This dual feeder includes a venturi device communicating with a pair of aspirator tubes to draw liquid additives from a pair of independent containers. Depletion of the additive in one container below the intake level of the aspirator tube results in automatic cut-off of the additive in the other container.
DUAL ADDITIVE FEEDER FOR DISHWASHING

BACKGROUND OF THE INVENTION

This invention relates in general to a dual additive feeder for a dishwashing machine and in particular to a feeder providing automatic cut-off of both additives supplied by the feeder to a dishwashing machine when the supply of one additive is exhausted.

One of the ways in which liquid chemical additives are supplied to a dishwashing machine is by use of a venturi-aspirator system in which the liquid additive is sucked into the mainstream of a water supply and transported to the dishwashing machine. Known devices used to supply more than one additive appear to operate by one of two methods. Either the additives are mixed together prior to aspiration or alternatively completely independent venturi-aspirator systems are provided for each additive. The former method suffers from the disadvantage that additives are often incompatible before mixing with water with the result that pre-mixing them reduces their storage life. The latter method suffers from the disadvantage that when the supply of only one additive is depleted, the other additive continues to be fed into the dishwashing machine and is wasted because both additives are required to provide an effective washing process. These disadvantages are overcome in the present invention.

SUMMARY OF THE INVENTION

This dual feeder does not require pre-mixing of the additives and hence increases the storage life of incompatible additives. Further, when the supply of one additive is depleted, the supply of the other is automatically cut off and thus there is no wastage of the additive not yet depleted.

The dual feeder provides a means of feeding additives from a pair of additive reservoirs into the water supply to a dishwashing machine and includes cut-off means automatically cutting off additive from one of the reservoirs when the additive in the other of said reservoirs is exhausted. The feeder means includes a pair of feed lines having intake ports immersible in associated reservoirs, said one reservoir being cut off when the additive in the other reservoir falls below the level of its associated aspirator tube intake port.

The dual feeder includes a venturi means receiving the water supply and the feed lines are provided by aspirator tubes communicating between the throat of the venturi means and the additive reservoirs so that when the supply of one additive is depleted to a level below the end of the tube, the vacuum at the venturi throat is broken resulting in automatic cut-off of the additive in the other reservoir.

The venturi means preferably includes two venturi interconnected at their throat portions by a conduit. Mixing chambers are provided at each venturi throat and the conduit extends between said mixing chambers. Each aspirator includes an aspirator port communicating directly with the mixing chambers of an associated venturi so that the aspirators are in communication with each other.

The water supply line includes branch portions, each connected to the entrance of an associated venturi and the discharge line includes a common mixing chamber communicating with the exit port of each venturi.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates the dual feeder used in conjunction with a dishwashing machine, and FIG. 2 is an enlarged sectional view of the mixer block.

DESCRIPTION OF THE PREFERRED EMBODIMENT:

Referring now by characters of reference to the drawing and first to FIG. 1, it will be understood that in the preferred embodiment, the dual additive feeder, generally indicated by numeral 10, is utilized in conjunction with a dishwashing machine 11 and provides a means of injecting at least two dishwashing additives in liquid form into a common water supply for delivery to said machine 11. The liquid additives are aspirated from containers 12 and 13 which constitute first and second reservoirs.

The dual feeder 10 includes a mixer block 14 shown in enlarged detail in FIG. 2 and in which is formed a pair of venturis 15 and 16 constituting first and second venturis. Each venturi includes an entrance port 20, an exit port 21 and a throat port 22. The throat port 22 is smaller in diameter than the entrance and exit ports 20 and 21 to effectuate the reduction in fluid pressure characteristic of a venturi device. A mixing chamber, generally indicated by numeral 23, is formed about each venturi throat 22. The mixing chambers 23 are substantially cylindrical in configuration. Each chamber 23 communicates with the upstream convergent portion 24 of an associated venturi and also leads directly into the downstream divergent portion 25 of said venturi. The mixing chambers 23 are interconnected by a conduit 26 extending between said chambers 23 and said conduit 26 in effect, provides communication between the throat portions 22 of each of the venturis 15 and 16.

In the preferred embodiment, water is supplied to the mixer block 14 by a supply line 17 connected to a water main 18. The supply line 17 communicates by means of a fitting 19 directly to an inlet passage 27 of the mixing block 14, said passage 27 communicating in turn with an inverted U-shaped passage 28 which has opposite branch portions 29, each communicating directly with the entrance port 20 of an associated venturi.

