

Aug. 31, 1965

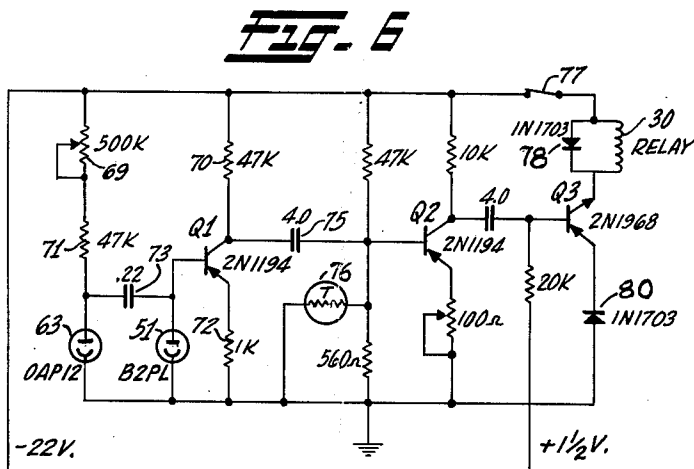
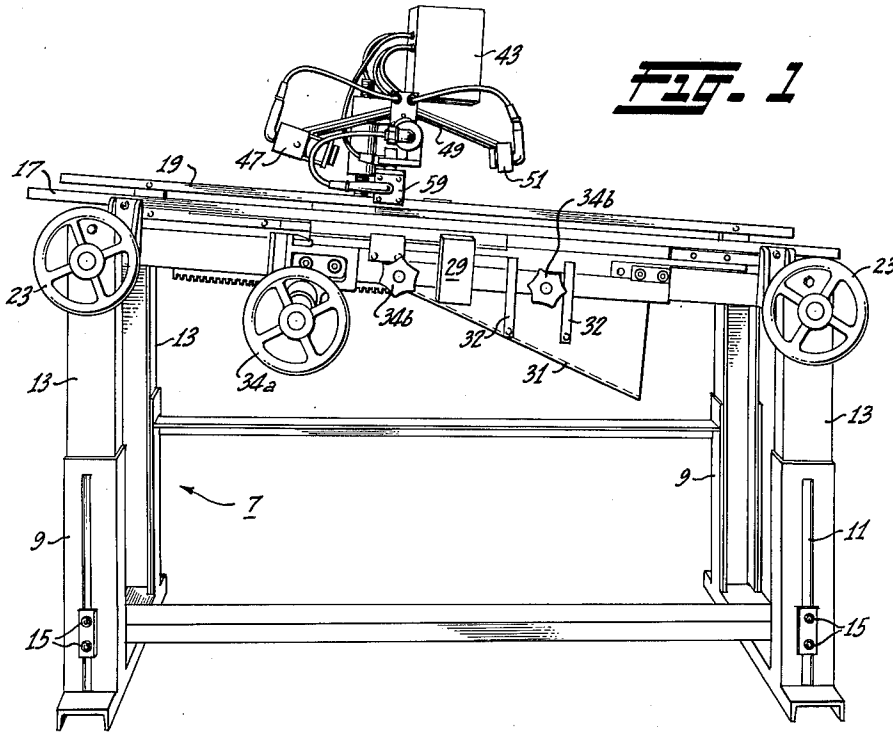
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3,203,547

