L. C. CHRISTIE.

TESTING APPARATUS.

APPLICATION FILED FEB. 28, 1908.

998,591. Patented July 18, 1911.

3 SHEETS—SHEET 1.

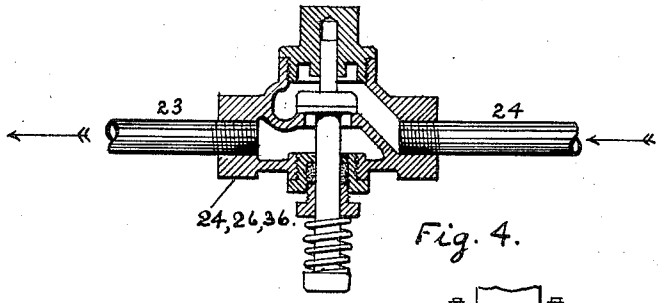

Fig. 4.

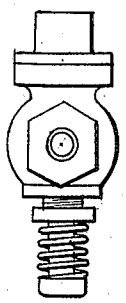

Fig. 5.

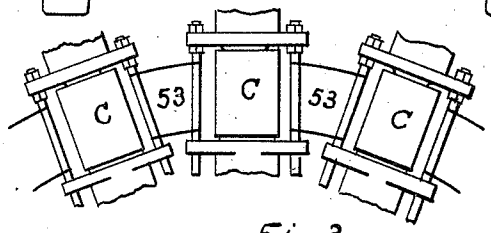

Fig. 3.

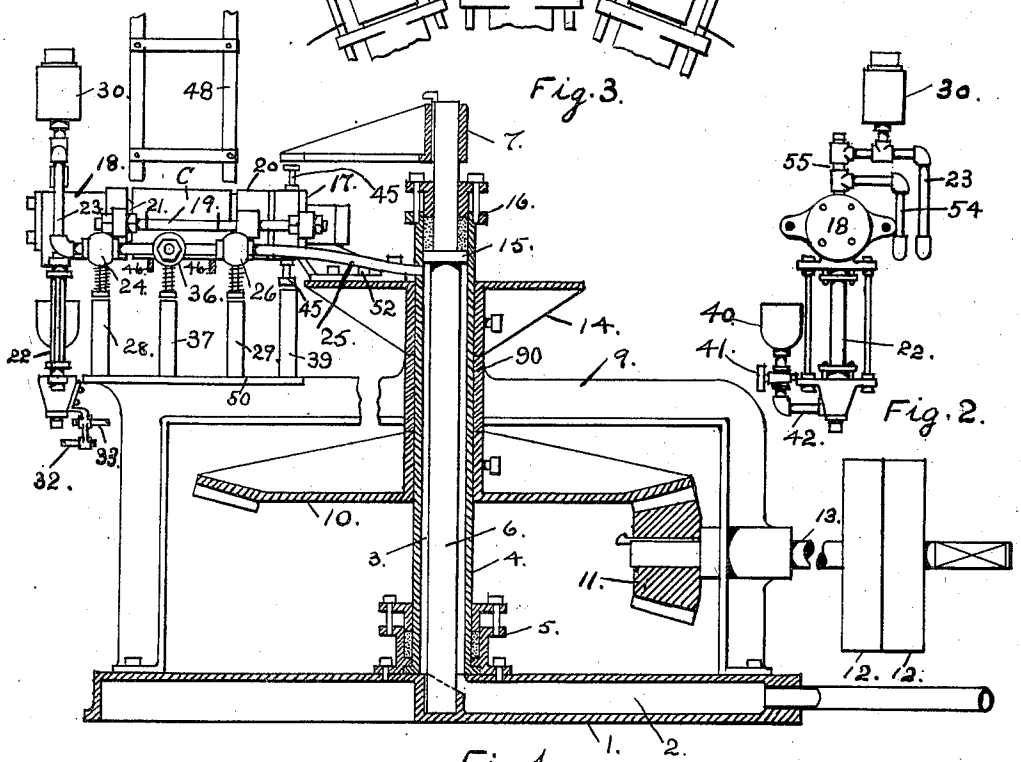

Fig. 1.

