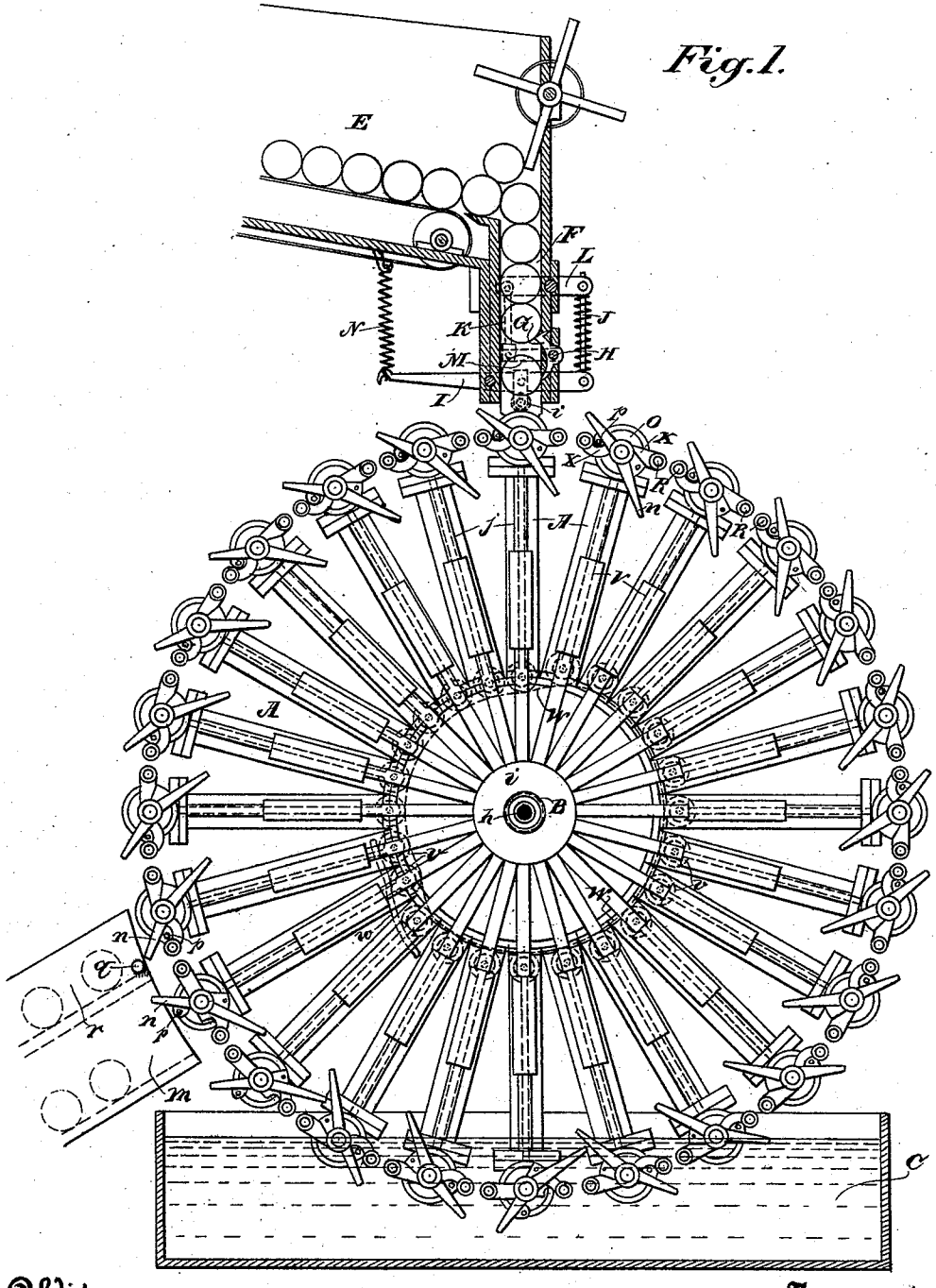
(No Model.) 2 Sheets—Sheet 1.

J. BLACK.

CAN TESTING MACHINE.

No. 531,616. Patented Dec. 25, 1894.

Fig. 1.



Witnesses,
J. L. Snure
F. F. Ascheck

Inventor,
Joseph Black
By Dewey & Co.
Attys

(No Model.) 2 Sheets—Sheet 2.

J. BLACK.

CAN TESTING MACHINE.

No. 531,616. Patented Dec. 25, 1894.

