

Sept. 21, 1926.

1,600,869

B. A. DICKSON

LAUNDRY APPARATUS

Filed Oct. 1, 1925

7 Sheets-Sheet 1

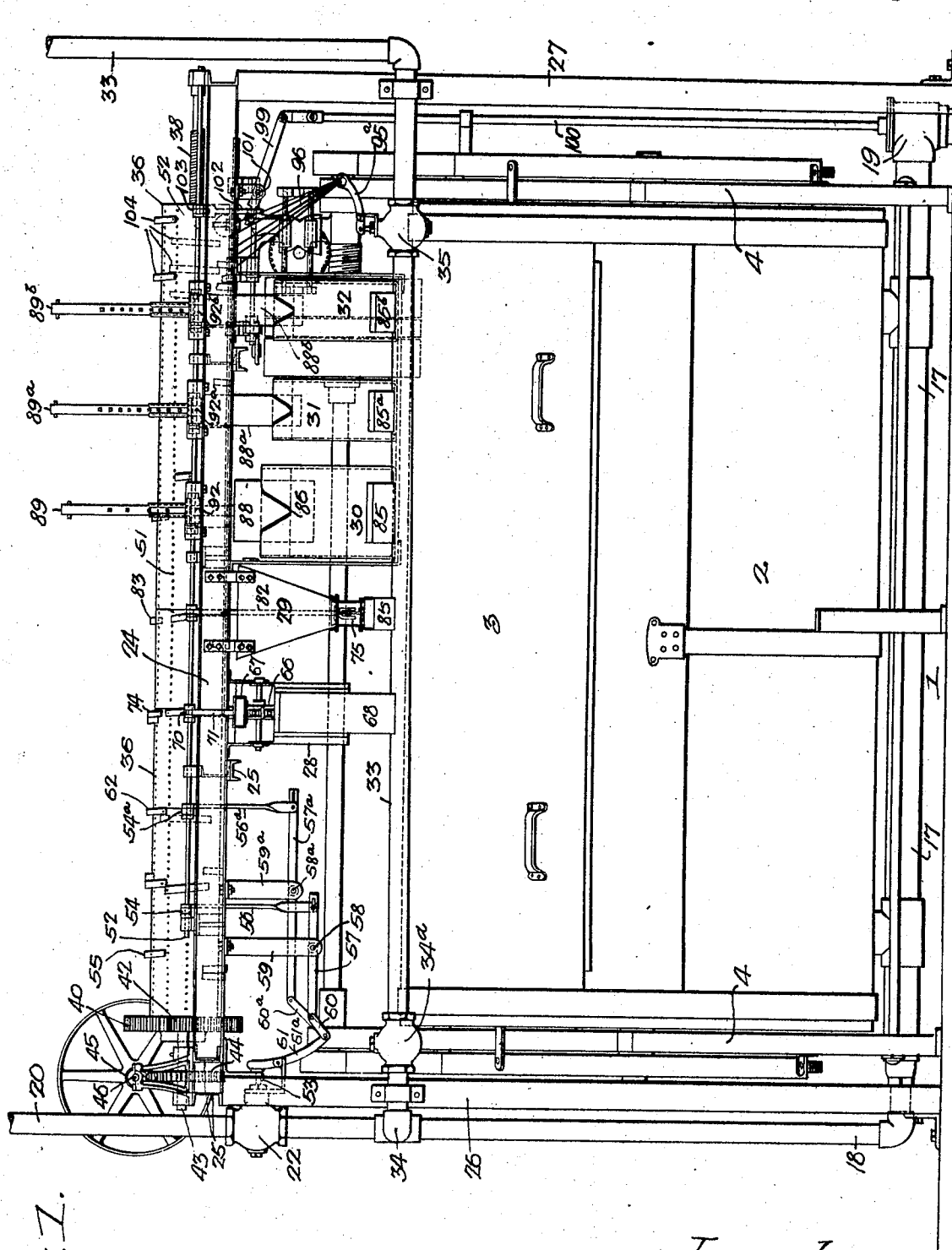


Fig. 1.

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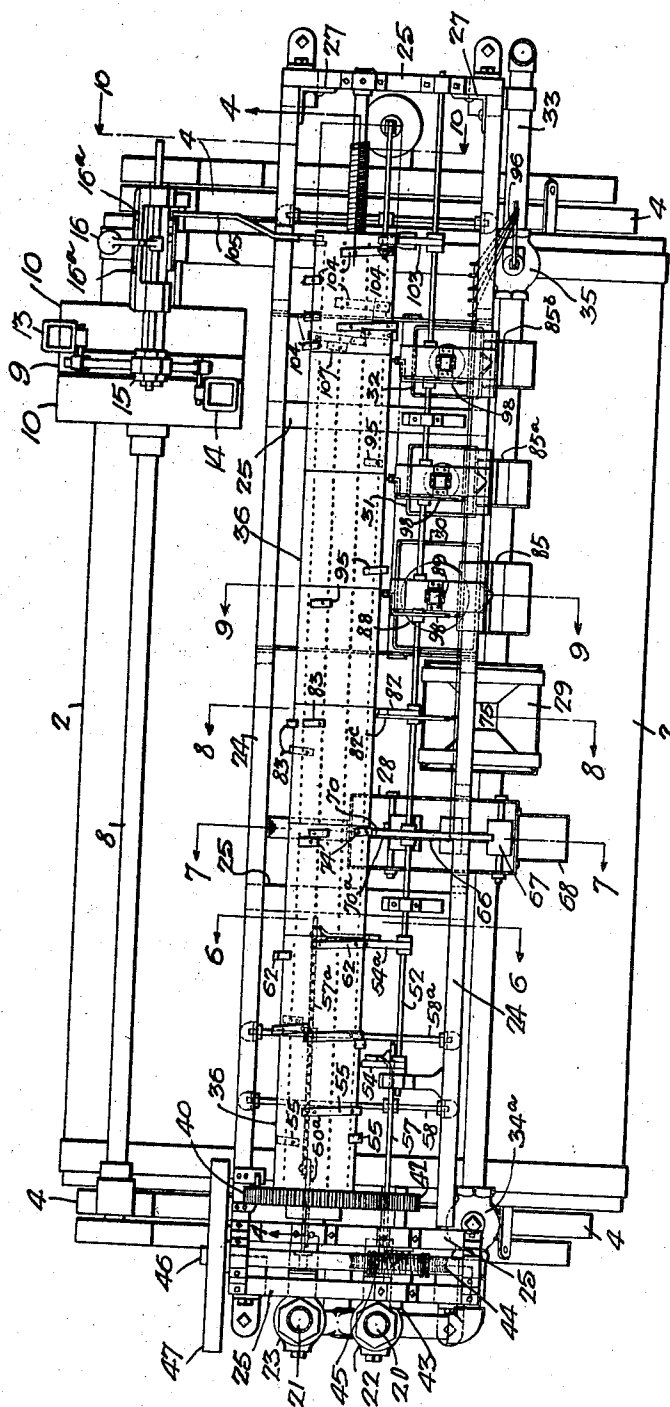
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7 Sheets-Sheet 2

Fig. 2.



