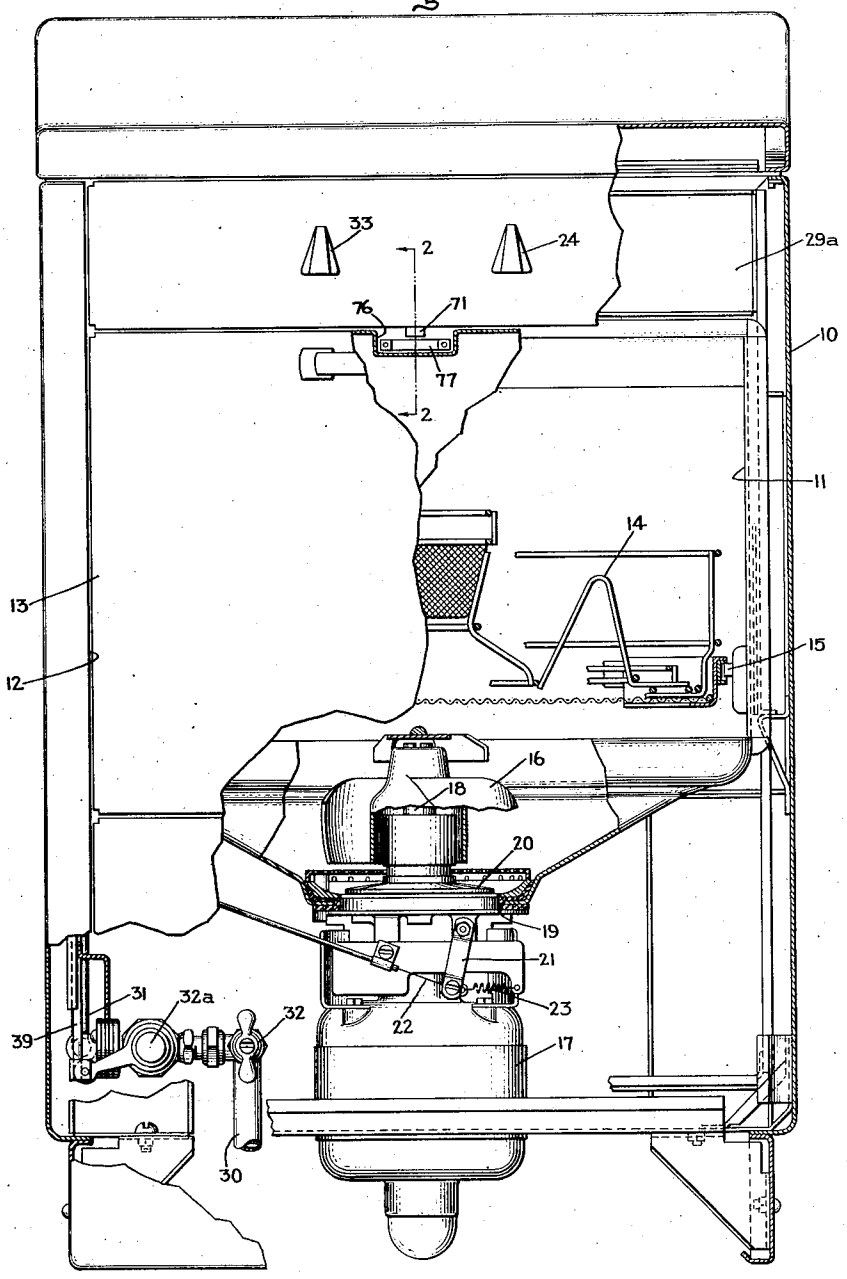
May 7, 1940. E. S. STODDARD ET AL 2,200,127

WASHING APPARATUS

Filed Aug. 27, 1937 4 Sheets-Sheet 1

Fig. 1.



Inventors:
Edgar S. Stoddard,
Philip K. Borman,
by Harry E. Dunham
Their Attorney.

May 7, 1940. E. S. STODDARD ET AL 2,200,127

WASHING APPARATUS

Filed Aug. 27, 1937 4 Sheets-Sheet 2

Fig. 2.

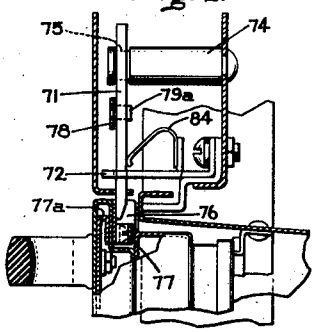


Fig. 13.

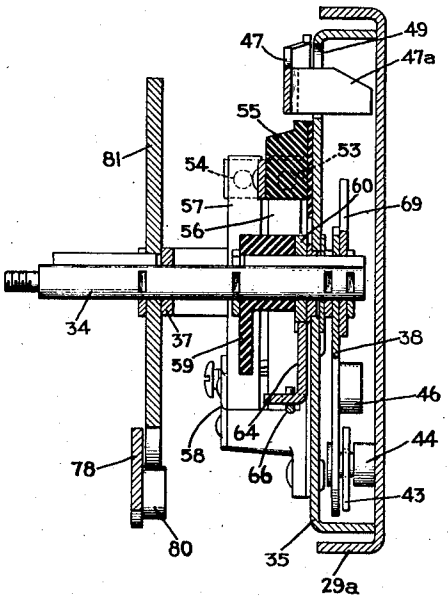


Fig. 17.