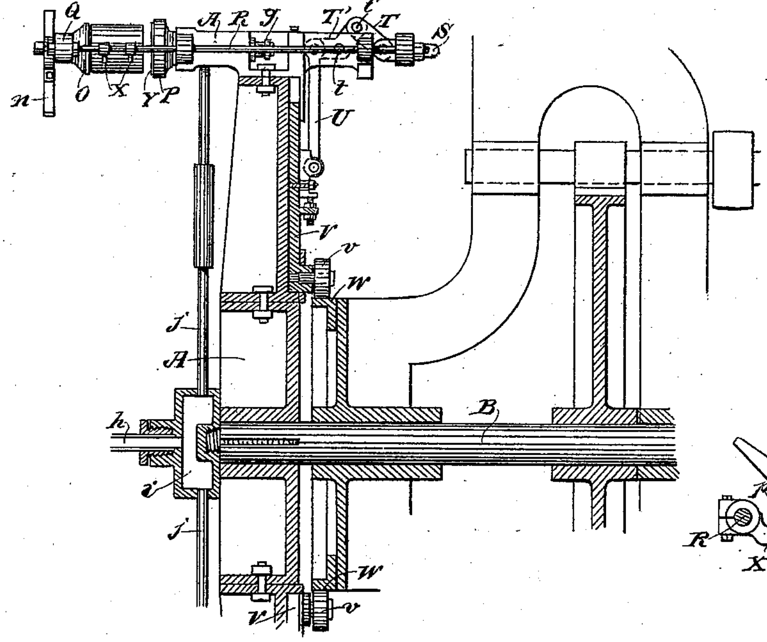


Fig. 2.

Fig. 5.

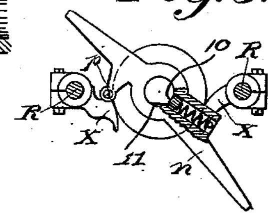


Fig. 3.

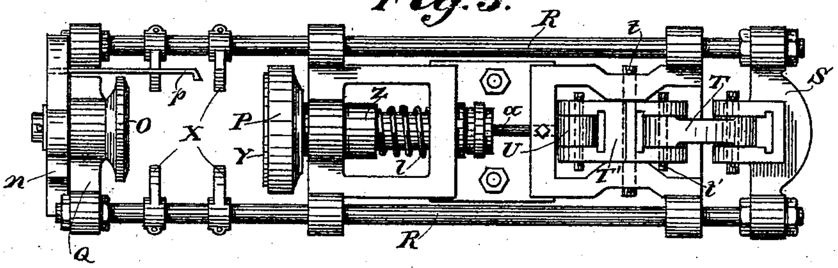
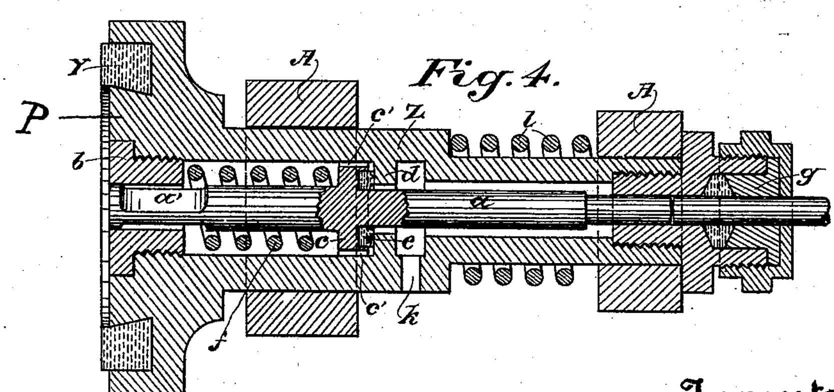


Fig. 4.



Witnesses,
J. H. Nourse
H. F. Ascheck

Inventor,
Joseph Black
By Dewey & Co.
Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH BLACK, OF SAN FRANCISCO, CALIFORNIA.

CAN-TESTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 531,616, dated December 25, 1894.

Application filed May 7, 1894. Serial No. 510,396. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BLACK, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Can-Testing Machines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus for testing cans after they have been completed, for the purpose of determining whether there are any leaks in them. It is of that class in which the cans are secured upon a rotary wheel, and air under pressure is admitted into the cans which are afterward submerged in a tank of water by the rotation of the wheel, and it consists in certain details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of the wheel showing a section of the feed apparatus, submerging tank and discharge chutes. Fig. 2 is a vertical section taken through the longitudinal plane of the axis of the machine. Fig. 3 is an enlarged detail of the mechanism for clamping the cans and supplying air thereto. Fig. 4 is an enlarged sectional view of an inner clamping head and the air supply and controlling devices. Fig. 5 is an end view showing the devices for ejecting the cans.

