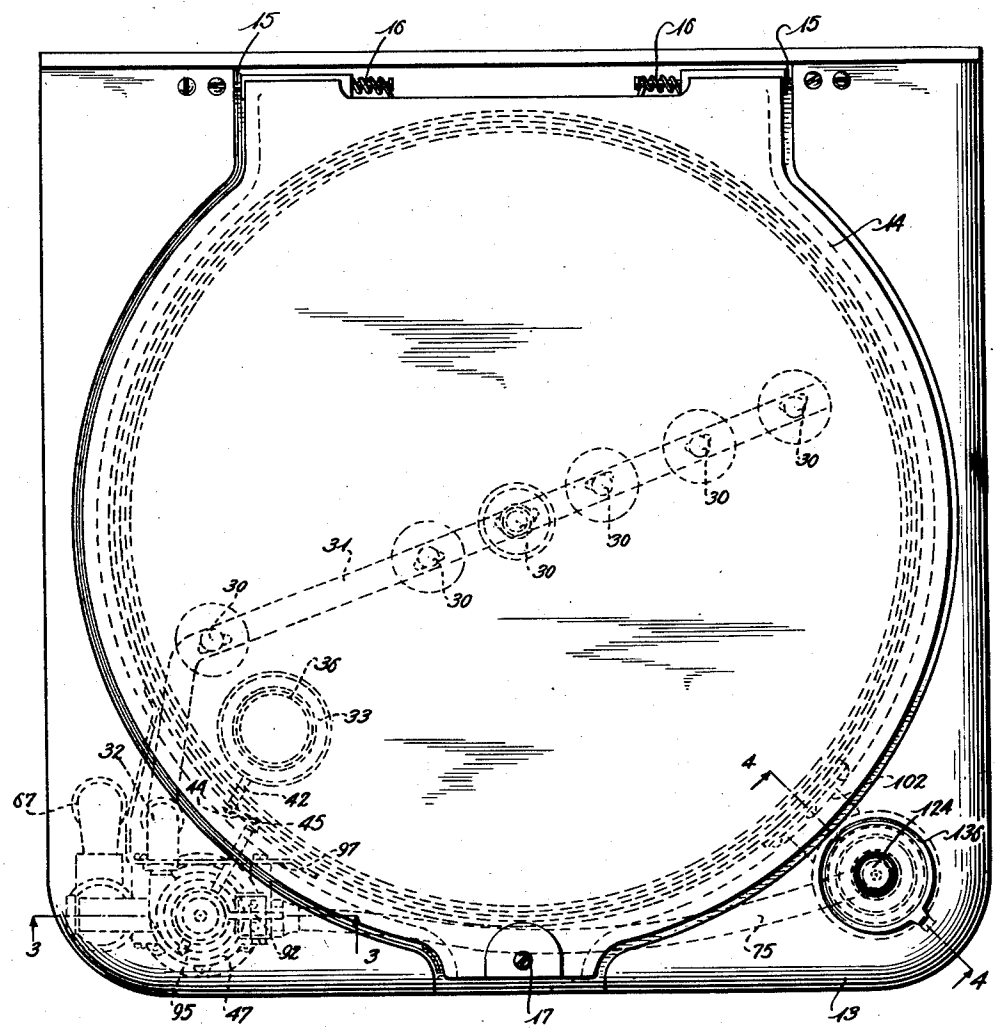
Nov. 6, 1951 C. DE GANAHL ET AL 2,573,787

DETERGENT DISPENSER AND TIMER VALVE FOR DISHWASHING MACHINES

Filed Feb. 20, 1948 5 Sheets-Sheet 1

Fig. 1.



Inventors

Carl de Ganahl,
Charles C. Smitlo and
Ira P. Romberger, Jr.

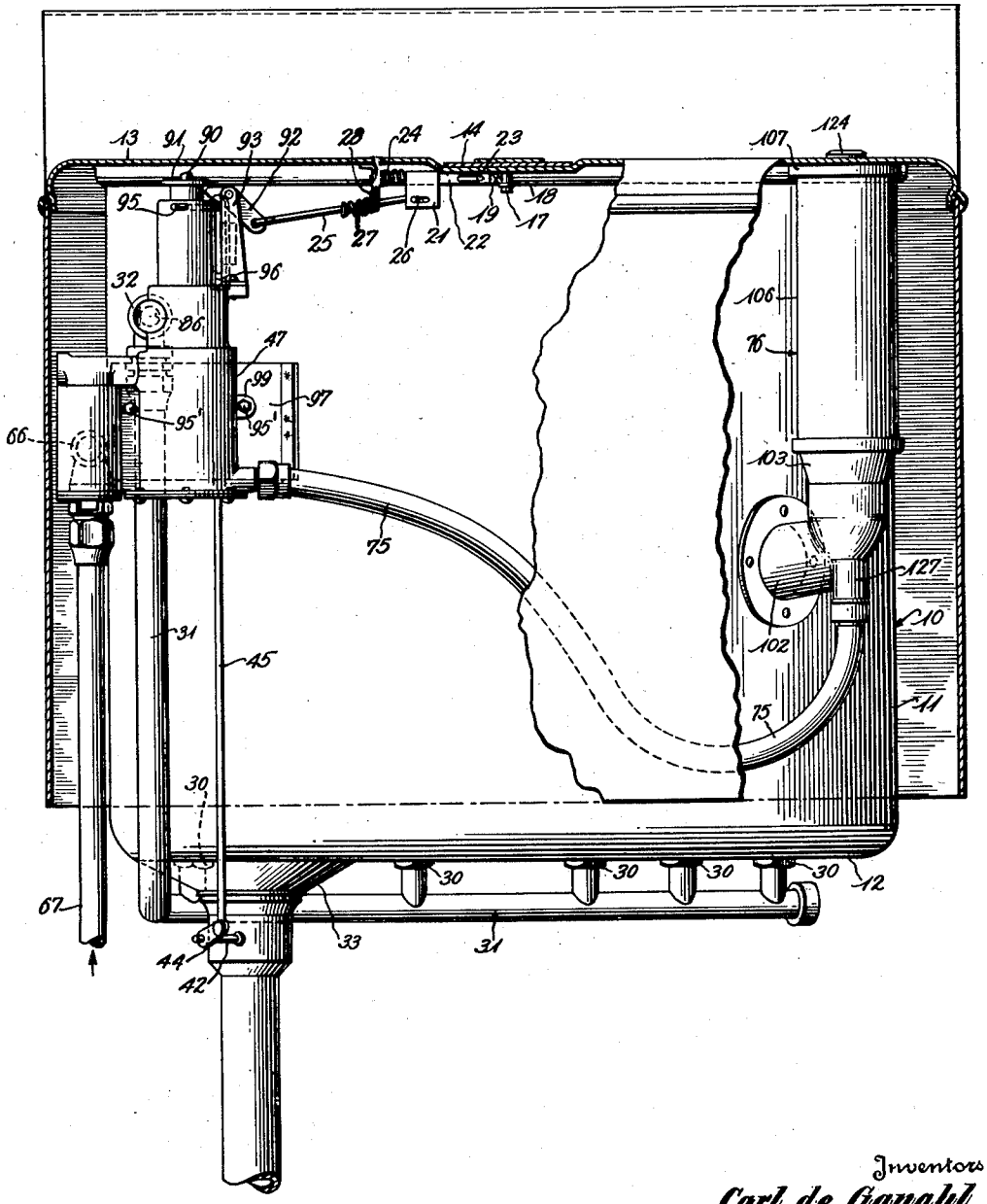
By James E. Toomey
Agent

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DETERGENT DISPENSER AND TIMER VALVE FOR DISHWASHING MACHINES

Filed Feb. 20, 1948 5 Sheets-Sheet 2

Fig. 2.