LABEL INSPECTION MACHINE

Filed April 3, 1962

3 Sheets-Sheet 1



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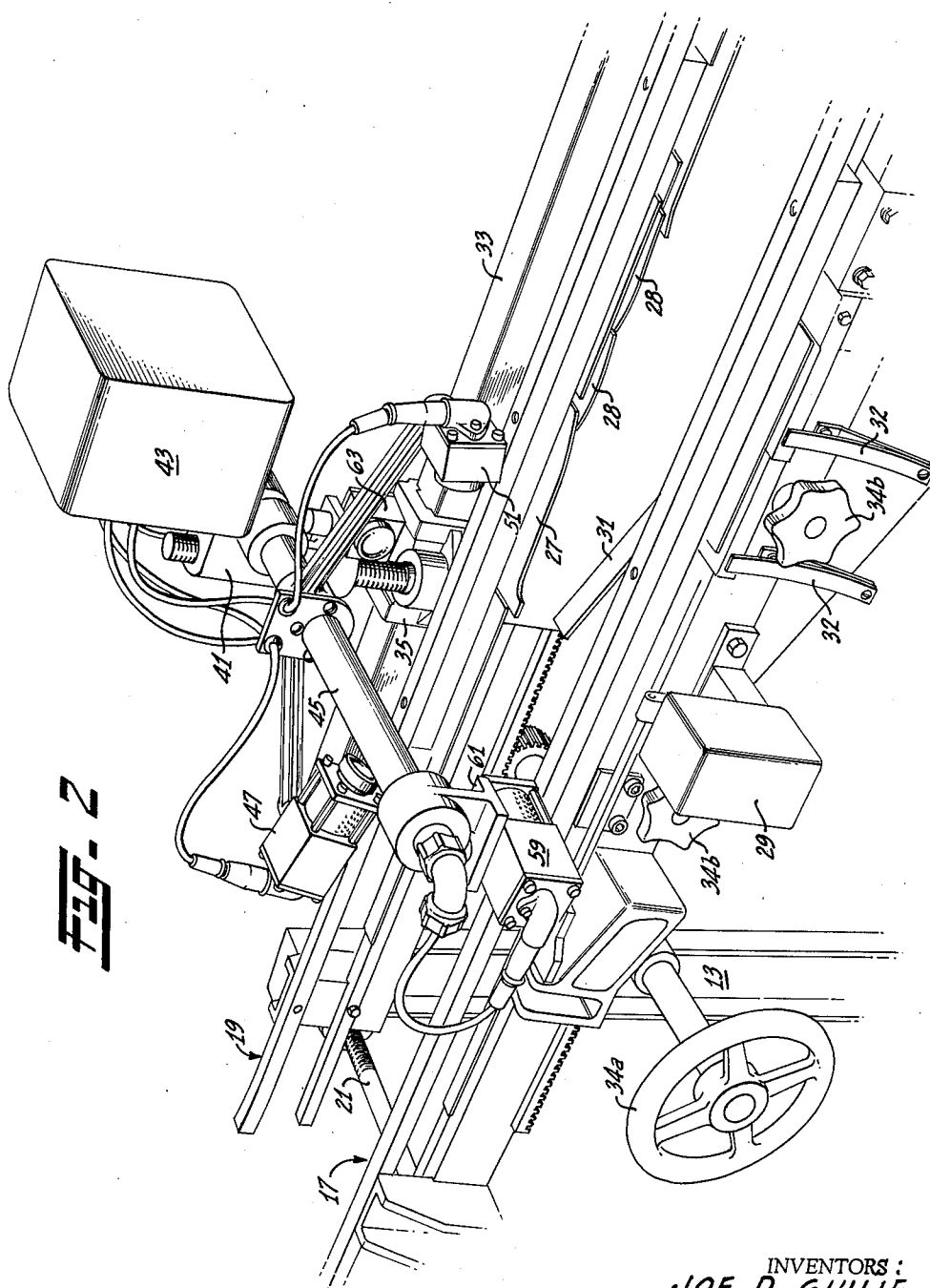


