Jan. 28, 1958 G. I. FOWLER ET AL 2,821,302

BOTTLE SORTER

Filed April 29, 1954 3 Sheets-Sheet 1

Fig. 1.

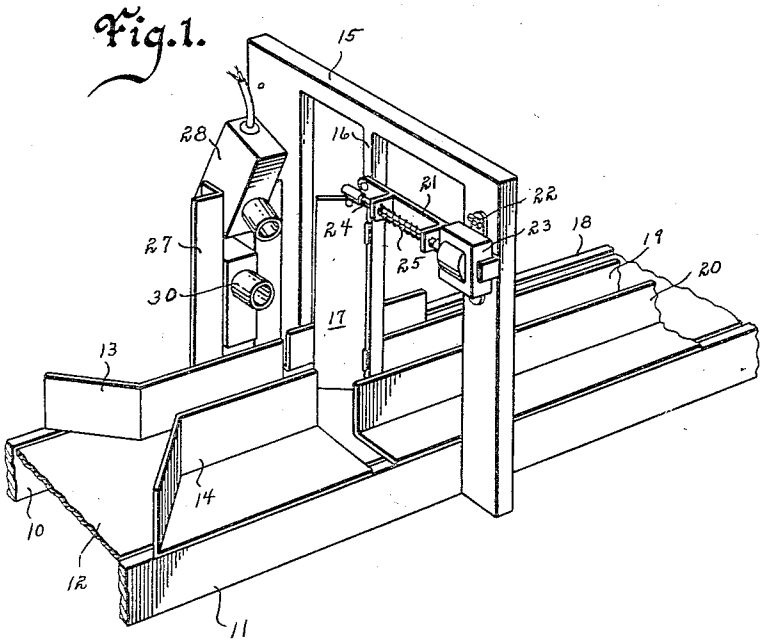
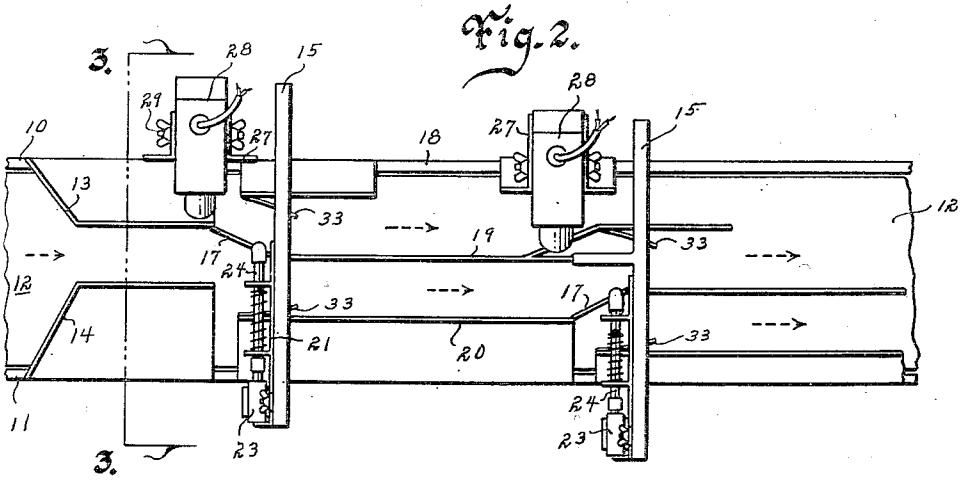


Fig. 2.