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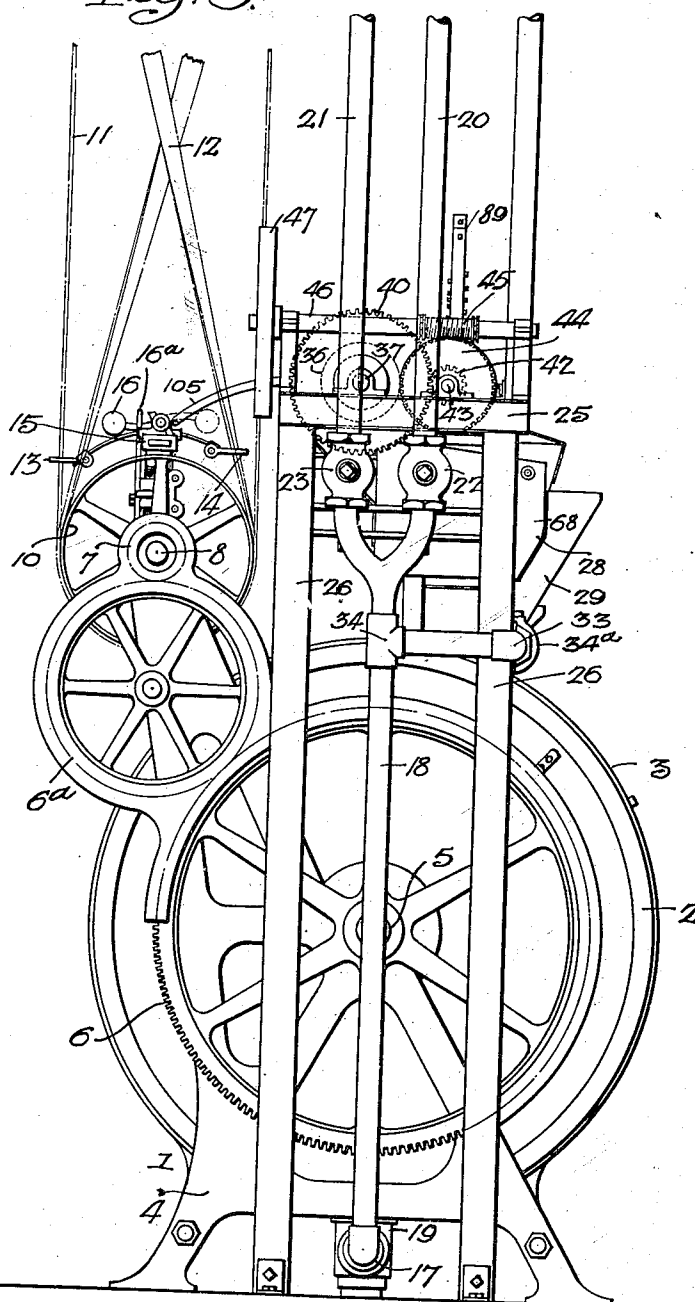
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LAUNDRY APPARATUS

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7 Sheets-Sheet 3

Fig. 3.



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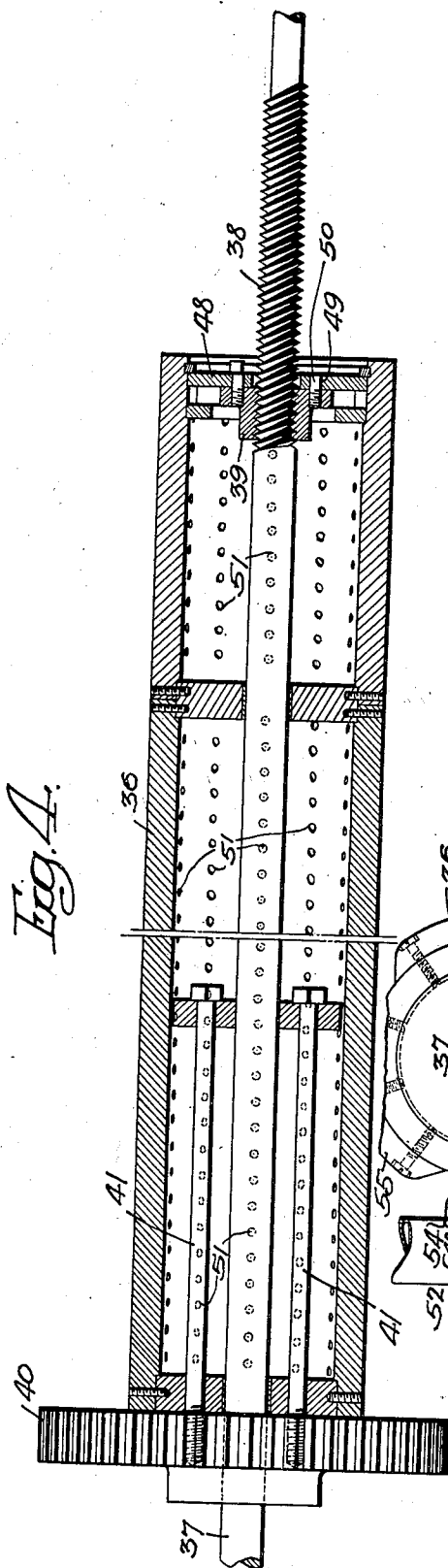


Fig. 5.

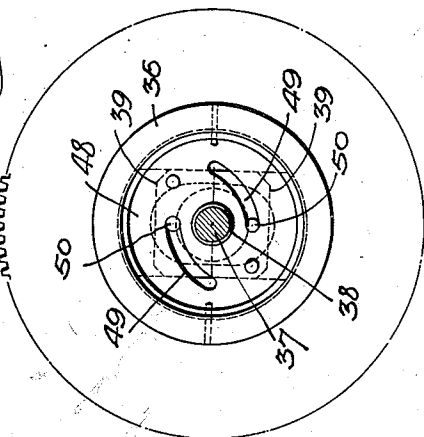
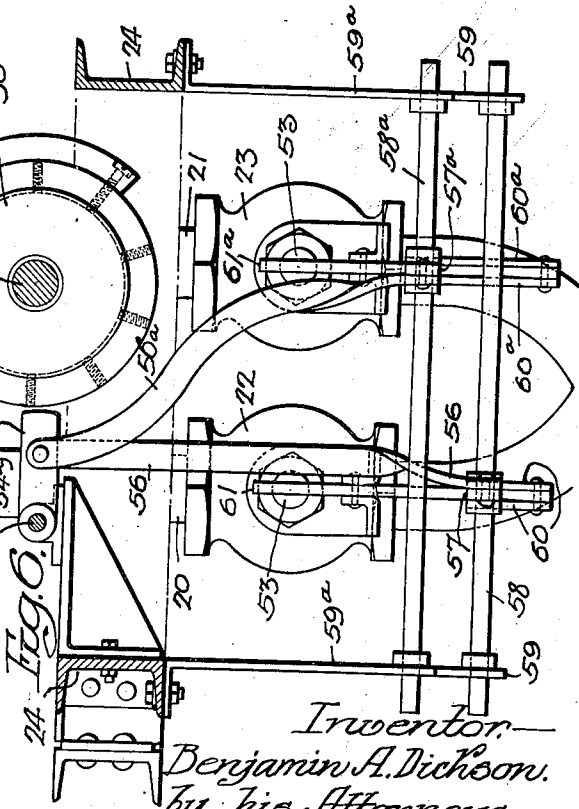


Fig. 6.