The liquid additives from the containers 12 and 13 are supplied to the mixer block 14 by aspirator tubes 30 and 31 respectively. The aspirator tubes 30 and 31 each include an intake port 32 or 33 operatively disposed below the level of the liquid additive and each of said tubes 30 and 31 is connected directly to an associated aspirator passage 34 by means of a fitting 35. The combined aspirator tubes and passages constitute aspirator means providing feed lines between the reservoirs 12 and 13 and the venturis 15 and 16 respectively. The aspirator passages 34 are formed in mirror-image of each other within the mixer block 14 and each communicates directly with the mixing chamber 23 of an associated venturi by means of an aspirator port 36. The ports 36 are preferably located substantially at the throat portion 22 of an associated venturi. It will be understood that by virtue of the conduit interconnecting passage 26, between the mixing chambers 23, the aspirator passages 34 are effectively in communication with each other.
The venturis 15 and 16 discharge into a common discharge line 37 which includes a flared collection head 38 disposed within a cylindrical cavity 39 communicating with the exit ports 21 of the venturis 15 and 16 and providing a common mixing chamber for additive-charged water issuing from each of the venturis. The combined stream charged with both additives passes from the collection head 38 into the dishwashing machine 11 as clearly indicated in FIG. 1. The operation of the dual feeder 10 is such that when either one of the liquid additives is depleted sufficiently so that the level falls below the inlet port of its associated aspirator tube, the supply of both additives is automatically cut off. This operation will now be briefly described.

Water supplied under pressure from the mains 18 passes through the dual venturis 15 and 16 on route to the dishwashing machine 11. During normal operation, the pressure drop at the venturi throats 22 is sufficient to aspirate liquid additive from each of the containers 12 and 13 into associated mixing chambers 23 for mixing with the water stream. However, if the liquid additive in one container, for example in container 13, falls below the elevation of intake port 33 so that the aspirator tube 31 is no longer immersed in liquid additive, the vacuum at the throat of venturi 16 is destroyed. Because the throats 22 of each of the venturis 15 and 16 are in communication, by virtue of the conduit 26, the vacuum at the throat of the venturi 15 is also destroyed and the aspiration of the additive from the other container, container 12, automatically ceases. Thus, wasteful supply of a single additive from the container 12 to the dishwashing machine 11 cannot occur. The delivery of the uncharged water to the dishwasher 11 continues immediately following additive cut-off but, because of the cutoff of the supply of both additives, this water dilutes the wash solution present in the dishwashing machine 11. A conventional controller (not shown) responding to the dilution of the wash solution may be provided to make an audible or visual signal to indicate that replenishment of the additive containers is required.

We claim as our invention:

1. A dual additive feeder for a dishwashing machine comprising:
   a. a first venturi including an entrance port, an exit port and a throat disposed between said ports,
   b. a supply means supplying fluid to the entrance port,
   c. a first liquid additive reservoir,
   d. a first aspirator means communicating between the first additive reservoir and the throat portion of the venturi at one location on the throat portion,
   e. a second liquid additive reservoir,
   f. a second aspirator means communicating between the second additive reservoir and the throat portion of the venturi at another location on the throat portion,
   g. discharge means discharging fluid from the exit port.

2. A dual additive feeder as defined in claim 1, in which:
   h. the venturi includes a mixing chamber peripherally disposed about the throat portion, and
   i. each aspirator means includes an elongate tube communicating with the mixing chamber and having an air inlet port disposed below the additive level under normal operating conditions to aspirate additives to said mixing chamber and both aspirator means being cut off when the level of one additive falls below the inlet port of the associated aspirator means.

3. A dual additive feeder for a dishwashing machine, comprising:
   a. a first venturi including an entrance port, an exit port and a throat portion disposed between said ports,
   b. a second venturi including an entrance port, an exit port and a throat portion disposed between said ports,
   c. conduit means communicating between the throat portions of said first and second venturi,
   d. supply means supplying fluid to the entrance ports of each venturi,
   e. a first additive reservoir,
   f. a first aspirator means communicating between the first additive reservoir and the throat portion of the first venturi,
   g. a second additive reservoir,
   h. a second aspirator means communicating between the second additive reservoir and the throat portion of the second venturi,
   i. discharge means discharging fluid from the exit ports of the first and second venturi.

4. A dual additive feeder as defined in claim 3, in which:
   j. the supply means includes a main supply line and a pair of branch portions, each branch portion being connected between the main supply line and an associated venturi entrance port, k. the discharge means includes a discharge mixing chamber communicating with the exit ports of the venturis.

5. A dual additive feeder as defined in claim 3, in which:
   j. a mixing chamber is peripherally disposed about the throat portion of each venturi, k. the conduit means includes a passage communicating between the mixing chambers, and l. each aspirator means includes an elongate tube communicating with an associated mixing chamber.

6. A method of feeding and cutting off additives in a dishwashing system comprising the steps of: a. passing a water supply through a venturi, b. supplying one liquid additive to the throat of the venturi by aspiration, c. supplying another liquid additive to the throat of the venturi by aspiration, d. supplying air to the venturi throat selectively in lieu of one of said liquid additives to destroy the venturi vacuum and automatically terminate the supply of both of said additives.

* * * * *
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,756,457 Dated September 4, 1973

Inventor(s) LAMBERT HOLMES and FRANKLIN M. McDOUGALL

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Title page, the designated Assignee "Economical Laboratory, Inc.," should read --Economics Laboratory, Inc.--

Signed and sealed this 25th day of December 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

RENE D. TEGTMeyer
Acting Commissioner of Patents