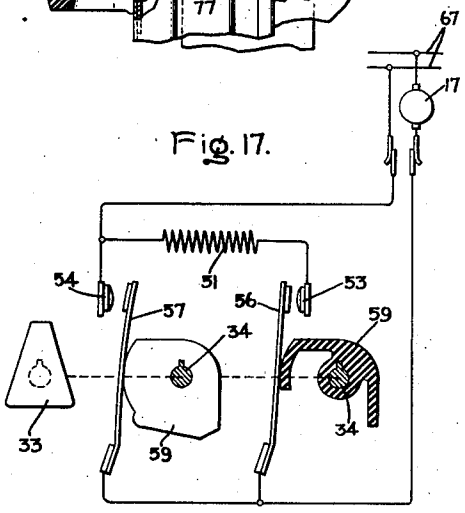


Fig. 14.

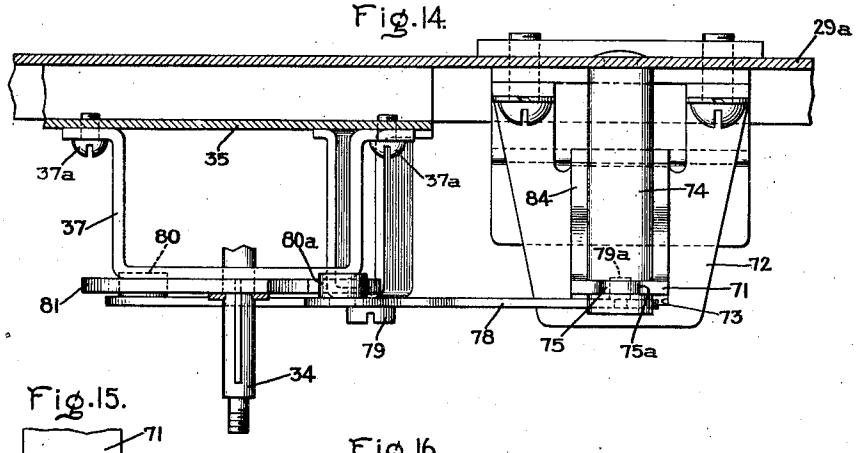


Fig. 15.

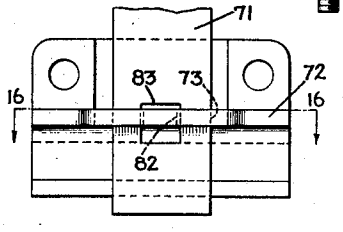
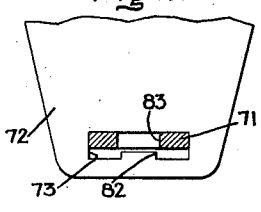


Fig. 16.



Inventors:
Edgar S. Stoddard,
Philip K. Borman,
by Harry E. Dunham
Their Attorney.

May 7, 1940. E. S. STODDARD ET AL 2,200,127

WASHING APPARATUS

Filed Aug. 27, 1937 4 Sheets-Sheet 3

Fig. 3.

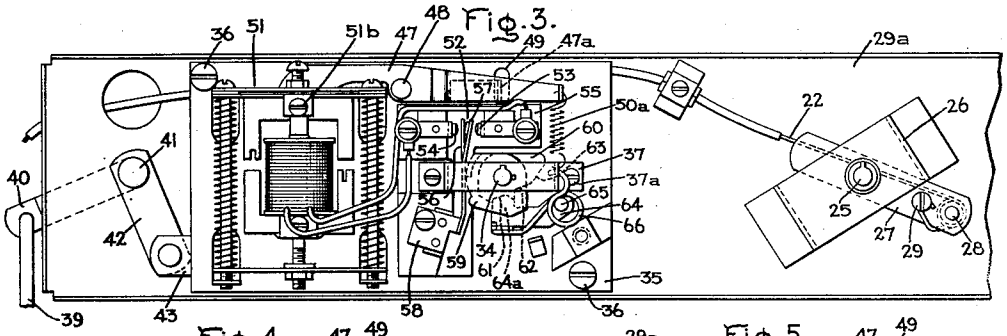


Fig. 4.

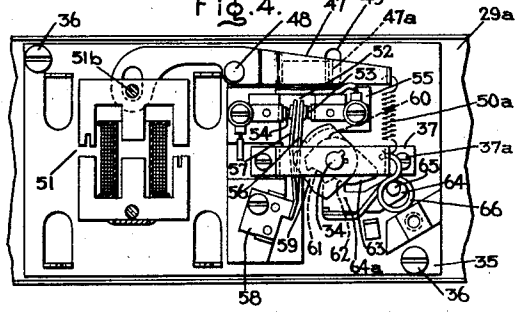


Fig. 5.

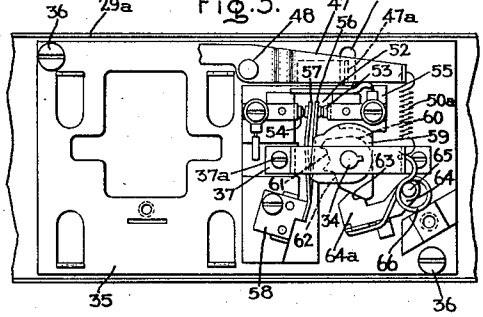


Fig. 7.

