

[54] **FLUSHING SYSTEM FOR SANITARY  
FLUSHING DEVICES**[75] Inventors: **Walter Mones, Haan; Harri Mones,**  
Gruiten, both of Germany[73] Assignee: **Zimmer & Kellerman, Dusseldorf,**  
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4/224, 225, 233, 249, DIG. 3; 134/143, 166  
R, 170, 171; 21/78[56] **References Cited****UNITED STATES PATENTS**

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Primary Examiner—John W. Huckert

Assistant Examiner—Stuart S. Levy

Attorney, Agent, or Firm—Walter Becker

[57] **ABSTRACT**

A flushing system for sanitary flushing devices, especially for flushing and disinfecting bed pans, urine bottles and the like, with pressure flushers for cold and warm water, in which two pressure flushers for cold and warm water respectively are connected to a common flushing conduit in which a pipe interruptor and an injector nozzle are arranged, while between the overpressure side of the injector nozzle and the warm water pressure flusher there is provided a control and relief conduit with a time delaying control valve interposed therein.

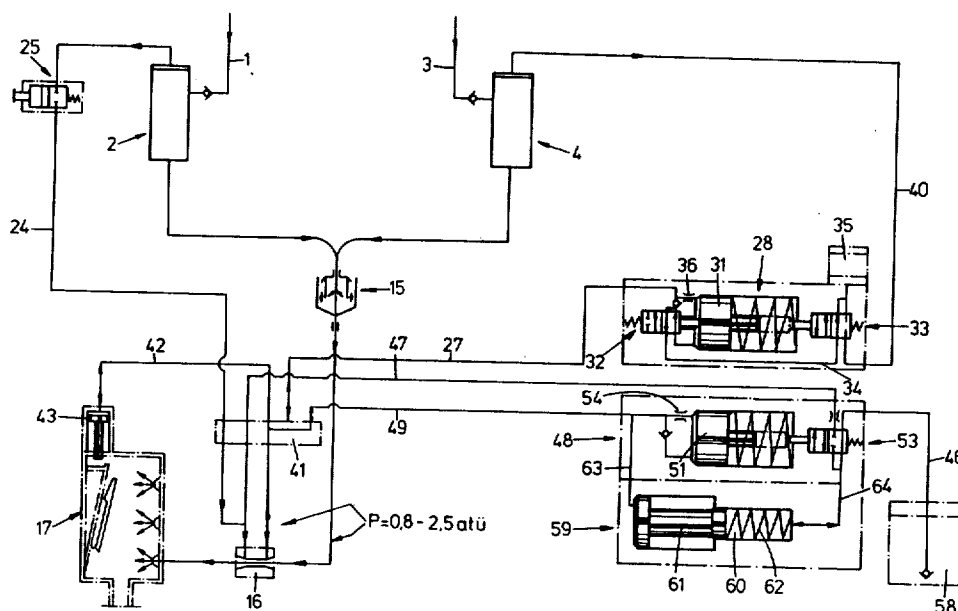
**13 Claims, 3 Drawing Figures**

Fig.1

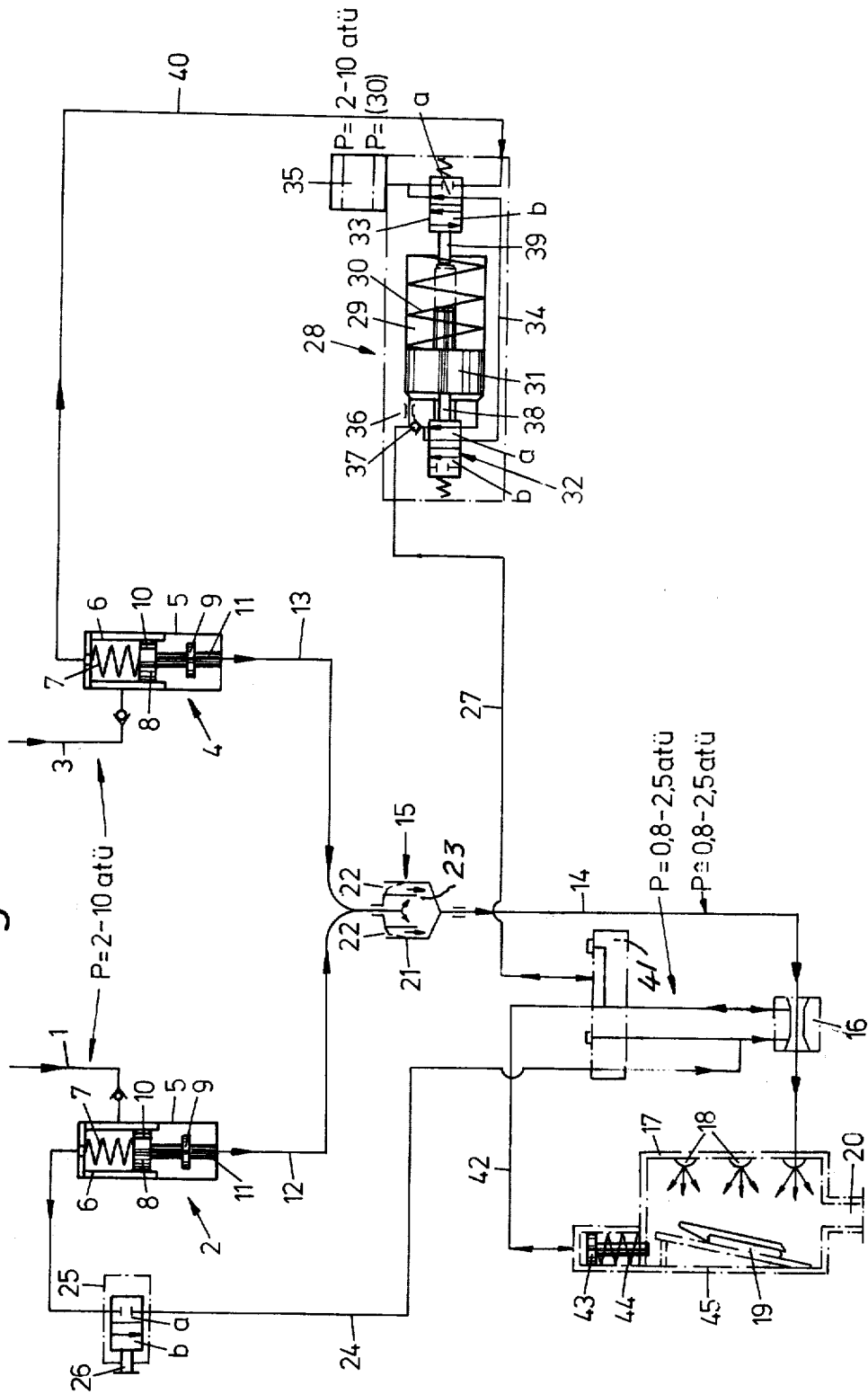


Fig. 2

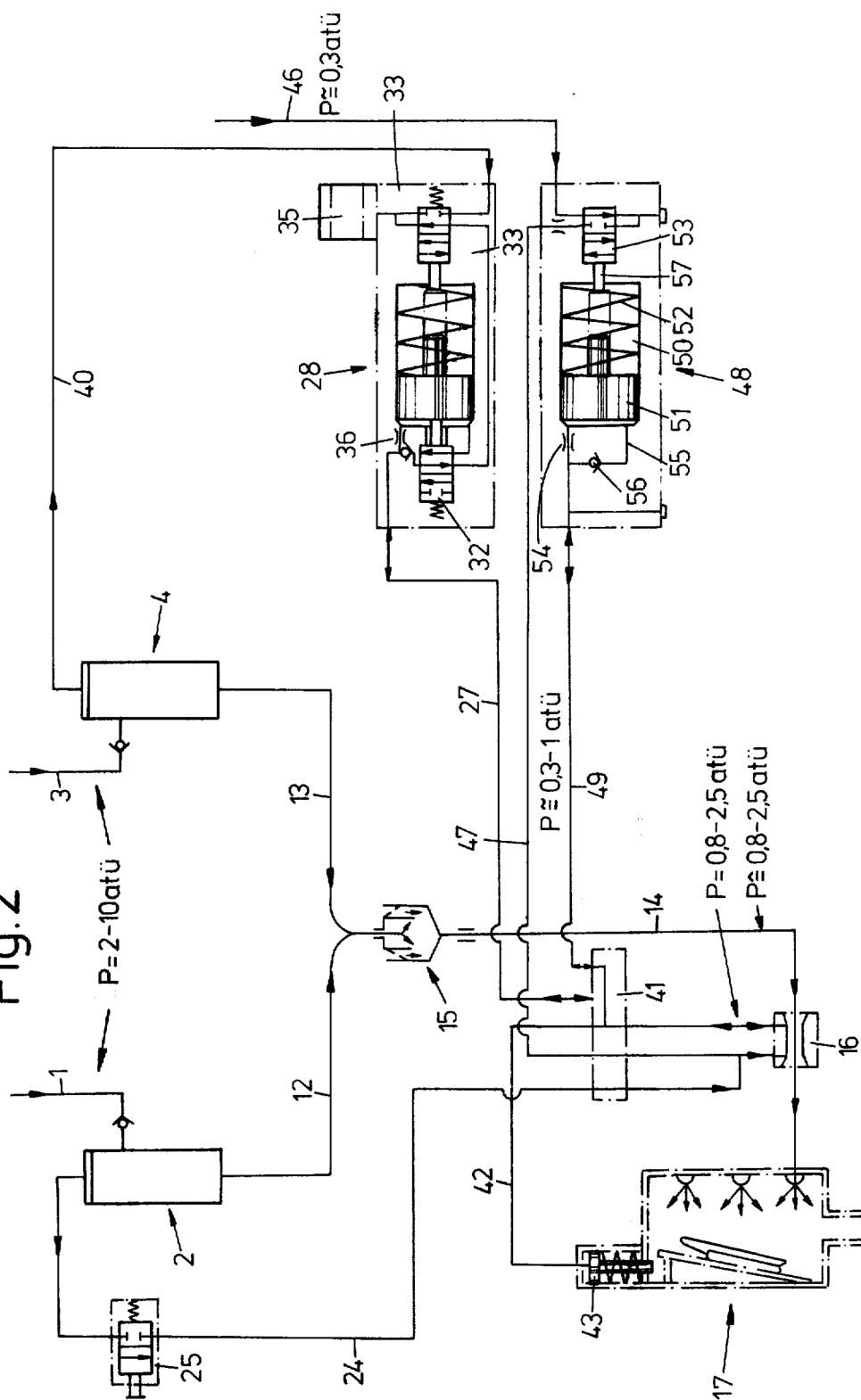
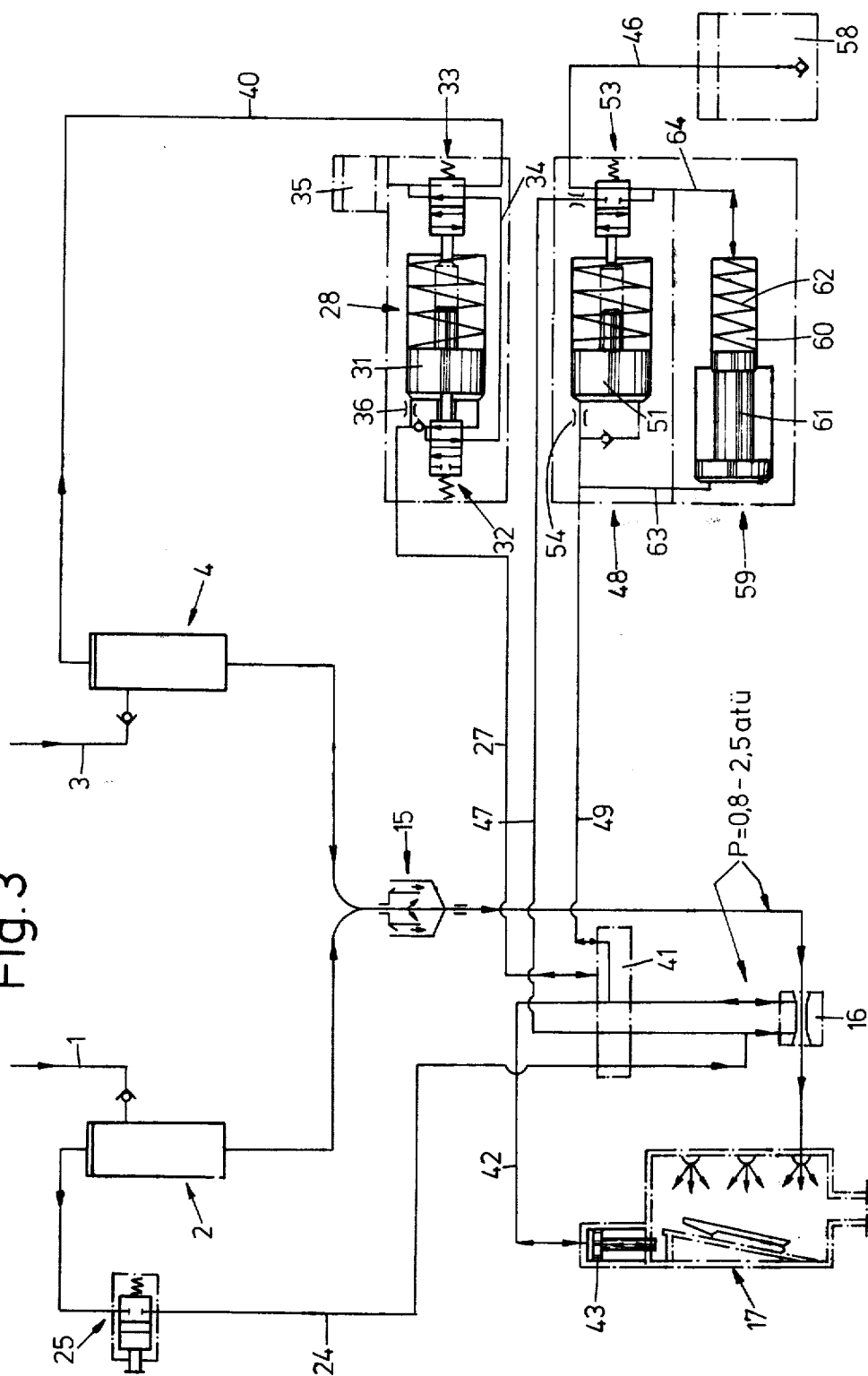


Fig.3



## FLUSHING SYSTEM FOR SANITARY FLUSHING DEVICES

The present invention relates to a flushing system for sanitary flushing devices, especially for flushing and disinfecting bed pans, urine bottles and the like with pressure flushers for cold and warm water.