Inventors
Gerald I. Fowler & Robert R. Wilson
by Talbert Dick & Adler
Attorneys

Witness
Edward P. Seeley

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BOTTLE SORTER

Filed April 29, 1954 3 Sheets-Sheet 2

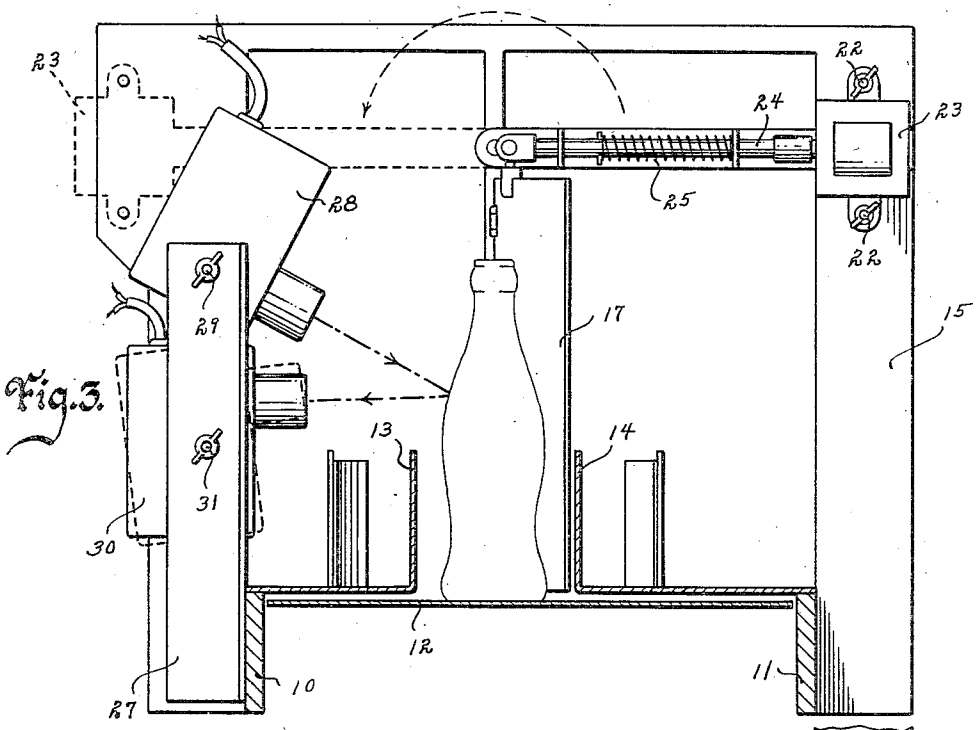


Fig. 3.

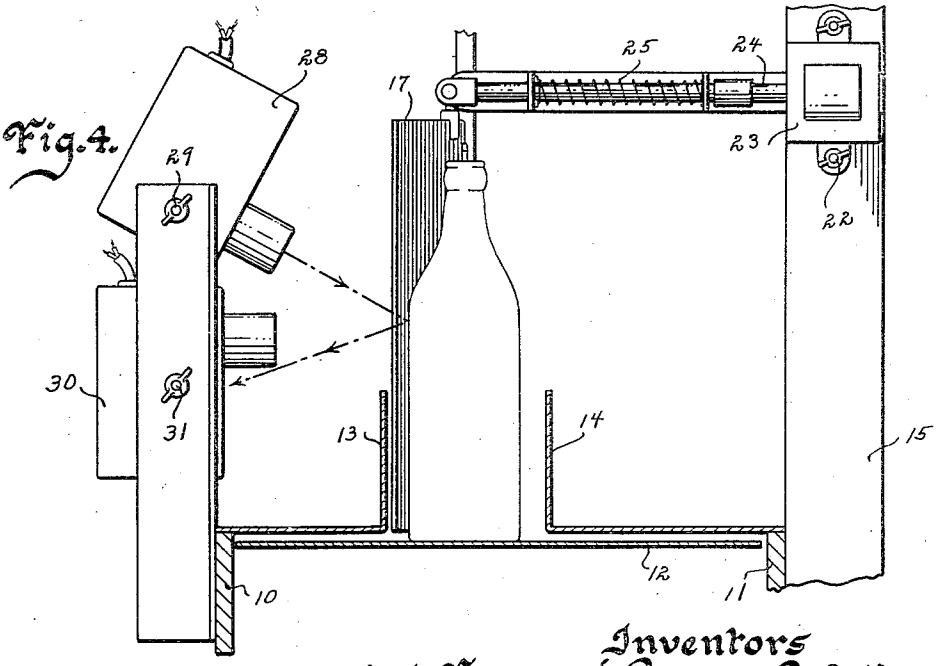


Fig. 4.

Inventors
Gerald I. Fowler & Robert R. Wilson
by Talbert Dick & Adler
Attorneys

Witness
Edward P. Seeley

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BOTTLE SORTER

Filed April 29, 1954 3 Sheets-Sheet 3

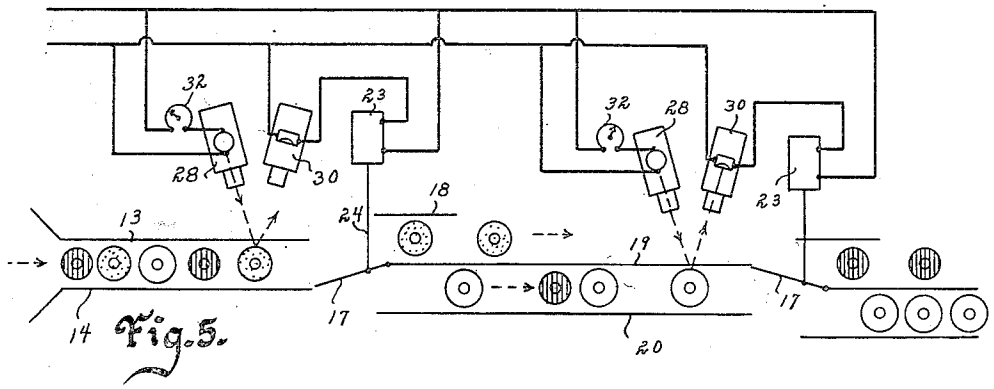


Fig. 5.

