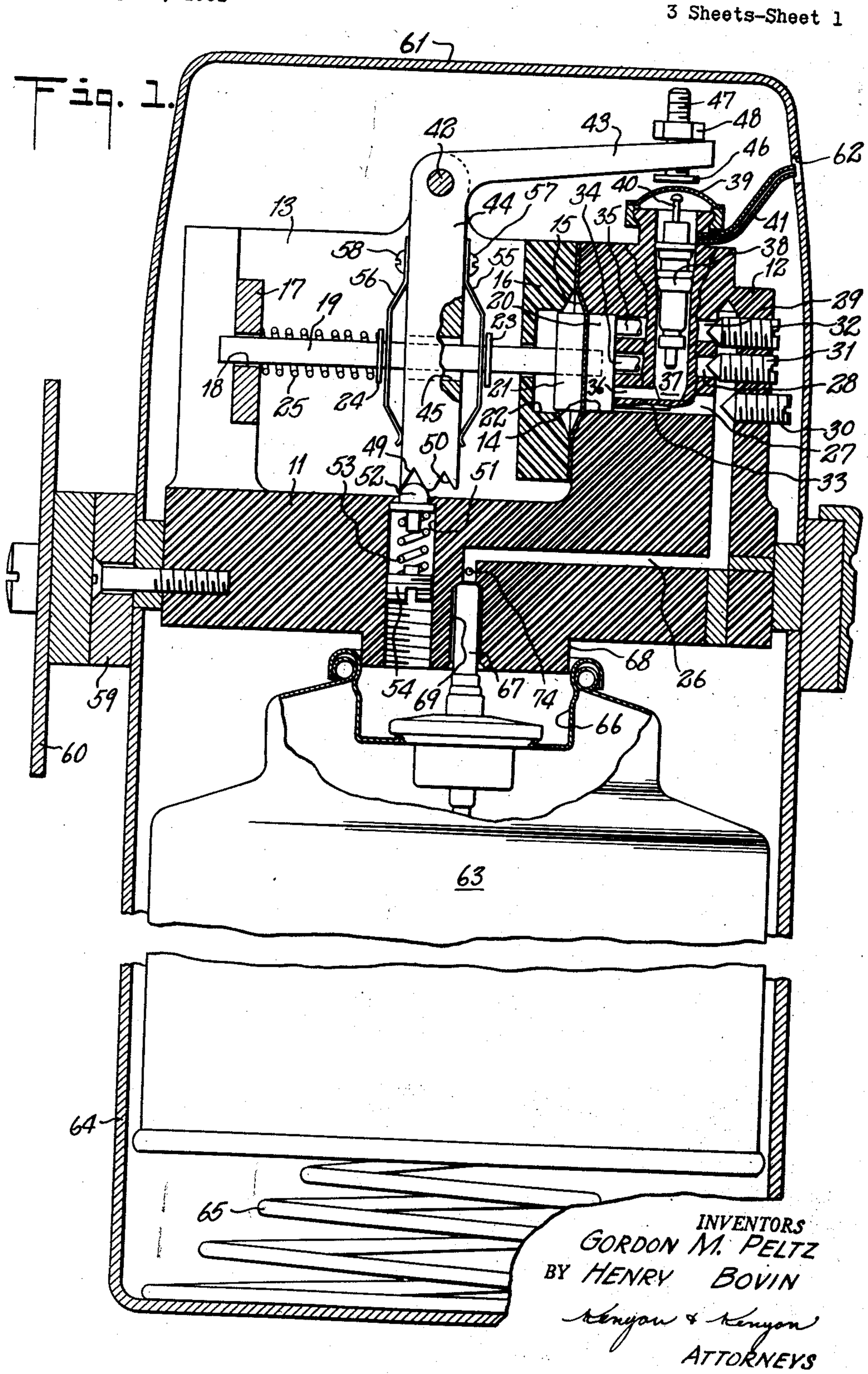
Sept. 29, 1953 G. M. PELTZ ET AL 2,653,625

INTERMITTENT FLUID DISCHARGE DEVICE

Filed May 15, 1951 3 Sheets-Sheet 1

Fig. 1.




