

May 15, 1962

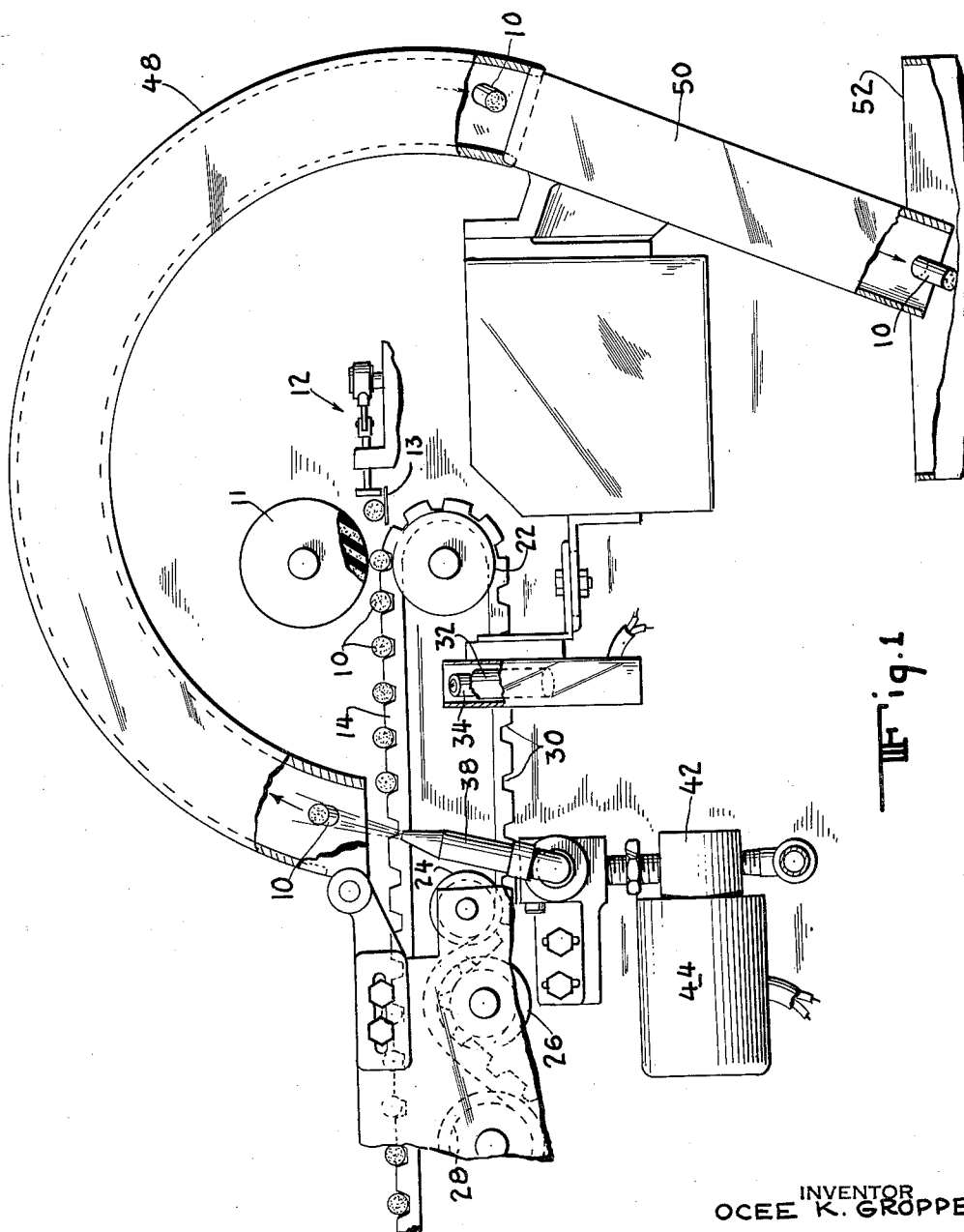
O. K. GROPPÉ

3,034,645

CIGARETTE REJECTOR

Filed March 23, 1960

2 Sheets-Sheet 1



INVENTOR
OCEE K. GROPPE

OCEE K. GRÖPPE

BY

BY
Tanner & Cristall
ATTORNEY

ATTORNEY

May 15, 1962

O. K. GROPPE
CIGARETTE REJECTOR

3,034,645

Filed March 23, 1960

2 Sheets-Sheet 2

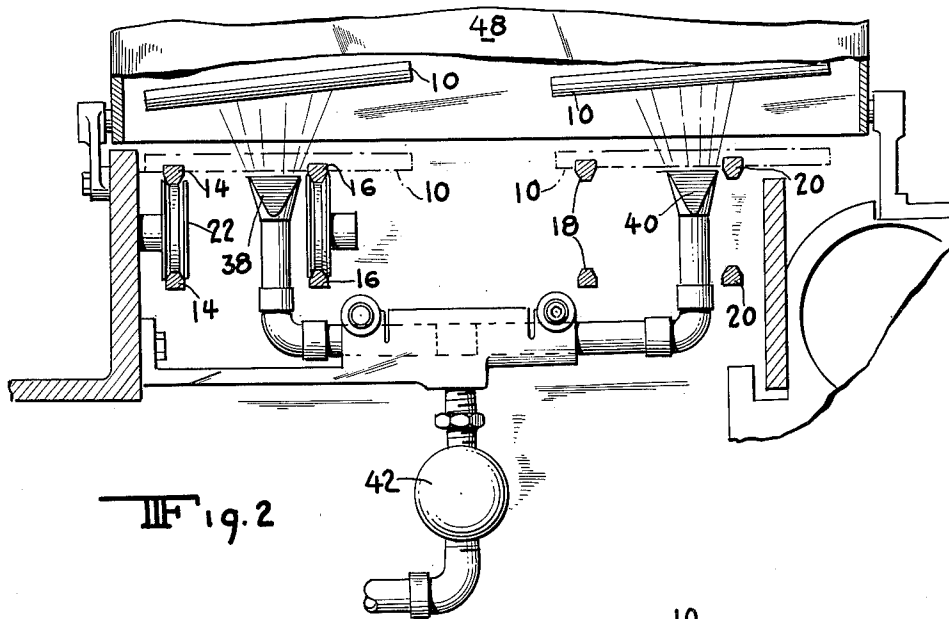


Fig. 1

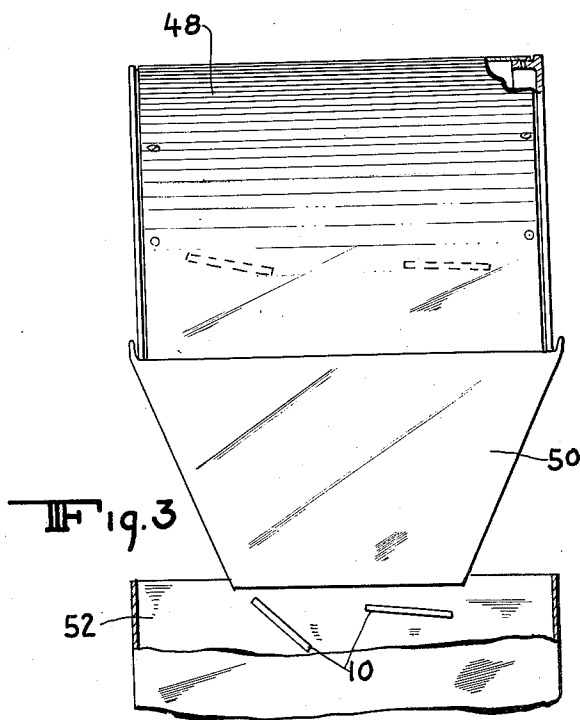


Fig. 3

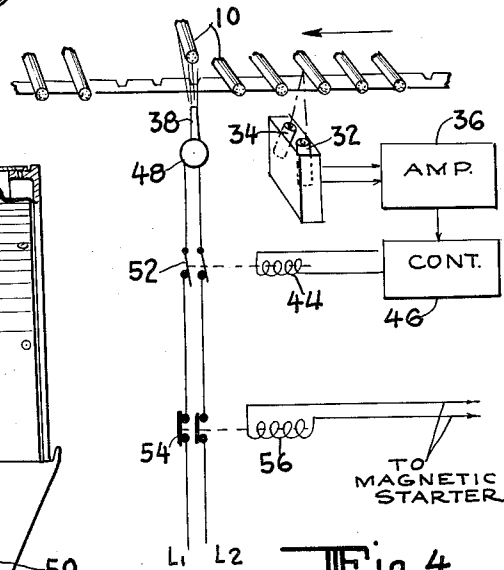


Fig. 4

INVENTOR
OCEE K. GROPPE
BY
Tanner & Bristol
ATTORNEY

1

3,034,645

CIGARETTE REJECTOR

Ocee K. Groppe, Richmond, Va., assignor to American Machine & Foundry Company, a corporation of New Jersey

Filed Mar. 23, 1960, Ser. No. 17,163

12 Claims. (Cl. 209—111.5)

The present invention relates to a method and apparatus for making cigarettes and in particular to a rejector which responds to gaps in a normally regular sequence of cigarettes produced continuously by a cigarette making machine.

In examining cigarettes produced sequentially at high speeds, your inventor has found that if one cigarette is missing from the sequence (i.e., if there is a gap in the normally evenly spaced line of cigarettes), a predetermined number of cigarettes preceding the gap and a predetermined number of cigarettes subsequent to the gap are frequently defective.