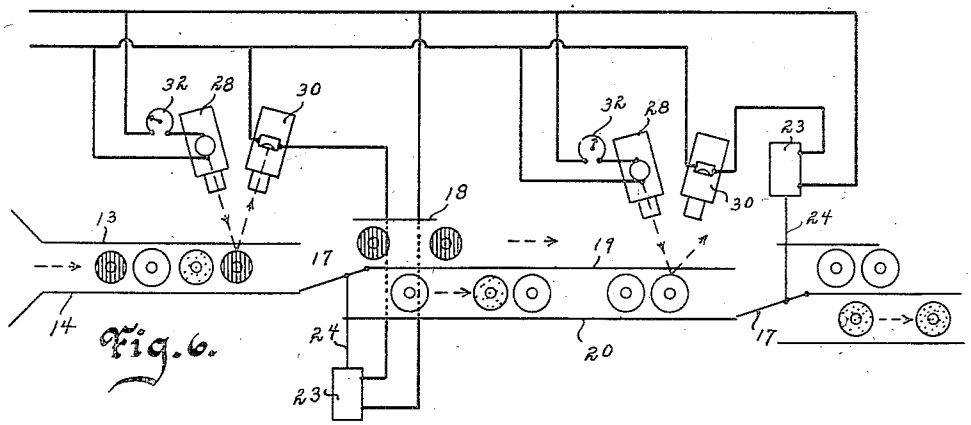


Fig. 6.

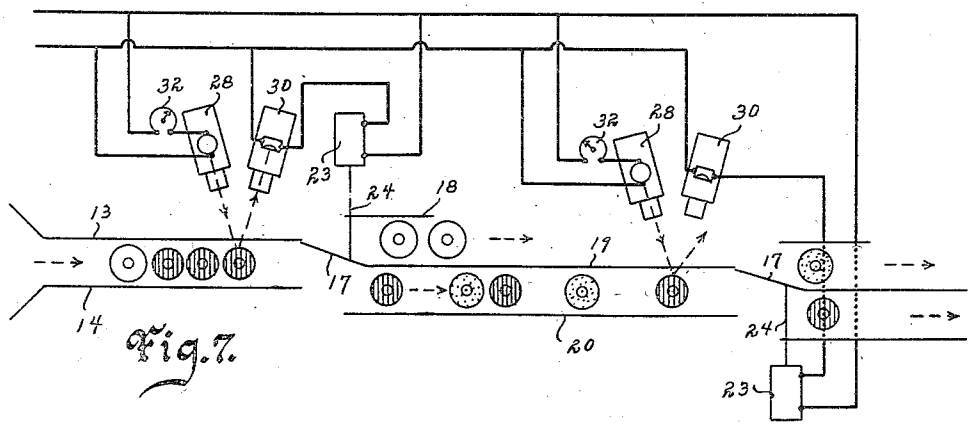


Fig. 7.

Inventors
Gerald I. Fowler & Robert R. Wilson
by Talbert Dick & Adler
Attorneys

Witness
Edward P. Seeley

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BOTTLE SORTER

Gerald I. Fowler and Robert R. Wilson, Waterloo, Iowa

Application April 29, 1954, Serial No. 426,464

4 Claims. (Cl. 209—111)

This invention relates to a device for electronically sorting bottles as to color, size, type and like.

In beverage bottling works, considerable time and labor is lost in sorting out the various styles and brands of bottles. This is due to the fact that most bottling companies bottle various brand name beverages and the unsorted bottles returned for refilling are of different characteristics used only for their particular fluid. While this problem is faced by beverage bottling companies, it is also encountered by all that receive a multitude of returned empty bottles.

Therefore the principal object of our invention is to provide an automatic bottle sorter that will divide a mass of bottles into kinds, shapes and colors.

A further object of this invention is to provide a bottle sorter that is easily adjusted for discharging selected bottles into different receiving gates or passageways.

A still further object of our invention is to provide a bottle sorter that is easily adjusted and operated.

Still further objects of our invention are to provide a bottle sorter that is economical in manufacture, and durable in use.