INVENTORS
GORDON M. PELTZ
BY HENRY BOVIN
Kenyon & Kenyon
ATTORNEYS

Sept. 29, 1953

G. M. PELTZ ET AL

2,653,625

INTERMITTENT FLUID DISCHARGE DEVICE

Filed May 15, 1951

3 Sheets-Sheet 2

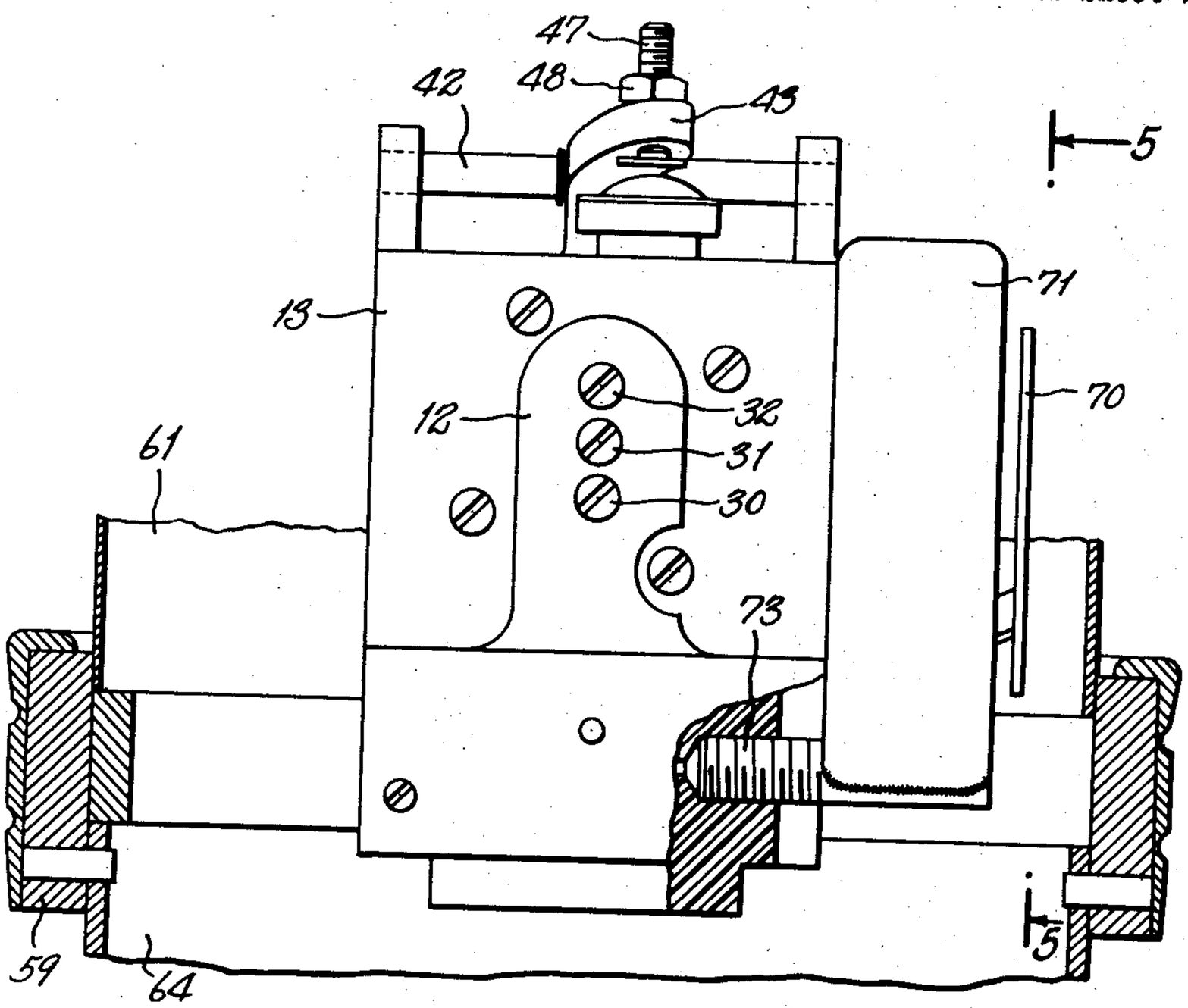



Fig. 2.

