

March 7, 1944.

D. W. MOLINS ET AL  
CIGARETTE MAKING MACHINE

2,343,240

Filed May 21, 1941

3 Sheets-Sheet 1

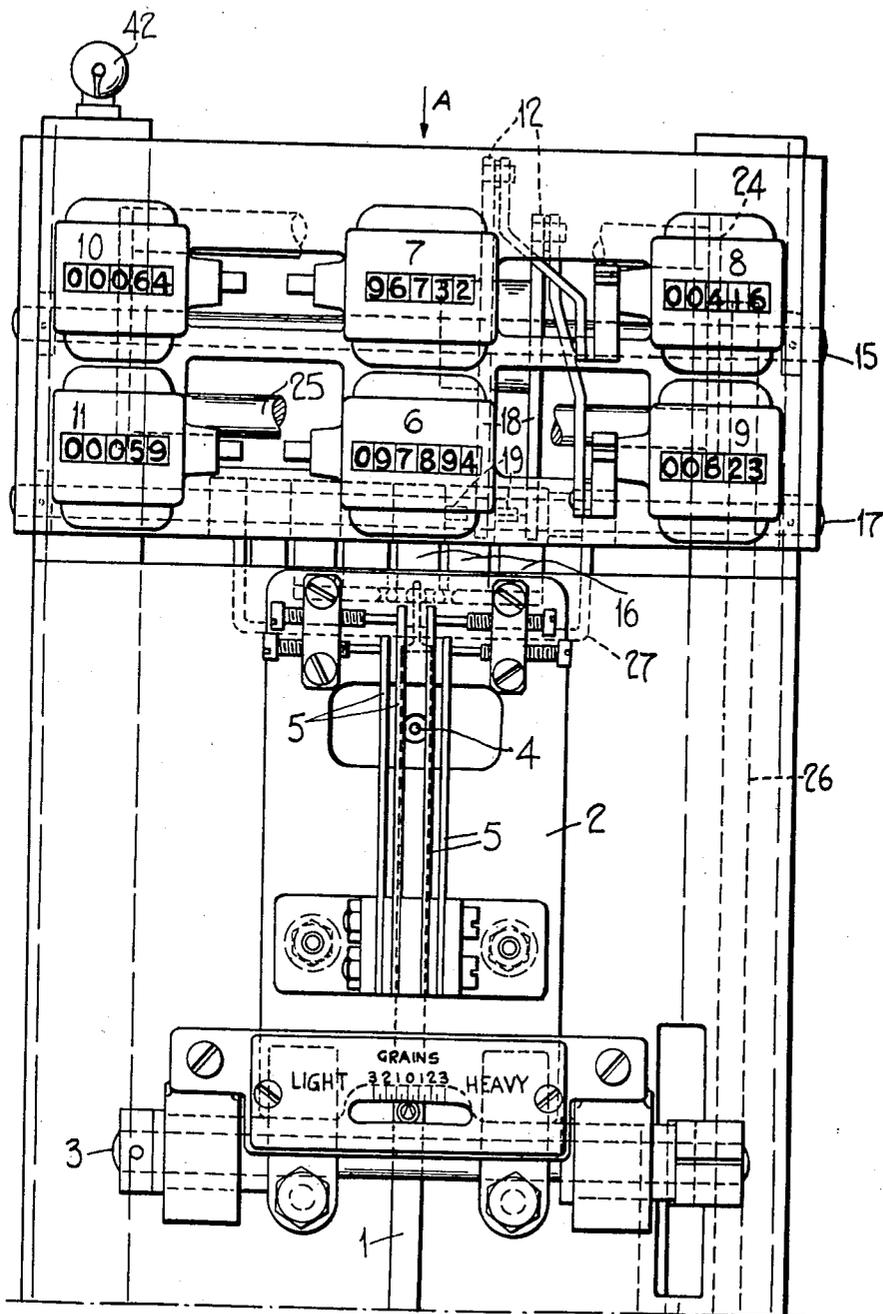


Fig. 1.