Fig. 2.

WITNESSES.

E. J. Sitting

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3 SHEETS—SHEET 2.

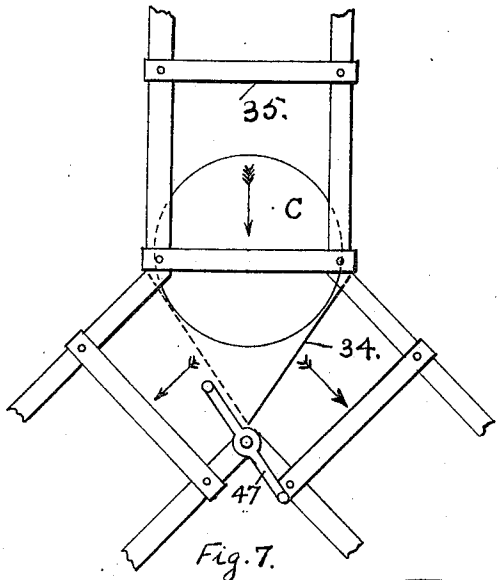

Fig. 7.

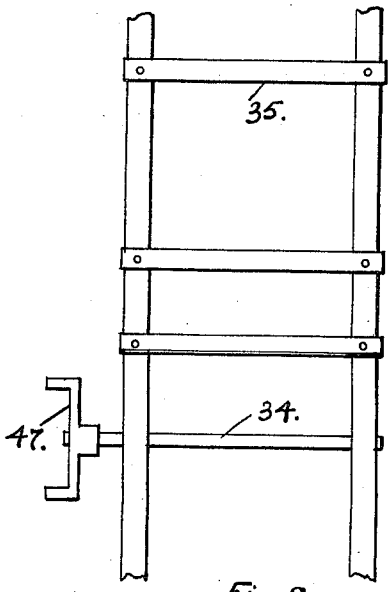

Fig. 8.

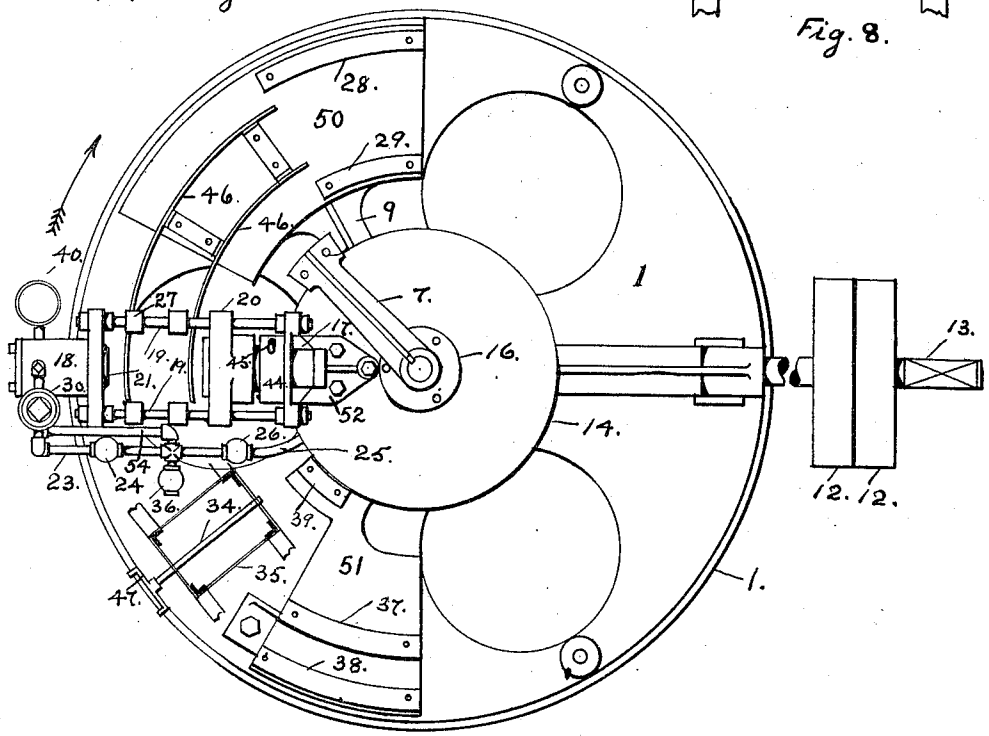

Fig 6.

