July 23, 1940. J. R. BENSON 2,209,219

AUTOMATIC CUT-OFF NOZZLE FOR FILLING TANKS AND CONTAINERS

Filed Nov. 21, 1938 2 Sheets-Sheet 1

Fig. 1.

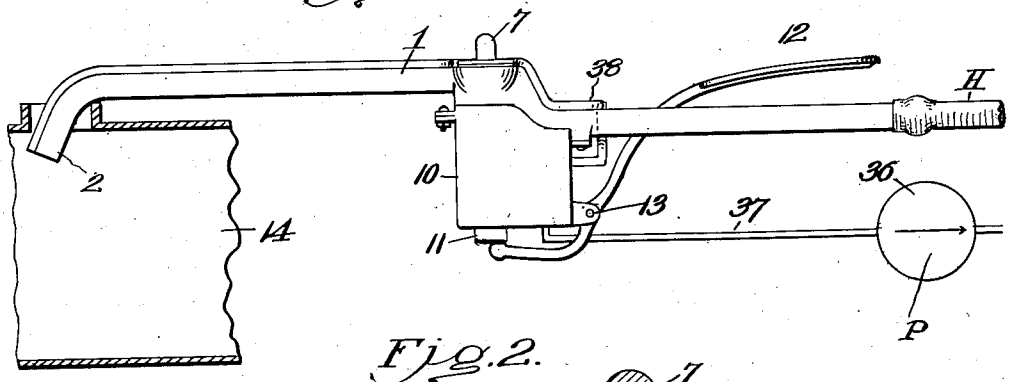


Fig. 2.

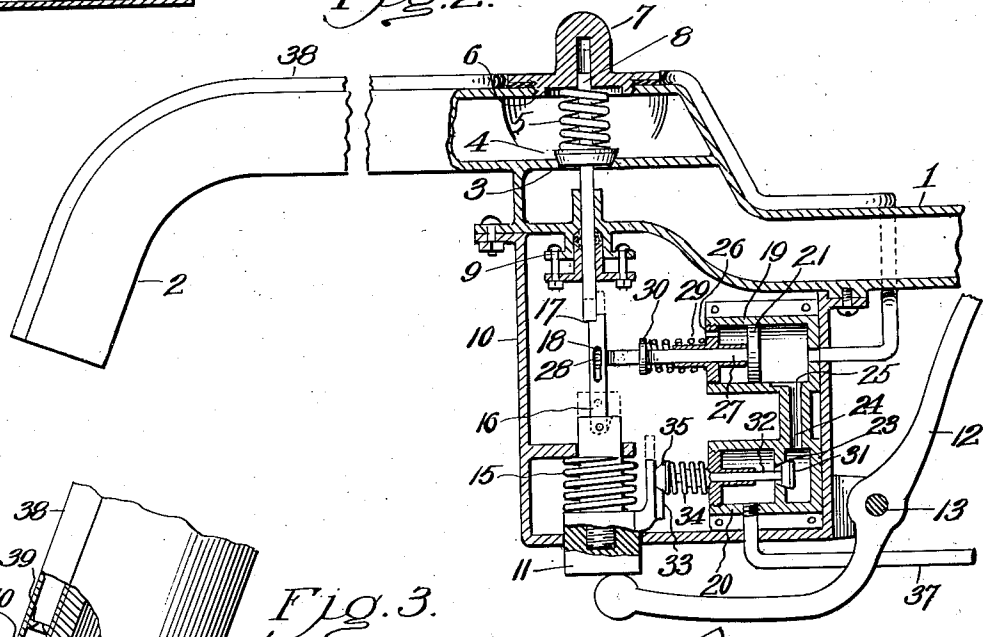


Fig. 3.

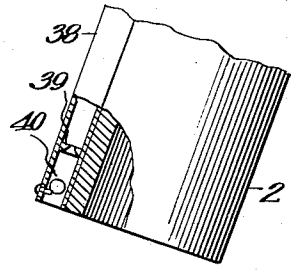


Fig. 4.

