A monitoring system is connected to a hot water heating system. The monitoring system includes a controller and various controls and sensors. Sensors are connected to the components of the hot water heating system including the thermostats, pipes, pumps and valves. Controls are connected to the pumps and valves to control operation of the hot water heating system for testing. During normal operation of the hot water heating system, the sensors are monitored to ensure proper operation. If the heating system does not operate within certain defined time parameters, the system is activated to test components of the heating system. An alarm is activated if the system does not operate properly.
CONTROL BOX

Power

Standby

Lockout

Zone 1

Test

Complete

Zone 2

Test

Complete

Zone 3

Test

Complete

Silence SW

Reset SW

Occ/Vac SW

Boiler Alarm

System Off

System Alarm

System Alarm

Boiler Alarm

FIG. 2
FIG. 3b

FIG. 3c
Thermostat Turn On

Minimum Time?

Monitor Zone Sensors

ALARM

Sensors In Range?

FIG. 5
SYSTEM AND METHOD FOR MONITORING HEATING SYSTEM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a system and method for monitoring a heating system. More particularly, it relates to a system and method for ensuring proper operation of a hot water heating system having multiple heating zones.

[0003] 2. Discussion of Related Art

[0004] Hot water heating systems are commonly used throughout the United States and the world. In such system, water is heated by a boiler. The hot water is distributed through pipes to rooms in a building for heating. Each room to be heated includes a heat transfer device. The heat transfer device may be baseboard heater or a radiator. A baseboard heater is a pipe which extends along the bottom of a wall of the room. The pipe has a plurality of metal fins extending from the pipe. The structure includes top and face plates to protect the fins. As hot water passes through the pipe, it and the fins are heated. The fins distribute the heat to the air of the room. A radiator is a pipe structure through which the hot water passes. The structure is heated by the water and, in turn, heats the air of the room.

[0005] Hot water heating systems are controlled by thermostats. A thermostat in the room to be heated senses the temperature of the room. When the temperature drops below a preset level, the thermostat causes the hot water to pass through the pipes. Typically, the thermostat is connected electronically to a pump and valve at the boiler. The valve is opened and the pump is engaged. The valve and pump operate to cause the hot water to flow through the pipe to the heat transfer device in the room.

[0006] Often buildings have multiple heating zones. Each heating zone covers a set of rooms. For each zone, a single pipe extends from the boiler and passes through the heat transfer devices in each room. A single thermostat in one of the rooms controls the system for a zone. Each zone operates independently. Different zones allow greater control of temperatures in different rooms. Zone heating allows different temperatures to be maintained in different areas of a building. It also improves efficiency and comfort when different areas have different heat loss characteristics.

[0007] Hot water heating systems can have a variety of problems which prevent proper operation of the system. Thermostats, pumps, valves, pipes and boilers may fail. If a thermostat fails, the system may not turn on to heat the rooms controlled by the thermostat, or may not turn off even though the room has reached a desired temperature. If a pump or valve fails, the system may not heat the room or may overheat a room. If pipes fail, water from the system may be discharged into the building. If a boiler fails, the whole heating system will not operate. Failures, in addition to being an inconvenience, can cause significant damage. If a building is not heated properly, water pipes can freeze and burst or mold and mildew may develop. Most damage occurs when the building occupants are not present—in office buildings at night, in homes during the day, or when people are on vacation.

[0008] Therefore, a need exists for a system to monitor operation of a hot water heating system. A variety of monitoring systems have been created. However, none of such systems operate to monitor all aspects of operation. For example, systems exist to monitor pumps and valves to ensure that they are functioning when turned on, but do not determine whether they are causing hot water to flow. A blockage in the system may prevent water from moving, even if the devices are operating properly. Furthermore, no systems exist to determine whether the water is properly returning to the boiler. Known systems also fail to properly monitor multiple zones to ensure that all zones are functioning properly.

SUMMARY OF THE INVENTION

[0009] The present invention relates to a system and method for monitoring operation of a multi-zone hot water system. The invention includes a controller connected to a variety of controls and sensors on the hot water system. According to one aspect of the invention, the thermostat sensors monitor when the thermostats in the system turn on and off. According to another aspect of the invention, flow sensors, connected to the outgoing pipes from the boiler, determine whether water is flowing. According to another aspect of the invention, temperature sensors, connected to the incoming pipes to the boiler, determine whether hot water is passing through the entire system. According to another aspect of the invention, controls are connected to the pumps and valves to conduct heating system tests. According to another aspect of the invention, different operational modes can be selected. Specific sensors and/or controls may be activated or deactivated based upon the operational mode.

[0010] According to one aspect of the invention, the controller has a basic hardware construction. It includes a variety of circuits connected to the sensors and controls. Each of the circuits controls a test of a zone of the heating system. The controller includes a display panel indicating operation of the controller. LEDs are lit to indicate when testing is occurring and the completed status of any tests. Alarms are activated if a test fails.