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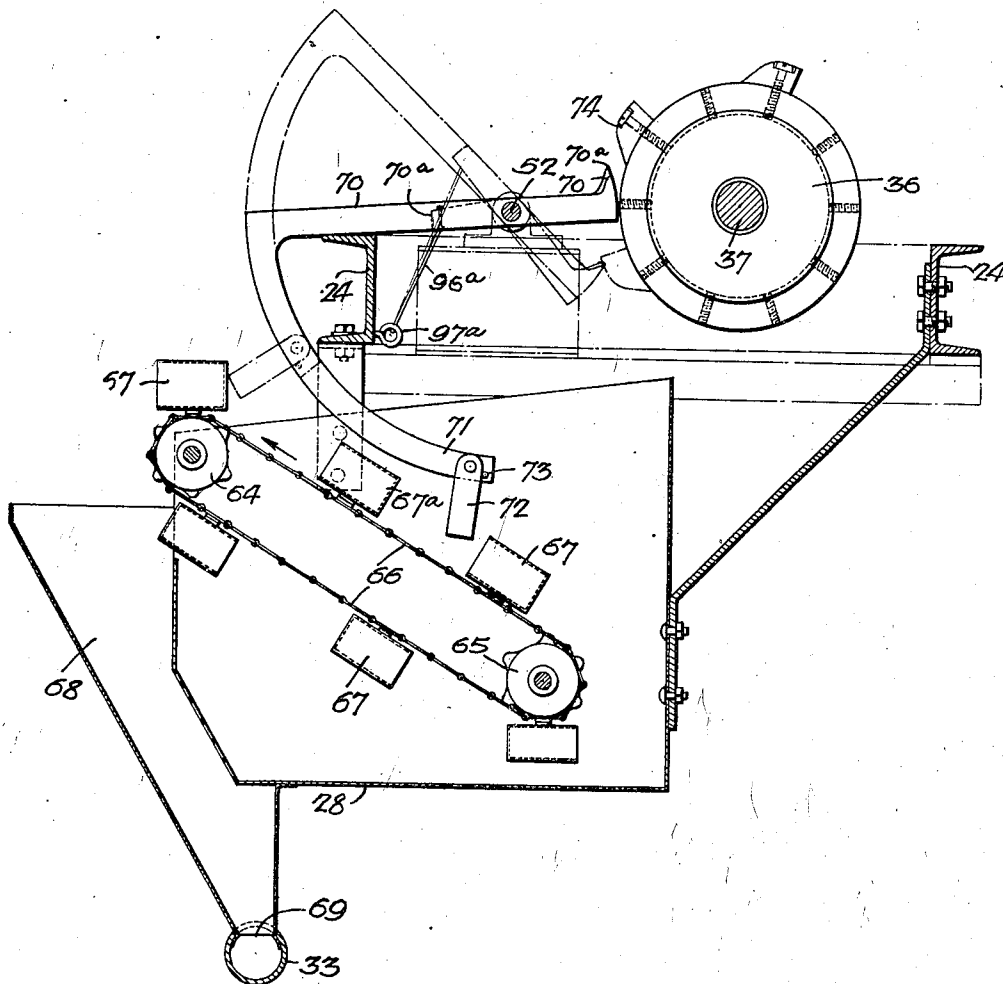
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LAUNDRY APPARATUS

Filed Oct. 1, 1925

7 Sheets-Sheet 5

Fig. 7.



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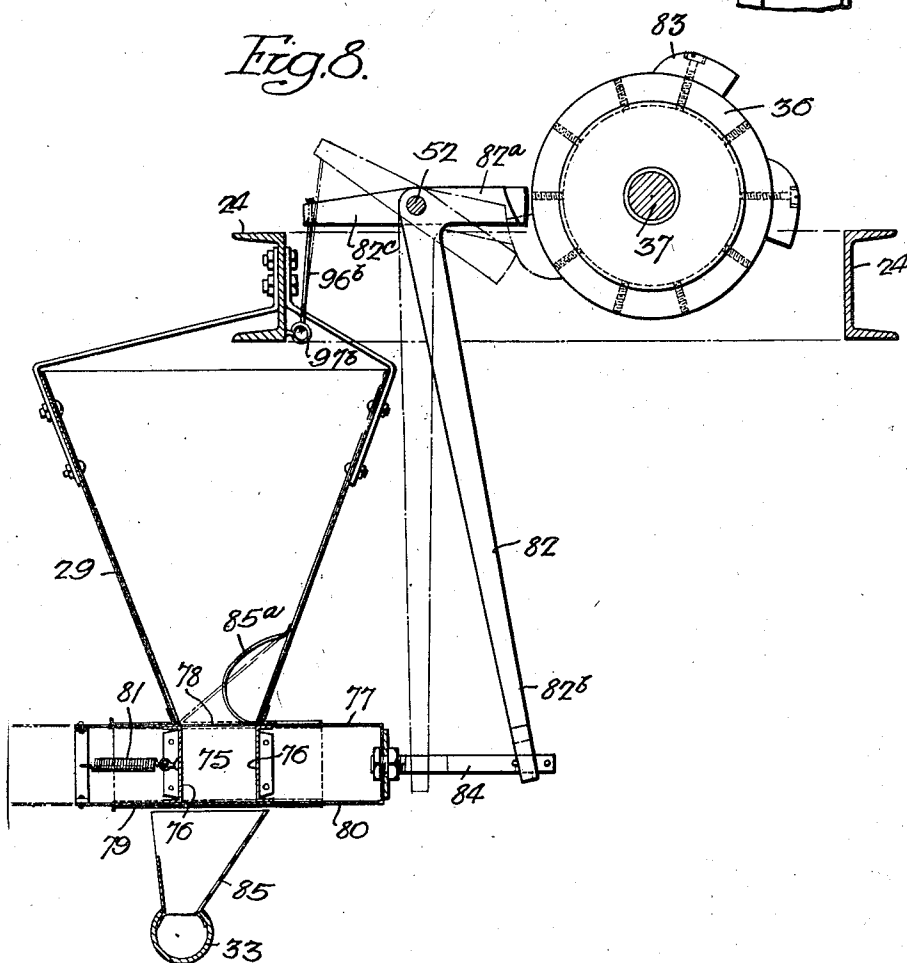
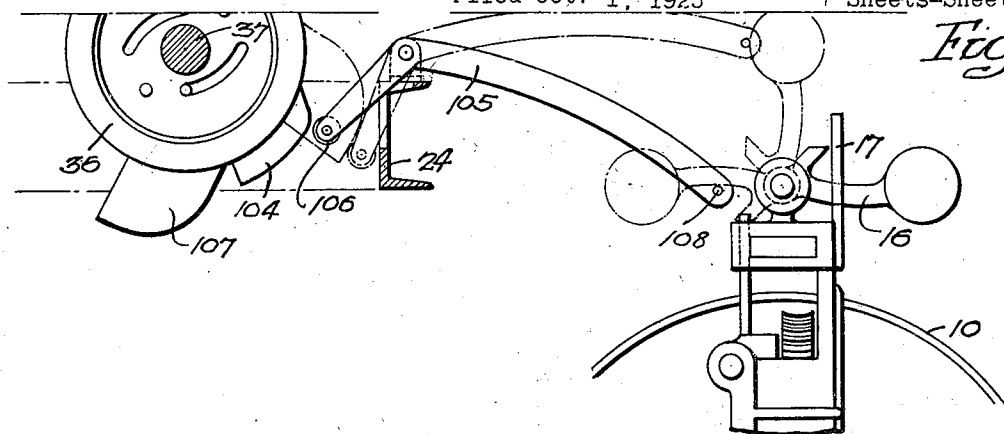
1,600,869