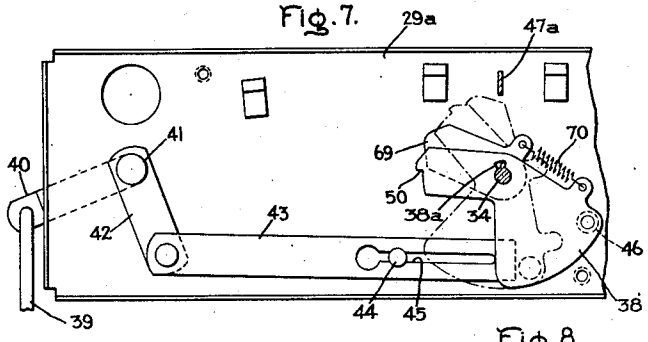


Fig. 6.

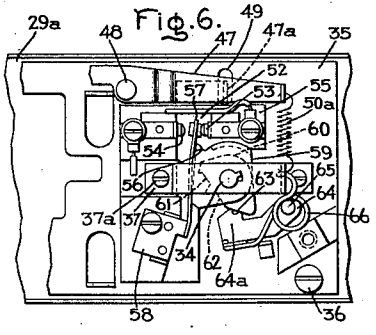
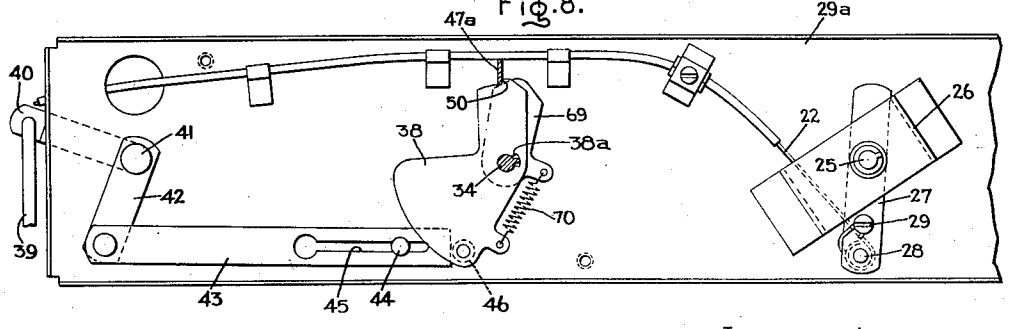


Fig. 8.



Inventors:
Edgar S. Stoddard,
Philip K. Borman,
by Harry E. Dunham
Their Attorney.

May 7, 1940. E. S. STODDARD ET AL 2,200,127

WASHING APPARATUS

Filed Aug. 27, 1937 4 Sheets-Sheet 4

Fig. 9.

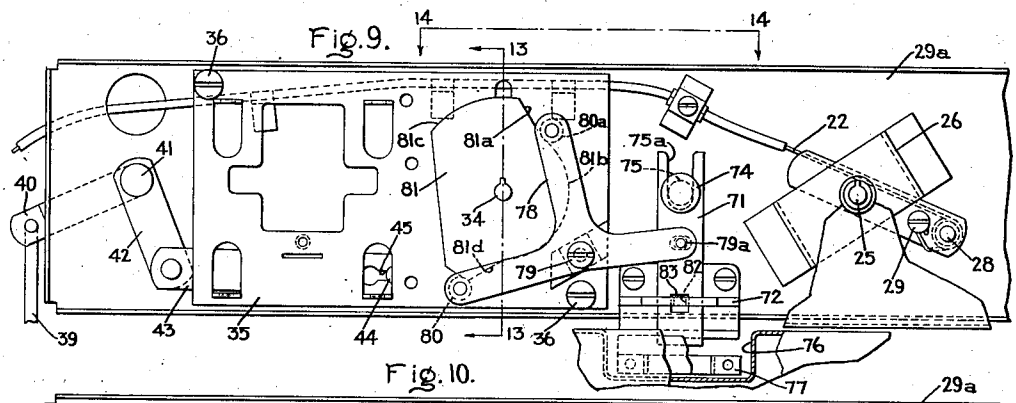


Fig. 10.

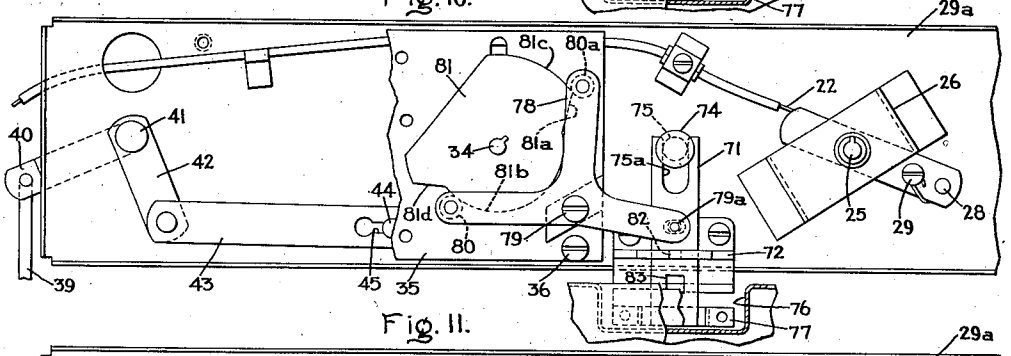


Fig. 11.

