

April 28, 1959

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2,884,197

THERMOSTATIC FLOW GOVERNOR

Filed Oct. 22, 1956

2 Sheets-Sheet 1

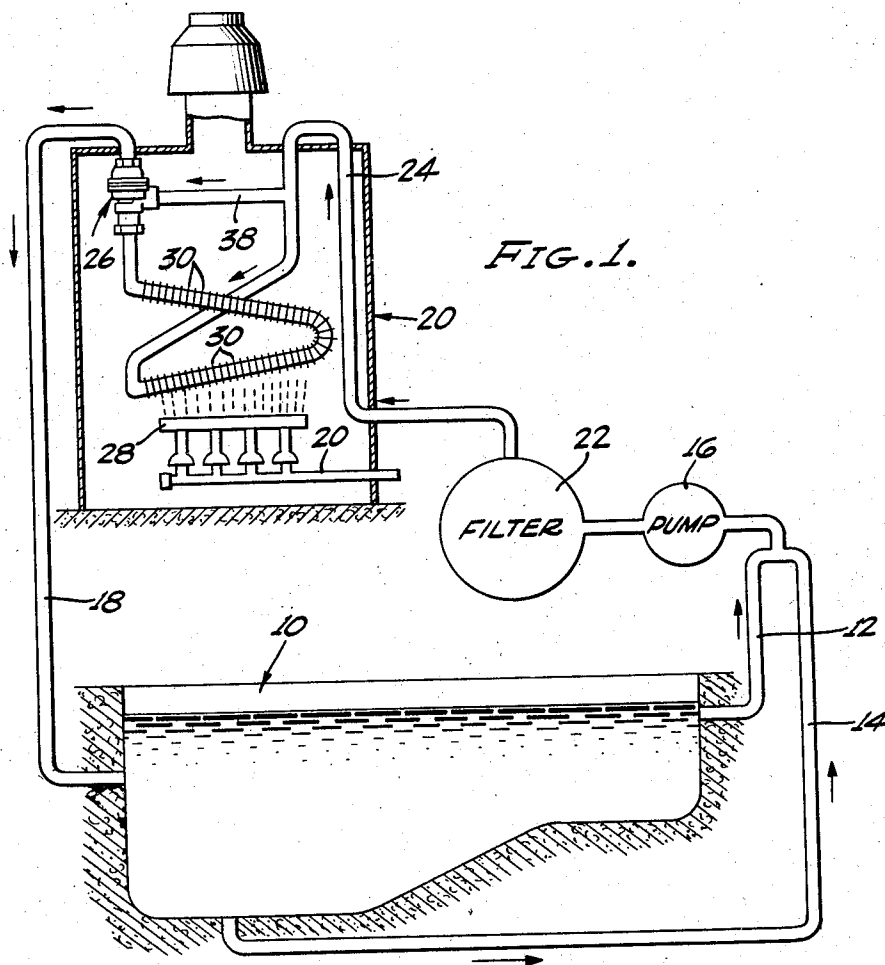


FIG. 1.

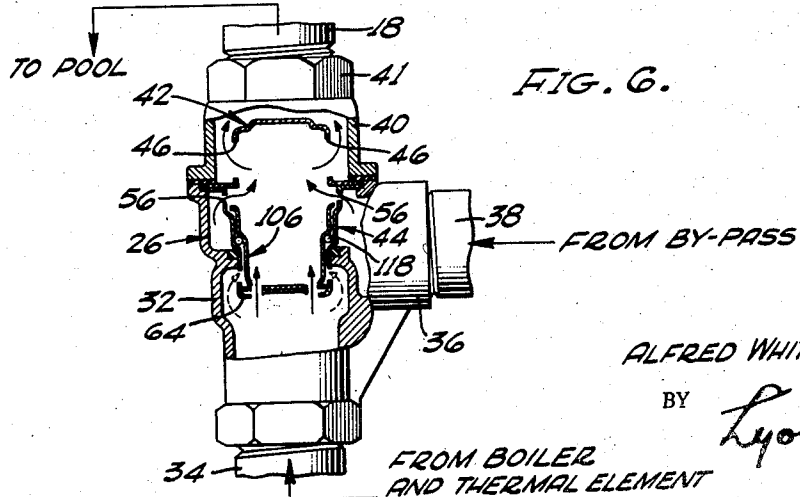


FIG. 6.

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FIG. 2.