Inventors
Carl de Ganahl,
Charles C. Swith and
Ira P. Romberger, Jr.

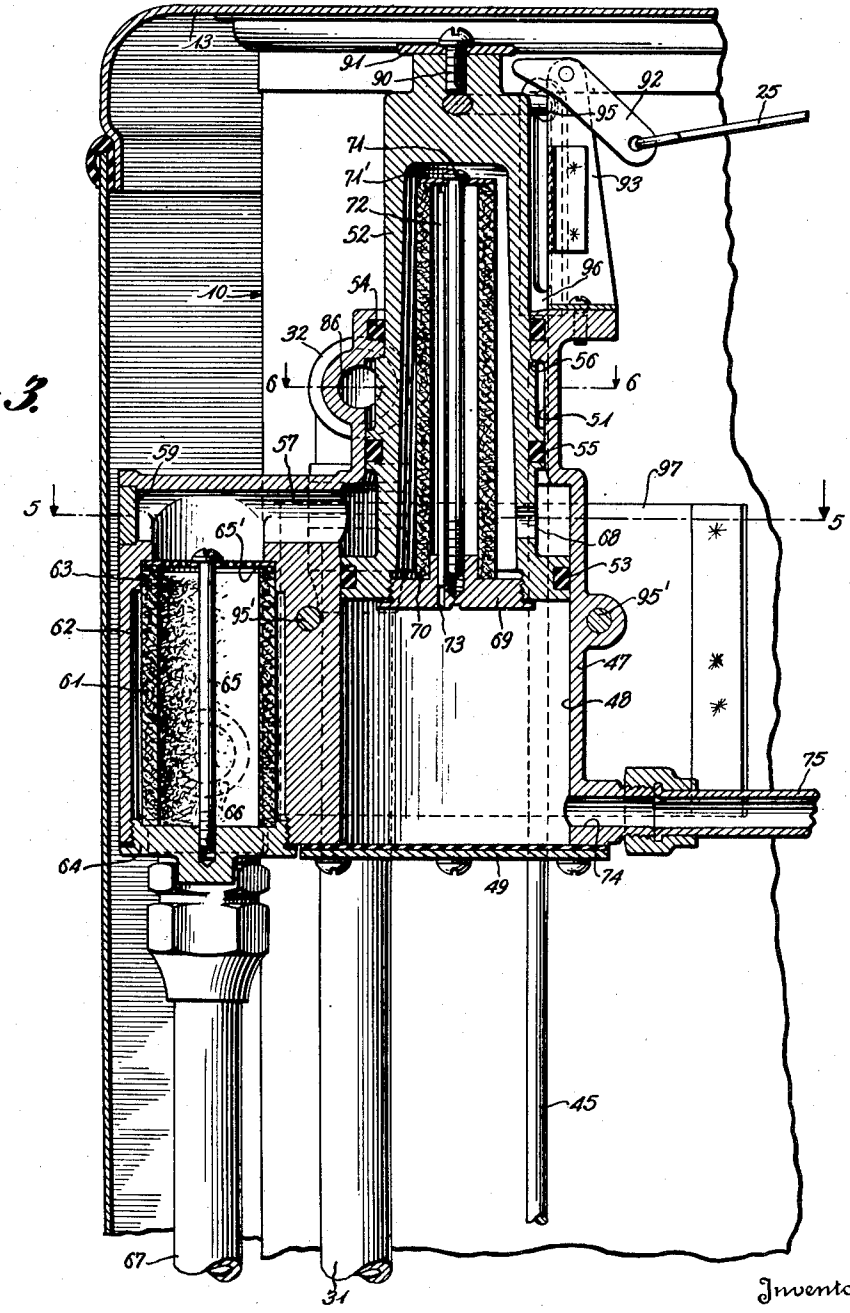
By
James E. Toomey
Agent

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DETERGENT DISPENSER AND TIMER VALVE FOR DISHWASHING MACHINES

Filed Feb. 20, 1948 5 Sheets-Sheet 3

Fig. 3.



Inventors

Carl de Ganahl,
Charles C. Smith and
Ira P. Romberger, Jr.

