

Oct. 5, 1943.

G. P. STOUT

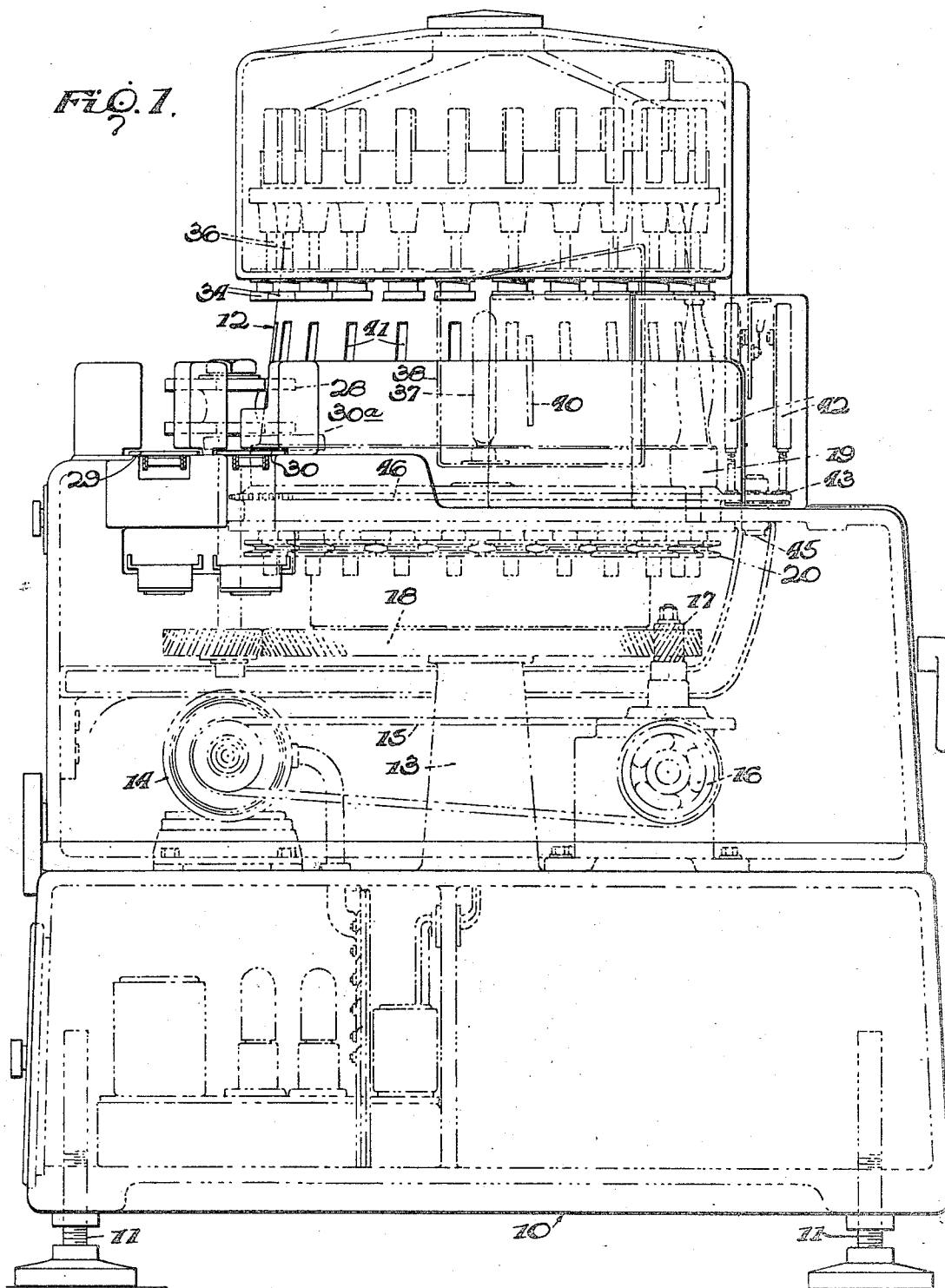
2,331,277

RAPID INSPECTION DEVICE

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2 Sheets-Sheet 1

FIG. 1.



