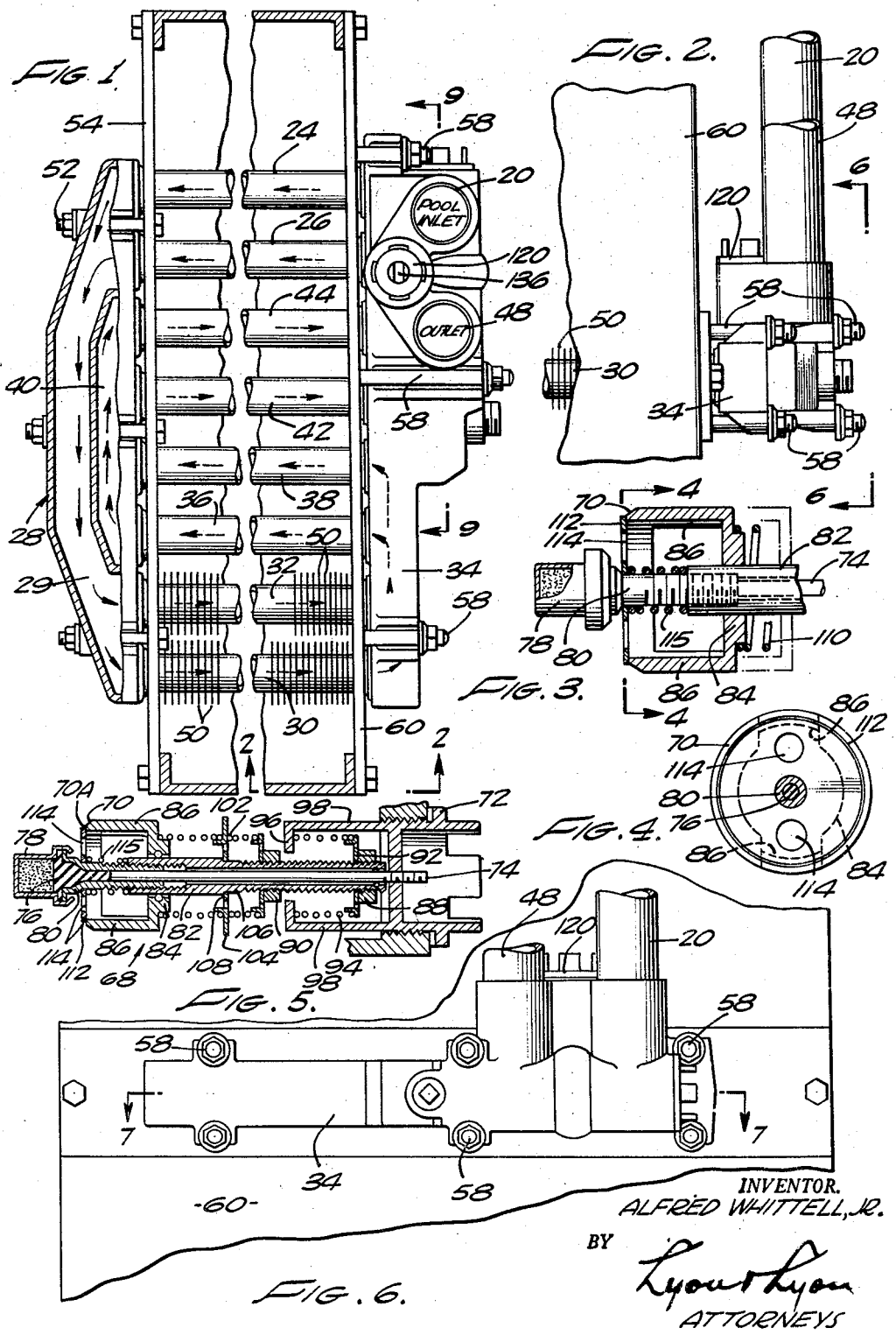
Sept. 15, 1964 A. WHITTELL, JR 3,148,828