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3 Sheets-Sheet 2

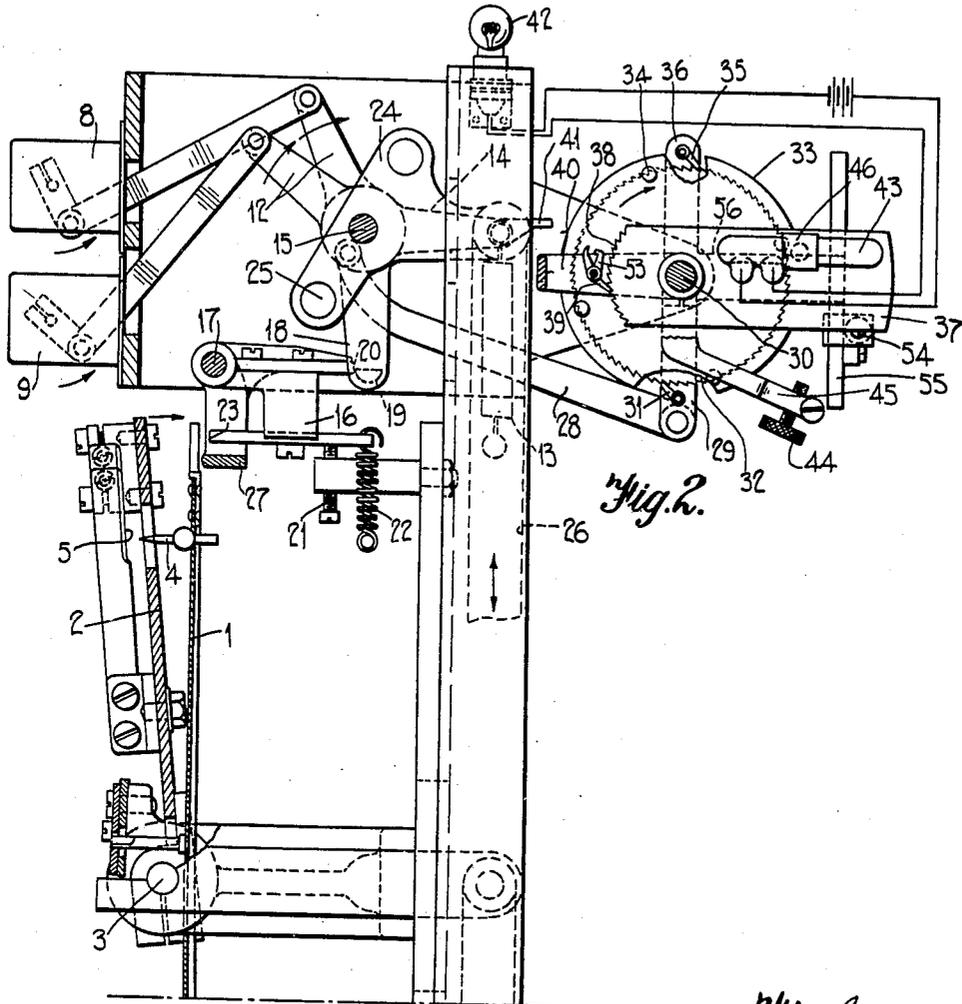


Fig. 2.

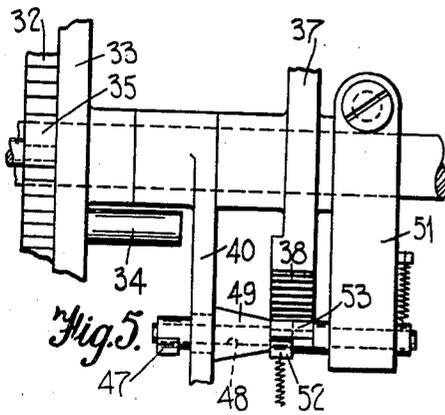


Fig. 5.