FIG. 2

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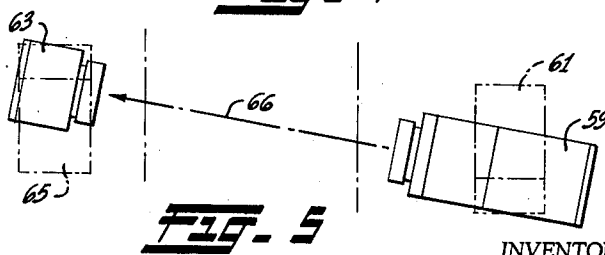
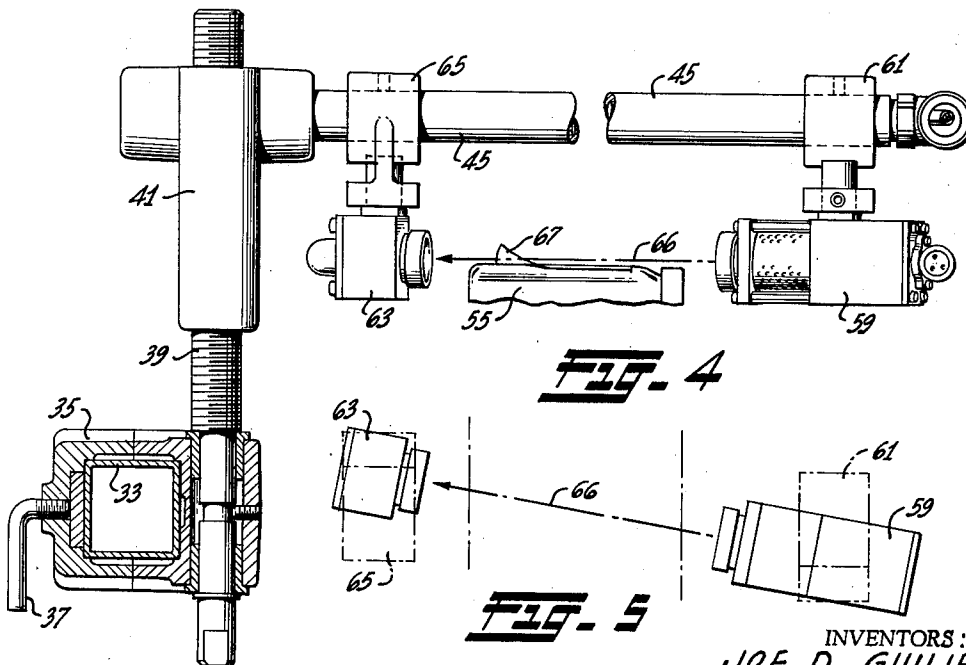
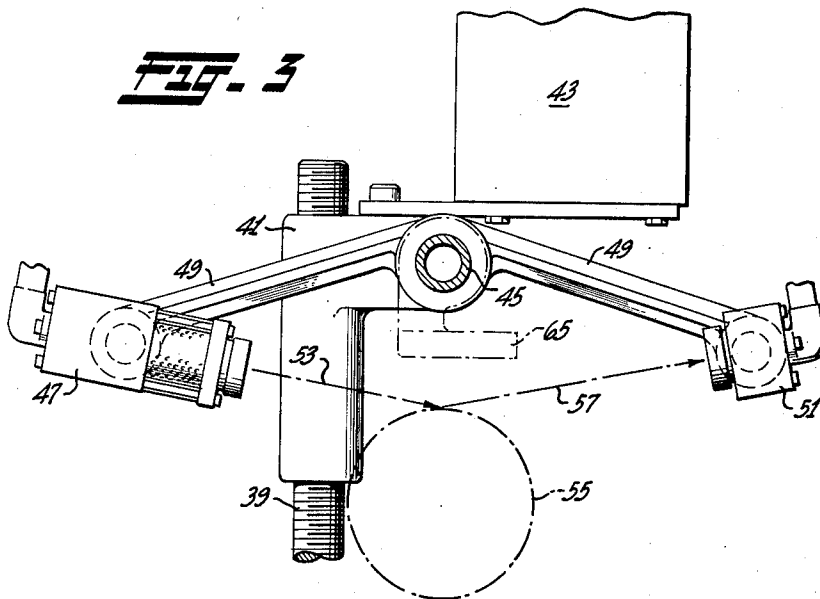
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LABEL INSPECTION MACHINE

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Filed Apr. 3, 1962, Ser. No. 184,731

1 Claim. (Cl. 209—111.7)

This invention relates to a label inspection machine and more particularly relates to a machine for inspecting the labels on glass jars or similar containers. The device of the present invention will determine whether the label is present or not and also will determine whether the label, if present, is squarely in place and free from dog-eared. It can also detect missing lids.

The machine of the present invention provides an inspection device which can operate at high speeds so that normal labeling lines are not slowed down in their operation. Further, the device of the present invention is relatively simple and has a long service life.

Another feature of the present invention is that it is adapted to inspect labels on cans or jars of widely varying sizes and can be readily adjusted to different sizes with little effort.

A further object of this invention is to provide a device for inspecting labels which will automatically segregate those containers having a defective label or no label.

In the drawings forming a part of this application:

FIGURE 1 is a side view of a device embodying the present invention.

FIGURE 2 is an enlarged, partial perspective view of the upper portion of the device shown in FIGURE 1.