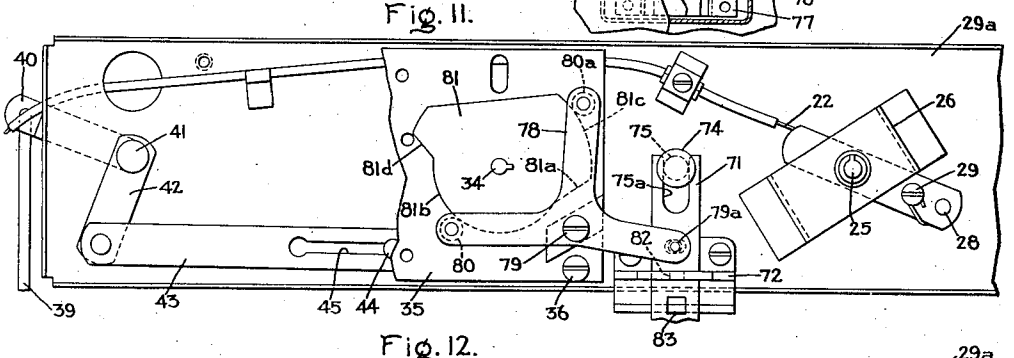
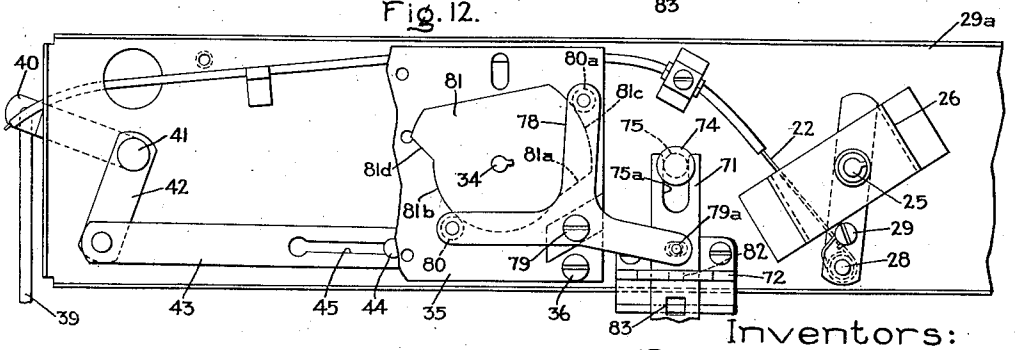


Fig. 12.



Inventors:
Edgar S. Stoddard,
Philip K. Borman,
by Harry E. Dunham
Their Attorney.

Patented May 7, 1940 2,200,127

UNITED STATES PATENT OFFICE

2,200,127

WASHING APPARATUS

Edgar S. Stoddard, Berwyn, and Philip K. Borman, Chicago, Ill., assignors to Edison General Electric Appliance Company, Inc., Chicago, Ill., a corporation of New York

Application August 27, 1937, Serial No. 161,259

11 Claims. (Cl. 141—9)

This invention relates to washing apparatus, more particularly to dishwashing apparatus, and it has for its object the provision of an improved device of this character.

While not limited thereto, this invention is particularly useful in household dishwashing apparatus of the front-opening type.

This invention contemplates an improved control including means for locking the door closed when the apparatus is operating, and preventing operation of the apparatus when the door is open. And in particular it contemplates the provision of these improvements in washing apparatus having a control such as described and claimed in the U. S. patent to L. A. Kempton, No. 2,142,902, dated January 13, 1939.

For a complete understanding of this invention, reference should be had to the accompanying drawings in which Fig. 1 is a front elevation of dishwashing apparatus embodying this invention, parts being broken away and parts shown in section so as to illustrate certain details of construction; Fig. 2 is an enlarged sectional view taken through the line 2—2 of Fig. 1 and looking in the direction of the arrows; Fig. 3 is an enlarged view in elevation illustrating control apparatus for the washing device of Fig. 1; Figs. 4, 5 and 6 are fragmentary views in elevation illustrating a portion of the control apparatus of Fig. 3 in its different operative conditions; Figs. 7 and 8 are fragmentary views in elevation illustrating other parts of the control apparatus of Fig. 3 in different operative conditions; Figs. 9, 10, 11 and 12 are fragmentary views in elevation illustrating certain door-locking mechanism arranged in accordance with this invention and associated with the control apparatus of Figs. 2–8 inclusive; Figs. 13 and 14 are sectional views taken through the lines 13—13 and 14—14 respectively of Fig. 9 and looking in the direction of the arrows; Fig. 15 is an enlarged view of a portion of the latching mechanism associated with the door of the washing apparatus of Fig. 1; Fig. 16 is a sectional view taken through 16—16 of Fig. 15 and looking in the direction of the arrows; and Fig. 17 is a diagrammatic view illustrating an impeller-driving motor used in the washing apparatus, and certain control apparatus therefor.

Referring to the drawings, this invention has been shown in one form as applied to household dishwashing apparatus of the front-opening type. Referring more specifically to Fig. 1, this washing apparatus comprises a casing or cabinet 10 enclosing a suitable washing vat 11. The casing 10 is provided with a front opening 12 whereby access may be had to the vat. This opening is normally closed by a door or cover 13 hinged at its bottom to swing from a normally closed vertical position to a horizontal open position. Arranged within the vat is a suitable dish-supporting rack 14 which is slidably mounted on suitable rails 15 provided on opposite sides of the vat so that when the front door 13 is open, the rack may be moved forwardly for loading and unloading. Arranged in the bottom of the vat below the rack is a suitable water-circulating impeller 16. The impeller 16 is driven by an electric motor 17 supported below the bottom wall of the vat and connected to the impeller by means of a shaft 18 extending upwardly into the vat where it is connected with the impeller. The bottom wall of the vat, as shown, is inclined downwardly toward the center where a drain opening 19 is provided.