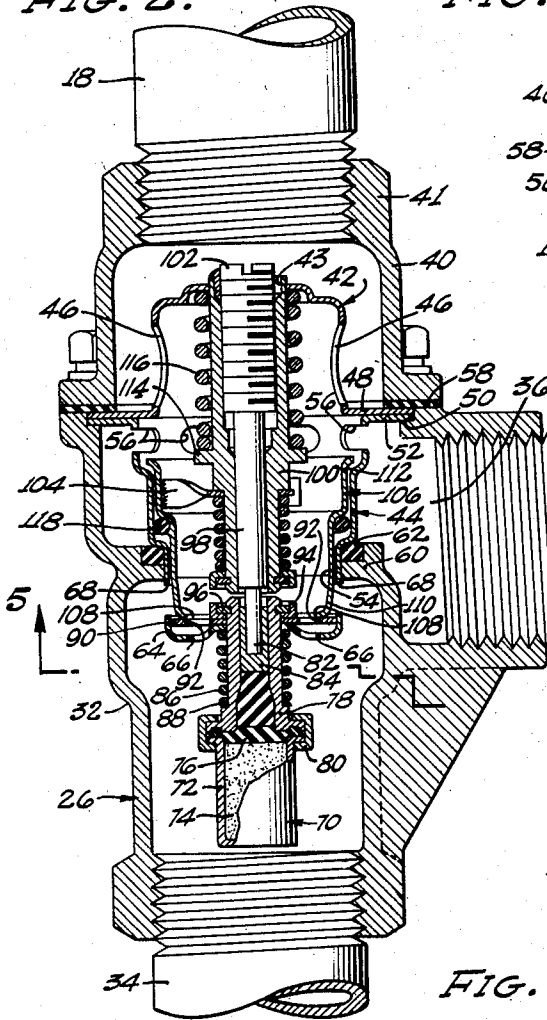


FIG. 4.

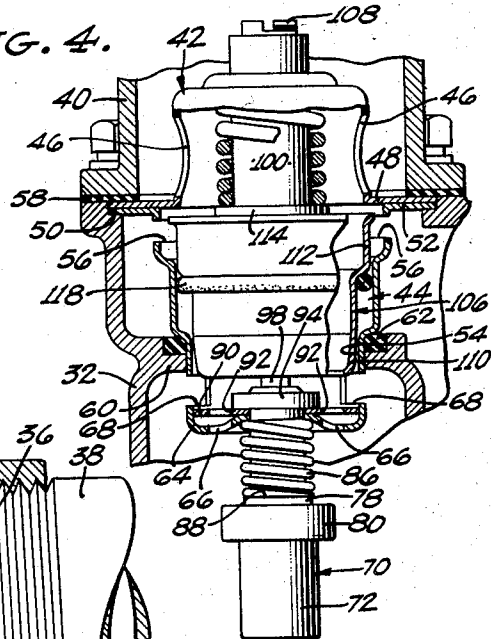


FIG. 3.

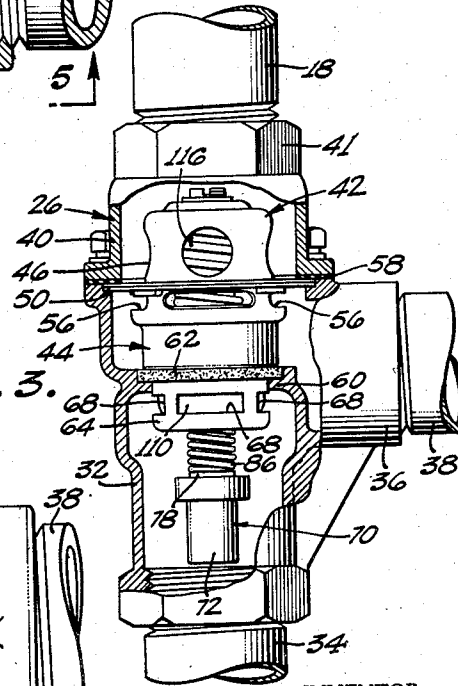
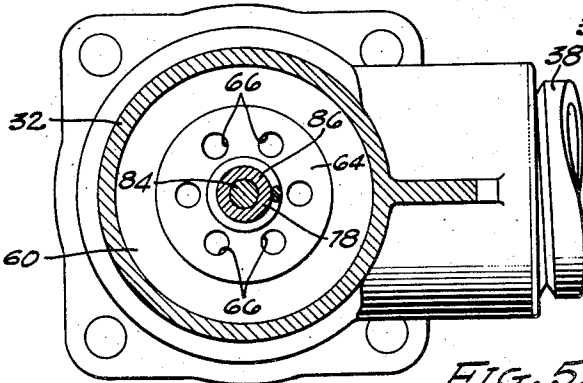


FIG. 5.