These and other objects will be apparent to those skilled in the art.

Our invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in our claims, and illustrated in the accompanying drawings, in which:

Fig. 1 is a perspective view of a portion of our device ready for use,

Fig. 2 is a top plan view of the device,

Fig. 3 is an enlarged cross sectional view of one of the selector units and is taken on line 3—3 of Fig. 2,

Fig. 4 is a view similar to Fig. 3, rejecting a bottle that is different in character than the bottle illustrated in Fig. 3,

Fig. 5 is a top diagrammatic view showing the selection of one type of bottle,

Fig. 6 is also a top diagrammatic view showing the selection of a different type of bottle than the ones selected in Fig. 5, and

Fig. 7 is also a top diagrammatic view showing the selection of bottles differing from either those selected in Fig. 5 or Fig. 6.

In these drawings we show two selecting units in the process, capable of dividing simultaneously at least three types of bottles. Obviously, one unit can be used to obtain a specific type of bottle from many types of bottles passing through it. Inasmuch as the two bottle selectors are indentical, we will confine our description of the same to one unit.

Any suitable frame may be used such as the members 10 and 11 shown in Fig. 1. Rotatably supported in the frame and suitably powered is an ordinary endless carrying belt 12. Above the belt and at the entrance is a vertical walled chute comprising the two spaced apart walls 13 and 14. The numeral 15 designates a rigid

bracket forward of the chute and extending over the belt as shown in Fig. 1. A center vertical post 16 extends downwardly from the bracket and is positioned in the center longitudinal plane of the chute. The numeral 17 designates a gate hinged on the rear side of the post and extending toward the chute. Forward of the post are two parallel chutes above the belt formed by the three walls 18, 19 and 20 as shown in Fig. 2. Obviously, if the gate is swung to the left, any bottles being carried by the belt will be guided into the chute formed by the walls 19 and 20, and if the gate is swung to the right, the bottles will be directed into the chute formed by the walls 18 and 19.

The numeral 21 designates a bracket arm pivoted to the post 16 and its other end detachably secured to the right side of the bracket frame 15 by bolts or like 22. The numeral 23 designates an ordinary electricity actuated solenoid on the outer end of the bracket 21. This solenoid has its actuating arm 24 pivotally and rotatably connected to the gate 17 as shown in Fig. 4. A spring 25 yieldingly holds the sliding solenoid arm outwardly when the solenoid is not electrically energized. Thus, when the solenoid is energized, the arm will be retracted, pulling the arm to the right and causing the gate to direct a bottle into the chute between the walls 18 and 19. When the solenoid is not activated, the gate will be swung by the action of the spring to the left, thereby directing a bottle or bottles into the chute between the walls 19 and 20. When the bracket arm 21 is swung over to the left, and fastened to the left side of the frame bracket 15, as shown by broken lines in Fig. 3, the reversal in the operation of the gate will result. This easy changeover gives a selection without changing the light receiving and sending portion, which we will now describe in detail.

From the drawings it will be noted that we use a light beam to selectively detect the various bottles. This can be accomplished in a variety of ways, i. e., by the angular adjustment of the light source and the light receiver, or by the adjustment of a rheostat to control the light intensity. Also, intensity of light may be controlled by longitudinal lens adjustment.

Mounted on the left side of the frame 10 is a vertical bracket 27. The numeral 28 designates the output lamp secured to the upper portion of the bracket 27 by any suitable means such as bolt 29. By loosening the nut of the bolt 29, the lamp may be placed at any desired angle, after which the nut of the bolt is tightened. Also on the bracket 27 and below the lamp 28 is the light receiver 30, also pivotally secured by bolt means 31. Also by loosening the bolt means 31, the light receiver 30 may be adjusted to the proper angle for a given bottle after which the bolt means 31 is tightened. The light intensity from the lamp 28 may be controlled by a rheostat 32.

The entire wiring of our device and its operation is illustrated in Figs. 5, 6 and 7. Obviously by the angular adjustment of the light source and receiver, and by the thermostat control of light intensity, the electrical contact can be made by the light receiver to close a circuit and actuate the solenoid which in turn operates the gate 17.