A is a wheel of any suitable diameter mounted upon a shaft B and having around its periphery means for holding cans while the wheel is being slowly rotated.

C is a tank of water into which the lower part of the wheel dips carrying with it the cans, which are secured to the periphery.

The cans are delivered to the apparatus by any suitable means. In the present case E is an inclined chute down which the cans roll, and F is a vertical passage connecting with the lower end, standing in line above the top of the wheel A. The cans fall into this passage one above the other, and are stopped by an oscillating pawl G mounted upon a shaft H.

The upper end of the pawl projects inwardly so as to check the cans which are descending the vertical passage F, and retain them until the shaft and pawl are turned sufficiently to allow a can to pass the upper part of the pawl G, when it is caught upon the lower part of the pawl, and is there retained until the wheel has advanced in its rotation sufficiently to bring one of the clamps between which the cans are held, into line beneath the chute.

A roller *i* is attached to the lever I suitably fulcrumed and connected by rods J, K and fulcrum lever L with a crank arm M upon the shaft H so that this shaft is rotated and the pawl G is actuated as previously described. A spring surrounds the connecting rod J, and another spring N is connected with the outer end of the lever arm I so that the parts are always returned to their normal position after the can has fallen.

The mechanism for receiving the can, consists of two disks O and P. The outer disk O is connected by a cross-head Q with rods R, these rods sliding in suitable guides and being connected at the rear end with the cross head S. The roller *i* travels upon this disk P so that when a disk P arrives under the center of the chute the lever I is raised sufficiently to press the arm M down far enough to swing the lower end of pawl G entirely out of the passage F, and it thus allows the can to drop while the upper end of the pawl G is swung inwardly and retains the next can; but when the can has dropped, that particular disk P has already moved away from the center, and the can strikes the can already in this receiving frame and rolls off and drops between the supports X of the succeeding frame as the wheel rotates, and when the next disk P arrives in the center of the chute, it releases the next can. That can will partially fall on the previous can and roll off the latter into the next receiving frame.

T T′ are the arms of a toggle lever fulcrumed together as shown at *t′*, the lever T′ being fulcrumed at *t*, so as to oscillate about its fulcrum pin.

U is a connecting rod by which the end of the lever T′ opposite to that which is connected with the lever T, is connected with a sliding arm V, carrying a friction roller *v* on its other end, which, in turn, is actuated by a cam W. The cam is of such shape, and is so situated with relation to the revolving wheel A that the toggle levers T T′ normally stand to meet at an angle, and the face-plate or disk O

is normally at such a distance from the disk P as to admit of a can falling between the two when delivered from the feed device. The can thus falling is received upon the arms X which prevent it falling through, and at this instant the toggles T T′ are operated by the cam W so as to be straightened out, thus forcing the cross-head S backward and advancing the disk O so as to press the end of the can which has the opening in it, against the disk P.

The arms X are rigidly attached to the rods R, and support the can in the downward travel to a certain point where their position will be changed as the wheel rotates until they are above the cans and the latter will thus be supported by the rods *p*. To the short shaft to which the disk O is attached the lever arm *n* is also attached in the following manner: This shaft has formed on its outer end two adjacent flattened surfaces 10, 11 and the lever also carries a socket containing a spring and block, and this block is pressed against one of these flat surfaces, and thus holds the arm in one position, and when moved to the other face, it will hold the arm steady in that position.

The disk P has an annular rubber or other elastic ring Y fitted into its face so as to receive the periphery of the can when the latter is pressed up against it, and this forms a tight joint at this point, before the toggle levers T T′ are fully straightened out. The disk P has a hollow extension Z to the rear, through which passes a shaft *a*, one end of which fits in an opening made in the center of a screw plug or gland *b* which is fitted into the end of the passage in the hollow extension Z. Just behind the end which fits into this opening in the gland *b*, the shaft *a* is cut away to a flattened or triangular form like a valve (as shown at *a*′) to leave a space or channel for the purpose to be hereinafter described.

Around the shaft is a collar *c* and within the hollow chamber Z is an inwardly projecting annular flange *d*. Between the collar *c* and the flange *d* is a washer *e* which forms a tight joint between the two and the two are normally forced together by a coil spring *f* which lies between the gland *b* and the collar *c*.

The rear of the stem *a* passes out through the rear end of the chamber Z and a tight joint is formed around it by means of a stuffing-box *g*.