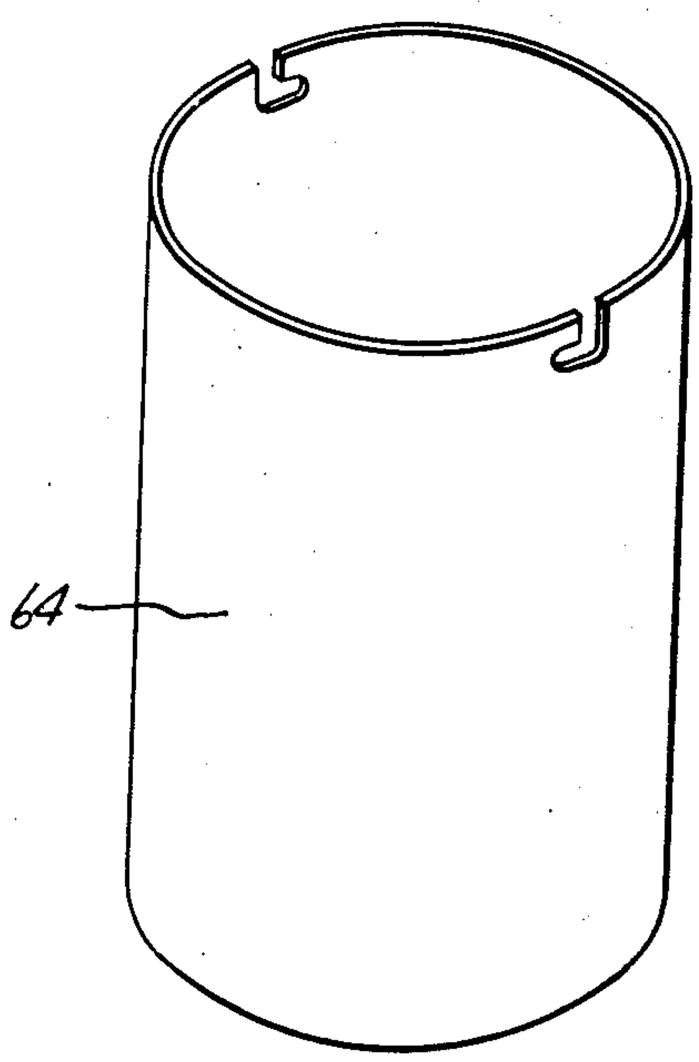



Fig. 3.

