March 17, 1959 A. ESENWEIN 2,877,884

METHOD AND DEVICE FOR ALIGNING CIGARETTES

Filed Nov. 15, 1956 2 Sheets-Sheet 1

Fig. 1

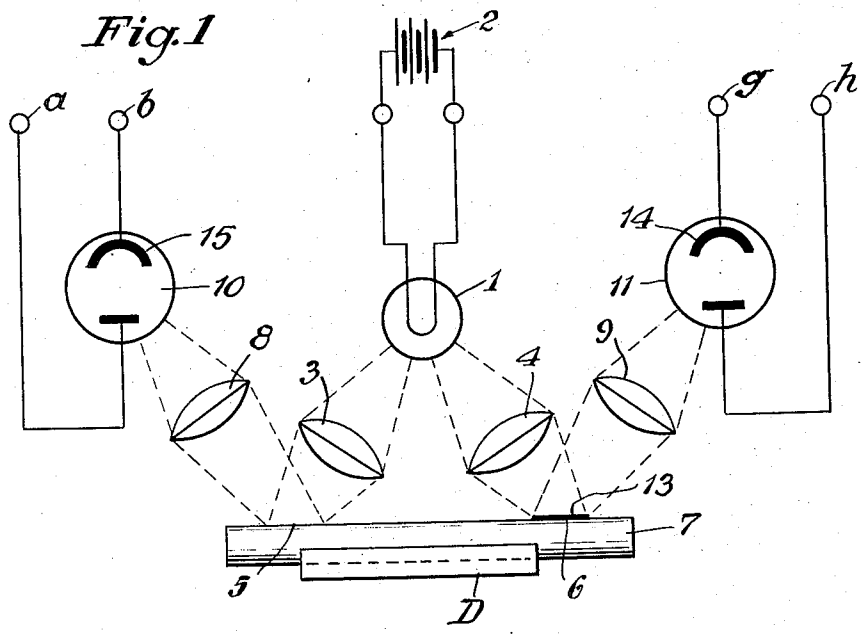


Fig. 2

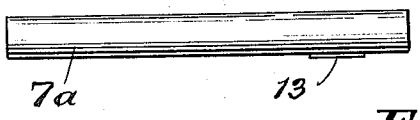


Fig. 3

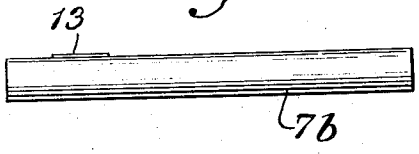
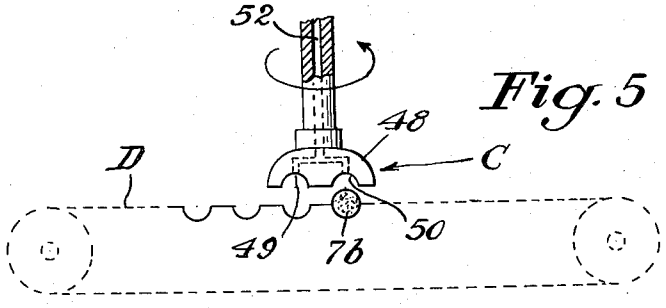


Fig. 4



Fig. 5



INVENTOR:
Albert Esenwein,
BY Singer, Stern & Carlberg,
Attorneys.