FIGURE 3 is a partial side view of that portion of the device which detects whether the label is in place.

FIGURE 4 is an end view through that portion of the device which detects whether a label is dog-eared, and shows the support mechanism for the photocells and associated equipment.

FIGURE 5 is a partial top view of the portion shown in FIGURE 4.

FIGURE 6 is a schematic diagram of a suitable operating circuit for the label inspector.

Referring to the drawings by reference characters, the device comprises a base member 7 having four upstanding legs 9, each of which is slotted as at 11 and adapted to receive a leg extension 13, said leg extensions being adapted to be adjusted to a desired height by means of the bolts 15. The leg extensions 13 support a pair of parallel spaced rails, generally designated 17 and 19, which are adjustable relative to each other by means of threaded members 21 located at each end of the machine and provided with hand wheels 23 so that the rails can be moved closer together or further apart depending upon the size of the containers being inspected. The rails are provided with flat surfaces 25 for supporting a container in rolling contact. As can be readily seen from FIGURE 1, the rails are set at an angle to the base so that when a glass jar or tin can is placed at the left-hand side of the machine, it will roll down the rails. The surfaces are interrupted by the swivel members 27 which are controlled by solenoids 30 within the housings 29 located on each side of the track. Beyond the members 27 are the members 28 each of which is pivoted and held in place with a spring 32. At high rates of speed, a jar will not fall sufficiently to clear the track during its passage along the members 27 and the members 28 will spring out of the way to enable a jar to pass. In their normal position, the members 27 allow a jar or can to roll over them, so that a jar will roll without interruption from one end of the rails to the other. On the other hand, should the solenoids 30 retract the members 27, any container riding on the rails will drop through to the

secondary rails 31 which serve as a diversion path for jars having a defective label, pushing the members 28 out of the way, if necessary. The hand wheel 34A is connected to a pinion which acts against a rack to adjust the position of the drop out mechanism on the frame while the members 34B clamp the mechanism in place when the desired position is obtained.

In the embodiment illustrated, the label inspector has two photocells. The first is adapted to tell whether a label is present, and if present, whether it is on straight or turned at an angle. The second photocell determines whether the label is properly pasted down or whether it is dog-eared. It will be apparent that the machine need not have both functions and that a device could be built with only one set of photocells if both types of inspection were not desired in a single machine.

The photocell equipment, as well as the light sources and power supply, are all supported by the rectangular rail 33 which is supported by means not shown just behind the rail 19. The rail 33 has thereon a rectangular clamp member 35 with an adjusting screw 37 so that the member 35 can be moved and fixed at any desired point along the rail 33. Extending upwardly from the member 35 is the threaded member 39 which in turn supports the cross-head 41. The cross-head 41 serves to support a control box 43 and also supports the bar 45. The bar 45 in turn supports a pair of photocells and associated light sources. The bar 45 can be adjusted to any desired height by changing the position of cross-head 41 on the threaded member 39.

The first light source 47 is carried on one end of bracket 49 which is attached to the bar 45 while the second photocell 51 is supported at the opposite end of the bracket 49. The light source 47 emits a narrow beam of light 53 generally parallel to the path of travel of a jar 55 as it rolls down the rails 17 and 19. The reflected beam 57 from the jar is picked up by the cell 51. A second light source 59 is mounted by a bracket 61 on the bar 45 while its companion photocell 63 is also mounted on the bar 45 by means of a bracket 65. The beam of light from the source 59 is generally at right angles to the path of travel of a jar being inspected, although preferably it is set at a slight angle to the perpendicular to provide a better scanning action. The source 59 puts out a beam 66, the purpose of which is to detect a dog-ear 67 on a jar 55.

Thus, as a jar rolls down the rails, the light source 47 will cause a reflection from the edge of the jar into the photocell 51, while the beam from the light source 59 will be interrupted with respect to the photocell 53 in the event a jar with a label having a dog-ear passes through the machine. The photocells are electrically connected through an amplifier circuit to the relay 30 so that if the label is missing entirely or is set at an angle from the jar, or if the label has a dog-ear, the relay 30 will be actuated, diverting the jar to the path 31.