This opening is controlled by means of a drain valve 20. The drain valve 20 is opened and closed by means of an operating lever 21. When the lever is in its position shown in Fig. 1, the drain valve is held in its open position. The lever 21 is held in this position by means of a cable 22 which is held under tension by means of a spring 23. The cable 22 is guided upwardly through the cabinet to an operating knob 24. The operating knob 24 operates a shaft 25 (Fig. 3) which is mounted in a U-shaped supporting bracket 26. Rigidly secured to the inner end of the shaft 25 is an operating lever 27. The upper end of cable 22 is secured to the lever as shown by winding it about a pin 28 secured to the lever and then attaching the free end of the cable to the stud 29. When the lever is moved from its position shown in Fig. 3 to its position shown in Fig. 8, it releases the cable to close the drain valve, and when returned it opens the drain valve. The bracket 26 is secured to a control panel 29a which in turn is rigidly secured to the upper front portion of the cabinet 10.

Cleansing liquid, such as hot water, is supplied to the vat from a suitable conduit 30. This conduit is connected through a pair of valves 32 and 32a to a conduit 31, which in turn is connected with the vat. The water enters the vat through a spray device (not shown) located in the top of the vat. The valve 32 is a manually operable valve and is normally in its open position, the control of the water to the vat in the normal operation being solely by the valve 32a. The valve 32a is of the self-closing type and is

moved to its open position by means of a manually operable control knob 33.

The knob 33 is keyed to an operating shaft 34 mounted on a panel 35. The panel 35 is secured to the panel 29a by means of screw fastening means 36. The rear end of the shaft 34 is journaled in the panel 35 while its forward end is supported in a U-shaped bracket 37 secured to the panel by means of screw fastening means 37a. Mounted on the rear side of the panel 35 and rigidly secured to the inner end of the shaft 34 is a plate or lever 38. This lever is connected to the supply valve 32a by means of a rod 39 extending from the valve 32a upwardly to the control panel where it is connected at its upper end with one arm 40 of a bell crank that is mounted to rotate on a pin 41. The second bell crank arm 42 is connected to a slide bar 43 which is supported at its remote end by means of a pin 44 entering a slot 45 provided for it in the bar. A pin 46 is provided on the lever 38 and the parts are so related that when the lever is moved in a clockwise direction, as viewed in Figs. 7 and 8, the pin engages the adjacent end of the slide to move it toward the left from its position of Fig. 7 to its position of Fig. 8. This operates to elevate the rod 39 and opens the supply valve 32a. When the plate 38 is moved in the opposite direction from its position of Fig. 8 to its position of Fig. 7, it permits the inlet valve to close.

When the liquid supply valve 32a is moved to its open position, it is latched in this position by means of a latching lever 47 mounted on a pin 48. The latching member 47 carries on its right-hand portion, as viewed in Figs. 3 to 8, a latching member or tooth 47a extending through an aperture 49 provided for it in the panel 35 and arranged to engage a detent or tooth 50 in the upper end of the lever 38 to hold the valve in its open position. The latch is biased to its latching position by means of a spring 50a.

The latching lever is moved to release the supply valve by means of an electromagnet 51. The armature of the magnet carries a pin 51b which is extended through an aperture in the lever so that when the excitation of the electromagnet has been increased to a predetermined value, the armature will move the lever to release the supply valve 32a.

The electromagnet is connected in the armature circuit of the impeller driving motor 17 when the supply valve 32a is opened so that if under these conditions, the drain valve is closed, the water supplied to the vat will accumulate therein, and as the quantity of water in the vat increases the armature current and excitation of the magnet will increase due to the increasing load imposed on the impeller 16, until eventually upon the occurrence of a predetermined armature current due to a predetermined supply of water in the vat, the electromagnet 51 will operate to release the supply valve to shut off the water.

The control member 33 operates a suitable switch 52 having a pair of fixed contacts 53 and 54 mounted on an electrically insulating block 55. Cooperating with the fixed contacts respectively and positioned in the space between them are a pair of movable switch arms 56 and 57. The lower ends of these switch arms are connected to a conducting plate 58. The switch arms are controlled by means of a cam 59 rigidly secured to the shaft 34, and formed of a suitable electrically insulating material. Also mounted on the shaft is a second controlling cam 60 that functions both as a control cam and also as a positioning cam for the shaft 34. The cam 60 is provided with a pair of spaced positioning depressions 61 and 62, and with a cam surface 63. Cooperating with the positioning depressions is a latch member 64 carrying a detent 64a arranged to be received in them, and also arranged to engage the cam surface 63. The member 64 is pivotally mounted on a pin 65 and is biased in a clockwise direction, as viewed in Figs. 3–6, by means of a spring 66. The depressions are so positioned that the detent 64a will lock the control member 33 when it is in its "off" position of Fig. 3, and also when in a position 45° removed therefrom in a clockwise direction, as shown in Fig. 4.

The electrical connections between the switch 52 and the motor 17 and the electromagnet 51 are shown diagrammatically in Fig. 17. As there shown, the motor 17 and magnet are energized from any suitable source of electrical supply 67. As also shown, the electromagnet is connected across the contacts 53 and 54.