March 17, 1959 A. ESENWEIN 2,877,884

METHOD AND DEVICE FOR ALIGNING CIGARETTES

Filed Nov. 15, 1956 2 Sheets-Sheet 2

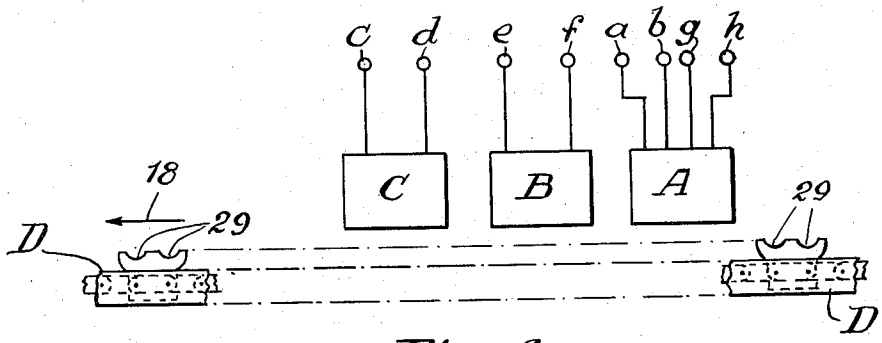


Fig. 6

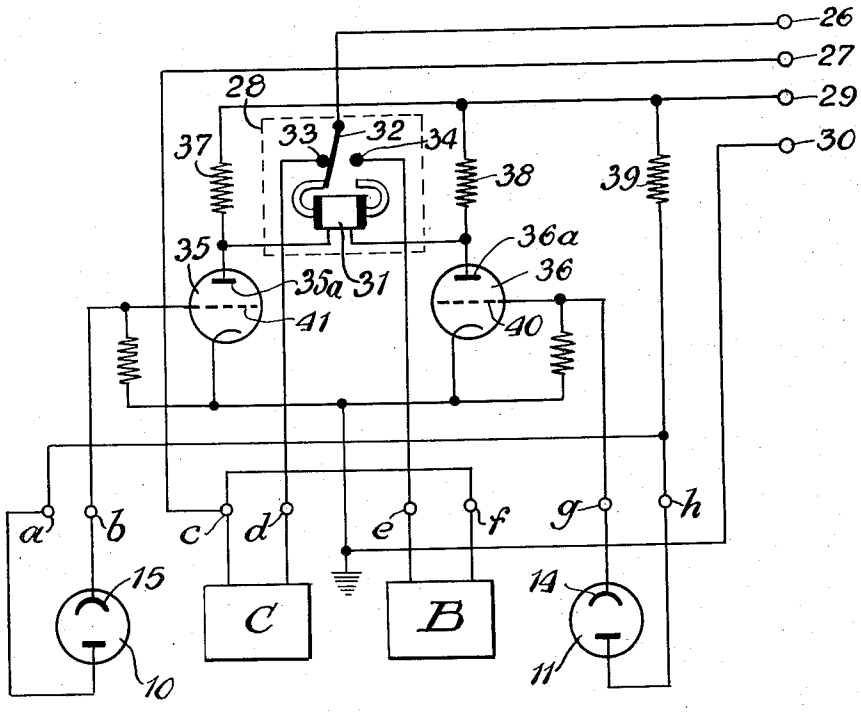


Fig. 7

INVENTOR:
Albert Esenwein,
BY Singer, Stern & Carlberg,
Attorneys.

United States Patent Office 2,877,884 Patented Mar. 17, 1959

2,877,884

METHOD AND DEVICE FOR ALIGNING CIGARETTES

Albert Esenwein, Hamburg-Bergedorf, Germany, assignor to Kurt Korber & Co., Hamburg-Bergedorf, Germany

Application November 15, 1956, Serial No. 622,468

Claims priority, application Germany November 23, 1955

9 Claims. (Cl. 198—33)

This invention relates to the manufacture of cigarettes in general, and more particularly to a method and device for aligning, or arranging, the cigarettes on the conveying line such that the trademark printing on each cigarette faces the same direction and is on the same end of each cigarette.

As well known by those skilled in the art, it is desirable in the packaging of cigarettes to have a uniform disposition of the printing on the cigarettes, so that when the user opens the cigarette package, the aligned printing on the several cigarettes within the pack presents a pleasing and neat appearance.