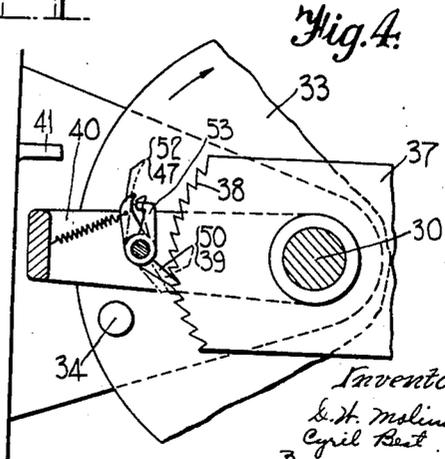


Fig. 4.

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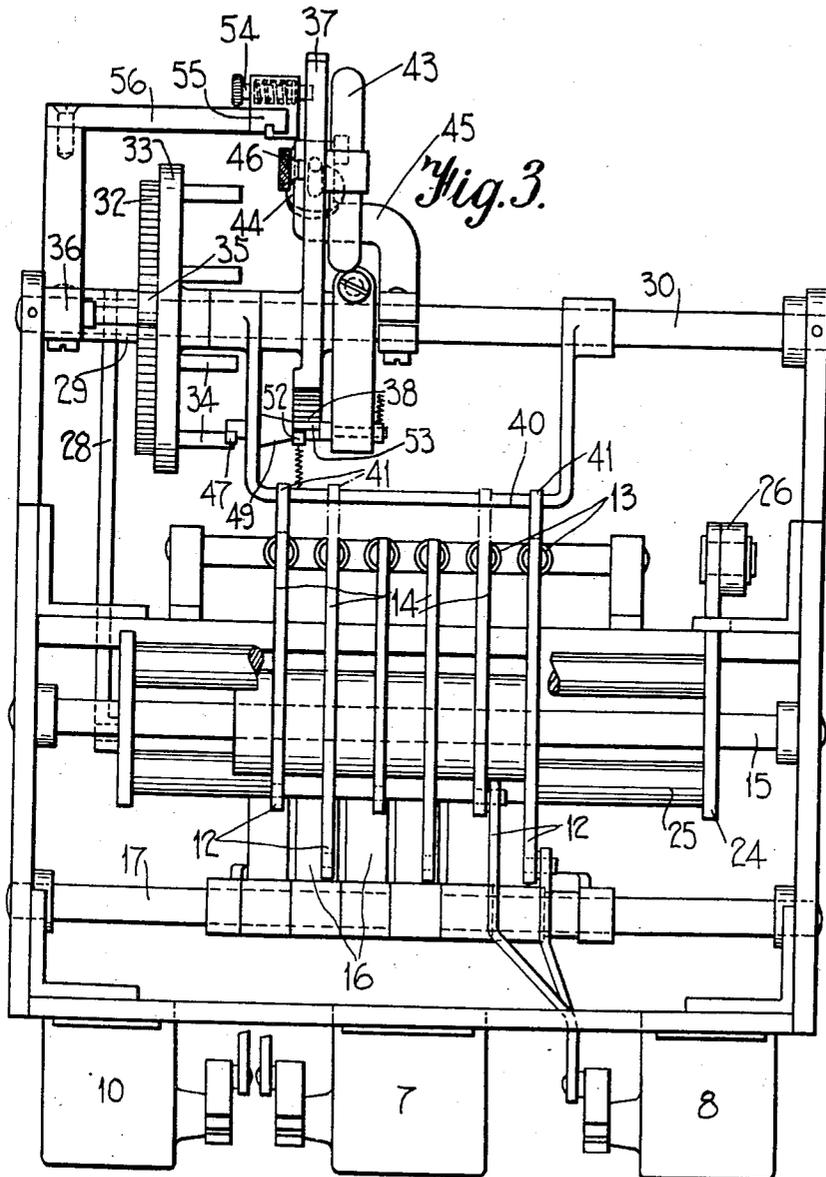
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3 Sheets-Sheet 3



*Fig. 3.*

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# UNITED STATES PATENT OFFICE

2,343,240

## CIGARETTE MAKING MACHINE

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Application May 21, 1941, Serial No. 394,542  
In Great Britain June 18, 1940

4 Claims. (Cl. 177—311)

This invention concerns improvements in or relating to testing apparatus for use in checking the product of an automatic machine.