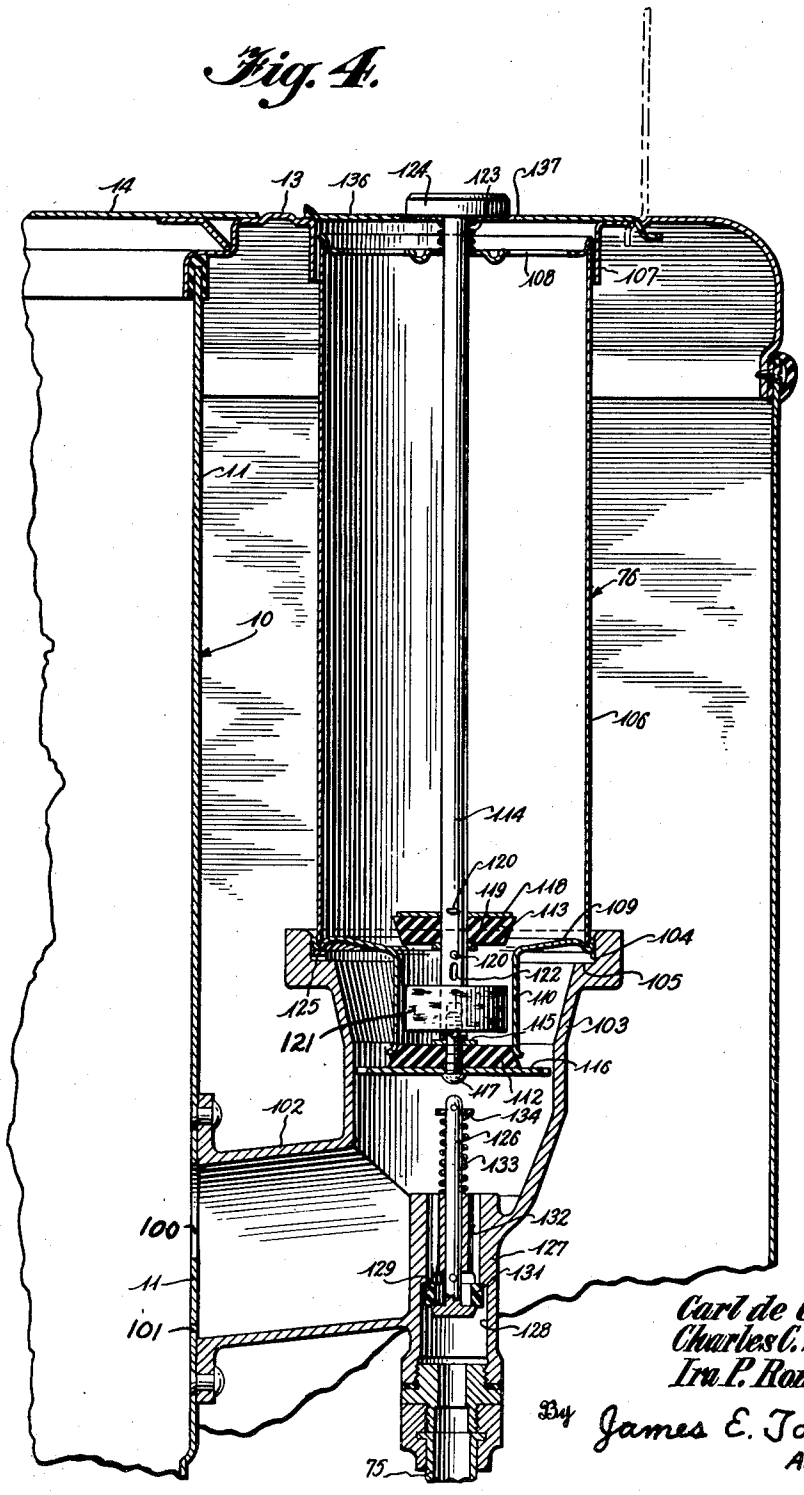
By James E. Toomey
Agent

Nov. 6, 1951 C. DE GANAHL ET AL 2,573,787

DETERGENT DISPENSER AND TIMER VALVE FOR DISHWASHING MACHINES

Filed Feb. 20, 1948 5 Sheets-Sheet 4

Fig. 4.



Inventors
Carl de Ganahl,
Charles C. Smith 2nd
Ira P. Romberger, Jr.
By James E. Toomey
Agent

Nov. 6, 1951 C. DE GANAHL ET AL 2,573,787

DETERGENT DISPENSER AND TIMER VALVE FOR DISHWASHING MACHINES

Filed Feb. 20, 1948 5 Sheets-Sheet 5

Fig. 5.

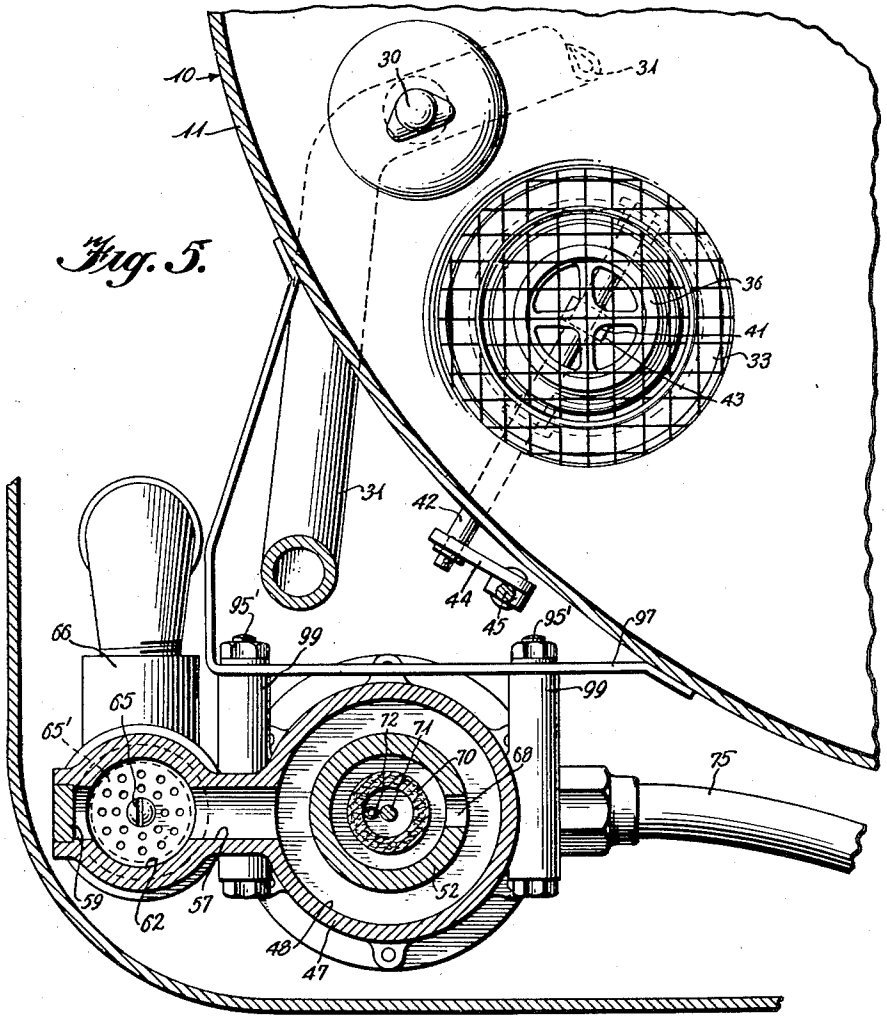
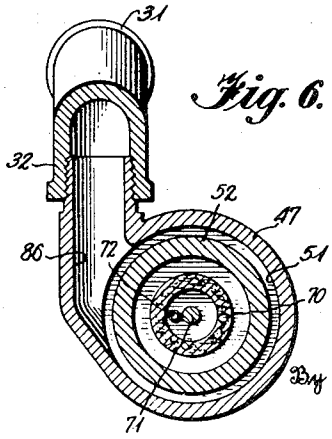


Fig. 6.



Inventors

Carl de Ganahl,
Charles C. Smith and
Ira P. Romberger, Jr.

By James E. Toomey
Agent

Patented Nov. 6, 1951

2,573,787

UNITED STATES PATENT OFFICE

2,573,787

DETERGENT DISPENSER AND TIMER VALVE FOR DISHWASHING MACHINES

Carl de Ganahl, Trenton, N. J., and Charles C. Smith, Warrington, and Ira P. Romberger, Jr., Langhorne, Pa., assignors to Kaiser Metal Products, Inc., a corporation of California

Application February 20, 1948, Serial No. 9,796

7 Claims. (Cl. 134—98)

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This invention relates to timing devices and more particularly to a device of this character for association with a dishwashing machine to automatically bring about in properly timed relationship the sequence of events necessary to fully cleanse dishes. Moreover, the invention relates to a detergent dispenser which is functionally associated with the timing device.