It has been known in the art to utilize the photo-electric method for the alignment of the trademark printing on cigarettes. This has been performed by taking absolute measurements of the reflection of illuminated places on the cigarettes. Thus the trademark printing on the cigarette has been illuminated, constituting a measuring spot, and the reflected light has been focused upon the light-sensitive layer of a photo-electric cell. The impingement of this light upon the light-sensitive layer, or cathode, of the photo-electric cell has then been used for the control of means for turning the cigarettes. The cigarettes are upon a conveying means, such as a conveyor band, and are continuously moved under the photo-cell. It has been customary to take the light reflection measurement only at the moment when the cigarette comes to pass under the measuring spot, so that a switching means must be provided, which will intermittently switch an amplifier in and out. The minute adjustments and turning of such a switching means are easily disturbed and are difficult to make.

It has, therefore, already been suggested to make the color of the conveying band the same as the color of the cigarettes, so as to eliminate undesirable impulses produced by faulty coloring, and thus to eliminate the switching means. But even in this case the different reflections from the different color shades and surface conditions, the latter being unavoidable, did not produce any satisfactory results.

The foregoing disadvantages of the previously used methods are eliminated by the present invention, in that simultaneously a second spot on the cigarette is illuminated in the same manner, for instance a spot opposite to the printing spot. The reflection of the second illuminated spot is then focused into the photo-electric cell in the same manner as the first illuminated spot, and the difference of the two currents is measured. This is accomplished by using a bridge circuit with the two currents being fed into the measuring bridge. The resultant bridge current produced by the difference between the two input currents is then, in accordance with the direction of current flow, used for the control of turning devices or of swinging devices, the latter being associated with a push-out means for pushing the cigarette out after the same has reached the proper position.

The circuit of the photo-cells is preferably adjusted in such a manner that when the differential bridge current

is present in the desired direction of flow, that is, when the cigarettes are correctly aligned in the proper position, the turning device for the cigarettes will not be actuated. This can be accomplished, for instance, by having the adjustable turning pegs, which are in a "turning" position, moved back to their initial position. If, however, the printing on the cigarette faces in the opposite direction, that is, the printing is turned, for example, 180° away from its correct position, then the spot illuminated will be opposite to the printed side of the cigarette, and the photo-cells will receive the same reflection from equally lighted and colored surfaces at the same angle. The bridge will then be in equilibrium, and the device for turning the cigarettes will be operated in order to turn the cigarette around by 180° in its operating position.

The photo-electric method of the present invention can also be carried out with only one photo-electric device in the bridge circuit, wherein only one light source is used for illuminating two measuring spots on a cigarette. Each illuminated measuring spot is focused on the cathode of its respective photo-cell. The method utilized in the invention has, therefore, the advantage that the effect of any variations, such as aging of the transmitter lamp, or voltage fluctuations of the bridge supply voltage will be eliminated.

A particular advantage of the present invention is that not only are means available for turning the cigarettes, but also means are available for swinging the cigarettes around 180° in a horizontal plane, or means may be provided for pushing the cigarette out sideways from its conveying means. The above means can all be controlled by the inventive method of the invention.

For instance, where a cigarette has its end turned about, or reversed, the bridge current will flow in the opposite direction to the direction of the current, which corresponds to the correct position of the cigarette. The reversed bridge current can then be used to operate a switching means for swinging the cigarette around by 180° in the horizontal plane, or a mechanism may be initiated for pushing the incorrectly-positioned cigarette out from the conveying band.

It is possible in an arrangement using two measuring devices according to the invention to reposition a cigarette into correct alignment, even if it originally was turned end-for-end and also had the trade-mark printing facing away from the photo-cell. This can be performed by passing the cigarette across a first measuring spot, which will result in its being turned, and secondly, passing the turned cigarette across a second measuring spot, whereby it will be swung over, or pushed laterally out of the conveying means.

It is, therefore, a general object of the invention to provide an improved method and device for turning and repositioning cigarettes on a conveying line so that the printing matter thereon will be correctly aligned for further packaging operations.

A further object of the invention is to provide an improved photo-electric means for measuring the illumination from two axially spaced measuring spots on the same cigarette, which means may be used to initiate turning or swinging devices for the uniform alignment of the trademark printing matter upon successive cigarettes.