In conventional cigarette making machinery, a large amount of time is required to seek out and discard such defective cigarettes. As the cigarettes come off the conveyor belt they are stacked in deep trays and the operators must pick out the defective cigarettes so stacked. This is a tedious and time-consuming procedure since the underlying layers of cigarettes are not readily accessible for inspection and removal of defective cigarettes.

Your inventor has further investigated this problem and has found that in a double-row collection of cigarettes it is advantageous to discard two pairs of cigarettes preceding the missing cigarette and two pairs of cigarettes following the missing cigarettes as well as the cigarette which would normally pair up with the missing cigarette. Thus, not counting the missing cigarette or cigarettes, a predetermined number of cigarettes need to be removed immediately to avoid contamination of perfect cigarettes.

It is an object of the present invention to provide a method and apparatus for automatically rejecting cigarettes preceding and following a gap in the production line.

Another object is to provide means for detecting and ejecting a predetermined number of cigarettes in a production line each time missing cigarettes are detected.

It is another object of the present invention to provide such a cigarette rejector which is simple and reliable in operation.

Other objects and features of the invention will appear as the description of the particular embodiment selected to illustrate the invention progresses. In the accompanying drawings, which form a part of this specification like characters of reference have been applied to corresponding parts throughout the several views which make up the drawings.

