair of presser elements (e. g., heated presser elements) arranged to engage the opposite ends of a cigarette, said elements being yieldingly mounted to move inwardly towards each other, means to deliver cigarettes one at a time between the presser elements, and means to arrest the inward movement of the presser elements after they have moved a predetermined distance.

The presser elements (for example, a plurality of pairs of presser elements) may be supported by a movable carrier, (for example, a rotatable carrier), each presser element of a pair being pivoted to the carrier and urged (e. g., resiliently urged) towards the other element of a pair, and a cam may be provided to move the elements of a pair away from each other to permit a cigarette to be introduced between the elements or to relieve the pressure exerted by the pressure elements.

For the purpose of testing the ends of a cigarette a feeler element may be provided to co-operate with each presser element, the feelers being arranged to engage the ends of a cigarette while the pair of presser elements between which the cigarette is located are closest together. The feelers may be movable with the presser elements and relatively thereto, and for this purpose may be located in an aperture formed in a presser element, the aperture having an outlet in that

face of the presser element which engages the end of a cigarette to permit the feeler to project from the cigarette engaging face of the presser element and means (e. g., yielding means) may be operative in timed relationship with the movement of one presser element of a pair towards the other element of the pair to effect movement of the feeler relatively to the presser element.

Apparatus constructed according to the invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a side elevation of apparatus constructed in accordance with the invention, some parts being broken away.

Figure 2 is an end elevation of Figure 1 looking in the direction of the arrow 2.

Figures 3 and 4 show details of the mechanism shown in Figures 1 and 2.

Figure 5 is a view of a presser element and a feeler engaging the end of a cigarette and is drawn to an enlarged scale.

Like reference numerals refer to like parts throughout the specification and drawings.

Referring to the drawings, a quantity of cigarettes which are to be tested are contained in a hopper 6 and are fed therefrom in known manner one at a time and delivered into flutes 7 formed in a rotatable carrier 8. The cigarettes in the hopper 6 are slightly agitated by a plate 9 which is connected with an arm 10, the latter being in turn connected with an arm 11 mounted on a spindle 12 and oscillated about its pivot by a cam 13 which co-operates with a cam follower 14 connected with a further arm 11a also mounted on the spindle 12. Although the cigarettes are shown in the drawings as being fed from a hopper 6, it is to be understood that if desired the cigarettes may be delivered directly from the continuous rod line of a continuous rod cigarette making machine, in which case the cigarettes may be deflected out of the continuous rod line and delivered to the flutes 7 in the manner shown in Figure 1 of United States Letters Patent No. 1,977,239.

The flutes 7 formed in the drum 8 are, as can be seen from the drawings, of substantially rectangular cross-section, and the carrier 8 is rotated in the direction of the arrow shown in Figure 1. The cigarettes are delivered to the flutes of the rotatable carrier just before a flute of the carrier occupies the position indicated by the reference numeral 15, see Figure 1. As the carrier rotates after receiving a cigarette, the cigarette is passed beneath a thin spring steel band 16, one end of which is anchored at 17, whilst the opposite end is adjustably anchored at 18. The arrangement of the flexible strip 16 is similar to that described in United States application Serial No. 210,977 and operates to re-

tain a cigarette against the bottom wall of a flute 7 and also against the rear wall of the flute, that is, the rear wall considered in the direction of movement of the rotatable carrier, in order to locate the cigarette for engagement by presser elements about to be described.

