(No Model.)

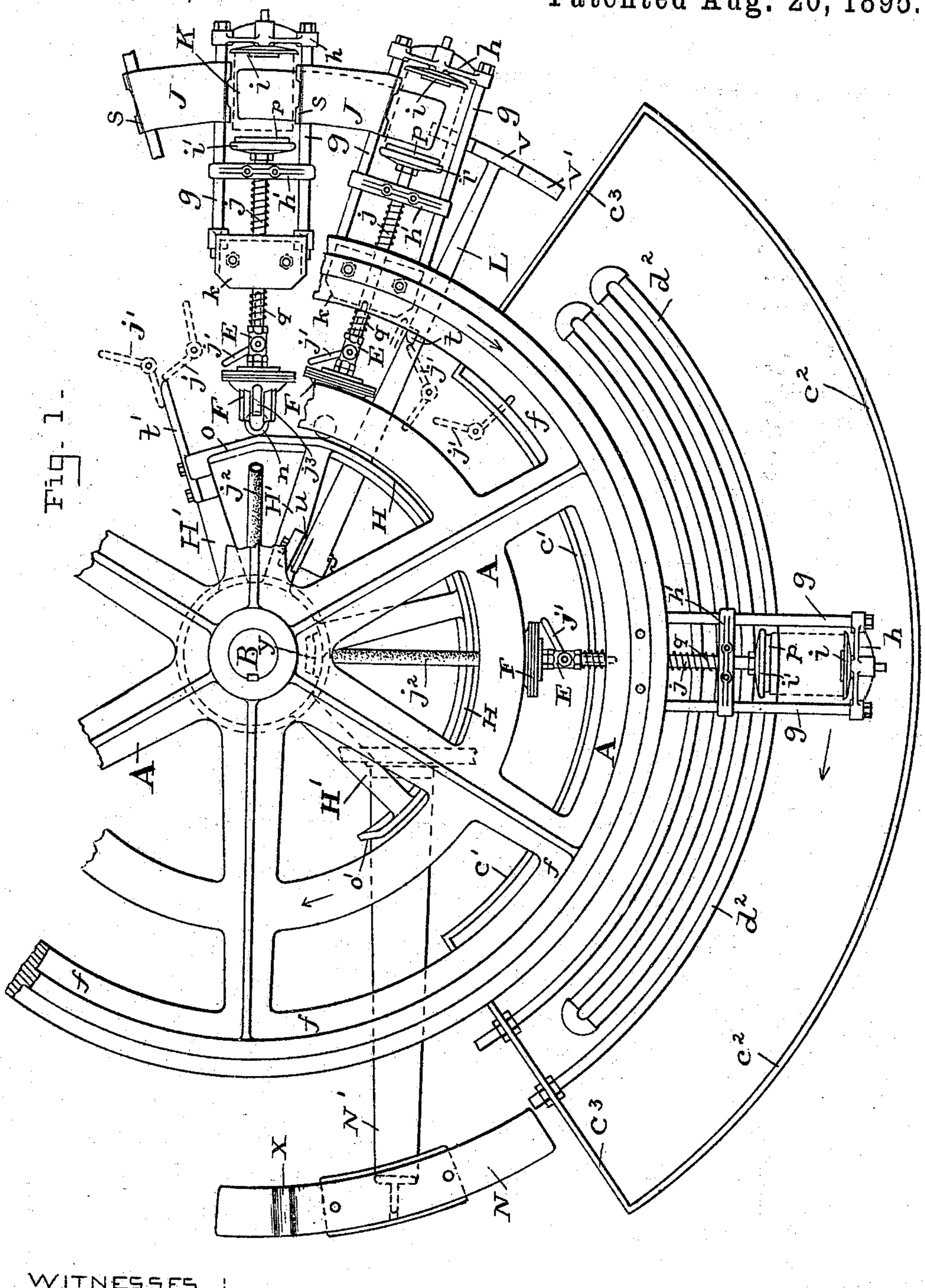
3 Sheets—Sheet 1.

W. H. H. STEVENSON.

CAN TESTING MACHINE.

No. 544,905. Patented Aug. 20, 1895.

Fig. 1.



WITNESSES :

L. L. Van Doren.

Charles B. Mann Jr.

INVENTOR :

Wm H. H. Stevenson

By Chas B. Mann

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(No Model.)