FIG. 1 is a side view of the cigarette rejector according to the present invention with parts broken away;

FIG. 2 is an end view of the cigarette rejector shown in FIG. 1;

FIG. 3 is a detailed view of the ejection duct for the rejected cigarettes; and

FIG. 4 is a schematic circuit diagram of the electronic control for the air blast.

I will now describe my invention by referring to the drawings. In FIGS. 1 and 2 cigarettes 10 are being transported on conveyor belts 14, 16, and 18, and 20.

Cigarettes 10 on a conveyor belt 13 are received and discharged from the cigarette making machine in an axially travelling direction as shown in FIG. 1. The axial movement of these cigarettes 10 must be stopped and a lateral movement must be imparted to successive pairs of cigarettes as more fully shown and described in U.S. Patent No. 2,176,485, granted to W. B. Bronander on

2

October 17, 1939. This may be accomplished by an eccentric 12 pushing the endwise advancing cigarettes 10 sidewise onto the two cooperating conveyor belts 14 and 16. Similarly an eccentric, not shown pushes alternate endwise advancing cigarettes 10 onto the two cooperating conveyor belts 18 and 20 which are parallel to and spaced from conveyor belts 14 and 16. When the cigarettes are thus pushed laterally, they are gripped from above and below by a sponge rubber roller 11 and conveyor belts 14, 16 and 18, 20 which thereby stop the axial movement of each pair of cigarettes so deflected.