Each cigarette which is delivered to the rotatable carrier 8 is arranged to be engaged by a pair of presser elements 19, (see Figures 2, 3 and 5), the presser elements of a pair being arranged on opposite sides of the carrier 8 and supported by arms 20, each of which is pivoted at 21 to the rotatable carrier 8 so as to be movable with the carrier 8. Each arm 20 of a pair is resiliently connected with the other by a spring 22 which as can be seen from Figures 2 and 3 tends to urge the presser elements 19 towards each other. A pair of stationary cams 23 which are fixed to bushes 55 mounted in the side frames 31 are arranged to engage with tail pieces 24 provided on the arms 20 and operate to turn the arms 20 about their pivots 21 so as to release the pressure on the ends of a cigarette at the appropriate moment. Each of the arms 20 is provided with an adjustable stop 25 which engages with the side faces of the rotatable carrier 8 and determines the distance by which the arms 20 can move inwardly towards each other and thereby determines the amount by which the tobacco at the ends of a cigarette is pressed inwardly.

The cross-sectional area of a presser element 19 is slightly less than that of a cigarette, so that when the presser members of a pair move towards one another to compress the tobacco at the ends of the cigarettes, the paper tube enclosing the tobacco core is not crushed.

By the arrangement just described the presser elements 19 are operated so as to press in the tobacco of the ends of a cigarette, of even those cigarettes which are relatively hard, and as stated above, the stops 25 determine the inward distance to which the presser elements are moved. By this means the distance between the compressed ends of a cigarette is always the same. It will, of course, be appreciated that the tobacco at the ends of the cigarettes is not compressed to any great extent, but that the ends are pressed so that the tobacco core is compressed for a short distance into the interior of the paper tube enclosing the core, and it is found that when the presser elements are opened so as to disengage the ends of a cigarette, the compressed tobacco has some resiliency which causes the tobacco to move lengthwise of the cigarette and towards the ends thereof.

In order to test the cigarettes and for the purpose of discovering cigarettes, the ends of which are too soft, feelers 26 are provided to engage with the tobacco at the ends of the cigarettes after the latter have been compressed by the presser elements 19. The feelers 26 are slidably disposed in apertures which extend through the presser elements 19, the aperture in a presser element being provided with an outlet on that face of the presser element which engages an end of a cigarette. The feelers 26 are arranged to be a good sliding fit in the apertures in the presser elements 19.

As the rotatable carrier 8 is rotated, the pairs of presser elements 19 which are engaging cigarettes pass between a number of thin spring plates 27 and the spring plates operate to press the feelers 26 against the compressed tobacco at the ends of the cigarettes. Preferably a number

of plates 27 instead of a single plate are used to permit adjustment as mentioned later.

If the ends of a cigarette are relatively hard, then the spring plates 27 are urged away from the rotatable carrier 8 by the feelers 26, since the pressure exerted by the spring plates 27 which may be adjusted by the screws 62, is so determined as not to be sufficient to press the feeler elements unduly against the compressed ends of the cigarette, that is the spring plates yield so the outer ends of the feelers which rub on the plates are not displaced. Should, however, the ends of a cigarette be soft, the feelers will under the pressure of the spring plates project into the ends of a cigarette and at a later stage will set in operation mechanism about to be described which mechanism separates the cigarette so detected as having a soft end from the remainder of the tested cigarettes.

The mechanism which is arranged to separate defective cigarettes from the remaining tested cigarettes comprises a plate 28 having a pair of projections 29 and is connected with a spindle 30 mounted for rotation in the frame 31 of the apparatus. The plate 28 is moved about the axis of the spindle 30 by a plunger 32 of a solenoid 33, the plunger 32 being arranged to engage with an arm 34 secured to the spindle 30. The solenoid 33 is operated in the following manner:

A battery 35 or other suitable source of electrical energy is arranged to energise a circuit which includes the solenoid 33, Figure 2, and the circuit is arranged to be completed in timed relationship with the movement of the pairs of presser elements 19 by a cam 36 which is secured to the shaft 37 to which the rotatable carrier 8 is also secured. The cam 36 engages with a spring plate 38, see Figure 1, and depresses the spring against a conductor 39 which supports contact element 40. The contact element 40 forms a part of a make and break contact of which the other part is constituted by an element 41. The make and break device is adjustably fixed to the frame 31 by a bracket, not shown.