In a co-pending application, filed on June 16, 1947, by Otto J. Borngesser et al., Ser. No. 754,918, a timer of this general character is disclosed and claimed and although that timer is fully satisfactory in its operation, the timer of the present invention embodies certain refinements thereover, both because of its improved and simplified construction, and its improved mode of operation. Thus, the timer of this invention serves to accomplish, in their proper order and for their respective periods of time, an initial washing of the dishes with clear water to remove any loose food, a cleansing operation in which water containing a detergent is played against the dishes, an opening movement of the drain valve, a final rinsing action against the dishes with clear water and a final release of the closed lid so that it will open and the dishes will be more quickly dried. These functions are performed by the timer of the above mentioned earlier filed application, but in addition to them, the association of a detergent dispenser with the timing device in accordance with the present invention has the further advantage of releasing a measured quantity of the detergent into the washing chamber at the proper time.

It is accordingly an object of the present invention to provide a timing device which may be readily constructed and assembled and which is positive in its operation.

Another object of the present invention is to associate a detergent dispenser with the timer so that at the proper time, detergent will be supplied to the dishwasher.

Another object of the invention is to provide a detergent dispenser which will supply the proper amount of detergent to the dishwasher.

Still another object of the invention is to associate a detergent dispenser with the timer in such relationship that water released from the timer serves to flush the released detergent to the dishwasher chamber.

A further object of the invention is to provide means for discharging the measured amount of detergent into the washing chamber over a prolonged period of time.

A still further object of the invention is to construct a timer having filters therein which minimize the possibility of interrupted operation of the timer due to clogging therein.

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One possible embodiment of the invention is illustrated in the accompanying drawings in which

Figure 1 is a plan view of a dishwashing machine to which the timing device and detergent dispenser of the invention have been applied,

Figure 2 is a front elevational view of Figure 1, a portion of the outer depending skirt of the cabinet having been broken away,

Figure 3 is a sectional view on the line 3—3 of Figure 1 on an enlarged scale,

Figure 4 is a sectional view on line 4—4 of Figure 1 on an enlarged scale,

Figure 5 is a sectional view on the line 5—5 of Figure 3, and

Figure 6 is a sectional view on the line 6—6 of Figure 3.

The dishwashing machine which is here illustrated includes a tub or shell 10 having a cylindrical side wall 11, and a bottom wall 12. At the top of the tub 10 is a top plate 13, which is flush with the top rim of the side wall 11. A lid or cover plate 14 for the shell 10 is pivoted about hinge shafts 15 to the rearward portion of the top plate 13. Springs 16 are positioned upon the shafts 15 and are under such torsion that they tend to lift up the cover plate 14 to an open position.

To hold the cover plate 14 downwardly in its closed position it is provided with a depending pin 17 (see Fig. 2) at its forward free edge, and pin 17 is formed with an upwardly facing shoulder 18 at its lower end. A retractable latch 19 engages over shoulder 18 to hold the cover plate in its downward position. The latch 19 is provided with an enlarged tail portion 21 and the latch 19 is guided for reciprocatory motion toward and away from the pin 17 by means of guide rails 22 on opposite sides of the latch. These rails are carried on the under-side of top plate 13. A pin 23 projects from the latch 19 through one or both of the guide rails 22 to limit the endwise movement of latch 19.

A spring 24 bears against the enlarged portion 21 to urge the latch 19 toward the pin 17. It will be observed that the engaging end of latch 19 is bevelled so that a mere downward motion on the cover plate 14 will serve to force the latch 19 to a retracted position against the action of spring 24 so that the shoulder 18 can become engaged under the latch 19. To disengage the latch 19, a pull rod 25 is provided and

this pull rod has an inturned end which enters a slot 26 in the tail portion 21 of the latch. A spring 27 urges the pull rod 25 in a direction which tends to disengage the latch, but it has insufficient pressure to bring this action about and serves merely to hold the parts in the proper relationship until a pull is exerted upon rod 25 at the proper time. This means for exerting a pull upon the rod 25 will be described later.

A bracket 28, depending from the top plate 13, provides a seat for spring 24 and also for spring 27, to back them up. Rod 25 passes through a hole in bracket 28.

Rotatably mounted within the tub 10 is any suitable means for supporting the dishes to be washed. As a suitable construction for this purpose is well known, an illustration of this detail has not been included but it will be understood that any open basket formation may be utilized. It is here contemplated that the basket, or like carrier, will be rotatable about a center vertical pivot so that the basket may rotate and bring all faces of all of the dishes into the streams of water which are to effect the cleansing action.

These streams of water are projected upwardly from the bottom wall 12 of the tub. As here shown, this is accomplished by providing a plurality of jets 30 which pass through fluidtight openings in the bottom wall 12 of the tub. All of the jets 30 are connected to a common pipe 31 which serves as a manifold, and the pipe 31 is connected at 32 to the timing device. In the illustrated apparatus, all or most of the jets 30 are inclined from the vertical so that they will direct streams against the dishes at such an angle that the carrier for the dishes will thereby be rotated about its support. However, it is to be understood that the invention is equally as applicable to a dishwasher having a motor driven dish-carrier and other types of water projecting means for washing the dishes.

The bottom wall 12 of the shell 10 preferably slopes downwardly to a drain 33 which is to be connected to a sewer. Within the opening of drain 33 a moveable valve 36 of known type is located, which in a raised position will result in total drainage of the tub 10, and which in its lowered position will trap a small amount of water at the bottom of the tub 10, but will permit an overflow of the water to the sewer so that a constant level will be maintained in the tub. For example, the tubular valve shown at 36 in the above-mentioned earlier filed application may be employed.

It may be mentioned at this point that during the washing step in which soap or a detergent is in the body of water being maintained at the bottom of the tub 10, the streams of water issuing from the jets 30 pick up this soapy water and project it against the dishes. For this reason, the orifices of the jets 30 are below the level of the body of water maintained in the tub when the valve is in its lowered position, and as a consequence the streams of fresh water from the jets 30 will be projected through the soapy body of water and carry a considerable amount of this soapy water upwardly against the dishes.

It may also be mentioned at this point that during the initial flushing action with fresh water to wash off the residue on the dishes there will not be sufficient height of water accumulated in the bottom of the tub 10 to overlie the jets 30. As a consequence there will not be a pick-up of water from the bottom of the tub and the full strength of the streams from the jets will be directed upon the dishes. These strong streams will remove the loose food particles from the dishes. After a sufficient amount of water has entered the tub so that it overlies the jets 30, the soapy water will be carried against the dishes to effect the thorough washing operation. After the washing operation is over the valve member 36 must be lifted to its upper position so that the soapy water can drain away and also so that the fresh water which is introduced to remove the soapy material from the dishes will also immediately escape through the drain 33.

To operate the valve member 36, a shaft 42 which passes transversely through the drain 33 is provided. This shaft 42 has affixed thereto a cam 43 so that an arcuate rotation of the shaft 42 will cause the cam 43 to bear against the under-side of a cross bar 41 of valve member 36 and lift valve member 36, or conversely, to permit it to move to its downward position. To give the shaft 42 this arcuate movement a lever 44 is affixed to shaft 42 and a pull rod 45 is pivotally connected to the outer end of lever 44. The means for operating the pull rod 45 will be explained later.