As is well known, many automatic machines at present in use are provided with testing apparatus adapted to weigh, gauge or otherwise test the product. For example, many cigarette making machines of the continuous rod type are provided with mechanism adapted automatically to control the rate at which tobacco is fed from a hopper to the cigarette rod forming mechanism. Such control mechanism is usually connected with and is operated by cigarette testing apparatus, such as weighing apparatus, which determines whether or not the cigarettes being produced by the machine are of the required standard. An example of such mechanism is shown and described in United States patent specification No. 2,083,173. There may, however, be occasions when the articles produced by an automatic machine are not up to the normal standard due to some special reason. In a cigarette making machine, for instance, an accident, such as the stripping of carding from a feed roller in the tobacco-feeding mechanism, gives rise to defects in the feeding which cannot be automatically compensated by alteration of the mechanism for controlling the rate at which the tobacco is fed from the hopper. Since the control mechanism and testing apparatus are automatic, it is not usual for the machine minder constantly to watch these parts and it is, therefore, possible that should the falling off in the standard of production be due to abnormal circumstances, a large number of unsatisfactory cigarettes may be produced before the unusual circumstances are observed by the machine minder. It is an object of the present invention to provide means whereby the machine minder's attention will be drawn at an early stage to the production of faulty articles due to unusual circumstances.

According to the present invention there is provided testing apparatus, for use in checking the product of an automatic machine, having indicating mechanism comprising an electrically operated signalling device, a switch in the signal circuit, switch operating means responsive to impulses received from the testing apparatus and operable after movement through a predetermined distance to a switch operating position to cause a signal to be emitted. Means may be provided for returning the switch operating means to a normal or starting position at the end of a cycle consisting of a predetermined number of testing operations.

The switch operating means may be moved to the switch operating position by a predetermined number of step by step movements due to impulses received from the testing apparatus when unsatisfactory articles are tested.

Means (e. g. a manually releasable catch) may be provided for holding the switch operating means in the signalling position when reached, irrespective of the operation of the resetting means.

One way of carrying the invention into effect will be described with reference to the accompanying drawings in which:

Figure 1 is a front elevation of part of a testing apparatus embodying the invention.

Figure 2 is a side elevation of Figure 1 partly in section.

Figure 3 is a view of the upper part of Figure 1 in the direction of the arrow A.

Figures 4 and 5 are fragmentary views of Figures 2 and 3 drawn to a larger scale.

Referring to the drawings the testing apparatus in the present case is a weighing apparatus adapted for use with a cigarette making machine of the continuous rod type. At regular intervals a cigarette is selected from the produce of the machine and delivered in a known way to the scale pan (not shown) of the weighing apparatus. For instance, one cigarette may be selected from each forty consecutive cigarettes produced by the machine.

The weighing apparatus is mechanically operated and timed to start weighing as soon as a cigarette is delivered into the pan and ultimately a pointer 1 fixed to the weigh beam comes to rest in an angular position depending on the weight of said cigarette. Then a pressing device 2 pivoted at 3 moves towards the pointer and a needle 4 on said pointer passes on one side or the other of one of a series of knife edges 5 according to the angular position of the pointer 1 and a counting unit is actuated to record the operation in the manner described below.

Six counting units are shown, one of which, 6, records the total number of cigarettes weighed by the weighing apparatus while the other units, 7, 8, 9, 10 and 11 record respectively the numbers of cigarettes which are of correct weight, heavy, very heavy, light or very light. Each counting unit is actuated through a pawl and ratchet arrangement contained within the unit casing by a spring urged lever 12, Figure 2. Springs 13 attached to levers 14 fixed to the levers 12 urge the latter to operate the counters by moving their arms in the direction of the arrows

Figure 2, but are restrained by a trigger referred to below. The levers for all the counting units are mounted on a common spindle 15 but each lever is movable independently of the others. Each of the spring loaded levers 12 is held in an inoperative position by a lever 16 pivoted on a spindle 17. A lever 18 is fixed to each lever 12 and has a semi-circular stud 19 at the end which engages an end projection 20 of the lever 16. The latter is held downwards against a stop 21 by a spring 22, the whole device thus constituting a trigger.