The vacuum photo-tubes may be used as a selecting means or if desired, photo-tubes with especial spectral sensitivity may be used. Such tubes are made by the Continental Electric Company, Geneva, Illinois, and we lay no claim to photo-tubes per se. We find, however, that even when ordinary tubes are used, good results may be obtained merely by the angular adjustment of the lamps. While we show light reflection as the control means, obviously it is possible to merely have the light pass through the glass and when this is done, only a rheostat intensity

adjustment is necessary. Most given brand name bottles have a color variation, although to the casual observer they look identical. It is generally considered that a Coca-Cola bottle is of a clear glass and similar to many other clear glass bottles. This, however, is not a fact and with our device, the light reflection from a Coca-Cola bottle is different from that of many other clear glass bottles. When the bottle is of an entirely different shade, such as a Seven-Up bottle, the device does not have to be critically adjusted to distinguish such a bottle from that of a Coca-Cola bottle.

We also find that most brand bottles are of different shapes and therefore reflect light differently and are able to easily and quickly operate the gate for receiving or rejecting a bottle. This can be accomplished by the intensity of the light reflection and if the bottles are decidedly of different shape, the reflection of light will in one instance be received by the light receiver and in another case will be unable to do so. This difference is illustrated in Figs. 3 and 4. In Fig. 3, the device, is set to accept Coca-Cola bottles and rejecting others. Fig. 4 shows that the reflected light does not strike light receiving unit and therefore the bottle shown in Fig. 4 is rejected. However, by using light intensity as the medium of operation, bottles of the same shape but of different reflecting characteristics can be sorted. When only one unit is used, and it is desired to accept a different bottle than the ones being accepted, the light means may be left without correction and merely the bracket arm 21 swung over to the left as shown by broken lines in Fig. 3, thereby reversing the operation of the gate. This reversal of the gate operating arm may be desirable even when more than one operating unit is employed.

In Figs. 5, 6 and 7 I show two complete detecting and sorting units. Any number of units may be used in series depending upon the kinds of bottles desired to be sorted in one operation. Various combinations may be employed to obtain the desired results.

In Figs. 5, 6 and 7, we show three types of bottles being fed into the device, any one of which may be selectively obtained. With either of the adjustments illustrated in Figs. 5, 6 or 7, all three types of bottles progressing into the machine will be separated from each other. The adjustment difference, however, obtained by these three showings does give a selection of the bottles desired to pass from the machine directly to the bottling equipment and this is selectively obtained regardless of the fact that all three types of bottles are separated. When two units are employed, all of their chute portions are in line as shown in the drawings. To facilitate the travel of the bottles on the belts and through the various chute portions, we have provided spring guided guard bars 33 on certain of the chute walls as shown in Fig. 2. The electric circuit hook-up of the units is illustrated in Figs. 5, 6 and 7.

Some changes may be made in the construction and arrangement of our bottle sorter without departing from the real spirit and purpose of our invention, and it is our intention to cover by our claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim:

1. In a device of the class described, an endless belt, a bracket frame over said endless belt, a gate hinged to said bracket frame for selectively guiding a bottle to left or right, a bearing bracket pivoted at one end to said bracket frame and capable of being swung to extend either to the right or left of its pivot point, a means for detachably securing the said bearing bracket in either of its extended positions, a solenoid on said bearing bracket, an actuating arm extending from said solenoid and rotatably and hingedly secured to said gate, a light producing means, and a light responsive means operatively electrically connected to said solenoid.

2. In a device of the class described, an endless belt, a bracket frame over said endless belt, a gate hinged to said bracket frame for selectively guiding a bottle to left or right, a bearing bracket pivoted at one end to said bracket frame and capable of being swung to extend either to the right or left of its pivot point, a means for detachably securing the said bearing bracket in either of its extended positions, a solenoid on said bearing bracket, an actuating arm extending from said solenoid and rotatably and hingedly secured to said gate, a light producing means, a means for regulating the light intensity of said light producing means, and a light responsive means operatively electrically connected to said solenoid.

3. In a device of the class described, an endless belt, a bracket frame over said endless belt, a gate hinged to said bracket frame for selectively guiding a bottle to left or right, a bearing bracket pivoted at one end to said bracket frame and capable of being swung to extend either to the right or left of its pivot point, a means for detachably securing the said bearing bracket in either of its extended positions, a solenoid on said bearing bracket, an actuating arm extending from said solenoid and rotatably and hingedly secured to said gate, a light producing means, and an adjustable light responsive means operatively electrically connected to said solenoid.

4. In a device of the class described, an endless belt, a bracket frame over said endless belt, a gate hinged to said bracket frame for selectively guiding a bottle to left or right, a bearing bracket pivoted at one end to said bracket frame and capable of being swung to extend either to the right or left of its pivot point, a means for detachably securing the said bearing bracket in either of its extended positions, a solenoid on said bearing bracket, an actuating arm extending from said solenoid and rotatably and hingedly secured to said gate, a light producing means, and a light receiving means operatively connected to said solenoid.

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