INVENTORS
GORDON M. PELTZ
BY HENRY BOVIN
Kenyon & Kenyon
ATTORNEYS

Sept. 29, 1953 G. M. PELTZ ET AL 2,653,625

INTERMITTENT FLUID DISCHARGE DEVICE

Filed May 15, 1951 3 Sheets-Sheet 3

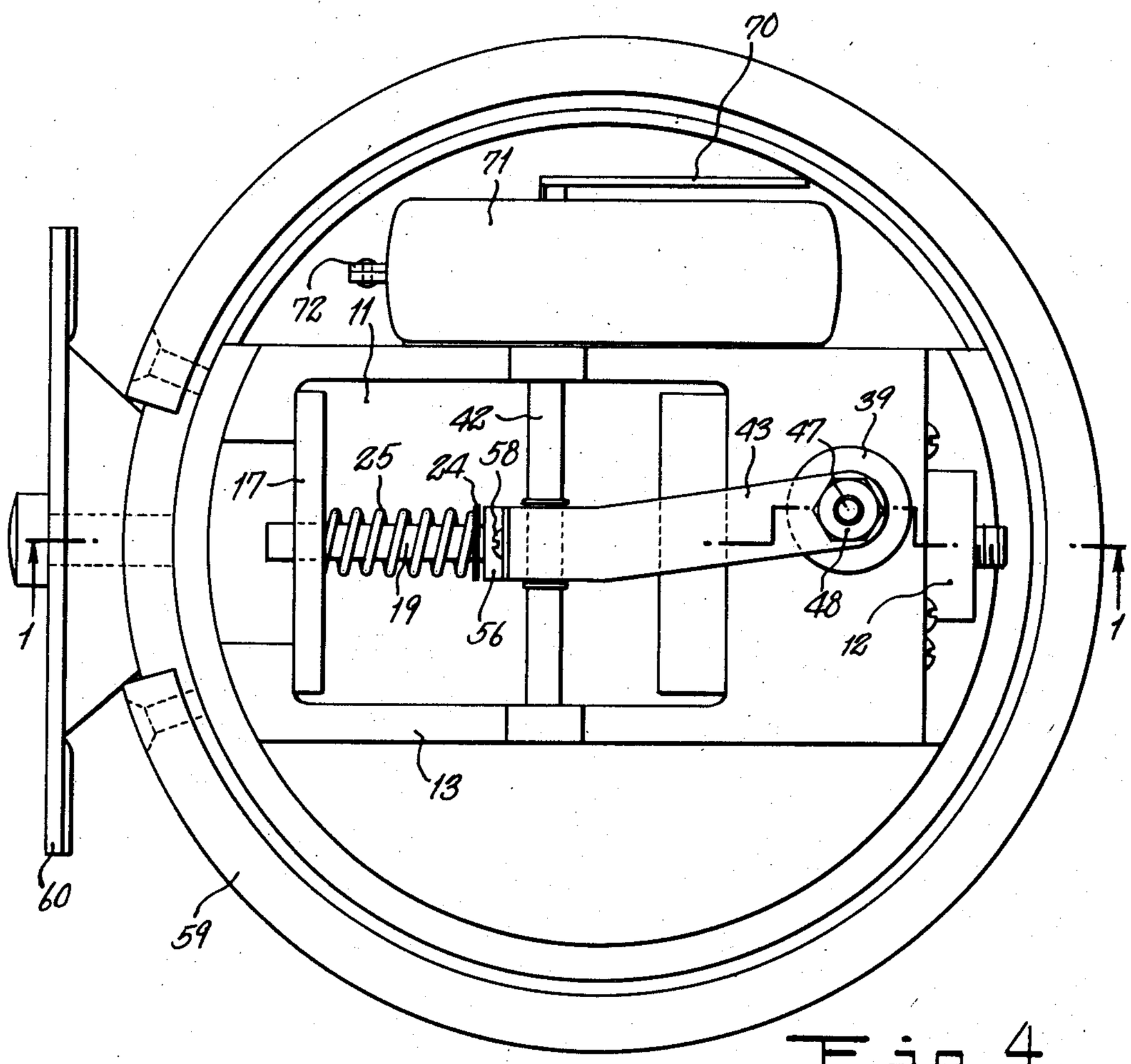
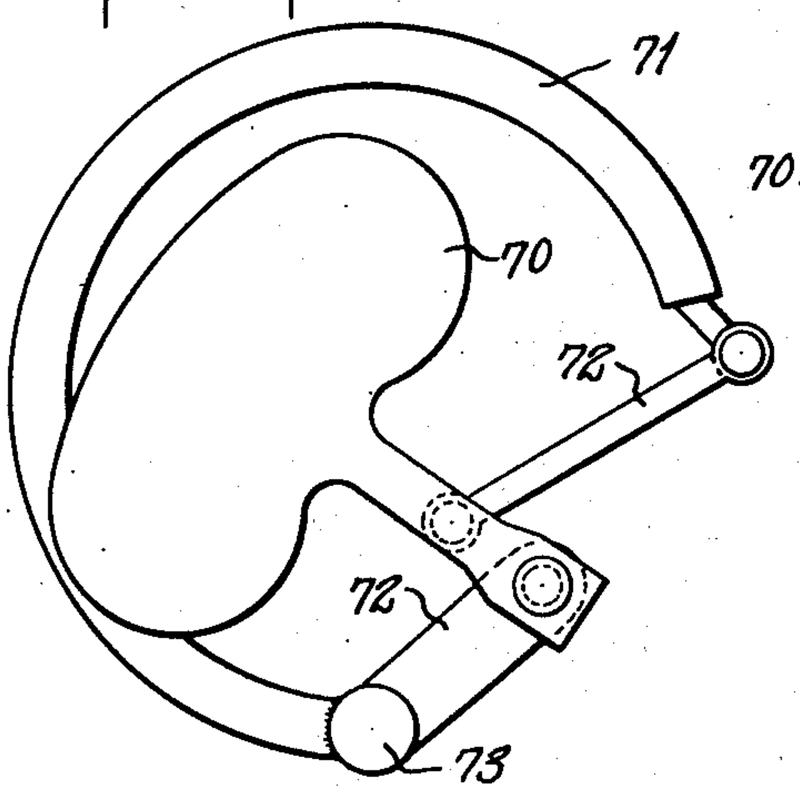



Fig. 4.

Fig. 5.



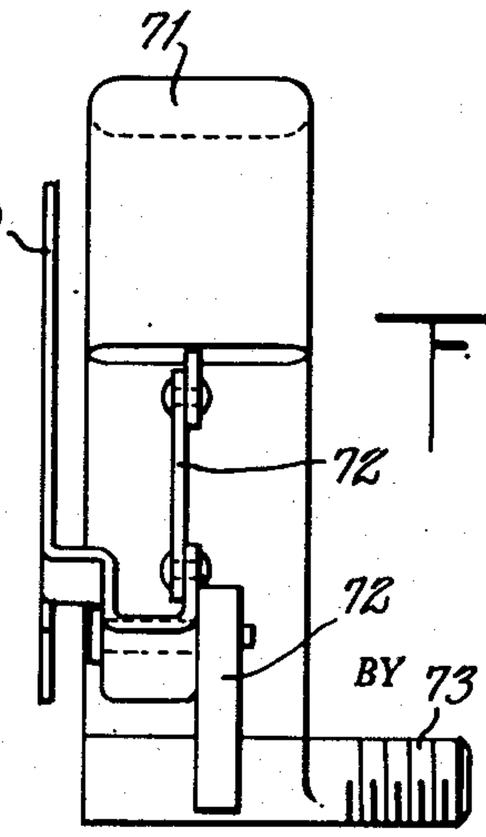




Fig. 6.