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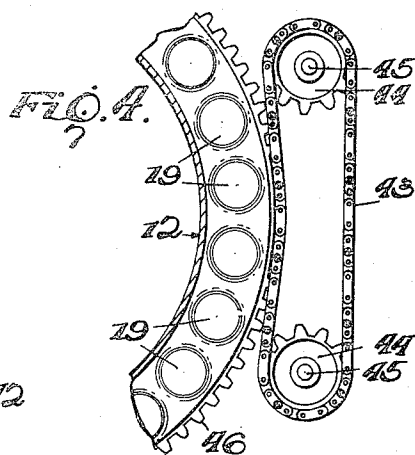
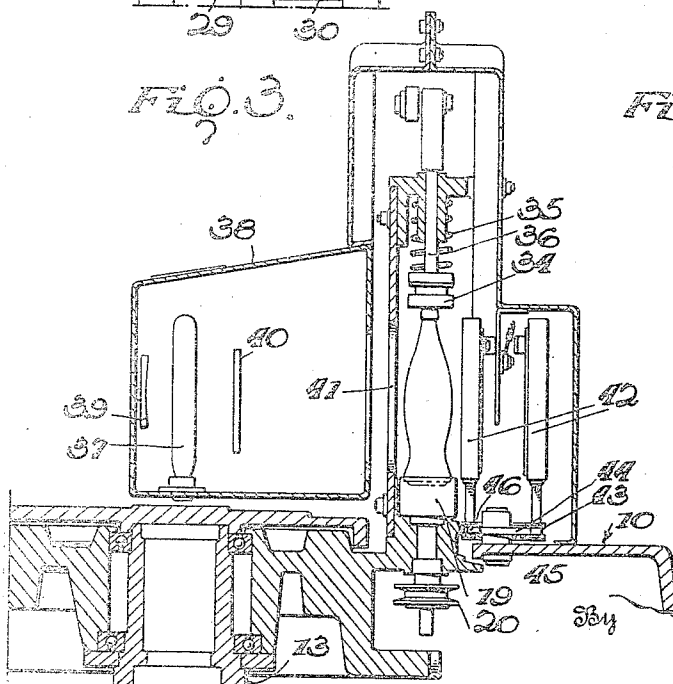
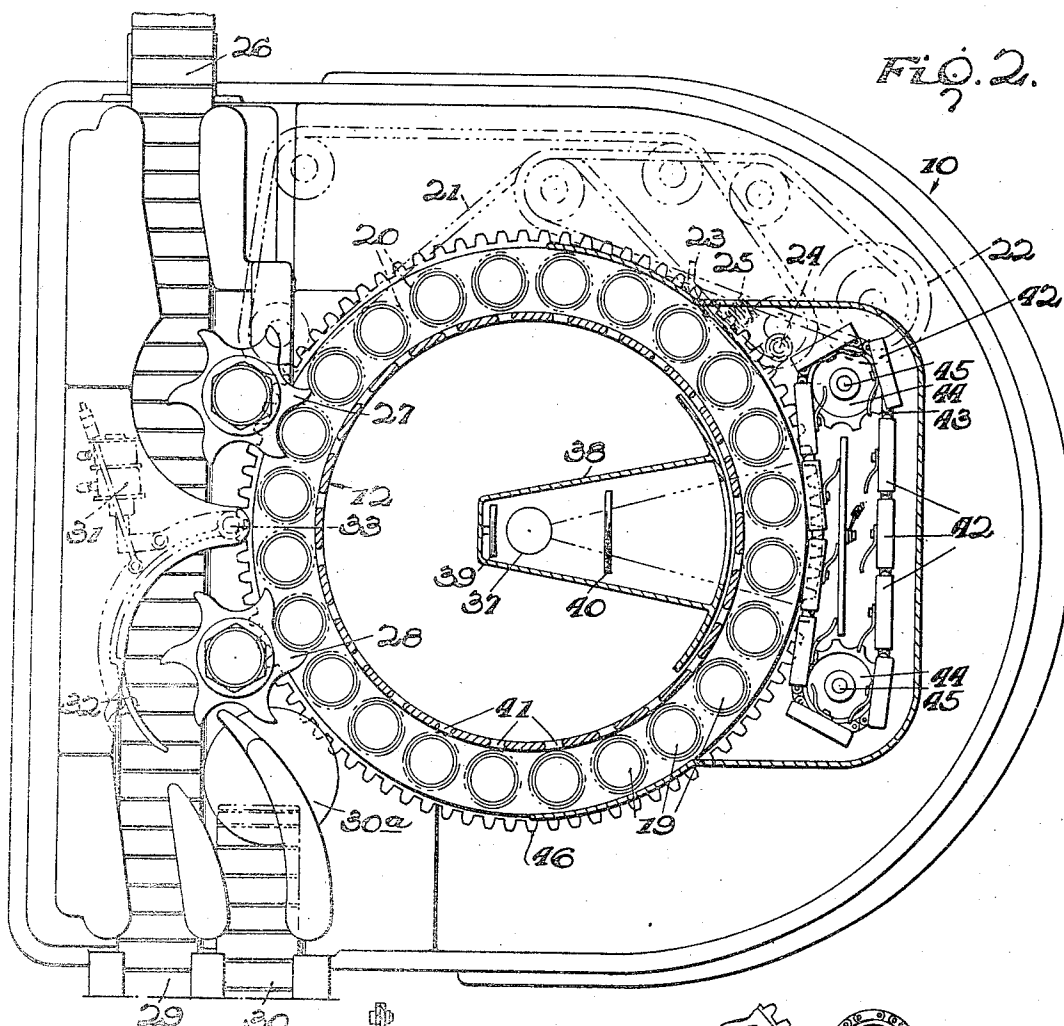
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2 Sheets-Sheet 2