Another object is to employ a bridge measuring circuit with the improved photo-electric means for the alignment of printed matter on cigarettes prior to their being packaged.

Still a further object of the invention is to provide an improved photo-electric alignment device for uniformly positioning the printed matter on cigarettes,

wherein a single illuminating means is employed to eliminate variations and fluctuations from a multiple light source.

Further objects and advantages will readily become apparent upon reading the following specification, taken in conjunction with the drawing, in which:

Fig. 1 schematically illustrates a photo-electric alignment device embodying the principles of the invention with a correctly positioned cigarette; and

Figs. 2–4 indicate various possible incorrect positions of cigarettes as they pass along a conveying line;

Fig. 5 illustrates diagrammatically details of the cigarette swinging device;

Fig. 6 illustrates diagrammatically the arrangement of the various parts of the cigarette aligning machine; and

Fig. 7 illustrates a wiring diagram of the arrangement of the invention.

Referring to the drawing, and more particularly to Fig. 1 thereof, the reference numeral **1** designates a source of light, such as a lamp, energized from any suitable source of power, such as a battery **2**. Light from the lamp **1** is condensed by the lenses **3**, **4** so as to be directed upon the two measuring spots **5**, **6** upon the cigarette **7**. The reflected light from the measuring spots **5**, **6** is directed through lenses **8**, **9** upon the cathodes of two photo-electric cells **10**, **11**. D indicates the conveyor which conveys the cigarettes in customary manner toward a packaging device in similar manner as disclosed in United States Patent No. 1,984,962 or in Heinz Kunath's United States patent application Serial No. 501,959, filed April 18, 1955, now abandoned.

In the case where the trademark printing matter **13** on the cigarette **7** is correctly positioned, as indicated in Fig. 1, then the currents induced within the photo-electric cells **10**, **11** will be unequal. These currents are directed into a bridge measuring circuit.

When the printed matter **13** on the cigarette **7** is correctly positioned the differential current in the bridge circuit will result in rendering the turning device and swinging device or push-out device inoperative.

In the case, as illustrated in Fig. 2, where the printed matter **13** is facing in the opposite direction from the photo-cell **10**, the light reflected from the measuring spot **6** onto the cathode **14** will cause an equal amount of current to flow through the photo-cell **11** as flows through the photo-cell **10**. This will cause an operation of the turning device which will effect a turning of the cigarette *7a* of Fig. 2 to the proper position.

Fig. 3 illustrates the position of a cigarette *7b*, wherein the printed matter **13** faces the photo-cell **10**. Hence, the illumination from the printed matter **13** will be directed through the lens **9** upon the cathode **15** of photo-cell **10**, and in this case the differential bridge current will then flow in a direction opposite to that corresponding to the correct position of the cigarette **7** in Fig. 1. This will effect an actuation of a swinging device which results in swinging the cigarette *7b* 180° around in a horizontal plane, or alternately there may be provided a discharge device which pushes the cigarette *7b* laterally outwardly from the conveyor D.

If, as illustrated in Fig. 4, a cigarette *7c* has its printed matter disposed at the wrong end, and also facing away from the photo-cells **10**, **11**, the cigarette *7c* will then, when passing the measuring point according to Fig. 1, be first turned around by the turning device and, when passing through a second similar measuring spot, be swung around 180° by the swinging device.

Instead of using the illustrated photo-electric cells **10**, **11**, as shown in Fig. 1, there may also be used as a substitute photo-resistances, or other photo-electric means.

Fig. 5 illustrates diagrammatically the cigarette swinging device C as consisting of a holder **48** provided at its lower face with two groove-like cavities **49**, **50** arranged above the cigarette conveyor D. When the cigarette *7b* reaches the cavity **49** a suction duct **52** in the holder **48** is connected with a source of low pressure which causes the cigarette *7b* to be sucked into the cavity **49**, whereupon the holder **48** rotates 180° about its vertical axis and then the source of low pressure is cut-off and the cigarette *7b*, which was swung around 180°, drops again onto the conveyor D.