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3 SHEETS—SHEET 3.

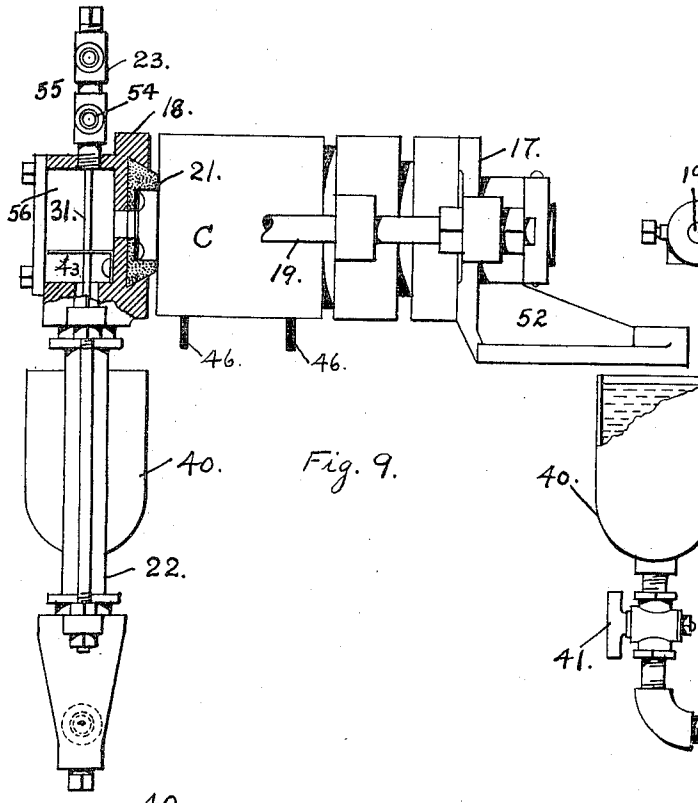

Fig. 9.

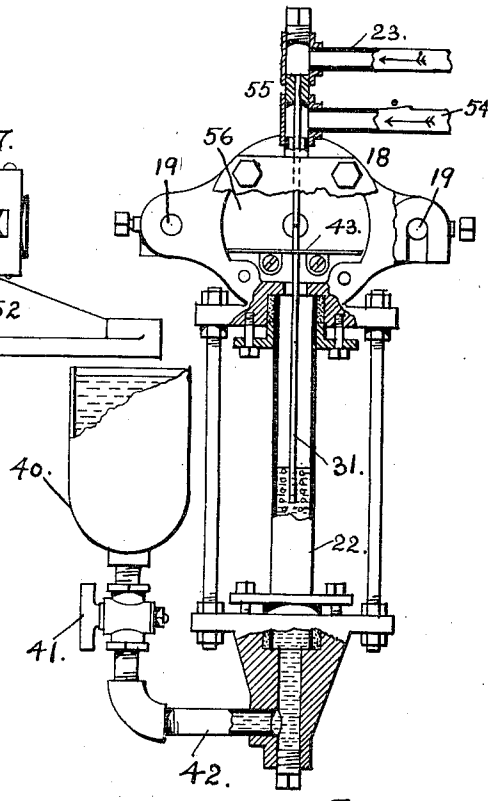

Fig. 10.