The control apparatus which has thus far been described forms the subject matter of the above-mentioned patent to L. A. Kempton; and operates in the following manner: When the control knob 33 is in its "off" position, the parts will be as shown in Figs. 3 and 7; and the supply valve 32a will be closed and the motor 17 and electromagnet 51 will be deenergized. When the control knob is moved from its "off" position to its first controlling position shown in Fig. 4, 45° in a clockwise direction from the "off" position, the cam 59 is so positioned that it closes the switch arms 56 and 57. This energizes the electric motor 17 and shorts the electromagnet. The motor 17 will therefore drive the impeller 16. The parts are locked in this position of Fig. 4 by the detent 64a seating in the depression 62. The control member will then be moved to a second controlling position 40° in a clockwise direction to the position shown in Figs. 6 and 8. In this position, the inner contact 53 remains closed but the outer contact 54 will have been permitted to open. In this condition of the parts, the electromagnet 51 is connected in the armature circuit of the motor 17. Also the movement of the knob 33 to this position will have caused the inlet valve 32a to open where it is locked by the latching member 47a. Now assuming that the drain valve 20 has been closed previous to the operation of the controlling member to this controlling position, the motor will be operating and water will flow into the vat from the supply source. As the motor load builds up, its armature current also builds up until eventually the electromagnet, which is connected in the armature circuit, will attract its armature to release the supply valve, as previously described.

It will be observed that when the control member 33 is in the second controlling position, the detent 64a engages the cam surface 63 on the cam 60 so that when the latch releases the inlet valve and the shaft 34 and knob 33, the detent moves these members back to the first controlling position. This return of the shaft to the first controlling position disconnects the electromagnet from the motor armature circuit by reclosing the switch 57.

As pointed out in detail in the above-mentioned Kempton patent, should the operator grasp the knob 33 while in its "off" position and rapidly move it to its second controlling position there is the danger that the large inrush of starting

current in the motor 17 would energize the magnet 51 sufficiently to cause it to retract the armature, which operation would hold the latch in its released position thereby preventing proper functioning of the washing apparatus. To obviate this, a third controlling position several degrees in advance of the second controlling position is provided. In this position, the parts occupy their positions shown in Fig. 5. As here shown, the cam 59 is so placed that the switch arms 56 and 57 are in the same positions that they have in the first controlling position of the knob 33, whereby the electromagnet is short circuited, while the motor is connected directly to the supply source. If, therefore, the control knob be moved directly to this position of Fig. 5, the motor 17 will be energized and will start up, as before, and the large starting current will have not effect upon the electromagnet 51 because it is shorted out. When the knob 33 is released in its position of Fig. 5, it is moved automatically to its second controlling position of Fig. 6 by the detent 64a, and it is held in this position by the latch 47a engaging the tooth 50 on the lever 38.

The supply valve 32a may be manually released before the automatic release of the electromagnet if it be desired to do so and for this purpose we prefer to use the valve releasing means described and claimed in the U. S. patent to E. S. Stoddard, No. 2,142,924, dated January 3, 1939. As there described, a releasing dog 69 is mounted on the inner end of the control shaft 34. The releasing dog 69 is rigidly secured to the shaft, whereas the plate 38 is keyed to the shaft so that it can rotate freely relatively to the shaft through a few degrees of movement; it will be observed that the key slot 38a provided in the plate 38 is relatively elongated to provide for this limited freedom of movement. The plate 38, and dog 69 are biased to move apart on their axis of rotation by means of a tension spring 70 joining the two members, as shown. It will be noted that when the knob 33 is moved in a clockwise direction to open the supply valve 32a, as previously described, the plate 38 and dog 69 will move together as a unit, the dog leading the upper end of the plate 38 until the latch 47a engages the tooth 50 to lock it. Now if the knob 33 be reversed it will move the dog 69 independently of the member 38 to engage the latch and release it, whereupon the dog and plate may return to their initial positions shown in Fig. 7.

This invention contemplates the provision of improved means for locking the door closed when the apparatus is operating and for preventing operation of the apparatus when the door is open. For this purpose, a suitable latch 71 is mounted in the upper forward part of the cabinet above the upper edge of the door 13. The latch 71 is mounted in a suitable supporting plate 72 horizontally positioned in the cabinet, as shown in Fig. 2, and having an elongated rectangular aperture 73 in it receiving the latch, as shown more clearly in Fig. 16. The upper end of the latch 71 is guided by means of a stud 74 having a reduced section 75 that is received in a slot 75a provided for it in the upper end of the latch. The lower end of the latch is arranged to be received in a recess 76 provided for it in the upper edge of the door. Arranged within this recess is a U-shaped clip 77 secured to the door in any suitable fashion as by means of screws which thread into a flange of a plate 77a in the door behind the recess 76. The clip 77 is positioned to receive the lower end of the latch when the latter is lowered so as to prevent opening of the door.

The latch 71 is moved vertically by means of an operating lever 78 having in general a T shape, as clearly shown in Figs. 9–12. The lever is pivotally mounted on a stud 79 to move on an axis substantially at the intersection of the head and stem of the lever. The outer end of the right-hand end of the head, as viewed in Figs. 9–12, is pivotally connected to the latch 71 by means of a pin and slot connection 79a, the slot being relatively elongated, as shown, so as to permit the arm to swing on its arc while the latch moves vertically. The opposite extremity of the other arm of the head carries a roller 80; the extremity of the stem carries a similar roller 80a. The two rollers 80 and 80a cooperate with a suitable cam 81. The cam 81 is keyed to the operating shaft 34.