Fig. 6 illustrates diagrammatically the arrangement of the device for aligning cigarettes. D illustrates a portion of the conveyor C with its individual elements with the cavities **29** for receiving the cigarettes and moving in the direction of the arrow **18**. The photo-cell arrangement for scanning the cigarettes is designated with A; the turning device, which may be similar to the one illustrated in U. S. patent specification No. 1,984,962 is designated with B, and the swinging device is designated with C (see also Fig. 5).

Referring now to Fig. 7, it will be noted that the terminals *a* and *b* are used for the photo-cell **10**; the terminals *g* and *h* for the photo-cell **11**; the terminals *c* and *d* are used for the swinging device C and the terminals *e* and *f* for the turning device B. The two photo-cells **10** and **11** form a part of the arrangement A. The bridge circuit employs two amplifier tubes **35** and **36**, the anodes **35***a* and **36***a* of which are connected with a polarized relay **28** indicated by a rectangle in dash lines. The anode circuits contain the resistances **37** and **38**, respectively. The anodes of the photo-cells **10** and **11** are connected to a line containing a resistance **39** which determines the bias voltage. The cathodes **14** and **15** of the photo-cells **11** and **10**, respectively, are connected with the control grids **40** and **41** of the tubes **36** and **35**, respectively. The described arrangement is energized by a direct current source connected to the terminals **29** and **30**. The alternating current source for operating the turning device B and the swinging device C is connected to the terminals **26** and **27**. Depending upon in what direction the direct current passes through the magnet coil **31** the movable contact **32** is attracted to the contact **33** or **34** and accordingly either one of the devices C or B is operated.

From the foregoing description it will be apparent that there is provided an improved method and means for the alignment of the printed matter on cigarettes during their conveyance prior to the packaging operation. The device is accurate and sensitive in response to the inaccurate positioning of the trademark printing on the cigarettes. It is easy to adjust, and maintains its adjustment. The use of a single light source eliminates variations resulting from filament wear and voltage fluctuations.

Although there is shown and described a particular photo-electric alignment device, it is to be understood that the same was merely for the purpose of description, and that changes and modifications may readily be made therein without departing from the spirit and scope of the invention.

I claim as my invention:

1. A photo-electric device for the alignment of printed matter on cigarettes including means for illuminating two axially spaced measuring spots on each cigarette adjacent the ends thereof, a pair of photo-electric cells arranged one adjacent each end of the conveyed cigarette, means for reflecting the illumination from each measuring spot into each said photo-electric cells simultaneously, a measuring bridge circuit for measuring the difference between the two photo-cell currents, a turning device for said cigarettes, and means repsonsive to the meausrement of the photo-cell currents by the bridge circuit to effect the actuation of said turning device.

2. The combination in a photo-electric device for the alignment of printed matter on cigarettes of light means for illuminating two spaced end spots on each cigarette, one spot being at the desired location of the printed matter, a pair of photo-electric cells arranged one ad-

jacent each end of the cigarette, reflecting means for reflecting light from said two spots on the cigarette into said pair of photo-electric cells, means including a measuring bridge circuit for comparing the two photo-cell currents, a turning device for said cigarettes, and means responsive to the measurement of the bridge circuit to effect the operation of said turning device.

3. A photo-electric device for the alignment of printed matter on cigarettes including means for illuminating two axially spaced end measuring spots on each cigarette, one measuring spot being at the location desired for the printed matter, a pair of photo-electric cells arranged one adjacent each end of said cigarettes, means for reflecting the illumination from each measuring spot into one of said photo-electric cells, a measuring bridge circuit having said two photo-electric cells in two arms thereof, a turning device, and means utilizing the differential bridge current to effect the actuation of said turning device.

4. A photo-electric device according to claim 3, wherein a single light is utilized as the illuminating means for both measuring spots.