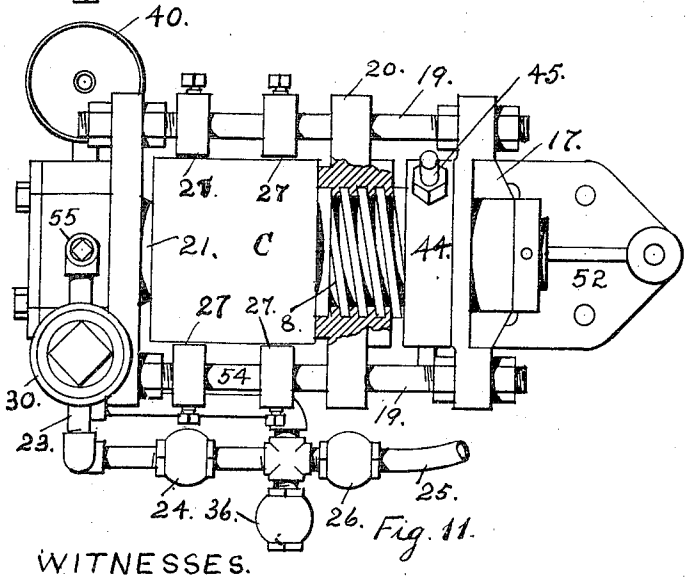

Fig. 11.

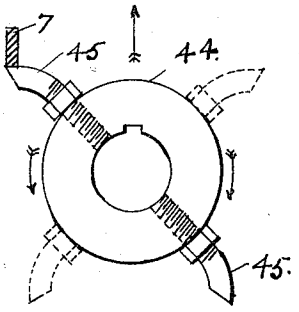

Fig. 12.

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UNITED STATES PATENT OFFICE.

LOUIS C. CHRISTIE, OF BERKELEY, CALIFORNIA.

TESTING APPARATUS.

998,591. Specification of Letters Patent. Patented July 18, 1911.

Application filed February 28, 1908. Serial No. 418,388.

To all whom it may concern:

Be it known that I, LOUIS C. CHRISTIE, a citizen of the United States, residing at Berkeley, in the county of Alameda and State of California, have invented certain new and useful Improvements in Testing Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to cam or other vessel testing apparatus, particularly to the dry testing type of the mechanism and has for its object to improve apparatus of this character in the several particulars to be hereinafter pointed out.

In the accompanying drawings I have illustrated a mechanism embodying my invention; referring to which drawings—

Figure 1 is an elevation of the mechanism, parts being in vertical section. Fig. 2 is an outer or front end view of one of the truck heads and the mechanisms immediately associated therewith. Fig. 3 is a detailed plan view illustrating the intervening guards located between adjacent trucks for insuring the proper delivery of cans to the trucks as they are automatically fed to the machine. Fig. 4 is an enlarged sectional view of one of the air supply or exhaust valves. Fig. 5 is an end elevation of the same valve. Fig. 6 is a top plan view of the machine, parts being omitted, and but one of the trucks being shown. Fig. 7 is an end view of the discharge chute and the gate for automatically directing the perfect and leaky cans, respectively, to chutes arranged to receive them. Fig. 8 is a side view of the mechanism shown in Fig. 7. Fig. 9 is an enlarged elevation of one of the can-carrying trucks, parts being in section. Fig. 10 is a front view of the mechanism illustrated in Fig. 9, parts being broken away and other parts in section. Fig. 11 is a top plan view of the mechanism shown in Figs. 9 and 10, parts being shown in section. Fig. 12 is an end view of the ring or head and the actuating projections carried thereby for operating the clamping screw of the truck.

The machine which I have illustrated in the drawings comprises a bed plate 1 in which is formed a conduit 2 through which air under suitable pressure from a source of air supply, not shown, passes to an annular passage 3, whence it is delivered, through pipes 25, to the can-supporting trucks of which there may be any desired number, one only being represented in Figs. 1 and 6 for simplicity of illustration. The annular passage 3 is located between an upright stationary post or shaft 6 at the center of the machine, and a tube 4 of a diameter sufficiently larger than the shaft to form such passage, surrounding said shaft and free to turn about the same. A stationary stuffing box 5 is carried by the bed plate constituting an air-tight bearing for the lower end of the rotating tube 4, while the packing for rendering the upper end of the tube tight is located between the gland 16 carried by the upper end of the tube and a collar 15 on the shaft 6. At the upper end of the stationary tube is a laterally extending bracket 7, the end of which is arranged to serve as a contact piece with which engages a projection 45 arranged to give motion to the can-clamping head to be presently described.