The timing device of the invention performs several functions. It operates the pull rod 45 which serves to lift and lower the valve member 36, the pull rod 25 which serves to retract the latch 19, and it also delivers liquid into the manifold pipe 31 at and for the proper period of time. Thus, the addition of the timing device to the dishwashing machine makes the operation of the machine fully automatic.

The timing device includes a body 47 which has a lower cylindrical chamber 48. Chamber 48 is closed at its lower end by a cover plate 49 which is affixed to the body 47. The upper portion of body 47 is formed with a cylindrical chamber 51, which is of less diameter than the chamber 48. Chamber 51 is in axial alignment with the cylindrical chamber 48.

Operating within the chambers 48 and 51 is a piston 52. The lower portion of piston 52 is enlarged to fit the cylindrical surface 48 and a packing material 53 therein provides a liquidtight seal between the lower end of the piston and the surface 48. The piston 52 passes upwardly through the top of the body 47 and a packing material 54 carried by the body 47 prevents escape of liquid to the outside of the body around piston 52. Above the lowermost end of piston 52, it is formed with a peripheral flange in which is located packing material 55. This packing material at 55 is in sealing engagement with the inner surface of the cylindrical chamber 51. Above the sealing material 55 the piston 52 is formed with a shoulder 56 which limits the upward movement of the piston 52 by contact against the body 47.

Extending transversely of the body 47 is a bore 57 and it will be observed that the bore 57 is on one side of the chamber 48. Also, the bore 57 is positioned between the chamber 48 and the smaller chamber 51 and therefore communicates with both of these chambers. This bore 57 may be formed by drilling cross-wise into the body 47 and thereafter closing the end by means of a plug 59.

The bore at 57 receives the water which is supplied under pressure. Although water may be delivered directly to this bore 57, in the present embodiment of the invention, a hollow, porous block 61, which acts as a sieve, is provided in

the path of the incoming stream to serve to filter the incoming water. The hollow, porous block 61 is positioned in a chamber 62 which is formed in the body 47 to one side of the cylindrical chamber 48.

The upper end of the hollow, porous block 61 is open and fits within a seat 63 at the upper portion of chamber 62. A plug 64 is screwed into the lower end of chamber 62 to close it and the lower end of the hollow, porous block 61 is held against this plug 64 by means of a screw 65, which passes through a perforated washer 65¹, which bears on the top edge of the block 61.

An inlet opening 66 is formed in the side wall of chamber 62 and the supply pipe 67 is connected to a source of water to supply water under pressure through this opening 66 and into the chamber 62. It is apparent that the water must all flow through the hollow, porous block 61 in order to enter the inlet bore 57.

The piston 52 is hollow and opens outwardly at its lower end. Openings 68 extend through the side wall of the piston 52 at a point just above the lower end of the piston so that a communication is established between the interior of the piston and the cylindrical wall 48 above the packing material 53. Water from the passageway 57 can therefore pass into the interior of the piston 52 through these openings 68.

The lowered, opened end of the hollow interior of the piston 52 is closed by means of a plug 69 which, for example, may be screw-threaded into the lower end of the piston 52. A hollow, porous block 70 is held at its lower end against the plug 69 by means of a screw 71 which passes through a washer 71¹ at the top of the porous block 70. The screw 71¹ is threaded into the plug 69 to hold these several parts in assembled relationship with respect to the plug 69.

Extending through the plug 69 and into the space within the hollow interior of the porous block 70 is a passageway 73, and fitting within this passageway 73 and extending upwardly within the interior of the porous block 70 is a capillary tube 72.

It is apparent that the incoming water can flow from the inlet bore 57 around the lower portion of the piston 52 and through the openings 68 into the interior of the hollow piston 52. From the interior of the piston 52, the water can pass through the hollow, porous block 70 and then into the upper end of the capillary tube 72, to flow throughout the length of this tube and through the opening 73 in plug 69. In this manner the water flows into the cylinder 48 below the piston.

Although it is preferred that the porous block 70 be present to make doubly certain that the water is well filtered before it reaches the capillary tube 72, it is not absolutely essential. This is especially true if the porous block 61 is used and is sufficiently fine to remove all contaminants.

The opening through the capillary tube 72 should be so small that in conjunction with the length of this capillary tube 72 only a small amount of water can pass through the tube in a definite time interval. It has been found that the use of this capillary tube is more satisfactory to regulate the flow and obtain a uniformity of operation than could be achieved for example by means of a simple small port opening.

It will be apparent that the water which is supplied to the underside of piston 52 through opening 73 will force the piston 52 upwardly to

the position of Figure 3. Although the water is also acting downwardly upon the upper side of the flange at the lower end of piston 52, since the underside of piston 52 has a greater effective area, the piston 52 will be pushed upwardly. However, it will be apparent that if the water pressure below piston 52 is allowed to escape, the water pressure acting downwardly on piston 52 will cause the piston 52 to move downwardly.

To permit the escape of the water beneath piston 52, the lower part of cylindrical chamber 48 is provided with an outlet opening 74. The outlet opening 74 communicates, by means of a pipe 75 with the lower end of the liquid dispenser 76, and as hereinafter will be explained, this detergent dispenser 76 includes a valve which will exhaust the water within the chamber 48 by allowing it to escape through opening 74 and pipe 75.

When escape of water through the opening 74 is prevented the piston 52 is forced to its uppermost position as has been mentioned, and this is because the exposed areas on the underside of the piston 52 is greater than the effective area on the upper side of the piston 52. So long as this escape through opening 74 is prevented, the piston 52 will remain in its uppermost position, and the incoming water supply will be sealed within the timing body. The water cannot escape above packing material 55, and it cannot escape out of chamber 48.

However, when the water below piston 52 can escape through the opening 74 and pipe 75, the water pressure beneath the piston 52 will be relieved and the force exerted by the incoming water upon the upper effective surface of the piston 52 will cause the piston 52 to rapidly descend to its lowermost position. This descent of piston 52 will not be interfered with by the water bleeding into the chcamber 48 through opening 73, because of the extremely small size of the opening through capillary tube 72 relative to the outlet opening 74 and the passageway through pipe 75.

From Figure 3, it will be apparent that as soon as the packing material 55 has moved below the surface 51 the water within the inlet bore 57 can pass upwardly along the piston 52 and into an outlet opening 86 in the upper part of the timer body. The outlet opening 86 is connected by the aforesaid coupling means 32 to the manifold pipe 31 which supplies water to the jets 30 within the tub 10. During the time that the packing material 55 is below the surface 51 the water supplied through incoming pipe 67 will pass through the timer body and into the manifold pipe 31 and during this entire same period of time streams of water will continue to issue from the jets 30.