In the circuit there are also included two further make and break contacts in parallel, a set being arranged at each side of the rotatable carrier 8, see Figure 2. Each make and break contact comprises a conductor 42 which is connected with a carrier 43 pivoted at 44 and which is provided with a tail 45 arranged continuously to engage with a further conductor 46. The other element of the make and break contact comprises the screw 47 and to the carrier 43 there is connected a plate 48 which is engaged by the feelers 26 in the manner indicated in Figure 4 and described below, if the ends of the cigarettes engaged thereby are not unduly soft, that is, in cases where the spring plates 27 yield instead of pressing said feelers inwards as in the case of soft ended cigarettes. Referring to Figures 1 and 4, it will be observed from the former figure that the plate 48 extends through an arc struck from the center of the shaft 37 for about 30° and from the latter figure it will be seen that the ends of the plate 48 are bent away from the side of the carrier 8 so that a feeler approaching the plate 48 as indicated gradually contacts therewith until when the head of the feeler is at the mid-distance of the plate the latter will be turned on the pivot 44 against the tension of the spring shown in these figures. The feelers engaging the plate 48 cause the carrier 43 to be turned about its pivot 44 and thereby to break the contact formed between the

conductor and contact member 47, thus interrupting the electrical current flowing through the circuit which latter is, at the time when the feeler engages the plate 48, completed by the cam 36. The interruption of the circuit by the feeler engaging the plate 48 has the result that the solenoid is not energised and the plate 28 is not moved so as to cause the projections 29 to extend into the path of the cigarettes.

If, however, a cigarette is found by a feeler 26 to have an unduly soft end, then the feeler will not operate to turn the carrier 43 about its pivot 44 and the electrical circuit will be completed and the plunger 32 of the solenoid will engage the projection 34 and cause the spindle 30 to rotate, thereby causing the projections 29 on the plate 28 to protrude into the path of the cigarettes at the time when the defective cigarette is to pass the position at which the projections 29 are located. As a make and break contact is arranged on each side of the rotatable carrier 8 it will be seen that if a cigarette has either one or both ends unduly soft it will be rejected as the circuit through the solenoid is always made if a feeler does not protrude far enough to separate one contact. The fixed cams 23 release the cigarettes from the presser elements 19 before they arrive at the position at which the projections 29 are located and so, if the projections are disposed in the path of a cigarette it will be separated from the remainder of the cigarettes and delivered to a position different from that to which the remaining tested cigarettes are delivered, for example, it rolls down a plate 57.

If the cigarettes are not defective they are carried by the flutes 7 of the carrier 8 past the position at which the projections 29 are located and are delivered to any suitable point. A curved shield 58 retains the cigarettes in the flutes until the discharge point is reached. When the spindle 30 is rotated so as to cause the projections 29 to protrude into the path of the cigarettes, a catch 49 which is mounted freely on a spindle 50 suitably mounted in bearings in the frame 31 is arranged to engage with a D shaped element 51, see Figure 1, formed on an arm 52 which is secured to the spindle 30. The catch, therefore, retains the projections 29 in position until the defective cigarette has been separated from the remainder of the tested cigarettes, but before the next succeeding cigarette carried by the rotatable carrier 8 arrives at the separating position the catch 49 is, unless the solenoid has again been operated because the next succeeding cigarette is also defective, arranged to release the D member 51 and the spindle 30 is returned to the position shown in Figure 1 by a spring. In order to permit the D-shaped member 51 to be released by the catch 49 the catch 49 is moved in an upward direction as seen in Figure 1 by a pin 59 on an arm 60 fixed to the spindle 50. The spindle 50 is turned about its axis by the cam 36 which engages with a cam follower 53 secured to an arm 54 connected with the spindle 50. A spring 61 returns the arm 54.

For convenience the circuits are shown throughout as dot and dash lines, while insulating material is indicated by cross hatching.