The heretofore known flushing systems for sanitary flushing devices are provided with pressure flushers arranged between the pressure conduits for cold and warm water and the flushing conduits. These pressure flushers must be provided with a so-called pipe interrupter so that in case of a stoppage or clogging up, flushing water contaminated with faeces or virus cannot flow back into the pressure conduits. The pipe interrupters practically form an integral component of the heretofore known pressure flushers so that with the heretofore known flushing systems it is not possible to connect the flushing conduits for cold and warm water on the flushing side with each other because when actuating a pressure flusher, due to the clog-up at the flushing nozzles, water from the pipe interrupter would flow out at the other pressure flusher. Moreover, with the heretofore known flushing systems, the different pressure flushers for cold and warm water are manually actuated one after the other so that first only cold water will be injected and immediately thereafter or at a spaced interval thereto only warm water will be injected into the flushing device by different flushing nozzles. Such an arrangement has inherent thereto the drawback that for instance urine bottles of glass would break at a shock-like change-over from the cold water flushing to the warm water flushing. A further drawback of the heretofore known flushing systems consists in that the flushing time for cold and warm water cannot always be precisely maintained, and the warm water flushing may already be actuated before sufficient pre-flushing with cold water has been effected. This results in the drawback that the faeces which, during the pre-flushing with cold water had not been removed and when post-flushing with from warm to hot water will be burned into the bed pan, will after completion of the flushing operation have to be removed mechanically.

It is, therefore, an object of the present invention to provide a flushing system for sanitary flushing devices, which will make it possible while employing heretofore known pressure flushers, to connect the flushing conduits for cold and warm water and an injection conduit for wash-active substances and disinfectants at the flushing side so that the flushing periods for cold and warm water may overlap and thus through the same flushing nozzles in the flushing device first cold water and then mixed water and subsequently warm water, and in the end phase of the flushing operation a wash-active substance and a disinfectant may be passed through with the flushing water.

It is another object of this invention to provide a flushing system as set forth in the preceding paragraph, which will be so designed that at the start only the pressure flusher for the cold water will be actuated and subsequently the flushing action will take place automatically in conformity with a fixed time plan.

It is still another object of this invention to provide a flushing system as set forth above which will overcome the drawbacks of the heretofore known devices of the general type involved.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 diagrammatically illustrates a flushing system without admixture of a washing substance, water softener or disinfectant.

FIG. 2 diagrammatically illustrates a flushing system with the admixture of a washing substance or water softener and disinfectant from a central supply station.

FIG. 3 shows a flushing system with the admixture of a washing substance or water softener and a disinfectant from a supply tank.

Starting with a flushing system for sanitary flushing devices with pressure flushers for cold and warm water, the flushing system according to the present invention is characterized in that the two pressure flushers for cold and warm water are connected to a common flushing conduit in which a pipe interrupter and an injector nozzle are arranged, and is furthermore characterized in that between the high pressure side of the injector nozzle and the warm water pressure flusher there is provided a control and relief conduit with a time delaying control valve interposed therein.

According to a practical embodiment of the present invention, the time delaying control valve may be formed by a displaceable valve spool or control piston adapted to be displaced against a pressure spring, a preceding and subsequently arranged two-way spindle valve, a by-pass conduit interconnecting said valve, an air reservoir and an inlet throttle or choke determining the time delay. Furthermore, it has proven advantageous to arrange a check valve between the control conduit and the preceding two-way spindle valve, said check valve being arranged in the by-pass conduit for the air reservoir. The check valve is intended at the end of the throttle flushing operation to permit a fast escape of the water accumulated in the control valve and the air reservoir. The control piston is moved only when in the air reservoir a pressure has built up which corresponds to the resistance of the pressure spring preloading the control piston. The pre-filling of the air reservoir has the advantage that further control valves will be unnecessary. The relief conduit of the warm water-pressure flusher is connected through the by-pass conduit to the control conduit at a certain time delay only after the cold water-pressure flusher has been turned on so that the warm water-pressure flusher will be placed into action at approximately the same time delay. In this way, the pressure flushers can be so controlled that the flushing periods for cold and warm water will overlap each other and thereby flushing water will at a mixing temperature be pressed into the nozzles of the flushing devices. In order to make sure that with a possible backup in the flushing conduit no flushing water contaminated by faeces or virus will flow back into the pressure conduits for cold and warm water, the pipe interrupter known per se is in conformity with the invention interposed in the common flushing conduit for cold and warm water. The two pressure flushers for cold and warm water themselves do not have a pipe interrupter.