It may be mentioned at this point that a suitable siphon-breaking device not shown, since it does not form part of the invention may be located in the supply conduit 67 so that upon the occurrence of a suction or reversed flow of supply water, the wash water within the bottom of the tub 10 will not be sucked into the fresh water supply and cause its contamination. Preferably such a reverse flow preventing device is located at an elevated position as by disposing it upon the top of the upper plate 13.

It has been pointed out that the timing mechanism serves to unlatch the cover 14 at the proper time so that when the dishes are cleaned this cover will automatically open. To accomplish this purpose the uppermost part of the piston 52

is formed with a flanged enlargement 91 such as by affixing a washer to the upper part of piston 52 by means of a screw 90. A trip lever 92 is pivotally attached to a bracket 93 secured to the timer body. The pull rod 25 is pivotally connected to one arm of lever 92 and the other arm of trip lever 92 extends into the path of the flanged enlargement 91 at the top of piston 52.

During the downward movement of piston 52 from its position in Figure 3 the flanged enlargement 91 will swing the trip lever 92 in a direction to exert a push upon the rod 25 and because of the slot connection at 26 this will have no effect on the latch 19. However, during the upward movement of the piston 52, when the flanged enlargement 91 strikes against the trip lever 92 a pull will be exerted upon the rod 25 and this in turn will withdraw the latch 19 from the shoulder 18 and release the locking pin 17. As a consequence the springs 16 will swing the cover or lid 14 upwardly to an open position.

It has also been mentioned that the timing device serves to open and close the drain valve 36 at the proper times. To accomplish these operations, a pin or stud 95 is affixed to the uppermost part of the piston 52 by means of screw 90. The upper end of the pull rod 45 is formed with an enlarged head 96 which is slotted, and pin 95 engages in this slot. As has been pointed out, pull rod 45 actuates the lifting cam 43 which acts upon the drain valve member 36. The slotted connection between pin 95 and head 96 permits a lost motion connection so that the longer travel of piston 52 relative to the necessary movement of rod 45 will be accommodated and so that valve 36 will not be lifted until the proper time.

The timing device may be supported in any convenient manner. As here shown, a bracket plate 97 is secured as by welding to the outer side of the tub 10. The body 47 is attached to plate 97 by means of bolts 95' which pass through bosses 99 of the body 47.

It has been mentioned that the valve which controls the exhaust from the portion of chamber 48 below the piston 52 in the timer is associated with the detergent dispenser. This detergent dispenser and associated valve is best illustrated in Figure 4 at 76. The lower end of this combined detergent container and exhaust valve includes a spout 102 which is attached to the lower end of the side wall 11 of the dishwasher tub 10. As is shown in Figure 4, the spout 102 is attached to the tub opposite a large opening 100, and a small opening 101. The opening 101 is in line with the bottom inside wall of the spout so that the detergent from the supply container can flow through the spout and directly into the lower portion of the tub through the opening 101. The large upper opening 100 prevents the occurrence of a vacuum in spout 102. The spout 102 is of a generally angular formation so that the lower portion thereof slopes slightly downwardly toward the tub, and the upper portion 103 thereof extends generally vertically.

The top of the upper portion 103 of the spout is enlarged and is formed with an internal counter-bore 104 which provides an upwardly facing shoulder 105. This entire upper portion of the spout 102 is circular in cross-section.

The container for the detergent includes a cylindrical shell 106, which freely fits within the counter-bore 104 so as to be removable up and down within the upper portion 103 of the spout 102. The upper portion of the shell 106 fits freely within a depending cylindrical portion 107 of the top plate 13, and it will be observed that this upper cylindrical portion 107 is in axial alignment with the counter-bore 104. The cylindrical portion 107 and the counter-bore 104 therefore serve as a guideway for the shell 106 to hold it upright and permit its vertical up and down motion.

The top of the shell 106 is closed by a plate 108 which is preferably attached to the top edge of the shell 106. This top plate 108 should be perforated at several points so that the liquid detergent can be poured through these perforations and into the shell 106 to fill it.

At the lower end of the detergent shell 106 is a bottom plate 109 and this bottom plate is shaped to provide cylindrical portion 110 of small size at the lower end of the shell 106. It is apparent that the liquid which is supplied to the shell 106 can flow downwardly into this bottom reduced cylindrical portion 110.

The reduced cylindrical portion 110 serves as a well to measure out a uniform proportion of the liquid detergent for supply to the dishwashing chamber 10. For this purpose, valve means are supplied to alternately open this well chamber 110 either to the upper supply shell 106 or to the lower portion of the spout 102, so that the detergent trapped within the well portion 110 will flow into the tub 10.

This valve means includes a valve head 112 for closing the lower end of the well chamber 110 and a valve head 113 for closing the top of the well chamber 110.

Both of the valve heads 112 and 113 are carried by a valve rod 114. Valve head 112 is located between washers 115 and 116, and these latter parts are clamped against the end of the valve rod 114 by means of a screw 117. Spaced upwardly along the valve rod 114 a distance slightly greater than the length of the well chamber 110 is the valve head 113 and washers 118 and 119 are on opposite sides thereof. The washers 118 and 119 are held in fixed position relative to the valve rod 114 by means of pins 120 which pass through the valve rod 114.

It is preferable that the valve heads 112 and 113 be made of rubber as shown so that they will seal the opposite ends of the well chamber 110 without requiring considerable pressure to prevent their leakage. Also, they are preferably made of frusto-conical sections, and are oppositely disposed so that they tend to wedge into the openings at the upper and lower ends of the well chamber 110 to establish a tight seal.

The valve rod 114 is bored from its upper end down to a lateral opening 122 through the side wall of the valve rod 114. This passageway through the valve rod 114 serves as a vent for the well chamber 110 when the upper valve head 113 is seating upon the upper end of the well chamber 110, to thereby assure the flow of the detergent which has been trapped into the well chamber 110 downwardly into the spout 102. The valve rod 114 is normally urged upwardly so as to hold the valve head 112 in sealing engagement with the lower end of the well chamber 110, by means of a spring 123 which is disposed between the top plate 108 and a push button 124 attached to the upper end of the valve rod 114. A downward push upon the button 124 will compress the spring 123 and move the valve head 112 off of its seat and also move the valve head 113 against its seat so that only the measured amount

of detergent in the well chamber 110 will be supplied to the dishwasher tub.

The invention also contemplates the provision of means for varying the volumetric capacity of the well chamber 110 so that the charge of detergent to be delivered can be varied. This is desirable because in installations where hard water is present, a greater amount of detergent is necessary. To accomplish this, a body of material 121, as cork, is positioned upon the rod 114 within well chamber 110. In situations having a soft water supply, this body 121 may be left in place so that a reduced volume of detergent will be measured out, but in hard water locations, all or a portion of the body 121 may be removed to thereby increase the volume of each charge.