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LAUNDRY APPARATUS

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7 Sheets-Sheet 6



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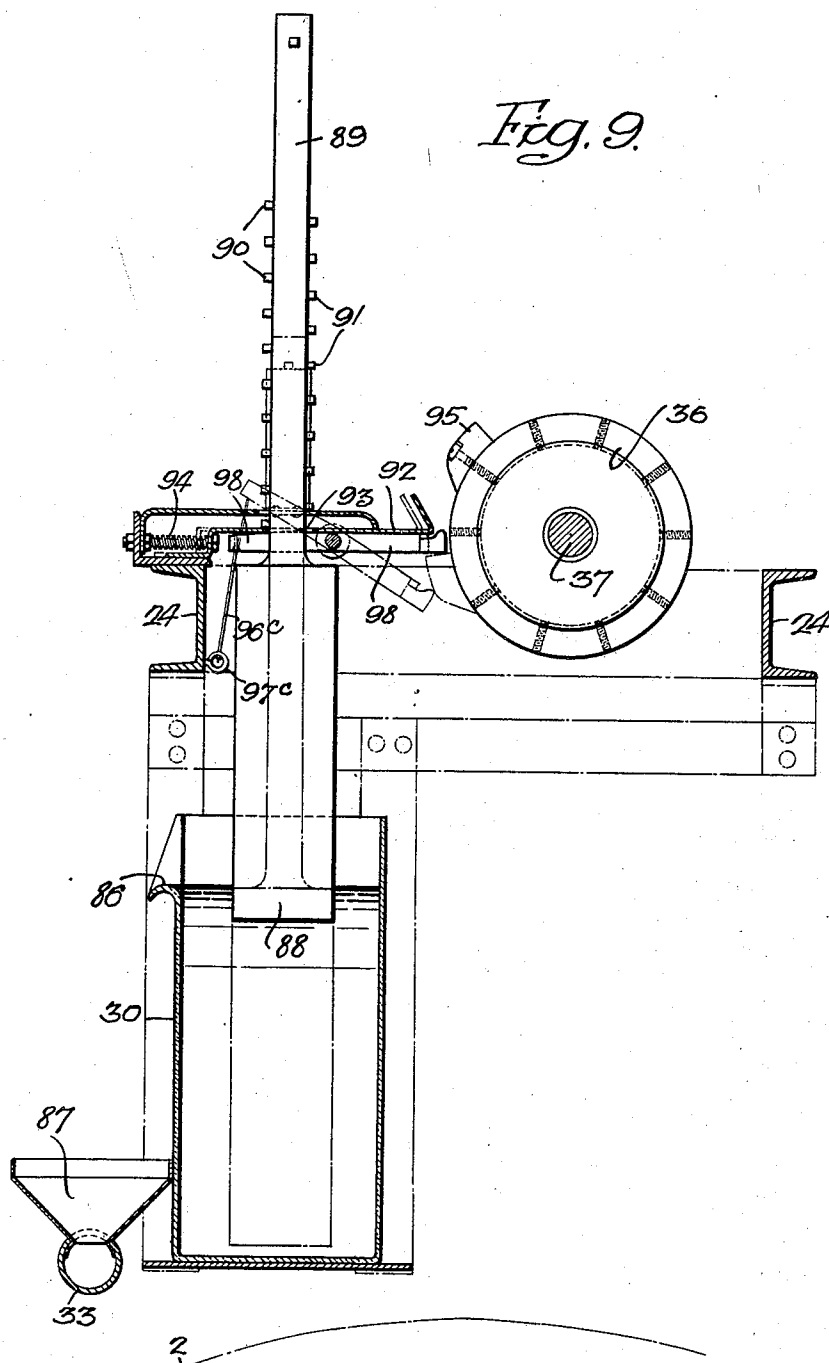
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LAUNDRY APPARATUS

Filed Oct. 1, 1925

7 Sheets-Sheet 7



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UNITED STATES PATENT OFFICE.

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LAUNDRY APPARATUS.

Application filed October 1, 1925. Serial No. 59,944.

This invention relates to an apparatus adapted to be associated with or combined with a washing machine to control the cycle of operation thereof.

According to current laundry practice a theoretical schedule or cycle is given to the machine operator, who is instructed to follow the given procedure in washing the clothes. It will be understood that different cycles are provided for different classes of clothes. Each cycle includes such steps as the introduction of cold water or hot water into the washing machine, and the addition of measured quantities of such washing materials as soda, soap, bleach, "sour" and bluing at predetermined intervals. The water may or may not be changed after each new substance is introduced. A typical cycle is as follows:

- a. Cold water and soda—5 minutes.
- b. Cold water, soda, soap and bleach—20 minutes.
- c. Hot water and soap—15 minutes.
- d. Hot water—2½ minutes.
- e. Tepid water—2½ minutes.
- f. Cold water—2½ minutes.
- g. Cold water and "sour"—2½ minutes.
- h. Cold water and bluing—3 minutes.

It will be understood that, in following a cycle such as the foregoing, the machine is emptied after each period, and that a certain interval is required between periods for emptying and refilling.

According to the present practice it is necessary to rely largely upon the machine operator to faithfully follow the prescribed schedule and there is no accurate or reliable check to determine whether or not he has in fact proceeded as he was instructed. Frequently, however, in order to insure that each washing period is long enough the operator is given an excessive allowance of time, it having been found from experience that the operators are inclined to shorten the prescribed time. Thus each cycle, as actually laid out, is longer than it theoretically needs to be. It also happens that in many cases an operator is unable to maintain the schedule as laid out for him. Each operator runs several machines, usually four, and if he is unexpectedly delayed at one machine he will be correspondingly delayed at

all of the others, thus increasing the time of the total cycle beyond what has been laid out. Furthermore, the measuring of the several washing compounds, whether solid or liquid, is done by hand, and in many cases this is inaccurately done, the operator putting in either more or less than the prescribed amount.

The primary object of my present invention is to provide an improved automatic mechanism for establishing and entirely controlling the cycle of operations of the washing machine, thus relieving the operator from all responsibility for the timing of the operations and for the introduction of the proper quantities of material. In accordance with the invention, the water and the several washing compounds are automatically introduced in measured quantities in a definite sequence and at predetermined intervals, the machine is emptied at the conclusions of the several washing periods, and finally the operation of the machine is stopped. The duties of the operator are merely to introduce the clothes to be washed, to start the cycle of operations, and finally to remove the washed clothes. Thus each operator can attend a considerably larger number of machines. At the same time the cycles of the machines, being definite and invariable, can be slightly shortened. A further advantage resides in the fact, that by mechanically measuring and supplying the washing compounds I avoid the waste which is frequently attendant on hand operation.

A more specific object of the invention is to provide means whereby both solid and liquid washing compounds may be automatically supplied to the washing machine.

A further specific object of the invention is to provide means whereby all of the compounds are delivered to the washing machine through a single conducting means and at the same location, thus avoiding concentrations of the undiluted compounds at different parts of the machine.

Another object of the invention is to provide for the introduction of the compounds into the water supply pipe so that the said compounds are diluted and thoroughly mixed with the water before being introduced into the washing machine.

Still another object of the invention is to provide permanently open conducting means interposed between the receptacles and the washing compounds and the machine so that the use of valves is avoided.

Another object of the invention is to provide an improved means for introducing the washing compounds through the medium of an auxiliary water supply.

Another object of the invention is to provide an improved cam mechanism in association with the several material supplying devices for operating them successively and in the desired timed relation.

Still another object of the invention is to provide various improved details of construction as will be hereinafter set forth.

Additional objects of the invention will be apparent from the following specification and claims.

In the accompanying drawings I have shown an embodiment of the invention, wherein a separate apparatus is provided adapted to be associated with a previously or separately constructed washing machine. I desire it to be definitely understood, however, that the invention is not so limited, and that the mechanism to which the invention particularly relates may, if desired or preferred, be structurally combined with the washing machine to form a single unitary machine. It will further be understood that the apparatus shown in the drawings has been selected merely for the purpose of illustrating the invention, and that the drawings are not to be construed as defining or limiting the invention, the claims forming a part of the specification being relied upon for that purpose.

Of the drawings:

Fig. 1 is a front view of an apparatus embodying the invention, this apparatus being shown in conjunction with a washing machine which is or may be of any usual or preferred type.

Fig. 2 is a plan view of the apparatus shown in Fig. 1.

Fig. 3 is an end view of the apparatus shown in Figs. 1 and 2.

Fig. 4 is an enlarged longitudinal view showing the cam drum, this view being partly in section along the line 4—4 of Fig. 2.

Fig. 5 is a detail view showing the nut mechanism for traversing the cam drum.

Fig. 6 is an enlarged fragmentary transverse sectional view taken along the line 6—6 of Fig. 2, and showing the operating mechanism for the water supply valves.

Fig. 7 is an enlarged fragmentary transverse sectional view along the line 7—7 of Fig. 2, and showing the device for supplying hygroscopic solid material such as soda.

Fig. 8 is an enlarged fragmentary transverse sectional view taken along the line 8—8 of Fig. 2 and showing the device for

supplying non-hygroscopic solid material such as powdered or flake soap.

Fig. 9 is an enlarged fragmentary transverse sectional view taken along the line 9—9 of Fig. 2 and showing one of the devices for supplying a liquid washing material.