According to a further development of the invention, for purposes of admixing wash-active substances and disinfectants from a supply line fed from a central station, there is provided between the under-pressure side of the injector nozzle and the supply line a time delay-

ing admixture valve with a two-way valve and an injection conduit leading to the under-pressure side injector nozzle. The admixture valve expediently has a displaceable valve spool or control piston displaceable against the thrust of a pressure spring, and furthermore has an inlet throttle determining the time delay, as well as a by-pass line with a check valve, said by-pass line being provided between the control conduit and the control piston. The time delay between the movement of the control piston in the admixture valve and the actuation of the cold water-pressure flusher and the control pulse emanating therefrom in the control conduit is so set that the admixture of the wash-active substance and of the disinfectant is effected only during the last few seconds of the running period of the warm water-pressure flusher.

In order to make sure that the withdrawal of the wash-active substances and of the disinfectant may be effected also from a pressureless storage tank, the admixture valve has in conformity with the invention associated therewith a pump which is arranged in parallel with regard to said admixture valve. According to a preferred embodiment of the invention, this pump has a differential piston which is displaceable against a pressure spring and the low pressure side of which is adapted to be connected with the control conduit which is connectable to the over-pressure side of the injector nozzle, whereas the high pressure side of said differential piston is connectable through the two-way spindle valve of the admixture valve to the supply tank and to the injection conduit. In this way, the wash-active substance and the disinfectant controlled by the admixture valve is at the end of the flushing program injected into the injection conduit, and after completion of the flushing program, a new wash-active substance and disinfectant is by the differential piston of the pump drawn in from the supply tank. In order to make sure that the wash-active substance will not be able during the injection stroke of the pump to flow back into the supply tank, a check valve is provided at the end of the supply conduit.

According to a further development of the invention, the cold water-pressure flusher may likewise be independent of a manual actuation. To this end, a turning-on valve precedes the cold water-pressure flusher. More specifically, between the cold water-pressure flusher and the under-pressure side of the injector nozzle, there is provided a relief conduit in which the two-way turning-on valve may be arranged.

The flushing system according to the present invention may also be used to bring about an automatic locking or blocking of the flushing device during the period during which the flushing cycle is in operation. To this end, the flushing device has a displaceable blocking piston which is movable against the thrust of a pressure spring and which through a pressure conduit communicates with the overpressure side of the injector nozzle. As soon as the flushing cycle starts, in this way the door of the flushing device is automatically locked and is unlocked only after completion of the flushing cycle.

Referring now to the drawings in detail, cold water with a pressure of from 2 to 10 atmospheres above atmospheric pressure is conveyed by a pressure conduit 1 to a pressure flusher 2 whereas warm water at a pressure of from 2 to 10 atmospheres above atmospheric pressure is conveyed by a pressure conduit 3 to a pressure flusher 4. The two pressure flushers 2, 4 are as far

as their structure is concerned known in principle and comprise a housing 5, a piston 8 displaceable in a cylinder 6 against a pressure spring 7, and a valve cover 9 at the lower end of the piston 8. In the piston 8 there is provided a compensating passage 10 with narrow cross section. The function of the two pressure flushers 2, 4 is extremely simple. As soon as the cylinder 6 is relieved, cold or warm water can flow. The piston 8 will then be lifted from below and will against the thrust of spring 7 be moved into the cylinder 6; at the same time, the valve cover 9 opens an outlet pipe 11 at the lower end of the piston 8. As soon as the relief of cylinder 6 has been interrupted, the pressure spring 7 again moves the piston 8 downwardly. The speed and thereby the time delay at which the piston 8 is by pressure spring 7 moved downwardly is determined by the cross section of the compensating passage 10. During the downward movement of the piston 8, an under-pressure builds up in the cylinder 6 which under-pressure is compensated for by incoming water. Only when the valve cover 9 again rests on the outlet pipe 11, the through flow of the cold and warm water is again interrupted. In the illustrated embodiments, the cross sections of the compensating passages 10 are so designed that each pressure flusher 2, 4 will after release have a running period of approximately 10 seconds.

From the two pressure flushers 2, 4, the cold or warm water flows through flushing conduits 12, 13 into a common flushing conduit 14 which through a pipe interrupter 15 and an injector nozzle 16 leads to a flushing device with three flushing nozzles 18 for a bed pan 19. The flushing water contaminated by faeces flows out of the flushing device 17 through an outlet pipe 20.

The pipe interrupter 15 which is built into the common flushing conduit 14 has the purpose during a backup caused for instance by clogging of the outlet pipe 20, to prevent the flushing water contaminated with faeces from flowing back into the two pressure flushers 2, 4 and thereby into the pressure conduits 1, 3. The function of the pipe interrupter 15 is extremely simple. In a housing 21 the cover of which is provided with slots 22 there is arranged an elastic sleeve 23 of synthetic material or rubber which during the inflow of cold or warm water functionally moves in front of the slots 22. However, as soon as a backup forms, the sleeve 23 again contracts and thus frees the slots 22 so that backup and possibly contaminated flushing water can escape.