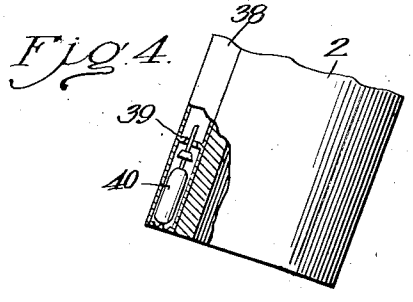
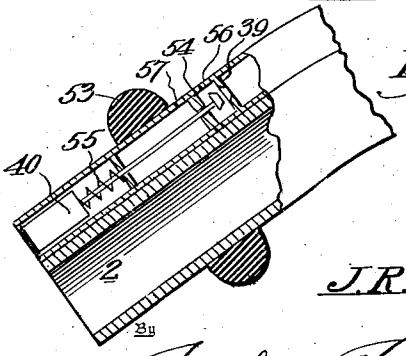


Fig. 5.



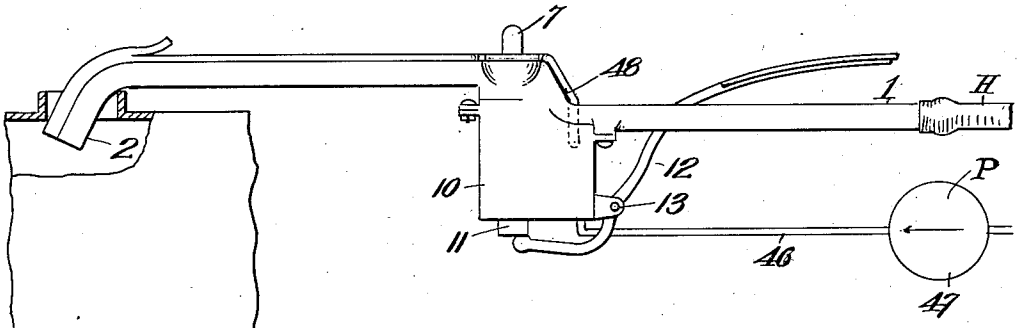
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AUTOMATIC CUT-OFF NOZZLE FOR FILLING TANKS AND CONTAINERS

Filed Nov. 21, 1938 2 Sheets-Sheet 2

Fig. 6.



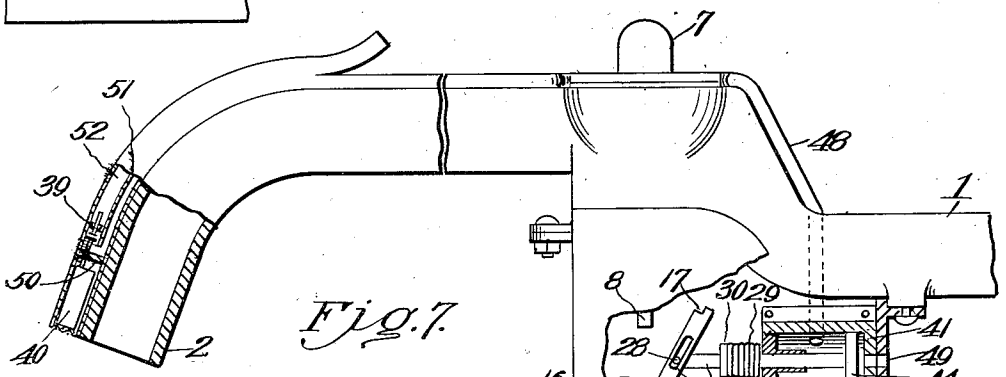


Fig. 7.

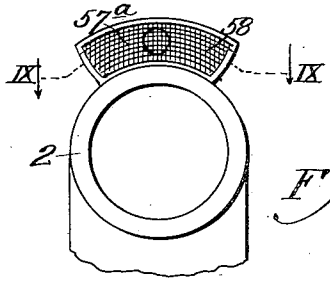


Fig. 8.

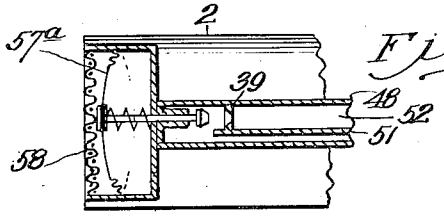


Fig. 9.