INVENTORS
GORDON M. PELTZ
HENRY BOVIN
BY Kenyon & Kenyon
ATTORNEYS

Patented Sept. 29, 1953

2,653,625

# UNITED STATES PATENT OFFICE

2,653,625

## INTERMITTENT FLUID DISCHARGE DEVICE

Gordon M. Peltz, Flushing, and Henry Bovin, New York, N. Y., assignors to Bridgeport Brass Company, Bridgeport, Conn., a corporation of Connecticut

Application May 15, 1951, Serial No. 226,384

4 Claims. (Cl. 137—599)

1

This invention relates to an intermittent fluid discharge device.

The device is particularly intended for use in conjunction with the aerosol spray packages currently in use. Such a package comprises a container equipped with a nozzle controlled by a valve. The container encloses liquefied gas in which an active ingredient is dissolved or mixed. Examples of active ingredients used are insecticides, deodorants and the like. The container maintains adequate pressure on the gas to keep it liquid and when the valve is opened the gas boils and ejects a spray.

Such a package is small enough to be manually manipulated by the user, the valve ordinarily being arranged so that the user must open it by the use of constant finger pressure when a spray is desired. However, it is sometimes desirable to provide a device with which such a package may be associated and which will automatically cause the intermittent discharge of a spray of relatively short duration so as to keep the atmosphere constantly supplied with the active ingredient.

A device of the above character is disclosed and claimed by patent application Serial No. 178,396, filed by Peltz, et al. on August 9, 1950.

One of the objects in developing the present invention was to improve on the device of the above application by simplifying the construction, reducing the manufacturing cost, providing for an even more positive actuation and, in general, to produce a better device. Other objects may be inferred from the following.

A specific example of the present invention is illustrated by the accompanying drawings in which:

Fig. 1 is a vertical section of a device of the type described and embodying the principles of the present invention;

Fig. 2 is an end view of the main operating assembly of the device;

Fig. 3 shows a casing used to position the described type of package so as to associate it with the device;

Fig. 4 is a top view of the device without the cover shown in Fig. 1;

Fig. 5 is a view taken on the line 5—5 in Fig. 2 and showing certain details; and

Fig. 6 is a side view of the details shown by Fig. 5.

The illustrated device comprises a chassis block made of non-metallic material, such as a suitable plastic, and formed to provide a relatively thick base 11 having an upstanding relatively thick wall 12 near one edge and from which bracket arms 13 extend horizontally to a location

2

opposite to the wall 12 and near to the edge of the base 11 on the opposite side. All of these parts are shown as integrally made. A recess 14 is formed in an inner vertical face of the wall 12 and a diaphragm 15 is fastened over this recess by a retainer plate 16, whereby to provide the recess 14 with a reciprocative wall, formed by the diaphragm. This wall forms, by cooperation with the recess 14, an expansible and contractible fluid chamber. The arms 13 near their ends position a horizontal bracket 17 opposite to the diaphragm 15. This bracket 17 has a hole 18 formed in it in axial alignment with the recess 14. This recess 14 is shown as having a cylindrical contour.

A push rod 19 is connected with the diaphragm 15 so as to extend outwardly therefrom, this push rod being long enough to extend through the hole 18 in the bracket 17 which it does freely. As illustrated, the push rod 19 connects with the diaphragm 15 by way of a mounting comprising relatively short cylinders 20 and 21 respectively, arranged on the inside and outside of the diaphragm with the latter clamped therebetween. The cylinder 20 slidingly fits the cylindrical recess 14, and the inside of the plate 16 has a cylindrical recess 22 slidingly fitted by the outer cylinder 21. Thus, the two cylinders 20 and 21 function as guides positioning the push rod 19. The diaphragm 15 provides a fluid-tight arrangement, the mutually facing edges of the recesses 14 and 22 being beveled so that they cooperatively form a V groove providing room in which the diaphragm may reciprocate.

Mutually spaced abutments 23 and 24 are fixed to the push rod 19 between the diaphragm 15 and the bracket 17 and spaced from each. These abutments are shown in the form of split spring rings snapped into grooves appropriately formed in the push rod 19. A coil compression spring 25 encircles the push rod 19 and under partial compression between the brackets 17 and the adjacent one of the abutments, this being the outer one 24. This spring serves to provide a constant spring bias applied to push the rod 19 inwardly and thus bias inwardly the diaphragm 15. In other words, the expansible and contractible fluid chamber formed by the recess 14 and diaphragm 15 is constantly biased to contract.