Fig. 10 is an enlarged fragmentary transverse sectional view taken along the line 10—10 of Fig. 2 and showing the mechanism for opening the discharge valve and stopping the machine.

Referring to the drawings, 1 represents a washing machine which is or may be of any usual or preferred construction. This washing machine does not of itself constitute any part of my invention, although the washing machine and my improved apparatus are intimately associated mechanically and functionally.

The washing machine comprises the usual casing 2 having an opening which is normally closed by means of a sliding door 3. This opening serves for the introduction of the clothes to be washed and for the removal of the washed clothes. The casing 2 is supported upon frame members or legs 4, 4. It will be understood that the interior of the machine is provided with a suitably mounted rotatable cylinder or drum (not shown) for carrying the clothes, this cylinder or drum being driven by any suitable mechanism. As illustrated the drum is mounted on a shaft 5 and located at opposite ends of the shaft are two large driving gears 6, 6, these gears 6, 6 meshing with idler gears 6', 6' which in turn mesh with pinions 7 at the ends of a drive shaft 8. Associated with the drive shaft 8 is a suitable mechanism for driving the shaft alternately in opposite directions and thus driving the drum or reel of the washing machine in opposite directions. This driving and reversing mechanism may be of any usual or standard construction, and does not of itself constitute any part of my invention. For purposes of illustration, I have shown a driving mechanism which includes a tight pulley 9 secured to the shaft 8 and two loose pulleys 10, 10 freely rotatable on the shaft 8. Two belts 11 and 12 are provided which are adapted to be shifted by means of the two shifting loops 13 and 14, both carried by a slidable yoke 15. A suitable automatic mechanism (not fully shown) is provided for regularly operating the belt shifters to cause the regular reversal of the machine in accordance with common practice. A weighted lever 16 serves, in cooperation with inclined guides 16^a, 16^a, to move the shifting mechanism into neutral position when it is thrown toward the rear, as shown in full lines in Figs. 2 and 3. When the lever 16 is in the position shown in dotted lines in Fig. 3, the shaft 8 is driven by the belts, and the direction of rotation is regularly reversed.

Thus by moving the lever from the dotted line position to the full line position the belt shifter can be brought into a position with both of the belts on the loose pulleys, thus causing the machine to be stopped.

Water is delivered to the washing machine through a pipe 17 running along the bottom of the casing and preferably communicating therewith at two or more points. This pipe communicates at one end with a delivery pipe 18 and at the other end with a discharge valve 19. Preferably provision is made whereby either cold or hot water can be supplied to the machine, and for this purpose I provide two supply pipes 20 and 21 which are respectively connected with the pipe 18 and which are respectively provided with valves 22 and 23. The pipe 21 is for cold water and the pipe 20 is for hot water.

As illustrated in the drawings, the apparatus to which my invention particularly relates is mounted on a suitable framework located above the washing machine. As shown the two main longitudinal members of the framework are represented by 24, 24 and in addition there are suitable transverse members 25, 25. The framework may be mounted directly on the washing machine or it may be independently mounted. For purposes of illustration, I have shown an independent mounting, there being separate columns 26, 26 and 27, 27 supported at their lower ends on the floor and connected at their upper ends with the beforementioned framework.

Supported on the framework are receptacles for various washing compounds, preferably there being at least one receptacle adapted for a solid material and at least one receptacle adapted for a liquid material. As illustrated there are two receptacles 28 and 29, preferably of different constructions, for solid materials and three receptacles 30, 31 and 32 for liquid materials, these latter receptacles preferably being similar in construction but of different sizes.

Suitable means is provided for conducting the compounds from the several receptacles to the washing machine, and this means may be widely varied within the scope of the invention. As concerns certain of the broader phases of the invention, pipe or ducts might be provided extending from the receptacles directly into the washing machine, but I prefer and have shown means whereby the compounds can be delivered to the machine indirectly by means of an auxiliary water supply. As illustrated, there is an auxiliary water supply duct 33 running along the top of the washing machine and serving as a manifold to receive the compounds discharged from the several receptacles, as will more fully appear hereinafter. This duct 33 is prefer-

ably in the form of a pipe which discharges into the main delivery pipe 18 at 34. When a pipe is provided as shown, it has a check valve 34^a. A valve 35 is provided for admitting water to the duct 33 substantially simultaneously with the delivery of one or more washing compounds to the said duct, this water serving to wash the said compounds along the duct toward or into the washing machine. When the duct 33 is a pipe as shown the water flushes the compounds through the check valve 34^a into the main delivery pipe 18 where it becomes mingled with the main water supply. The valve 35 is automatically operated as will be described in detail hereinafter.

I provide a suitable automatically acting cam mechanism for operating the supply devices which are associated with the several hoppers 28 to 32. This cam mechanism serves to operate the several supply devices in the proper sequence and at the proper predetermined intervals, and preferably this same cam mechanism also serves to control the main water supply, to open the discharge valve 19, and to stop the operation of the washing machine at the conclusion of the cycle. The details of construction of the cam mechanism may vary, and it will be understood that, without departing from the spirit of the invention, I may widely change the details of construction of the said mechanism. It will also be understood that many of the advantages of my invention may be obtained and utilized without employing all of the features thereof; that is the automatic cam mechanism may be utilized to operate some of the supply devices and other devices herein shown and described without operating others, leaving the said other mechanisms to be operated by hand or by independent means. It will, therefore, be understood that the scope of the invention is as set forth in the claims forming a part of this specification and is not limited to all of the functions and details of construction now to be described.

As the main element of the cam mechanism, I preferably provide a rotary member which extends substantially throughout the length of the apparatus. As illustrated, this rotary member is a drum 36 which is supported on a non-rotatable shaft 37, this shaft being suitably supported on the transverse members 25, 25 of the frame. One end of the shaft 37 is threaded, as shown at 38, and the drum is provided with a nut 39 engaging the threads at 38. It will be understood that as the drum is rotated, the nut 39 will travel along the threads 38, thus causing the drum to have a progressive movement along the shaft. For rotating the drum 36, I provide a gear wheel 40 which is also rotatable on the shaft 37 but held against longitudinal movement. Stud 41

41 project longitudinally from the gear wheel through holes in the head of the drum and serve the purpose of transmitting the rotative movement of the gear 40 without interfering with the longitudinal movement of the drum. For rotating the gear 40, I preferably provide a pinion 42 meshing therewith, this pinion being mounted on a shaft 43 which carries a worm wheel 44. A worm 45 on a transverse shaft 46 meshes with the worm wheel 44. Mounted on the shaft 46 is a belt pulley 47 adapted to be continuously driven by means of a suitable belt (not shown).

15 Preferably the pulley 47 and the pulley 9 are driven, directly or indirectly, from the same line shaft or other source of power, so that any variations in speed will affect the washing machine and the control apparatus similarly. If the machine runs slower, the control apparatus should also operate slower to increase the times of the several washing operations, and vice versa. In this way the clothes receive a definite amount of washing and scrubbing without regard to the exact speed of the apparatus.

From the foregoing description, it will be clear that the gear 40 is or may be continuously rotated and that the drum 36 is or may be also continuously rotated. The nut 39 causes the drum to progress along the shaft as stated, this progressive movement continuing until the nut runs beyond the threads 38, whereupon the drum merely rotates without endwise movement. In order that the drum may be shifted toward the left to its original position, the nut 39 is made in two parts which can be separated by turning the scroll plate 48. It will be observed that this scroll plate has two spiral slots 49, 49 therein, which receive pins 50, 50 carried by the two halves of the nut. By rotating the scroll plate, by means of a spanner wrench or otherwise, the two halves of the nut can be separated sufficiently to permit the entire drum to be moved bodily toward the left. Then by turning the scroll plate in the other direction the halves of the nut can then be re-engaged with the threads, thus again starting the regular progressive movement. If desired, the rotation of the pulley 47 and of the drum 36 can be interrupted when the drum is being moved toward the left, but as the rotation of the drum is slow it is not necessary to stop it.