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Secured in any suitable manner within the housing is a fitting, providing a pair of cylinders 19 and 20, the former containing a reciprocatory piston 21, and the latter a partition 22 having a valve-seat opening 23. The cylinders are connected at the opposite sides of the piston and partition from the trigger, by a port 24, and the cylinder 19 has a by-pass channel 25 communicating with said port, and at the opposite side of the piston from the channel, has a vent opening 26. The piston stem 27 extends through one end of cylinder 19 and is connected to a pin 28 slidingly and pivotally engaging the slot 18 of the trigger, a spring 29 upon said piston stem and bearing against cylinder 19 and collar 30 on the stem 27, tending to hold the trigger upright in engagement with the valve stem and the piston 21 withdrawn from the port 24 and by-pass channel 25. Within cylinder 20 is a valve 31 having a suitably-guided stem 32 extending through valve-seat 23 and an end of cylinder 20, and in proximity to one side of the push-rod, and the latter has an inclined shoulder 33 normally underlying said stem. A spring 34 upon the stem bears against the cylinder 20 and a head 35 on said stem, and normally holds valve 31 upon its seat 23.

A pump 36 is shown in accordance with the symbol in the Patent Office Rules of Practice. The pump may represent any instrumentality for exerting suctional force through a tube 37 connected to cylinder 20 to the left of the partition thereof. The suction, when the filler spout valve is seated, performs no function other than it may cooperate with spring 34 in holding the valve 31 upon its seat 23. A tube 38 arranged exteriorly or otherwise relative to the filler spout, connects at one end with the cylinder 19 to the right of the piston thereof, and at the other end is disposed adjacent the discharge end 2 of the spout, being adapted with the latter, to be fitted into the tank 14, preliminary to the charging of the latter with gasoline or other inelastic fluid. Said tube has a partition 39 provided with a valve-seat opening, and retained in the tube below said seat is a float valve, shown in Figures 3 and 4, as a ball or hollow cylinder 40. Normally the tube valve-seat is open under gravity or equivalent force, and remains unobstructed during the charging of the tank until the inelastic fluid rises to a level which causes the float valve to seat, or such fluid through splashing or regurgitative action causes the valve to seat.

The flow through the spout, of course, occurs when the attendant operates lever 12 and thereby forces push-rod 11 and trigger 16 upwardly to unseat valve 4, and incidentally unseat valve 31 through the action of the shoulder 33 on the head of valve stem 32. The unseating of valve 31 under the suction from the pump, starts a flow of air from the float end of tube 38 through cylinder 19, port 24, cylinder 20 and tube 37, and this action continues until the float is caused to close the tube valve-seat. The instant the tube is thus sealed by the valve 40, a strong suctional action is produced in cylinder 19, and piston 21 is drawn to the right and, through its stem, swings or trips the trigger from under valve stem 8, thus permitting valve 4 to be seated by its spring 5 and the flow of gasoline to be arrested, this result occurring regardless of the fact that the lever 12 may still be held in operated position by the attendant.

When the filler spout is not in use the tube valve is unseated and valves 4 and 31 are closed. To charge the tank, the filler spout is inserted therein and the lever 12 is depressed to cause the push-rod 11 and trigger 16 to move upwardly and unseat valve 4 to start the flow of inelastic fluid through the spout, the upward movement of the push-rod through its inclined shoulder 33, opening valve 31. As this valve 31 is unseated, the suctional pull of the pump causes air to pass through the tube, cylinder 19, port 24, cylinder 20 and tube 37, as above mentioned, but when the tube valve is closed by liquid in the tank attaining a proper level or regurgitating into the tube, a suctional pull—greater than the resistance offered by spring 29—is established in the right-hand end of the cylinder 19, and effects movement of piston 21 to the right and the tripping of the trigger from under the stem of valve 4 to permit the latter to reseat and cut off the flow of inelastic fluid regardless of the position of lever 12, and as the piston passes over the by-pass channel, the strong suctional pull on the piston is diminished enough by air entering vent 26 and passing through the by-pass channel, to let spring 29 move the piston and trigger to the left until the latter strikes the side of the piston stem 8 and is arrested thereby. If, however, the lever is released when the tube valve is closed, the push-rod and trigger are depressed by spring 15, and the inclined shoulder of the push-rod is disengaged from head 35 to permit spring 34 to reclose valve 31. This reclosure of valve 31 removes entirely the suctional pull on piston 21 and permits spring 29 to completely move the piston to the left and restore the trigger to operative relation to the stem of valve 4. It will thus be apparent that the flow of inelastic fluid through the filler spout is automatically arrested before overflow of the tank can occur, and that it cannot be restarted by operation of lever 12 until the float valve is reopened, because even the momentary closing of said valve by a surging or splashing of liquid up into the air tube, instantly is followed by tripping of the trigger, and the trigger cannot resume operative relation to the valve 4 until after the lever is released and the push-rod and trigger are depressed to initial position.