From the lower pressure side of the injector nozzle 16 a relief conduit 24 in which a two-way turning-on valve 25 is arranged leads to the cylinder 6 of the cold water-pressure flusher 2. As soon as a key 26 is depressed and thereby the two-way turning-off valve 25 is moved from the illustrated interrupted position *a* to the open position *b*, the cold water which is under the conduit pressure of from 2 to 10 atmospheres above atmospheric pressure, can, from the cylinder 6 of the pressure flusher 2, flow through the relief conduit 24 into the injector nozzle 16 and thereby also through the flushing nozzles 18 into the flushing device 17. Thereupon, for approximately a period of 10 seconds, cold water flows through the pressure flusher 2, the flushing conduits 12 and 14, and the injector 16 to the flushing nozzles 18.

During the running period of the cold water-pressure flusher 2, a control valve 28 for the warm water-pressure flusher 4 is actuated by means of a control

conduit 27 which originates in the overpressure side of the injection nozzle 16. The control valve 28 has the function of a time delaying relay and comprises a cylinder 29 with a control piston 31 which is displaceable against a pressure spring 30, a preceding two-way spindle valve 32, a subsequent two-way spindle valve 33, a by-pass conduit 34 interconnecting said two valves, an air reservoir 35, and an inlet throttle 36 determining the time delay.

The control valve 28 operates in the following manner:

As soon as the cold water-pressure flusher 2 has been actuated, water at the normal flushing pressure flows from the overpressure side of the injector nozzle 16 through the control conduit 27, the inlet throttle 36, the cylinder 29 past the piston 31 through the two-way spindle valve 32 occupying the illustrated position *a*, the by-pass conduit 34 and the two-way spindle valve 33 occupying the illustrated position *a* into the air reservoir 35. In order to make sure that the water which flows through the control conduit 27 will not by-pass the inlet throttle 36 and flow into the by-pass conduit 34, the two-way spindle valve 32 is preceded by a check valve 37. The control piston 31 will initially not move but only when a pressure equalization with regard to the pressure spring 30 acting upon the control piston 31 has occurred in the air reservoir 35. From this point on, the control piston 31 is displaced in the direction toward the two-way spindle valve 33. As soon as the control piston 31 is lifted off from a spindle 38 of the two-way spindle valve 32, the spindle valve 32 jumps into the position *b* so that the throughflow into the by-pass line 34 is blocked. With the illustrated embodiment, the control piston 31 will after approximately a running period of 7 seconds of the cold water-pressure flusher 2 engage a spindle 39 of the two-way spindle valve 33. As a result thereof, the two-way spindle valve 33 jumps from the illustrated position *a* into the position *b* so that warm water standing at the normal pressure of from 2-10 atmospheres above atmospheric pressure can through a relief conduit 40 of the warm water-pressure flusher 4 connected to the warm water-pressure flusher 4 pass into the air reservoir 35. At this instant, warm water from the pressure conduit 3 can through the warm water pressure flusher 4, flushing conduit 13 and 14, injection nozzle 16 and flushing nozzles 18, flow into the flushing device 17. The two-way spindle valve 33 will keep the relief conduit 40 in open condition. From the cylinder 6 of the pressure flusher 4 and the compensating passage 10 water will flow out until in the reservoir 35 a pressure equalization with the feeding pressure of the pressure conduit 3 has taken place. Since with this pressure equalization no relief water can any longer escape from the pressure flusher 4, the latter starts its closing operation as has been described with the cold water-pressure flusher 2. The control valve 28 will undergo no change until the pressure flusher closes. Only after the pressure flusher 4 has closed, the flushing conduit 14 and the injector nozzle 16 and thereby the cylinder 29 in the control valve 28 become pressureless. Under the effect of the pressure spring 30, the control piston 31 is lifted off from the spindle 39. The two-way spindle valve 33 then shifts over to the position *a*. The relief conduit 40 of the pressure flusher 4 is now blocked or shut off with regard to the two-way spindle valve 33. At the same time the passage from the air reservoir 35 to the by-pass

conduit 34 and thereby to the two-way spindle valve 32 is opened which latter occupies its position *b*.

The control piston 31 from now on quickly moves in the direction toward the two-way spindle valve 32 while the water in the cylinder 29 will be able to flow into the outflow pipe 20 through the two-way spindle valve 32 which is in the position *b*, the check valve 37 with large cross section, the control conduit 27, the injector nozzle 16 and the flush nozzles 18. During the further course of the cycle, the control piston 32 again shifts the two-way spindle valve 32 to its position *a* so that the water which, in the air container 35, is still under air pressure can through the spindle valve 32 and the check valve 37 flow off into the flushing device 17. The control valve 28 will then again be in its starting position.