Air from any source, such as a compressor or receiver into which air is forced under pressure, is admitted through a central pipe *h* into a hollow hub *i* on the face of the wheel, and from this radial air pipes *j* extend outwardly and connect with each of the chambered extensions Z through passages shown at *k*. The air thus admitted is confined in the space between the collar *c* and the stuffing-box *g*, and thus remains under pressure without being able to escape in any direction until such time as the can has been placed between the disks O and P, and the disk O advanced so as to press the can against the elastic washer Y of the disk P. A continuation of the pressure after this joint has been made tight, forces the disk P and its extension Z backward, and as the rear end of the shaft *a* is fixed so that it is immovable, the chambered extension Z slides backwardly upon the shaft. This moves the flange *d* away from the washer *e* and collar *c*, and thus allows air to pass through openings *c*′ around the periphery of the latter into the chamber containing the spiral spring *f*, and as the disk P has been forced backwardly until the end of the shaft *a* projects through the screw plug *b*, air will pass out around the flattened portion of the shaft at this point, previously described, and into the interior of the can. The cam W by which this operation is effected, is a stationary one and extends around behind the wheel with its larger diameter from the point where the cans are received, to a point near where they are to be discharged, and it thus retains the cans clamped between the disks, and air admitted into the cans under pressure, so that when the cans are submerged in the tank C any leakage of a can will be at once exposed by the escaping bubbles of air. If the cans are perfect, they remain between the clamps until they pass the end of the cam, when the toggle levers T T′ will be released, and by means of a spring *l* surrounding the extension Z, the extension will be forced forward so as to close the passage of air between the collar *c* and interior flange *d*, and at the same time the disk O will be retracted so as to allow the cans to roll into the discharge chute *m* which receives the perfect cans. The retraction of the disk O is effected by a short stationary cam *w* acting upon the roller *v*, sliding arm V and connections, to return the disk to its normal position.

n are lever arms fulcrumed upon centers exterior to the disks O, and from these lever arms rods *p* extend inwardly between the supports X. The arms *n* normally remain in such position that the rods *p* are out of the path of the cans and allow the cans to be discharged at once into the chute *m*. If, however, while the cans are passing through the water air bubbles escape, the operator who is watching, turns the lever *n* of that particular can in such a manner as to throw the rod *p* into line beneath the can, and this will prevent the can from falling into the chute *m* when it reaches it. The end of the lever *n*, however, projects in this case in such a manner that after it has passed the chute *m*, it will be engaged by a stationary pin *q* which will turn back the rod *p* to its normal position, so as to allow the defective can to fall into a chute *r* situated just above the chute *m* and the levers *n* with their rods will then be in proper position to receive another can when the device has rotated to bring these parts up to the feed apparatus again.

By the construction here shown, each can forms an operative part of the apparatus, since the inner clamping head P must be forced back before air can escape from the chamber behind it, and as the cam mechanism acts upon the outer clamping heads, the cans must be in place between them to transmit the movement to the inner heads. When no cans are in place, the wheel may be revolved without there being any escape of air. If a can fails to be placed between any pair of clamps O, P, there will be the same result and no air will escape.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a can testing machine, a water tank, a vertically rotating wheel journaled to dip its periphery into the tank at its lowest point, clamping disks adapted to receive the ends of the cans and hold the latter between them, mechanism by which the outer disk is reciprocated, consisting of the toggle levers, the stationary cam and connecting rods by which they are actuated, cross heads and slide rods connecting them and the outer clamping disk, an inner retractile disk having an annular ring washer adapted to form a tight joint with the open head of the can, a hollow rearward extension of the inner disk, a radial pipe through which air is delivered into the extension, a flange projecting inwardly within the extension, a shaft extending there-through having a collar and a washer forming a joint against the flange and projecting through an opening in the center of the disk and having channels through which air may escape into the can when the disk is retracted upon the shaft.

2. In a can testing machine, a water tank, a vertically rotating wheel journaled to dip its periphery into the tank at its lowest point, a slidable frame composed of parallel rods and end cross heads, a clamping head carried by said frame and an opposing yielding cross head guided on said frame, a cam and toggle lever mechanism connected with the slidable frame for moving said frame and its fixed clamping head whereby said clamping head is first advanced toward the opposing clamping head to confine the can between the heads, after which both heads and the can continue to move in the same direction, a stationary central shaft passing through one of the heads to form a valve or closure therefor, and a surrounding chamber receiving air under pressure and adapted to deliver into the can.

3. In a can testing machine, the combination, of a water tank, a vertically rotating wheel journaled to dip its periphery into the tank at its lowest point, a transversely slidable frame composed of parallel rods and end cross heads, a clamping head fixed to one of said cross heads and an opposing clamping head yieldingly mounted and guided on said frame, an air chamber communicating with one of said heads, with a valve or closure controlling its outlet, and means connecting with the end of the frame opposite to fixed clamping head for operating said frame.