The cam 81 is so arranged that when the operating knob 33 is in its "off" position and the supply valve 32a is closed and the motor 17 is not operating, the cam occupies its position of Fig. 9, in which position the latch 71 will be elevated so that the door 13 may be moved freely between its open and closed positions.

However, when the control knob 33 is moved to its first controlling position of Fig. 4 to start the motor, the cam surface 81a will engage the roller 80a and will move the lever 78 in a clockwise direction from its position of Fig. 9 to its position of Fig. 10. When the cam moves between these positions, the follower 80 at the extremity of the head merely follows the curved cam surface 81b. This operation of the lever to Fig. 10 locks the door in its closed position by causing the lower end of the latch 71 to move into the U-shaped collar 77.

The control knob 33 may be advanced from its first controlling position of Fig. 4 to its second controlling position of Fig. 6 and also to the advance position of Fig. 5 and returned without moving the lever 78 from its locking position by reason of the fact that when the cam 81 is thus moved with the knob between these positions, the follower 80 rides on its curved cam surface 81b, while the follower 80a rides on the curved cam surface 81c, neither of which surfaces effects any movement of the associated followers tending to move the lever 78. However, when the knob 33 is moved from its first controlling position of Fig. 4 to its "off" position of Fig. 3, the lift 81d of the cam 81 engages the follower 80 to move the lever 78 in a counter-clockwise direction from its locking position of Fig. 10 to its unlocking position of Fig. 9. This operation elevates the latch 71 to unlock the door. As the lever 78 moves in this counter-clockwise direction, the follower 80a merely rides on the cam surface 81a to its position shown in Fig. 9.

Thus, when the control knob 33 is moved to its first controlling position of Fig. 4, the door 13 is locked closed, but the locking mechanism permits flexibility of movement of the control knob 33 between all of its controlling positions, and functions to unlock the door only when the control knob is returned to its "off" position of Fig. 3.

When the latch 71 is in its released position of Fig. 9 it is automatically locked in this position when the door 13 is opened so as to prevent operation of the control knob 33 from its "off" position as long as the door is open. For this purpose, the plate 72 is provided with a tooth 82 (Fig. 16) in the front edge of the opening 73. Arranged within the latch 71 is an opening 83

arranged to register with the tooth 82 when the latch is in its retracted position. The latch is biased forwardly of the washing apparatus to cause the opening to receive the tooth by means of a compression spring 84, but is held against such movement when the door is closed by the inner front wall of the recess 76 which engages the lower end of the latch, as shown in Fig. 2. When the door is opened the spring causes the latch to move forwardly whereby the tooth is received in its opening in the latch. It will be observed that when this happens, movement of the lever 78 is prevented. When this lever is locked in this manner it is impossible to move the control knob 33 from the "off" position, because the cam surface 81*a* is engaged by the roller 80*a* on the end of the stem of the lever 78 to securely lock the cam against rotation.

The latch 71 is automatically released from the locking tooth 82 when the door is closed by the engagement of the outer surface of the recess 76 with the latch to move it inwardly sufficiently to clear the locking tooth 82.

While we have shown a particular embodiment of our invention it will be understood, of course, that we do not wish to be limited thereto since many modifications may be made, and we, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. Washing apparatus comprising a vat, a cover for closing said vat, means for circulating liquid in the vat, a motor for driving said circulating means, a control member movable from an off position to a predetermined position to start said motor, a latch for locking said cover closed operated into its locking position with relation to the cover by said control member when it is moved to said predetermined poistion, and moved to its releasing position when the control member is returned to the off position, said latch having an opening therein, a locking tooth positioned opposite said latch and registering with said opening when said latch is moved to its door releasing position, the door when closed engaging the latch to hold it from said tooth and when opened releasing the latch for movement toward the tooth whereby the latter can enter said opening and lock the latch, and means biasing the latch to move toward said tooth.

2. Washing apparatus comprising a vat, a cover for closing said vat, means for circulating liquid in the vat, a control member for said circulating means movable from an off position to a controlling position to start said circulating means, a latch, means mounting said latch for longitudinal movement into and out of locking relation with said cover, a locking tooth positioned opposite said latch and arranged to enter an aperture provided for it in said latch when the latch is in its cover releasing position, means biasing said latch for movement in a direction to cause the opening to receive the tooth, the cover when closed holding the latch away from said tooth, and an operable connection between said control member and said latch for moving the latch to its locking position when the cover is closed and the control member is moved from its off position to start said circulating means, and so as to lock the control member in its off position when the cover is open.

3. Washing apparatus comprising a vat, a cover for closing said vat, means for circulating liquid in the vat, a control member controlling the operation of the circulating means to effect a washing action when moved from an off position to a predetermined controlling position, a latch, means mounting said latch for longitudinal movement into and out of locking relation with said cover, a locking tooth positioned opposite said latch and arranged to enter an aperture provided for it in said latch when the latch is in its cover releasing position, means biasing said latch for movement in a direction to cause the opening to receive the tooth, the cover when closed holding the latch away from said tooth, and an operable connection between said control member and said latch for moving the latch to its locking position when the cover is closed and the control member is moved from its off position to start the washing action.