Referring now to the air-pressure or blast type construction illustrated by Figures 6 and 7, it will be noted that the chambers of cylinder 41 and 42 are connected by port 43 to the left of the piston 44 of partition 45, and that the pipe 46 leading from a pump or compressor 47 communicates with cylinder 42 at the right-hand side of the partition, and that tube 48 communicates with the left-hand chamber of cylinder 41, the right-hand chamber having a by-pass channel and a vent opening 49. In other respects the construction is identical to the suction type except in the fact that the tube 48 is shown as having a bottom 50 and above the same is partitioned at 51 to provide a return passage 52 leading to the atmosphere exterior to the tank, as otherwise the blast would be directed upon and would undesirably agitate the liquid within the tank. All of the parts of Figures 6 and 7, except in the respects noted are identical with the corresponding features of the suction type, and for this reason all such illustrated common parts except those numbered from 41 to 49 inclusive, are correspondingly identified by the same reference characters.

In operation, assuming the valve 4 has been raised or unseated, and valve 31 has, of course, been opened by the inclined shoulder of the

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AUTOMATIC CUT-OFF NOZZLE FOR FILLING TANKS AND CONTAINERS

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Application November 21, 1938, Serial No. 241,587

11 Claims. (Cl. 226—127)

This invention relates to so-called filler spouts or nozzles for fluids, especially of the inelastic type, such as gasoline, water, oil and the like. The filler spouts in common use for filling the tanks of motor cars, for example, have no means for stopping the flow to the tank in the event the operator fails to release the valve lever, and as a consequence, it frequently happens that an overflow at the tank takes place. It has been proposed through sealing the end of an air tube by submergence in liquid in the tank being filled and to provide accelerated flow of liquid through the filler spout, to set up a suction sufficient through appropriate instrumentalities, to permit the valve to reseat and cut off the flow of liquid, but this reseating action cannot take place as long as the operator holds the lever in operative or depressed position. Such proposed arrangement therefore cannot alone be depended upon to guard against overflow of the tank.

My object is to provide equipment which will invariably automatically cut-off the flow through the spout when the submerged end of the tube is sealed by the liquid discharged into the tank, even though the valve unseating lever is not released by the operator, thus guarding effectively against any possibility of overflow of the tank and the waste or danger incident thereto. In accomplishing the automatic cut-off of the flow under the sealing of the end of the tube by a valve, it is practicable in one form of construction to set up a suctional action, and in another form to utilize pressure or blast action as contrasted with suctional action, the two forms being generally identical with mere change in connections for the flow of air or operating fluid. It is my object also to provide for sealing the end of the tube, whether adapted for suctional or blast action, by means of a valve which will float or move to its seat when the liquid in the tank attains a sufficient level, or be engaged with its seat by regurgitation of the liquid in the tank. If the regurgitative action, which can only close the tube momentarily, results in the seating of the gasoline valve before the quantity ordered has been delivered, the operator releases the manual lever and again depresses it to effect the reopening action of the valve.

With the general object named in view of securing automatic closure of the filler spout through the action of closing an air or auxiliary fluid tube by a valve actuated by liquid in a tank being filled, and other objects of a tributary character, the invention consists in certain novel and useful features of construction and combination of parts as hereinafter described and claimed; and in order that it may be fully understood, reference is to be had to the accompanying drawings, in which:

Figure 1 is a small scale side elevation of a filler spout embodying the invention as used with a suction producing means.

Figure 2 is a broken enlarged central vertical longitudinal sectional view.