Secured to the drum 36 are a number of cams adapted to perform various functions during the operation of the apparatus. These cams may be permanently secured in place at the required positions, but I prefer to provide a helical series of holes 51, 51 in the drum which are preferably threaded so as to permit the attachment of cams at practically any desired position and to

further permit the shifting of the cams when it is desired to change the apparatus from one cycle of operations to another. The pitch of the helix on which the holes 51, 51 are located is the same as the pitch of the threads 38, the result being that different cams mounted in successive positions along the helix will follow the same predetermined path as the drum rotates and progresses. In order that the timing of the operations may be easily and quickly determined and set, I preferably rotate the drum at a definite speed, as for instance one revolution in five minutes. With this speed there are preferably ten holes 51, 51 for each convolution of the helix, and each hole represents one-half minute of time. The several levers which are operated by the several cams are preferably located at uniform distances apart, the distance preferably representing 12 convolutions of the helix or one hour of time.

Preferably a non-rotatable shaft 52 is provided adjacent the cam drum 36, this shaft serving for the support of the several operating levers, as will presently be described.

The cam mechanism is preferably utilized for at least opening one or the other or both of the valves 22 and 23 and preferably also for closing them. It will be understood, however, that separate closing means for the valves may be used if desired. The mechanisms for operating these valves are similar, although differing somewhat in detail by reason of the different positions of the valves.

Each of the valves 22 and 23 is of the "whistle" type, and is normally held closed by a spring. The valve may be opened by pressing the stem 53 inward. For operating the valve 22, there is provided a lever 54 loosely mounted on the shaft 52, as shown in Fig. 6, and adapted to be engaged by a cam 55 secured to the cam drum 36. A link 56 connects the lever 54 with a longitudinally extending lever 57. This lever 57 is pivotally mounted on a transverse rod 58 carried by supports 59 depending from the main frame. A link 60 is provided for connecting the left hand end of the rod 57 with a pivoted lever 61 which engages the stem 53 and serves to open the valve. From the foregoing description, it will be clear that when the lever 54 is pressed downward by the cam 55 the lever 57 will be moved in the clockwise direction, thus moving the lever 61 in the counter-clockwise direction and opening the valve 22. The valve will remain open so long as the cam 55 engages the lever 54, but it will immediately close as soon as the lever is released by the cam.

The mechanism for operating the valve 23 is similar to that already described, the operating mechanism comprising the parts 54^a, 56^a, 57^a, 58^a, 59^a, 60^a and 61^a is similar

respectively to the parts 54, 56, 57, 58, 59, 60 and 61. The lever 54^a is engaged by a cam 62 on the cam drum 36.

The two receptacles and dispensing devices for solid material are preferably of different construction, one of them being adapted by a hygroscopic compound such as soda, and the other for a non-hygroscopic compound such as powdered soap. It will be understood, however, that I do not limit myself to two different kinds of receptacles and dispensing devices, as it may, under many circumstances, be possible to use receptacles identical in construction. As illustrated, particularly in Fig. 7, the receptacle 28, for a hygroscopic compound such as soda, is supported by means of suitable arms or brackets from the main frame members 24, 24. Mounted within or upon this receptacle 28 are two chain sprockets 64 and 65 over which passes a chain 66 carrying a series of uniformly spaced buckets 67, 67. Adjacent the receptacle 28 is a hopper 68 having an inclined bottom terminating at a discharge outlet 69 which communicates with the beforementioned water duct or pipe 33. The chain 66 and the buckets thereon are so disposed that, when the chain is moved in the direction indicated, the buckets will be filled with measured amounts of the compound in the receptacle and will successively discharge their contents into the hopper. Thus when the hopper is filled with a washing compound such as soda the chain and buckets constitute a means for supplying predetermined amounts of the said compound from the receptacle to the washing machine, the compound passing into the machine through the duct or pipe 33 as already described.

For operating the chain 66 and the buckets 67, I provide a lever 70 which is pivotally mounted on the beforementioned shaft 52. The lever 70 is normally in the position shown by full lines in Fig. 7, and it is provided with a tail portion 71 which is curved concentrically with the axis of the shaft 52. At the lower end of the tail 71 is a pivoted dog 72, the pivotal movement toward the right being limited by means of a stop 73. The dog 72 extends downward between two of the buckets 67, 67. The lever 70 is adapted to be engaged by a cam 74 on the cam drum 36. This cam serves to move the lever 70 from the full line position to the dotted line position, and in so moving the dog 72 engages the rear part of one of the buckets 67, thus advancing the said bucket and all of the buckets through a distance equal to that between two adjacent buckets. As soon as the lever 70 is released by the cam 74, the lever returns to its normal position, the pivoted dog passing over one of the buckets 67 and

falling into position to subsequently engage 65 the rear portion thereof. It will be observed that one of the buckets, as for instance 67^a, is left in position to discharge its contents into the hopper 68 upon the next actuation.

For supplying a non-hygroscopic material, such as powdered soap, I prefer to use a somewhat different and simpler receptacle and dispensing device therefor. The receptacle 29 for this purpose is shown more clearly in Fig. 8. It is supported by suitable bars or straps from the front frame member 24. The receptacle 29 is preferably in the form of an inverted truncated pyramid and terminates in a lower rectangular chamber 75 which is open at the bottom and which has fixed side walls 76, 76. Above the side walls 76, 76 and below the inclined walls of the receptacle are slots through which extends a sheet metal slide 77 having an opening 78 therein normally registering with the bottom of the pyramidal part of the hopper. A second slide 79 is located adjacent the bottom of the chamber 75 and is provided with an opening 80 which is out of register with the opening 78 in the slide 77. The two slides 77 and 80 are preferably connected to form a unitary member and they are normally held in the right hand position as shown by a suitable means such as a coil spring 81. A bell crank lever 82 is mounted on the shaft 52 and has an arm 82^a adapted to be engaged by a cam 83 on the cam drum 36. The other arm 82^b of the bell crank lever has operative engagement with a horizontal stud 84 carried by the slides 77 and 79. When the lever arm 82^a is engaged by the cam 83 the lever is oscillated in the clockwise direction and the slides 77 and 79 are moved toward the left. If the hopper 29 and the chamber 75 are filled with powdered or granular material, it will be seen that the movement of the slide 77 serves to cut off the material in the chamber 75 from the main body of material in the hopper 29. Simultaneously the opening 80 in the slide 79 comes into register with the bottom of the chamber 75, thus releasing the contents of the chamber. Immediately below the chamber 75 is a hopper 85 communicating with the beforementioned duct or pipe 33. Therefore, when the slides 77 and 79 are actuated as described they serve as means for supplying a predetermined amount of the washing compound from the receptacle 29 to the washing machine, this compound moving into the machine through the pipe 33 in the manner already described. It will be understood that as soon as the lever arm 82^a is disengaged by the cam 83 the slides are returned by the spring to their right hand positions as shown, the bottom of the chamber 75 being thus closed and the

top thereof being opened to permit it to be again filled by the material in the receptacle 29.

Preferably, in order to prevent any possible caking or bridging of the material in the hopper 29 I provide one or more wires or cables 85^a which are connected at their respective ends to the hopper 29 and to the slide 77 and which are in looped positions, as shown by full lines, when the slides are in normal positions. When the slides are moved toward the left the wires or cables are straightened, as shown by dotted lines. This movement of the wires through the material serves to break it and maintain it in a pulverulent condition.

For holding and supplying liquid washing compounds the receptacles 30, 31 and 32 are provided as already described. It will be understood that the number of these receptacles can be varied and also that their relative sizes can be varied to suit different conditions. As these three receptacles and the parts associated therewith are similar in construction a description of one of them will suffice for all.