When the pressing device 2 moves inwards and presses on the pointer 1, the latter is pressed against the end projection 23 of one of the levers 16 and the lever rotates on the spindle 17 and releases the trigger thus permitting the operation of the appropriate counter. On the spindle 15 on which the levers 12 are mounted, two arms 24 are also mounted and these carry a cross-bar 25 which lies in front of the levers 18. After a counting unit has been actuated, the trigger is reset by the cross-bar which is oscillated about the spindle 15 by a link 26 movable in the direction of the arrow Figure 2 in timed relationship with the rest of the apparatus. While a particular counting unit is being operated as described above, the unit 6 is operated by pressure of the pointer 10 on a stirrup 27 pivoted on the spindle 17, which similarly releases the lever 18 appertaining to the counter 6.

A link 28 pivoted to one of the arms 24 is pivotally attached to a crank 29 loosely mounted on a fixed spindle 30. A pawl 31 is pivoted on the crank and pressed by a spring (not shown) into engagement with a ratchet wheel 32 which is fixed to a disc 33 both members being freely rotatable on the fixed spindle 30. This disc 33 is provided with a number of pins 34 fixed to it at equally spaced positions around its centre and constitutes a resetting device referred to later. Alternatively the disc may be provided with a larger number of equally spaced holes into some of which pins may be fixed at equal angular positions according to the number of pins it is desired to have. When the apparatus is in operation it will be seen that the disc 33 is rotated step by step and moved an angular distance equal to the pitch of the ratchet teeth at each weighing operation. The circular distance between two consecutive pins 34 represents a cycle of weighing operations and will be referred to later. Another pawl 35 acting as a detent is carried on an arm 36 fixed to the spindle 30.

A lever 37, constituting a carrier for an electric switch referred to below is also freely mounted on the spindle 30. One end of the lever is provided with ratchet teeth 38 which are operatively engaged at times by a pawl 39 pivoted on a lever 40 which is loosely mounted on the spindle 30. The lever 40 is shaped as a stirrup, see Figure 3, and is oscillated about the spindle 30 by extensions 41 formed at the ends of those levers 14 which appertain to the counters 9 and 11 for recording very heavy or very light weights or if desired, as shown in chain lines Figure 3, also to those levers 14 which appertain to the counters 8 and 10 for light and heavy weights. Thus, if during a cycle the machine begins to run erratically and an undue number of heavy or light cigarettes are produced, the switch carrier 37 will be rotated about the spindle 30 until it reaches a position at which a switch is caused to close and operate a signalling device 42. Preferably a mercury switch 43 is employed and car-

ried by the lever 37 and when the latter reaches the predetermined position the signalling device is operated, e. g. a lamp is lit or a bell is rung. The initial position of the switch carrier is determined by an adjustable stop 44 mounted in an arm 45 fixed to the spindle 30. As shown in Figure 2 the switch carrier 37 is horizontal and the mercury switch is "making," the carrier having been moved through an angular distance of five ratchet teeth from the initial position, to close the switch.

The switch is fixed to the carrier by an adjustable clamp 46 whereby it may be fixed at any angle to alter the number of step by step movements necessary to close the switch.