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THERMOSTATIC FLOW GOVERNOR

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Application October 22, 1956, Serial No. 617,508

15 Claims. (Cl. 236—12)

This invention relates to an improved flow governor.

In a system for heating a body of water for example a swimming pool, a pump moves the water through a filter then through a boiler where the water is heated and hence back to the pool. As the filter gets dirty the pressure drop thereacross increases, decreasing the flow rate through the boiler, resulting in an increase in the temperature of the boiler discharge.

It is an object of this invention to provide a device which will control the flow of water through the boiler so that the boiler temperature remains constant even though the pool water temperature is rising and the filter pressure changes.

It is a further object of this invention to provide such a device to control the boiler discharge temperature to reduce formation of scale in the boiler which increases at excess temperature and also eliminate formation of condensate in the boiler which occurs at too low a temperature.

It is still a further object of this invention to provide a control for the boiler discharge temperature which is automatic in its responses and eliminates the necessity for manual controlling of either the fuel or water input to the boiler.

It is still a further object of this invention to provide a silent and highly efficient device for controlling the boiler discharge temperature.

Other objects and advantages will be readily apparent from the following description:

In the drawings:

Figure 1 is a diagrammatic view of a swimming pool heating system.

Figure 2 is a side elevation in section of the governor.

Figure 3 is a side elevation of the governor with portions of the casing broken away.

Figure 4 is a view similar to Figure 3 with the boiler discharge inlet valve opened.

Figure 5 is a section taken along line 5—5 of Figure 2.

Figure 6 is a diagrammatic view of the governor.

Referring first to Figure 1, the pool 10 has a pair of effluent lines 12 and 14 leading to a pump 16 and an influent line 18 from the heat exchanger or boiler 20. Water is circulated by pump 16 through a filter 22 through line 24, which is the boiler inlet, through the boiler, through the governor 26 to line 18 and hence back to the pool.

The boiler is shown diagrammatically having fuel burners 28 and a section of line 24 positioned thereover through which water flows while being heated. The portion of line 24 exposed to the heat of the fuel burners has a plurality of fins 30 thereon to facilitate heat exchange.

The governor 26 is formed of a two-piece casing. The lower section 32 has an inlet 34 from the boiler and line 24 and a second inlet 36 from by-pass line 38. The by-pass line is a connection between boiler inlet line 24 and the governor which by-passes the heater 20 whereby water from the pool is passed directly to the governor. The second section 40 of the casing is bolted to the lower sec-

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tion 32 and contains the outlet 41 into which the line 18 is threaded.

Clamped between the upper 40 and lower 32 sections of the casing are the peripheries of cages 42 and 44. The cage 42 is cup-shaped having a central aperture 43 and four ports 46 in the side walls thereof which communicate the outlet 41 with the interior of cage 42, and a peripheral flange 48 which fits into a notch 50 formed in casing section 32. The other cage 44 likewise has a peripheral flange 52 which fits in notch 50 and a central bore 54 which is aligned with aperture 43 of cage 42, the cages being inverted with respect to one another. Cage 44 has four elongated slots 56 therein communicating the interior of the cage with by-pass inlet 36. A washer 58 of a suitable resilient material is positioned between the upper and lower sections of the casing providing a water-tight seal when the cages are clamped into position.

The lower extremity of cage 44 projects through a suitably formed aperture in web 60 formed in the lower section 32 of the casing and a washer 62 forms a water-tight seal isolating the boiler inlet 34 from the by-pass inlet 36 except through the interior of cage 44.

The lower extremity of stationary cage 44 projects beneath the web 60 and the lower extremity 64 is provided with a plurality, in this instance six, of holes 66 with four slots 68 provided in the side walls of the cage between holes 66 and web 60.

Suspended from the lower extremity 64 of cage 44 is a thermostatic power element 70 which is known commercially as a "Vernatherm" or "Vernet" type power element. The element comprises a housing 72 enclosing a suitable thermostatic material 74 which is expansible upon a change of temperature. The material 74 operates against a diaphragm 76 which is retained in contact with the material by the lower extremity of sleeve 78 which in turn is clamped to the housing 72 by ring 80. The sleeve has a central bore housing the upper extremity of diaphragm 76 and an operating rod 82 which fits at its lower extremity into a bore formed in cap 84 which in turn is free to reciprocate in sleeve 78 under the direction of diaphragm 76.