Once the cigarettes reach the pairs of conveyor belts 14, 16 and 18, 20, initially adjacent cigarettes will be distributed over both pairs of belts. Hence if cigarettes initially adjacent to a gap, i.e., to one or more short or missing cigarettes, are to be discarded, cigarettes from both belt pairs 14, 16 and 18, 20 must be discarded together. If this is not done and the defective cigarettes proceed in the production line and are disposed in the deep trays, it will require close scrutiny of tightly packed cigarettes to detect defective cigarettes. Thus it will involve careful and time-consuming inspection to find cigarettes that may be somewhat shorter than standard size of cigarettes or that are not properly filled with tobacco. It will now be shown how, according to the present invention, frequently defective cigarettes are automatically removed from the production line.

Collector belt 14 is shown to be supported by roller 22 and tightening roller assembly 24, 26, and 28. Also receptacles 30 for cigarettes are shown which are equally spaced and receive subsequently arriving cigarettes 10. Receptacles 30 in all four conveyor belts 14, 16 and 18, 20 are aligned in the direction of belt advance so that each pair of belts 14, 16 and 18, 20 is provided with a pair of aligned cooperating receptacles 30, each receptacle pair 30 of one pair of belts being aligned with a receptacle pair 30 of the other pair of belts.

Suitable means for detecting one or more missing or short cigarettes are required. Various devices may be used for this purpose and the photoelectric detector shown will now be described.

A photoelectric detector 32 receives light from a light source 34 and reflected from a cigarette 10. Light impinges on photoelectric detector 32 only if a cigarette passes a specific location along the path of cigarette advance. As seen in FIG. 2 the photoelectric detector will not receive any reflected light if no cigarette is present. Cigarettes may be missing for a variety of reasons, such as failure of the rod-forming mechanism or they are too short and are eliminated before they reach the detecting station.

The term "gap" as used in the claims and in the rest of this specification is intended to include short-length cigarettes as well as missing cigarettes.

Each time photoelectric detector 32 receives a light signal, the signal is amplified in amplifier 36 (FIG. 4) and fed to control circuit 46 which operates a relay 44. Regularly received signals will maintain relay 44 in a position to keep contacts 52 open.

However, as soon as one or more light pulses are missing, relay 44 will close contacts 52. It requires a predetermined number of successive pulses to restore photoelectric detector 32 to provide a signal capable of returning relay 44 to its operated position in which contacts 52 are open. Hence contacts 52, once closed, will stay closed until a predetermined number of successive light reflecting cigarettes 10 have passed the specific location along the production line.

An identical photoelectric detector, or other cigarette gap detector (not shown) is provided to cooperate with the cigarettes 10 progressing with the pair of conveyor belts 18, 20. Its output may also be fed to amplifier 36 or

it may be amplified by an independent amplifier. It will be appreciated that if either photoelectric detector fails to receive the required sequence of light signals, relay 44 will close contacts 52.

Various controlled ejectors may be used for the purpose of the present invention. In the embodiment illustrated blowers 38 and 40, controlled by supply valve 42 are used and these will now be described in detail.

The pair of blowers 38 and 40 are arranged between conveyor belt pairs 14, 16 and 18, 20, respectively. Each blower is centered relative to cigarettes 10 so that, if blowing, it will provide an air blast directed towards the central section of cigarettes 10.

Both blowers 38 and 40 are controlled by supply valve 42 which is connected to line L1, L2 only if relay operated switches 52 are closed. As previously explained, switches 52 close in response to a gap in the regular succession of cigarettes on either belt and is opened after a predetermined number of sufficiently long cigarette pairs have passed the specific locations inspected by the two photoelectric detectors.

If it is intended to remove two pairs of cigarettes prior to a gap and two pairs of cigarettes subsequent to a gap, blowers 38 and 40 are spaced by two cigarette spacings from their respective photoelectric detectors. Further the photoelectric detectors are so designed as to be restored to their switch-opening condition after four light pulses have been simultaneously received by both photoelectric detectors. However, other arrangements may be preferable depending on the circumstances.

An arcuate chute 48 extends upwards covering both blower locations. The downwardly directed end of arcuate chute 48 is tapered as at 50 and extends into a receptacle for discarded cigarettes. It will be appreciated that chute 48 may be of different shape or directed in a different direction. Furthermore, if blowers 38, 40 are replaced with another device for removing cigarettes, for instance, if the cigarettes 10 to be discarded are pushed off conveyor belts 14, 16 and 18, 20, different and suitable receptacles for the discarded cigarettes may be installed.