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2,331,277

RAPID INSPECTION DEVICE

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Application September 10, 1941, Serial No. 410,316

7 Claims. (Cl. 209—111)

This invention relates to inspection devices, and more particularly to that type employing inter alia a photo-electric cell in the detecting of foreign ingredients in transparent containers such as commonly used in the merchandising of beverages.

I have heretofore disclosed a device of this type in my United States Patent No. 2,132,447, issued October 11, 1938, for Processes and apparatus for inspecting fluids; and machines involving this basic inventive concept are coming increasingly into commercial use. Broadly speaking, the procedure involved is to rotate a bottle at a substantial speed and then quickly stop same, allowing the fluid contents, however, to continue to revolve. The container is then in effect "looked through" by a photo-electric system to determine if there is any dynamic change such as is caused by a foreign particle passing through the beam of light of the optical system, any such change being detected by the photo-electric cells, amplified and used to bring into play mechanical means causing the bottle containing the objectionable matter to be segregated from other bottles and thereby prevented from entering the channels of trade.

While devices of this type may be considered as both successful and satisfactory, one objection thereto lies in the fact that during actual inspection the photo cell equipment must, for a stated interval, travel with the bottle in synchronized relationship therewith, upon which said optics are returned to their former position by means of a cam arrangement, and then pick up another bottle, this constant reciprocation necessarily entailing a certain loss of time and accordingly somewhat slowing down the operation of said machines. For example, it has been found that a maximum safe inspection speed lies around 120 bottles per minute under this system. In small plants this presents no problem as the equipment either operates at about that speed or at a much lower speed, but in large plants such as those found in some cities, a higher rate of bottling is uniformly practiced, which means that two inspection machines instead of one must be employed. This not only requires a diverting of every other bottle in the line to the auxiliary machine, but requires an initial extra expenditure for the other machine, which, besides representing a considerable investment in dollars and cents, is undesirable at a time when supplies and materials of this type are increasingly difficult of procurement and

when national policy demands conservation in every way possible.

An object of my invention is to provide apparatus for and a method of inspecting bottled beverages and the like whereby a single machine may be speeded up to accomplish the same results now produced by two such devices.