The shell 106 of the detergent container is held above the shoulder 105 of the counter-bore 104 by means of a curved leaf spring 125, and this spring should be slightly stiffer than the spring 123 so that the shell 106 will be maintained upwardly while the valve rod 114 is pushed downwardly to close valve 113 and open valve 112. At the time that the valve head 113 seats firmly on the top of well chamber 110 the head of the screw 117 should just come into contact with the upper end of a valve stem 126 which will be later described. Continued downward movement of the valve rod 114 after the valve head 113 is seated will cause the shell 106 to move downwardly and compress the spring 125. This continued downward movement of the valve rod 114 will push downwardly the valve stem 126.

The valve stem 126 is guided within a central bore of a hub-like formation 127 of the spout 102. This hub-like formation 127 is in axial alignment with the counter-bore 104 of the upper portion 103 of the spout and the central bore through this hub 127 for the valve stem 126 disposes this valve stem in axial alignment with the valve rod 114. The lower end of the hub 127 is counter-bored at 128 to provide a valve seating shoulder 129. A valve head 131, which is preferably made of rubber, is attached to the lower end of valve stem 126 and is intended to seat on the shoulder 129. Extending through the top portion of the hub 127 from the counter-bore 128 are port openings 132 which are closed by the valve head 131.

Surrounding the portion of the valve stem 126 above the hub 127 is a spring 133 and the upper end of this spring bears against a washer 134 attached to the top of the valve stem 126. This spring 133 tends to hold the valve head 131 in position to close the passageway 132. It is evident that a downward movement of the valve stem 126 under the action of valve rod 114 will move the valve head 131 off of its seat and thereby open the passageway 132.

The pipe 75 leading from the opening 74 of the timer body 47 is connected to the lower end of the hub 127. It is, therefore, apparent that when the valve head 131 is seated, pressure will be maintained in the chamber 48 below the piston 52 and that when the valve head 131 is displaced from its seat, the chamber 48 will be exhausted and the piston 52 will move downwardly as has been explained.

It is preferable that the washer 116 be of large size as shown so that it nearly fills the interior of the upper portion 103 of the spout, as shown in Figure 4. This is desirable so that the water which issues upwardly through the openings 132 when the valve head 131 is displaced downwardly, will strike against the underside of this washer 116 and cannot escape upwardly through the counterbore 104 and out of the dishwashing machine. Also, the presence of this washer 116 tends to divert the flow of water issuing upwardly from the passageways 132 so that it is directed downwardly and flows into the lower portion of the spout 102 and through the opening 101 into the tub 10, carrying with it the detergent which has been discharged from the well chamber 110. The water which is therefore discharged from the chamber 48 of the timer is utilized to flush out the spout 102 and make certain that all of the released detergent is carried into the tub of the dishwasher.

The provision of the small opening 101 is important because it reduces the rate of flow of the detergent from the spout 102 into the washing tub. If all of the detergent were delivered into the tub at once, it would be rapidly dissipated because some of it would be continuously discharged to the drain through the overflow 36. By prolonging the entry of the detergent into the washing tub, due to the presence of the small opening 101, a higher overall concentration of the detergent is maintained in the washing tub.

The detergent container can be readily removed, in accordance with the invention, so that it can be refilled. It has been noted that the shell 106 fits freely within the upper depending cylindrical portion 107 and the counter-bore 104 as guideways. The opening at the top of the dependent cylindrical portion 107 is normally closed by a cover plate 136, and by merely lifting this cover plate 136 upwardly to the position shown in dotted lines in Figure 4, the entire detergent dispenser can be lifted out.

To accommodate the push button 124 when the cover plate 136 is in a downward position, an opening 137 is formed centrally of the cover plate. It is also apparent that by merely lifting the cover plate 136, liquid detergent can be poured directly into the shell 106 through the perforations which are formed in the top 108 of the shell 106.

In considering the complete operation of the mechanism it may first be pointed out that during stand-by periods, the water pressure from supply pipe 67 is maintained within the cylindrical chamber 48 on the underside of piston 52 to keep this piston in its proper position. The packing material 55 during this time serves as a valve to prevent the water from passing to the outlet opening 86 and into the manifold pipe 31. Also, as valve 131 will be upon its seat, water cannot escape from the chamber 48 and there will consequently be no loss of water from the supply.

When the machine is to be used for washing dishes, the dishes are placed in the basket or other dish carrier within the shell or tub 10 and the lid 14 is then closed. The latch 19 will engage the shoulder 18 of pin 17 to hold the lid down against the action of springs 16. It will be observed that at this time the drain valve 36 is held in its open position by means of the pin 95 which is holding pull rod 45 in its upper position.

When the push button 124 is depressed to initiate the washing action, valve head 112 is first released from its seat and at the same time, valve head 113 closes on its seat so that a measured amount of detergent is released to flow into the tub 10. Immediately thereafter, valve 131 is removed from its seat and the water beneath piston 52 escapes through opening 74, through pipe 75,

into the spout 102 and flows into the tube 10, carrying therewith the released detergent. The piston 52 thereupon moves downwardly rapidly and as soon as the packing material 55 passes below the surface 51 the incoming water is permitted to flow into the outlet 86 and through outlet pipe 31 to the jets 30.

When the piston 52 has reached its lowermost position the valve member 36 closes so that the inflowing water cannot escape from tub 10. At this time, push button 124 must be released.

During the initial period that the water is flowing through jets 30, the fresh water will impinge upon the dishes to remove the loose residue which is upon them. These will be strong streams, because not enough water will have entered the tub to overlie the jets 30.

The water which is entering through jets 30 into the tub 10 will collect at the bottom of the tub 10 until it reaches the top rim of valve member 36. As has been pointed out the position of this top rim of valve member 36 determines the liquid level which will exist in the tub 10 during the washing operation. It has been pointed out, also, that during this washing step the fresh water issuing from jets 30 passes through the body of soapy water at the bottom of the tub 10 and carries this soapy water against the dishes.

When valve 131 is permitted to close by releasing the push button 124, the water which is bleeding into the cylindrical chamber 48 from the port opening 73 will serve to gradually move the piston 52 in an upward direction. As the water delivered to chamber 48 must pass through the capillary tube 72, it is evident that a prolonged period of time will be required to move the piston through its entire upward movement. By a proper selection of the capillary tube 72 the time interval for the complete rise of piston 52 can be pre-determined.

When the piston 52 has moved upwardly far enough for the pin 95 to move through the full length of the slotted head 96, the pull rod 45 will be moved upwardly and this will turn the cam 43 to lift the drain valve member 36. This lifting movement of the drain valve member 36 should occur before the packing material 55 has reached the lower end of surface 51. It will therefore be appreciated that the drain valve 36 will be opened and that the liquid in the bottom of the tub 10 can drain away before the supply of water to the jets 30 is shut off by the valving action of packing material 55. The fresh water which flows through jets 30 at this time will serve to wash the soapy water off of the dishes and down the drain.