BOILER TEMPERATURE CONTROL SYSTEM

Filed July 31, 1962 2 Sheets-Sheet 1



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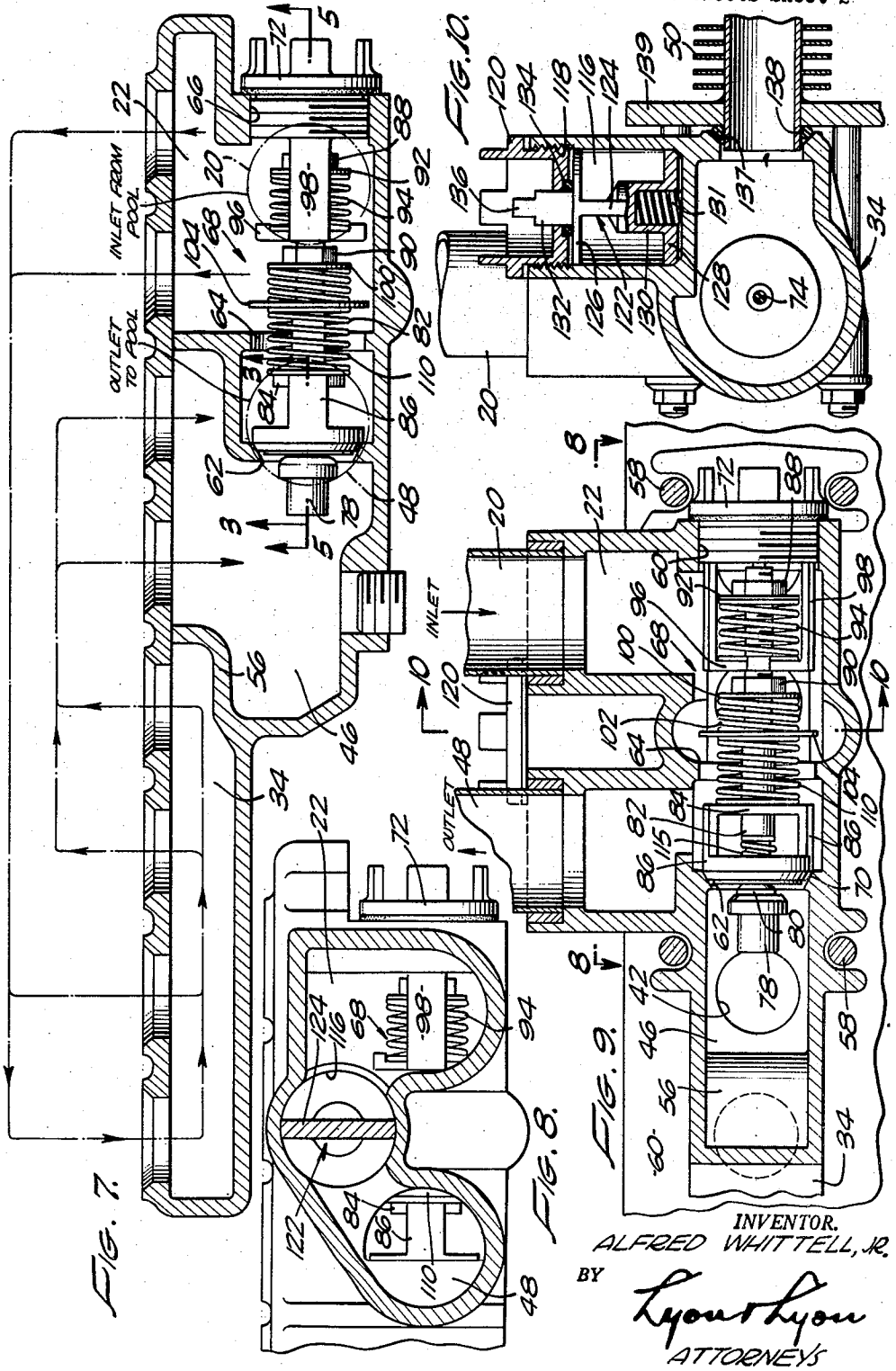


FIG. 7.