Supported upon the bed plate 1 is a stand 9 preferably formed with three legs which unite at the center of the machine to form a bearing 90 for the upright tubular shaft 4. To the latter is secured a bevel wheel 10 with which engages a pinion 11 mounted upon the drive shaft 13 which is mounted in a suitable bearing carried by one of the legs of the stand 9, and upon which are supported the fast and loose belt wheels 12, 12. The other legs of the stand are at their top fashioned into or provided with plates 50, 51 upon which are supported certain tracks or stationary contact strips which will be described. Secured fast to the tube 4 above its bearing 90, is a circular table 14 upon which are supported the trucks or carriers for the cans during the testing operations. There may be many or few of these trucks as the size of the machine warrants and they are arranged in a circular series radiating from the center of the machine of which the stationary shaft 6 is the axis. Each truck or carrier for a can or vessel consists of a supporting bracket 52 arranged to rest upon or be secured to the table 14, a pair of parallel rods 19, 19 secured fast to an upright portion 17 of the bracket and serving as supports and guides for other elements of the truck, a stationary head 18 arranged preferably at the outer ends of the rods 19, and a movable or clamping head 20. This latter part is formed with ears or perforated lugs having engagement with the rods 19

and freely movable thereupon and is internally screw-threaded and engaged by a screw 8 which is provided with a head 44 preferably located between the clamping head 20 and the face plate 17 of the supporting bracket. A pair of projections 45, 45 are carried by the head or ring 44 of the screw 8 and these engage respectively with stationary stops or contacts, one of which—the bracket 7 already referred to—is arranged to impart a rotary motion in one direction to the said ring and screw for the purpose of causing the clamping head to be moved to engage with and clamp the can or vessel to be tested, while the other contact, 39, Fig. 6, rotates the screw in the opposite direction to move the clamping head and release the can. The outer stationary head 18 is hollow as indicated in Fig. 9 and carries an elastic disk 21 formed of rubber or other suitable material, adapted to enter the filling opening when the can C or other vessel to be tested is clamped in place.

27, 27 indicate gage blocks mounted upon the parallel rods 19 and arranged to cause the can to be quickly brought to proper position when it is delivered to the truck. Between adjacent trucks are arranged shields 53, see Fig. 3, which operate to prevent the cans from lodging between adjacent trucks as they are automatically fed in the machine.

The cans or other vessels to be tested could be fed to the machine by hand, but I prefer that the feeding should be automatic and I have represented, at 48, a chute along which the cans to be tested are fed and from which they are delivered to the trucks as they successively pass the end of such feeding chute.

In order to separate the defective from the perfect cans I arranged a gate 34 below the plane in which the trucks travel and adjacent to the place where the cans are released. The position of this gate is indicated in Fig. 6 and its construction is illustrated in detail in Figs. 7 and 8. It consists of a swinging plate mounted upon a shaft that is provided with a tappet 47 having a pair of arms. These are arranged to be engaged respectively by pins or press fingers 32, 33, a set of these being carried by each truck as represented in Fig. 1. When the attendant, watching the indicator, sees a perfect can approaching the place of discharge he presses one of the fingers, 32 or 33, which, by engagement with an arm of the tappet 47, sets the gate into position to deliver to a chute leading to the receptacle for perfect cans. Should a defective can be observed the other finger is pressed and it will, on passing the tappet 47, set the gate to deliver to another chute leading to the receptacle for imperfect cans.