If desired, the presser element 19 may be heated in order to facilitate the compression of the ends of the cigarettes. The heating of the presser elements is in such cases preferably effected by the engagement of the presser elements with a heating surface at some suitable point during their rotation. It will, however,

be appreciated that too great a heat must not be employed or the tobacco at the ends of the cigarettes becomes too dry. The temperature must, of course, be determined by the moisture content of the tobacco in the cigarettes and the speed of operation of the apparatus, because if the heat is too great, in addition to the fact that the tobacco at the ends of the cigarettes will become too dry, juices from the tobacco will adhere to the presser elements and this must as far as possible, be avoided.

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

1. In a device for testing and compressing the tobacco at the ends of cigarettes, a pair of presser elements arranged to engage the opposite ends of a cigarette, said elements each being yieldingly mounted to move inwardly towards the other, means to deliver cigarettes one at a time between the presser elements, means to arrest the inward movement of the presser elements after they have moved a predetermined distance, a feeler co-operating with each presser element to engage the tobacco at the end of a cigarette and means to urge said feelers towards each other, said last named means becoming operative after the presser elements have been moved into the position at which they are closest together.

2. In a device for testing and compressing the tobacco at the ends of cigarettes, a pair of presser elements arranged to engage the opposite ends of a cigarette, said elements each being yieldingly mounted to move inwardly towards the other, means to deliver cigarettes one at a time between the presser elements, means to arrest the inward movement of the presser elements after they have moved a predetermined distance, a feeler co-operating with each presser element to engage the tobacco at the end of a cigarette, and means to urge said feelers towards each other, said last means becoming operative after the presser elements have been moved into the position at which they are closest together.

3. In a device for testing and compressing the tobacco at the ends of cigarettes, a movable carrier, a plurality of pairs of presser elements each of which is pivoted to the carrier and movable therewith, means to urge each presser element of a pair inwardly towards the other element of the pair, means to arrest the inward movement of the presser elements after they have moved a predetermined distance, a cam to move a presser element away from the other element of a pair, a feeler co-operating with each presser element to engage the tobacco at the end of a cigarette, and means to urge the feelers of a pair towards each other, said last named means being operative after the presser elements of a pair with which the feelers co-operate have been moved into the positions at which they are closest together.

4. In a device for testing and compressing the tobacco at the ends of cigarettes, a rotatable drum, a plurality of spaced peripheral flutes on said drum, each flute being of substantially rectangular cross-section and adapted to contain one cigarette, means to retain a cigarette against the rear wall and bottom of a flute, a plurality of pairs of presser elements each of which is pivoted to the drum for rotation therewith, means to urge each presser element of a pair inwardly towards the other element of the pair, means to arrest the inward movement of the presser elements after they have moved a predetermined distance, a cam to move a presser element away from the other element of a pair, a feeler co-

operating with each presser element to engage the tobacco at the end of a cigarette, and means to urge the feelers of a pair towards each other, said last named means being operative after the presser elements of a pair with which the feelers co-operate have been moved into the position at which they are closest together.

5. In a device for testing and compressing the tobacco at the ends of cigarettes, a pair of presser elements arranged to engage the opposite ends of a cigarette, said elements each being yieldingly mounted to move inwardly towards the other, means to deliver cigarettes one at a time between the presser elements, means to arrest the inward movement of the presser elements after they have moved a predetermined distance, a feeler slidably mounted in an aperture in a presser element to project from that face of the presser element which engages the tobacco at the end of a cigarette and means to cause the feeler to engage the tobacco at the end of a cigarette while the presser elements of the pair are closest together.

6. In a device for testing and compressing the tobacco at the ends of cigarettes, a movable carrier, a plurality of pairs of presser elements each of which is pivoted to the carrier and movable therewith, means to urge each presser element of a pair inwardly towards the other element of the pair, means to arrest the inward movement of the presser elements after they have moved a predetermined distance, a cam to move a presser element away from the other element of a pair, a feeler slidably mounted in an aperture in a presser element to project from that face of the presser element which engages the tobacco at the end of a cigarette, and means to cause the feeler to engage the tobacco at the end of a cigarette while the presser elements of the pair are closest together.