Continued upward movement of the piston 52 will cause the packing material 55 to reach the cylindrical surface 51 and because of the valving action which then occurs water will be shut off from the outlet 86 and from the pipe 31 and jets 30. As soon as this has occurred, the flanged enlargement 91 at the top of the piston 52 should strike against the trip lever to exert a pull on rod 25. This will withdraw the latch 19 from the shoulder 18 and release pin 17 so that the cover or lid 14 can swing upwardly to an opened position under the action of springs 16.

The timing mechanism has at this time assumed its normal stand-by position, so that when the next washing operation is intended to take place the cycle of events which has just been described may be repeated.

What is claimed is:

1. In combination with a dishwashing machine having means for receiving dishes therein and spray jets for directing water upon the said dishes, a timing device for determining the time the water flows to said jets and means including a dispenser for delivering detergent against the said dishes, said timer comprising a body having an internal cylinder provided with an inlet opening and an outlet opening, said inlet opening being connectable to a source of water under pressure and said outlet opening being connectable to said spray jets, a valve determining flow of water from said inlet to said outlet, a piston in said cylinder for operating said valve, means providing a restricted passageway for the flow of water from said inlet to said cylinder to urge the piston to move said valve to closed position, conduit means for connecting said cylinder to said dispenser including an exhaust opening in said cylinder through which the water acting on the piston to hold the valve closed may escape to thereby permit movement of the valve to open position, and said dispenser including valved means for delivering detergent to said second mentioned means and also including an exhaust valve in said conduit means which controls the escape of water from the exhaust opening of the cylinder, whereby the water escaping from the cylinder through said exhaust valve flows with the released detergent to said second mentioned means and thence against the said dishes.

2. In combination with a dishwashing machine having means for receiving dishes therein and spray jets for directing water upon the said dishes, a timing device for determining the time the water flows to said jets and means including a dispenser for delivering detergent against the said dishes, said timer comprising a body having an internal cylinder provided with an inlet opening and an outlet opening, said inlet opening being connectable to a source of water under pressure and said outlet opening being connectable to said spray jets, a valve determining flow of water from said inlet to said outlet, a piston in said cylinder for operating said valve, means providing a restricted passageway for the flow of water from said inlet to said cylinder to urge the piston to move said valve to closed position, conduit means for connecting said cylinder to said dispenser including an exhaust opening in said cylinder through which the water acting on the piston to hold the valve closed may escape to thereby permit movement of the valve to open position, said dispenser including valved means for delivering detergent to said second mentioned means and also including an exhaust valve in said conduit means which controls the escape of water from the exhaust opening of the cylinder, and a common means for operating said valved means and said exhaust valve whereby the water escaping from the cylinder through said exhaust valve substantially mingles with the released detergent to carry it to said second mentioned means and thence against the said dishes.

3. In combination with a dishwashing machine having a walled receptacle, for receiving dishes and spray jets for directing water upon the said dishes, a timing device for determining the time the water flows to said jets and means including a dispenser for delivering detergent against the said dishes, said timer comprising a body having an internal cylinder provided with an inlet opening and an outlet opening, said inlet opening being connectable to a source of water under

pressure and said outlet opening being connectable to said spray jets, a valve determining flow of water from said inlet to said outlet, a piston in said cylinder for operating said valve, means providing a restricted passageway for the flow of water from said inlet to said cylinder to urge the piston to move said valve to closed position, conduit means for connecting said cylinder to said dispenser including an exhaust opening in said cylinder through which the water acting on the piston to hold the valve closed may escape to thereby permit movement of the valve to open position, and said dispenser including valved means for delivering detergent to said first mentioned means and also including an exhaust valve in said conduit means which controls the escape of water from the exhaust opening of the cylinder, and said first mentioned means also including a spout leading from said dispenser into said walled receptacle, the released detergent and also the water escaping past said exhaust valve being co-mingled in said spout prior to their entry into said walled receptacle.

4. In combination with a dishwashing machine having means for receiving dishes therein and spray jets for directing water upon the said dishes, a timing device for determining the time the water flows to said jets and means including a dispenser for delivering detergent against the said dishes, said timer comprising a body having an internal cylinder provided with an inlet opening and an outlet opening, said inlet opening being connectable to a source of water under pressure and said outlet opening being connectable to said spray jets, a valve determining flow of water from said inlet to said outlet, a piston in said cylinder for operating said valve, means providing a restricted passageway for the flow of water from said inlet to said cylinder to urge the piston to move said valve to closed position, conduit means for connecting said cylinder to said dispenser including an exhaust opening in said cylinder through which the water acting on the piston to hold the valve closed may escape to thereby permit movement of the valve to open position, said dispenser including a measuring chamber and cooperating valves for alternately filling and releasing the detergent in said chamber and for delivering measured amount of detergent to said second mentioned means, said dispenser also including an exhaust valve in said conduit means which controls the escape of water from the exhaust opening of the cylinder, and a common operating means for first actuating said co-acting valves to release a measured amount of detergent and thereafter actuating the exhaust valve to permit escape of water from said cylinder whereby said escaping water serves to deliver the released detergent to said second mentioned means and thence against said dishes.

5. In combination with a dishwashing machine having a walled receptacle for receiving dishes and spray jets for directing water upon the said dishes, a timing device for determining the time the water flows to said jets and means including a dispenser for delivering detergent against the said dishes, said timer comprising a body having an internal cylinder provided with an inlet opening and an outlet opening, said inlet opening being connectable to a source of water under pressure and said outlet opening being connectable to said spray jets, a valve determining flow of water from said inlet to said outlet, a piston in said cylinder for operating said valve, means providing a restricted passageway for the flow of water from said inlet to said cylinder to urge said piston to move said valve to closed position, conduit means for connecting said cylinder to said dispenser including an exhaust opening in said cylinder through which the water acting on the piston to hold the valve closed may escape to thereby permit movement of the valve to open position, and said dispenser including a valved means for delivering detergent to said first mentioned means and also including an exhaust valve in said conduit means which controls the escape of water from the exhaust opening of the cylinder, common means for operating said valved means and said exhaust valve whereby the water escaping from the cylinder through said exhaust valve substantially mingles with the released detergent, and said first mentioned means also including a spout leading from said dispenser into said walled receptacle in which the released detergent and water escaping past said exhaust valve are further commingled prior to their entry into said walled receptacle.

6. In combination with a dishwashing machine having means for receiving dishes therein and spray jets to direct water upon the dishes, a timing device for determining the time the water flows to said jets and means including a dispenser for delivering detergent to the machine as defined in claim 1 including a cover movably upon said dishwashing machine, and means responsive to movement of the piston to a valve closing position to open the said cover upon the completion of the washing cycle.

7. In combination with a dishwashing machine having means for receiving dishes therein and spray jets to direct water upon the dishes, a timing device for determining the time the water flows to said jets and means including a dispenser for delivering detergent to the machine as defined in claim 2 including a cover movably supported upon said dishwashing machine and means responsive to movement of the piston to a valve closing position to open the said cover upon the completion of the washing cycle.

CARL DE GANAHL.
CHARLES C. SMITH.
IRA P. ROMBERGER, JR.

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