In operation the succession of substantially spaced cigarettes normally passes the detector station, i.e., photoelectric detector 32, supplying a series of signals at regular intervals. As long as the detector is thus operated, it retains relay 44 in a position to maintain line switches 52 open. However, as soon as a gap in the succession of cigarettes occurs, the photoelectric detector 32 is no longer operated and relay 44 closes line switches 52. Both blowers 38 and 40 start blowing.

This condition prevails until a succession of a predetermined number of sufficiently long pairs of cigarettes passes along the double-row collection of cigarettes. As soon as both detectors simultaneously receive a succession of a predetermined number of pulses, the relay 44 is restored to its initial position opening switches 52 and shutting off both blowers 38 and 40. It will be appreciated that any other ejector may replace blowers 38 and 40.

It will be appreciated that the blowers 38 and 40 stay operated until the production line starts again, i.e., until a predetermined number of sufficiently long cigarettes have come off the production line. Thus gaps of one or more cigarettes are taken care of as well as a sequence of closely spaced gaps.

A provision is also made to automatically shut off the air (blowers) when the production of cigarettes or plug is stopped by stopping the motors of the maker. This may be done to conserve air and reduce the noise during deliberate shut-downs.

This has been accomplished by installing a set of relay contact 54 in series with the power supply to the solenoid air valve 38. The coil 56 of this relay is energized by cigarette-maker motor starter (not shown). Thus, if the cigarette-maker is shut down, there is no current available to the solenoid valve 56.

The invention hereinabove described may therefore be varied in construction within the scope of the claims, for the particular device selected to illustrate the invention is but one of many possible embodiments of the same. The invention, therefore, is not to be restricted to the precise details of the structure shown and described.

What is claimed is:

1. A cigarette rejector for a succession of cigarettes advancing at a constant speed, comprising in combination a detector responsive to a gap in the succession of cigarettes and control means operated by said detector, said control means when operated removing a predetermined number of cigarettes adjacent to the gap from the succession of cigarettes.
2. A cigarette rejector for a normally equally spaced succession of cigarettes on a conveyor belt advancing at a predetermined speed, comprising a detector positioned to detect a gap in the succession of cigarettes, a relay having an operative and an inoperative position, said relay being moved to its operative position in response to the detection of a gap by said detector, a blower, an air valve controlling said blower, said air valve being open when said relay is in its operative position, said blower being directed towards the succession of cigarettes a predetermined distance from said detector in the direction of belt advance, and means for returning said relay to its inoperative position a predetermined time interval after it has been moved to its operative position the predetermined time interval being long enough for the blower to direct an air blast across the gap and to eject at least one cigarette adjacent to the gap.
3. A cigarette rejector for a normally equally spaced series of cigarettes on a conveyor belt advancing at a predetermined speed, comprising in combination a detector positioned to detect a gap in the series of cigarettes at a predetermined position along the conveyor belt, a cigarette ejector adapted to remove a cigarette located on said conveyor belt two cigarette spacings removed from said predetermined position, and means connecting said detector and cigarette ejector adapted to actuate said cigarette ejector in response to the detection of a gap by said detector for a period of time sufficient for the cigarette ejector to perform an ejection operation across the gap and to eject at least one cigarette adjacent to the gap.
4. A cigarette rejector for two parallel normally equally spaced series of cigarettes arranged on two parallel conveyor belts advancing at the same speed, two cigarettes from different conveyors being aligned to form a pair, comprising in combination, two detectors positioned respectively to simultaneously detect a gap in either series of cigarettes, a pair of cigarette ejectors adapted to remove a pair of cigarettes respectively, a valve associated with both said cigarette ejectors, means for opening said valve for a predetermined period of time sufficient to allow the cigarette ejectors to perform an ejection operation across the gap and to eject at least two aligned cigarettes adjacent to the gap, said means being responsive to the detection of a gap by either or both detectors.
5. A cigarette rejector for a series of equally spaced cigarettes advancing with a conveyor belt at a predetermined speed, a detector operative at a gap at a predetermined location along the conveyor belt, a cigarette ejector when actuated adapted to remove a cigarette from said conveyor belt spaced a predetermined distance a head of said predetermined location, means interconnecting said detector and said cigarette ejector to actuate said cigarette ejector for a predetermined time interval in response to the operativeness of said detector the predetermined time interval being sufficient for the cigarette ejector to perform an ejection operation across the gap and to eject at least one cigarette adjacent to the gap, and an arcuate chute positioned to receive any cigarette removed from said conveyor belt by said cigarette ejector.
6. A cigarette rejector as claimed in claim 5 in which