4. In a can testing machine, two opposing clamping heads between which the can is received, a slidable frame composed of parallel rods or bars and end cross-heads to one of which heads one of the clamping heads is fixedly secured, while the other clamping head is movable and guided on said rods or bars, one of said clamping heads being provided with a valve or closure controlling the discharge from an air chamber, and means for operating the frame transversely whereby as the fixed clamping head advances toward the opposing head it presses the can against the latter and then overcomes the resistance of the said opposing head to cause it to slide upon the movable frame and uncover the valve-controlled discharge from the air chamber.

5. In a can testing machine having a water tank, a vertically rotating wheel journaled to dip its periphery into the tank at its lowest point, opposing clamping heads carried by the wheel and adapted to receive the cam between them, a frame consisting of parallel rods and cross heads slidable transversely of said wheel and carrying one of said heads and serving as a guide for the opposing head, means whereby said opposing head may yield in the direction of the movement of the frame, and means for operating the frame whereby the clamping head carried by it is advanced toward the opposing head to confine the can between itself and the opposing head and transmits its own movement to the opposing head, and means for supplying air to the interior of the can during the movement of said opposing head.

6. In a can testing machine, a frame composed of parallel bars or rods slidably mounted and connected at their ends by cross heads, an outer clamping head carried by one of said cross heads, an opposing inner clamping head yieldingly mounted in said frame and having an internal chamber connected with an air supply, toggle levers connected with the other cross head, a stationary cam for actuating said levers, and a stationary shaft passing through the chamber of the inner clamping head to form a valve or closure therefor.

7. In a can testing machine, a water tank, a vertically rotating wheel journaled to dip its periphery into the tank at its lowest point, a transversely slidable frame carried by the wheel and comprising parallel rods and end cross heads, a clamping head fixed to one of said cross heads, an opposing head yieldingly mounted in the slidable frame, said heads adapted to receive the can between them, means for operating the slidable frame consisting of toggle levers connected therewith and with a fixed point, a stationary cam and a vertically slidable connection between the same and the toggle levers, one of said heads being connected with an air chamber con-

trolled by a valve which opens when the head is moved, whereby air may be discharged into the can.

8. In a can testing machine, a water tank, a vertically rotating wheel, clamping heads upon the wheel, mechanism for admitting air under pressure through one series of these heads into the cans clamped between opposing heads, a chute having a vertical extension whose lower end stands in line above the top of the wheel, a shaft mounted in said vertical extension and carrying a pawl the upper end of which projects into the passage of the extension and means for oscillating said pawl.

9. In a can testing machine having a revoluble wheel with opposing clamping heads for receiving the can between them, a chute having a vertical extension with a passage through which the cans pass terminating just above the top of the wheel, an oscillating pawl operating within said vertical passage to check the passage of the cans, and means for operating the pawl consisting of suitably fulcrumed levers and connecting rods, one of said levers being actuated during the passage of a previous can beneath it whereby the can held in check is permitted to descend.

10. In a can testing machine, a revoluble wheel and peripheral clamping devices adapted to receive and hold the cans to be tested, a chute through which cans pass to the top of the wheel, having a vertical extension terminating just above the top of the wheel, an oscillating stop so fulcrumed that its ends when interposed in the passage will check the movement of the cans, a lever so fulcrumed to said extension that it will be in the path of and will be elevated by a can or other projection carried by the rotating wheel, and connections between the lever and the stop whereby the latter is oscillated to release and deliver a can between each set of clamps upon the wheel.

11. In a can testing machine, a revoluble wheel with reciprocating clamps around its periphery, a chute and mechanism by which the cans are delivered singly between the clamps, supports upon which the cans are received and held while being grasped by the clamps, lever arms fulcrumed upon the axes of the exterior clamps, with arms *p* extending therefrom beneath the cans, a discharge chute *r* and a stop *q* adapted to engage the arms and turn them to eject the cans into the chute.

12. A can testing machine consisting of a revoluble wheel journaled to dip its periphery into a water tank at its lowest point, and comprising a hollow hub and radial extensions, movable disks upon the periphery of the wheel against which the ends of the can are adapted to abut, having chambers into which air under pressure is admitted from the radial pipes and valves closing openings through the disk faces to the cans, opposing disks between which and the air supply disks the cans are clamped, and mechanism comprising a stationary cam and toggle levers by which the latter disks are moved to first clamp the cans and afterward retract the air supply disks and open the passages to the cans.

In witness whereof I have hereunto set my hand.

JOSEPH BLACK.

Witnesses:
S. H. NOURSE,
J. C. BRODIE.