FIG. 8.

FIG. 9.

FIG. 10.

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BOILER TEMPERATURE CONTROL SYSTEM

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This invention relates to an improved boiler temperature control system.

In a boiler such as for example used to heat the water in a swimming pool it is necessary to maintain the temperature of the water discharged from the boiler within prescribed limits to reduce formation of scale in the event the temperature gets too hot or condensate in the event the temperature gets too cold.

It is an object of this invention to provide a device which will control the boiler discharge temperature and which is capable of compensating for seasonal changes in the normal temperature of the water, which changes are of such a magnitude that they make conventional automatic control device inadequate.

It is another object of this invention to provide a device which will control the boiler discharge temperature and which will compensate for the temperature changes which result from the large variation in flow requirements of residential and commercial filter systems, which requirements are in general imposed by health authorities.

It is still another object of the present invention to provide a control for boiler discharge temperature which is capable of withstanding large temperature variations, but which does not require by-pass piping or additional valving in such by-pass piping.

It is an object of this invention to provide a device which will control the boiler discharge temperature and maintain same with the desired upper and lower limits.

It is a further object of this invention to provide such a device which is capable of handling water flow of standard as well as extra large swimming pools such as municipal pools and the like.

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

In the drawings:

FIGURE 1 is a top plan view partially in section of a device embodying this invention.

FIGURE 2 is a view taken along line 2—2 of FIGURE 1.

FIGURE 3 is a view taken along line 3—3 of FIGURE 7.

FIGURE 4 is a view taken along line 4—4 of FIGURE 3.

FIGURE 5 is a view taken along line 5—5 of FIGURE 7.

FIGURE 6 is a view taken along line 6—6 of FIGURE 2.

FIGURE 7 is a view taken along line 7—7 of FIGURE 6.

FIGURE 8 is a view taken along line 8—8 of FIGURE 9.

FIGURE 9 is a view taken along line 9—9 of FIGURE 1.

FIGURE 10 is a view taken along line 10—10 of FIGURE 9.

This present invention is an improvement over that set forth in my prior Patent 2,884,197 issued April 28, 1959 which describes in detail the theory and operation of the governor unit utilized.

In this device water from a swimming pool which has previously passed through the filter enters the device through the pool inlet 20 into a first or inlet chamber 22. From chamber 22 flow proceeds to the boiler through boiler pipes 24 and 26 to rear header 28. Header 28 directs flow through a passage 29 to return pipes 30 and

32 to front header 34 which in turn directs flow through boiler pipes 36 and 38 to a second passage 40 in rear header 28 wherein flow is again directed through boiler pipes 42 and 44 into outlet or second chamber 46 from which same passes to outlet 48 and is returned to the pool. In the preferred embodiment of the present invention, the water is passed through the boiler in pairs of pipes to promote scrubbing of mineral incrustation from the pipes by reason of the high velocity of the water.

Each boiler pipe has the usual heat transfer fins 50 fixed to its periphery and a burner is positioned beneath the pipes to heat the water in the pipes as it makes four passes through the boiler.

The rear header 28 is a casting secured by bolts 52 to the rear walls 54 of the boiler. Front header 34 and the two chambers 22 and 46 are formed in a single casting separated by wall 56 which casting is secured by bolts 58 to the front wall 60 of the boiler. Positioned between outlet 48 and chamber 46 is an annular shoulder 62 and between the inlet and outlet chambers 22 and 46 an annular valve seat 64 is provided. A third annular opening 66 is provided in chamber 22 in the line with annular shoulder 62 and valve seat 64.