said cigarette ejector ejects the cigarette to be removed in an upward direction and said arcuate chute extends first upwardly and then gradually changes its direction to downwardly, further comprising a receptacle at the downwardly directed end of said arcuate chute to receive the removed cigarettes.

7. A cigarette rejector for equally spaced cigarettes advancing at a predetermined speed along a predetermined path, a detector aligned with a specific location along the path to detect a gap at this position, a cigarette ejector spaced a predetermined distance from said specific location along the path for removing cigarettes from said path when actuated, a device for actuating said cigarette ejector, and control means interconnecting said detector, and said device to actuate said ejector for a predetermined time interval when said detector detects a gap at the specific location, the predetermined time interval being sufficient to allow the cigarette ejector to perform an ejection operation across the gap and to eject at least one cigarette adjacent to the gap.

8. A cigarette rejector comprising two parallel spaced endless conveyor belts, each belt being formed with equally spaced receptacles, one receptacle of a first belt and one receptacle of a second belt being aligned in a direction transverse to the extension of said belts and forming a pair of receptacles adapted to support a cigarette, a detector positioned to detect a short length cigarette or the absence of a cigarette between a pair of receptacles as a said pair of receptacles passes a specified location, a cigarette ejector when actuated adapted to eject cigarettes from the space between said two belts at a location removed a predetermined distance from said specified location and means interconnecting said detector and said ejector, said means being responsive to the detection of the gap by said detector to actuate said ejector for a predetermined time interval, the predetermined time interval being sufficient to allow the cigarette ejector to perform an ejection operation across the gap and to eject at least one cigarette adjacent to the gap.

9. A cigarette rejector for a normally equally spaced succession of cigarettes on a conveyor belt advancing at a constant speed, comprising a detector positioned to detect a gap in the succession of cigarettes, a blower, an

air valve controlling said blower, a relay having an operative and an inoperative position, said relay when in its operative position opening said air valve, said blower being directed towards said succession of cigarettes a predetermined distance from said detector, said relay being moved to its operative position in response to the detection of a gap by said detector, said relay being in an operative position long enough to cause the blower to direct a fluid blast across the gap and to eject at least one cigarette adjacent to the gap and to remain in an operative position until a predetermined number of cigarettes pass the detector causing the required number of pulses in the detector to move the relay to its inoperative position thereby closing the air valve.

10. A method of rejecting selected cigarettes from a progressing succession of cigarettes, comprising the steps of detecting a gap in the progressing succession and removing a predetermined number of cigarettes adjacent the gap from the succession of cigarettes.

11. A method of rejecting selected cigarettes from a progressing succession of cigarettes, comprising the steps of establishing the location of a gap in the succession of cigarettes and discarding a predetermined number of cigarettes preceding the gap in the direction of progress and a predetermined number of cigarettes following the gap in the direction of progress.

12. A method of rejecting selected cigarettes from an evenly progressing succession of cigarettes, comprising the steps of establishing the time of occurrence of a gap at a predetermined location along the succession of cigarettes, actuating a cigarette ejector positioned to eject cigarettes at a station spaced from the predetermined location in the direction of progress and maintaining said cigarette ejector actuated for a predetermined interval of time, so as to eject a predetermined number of cigarettes adjacent to the gap.

References Cited in the file of this patent

UNITED STATES PATENTS

2,584,327	Capstack	Feb. 5, 1952
2,729,214	Broekhuysen	Jan. 3, 1956
2,734,628	Schlayer	Feb. 14, 1956
2,951,364	Sherrill	Sept. 6, 1960