3 Sheets—Sheet 2.

W. H. H. STEVENSON.

CAN TESTING MACHINE.

No. 544,905. Patented Aug. 20, 1895.

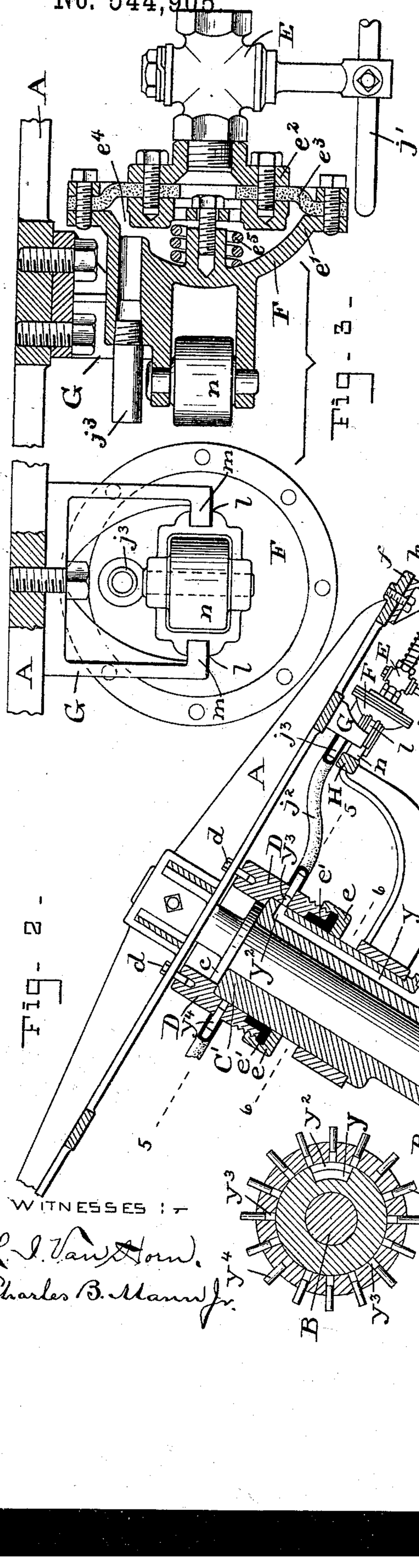

Fig. 2.

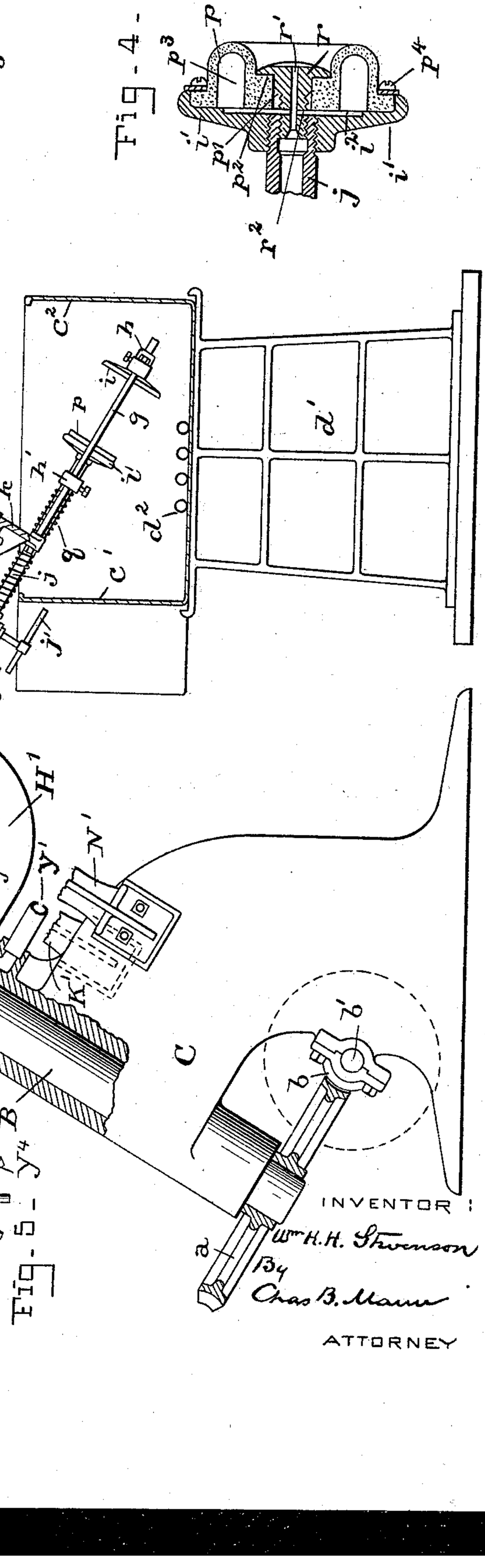

Fig. 3.