The flow governor generally designated 68 is illustrated in FIGURE 5. It includes valve seat 70A and a beveled ring 70 adapted to abut annular shoulder 62 to support an end of the governor and a threaded cap 72 which screws into opening 66 to close off flow therethrough and support the other end of the governor. An operating rod 74 is fixed to cap 72 and projects the length of the governor and carries at its opposite extremity diaphragm 76 which fits within housing 78 of a thermostatic power element which contains a suitable thermostatic material which is expansible upon a rise in temperature. Projecting from housing 78 is a tubular extension 80 which telescopically receives operating rod 74 and screws into hollow sleeve 82 which fits within a collar 84 supported by a pair of arms 86 projecting from ring 70.

Sleeve 82 is externally threaded to receive nuts 88 and 90. Nut 88 is positioned adjacent cap 72 and is abutted by spring retaining plate 92. A coil spring 94 abuts plate 92 and collar 96 which is supported by arms 98 which is turn are supported by cap 72.

A second spring retainer 100 abuts nut 90. A coil spring 102 is positioned between retainer 100 and by-pass valve disc 104 which slides on unthreaded portion 106 of sleeve 82 and abuts shoulder 108 on said sleeve. A further spring 110 is positioned between by-pass valve disc 104 and collar 84.

Positioned between ring 70 and housing 78 is a valve disc 112 which has a series of ports 114 therethrough to insure a minimum flow at all times.

In operation hot water from the boiler flows past the power element through ports 114 and under valve disc 112 to the pool. Should the boiler discharge temperature exceed a predetermined upper limit the same will cause the material in housing 78 to expand against diaphragm 76 pushing housing 78 to the left in FIGURES 7 and 9. Spring 115 which is positioned between valve element 112 and sleeve 82 will move the valve element to further open the valve. At the same time valve disc 104 will move closer to valve seat 64 throttling the by-pass and forcing increased flow through the boiler to reduce the discharge temperature. Should the discharge temperature become too low, the opposite occurs with the power element contracting seating valve disc 112 against valve seat 70A permitting minimum flow through the boiler and simultaneously moving valve disc 104 a maximum distance from seat 64 permitting maximum flow to by-pass the boiler.

While the above arrangement is suitable for the average small pools, in the case of an oversized pool or any size commercial pool where a greatly increased rate of flow

through the filter is necessary, or in any other environment where large temperature and flow variations are encountered, an additional boiler by-pass is necessary to accommodate same. For this purpose an additional valve chamber **116** is provided in the casting which has a window opening into chamber **22** and outlet **48**. The chamber has a threaded opening **118** into which cap **120** screws. Within the chamber **116** is positioned a valve **122**. The valve is in the form of a flat plate **124** positioned between two circular plates **126** and **128** with an enlarged cylindrical portion **130** adjacent plate **128**, countersunk to receive spring **131**. A cylindrical protuberance **132** projects through a hole in cap **120** and a sealing ring **134** is provided to prevent leakage. Outside of cap **120** the protuberance has a flattened portion **136** to facilitate grasping same with a tool to rotate the valve or plate **124** to adjust flow through this second or manually operated by-pass.

An annular beveled surface **137** is provided on the header casting as a mounting for O-ring **138**. The boiler pipe need not be rolled on the tube sheet **139** because of the highly effective seal provided by ring **138**.

Thus when the volume of water to be handled through the casting exceeds the capabilities of the boiler and the governor this manual by-pass is partially or even fully open to shunt the excess water directly from chamber **22** to outlet **48**.

While what hereinbefore has been described as the preferred embodiment of this invention, it is readily apparent that alterations and modifications can 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 device for controlling flow to a swimming pool boiler comprising a housing having two inlets and an outlet, means communicating with one of said inlets for delivering liquid to said 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 same to said heating means, a flow governor within said housing having a first valve means controlling flow between said first mentioned inlet and said outlet and having a second valve means between said second mentioned inlet and said outlet, said flow governor including a thermostatic power element positioned in said first mentioned inlet and responsive to the temperature to simultaneously move both said first and second valve means to control the amount of flow through said heating means, an additional chamber within said housing communicating said outlet and a third said last mentioned inlet, and valve means within said chamber controlling flow through said chamber.