As stated the stationary clamping head 18 is hollow and the chamber contained therein communicates with the interior of the can through the packing ring 21 as clearly indicated in Fig. 9. The air under pressure for testing the tightness of the can is delivered to each truck through a pipe 25 which opens into the annular air passage 3, as illustrated in Fig. 1. The pipe 25 branches and has two portions, designated 23 and 54, respectively, and leading to a coupling head 55—see Figs. 9 and 10. A valve 26 having a spring-actuated spindle controls the supply of air to the two branches 23, 24; another valve, 36, controls the exhaust, communicating with these two pipes; and a third valve 24 controls the flow of air through the branch pipe 23. These valves are each spring-actuated and their construction is illustrated in Fig. 4. The ends of the spindles of these valves are provided with contact pieces or tappets, adapted to engage with stationary tracks or slides which effect the opening of the valves, the springs surrounding the spindles insuring instant closing of the valves whenever the tappets pass off from the slides. The track or slide for the tappet of valve 26 is designated 29, that for valve 36, 37, and those for valve 24, 28 and 38, respectively.

22 designates a glass test tube adapted to contain a body of liquid and communicating with the chamber 56 within the stationary clamping head 18. From this arrangement it follows that the pressure on the surface of the liquid within the test tube must correspond with that in the chamber 56 within the head 18, and as the latter communicates with the interior of the vessel for testing, the pressure within such vessel is also the same as that upon the surface of the liquid. The branch tube 54 has direct communication with the chamber 56. A small tube 31, communicating with the pipe or tube 23, as represented in Fig. 10, extends down through the chamber 56 and its lower end dips below the surface of the liquid within the test tube 22. It will be seen from the foregoing description that if valves 26 and 24 be simultaneously opened air under pressure will be delivered through branch pipe 54 to the can being tested and to the surface of the liquid within the test tube; and that another body of air will be delivered through the branch tube 23 to the tube 31. The pressure of these two separate bodies of air is equal so long as all sources of leakage are closed, and they are separated by the body of liquid within the test tube and that entering the submerged end of the tube 31. If under these conditions there should be a leakage of air from the vessel C, showing that it is defective, the pressure within the can, within the chamber 56, and on the surface of the liquid in the test tube will be reduced, as compared with that in the tubes 23 and 31, with

the result that air will flow from tube 23 through tube 31 and escaping therefrom will bubble up in the liquid in the tube, thereby seeking to restore equilibrium of pressure between the two volumes of air. As, in practice, it is proposed to charge the pipes 23 and 54 and their connections simultaneously, and then to cut them off from the air supply while the test is being made, I have found it advantageous to connect with the pipe 23 an air reservoir 30 in which may be accumulated a sufficient supply of air under pressure to insure a satisfactory test.

To guard against a too violent disturbance in the test glass by reason of a very faulty or leaky can being delivered to the truck, or in case of no can being delivered, a baffle plate 43 is provided, see Figs. 9 and 10. This plate is located within the chamber 56 and is of such shape that while it does not fit across the chamber so closely as to prevent the free passage of air in limited quantities, it nevertheless operates to check a violent or rapid rush of air. Should the test liquid fall below the end of the test tube, through evaporation or otherwise, it may be replenished from a cup 40 by opening the valve 41 and allowing a sufficient quantity of liquid to pass into the test tube through the connection 42.

The operation of the machine is as follows: A can to be tested is delivered from the chute 48 to each truck at about the time it reaches the position indicated in Fig. 6, the heads 18, 20 being then separated. The can rests upon the tracks 46 and is held in position by the gage blocks 27. The truck moves in the direction indicated by the arrow in Fig. 6 and the following operations take place in sequence: The can is first clamped against the packing ring 21 of the stationary head by reason of the engagement of a projection 45 with the projecting end of the bracket 7. As soon as the can is clamped in place the valves 26 and 24 are opened by the engagement of their spindles with the tracks 29 and 28, respectively. The air for testing is thus delivered to the can and to the tubes 23 and 31. During approximately a half revolution from the time the spindles of the valves pass off the tracks or slides 28, 29, the valves are closed and the test is made, the attendant observing the gage to see whether bubbles of air escape through the liquid. If such escape takes place a leaky can is indicated and the proper pin 32 or 33 is pushed to cause the can when released to be discharged into the faulty can receptacle. As the truck approaches the position for discharge the shoes on the ends of the spindles of valves 36 and 24 come into engagement with the tracks or slides 37 and 38, respectively, which open the pipes 54 and 23 to the exhaust. Immediately thereafter the lower projection 45 engages with the stationary contact or stop 39 and the screw 8 is turned to release the can, which is discharged upon the gate 34.