Fig. 4.

Fig. 5.

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(No Model.) 3 Sheets—Sheet 3.

W. H. H. STEVENSON.

CAN TESTING MACHINE.

No. 544,905. Patented Aug. 20, 1895.

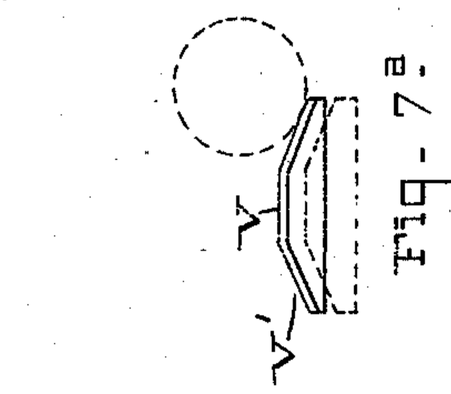

Fig. 7a.

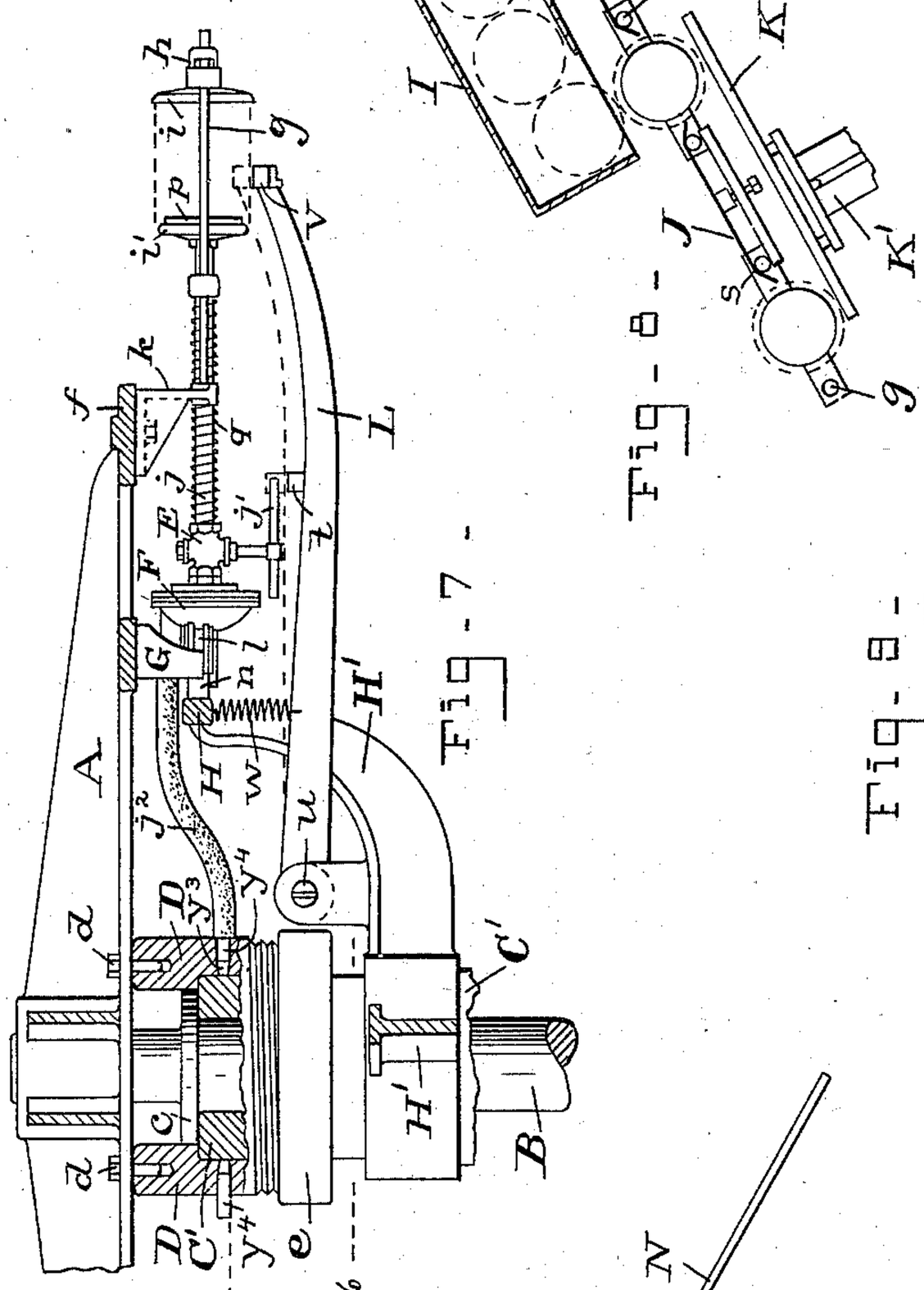

Fig. 7.

Fig. 8.

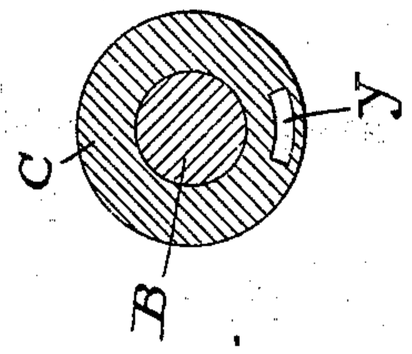

Fig. 8.

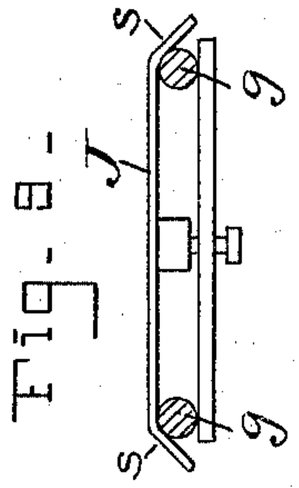

Fig. 8.

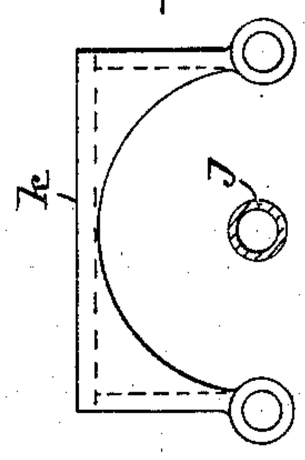

Fig. 10.

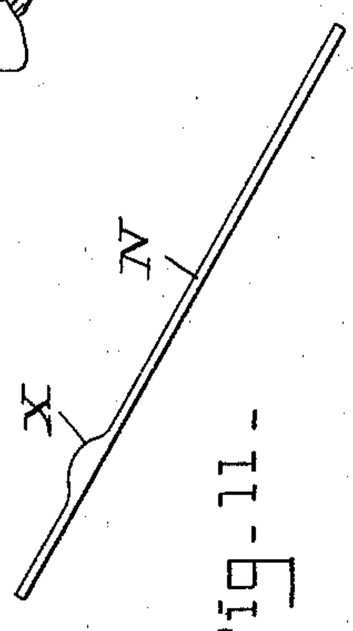

Fig. 11.

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UNITED STATES PATENT OFFICE.

WILLIAM H. H. STEVENSON, OF MOUNT WASHINGTON, MARYLAND.

CAN-TESTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 544,905, dated August 20, 1895.

Application filed August 16, 1894. Serial No. 520,442. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. H. STEVENSON, a citizen of the United States, residing at Mount Washington, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Can-Testing Machines, of which the following is a specification.

This invention relates to a machine for detecting leaks in tin cans which are to be used for hermetically sealing articles of food, such as fruits, vegetables, meats, and oysters.

This machine involves the use of compressed air to be forced into the can while it is undergoing test and a water-tank into which the cans are submerged while containing the compressed air. If the can leaks, such fact will be indicated by air-bubbles which will arise in the water-tank.