2. A device for controlling flow to a swimming pool boiler comprising a housing having two inlets and an outlet, means communicating with one of said inlets for delivering liquid to said 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 same to said heating means, a flow governor within said housing having a first valve means controlling flow between said first mentioned inlet and said outlet and having a second valve means between said second mentioned inlet and said outlet, said flow governor including a thermostatic power element positioned in said first mentioned inlet and responsive to the temperature to simultaneously move both said first and second valve means to control the amount of flow through said heating means, an additional chamber within said housing communicating said outlet and said last mentioned inlet, a third valve means within said chamber controlling flow through said chamber and said third valve means being manually operated from outside said housing.

3. A device for controlling flow to a swimming pool boiler comprising a housing having two inlets and an outlet, means communicating with one of said inlets for delivering liquid to said 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 same to said heating means, a flow governor within said housing having valve means controlling flow between said first mentioned inlet and said outlet and having valve means between said second mentioned inlet and said outlet, said flow governor including a thermostatic power element positioned in said first mentioned inlet and responsive to the temperature to simultaneously move both said valve means to control the amount of flow through said heating means, an additional chamber within said housing communicating said outlet and said last mentioned inlet, a rotary valve in said chamber, a cap screwing into said chamber securing said rotary valve therein, and means on said valve projecting through said cap permitting manual positioning of said valve from outside said housing.

4. A device for controlling flow to a swimming pool boiler comprising a housing having a first, a second and a third chamber arranged in line therein with an annular opening between said first chamber and said second chamber and between said second chamber and said third chamber, means for introducing water into said first chamber, means for directing water through a heating means to said third chamber and an outlet communicating with the second chamber, a flow governor having valve means cooperating with each annular opening; said governor having a thermostatic power element responsive to temperature of water entering said third chamber to simultaneously move said valve means controlling flow from said inlets to said outlet, a by-pass chamber formed in said housing through which said first and second chambers communicate, manually positioned valve means in said by-pass chamber.

5. A device for controlling flow to a swimming pool boiler comprising a housing having a first chamber, a second chamber and a third chamber arranged in line therein with an annular opening between said first chamber and said second chamber and between said second chamber and said third chamber, means for introducing water into said first chamber, means for directing water through a heating means to said third chamber and an outlet communicating with the second chamber, a flow governor having valve means cooperating with each annular opening, said governor having a thermostatic power element responsive to temperature of water entering said third chamber to simultaneously move said valve means controlling flow from said inlets to said outlet, an access opening in said housing aligned with said annular openings permitting insertion of said flow governor, a by-pass chamber formed in said housing through which said first and second chambers communicate, manually positioned valve means in said by-pass chamber.

6. A device for controlling flow to a swimming pool boiler comprising a housing having a first chamber, a second chamber and a third chamber arranged in line therein with an annular opening between said first chamber and said second chamber and between said second chamber and said third chamber, means for introducing water into said first chamber, means for directing water through a heating means to said third chamber and an outlet communicating with the second chamber, a flow governor having valve means cooperating with each annular opening, said governor having a thermostatic power element responsive to temperature of water entering said third chamber to simultaneously move said valve means controlling flow from said inlets to said by-pass outlet, a by-pass chamber formed in said housing through which

said first and second chambers communicate, a rotary valve in said bypass chamber, a cap screwing into said chamber securing said rotary valve therein, means on said rotary valve projecting through said cap permitting manual positioning of said rotary valve from outside said housing.

7. The device recited in claim 1 wherein said housing is connected to at least one boiler pipe, said housing being provided with an annular bevel, an O-ring mounted on said bevel to provide an effective seal between said housing and said boiler pipe.

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