In the present machine I do not make use of a tester bath or tank containing a liquid bath within which the can to be tested is submerged. Consequently it is not necessary that the tested cans be run through a drying apparatus. The device being a dry tester, in contradistinction to a wet tester, or those making use of a tester-bath, I do not wish to be understood by the expression an "indicator or indicating device" as meaning or claiming a tester-bath within which the can to be tested is submerged, but wish to be understood as claiming any indicating mechanism for denoting a leaky can or vessel other than a tester or liquid bath.

I am aware that it is old in the art to construct a dry tester wherein the cans or vessels are tested by the vacuum process, such a machine being fully shown and described in Letters Patent of the United States No. 498,408, granted to G. Roth, May 30, 1893, for an improved can-testing machine, and I do not claim or wish to be understood as claiming a machine for testing cans by the vacuum process, and such a style of can-testing machinery is hereby expressly disclaimed by me. I am further aware that the present machine as described being a material improvement on testing apparatus as granted to above petitioner and known as Patent No. 603,874, dated May 10, 1898, and I do not therefore claim the same broadly, but experience does dictate the present form of construction and details of parts, and

What I claim as new and desire to obtain by Letters Patent is:—

1. In a dry can testing machine, the combination of a central air duct, a support connected with the said air duct, a truck for carrying a cam mounted on the said support, means connected with the said central air duct for supplying air to the interior of the can when supported in the truck, an indicating device for determining whether the can leaks, spring-actuated valves controlling the admission of air to the can and the exhaust therefrom, and means for operating the spring-actuated valves.

2. In a dry can testing machine, the combination of a central air duct, a support connected therewith, means for rotating the said air duct and support, a truck for carrying a can mounted on the support, means connected with the central air duct for supplying air to test the can when supported in the truck, an indicating device for determining whether the can leaks, spring-actuated valves controlling the admission of the air to the can and the exhaust therefrom, a stand arranged adjacent to the said movable support, and stationary means mounted on the said stand for operating the spring-actu-

ated valves in desired sequence as the said support and parts carried thereby are rotated.

3. In a dry can testing machine, the combination of means for holding a can, means for charging it with air under pressure, an indicating device for determining whether the can leaks, a connection between the air supply and the indicating device, and a separate connection between the indicating device and the interior of the can, spring-actuated valves controlling the supply to and exhaust from the can, and means for automatically operating the spring-actuated valves.

4. In a can testing machine, the combination of a rotary holder for a can, a discharge chute having one track for the perfect cans and another one for the faulty ones, a swinging gate for determining which track a can, as released from the holder, shall take, a two-arm lever connected with the gate, and a pair of press fingers arranged in position to engage one or the other of the arms of the said lever accordingly as one or the other of them is moved into operative position.

5. In a dry can testing machine, the combination of a feed chute supplying cans, a plurality of can holding trucks having clamping devices for sealing the cans air-tight, stationary contacts operating said clamping devices, a support for said can holding trucks, a revoluble compressed air-receiver carrying said support, test glasses, connections from the said compressed air-receiver to the interior of the cans and to the test glasses, conduits joined to said connections and ending in tubes partly entering test glasses, admission and exhaust valves joined to said connections, stationary contacts for operating said valves, indicating means comprising liquid partly filling said test glasses and submerging the ends of the tubes which partly enter the test glasses, reservoirs adapted to supply the said liquid, baffle plates arranged to check the rush of compressed air through the tubes during test in case of very leaky cans, discharge chutes adapted to segregate tight and leaky cans, and means for causing said segregation.

In testimony whereof I affix my signature, in presence of two witnesses, this 18th day of February, 1908.

LOUIS C. CHRISTIE.

Witnesses:
E. J. SITTIG,
B. KANSTRUP.