In order that the signalling device shall not be operated to give warning solely due to occasional faulty cigarettes being detected during the normal running of the machine over a relatively long period of time the operations of the mechanism are arranged to take place during a predetermined cycle at the end of which the switch carrier is automatically set back to the normal or initial position by the resetting device unless during said cycle the signalling device has been operated, in which case a catch device described below prevents such automatic resetting of the carrier. For example, a cycle may be a period of time in which fifty consecutive weighing operations take place or a period required to manufacture two thousand cigarettes in the case where one cigarette is weighed from each forty produced. In the construction shown the pins 34 would require to be spaced apart on the disc 33 at an angular distance equal to the pitch of fifty teeth on the ratchet wheel 32. Actually fewer teeth are shown in order to render the drawing clear. As the disc 33 rotates, the pins 34 periodically strike against a lever 47 fixed on a spindle 48 rotatable in a bearing 49 fixed to the stirrup 40. At the other end of the spindle 48 is fixed the pawl 39 which moves the switch carrier. A detent 50 is also provided which engages the teeth 38 and retains the switch carrier in position while the pawl 39 is making its idle stroke. This detent is pivoted in an arm 51 fixed to the spindle 30. When a pin 34 strikes the lever 47 the pawl 39 is moved out of engagement with the teeth 38 (see chain line position Figure 4) and an extension lever 52 formed in one with the pawl 39 engages an extension lever 53 formed in one with the detent 50 and thus disengages the detent and normally, unless the carrier 37 is held up by a switch carrier retaining means 54 described below, the carrier 37 drops until it is arrested by the stop 44 and a new cycle commences. The contours of the levers 47 and 52 are identical and they are located on the spindle 48 in the same angular position and thus the lever 47 is hidden by the lever 52 in Figure 4. Similarly the detent 50 covers the pawl 39 and in both instances the appropriate references are bracketed in that figure.

In order that the signalling device shall continue to operate until the machine minder's attention is attracted, means are provided to hold the switch carrier in the switch operating position after such position has been reached even if the resetting device has operated on the pawl 39 and detent 50. The switch carrier retaining means shown comprises a catch device 54 formed as a spring bolt adjustably fixed to a bar 55 supported on a side extension 56 of the arm 36.

What we claim as our invention and desire to secure by Letters Patent is:

1. Signalling equipment for use with apparatus for testing articles to determine the conformity thereof with a standard and desired characteristic of such articles, comprising a device movable step by step from a first position toward a second position, means connecting said apparatus to said device to impart one step of movement to the latter on the testing by said apparatus of a non-conforming article, signalling means operable by said device on the completion of movement thereof to said second position, means operable by said apparatus for restoring said device to said first position on the completion by said apparatus of a predetermined number of tests of articles, and means for retaining said signalling means in operation when rendered operable by said device irrespective of restoration of said device to said first position.

2. Signalling equipment for use with apparatus for testing articles to determine the conformity thereof with a standard and desired characteristic of such articles, comprising a device movable step by step from a first position toward a second position, means connecting said apparatus to said device to impart one step of movement to the latter on the testing of a non-conforming article, signalling means operable by said device on the completion of movement thereof to said second position, and means operable by said apparatus for moving said device in the opposite direction whenever movement of said device to said second position is not completed prior to the testing of a predetermined number of articles.

3. Signalling equipment for use with apparatus for testing articles to determine the conformity thereof with a standard and desired characteristic of such articles, comprising a device

movable step by step by said apparatus in response to the testing of successive articles, a second device movable step by step from a first position toward a second position by said apparatus in response to the testing of non-conforming articles, signalling means operable by said second device on the completion of movement thereof to said second position, means operable by said first device for restoring said second device to said first position on the completion of testing by said apparatus of a predetermined number of articles prior to operation of said signalling means, and means preventing the return of said second device from said second position to said first position by said restoring means when said second position is reached, whereby said signalling means is maintained in operation following the testing of a predetermined number of articles of which an excessive number are non-conforming.

4. Signalling equipment for use with apparatus for periodically testing articles to determine the conformity thereof with a standard and desired characteristic of such articles, comprising a device movable step by step from a first position toward a second position, means connecting said apparatus to said device to impart one step of movement to the latter on the testing by said apparatus of a non-conforming article, signalling means operable by said device on the completion of movement thereof to said second position, and means operable by said apparatus for restoring said device to said first position from a position short of said second position on the completion of the testing by said apparatus of a predetermined number of articles prior to operation of said signalling means.

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