The chassis block has an inlet fluid duct 26 feeding into the chamber formed by the recess 14 and diaphragm 15. This duct 26 includes a vertical portion extending up into the wall 12 opposite to the inner end of the recess 14. This vertical portion forms what is in effect a header

from which three horizontal branch ducts 27, 28 and 29 lead into the bottom of the recess 14. Holes are formed in from the outer face of the wall 12 so as to register with these three branch ducts, and screws 30, 31 and 32 are screwed through these holes. Each of these screws has a pointed end so that when screwed in completely it closes the entrance to the branch duct with which it is aligned. Therefore, by selectively screwing in any two of these screws, the remaining one of the ducts may be made effective, the other two being closed off. Also any two or all three of the ducts may be left open if desired. The ducts contain fluid flow chokes in the form of porous plugs 33, 34 and 35, each respectively arranged in the branch ducts 27, 28 and 29. These flow choke plugs may be made from any permeable material that is inert respecting the fluid furnished by the package used with the device. One ordinarily suitable material is porous stainless steel which is currently available commercially. This is believed to be made by sintering powdered stainless steel. Each of the plugs 33, 34 and 35 is made with either a different length or density, or both, respecting the others, whereby to provide for three different choked flow rates through the three branch ducts. It follows that the flow rate from the duct 26 into the recess 14 is determined by the adjustment of the screws 30, 31 and 32.

An outlet or discharge duct 36 is formed in the wall 12 so as to extend away from the bottom of the recess 14. This outlet duct 36 includes a portion in the form of a vertical well 37 in which a pneumatic tire valve core 38 is installed so as to control the discharge flow up through the well 37. The valve core 38 is, of course, a normally-closed valve. Depending upon the chemical properties of the packaged material it may be necessary to modify the usual valve core by substituting a suitable inert plastic or the like for the normally provided non-metallic parts which are usually made of rubber. The top of the well 37 is gas-tightly closed by a deformable elastic dome 39, which may be made of a suitable elastic plastic, and the valve stem 40 of the tire valve core may be pressed by depressing this dome 39. The top of the well 37, above the core 38, exhausts through a capillary tube 41 arranged to discharge an upwardly inclined spray of the packaged material when the device is in operation.

A horizontal shaft 42 is positioned by the arms 13 above the push rod 19 transversely thereto and at a location between the push rod's abutments 23 and 24. This push rod mounts a bell crank having a generally horizontal arm 43 and a generally vertical arm 44. The vertical arm has a hole 45 through which the push rod 19 freely passes, this arm 44 depending far enough so that its lower end swings close to the top of the chassis block's base portion 11. The generally horizontal arm 43 has its end provided with a button finger 46, this finger being formed by a flat head of a screw which has its shank 47 screwed through the end of the arm 44 and locked by a jam nut 48. This permits adjustment of the depressing action of this finger.

The bell crank, having the arms 43 and 44, functions as an operator for the valve 38. Its arm 44 reciprocates generally in line with the reciprocative motion of the push rod 19. The arm 44, of course, swings through an arc, but the motion is generally in the same direction respecting the push rod 19. The hole 45 is sufficiently



oversized to permit the arm 44 to swing respecting the push rod 19. When the arm 44 is swung to a left-hand position, as the device is shown by Fig. 1, the finger 46 deflects the flexible dome 39 and depresses the valve stem 40 so as to open the valve 38. When the arm 44 is swung to a right-hand position the finger 46 is raised free from the dome 39 so as to close the valve 38, since this valve 38 is of the normally-closed type.

The lower end of the arm 44 has two inverted V notches 49 and 50 defining the two positions described above. These notches are side by side and transversely aligned with each other in the swinging direction of the arm 44. The base 11 has a vertical hole 51 up through which a ball type latch bar 52 providing, in effect, oppositely facing cam surfaces is projected by a coil compression spring 53, the latter being maintained under partial compression by a screw 54 screwed up through the bottom of the hole 51. This arrangement functions as a force-released latch. When the ball part 52 is in the notch 49, as shown by Fig. 1, the valve operator arm 44 is in its valve-closed position. When the arm 44 is pushed to the left with sufficient force the ball 52 is cammed out of the notch 49 and then immediately snaps into the notch 50. In this second arrangement, the valve operator arm 44 is in its valve-open position. Thus, it can be seen that by pushing back and forth on the arm 44 the valve 38 can be snapped open and shut if the force applied to the arm 44 is continued so as to carry the arm from one of its positions to another.