The running periods of the two pressure flushers 2, 4 for cold and warm water respectively overlap each other for approximately 3 seconds so that during this period, flushing water will at a mixing temperature be injected through the flushing nozzles 18 into the flushing device 17. When the cold water-pressure flusher 2 has been turned off, the warm water-pressure flusher 4 will still continue running for approximately 7 seconds. Due to the shift-over from the cold water flushing to warm water flushing with a gradual increase in temperature, the sanitary devices are considerably better flushed than has been possible with heretofore known flushing systems. Moreover, the sanitary devices as far as they are made of glass are saved and can no longer break in view of a sudden temperature change.

A distributor 41 is interposed in the relief conduit 24 of the cold water-pressure flusher 2 which leads from the under-pressure side of the injector nozzle 16 to the two-way turning-on valve 25 and into control conduit 27 which leads from the under-pressure side of the injector nozzle 16 to the control valve 28. In this distributor 41, there is branched off from the control conduit 27 a pressure conduit 42 which leads to a blocking piston 43 in the flushing device 17. By means of the blocking piston 43 which is displaceable against the thrust of a pressure spring 44, a door 45 of the flushing device 17 is blocked from the start of the flushing cycle to the completion thereof.

FIG. 2 shows an embodiment of a flushing system according to the invention in which at the end of the running period of the warm water-pressure flusher 4, a washing-active substance and/or a disinfectant is, from a supply conduit 46, injected into the flushing conduit 14. To this end, an admixing valve 48 is inserted or interposed in the supply conduit 46 and a washing-active substance conduit 47 leading to the under-pressure side of the injector nozzle 16. This admixing valve 48 is actuated through a control conduit 49 communicating with the over-pressure side of the injector nozzle 16. The admixing valve 48 comprises a control piston 51 which is arranged in a cylinder 50 and which is adapted to be displaced against the thrust of a pressure spring 52. The admixing valve 48 furthermore comprises a two-way spindle valve 53, an inlet throttle 54, and an outlet conduit 55 with interposed check valve 56.

The inlet throttle 54 of the admixing valve 48 is so dimensioned that the running period of the control piston 51 after the cold water-pressure flusher 2 has been turned on amounts to approximately 50 seconds. Subsequently, the control piston 51 hits a spindle 57 of the two-way spindle valve 53 and shifts the latter from its

illustrated uninterrupted position *a* into the through-flow position *b* for the washing-active substance (WAS). At this instant, the WAS substance can, from the supply conduit 46 through the two-way spindle valve 53 and the WAS conduit 47 at the underpressure side of the injector nozzle 16, be injected into the flushing conduit 14 while the quantity can be controlled by means of an injection throttle in the admixture valve 48. As soon as the control pressure in the control conduit 49 decreases after the warm water-pressure flusher 4 has been turned off, the pressure spring 52 moves the control piston 51 back to its starting position. The two-way control valve 53 jumps back onto its uninterrupted position *a*, and the water which has entered the cylinder 50 will, through the outlet conduit 55 and the check valve 56, be pushed back into the control conduit 49. Thereupon, the admixture valve 48 has regained its starting position.

Inasmuch as the connection between the supply conduit 46 and the WAS conduit 47 is established only toward the end of the running period of the warm water-pressure flusher 4, approximately 2 seconds before the warm water-pressure flusher is turned off, the injection of the washing-active substance and/or of the disinfectant is effected also only during these last 2 seconds of the entire flushing cycle.

FIG. 3 illustrates a further modification of the flushing system according to the invention, according to which the washing-active substance and/or the disinfectant is not added from a central supply station into the supply conduit 46 under pressure but is pumped off from a supply tank 58. To this end, a pump 59 is shifted into communication with the admixing valve 48. The pump 59 comprises a differential piston 61 which is arranged in a step-shaped cylinder 60 and which is adapted to be displaced against the thrust of a pressure spring 62. In this starting position, the differential piston 61 has drawn wash-active substance from the supply tank 58 through the supply conduit 46 and the two-way spindle valve 53 in the admixing valve 48. As soon as the control piston 51 in the admixing valve 48 has shifted the two-way spindle valve 53 from the illustrated intake position *a* to the injection position *b*, pressure water can from the control conduit 49 flow through a pump conduit 63 into the cylinder 60 and can displace the differential piston 61. The drawn-in wash-active substance and/or the disinfectant is through an injection conduit and the two-way spindle valve 53 injected into the WAS conduit 47. At the end of the supply conduit 46, a check valve is arranged in order that the washing-active substance during the injection stroke of the pump 59 cannot flow back into the supply tank 58. The function of the admixing valve 48 will substantially remain unchanged.