Another object is to provide simplicity of operation and economy in construction of a beverage inspection device.

A still further object is to make possible efficiency in operation of such a machine.

These and other objects made apparent during the further progress of this specification are accomplished by means of the instant invention, a full and complete understanding of which will be facilitated by reference to the appended drawings, in which:

Fig. 1 is a side elevational view of a beverage inspection device embodying my invention;

Fig. 2 is a top view of the structure illustrated in Fig. 1;

Fig. 3 is an enlarged fragmentary side view showing the optics employed in conjunction with my inspection device; and

Fig. 4 is an enlarged fragmentary view of the driving means directly employed to synchronously move the photo cells comprising an important part of said optics.

Referring now to the drawings (Fig. 1), it will be seen that there I employ a base and supporting structure 10, associated with which are vertically adjustable supports 11, and that a revolving turret 12 is mounted at 13, said turret being powered by a motor 14 operating through drive belt 15 to drive pulley 16, which through a conventional intermediate gear assembly rotates pinion 17 engaging the large gear 18 which extends around the lower peripheral edge of turret 12.

In said turret is positioned a series of bottle-holding cups 19 (Fig. 3) and a plurality of pulleys 20 are mounted upon conventional spindles which rotate said cups, when belt 21 which is actuated by motor 22, contacts said pulleys. This rotation of the containers is abruptly stopped, immediately before inspection, through brake arm 23 (Fig. 2) pivotally mounted at 24 and operating against the tension of spring 25. Bottles enter the machine through conveyor 26 and infeed star wheel 27 and leave same with the assistance of outfeed star wheel 28, there to be directed either to the ordinary discharge conveyor 29 or a reject conveyor 30 with the assistance of revolving disc 30a, this latter occurring when the presence of a foreign particle in a bottle has

resulted in an amplified impulse setting up means whereby solenoid 31, which normally holds reject arm 32 in an open position, becomes de-energized with the result that said arm, which is pivoted on a spring at 33, assumes the position shown in Fig. 2, the bottle containing the undesired substance then being by-passed or rejected when it reaches this point and such reject condition continuing until solenoid 31 again becomes energized, which may be effected by conventional means.

A cap or receiving element 34 (Fig. 3) is contemplated to engage the tops of bottles in the machine, said cap being held in position against the tension of spring 35 and allowed freely to revolve either on shaft 36 or in conjunction with said shaft. As the bottle enters the machine, a fixed cam guide automatically raises element 34 so that the bottle may be secured in place, said cap then descending and remaining in place until a similar guide elevates it and releases the bottle just as such is about to leave the machine.

Attention is now directed to the optical system which constitutes an important part of the instant invention, same comprising a source of light 37 suitably screened as at 38 and backed by a reflector 39, said radiant energy being passed through a lens 40 so as to direct its beams through two or more openings 41 of turret 12, the beams then passing through bottles being inspected in a more or less conventional manner.

Particular attention is now drawn to the rear or receiving end of my optical system, same constituting a plurality of photo-electric cells 42 spacedly mounted on a silent or roller chain 43, which chain operates on a pair of open-toothed gears 44 mounted on shafts 45 in such a manner that chain 43 and associated photo-electric cells revolve freely in the path established by said gears upon application of an appropriate external driving force, which in this instance is represented by teeth 46 positioned around the outside edge of turret 12 in such a manner that as said turret revolves the teeth engage 43 and thereby result in bottles adjacent said teeth travelling together in synchronized relationship with individual photo-electric cells on said chain for a stated interval during which inspection occurs.

That is, upon a bottle's coming into juxtaposition with a given photo-electric cell, the focused light from lamp 37 passes through the whirling contents of the bottle and on to the cell. Any interruption in said beam of light, such as would be caused by a foreign particle passing into or out of said light, is immediately registered by the cell, amplified and employed to cause a rejection of the objectionable container.