Fitted upon the outer periphery of sleeve 78 is a spring 86 which at one extremity bears against shoulder 88 on the sleeve and at the other extremity against the lower end 64 of cage 44, urging the thermostatic power element 70 downwardly in Figure 2. To hold the element 70 in place a valve seat 90 is provided having holes 92 corresponding to the holes 66 which fit onto the upper extremity of sleeve 78 and is held in place by cap 94, which in turn is secured by lock ring 96. Thus the element 70 is stationary while rod 82 is moved upwardly upon expansion of material 74.

At its upper extremity rod 82 abuts a second rod 98 which fits within a bore formed in post 100 and is positioned therein by screw 102 which threads into the upper end of the bore in post 100. The post 100 has supported thereon by means of a spider 104 a valve element 106 which at its lower extremity has holes 108 corresponding to holes 92 and 66 and which valve element moves with post 100. The lower portion 110 of the valve element 106 blocks off slots 68 when in the fully lowered position and likewise the upper extremity 112 of the valve element blocks slots 56 when in the fully raised position.

The post 100 has a shoulder 114 thereon forming a seat for spring 116 which is coiled around post 100 and bears against the stationary cage 42, thereby urging post 100 downwardly against the upward urging of the operating rod 82 upon expansion of the material 74.

A suitable O ring 118 is positioned between movable valve element 106 and stationary cage 44 to prevent leakage therebetween.

In operation, as water flows from the heat exchanger or boiler 20 it flows past the power element 70 through

holes 66, 92 and 108 upwardly through cages 44 and 42, through ports 46 and through the outlet into the pool. This flow is joined by flow from the by-pass line 38 through slots 56. When the discharge from the boiler into the governor exceeds a predetermined temperature the expansion of material 74 resulting therefrom pushes upwardly on rod 82 and hence rod 98 and against the downward urging of spring 116. By proper sizing of the spring and by adjustment of screw 102 the temperature of the boiler discharge at which point the spring becomes overpowered may be established. As the rod 82 rises the valve element 106 is raised unblocking slots 68 and thereby increasing the size of the boiler discharge inlet to permit faster flow through the boiler. At the same time the upper end 112 of the valve element closes off slots 56 decreasing the by-pass inlet and thereby diverting a greater flow through the boiler or heat exchanger resulting in a decreased discharge temperature. As the boiler discharge temperature is reduced the material 74 contracts and spring 116 urges the valve element to the position wherein the by-pass inlet is fully opened and the boiler inlet is at a minimum.

In this manner the range of temperature within which the boiler or heat exchanger 20 will discharge is automatically controlled.

While what hereinbefore has been described is the preferred embodiment of this invention, it is readily apparent that alterations and modifications may be resorted to without departing from the scope of this invention and such alterations and modifications are intended to be included within the scope of the appended claims.

I claim:

1. A flow governor system, comprising: a governor including a casing provided with two inlets and an outlet; means communicating with one of said inlets for delivering liquid to said one inlet and for heating said liquid during the course of its flow to said one inlet; means communicating with the other of said inlets in by-passing relation with said heating means for delivering liquid to said other inlet without exposing it to said heating means; valve means in said casing controlling flow through each of said inlets, said valve means permitting at least a restricted flow through said one inlet at all times and being normally partially open to permit flow through said other inlet; and a thermostatic drive element in said one inlet to further open said valve means with respect to said one inlet in response to an increased temperature of liquid delivered to said one inlet.

2. A flow governor system, comprising: a governor including a casing provided with two inlets and an outlet; means communicating with one of said inlets for delivering liquid to said one inlet and for heating said liquid during the course of its flow to said one inlet; means communicating with the other of said inlets in by-passing relation with said heating means for delivering liquid to said other inlet without exposing it to said heating means; valve means in said casing controlling flow through each of said inlets, said valve means permitting at least a restricted flow through said one inlet at all times and being normally partially open to permit flow through said other inlet; and a thermostatic drive element in said one inlet to further open said valve means with respect to said one inlet in response to an increased temperature of liquid delivered to said one inlet, said drive member simultaneously moving said valve means toward closed position with respect to said other inlet.

3. The device of claim 2 wherein spring means are provided to urge said valve means in the opposite direction from that of the force of said drive element.