As the operations of this machine are all automatic, it is important to provide means for preventing compressed air from escaping into the water in the tank in the contingency that one or more of the can-holders, during the rotation of the machine, should fail to receive a can to be tested. It will be obvious that if a stream of compressed air was discharging from one can-holder into the water in the tank the water would thereby be so much agitated as to render it impossible to distinguish air-bubbles arising from a leaky can in another can-holder. To prevent this difficulty is one of the objects of my invention.

This invention consists of means to accomplish the end mentioned and of certain other novel features both of construction and combination of parts.

The accompanying drawings illustrate one form of machine for carrying my invention into effect.

Figure 1 is a top plan view of the greater portion of a machine, being shown as broken away because the drawing-paper is not large enough to show the entire machine. Fig. 2 is an elevation showing the rotary can-carrier partly in section and the segment-shaped water-tank. Fig. 3 shows a sectional view, on a larger scale, of the valve which controls the passage of compressed air to the can-holder. Fig. 4 is a sectional view of the elastic sealing-cap which closes the mouth end of the tin can. Fig. 5 is a section on line 5 5 of Fig. 2, showing the air-passages in the bearing and revoluble box. Fig. 6 is a section of the shaft and bearing on the line 6 6 of Figs. 2 and 7. Fig. 7 shows a detail of the depressible arm and related parts. Fig. 7^a is an end view of the shoe on the depressible arm. Fig. 8 is a side view of the chute or can-feed device and related parts. Fig. 9 is a view of the bridge which connects between adjoining can-holders. Fig. 10 is a front view of the bracket-plate of a can-holder. Fig. 11 is a side view of the can-release device.

The rotary can-carrier A is mounted on the upper end of an inclined shaft B, which turns in a base-bearing C, on which the whole machine is supported. The lower end of the shaft B has a worm gear-wheel *a*, which meshes with a worm *b* on a driven shaft *b'*. This worm-shaft imparts rotary motion to the can-carrier A. The upper end of the shaft B has a flange *c*, which rests upon the top of the bearing and serves as a seat to support the shaft. The upper part C' of the bearing C is turned around exteriorly, so that a box D, which is secured by bolts *d* to the under side of the carrier A, may fit close and turn on said rounded part. A collar *e*, also around the shaft, serves to make a packing or stuffing box *e'*.

The can-carrier A is a wheel, the rim *f* of which has a number of can-holders attached. These can-holders, in the present instance, comprise two parallel rods *g*, united at their outer ends by a cross-bar *h*, which carries a stationary seat or can-disk *i*. Another cross-bar *h'* serves as a bearing for a pipe *j*, which has endwise movement through the cross-bar, and the outer end of the pipe carries a metal disk *i'*, on which is an elastic sealing-cap *p*. (See Fig. 4.) A screw *r* has an air-passage *r'* through its head and stem, and said screw extends through a central hole *p'* in the sealing-cap and into the end of the pipe *j*. The can to be tested is placed between the stationary disk *i* and the sealing-cap *p*, the mouth end of the can resting against the said cap. The disk *i'* and the elastic cap *p* are of special construction to insure an air-tight closure of the mouth of the can while the can is undergoing test. The sealing-cap has a depressed center provided with a seat p^2 around the

hole p'. The head of the screw r bears on this seat. The cap also has on its under side, next to the metal disk, an annular groove or chamber p^3, which surrounds the depressed center. This construction forms an elastic ring-shaped shell, which is the cap p referred to. This ring-shaped shell or cap bears against the mouth end of the can, the depressed center part and screw-head coming immediately over the open can mouth. The elastic sealing-cap is secured to the metal disk by a ring placed around the rim of the cap and secured by screws p^4.

The metal disk i' has on its face adjoining the elastic cap a diametrical groove i^2, over which the annular chamber p^3 of the cap is seated, and the screw r has a cross-passage r^2, leading from the passage r'. This construction insures that compressed air coming from air-pipe j to the can that is being tested will pass through the passage r' to the can, and also pass from the cross-passage r^2 to the diametrical groove i^2 on the metal seat, and thence into the annular chamber p^3 of the cap. Thus the elastic sealing-cap will be inflated with compressed air. The two rods g of each can-holder are rigidly held by a bracket-plate k, secured to the rim f of the carrier-wheel, and the radial air-pipe j passes below said bracket. The inner end of the air-pipe j is attached to a valve-cock E, whose plug-stem has a cross-rod lever j', by which the said valve-plug is turned to let on the compressed air to the can or cut it off. The two ends of the cross-rod j' have the relative position of an obtuse angle. (See broken lines in Fig. 1.)