As illustrated in Fig. 9 the receptacle 30 is supported by means of suitable bars and straps from the main frame members 24, 24. The receptacle itself is preferably of such construction that it will not be deleteriously affected by the washing compounds which it is to contain. It may be made of earthen ware or of Monel metal or other metal suitably enameled. In providing for the handling and supplying of the washing compounds, it is essential to avoid the use of valves or other mechanically operating devices which would quickly become corroded or clogged. Therefore, the receptacle is provided with a discharge duct which communicates with the receptacle above the level of the liquid therein. This duct is permanently open containing no valves or other obstructions. As illustrated, the duct is in the form of a spout 86. A suitable means is provided whereby the liquid washing compound is conducted from the discharge duct or spout 86 to the machine. This means includes a funnel 87 which is arranged to receive the liquid discharged from the duct or spout 86 and which communicates with the beforementioned water duct or pipe 33. In accordance with the invention, I provide a device for causing predetermined amounts of the liquid compound in the receptacle to be discharged from the receptacle into the duct. As illustrated, this device comprises a plunger 88 having a stem 89 supported so as to be intermittently movable downward into the receptacle 30 to displace measured quantities of the liquid therein.

Different means may be provided for effecting the desired intermittent movement of the plunger, but I have shown an escape-

ment mechanism which permits the movement to take place intermittently by gravity. As illustrated, the plunger 89 is provided at its front and rear sides with two series of uniformly spaced pins 90, 90 and 91, 91. It will be observed that the pins of one series are staggered with relation to those of the other series. A horizontal slide 92 is provided having an opening 93 therein through which the stem 89 projects. This opening 93 has a length slightly in excess of the combined width of the stem 89 and one pin 90 or 91 but less than the combined width of the stem and two pins. The slide 92 is normally held in its right hand position, as shown, by a suitable means such as a spring 94, and when in this position the slide serves to support the stem 89, together with the plunger 88, by reason of the engagement of one of the pins 90 with the slide. The right hand end of the slide is adapted to be engaged by a cam 95 on the drum 36, this cam serving to move the slide toward the left. When the slide is thus moved toward the left the engaged pin 90 is released and the stem and plunger are permitted to drop through a limited distance. The downward movement, however, is stopped by the engagement of the next pin 91 with the slide 92. As soon as the slide 92 has been released by the cam 95 the spring 94 again moves it toward the right, thus releasing the pin 91 and permitting the stem and plunger to again drop until stopped by the next pin 90. Thus a single actuation of the slide 92 toward the left and back toward the right permits the plunger to drop through a distance equal to a distance between two of the pins 90, 90. The size of the plunger is so determined in relation to the distance moved at each actuation that a definite predetermined amount of the liquid washing compound is displaced to the washing machine through the duct or pipe 33.

As has already been pointed out, the valve 35 serves as a means for admitting a limited amount of water to the duct or pipe 33 for the purpose of washing or flushing the several washing compounds along the duct or pipe and toward or into the washing machine. This valve is preferably of the "whistle" type and is normally closed, but it can be opened by moving the lever 95^a upward. For automatically opening the valve 35 in timed relation to the supply of washing compounds from the several receptacles, I provide cords 96 which are connected to the lever 95^a and which extend to the respective devices for supplying the compounds to the receptacles. As shown in Fig. 7, there is a cord 96^a which is connected to a supplemental lever 70^a, adjacent the lever 70, which is operated slightly in advance of the operation of the lever 70 by

the cam 74 as already described. This cord 96^a extends through suitable eyes or guides 97^a. In Fig. 8 there is shown a cord 96^b which is connected to a supplemental lever 82^a. The lever 82^a is operated by the cam 83 slightly in advance of the operation of the lever 82 by the cam in the manner already described. This cord extends through suitable eyes or guides 97^b. As shown in Fig. 9 a supplemental lever 98 is provided which is operated by the cam 95 slightly in advance of the operation of the slide 92. Connected with the lever 98 is a cord 96^c which extends through eyes or guides such as 97^c. It will be understood that levers similar to the lever 98 are provided in conjunction with the receptacles 31 and 32 and that cords similar to the cord 96^c are also provided. From the foregoing description, it will be clear that when the dispensing device associated with any one of the receptacles is operated the valve 35 will be simultaneously or previously opened to admit a limited amount of water into the duct or pipe 33, this water serving to wash or flush the material along the duct or pipe either directly into the machine or into the main water delivery pipe where it can be picked up by the water flowing into the washing machine.

For opening the discharge valve 19 there is provided a lever 99 which is connected with the valve by means of a link 100. The lever 99 is pivoted between its ends on a transverse shaft 101 which is carried by brackets depending from the main frame. A link 102 serves to connect the lever 99 with a lever 103 which is pivoted on the shaft 52. The lever 103 is adapted to be engaged by a cam 104 on the drum 36. It will be obvious that when the lever 103 is moved downward the lever 99 will be turned in the counter-clockwise direction, thus raising the link 100 and opening the valve.

For stopping the operation of the washing machine, there is provided a bell crank lever 105, as shown in Fig. 10. This lever is horizontally pivoted between its ends on a bracket carried by the rear frame member 24. The inner arm of the bell crank lever is provided with a roller 106 adapted to be engaged by a cam 107 carried by the drum 36. The other arm of the bell crank lever carries a horizontal finger 108 which extends underneath the weighted lever 16 of the reversing mechanism. When the roller 106 is engaged by the cam 107 the lever 105 is turned in the counter-clockwise direction with the result that the finger 108 is raised and the lever 16 thrown over into its full line position as shown in Fig. 10. When in this position the lever serves to stop the operation of the machine as has already been explained. It will be understood that the roller 106 is positioned far

enough away from the drum so that it will not be engaged by the cam 104. The cam 107 projects outward from the drum further than the cam 104 and is thus adapted to engage the said roller and operate the lever as already described.

I have already pointed out that a mechanism embodying my invention can be adapted for practically any desired cycle of operations, and I have further pointed out that by preference the mechanism is so constructed that it can be adjusted to carry out different cycles of operations without any structural changes other than the shifting of cams. While any desired cycle of operations can be carried out I have, for purposes of illustration, selected a cycle substantially the same as that itemized near the beginning of this specification. It will not be necessary to describe in detail the several successive operations as these will be apparent from the description which has already been given in connection with the various parts of the mechanism. It will be understood that a charge of one or more of the washing compounds is introduced into the manifold or duct 33, by means of the cams and supplying devices already fully described, and that the valve 35 is simultaneously or previously opened to admit sufficient water to flush the said compounds along the duct and into the main delivery pipe 18. Immediately thereafter one or the other of the valves 23 or 22 is opened, or if desired both valves may be opened. The cams 62 and 55 for opening these valves are of such length as to hold the valves open long enough to permit the required quantity of water to enter the washing machine. I have assumed that the required quantity will be delivered in one minute through one of the valves, and it therefore follows that when both of the valves are opened simultaneously they should be held up only one-half of a minute.

At the conclusion of each washing cycle the discharge valve 19 is opened and the cam 104 is of such a length as to hold the valve open during the time required for the discharge of all of the water in the machine. I have assumed that one minute will be required for this discharge.

Inasmuch as a cycle of operations include several separate washing periods, it is necessary to repeatedly open the valves 22 and 23 and I have, therefore, shown not only the initial cams 62 for the cold water but also five secondary cams which follow at the proper intervals. Similarly I have shown not only the initial cam 55 for the hot water but also two secondary cams, which follow at the proper intervals. Inasmuch as the water must be discharged at the conclusion of each washing operation, I have shown not only the primary cam 104 for opening

the discharge valve but also seven secondary cams which follow the cam 104 at the proper intervals.

It will also be understood that there are or may be secondary cams following the cams 74 and 83 to supply successive charges of the washing compounds for use in the successive washing operations.