With the above in mind, the arm 44 is provided with spring means for interconnecting it with the push rod 19. This means takes the form of a leaf spring 55 fastened to the right-hand side of the arm 44 for engagement by the abutment 23, and a similar leaf spring 56 fastened to the left-hand side of the arm 44 for engagement by the abutment 24. These springs in miniature each act like a semi-elliptic automobile spring. The springs are fastened to the arm 44 by screws 57 and 58 respectively, and the two springs may be provided with holes, or bifurcated, so that the push rod 19 can pass through them freely. The arrangement is such that when the diaphragm 15 is at its innermost position the notch 49 is engaged by the ball 52 and the two abutments 23 and 24 are slightly spaced from the two springs 55 and 56. As the wall 15 is moved to its outer position the spring 55 deflects until it builds up sufficient resilient force to overcome the restraint of the ball 52, whereupon the arm 44 snaps to its other position with the stored energy in the deflected spring 55 providing the drive to carry the arm 44 quickly across until the ball 52 seats in the notch 50, the springs again being slightly free from the abutments. When the spring 25 returns the diaphragm 15 from its outer to its inner position, the abutment 24 engages the spring 56 and produces the same kind of action, but in reverse, so as to drive the arm 44 across and reregister the notch 49 with the ball 52. The movement occurs with a snap actuation in both directions whereby the valve 38 is snapped open or shut as the case may be.

The base 11, of the chassis block, is provided with an encircling ring 59 and the latter is shown provided with a bracket arrangement 60 for supporting it horizontally on the wall of a room. The mechanism above the disk 11 is concealed and protected by a cover 61 having a suitable opening 62 for the discharge from the tube 41.

The aerosol spray package 63 is mounted beneath the plate 11 by a casing 64 having a spiral compression spring 65 in its bottom which elastically forces the package 63 upwardly. The package 63 is shown with the contour of a currently popular commercial package having a depression 66 in its top and a combination valve stem and nozzle 67 projecting upwardly centrally from this recess. In the case of this package downward pressure of the stem 67 opens the package to the atmosphere. In using the package 63, the bottom of the base 11 is provided with a downwardly extending stud 68 which fits the recess 63, the central portion of this stud 68 having an enlarged upwardly extending recess connecting with and forming an entrance for the duct 26. With the chassis made of plastic that is slightly elastically formable, the spring 65 jams the nozzle 67 upwardly into the recess 69 so as to both form a substantially gas-tight fit and hold the nozzle valve stem 67 depressed so that the interior of the package 63 is placed in constant communication with the duct 26.

So that it can be determined whether or not the package 63 is empty, an indicator is provided. This indicator is in the form of a swinging flag 70 which is waved in front of an appropriate opening in the cover 61 by the action of a Bourdon tube 71 through the actuation of a lever system 72 working between the ends of the Bourdon tube and mounting the flag 70. This tube 71 is carried by a mounting stud 73 having a bore and which is screwed into one side of the base 11, the latter having an appropriate threaded hole with this hole connecting with a duct 74 opening into the duct 26 between its inlet and the various choke plugs. As long as there is a predetermined pressure in the duct 26 the flag 70 is in one position, and when this pressure fails the spring of the Bourdon tube shifts the flag 70 to another position. The flag may be marked empty and full or suitably colored for the purpose of indicating whether or not there is pressure in the duct 26 and hence in the package 63.

In operation, the device may be placed on a wall and the package 63 associated with the device as previously described. Depending on the frequency of discharge desired, one or another of the screws 30, 31 and 32 is unscrewed so as to give the liquefied gas access to the recess 14, the other screws being tightly screwed in. This access is gained only through the selected one or ones of the flow plugs 33, 34 and 35. The liquid flows very slowly into the expansible chamber provided by the recess 14 and the diaphragm or wall 15. Part of this liquid passes into its gas phase, depending upon the influx of heat to the expansible chamber and the pressure of the spring 25. As more and more of the liquid passes into its gas phase, the pressure in the expansible chamber rises driving the wall or diaphragm 15 outwardly to the left and hence, moves the push rod 19 to the left so that deflection of the spring 55 starts to occur.

When the spring 55 deflects sufficiently to develop adequate resilient force the force-released latch restraint is overcome, the ball 52 being depressed and the arm 44 then being driven with a snap-action to its valve-open position by the driving power stored in the spring 55. This opens the valve 38 so that the liquid in the expansible and contractible chamber is driven into the atmosphere through the discharge tube 41 by the gas pressure over the liquid. When all the liquid has been driven out, gas then escapes from the



expansible and contractible chamber until the force on the piston is decreased enough so that the force of the spring 25 is enough to overcome the force released latch and allow arm 44 to return with snap action to its valve-closed position.

If too much heat flows into the expansible chamber all of the liquid is changed to its gas phase, thus operating the mechanism with only gas being dispensed. In order to prevent this and to allow only part of the liquid to pass into its gas phase, the chassis wall 12 is made from nonmetallic material to decrease heat conduction into the expansible chamber. As the spring 25 pushes the diaphragm 15 and the piston rod 19 to the right as a result of the pressure in the expansible chamber decreasing, the abutment 24 deflects the spring 56 until the resulting force snaps the arm 44 back to its valve-closed position. During the exhaust of the liquid and gas from the expansible chamber liquid still passes through the choke in the fluid inlet chamber, but not in a large enough volume to keep the mechanism from returning to its valve-closed position.