The cock E is attached to an equalizing-case F, which has an exterior slide-groove l on each of two sides, and a stationary hanger G is attached to the carrier-wheel and has two inturned slide-flanges m, which point toward each other. Each of these flanges m takes in one of the said slide-grooves l, so that the equalizing-case F may slide or reciprocate in a radial direction from the main shaft B, and the cock E, air-pipe j, disk, and sealing-cap p may also have radial movement. The case F carries a contact-piece or roller n, which at one part of the revolution of the carrier-wheel bears on a fixed or stationary cam-rail H, supported upon arms H', which are attached to the bearing C'. This cam-rail H is semicircular in plan view (see Fig. 1) and extends concentric with respect to the shaft B about half-way around the machine. The cam-rail has its entrance end or primary end o located nearly coincident with the feed-chute or can-feed device, so that soon after a can drops from said feed-chute into one of the can-holders the rollers n of that can-holder will ride upon the said primary end o of the cam-rail, and thereby the latter will impart outward radial movement to the case F, air-pipe j, and sealing-cap p, and force the latter tight against the mouth end of the can. A spiral spring q surrounds the air-pipe and is compressed between the cross-bar h' and valve-cock E. As soon as the carrier-wheel has turned far enough to allow the roller n to pass off the terminal end o' of the cam-rail, this spring q will impart inward or retracting movement to the air-pipe and sealing-cap p, and thus release the said cap from pressing the can and allow the can to be removed from the machine.

The case F is termed an "equalizing-case" because it makes provision for accommodating cans of variable length. In the manufacture of cans it is found to be the case that a given size—say a two-pound can—made by one manufacturer may be a little longer or a little shorter than the same size can made by another manufacturer. As the disk i', air-pipe j, and roller n of any one of the can-holders, if rigidly connected together, would coact with the cam-rail H so as to produce at each revolution of the carrier-wheel A the same definite radial movement of the disk i', it is obvious such rigid connection would be unsuitable to accommodate cans of different length. Therefore I have provided the equalizing-case F to make allowance for the variations in the length of the cans. This case has two metal sides e' e^2, which are united by a flexible ring e^3 of vulcanized fabric, so that the yielding of the fabric ring will allow independent movement to the two sides. The cock E is attached to one side e^2 and a nozzle j^3 is attached to the other side. The two sides and flexible ring together form a tight air-chamber e^4, which contains an expansion-spring e^5. This spring keeps the two sides of the case normally distended, and yet by the compression of the said spring the two sides may be flattened or closed together. Thus this is an expansion or equalizing case.

The upper part C' of the bearing has an air duct or passage y, to the lower end of which a nozzle y' is connected for the attachment of a pipe which shall supply compressed air from some storage or source of supply. This air-duct y is seen in Figs. 2, 5, and 6. At its upper end the air-duct branches laterally, as at y^2, and opens at the side of the exteriorly-rounded part and within the close-fitting revoluble box D. This box has a number of radial passages y^3, and each passage has a teat y^4, which projects on the exterior of the box. A flexible hose j^2 makes connection between each teat y^4 and one of the air-pipes j leading to a can-holder. The construction to effect this is as follows: Said air-pipe j connects with the valve-cock E, and the equalizing-case F, to which the cock is attached, has a nozzle j^3, with which the flexible hose j^2 connects. It will be seen that this construction and combination of parts will operate as follows: As the carrier-wheel revolves, a can from the feed-chute enters a can-holder. The roller n passes onto the cam-rail H and causes the elastic cap p to press on the end of the can. In this action the case F slides on the flanges m, and the cock E and air-pipe j are also forced to slide radially and the hose-pipe j^2 has suffi-