Figure 3 is a magnified section taken at the discharge end of the spout and of a float valve tube adjacent to the spout.

Figure 4 is a view similar to Figure 3, but showing a slightly different arrangement of float valve.

Figure 5 is an enlarged fragmentary longitudinal section of an air tube arrangement suitable for use with either suctional or pressure embodiments of the filler spout.

Figure 6 is a view similar to Figure 1, but modified for operation with fluid pressure or blast supply means.

Figure 7 is an enlarged view corresponding to Figure 2, but of the type of construction shown in Figure 5.

Figure 8 is an end view of a modification of the construction shown in Figures 3 and 4, illustrating the use of a diaphragm instead of a float, for seating or unseating the tube valve.

Figure 9 is a section taken on the line IX—IX of Figure 8.

Referring now to the drawings in detail, and more particularly to the construction shown on sheet one of the drawings, 1 is a filler spout of the form shown or of any other suitable type for connection to an inelastic-fluid supply hose H, or its equivalent, and having a preferably curved end 2; a partition having a valve-seat opening 3, and a valve 4, normally held by a spring 5 upon the valve-seat. The spout has an opening 6 through which the valve can be placed in operative position, and a cap 7 for closing the opening 6 and providing a resistance abutment for the upper end of spring 5. The stem 8 of the valve is fitted in said cap and extends, in the embodiment shown, through a packing gland 9 at the bottom of the spout to prevent escape or leakage of fluid, such as gasoline, around the lower portion of said stem, into a housing 10 secured to the spout. Fitting for reciprocatory action in and depending from the housing, is a push-rod 11 engaged at its lower end by a lever 12 pivoted to the housing at 13, and adapted to be manipulated by an operator to charge a tank 14 of a motor car, or for storage or any other purpose.

The push-rod 11 is normally held depressed and the lever in inoperative position, by a spring 15 bearing upon the push-rod and against a part of the housing, and pivoted at its lower end to the push-rod is a trigger 16, stepped at 17 to normally bear against the lower end and one side of the valve stem, and said trigger is formed with a slot 18.

raised push-rod, air passes through the valve opening in the partition 45 and thence passes through port 43 and into the left-hand end of cylinder 41. When the valve of the air tube is closed to prevent air passing completely through the tube, a strong pressure is applied on the piston to force it to the right and effect the tripping of the trigger and the consequent closure of valve 4. As the piston passes over the by-pass channel, the air pressure on the piston is reduced, as the air, being unable at this moment to traverse the tube, passes through the channel and vent 49 to the atmosphere, assuming, of course, that the push-rod and trigger are still held in raised position by the operator. This lets the piston move to the left under the pressure of spring 29, and swings the trigger against the side of the stem of the seated valve 4. If in the meantime, the lever has been released and the trigger and push-rod relowered by the spring 15—in which case the valve 31 is reclosed to cut off air pressure from the piston—the trigger is swung back under the valve stem 8 by the spring 28, and the filler spout is again ready to discharge liquid upon the next manual operation of the lever. The withdrawal of the spout from the charged tank permits the float-actuated valve or its equivalent, to open, and it remains in such condition until again closed by the inelastic fluid attaining the level required or surging back into the air tube, as explained.

In Figure 5, the spout is encircled by a fixed compressible ring 53 to fit upon and seal the filling nozzle or mouth of the tank, and the air tube has a float-actuated valve 40 and valve seat 39. It also has a bottom 54 and a spring 55 tending to hold the valve unseated, and between the valve seat and partition and above the sealing ring, has an intake air opening 56, and below the partition, but also above the sealing ring, has an air exit opening 57 so that air displaced from the tank by the inelastic fluid supplied thereto, may escape to the atmosphere. The air drawn by suction, enters through the opening 56 and passes thence through the valve seat opening. If the blast method is employed, the air escapes through the valve seat opening and opening 56. This arrangement is merely to accommodate displaced air and to avoid the discharge of air under pressure into the tank.

In Figures 8 and 9, a valve construction similar to that shown in Figure 7, is disclosed, but in lieu of a float, a diaphragm 57*a* is employed to respond to pressure of inelastic fluid in the tank. The diaphragm is protected against accidental rupture by a screen 58.