From the foregoing it will be apparent that my invention results in the speed of inspection being greatly increased, it no longer being necessary to wait for the optics to return to their initial position before starting inspection of another bottle, each bottle in effect being met at the threshold by a photo-electric cell which travels with it during such time as may be required for inspection, the number of cells on chain 43 and the manner in which said cells travel through a given course guaranteeing that there shall be no waiting, but that each bottle shall be promptly and expeditiously inspected.

This arrangement makes possible the elimination of the extra machine now employed in high speed plants, and at little additional cost.

While I have described in detail certain preferred structure in disclosing my invention, it

will be understood that I do not intend to limit myself thereby, nor is the exact method described herein to be unduly restricted, it being my intention that the appended claims shall be given a construction and scope fairly in keeping with my contribution to the art.

I claim:

1. In a device of the character described, means for rapidly rotating fluid-containing bottles about their vertical axes, brake means for abruptly interrupting such rotation, means for moving containers into a field of radiant energy while the contents of said containers are rapidly rotating, a series of photo-electric cells mounted on a chain and synchronized so that progressive cells come into juxtaposition with individual bottles as they are carried through the device, and means to amplify any impulse caused by the movement of a foreign particle into or out of said field of radiant energy, such amplified impulse then being employed to cause to be rejected the container in which said foreign particle is found.

2. In a device of the character described, means for rapidly rotating fluid-containing bottles about their vertical axes, brake means for abruptly interrupting such rotation, means for moving containers into a field of radiant energy while the contents of said containers are rapidly rotating, a plurality of photo-electric cells revolvably mounted and synchronized so that progressive cells come into juxtaposition with individual bottles as they are carried through the device, means to amplify any impulse caused by the movement of a foreign particle into or out of said field of radiant energy, and means including such amplified impulse to cause to be rejected the container in which said foreign particle is found.

3. In a device of the character described, means for rapidly rotating fluid-containing bottles about their vertical axes, brake means for abruptly interrupting such rotation, means for moving containers into a field of radiant energy while the contents of said containers are rapidly rotating, a plurality of photo-electric cells, means for progressively bringing said cells into operative relationship with individual bottles as such are carried through the machine, means to amplify impulses caused by the movement of a foreign substance into or out of said field of radiant energy, and means to cause to be rejected the bottle in which said foreign substance is found.

4. In a device of the character described, means for rapidly rotating fluid-containing bottles about their vertical axes, brake means for abruptly interrupting such rotation, means for moving containers into a field of radiant energy while the contents of said containers are rapidly rotating, a plurality of photo-electric cells, means including an endless chain for rotating said cells adjacent said field of radiant energy so that individual cells travel with successive bottles in synchronized relationship as such enter said field, and means to cause to be diverted containers in which foreign particles are found to exist.

5. In a device of the character described, means for rapidly rotating fluid-containing bottles about their vertical axes, means for moving containers into a field of radiant energy while the contents of said containers are rapidly rotating, a plurality of photo-electric cells, means including an endless chain for rotating said cells adjacent said field of radiant energy so that individual cells travel with successive bottles in synchronized relationship as such enter said field, and means

to cause to be diverted containers in which foreign particles are found to exist.

6. In a device of the character described, means for rapidly rotating fluid-containing bottles about their vertical axes, brake means for abruptly 5 interrupting such rotation, means for moving containers into a field of radiant energy while the contents of said containers are rapidly rotating, a plurality of photo-electric cells, means including an endless chain for rotating said cells 10 adjacent said field of radiant energy so that individual cells travel with successive bottles in synchronized relationship as such enter said field, and means including an amplifier to cause to be 15 diverted containers in which foreign particles are found to exist.

7. In a device of the character described, means for rapidly rotating fluid-containing bottles about their vertical axes, means for moving containers into a field of radiant energy while the contents of said containers are rapidly rotating, a plurality of photo-electric cells revolvably mounted and synchronized so that progressive cells come into juxtaposition with individual bottles as they are carried through the device, means to amplify any impulse caused by the movement of a foreign particle into or out of said field of radiant energy, and means including such amplified impulse to cause to be rejected the container in which said foreign particle is found.

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