cient slack in it to allow this movement. As the carrier-wheel continues to revolve, the radial passage y^3 which is in connection with the particular can-holder that contains the can will come into coincidence or register with the lateral branch y^2, whereupon compressed air will flow to the can. The can then passes through the segment-shaped water-tank, and as soon as the radial passage y^3 passes the lateral branch y^2 the compressed air will thereby be cut off from the can. A chute I, of suitable construction, is inclined. The cans drop from this chute to the machine. I provide a bridge J to span the space between two adjoining can-holders. This bridge is a flat plate having downturned or inclined ends *s*. One end *s* takes over a rod *g* of one can-holder, and the other end takes over a rod *g* of another can-holder, as seen in Figs. 1, 8, and 9. A stationary centering-plate K is supported on an arm K′, secured to the base of the bearing C. This plate K has an inclined position. When a can is about to drop from the chute I, it may alight upon one of the bridges J before clearing the chute, and will thereby be sustained in the delivery-hole of the chute until, by the rotation of the carrier, the can rolls off the bridge and drops onto the centering-plate K. This plate is so adjusted that it will stop a falling can and insure it to lodge with its ends accurately between the disk *i* and elastic cap *p*. As already stated, the roller *n*, acting on cam-rail H, causes the can to be clamped.

I will now describe the automatic means I have provided for preventing compressed air, in the event a can should accidentally fail to lodge in the can-holder, from escaping into the water-tank and agitating the water.

As already described, the air which is supplied to the can while undergoing test is let on and cut off by the revolution of the carrier A and of the box D by the radial passage y^3 first registering with the lateral branch y^2 and then passing beyond it. The valve-cock E and the depressible arm L to turn the cock-plug to the closed or cut-off position in case no tin can enters the holder comprise the automatic means referred to which prevent the compressed air from escaping. A stationary knocker is employed to turn the closed cock-plug to the open position. The function of the depressible arm L is to turn the plug of the cock to its closed position in all cases where a can has not been entered in the can-holder, and thereby in such contingencies the escape of air will be prevented. The arm is so arranged, however, that in all cases where a tin can enters the can-holder the said can will depress the arm L and the plug of the cock will remain open ready for admitting air to the can when, by the revolution of the carrier A, the radial passage y^3 registers with the lateral branch y^2. The depressible arm L has one end pivoted at *u* on one of the stationary arms H′. The free end of this arm L has a shoe *v*, which tapers or inclines from the thick center toward both ends *v′*, as shown in Fig. 7ª. This shoe is in the circular path traversed by all tin cans when they are in the can-holders. This depressible arm carries an upward-projecting stud *t*, which has position in the circular path described by the cross-rod lever *j′* of the cock. A suitable spring *w* is arranged to keep the free end of this arm L normally raised, so as to maintain its stud *t* in the path of the cock-lever *j′*, where the latter will strike the said stud and thereby turn the plug of the cock E to the closed or cut-off position. This is the operation in those instances where from any cause a can fails to lodge in a can-holder. The empty can-holder, having its air-supply automatically cut off, will then pass through the water in the tank without any air escaping into the water. In all cases where a tin can enters a can-holder such cans will ride over the shoe *v* on the arm L and will thereby depress said arm and lower the stud *t*, so as to prevent the cross-rod lever *j′* of the cock from striking the stud, and in these cases the stud will not turn the plug of the cock. The stationary knocker consists, in this instance, of a rigid arm *t′*, (see Fig. 1,) projecting from one of the arms H′ into the circular path described by the cross-rod levers *j′* of the cocks E. The rotation of the carrier A brings one end of the cross-rod lever *j′* of every closed cock against the knocker or rigid arm *t′*, and thereby the plug of the said closed cock is turned to open the passage and make ready for the compressed air to have access to the air-pipe *j*.

A can-releasing device consists of an inclined plate N, supported by a rigid arm N′, and said plate provided on its upper surface with a raised lug or knocker *x*. This plate is curved to correspond with the circular path of the can-holders, and the lug or knocker *x* has such relative position that a tin can in a can-holder will come in contact with it after the roller *n* has passed off the terminal end *o′* of the cam-rail. Thus the lug or knocker *x* will cause the tin can to be released from the holder and the tested can will drop.

It is desirable to have the movable parts of the machine totally separate from the water-tank in order to avoid leaks, and also to obviate the agitation of the water by lessening the number of the machine parts which are to move through the water. To this end I construct a segment-shaped tank (see Figs. 1 and 2) having two parallel curved walls c' c^2 and end walls c^3. This tank is supported on a stand *d′*, and steam coil-pipes d^2 are in the tank. The coil-pipes are for keeping the water in the tank heated. The rotary can-carrier is not mounted in the tank. Only the ends of the can-holders and cans at one point of their revolution are submerged in the water contained in the tank. The cans in the can-holders do not revolve while in the water.