As will be evident from the above, the flushing system according to the present invention has the outstanding advantage that by means of one and the same flushing nozzles in the flushing device, dependent on the water pressure, in conformity with a fixed determinable time program, first cold water and then mixing water with increasing temperature and subsequently only warm water is injected. A further advantage of the invention consists in that the actuation of the warm water-pressure flusher is no longer effected manually at any at random time interval after the cold water pressure flusher has been turned off, but instead is effected automatically in conformity with the running period of

the cold water-pressure flushing in conformity with the fixed definite time program. From this fact, there result the further advantages of a better cleaning of the sanitary devices and the avoidance of breakage as far as the devices consist of glass. Still another important advantage of the invention consists in the reduction of the elements to be used because according to the invention only one set of flushing nozzles is required in the flushing device.

It is, of course, to be understood that the present invention is, by no means, limited to the particular arrangement shown in the drawings but also comprises any modifications within the scope of the appended claims.

What we claim is:

1. A flushing system for sanitary flushing devices, especially for flushing and disinfecting bed pans and urine bottles, which includes in combination: a cold water pressure flusher having an inlet and an outlet for respectively receiving and discharging cold water, a warm water pressure flusher having an inlet and an outlet for respectively receiving and discharging warm water, flushing conduit means common to said cold water pressure flusher and said warm water pressure flusher and connected to the respective outlets thereof, pipe interrupter means and injector nozzle means interposed in said conduit means, said injector nozzle means having an overpressure side and a low pressure side and being located behind said interrupter means when looking in the direction of flow of the water from said pressure flushers through said common conduit means, flushing nozzle means connected to said injector nozzle means for receiving flushing fluid therefrom and dispensing same, cold water relief conduit means interposed between the cold water pressure flusher and the low pressure side of the injector nozzle, time delaying control valve means, warm water relief conduit means interposed between the warm water pressure flusher and the time delaying control valve means, and control conduit means interposed between the time delaying control valve means, and control conduit means interposed between the time delaying control valve and the over pressure side of the injector nozzle.

2. A flushing system in combination according to claim 1, in which said time delaying control valve means includes: a spring loaded reciprocable control piston, two two-way spindle valves respectively preceding and following said control piston, by-pass conduit means adapted to interconnect said spindle valves, an air reservoir connectable to said by-pass conduit means, and inlet throttle means associated with said time delaying control valve means for determining the time delay of the latter.

3. A flushing system in combination according to claim 2, in which includes a check valve means interposed between said control conduit means on one hand and that two-way spindle valve which precedes said control piston.

4. A flushing system in combination according to claim 2, in which that two-way spindle valve which follows said control piston is operable selectively to effect communication between said air reservoir and said by-pass conduit means and is also operable to effect communication between said air reservoir and said warm water relief conduit means.

5. A flushing system in combination according to claim 1, which includes supply conduit means for sup-

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plying an additive to the flushing fluid, a time delaying admixing valve arranged between the overpressure side of the injector nozzle means and said supply conduit means, a two-way spindle valve associated with said admixing valve and additive-conveying conduit means communicating with said admixing valve and with the under-pressure side of said injector nozzle means.

6. A flushing system in combination according to claim 5, in which said admixing valve includes a control piston and time delaying inlet throttle means, pressure spring means associated with said control piston, said control piston being displaceable against the thrust of said pressure spring means.

7. A flushing system in combination according to claim 6, which includes by-pass conduit means connected to the overpressure side of said injector nozzle means and said control piston of said admixing valve, and check valve means associated with said last mentioned by-pass conduit means.

8. A flushing system in combination according to claim 5, which includes a storage tank associated with said supply conduit means and also includes pump means arranged in parallel to said admixing valve.

9. A flushing system in combination according to claim 8, in which said pump means includes a differential piston having a low pressure side as well as a high pressure side and also includes pressure spring means, said differential piston being displaceable against the thrust of said pressure spring means, the low pressure side of said differential piston being connected to the overpressure side of said injector nozzle means and the

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high pressure side of said differential piston being connected to the two-way spindle valve associated with said admixing valve to said storage tank.

10. A flushing system in combination according to claim 5, in which said time delaying control valve means includes means for effecting a time delay between the actuation of said cold water pressure flusher and the actuation of said admixing valve, to such an extent that the injection of the additive by said admixing valve amounts to approximately seven-eighths of the total running period of the two pressure flushers.

11. A flushing system in combination according to claim 1, in which said cold water relief conduit means includes a two-way turn-on valve.

12. A flushing system in combination according to claim 1, which includes housing means for housing said flushing nozzle means, a blocking piston associated with said housing means, pressure spring means associated with said blocking piston, said blocking piston being displaceable against the thrust of said pressure spring means, and pressure conduit means adapted to establish communication between said blocking piston and the overpressure side of said injector nozzle means.

13. A flushing system in combination to claim 1, includes means for establishing a time delay between the actuation of said cold water flusher and said warm water flusher to such an extent that said time delay amounts to approximately two-thirds of the running period of said cold water pressure flusher.

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