4. A flow governor system, comprising: a governor including a casing provided with two inlets and an outlet; means communicating with one of said inlets for delivering liquid to said one inlet and for heating said liquid during the course of its flow to said one inlet; means communicating with the other of said inlets in by-passing

relation with said heating means for delivering liquid to said inlet without exposing it to said heating means; valve seats positioned in said casing to control flow through the respective inlets; a valve element positioned in said casing to cooperate with one valve seat to partially close off flow through said one inlet when said valve element is in closed position with respect to said one valve seat without restricting flow through said other inlet; and a thermostatic drive element connected with said valve element and moving the same off of said one valve seat in response to an increased temperature of liquid delivered to said one inlet to permit increased flow through said one inlet, said valve element being thereby moved toward the other of said valve seats to obstruct flow from said other inlet.

5. The device of claim 4 wherein means are provided to urge said valve element toward said one valve seat.

6. The device of claim 5 wherein said last-mentioned means comprises a spring.

7. A flow governor system, comprising: a governor including a casing provided with two inlets and an outlet; means communicating with one of said inlets for delivering liquid to said one inlet and for heating said liquid during the course of its flow to said one inlet; means communicating with the other of said inlets in bypassing relation with said heating means for delivering liquid to said other inlet without exposing it to said heating means; a valve seat positioned in a restriction in said casing and disposed across the path of flow through said one inlet; a second valve seat disposed across the path of flow through said other inlet; a valve element mounted in said casing and movable between positions where its opposite ends engage the respective valve seats; a thermostatic drive element responsive to increased temperature of flow through said one inlet to move said valve element away from said one valve seat and toward said other valve seat to simultaneously adjust the relative openings of the respective valves; and means for permitting a restricted flow of liquid through said governor from said one inlet when said valve element is in engagement with said first-mentioned valve seat.

8. The device of claim 7 wherein spring means are provided to resist the movement of said valve element by said drive element.

9. The device of claim 8 wherein means are provided for adjusting said spring means.

10. A governor for controlling discharge temperature of liquid from a heat exchanger of the type having an inlet for liquid from said heat exchanger and an inlet from a by-pass around said heat exchanger, and an outlet, comprising: a valve housing including a tubular member, closure means for the ends of said tubular member, a plurality of spaced port means in the wall of said tubular member, certain of said port means communicating with said inlet from the heat exchanger, other of said port means communicating with said inlet from the by-pass, while still other of said port means communicate with said outlet, a valve element movable within said tubular member from one extreme position in which the port means which communicates with the inlet from the by-pass is fully opened and the port means which communicates with the inlet from the heat exchanger is fully closed, to another extreme position in which the port means which communicates with the inlet from the by-pass is fully closed and the port means which communicates with the inlet from the heat exchanger is fully opened, one of said closure means being provided with an opening in communication with said inlet from the heat exchanger, whereby liquid from the heat exchanger is permitted to pass through said valve in all positions of said movable valve element and a thermostatic drive element in said inlet from the heat exchanger responsive to increased temperature of flow therethrough and operatively connected to said valve

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element, for opening the port means in communication with the inlet from the heat exchanger.

11. A governor for controlling discharge temperature of liquid from a heat exchanger as recited in claim 10, in which said closure means having the opening therein also provides a seat for said movable valve element. 5

12. A governor for controlling discharge temperature of liquid from a heat exchanger as recited in claim 10, said thermostatic drive element being supported by one of said end closures, said operative connection to said valve element including a movable member passing through said valve element and an opening in said other end closure to guide said movable member. 10

13. A governor for controlling discharge temperature of liquid from a heat exchanger as recited in claim 12, including spring means between said other end closure and said movable member to oppose movement by said thermostatic drive element. 15

14. A governor for controlling discharge temperature of liquid from a heat exchanger as recited in claim 12, including means in said operative connection to vary the distance between said thermostatic drive element and said valve element. 20

15. A governor for controlling discharge temperature of liquids from a heat exchanger as recited in claim 10, 25

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in which the valve housing and valve element are of stepped construction providing portions having different diameters, the port means which communicate with the inlet from the by-pass being provided in the portion of larger diameter and the port means which communicate with the inlet from the heat exchanger being provided in the portion of lesser diameter.

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Notice of Adverse Decision in Interference

In Interference No. 90,722 involving Patent No. 2,884,197, A. Whittell, Jr., THERMOSTATIC FLOW GOVERNOR, final judgment adverse to the patentee was rendered Aug. 10, 1961, as to claims 1, 2, 4 and 7.

[Official Gazette May 4, 1965.]