From the above description, it will be apparent that I have produced a filler spout possessing the feature of advantage mentioned in the broad objective of the invention, and while the preferred embodiments are shown and described, it is to be understood that the right is reserved to all changes which fall within the principle of construction involved and without the ambit of the prior art.

I claim:

1. The combination with inelastic fluid supply and receiving means, of a filler spout connected to the supply means and adapted for discharge into the receiving means, a yieldingly-seated valve normally closing the passage of the spout, manually-operable means, a trigger normally operable by the manually-operable means to unseat said valve, an air conduit normally open to the flow of air, a valve actuated by liquid in the receiving means for closing the air conduit, and means responsive to such closure of the air conduit valve and separate from and independent of said valve-actuating fluid, for breaking the normal relationship between the trigger and the valve to permit the latter to reseat regardless of the position of the manually-operable means.

2. The combination with inelastic fluid supply and receiving means, of a filler spout connected to the supply means and adapted for discharge into the receiving means, a yieldingly-seated valve normally closing the passage of the spout, manually-operable means, a trigger normally operable by the manually-operable means to unseat said valve, an air conduit normally open to the flow of air, means actuated by liquid in the receiving means for closing the air conduit, a piston connected to the trigger, and means actuated by closure of the air conduit by fluid in the receiving means to apply force on the piston to cause it to move and break the normal relationship between the trigger and the valve to permit the latter to reseat regardless of the position of the manually-operable means.

3. The combination with inelastic fluid supply and receiving means, of a filler spout connected to the supply means and adapted for discharge into the receiving means, a yieldingly-seated valve normally closing the passage of the spout, manually-operable means, a trigger normally operable by the manually-operable means to unseat said valve, an air conduit normally open to the flow of air, means actuated by liquid in the receiving means for closing the air conduit, a cylinder having a vent and a by-pass, a piston in the cylinder and connected to the trigger, and means responsive to closure of the conduit by liquid from the receiving means, to apply force on the piston to cause it to move and break the normal relationship between the trigger and the valve regardless of the position of the lever, and then establish communication between the by-pass and vent.

4. The combination with inelastic fluid supply and receiving means, of a filler spout connected to the supply means and adapted for discharge into the receiving means, a yieldingly-seated valve normally closing the passage of the spout, manually-operable means, a trigger pivotally carried by and operable by the manually-operable means to unseat said valve, an air conduit normally open to the flow of air, means actuated by liquid in the receiving means for closing the air conduit, and means actuated by such closure of the air conduit for breaking the normal relationship between the trigger, manually-operable means and the valve to permit the latter to reseat regardless of the position of the manually-operable means.

5. The combination with inelastic fluid supply and receiving means, of a filler spout connected to the supply means and adapted for discharge into the receiving means, a yieldingly-seated valve normally closing the passage of the spout, manually-operable means, a trigger normally operable by the manually-operable means to unseat said valve, an air conduit normally open to the flow of air, means actuated by liquid in the receiving means for closing the air conduit, means actuated by such closure of the air conduit for breaking the normal relationship between the trigger and the valve to permit the latter to reseat regardless of the position of the manually-operable means, and a valve mechanism for yieldingly closing the air conduit when the spout

valve is closed, and for opening said conduit when the manually-operable means is manually operated, regardless of the position of the trigger.

6. The combination with inelastic fluid supply and receiving means, of a filler spout connected to the supply means and adapted for discharge into the receiving means, a yieldingly-seated valve normally closing the passage of the spout, a manually-operable means, a trigger for unseating the valve, an air conduit normally open to the flow of air, means actuated by liquid in the receiving means for closing the air conduit, means actuated in response to air conduit closure by the said liquid in the receiving means to trip the trigger from operative to inoperative position relative to the spout valve to permit the latter to reseat, yielding means to restore the manually operable means to initial position after the manually applied force is removed, and means following the return of the manually-operable means to initial position, to restore the trigger to operative relation to the reseated spout valve.