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

1. A sealing cap for closing the mouths of cans while being tested, having, in combination, a rigid disk mounted on the end of an air-pipe; and an elastic cap seated on the said rigid disk with an air-chamber between the rigid disk and elastic cap for the reception of air under compression,—said disk and cap provided with an always-open passage through them to transmit air from the air-pipe to the can under test, and also provided with a communication from the air-pipe to said air-chamber, whereby compressed air flowing from the pipe will enter the can which is under test and also enter the said air-chamber of the sealing-cap and inflate or press out the elastic cap.

2. A sealing cap for closing the mouths of cans while being tested, having, in combination, a rigid disk mounted on the end of an air-pipe; an elastic cap seated on the disk with an inflatable chamber between the disk and cap; a screw through the center of the elastic cap, said screw provided with an always-open passage, r', through which compressed air from the air pipe may flow to enter the can; and an air communication from the air-pipe to said inflatable chamber.

3. The combination, in a can-testing machine, of a rotary carrier having a box or hub provided with passages for supplying air under compression; an air-pipe having one end in communication with said box or hub and provided at the other end with a rigid disk; and an elastic cap on the disk provided on the side next to the disk with an inflatable annular chamber, p^3, said disk and cap having an always-open passage through them by means of which compressed air may flow from the pipe to enter the can, and also having an air-communication through which air may pass to said inflatable chamber; and a valve, E, in the air-pipe to control the supply of compressed air both to the can and inflatable chamber.

4. A sealing cap for closing the mouths of cans while being tested, having, in combination, a rigid disk mounted on the end of an air-pipe; an elastic cap having a depressed center seat, p^2, and provided on the side next to the disk with an inflatable annular air-chamber, p^3, which surrounds said depressed center; a screw having its head bearing on said seat and confining the cap and provided with an always-open passage, r', through which compressed air may flow from the air-pipe to enter the can to be tested; and a passage through which compressed air may flow to enter the said inflatable chamber.

5. In a can-testing machine, the combination of a rotary carrier; can-holders mounted on said carrier, each holder having a movable disk; an air-pipe leading from the hub of the rotary carrier to the said movable disk; a stationary cam-rail; a contact piece, n, carried by the air-pipe and which at one part of the revolution of the carrier bears on the said stationary cam-rail; and an equalizing case on the air-pipe between the said contact piece and movable disk, for the purpose described.

6. In a machine for testing cans by means of compressed air, the combination of a rotary carrier; can-holders mounted on said carrier; an air-pipe leading from the hub of the rotary carrier to each of said can-holders and serving to apply compressed air to the cans while they are in the holders; a valve-cock in each of said air-pipes to cut off the supply of compressed air to any given can-holder in case no can enters the said holder; and means whereby any one of the said valve-cocks will be closed automatically in the contingency that the can-holder which is in connection therewith fails to receive a can.

7. In a can-testing machine, the combination of a rotary carrier; can-holders mounted on said carrier; means to apply compressed air to the cans while they are in the can-holders; a valve for each separate can-holder to let in or cut off the compressed air; means attached to a stationary part of the can-machine and located in the circular path traversed by all the said valves and serving for automatically closing the valve connected with any can-holder which fails to receive a can; and a stationary knocker device to open any of said valves that may be closed.

8. In a can-testing machine, the combination of a rotary carrier; can-holders mounted on said carrier; means to apply compressed air to the cans while they are in the can-holders; a valve for each separate can-holder to let in or cut off the compressed air; a movable device located normally in the circular path traversed by all the said valves and serving when in its normal location to close said valves; and means mounted in the circular paths traversed by all the tin-cans in the holders, and connected with said valve-closing device so that a tin-can in the holder will move said device from its normal location out of the circular path of the said valves.

9. In a can-testing machine, the combination of a rotary carrier; can-holders mounted on said carrier; means to apply compressed air to the cans while they are in the can-holders; a valve for each separate can-holder to let in or cut off the compressed air; and a depressible arm to close the valve of any holder which contains no can and having a shoe which normally is in the circular path traversed by all the tin-cans in the holders, said shoe and arm being depressed by each tin-can.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM H. H. STEVENSON.

Witnesses:
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CHARLES B. MANN, Jr.