5. A photo-electric device for the alignment of printed matter on successively conveyed cigarettes including means for illuminating the point on a cigarette adjacent one end thereof at which the printed matter is desired to be located, means for illuminating a point on the same cigarette adjacent the other end thereof, a pair of photo-electric cells arranged one adjacent each end of said cigarette, means reflecting the illumination from said two points on the cigarette to said pair of photo-electric cells, a turning device and swinging device for said cigarette, a bridge circuit for comparing the currents transmitted by said two photo-electric cells, means responsive to the differential bridge current to effect the actuation of said turning and swinging devices, the arrangement functioning to render inoperative said turning and swinging devices when the printed matter is at the first said point on the cigarette and the photo-cell currents are unequal with the differential bridge current in one direction and when the photo-cell currents are unequal with the differential bridge current in the opposite direction the swinging device being rendered operative, and the arrangement also functioning such that when the bridge is in equilibrium the turning device is actuated.

6. A photo-electric device according to claim 5, wherein only a single light is utilized as the illuminating means for illuminating both measuring points on the cigarette.

7. A photo-electric device for the alignment of printed matter on successively conveyed cigarettes including means for conveying cigarettes in succession, means for illuminating the point on a cigarette adjacent one end thereof at which the printed matter is desired to be located, means for illuminating a point on the same cigarette adjacent the other end thereof, a pair of photo-electric cells arranged one adjacent each end of said cigarette, means reflecting the illumination from said two points on the cigarette to said pair of photo-electric cells, a turning device and a swinging device for said cigarette, a bridge circuit for comparing the current transmitted by said two photo-electric cells, means responsive to the differential bridge current to effect the actuation of said turning and swinging devices, the arrangement functioning to render inoperative said turning and swinging devices, when the printed matter is at the first said point on the cigarette and the photo-cell currents are unequal with the differential bridge current in one direction and when the photo-cell currents are unequal with the differential bridge current in the opposite direction the swinging devices being rendered operative to reverse the position of said cigarette on said conveying means, and the arrangement also functioning such that when the bridge is in equilibrium the turning device is actuated.

8. A photo-electric device according to claim 7, wherein only a single light is utilized as the illuminating means for illuminating both measuring points on the cigarette.

9. A photo-electric device for orienting cigarettes as they travel along a conveyor pathway so that the printed matter on the cigarettes will be arranged in the same position comprising illuminating means arranged above said conveyor pathway for illuminating the point on a cigarette adjacent one end thereof at which the printed matter is desired to be located, means for illuminating a point on the same cigarette adjacent the other end thereof so that light will be reflected from opposite ends of the cigarettes in a direction upwardly and to one side of said conveyor pathway, a photo-electric cell arranged on each side of said pathway to receive the reflected light on the ends of said cigarette, a turning device and a swinging device for said cigarettes mounted along said conveyor pathway, a bridge circuit connected to said photo-electric cells for comparing the current transmitted thereby, means responsive to the differential bridge current to effect the actuation of said turning and swinging devices to locate the printed matter on the cigarette at the point where the matter is desired to be located, the arrangement functioning to render inoperative said turning and swinging devices when the printed matter is at the point desired and the photo cell currents are unequal with the differential bridge current in one direction, and when the photo-cell currents are unequal with the differential bridge current in the opposite direction the swinging device being rendered operative to reverse the position of said cigarette on said conveying means, said arrangement also functioning such that when the bridge circuit is in equilibrium the turning device is actuated.

References Cited in the file of this patent

UNITED STATES PATENTS

1,812,294	Hohn	June 30, 1931
1,984,962	Brunn	Dec. 18, 1934
2,026,330	Tauschek	Dec. 31, 1935
2,140,355	Gulliksen	Dec. 13, 1938
2,232,622	Moses	Feb. 18, 1941
2,693,872	Baader	Nov. 9, 1954
2,781,477	Jenner	Feb. 12, 1957