7. The combination with inelastic fluid supply and receiving means, of a filler spout connected to the supply means and adapted for discharge into the receiving means, a yieldingly-seated valve normally closing the passage of the spout, manually-operable means, a trigger for unseating the valve, an air conduit normally open to the flow of air, means setting up a forcible air flow through said conduit, means actuated by liquid entering the mouth of the conduit within the receiving means for effecting closure of said conduit, means actuated by force exerted in said conduit when closed through the action of liquid, for tripping said trigger to permit the spout valve to reseat, means to cause the manually-operable means to resume its original position when the manually-applied force is removed, and means to cause the trigger to resume its operative relation to the spout valve.

8. A filler spout having a yieldingly closed control valve, a lever, a yieldingly repressed push-rod for actuation by the lever, a trigger carried by the push-rod and adapted to unseat the valve under manual operation of the lever, a pair of cylinders having a connecting port, one having a vent opening, and the other a partition provided with a valve-seat opening, a piston in the first-named cylinder having a stem connected to the trigger, yielding means exerting force on the piston to hold the trigger in operative relation to the spout valve, a pipe for air flow connected to the cylinder having a valve seat, an air conduit connected to the other cylinder and having its mouth end in proximity to the discharge end of the spout, a valve means susceptible of closing the air conduit at its mouth end, a yieldingly seated valve for the valve seat opening of the partitioned cylinder, and means movable with the push-rod for unseating said valve under manual operation of the lever, to establish communicating between said air pipe and air conduit when the latter is unobstructed, and, when the latter is obstructed, to exert force on and move said piston to trip the trigger from engagement with the spout valve.

9. A filler spout having a yieldingly closed control valve, a lever, a yieldingly repressed push-rod for actuation by the lever, a trigger carried by the push-rod and adapted to unseat the valve under manual operation of the lever, a pair of cylinders having a connecting port, one having a vent opening, and the other a partition provided with a valve-seat opening, a piston in the first-named cylinder having a stem connected to the trigger, yielding means exerting force on the piston to hold the trigger in operative relation to the spout valve, a pipe for air flow connected to the cylinder having a valve seat, an air conduit connected to the other cylinder and having its mouth end in proximity to the discharge end of the spout, a valve means susceptible of closing the air conduit at its mouth end, a yieldingly seated valve for the valve seat opening of the partitioned cylinder, means movable with the push-rod for unseating said valve under manual operation of the lever, to establish communication between said air pipe and air conduit when the latter is unobstructed, and, when the latter is obstructed, to exert force on and move said piston to trip the trigger from engagement with the spout valve, the said first-named cylinder having a by-pass to permit the air to pass the piston and escape through the said vent opening after the tripping action has occurred.

10. A filler spout having a yieldingly closed control valve, a lever, a yieldingly repressed push-rod for actuation by the lever, a trigger carried by the push-rod and adapted to unseat the valve under manual operation of the lever, a pair of cylinders having a connecting port, one having a vent opening, and the other a partition provided with a valve-seat opening, a piston in the first-named cylinder having a stem connected to the trigger, yielding means exerting force on the piston to hold the trigger in operative relation to the spout valve, a pipe for air flow connected to the cylinder having a valve seat, an air conduit connected to the other cylinder and having its mouth end in proximity to the discharge end of the spout, a valve means susceptible of closing the air conduit at its mouth end, a yieldingly seated valve for the valve seat opening of the partitioned cylinder, means movable with the push-rod for unseating said valve under manual operation of the lever, to establish communication between said air pipe and air conduit when the latter is unobstructed, and, when the latter is obstructed, to exert force on and move said piston to trip the trigger from engagement with the spout valve, the said first-named cylinder having a by-pass to permit the air to pass the piston and through the said vent opening after the tripping action has occurred, and means to reseat the valve of the partitioned cylinder, and thus close flow of air between the air pipe and the first-named cylinder, upon the return of the push-rod to initial position.

11. The combination with inelastic fluid supply means and an open-mouth receiving means, of a filler spout connected to the supply means and adapted for discharge into the receiving means, a yieldingly-seated valve normally closing the passage of the spout, manually-operable means, a trigger normally operable by the manually-operable means to unseat said valve, an air conduit normally open to the flow of air, means actuated by liquid in the receiving means for closing the air conduit, and means responsive to such closure of the air conduit for breaking the normal relationship between the trigger and the spout valve to permit the latter to reseat regardless of the position of the manually-operable means.

JEWELL R. BENSON.