We claim:

1. An intermittent fluid discharge device including a wall having a recess, a reciprocative wall closing said recess and forming therewith an expansible and contractible fluid chamber, a bracket spaced oppositely from said wall, a push rod connecting with and extending outwardly from said wall and reciprocatively past said bracket, mutually spaced abutments fixed to said push rod between said wall and said bracket, a coil compression spring between said bracket and the adjacent one of said abutments and biasing said wall inwardly, said block having an inlet duct feeding into said chamber and an outlet discharge duct leading from said chamber into the atmosphere, a flow choke in said inlet duct, a normally-closed valve blocking said discharge duct, a valve operator connecting with said valve and including an arm having an opening through which said push rod extends with said abutments straddling said arm, said arm being pivoted to swing in line with said push rod's motion between a valve closing position corresponding to an inward position of said wall and a valve opening position corresponding to an outward position of said wall, force-released latch means holding said arm at either of said positions, and leaf springs oppositely fastened to said arm for respective engagement by the adjacent one of said abutments.

2. An intermittent fluid discharge device including a wall having a recess, a reciprocative wall closing said recess and forming therewith an expansible and contractible fluid chamber, a bracket spaced oppositely from said wall, a push rod connecting with and extending outwardly from said wall and reciprocatively past said bracket, mutually spaced abutments fixed to said push rod between said wall and said bracket, a coil compression spring between said bracket and the adjacent one of said abutments and biasing said wall inwardly, said block having an inlet duct feeding into said chamber and an outlet discharge duct leading from said chamber into the atmosphere, a flow choke in said inlet duct, a normally-closed valve blocking said discharge duct, a valve operator connecting with said valve and including an arm having an opening through which said push rod extends with said abutments straddling said arm, said arm being pivoted to swing in line with said push rod's motion between

a valve closing position corresponding to an inward position of said wall and a valve opening position corresponding to an outward position of said wall, force-released latch means holding said arm at either of said positions, and leaf springs oppositely fastened to said arm for respective engagement by the adjacent one of said abutments, said wall having at least a second inlet duct feeding into said chamber, a second flow choke in said second duct and providing a different degree of choke from the first-named choke, and valve means for each of said ducts.

3. An intermittent fluid discharge device including a wall having a recess, a reciprocative wall closing said recess and forming therewith an expansible and contractible fluid chamber, a bracket spaced oppositely from said wall, a push rod connecting with and extending outwardly from said wall and reciprocatively past said bracket, mutually spaced abutments fixed to said push rod between said wall and said bracket, a coil compression spring between said bracket and the adjacent one of said abutments and biasing said wall inwardly, said block having an inlet duct feeding into said chamber and an outlet discharge duct leading from said chamber into the atmosphere, a flow choke in said inlet duct, a normally-closed valve blocking said discharge duct, a valve operator connecting with said valve and including an arm having an opening through which said push rod extends with said abutments straddling said arm, said arm being pivoted to swing in line with said push rod's motion between a valve closing position corresponding to an inward position of said wall and a valve opening position corresponding to an outward position of said wall, force-released latch means holding said arm at either of said positions, and leaf springs oppositely fastened to said arm for respective engagement by the adjacent one of said abutments, said valve being interposed in said outlet discharge duct and the latter including a flexible wall deflected by said operator to open said valve.



4. An intermittent fluid discharge device including a wall having a recess, a reciprocative wall closing said recess and forming therewith an expansible and contractible fluid chamber, a bracket spaced oppositely from said wall, a push rod connecting with and extending outwardly from said wall and reciprocatively past said bracket, mutually spaced abutments fixed to said push rod between said wall and said bracket, a coil compression spring between said bracket and the adjacent one of said abutments and biasing said wall inwardly, said block having an inlet duct feeding into said chamber and an outlet discharge duct leading from said chamber into the atmosphere, a flow choke in said inlet duct, a normally-closed valve blocking said discharge duct, a valve operator connecting with said valve and including an arm having an opening through which said push rod extends with said abutments straddling said arm, said arm being pivoted to swing in line with said push rod's motion between a valve closing position corresponding to an inward position of said wall and a valve opening position corresponding to an outward position of said wall, force-released latch means holding said arm at either of said positions, and leaf springs oppositely fastened to said arm for respective engagement by the adjacent one of said abutments, said wall being made of non-metallic material retarding loss of heat from said recess to said outlet discharge duct.

GORDON M. PELTZ.
HENRY BOVIN.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,918,341 | Knack | July 18, 1933 |
| 1,980,148 | Woodford | Nov. 6, 1934 |
| 2,307,314 | Willson | Jan. 5, 1943 |