4. Washing apparatus comprising a vat, a door for closing said vat, a liquid supply valve for said vat, a latch, means mounting said latch for longitudinal movement into and out of locking relation with said door, a locking tooth positioned opposite said latch and arranged to enter an aperture provided for it in said latch when the latch is in its door releasing position, means biasing said latch for movement in a direction to cause the opening to receive the tooth, the door when closed holding the latch away from said tooth, a common control member for said latch and valve operating when moved from an off position to open the valve and to move the latch to its locking position with relation to the door, and the latch when locked by said tooth preventing movement of the control member from the off position.

5. Washing apparatus comprising a vat, a cover for closing said vat, a liquid supply valve for said vat, means for circulating liquid in the vat, a motor for driving the circulating means, a control member connected to the supply valve and motor movable from an off position to start said motor and to open the valve, a latch for locking said door closed, a cam operated by said control member for operating said latch to its locking position when the control member is operated from the off position to start the motor and open the valve and holding said latch in said locking position until the control member is returned to the off position so that the door is locked in its closed position as long as said valve is open to supply liquid to said vat, and as long as said motor is operating said liquid circulating means.

6. Washing apparatus comprising a vat, a cover for closing said vat, means for circulating liquid in the vat, a control member controlling the operation of the circulating means to effect a washing action when moved from an off position to a predetermined controlling position, a latch for locking said cover closed, a cam operated by the control member, a T-shaped member, means mounting the member for movement about an axis substantially at the juncture of the head and stem of the member, means connecting one arm of the head to said latch and the other arm and stem carrying rollers engaged by the cam, the cam engaging the rollers to pivot the T-member in one direction to move the latch to its locking position when the control member is moved to effect said washing action and to pivot the T-member in the opposite direction to move the latch to its cover releasing position when the control member is returned to the off position.

7. Washing apparatus comprising a vat, a cover for closing said vat, a liquid supply valve for said

vat, means for circulating liquid in the vat, a motor for driving the circulating means, a control member for the supply valve and motor, operating to start said motor when moved to a first controlling position and to open the valve when moved to another controlling position beyond the first position while the motor continues to operate so that the liquid supplied into the vat while the valve is open is circulated by said liquid circulating means, a latch for locking said door closed, and an operating connection between the latch and control member arranged to move the latch to its locking position when the control member moves to said position so that the circulated liquid cannot escape from the vat.

8. Washing apparatus comprising a vat, a cover for closing said vat, a liquid supply valve for said vat, means for circulating liquid in the vat, a motor for driving the circulating means, a control member for the supply valve and motor operating to start said motor when moved to a controlling position and to open the valve when moved to another controlling position beyond the first position, a latch for locking said door closed, a cam operated by said control member, a member connected to said latch driven by said cam, the cam operating said member to move the latch into its locking position when the control member moves to the first position and holding said latch in said locking position when the control member moves to said second position to open the supply valve and until said member returns to and beyond said first position whereupon it acts on said member to move the latch to release the door.

9. Washing apparatus comprising a vat, a cover for closing said vat, a liquid supply valve for said vat, means for circulating liquid in the vat, a motor for driving the circulating means, a control member for the supply valve and motor operating to start said motor when moved to a controlling position and to open the valve when moved to another controlling position beyond the first position, a latch for locking said door closed, a cam operated by the control member, a T-shaped member, means mounting the member for movement about an axis substantially at the juncture of the head and stem of the member, means connecting one arm of the head to said latch and the other arm and stem carrying rollers engaged by the cam, the cam engaging the rollers to pivot the T-member in one direction to move the latch to its locking position when the control member is moved to said first position, and rotating with reference to the member without moving it when the control member is moved to the second controlling position and while returned to the first, and the cam upon continued movement of the control member back of the first operating the T-member to move the latch to its releasing position.

10. Dishwashing apparatus comprising a washing vat, water circulating means in said vat, a motor for driving said circulating means, a liquid supply valve for said vat, and the vat being provided with an opening providing for the insertion and removal of dishes to be cleansed, a door for closing said opening, a latch for locking said door in its closed position, a common control member for said latch, liquid supply valve and motor movable to a first controlling position to energize said motor, and a cam operated by said control member arranged when the control member moves to the first controlling position to operate the latch to its locking position with relation to the door, and the control member movable to a second controlling position to open the liquid supply valve, the cam permitting movement of the control member to the second controlling position and its return movement to the first controlling position without affecting the position of the latch with relation to the door, but when the control member is moved to the "off" controlling position, the cam engages the latch to move it to its releasing position.

11. Washing apparatus comprising a vat, a cover for closing said vat, means for circulating liquid in the vat, a control member for said circulating means movable from an off position to a controlling position to start said circulating means, a latch, means mounting said latch for longitudinal movement into and out of locking relation with said cover, and also providing for transverse movement of said latch, a driving connection between said control member and said latch so that when the control member is moved from said off position to said controlling position to start said circulating means said latch is moved longitudinally to lock said door and when said control member is returned to said off position the latch is moved longitudinally to release said door, means coacting with said latch for locking it against longitudinal movement when it is in one position in its path of transverse movement to prevent operation of said control member from its off position, means biasing said latch to said one position, and the cover when closed engaging the latch to hold it out of said position to free said control member for movement from said off position to start said circulating means.

EDGAR S. STODDARD.
PHILIP K. BORMAN.