7. In a device for testing and compressing the tobacco at the ends of cigarettes, a pair of presser elements arranged to engage the opposite ends of a cigarette, said elements each being yieldingly mounted to move inwardly towards the other, means to deliver cigarettes one at a time between the presser elements, means to arrest the inward movement of the presser elements after they have moved a predetermined distance, a feeler co-operating with each presser element to engage the tobacco at the end of a cigarette, each said feeler being movable relatively to the presser element with which it cooperates, means to effect movement of the feelers toward each other after the presser elements have been moved into the positions at which they are closest together, and means dependent on the extent of the inward movement of the feeler to separate from the tested cigarettes those which are determined by the feeler to have soft ends.

8. In a device for testing and compressing the tobacco at the ends of cigarettes, a movable carrier, a plurality of pairs of presser elements each of which is pivoted to the carrier and movable therewith, means to urge each presser element of a pair inwardly towards the other element of the pair, means to arrest the inward movement of the presser elements after they have moved a predetermined distance, a cam to move a presser element away from the other element of a pair, a feeler co-operating with each presser element to engage the tobacco at the end of a cigarette, each said feeler being movable relatively to the presser element with which it cooperates, means to effect movement of the feelers toward each

other after the presser elements of a pair have been moved into the positions at which they are closest together and means dependent on the extent of the inward movement of the feeler to separate from the tested cigarettes those which are determined by the feeler to have soft ends.

9. In a device for testing and compressing the tobacco at the ends of cigarettes, a pair of presser elements arranged to engage the opposite ends of a cigarette, said elements each being yieldingly mounted to move inwardly towards the other, means to deliver cigarettes one at a time between the presser elements, means to arrest the inward movement of the presser elements after they have moved a predetermined distance, a feeler slidably mounted in an aperture in a presser element to project from that face of the presser element which engages the tobacco at the end of a cigarette, means to cause the feeler to engage the tobacco at the end of a cigarette while the presser elements of the pair are closest together and means dependent on the extent of the inward movement of the feeler to separate from the tested cigarettes those which are determined by the feeler to have soft ends.

10. In a device for testing and compressing the tobacco at the ends of cigarettes, a movable carrier, a plurality of pairs of presser elements each of which is pivoted to the carrier and movable therewith, means to urge each presser element of a pair inwardly towards the other element of the pair, means to arrest the inward movement of the presser elements after they have moved a predetermined distance, a cam to move a presser element away from the other element of a pair, a feeler slidably mounted in an aperture in a presser element to project from that face of the presser element which engages the tobacco at the end of a cigarette, means to cause the feeler to engage the tobacco at the end of a cigarette while the presser elements of the pair are closest together and means dependent on the extent of the inward movement of the feeler to separate from the tested cigarettes those which are determined by the feeler to have soft ends.

11. In a device for testing and compressing the tobacco at the ends of cigarettes, a pair of presser elements movable in a predetermined path and arranged to engage the opposite ends of a cigarette, said elements each being yieldingly mounted to move inwardly towards the other, means to arrest the inward movement of the presser elements after they have moved a predetermined distance, a feeler co-operating with each presser element to engage the tobacco at the end of a cigarette, means to urge said feelers towards each other, said last named means becoming operative after the presser elements have been moved into the position at which they are closest together, means to move a feeler away from the other feeler of the pair, a separating element movable between the feelers to separate from the tested cigarettes those which are determined to have soft ends, an electrically operated device to effect movement of the separating element, an electrical circuit to energize said device, means movable in timed relationship with the feelers to complete said circuit and yielding contact members movable in response to engagement by said feelers and thereby to break said circuit and prevent the energizing of said electrically operated device.

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