What I claim is:

1. In a laundry apparatus of the class described, the combination of a water duct adapted to communicate with a washing machine, a receptacle for a washing compound, a device for supplying a predetermined amount of the said compound from the said receptacle to the said water duct, and means for operating the said device and for also admitting a limited amount of water into the said duct to flush the said compound therealong.

2. In a laundry apparatus of the class described, the combination of a water duct adapted to communicate with a washing machine, a receptacle for a solid washing compound, a device for supplying a predetermined amount of the said solid compound from the said receptacle to the said water duct, and means for operating the said device and for also admitting a limited amount of water into the said duct to flush the said compound therealong.

3. The combination of a washing machine, a water duct communicating with the machine, a plurality of receptacles for different washing compounds, devices for supplying predetermined amounts of the said compounds from the respective receptacles to the said water duct, and automatic means for operating the said devices and for also admitting a limited amount of water into the said duct, when any one of the devices is operated, to flush the corresponding compound along the duct, whereby the said compounds are supplied through the duct and are all delivered to the machine at the same part thereof.

4. The combination of a washing machine, a water duct communicating with the machine, a plurality of receptacles for different washing compounds, at least one of the said receptacles being adapted to contain a solid washing compound and at least one of the said receptacles being adapted to contain a liquid washing compound, devices for supplying predetermined amounts of the said compounds from the respective receptacles to the said water duct, and automatic means for operating the said devices in a definite sequence and at predetermined intervals and for also admitting a limited amount of water into the said duct, when any one of the said devices is operated, to flush the corresponding compound along the duct.

5. In a laundry apparatus of the class described, the combination of a water duct

adapted to communicate with a washing machine, a plurality of receptacles for different washing compounds, devices for supplying predetermined amounts of the said compounds from the respective receptacles to the said water duct, and automatic means for operating the said devices and for also admitting a limited amount of water into the said duct, when any one of the devices is operated, to flush the corresponding compound along the duct.

6. In a laundry apparatus of the class described, the combination of a water duct adapted to communicate with a washing machine, a plurality of receptacles for different washing compounds, at least one of the said receptacles being adapted to contain a solid washing compound and at least one of the said receptacles being adapted to contain a liquid washing compound, devices for supplying predetermined amounts of the said compounds from the respective receptacles to the said water duct, and automatic means for operating the said devices in a definite sequence and at predetermined intervals and for also admitting a limited amount of water into the said duct, when any one of the said devices is operated, to flush the corresponding compound along the duct.

7. The combination of a washing machine, a main water supply pipe communicating with the said machine, a valve in the said pipe, an auxiliary water duct also communicating with the said machine, a receptacle for a washing compound, a device for supplying a predetermined amount of the said compound from the said receptacle to the said water duct, and automatic means for operating the said device, for admitting a limited amount of water into the said duct to flush the said compound therealong and for also opening the main supply valve.

8. The combination of a washing machine, a main water supply pipe communicating with the said machine, a valve in the said pipe, an auxiliary water pipe communicating with the first said pipe between the said valve and the machine, a receptacle for a washing compound, a device for supplying a predetermined amount of the said compound from the said receptacle to the said auxiliary water pipe, and automatic means, for operating the said device, for admitting a limited amount of water into the said auxiliary pipe to flush the said compound into the main supply pipe and for thereafter opening the main supply valve.

9. The combination of a washing machine, a main water supply pipe communicating with the said machine, a valve in the said pipe, an auxiliary water duct also communicating with the said machine, a plurality of receptacles for different washing compounds, devices for supplying predetermined amounts of the said compounds from the respective

receptacles to the said water duct, and automatic means for operating the said devices, for admitting a limited amount of water into the said duct, when any one of the said devices is operated, to flush the said compounds along the duct, the said means also serving to operate the main supply valve in timed relation to the operation of the said devices.

10. In a laundry apparatus of the class described, the combination of a main water supply pipe adapted to communicate with a washing machine, a valve in the said pipe, an auxiliary water duct also adapted to communicate with the said machine, a receptacle for a washing compound, a device for supplying a predetermined amount of the said compound from the said receptacle to the said water duct, and automatic means for operating the said device, for admitting a limited amount of water into the said duct to flush the said compound therealong and for also opening the main supply valve.

11. In a laundry apparatus of the class described, the combination of a main water supply pipe adapted to communicate with a washing machine, a valve in the said pipe, an auxiliary water pipe communicating with the first said pipe between the said valve and the machine, a receptacle for a washing compound, a device for supplying a predetermined amount of the said compound from the said receptacle to the said auxiliary water pipe, and automatic means for operating the said device, for admitting a limited amount of water into the said auxiliary pipe to flush the said compound into the main supply pipe and for also opening the main supply valve.

12. In a laundry apparatus of the class described, the combination of a main water supply pipe adapted to communicate with a washing machine, a valve in the said pipe, an auxiliary water pipe communicating with the first said pipe between the said valve and the machine, a receptacle for a washing compound, a device for supplying a predetermined amount of the said compound from the said receptacle to the said auxiliary water pipe, and automatic means for operating the said device, for admitting a limited amount of water into the said auxiliary pipe to flush the said compound into the main supply pipe and for thereafter opening the main supply valve.

13. In a laundry apparatus of the class described, the combination of two main water supply pipes adapted to communicate with a washing machine and also adapted respectively to supply cold and hot water, valves in the respective pipes, an auxiliary water duct also adapted to communicate with the said machine, a receptacle for a washing compound, a device for supplying a predetermined amount of the said compound from the said receptacle to the said

water duct, and automatic means for operating the said device, for admitting a limited amount of water into the said duct to flush the said compound therealong and for also operating either one of the main supply valves.

14. In a laundry apparatus of the class described, the combination of a main water delivery pipe adapted to communicate with a washing machine, two water supply pipes communicating with the delivery pipe and adapted respectively to supply cold and hot water, valves in the respective supply pipes, an auxiliary water pipe communicating with the said delivery pipe, a receptacle for a washing compound, a device for supplying a predetermined amount of the said compound from the said receptacle to the said auxiliary water pipe, and automatic means for operating the said device, for admitting a limited amount of water into the said auxiliary pipe to flush the said compound into the said main delivery pipe and for also operating either one of the said main supply valves.

15. In a laundry apparatus of the class described, the combination of a main water supply pipe adapted to communicate with a washing machine, a valve in the said pipe, an auxiliary water duct also adapted to communicate with the said machine, a plurality of receptacles for different washing compounds, devices for supplying predetermined amounts of the said compounds from the respective receptacles to the said water duct, and automatic means for operating the said devices and for admitting a limited amount of water into the said duct, when any one of the said devices is operated, to flush the said compounds along the duct, the said means also serving to operate the main supply valve in timed relation to the operation of the said devices.

16. In a laundry apparatus of the class described, the combination of a main water supply pipe adapted to communicate with a washing machine, a valve in the said pipe, an auxiliary water pipe communicating with the first said pipe between the said valve and the machine, a plurality of receptacles for different washing compounds, devices for supplying predetermined amounts of the said compounds from the respective receptacles to the said auxiliary water pipe, and automatic means for operating the said devices and for admitting a limited amount of water into the said duct, when any one of the said devices is operated to flush the said compounds along the auxiliary pipe into the main pipe, the said means also serving to operate the main supply valve in timed relation to the operation of the said devices.

17. In a laundry apparatus of the class described, the combination of a main water

delivery pipe adapted to communicate with a washing machine, two water supply pipes communicating with the delivery pipe and adapted respectively to supply cold and hot
5 water, valves in the respective supply pipes, an auxiliary water pipe communicating with the said delivery pipe, a plurality of receptacles for different washing compounds, devices for supplying predetermined amounts
10 of the said compounds from the respective receptacles to the said auxiliary water pipe, and automatic means for operating the said devices and for admitting a limited amount of water into the said duct, when any one of the said devices is operated, to flush the
15 said compounds along the auxiliary pipe into the delivery pipe, the said means also serving to operate either one of the said main supply valves.

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