The circuit by which this is accomplished is shown in FIGURE 6. The photocell 51 is a selenium self-generating cell which normally gives a slight forward bias to the transistor Q1 which may be a PNP such as a 2N1194. Bias is obtained by means of resistors 70 and 72 and when a sharp pulse of light strikes cell 51, a negative pulse will be generated and appear on the base of transistor Q1. The photocell 63 is a germanium photocell which is not self-generating but which decreases in resistance as light strikes it, so that if light is withdrawn from the cell 63, the voltage drop across the resistors 69 and 71 is decreased, causing a negative pulse to pass through the capacitor 73 and on to the base of the transistor Q1. A negative pulse on the base of the transistor Q1 from either the photocell 51 or the photocell 63 is amplified and inverted and passes through the capacitor 75 to the base of

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the transistor Q2, where it is further amplified and inverted and passed to the transistor Q3. Thermistor 76 serves to provide temperature compensation by varying the forward bias voltage on Q2. The transistor Q3 is a transistor of the PNP type, such as a Tungsol 2N1968. A silicon PNPN device could be substituted as Q3 by inverting all the voltages in which case Q1 and Q2 become NPN. When a negative pulse strikes Q3, the loop gain exceeds unity and it goes into a heavy conduction condition, causing the relay 30 to close. Normally, the transistor Q3 would continue to conduct so that a switch 77 is placed in series with the relay, which switch opens when the members 27 are retracted. This breaks the circuit, turning off Q3 which de-energizes the relay and permits the members 27 to swing back into place. As the members 27 return, the contacts of switch 77 close, so that the relay is in position for a repetition of the cycle. Thus, the action is such that a negative pulse from either cell 51 or 63 is amplified, causing the relay 29 to close, retracting the members 27 and allowing the jar to pass down the path 31. As the members 27 retract, they open the switch 77, which removes current from the relay 30, allowing the members 27 to assume their former position so that the device is ready for a repetition of the cycle. A diode 78 prevents the relay kick-back voltage from damaging Q3 while silicon diode 80 provides temperature stability.

It will be seen that the photocell 51 receives a reflection from the light source 47 whenever a jar passes over the path. However, if a label is in place, the reflection is relatively weak, because of the diffusion effect of a paper label. On the other hand, should the label be missing, a very bright reflection will be received from the mirror-like surface of the jar. The cell 51 is adjusted in such a manner that the reflection from a label will not produce a sufficiently high negative peak to actuate the relay. On the other hand, the higher peak produced by the reflection from a glass jar will be sufficient to actuate the relay. Normally, the cell 51 and associate light source 47 are placed at the very edge of the label. Thus, if the label is in place, a relatively weak, diffused reflection will be produced, while if the label is missing entirely, or, if it is slightly off center so that there is some reflection from the glass jar itself, the sharp pulse will be produced on the photocell 51. In this manner, if the label is missing or if it is turned at an angle, a negative pulse will be produced by the cell 51, while if the label has a dog-ear, a pulse will be produced on the cell 63, so that in either

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instance a negative pulse will be produced at the base of the transistor Q1, actuating the relay and causing a jar to be deflected to the path 31.

Although only one cell 51 has been shown to inspect the edge of the label, it is obvious that this cell and its associated light source could be duplicated so that both the top and bottom edges of the label could be inspected simultaneously.

It is believed apparent from the foregoing that we have produced a simplified jar inspection device which will detect whether a label is present, whether a label is on straight, or whether it is dog-eared.

Although various circuit values have been given it will be understood that these are for illustration only and that other values can be substituted.

- We claim:
- A label inspection machine comprising in combination:
- (a) a pair of spaced, slanting rails over which containers can roll;
 - (b) a pair of swivel members, one located on each rail;
 - (c) said swivel members normally forming a continuation of the rails, and being adapted to swivel outwardly from each other whereby a container passing thereover will fall between the swivel members and onto a diversion path;
 - (d) pivoted spring biased members forming a continuation of the path of travel beyond the swivel members whereby as the swivel members swing outwardly allowing a container to partly fall below the level of the rails, the container will push the pivoted spring members aside, permitting the container to complete its travel below the rails and onto the diversion path;
 - (e) photoelectric means supported over the rails, said photoelectric means being adapted to activate the swivel members, causing them to swing outwardly upon the passage of a defective container under the photoelectric means.

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