[0011] According to another aspect of the invention, the controller is operated in accordance with a method to determine proper operation of the heating system. According to one aspect of the method, maximum and minimum times are set in the controller. The maximum and minimum times are used to determine whether the thermostats are turning on properly. According to another aspect of the invention, a heating system check is periodically performed to test operation of the heating system. According to another aspect of the invention, the controller is programmable to adjust for different operating parameters. According to another aspect of the invention, information regarding testing and operation of the system is stored for later review. According to another aspect of the invention, an alarm is activated if the system is not operating properly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 illustrates a hot water heating system including a monitoring system according to an embodiment of the present invention.

[0013] FIG. 2 illustrates a display panel for a monitoring system according to an embodiment of the present invention.

[0014] FIGS. 3a-3c are high level circuit diagrams for a monitoring system according to an embodiment of the present invention.
FIG. 4 is a block diagram of a monitoring system according to a second embodiment of the present invention.

FIG. 5 is a block flow diagram illustrating operation of a monitoring system according to an embodiment of the present invention.

DETAILED DESCRIPTION

FIG. 1 illustrates a monitoring system 110 for use with a hot water heating system 100. As is known in the art, the hot water heating system 100 includes a boiler 10, a plurality of outgoing pipes 30, 40, 50 and a plurality of incoming pipes 60, 61, 62. The boiler 10 may be of any known type which can provide hot water to the heating system. It may use natural gas, oil, propane, wood, wood pellets, or any other fuel for heating the water for the system. Each outgoing pipe 30, 40, 50 connects to one or more heat transfer devices (not shown) in rooms to be heated and to one of the incoming pipes 60, 61, 62. Each of the outgoing and incoming pipes corresponds to a heating zone for the heating system. A thermostat 70, 71, 72 is positioned in a room to be heated within the corresponding heating zone. The thermostats 70, 71, 72 are connected to the heating system to control normal operation. A plurality of valves 32, 42, 52 are positioned in an outgoing pipe 30, 40, 50 and connected to a respective thermostat 70, 71, 72. When the thermostat, for example thermostat 70, turns on, it activates the corresponding valve 32. Hot water from the boiler 10 passes through the valve 32 and the outgoing pipe 30. It returns on the corresponding incoming pipe 60. A pump 31 forces the hot water through the system. A pump 31, 41, 51 is positioned on each outgoing pipe and connected to a corresponding thermostat 70, 71, 72. The corresponding pump is activated when the valve is opened. Alternatively, a single pump can be used for all zones in the heating system. In such a system, the pump is activated whenever any of the valves are opened.

FIG. 2 is a display panel 300 to indicate the status of the monitoring system and the heating system. Basic operation of the monitoring system is indicated by the display panel 300. According to an embodiment of the invention, the display panel 300 is formed as a cover to the controller 120 of the monitoring system. Alternatively, the display panel could be separate from the controller and could be positioned anywhere in the building. The display panel 300 may be wired to the monitoring system for direct operation of the panel. Alternatively, the panel and monitoring system may communicate over a communications link, such as a wireless connection, to provide information between the panel and the monitoring system.

The display panel 300 includes various visual and audible indicators and user-actuated switches. The display panel 300 is labeled to indicate the purpose and meaning of each of the indicators and switches. According to a preferred embodiment of the invention, the visual indicators are LEDs. However, other types of visual indicators could be used. A first LED 310 indicates when the monitoring system is being powered. The system may connect to power for the building it is monitoring or may have a separate power source. Batteries may be used either as a primary or back-up power source for the monitoring system. If the monitoring system is receiving power, then the power LED 310 is lit. Two LEDs 311, 312 represent the current operational status of the monitoring system when not in a testing mode. If the standby LED 311 is lit, then the system is awaiting a testing period. A testing period starts when a thermostat for one of the zones is activated when in standby mode. After a testing period is completed, the monitoring system enters a lockout mode, indicated by LED 312. The lockout mode prevents the system from conducting another test until a predetermined period of time has elapsed. After the predetermined time has elapsed, the monitoring system switches from the lockout mode to the standby mode, and turns off LED 312 and on LED 311.

If the monitoring system is in standby mode when a thermostat turns on, a testing period commences for each of the zones in the heating system. The system lights LEDs 321, 322, 323 to indicate that each zone is current in a test mode. As described below, the test mode determines that all of the components of the heating system for a respective zone are functioning properly. Once a test for a zone has been successfully completed, the corresponding test LED 321, 322, 323 for that zone is turned off and a completed LED 324, 325, 326 for that zone is turned on. Thus, the panel indicates the current status, either ongoing or completed, for each zone.

If a test is not completed properly for any of the zones, one or more alarms are activated. The display panel 300 illustrated in FIG. 2 includes four alarms, two visual 331, 322 and two audible 351, 352. The visual alarms 331, 332 are LEDs which are lit when an alarm condition exists. The audible alarms 352, 352 are powered speakers which output a sound indicating the alarm condition. Additionally, the system may include other alarm mechanism, such as an autodialer or text messaging device to notify an operator at another location of the alarm condition. Two alarms are used to indicate different conditions. One set of visual alarm 332 and audible alarm 351 are used when a problem is detected with the heating system. The other set of visual alarm 331 and audible alarm 352 are used when a power related problem with monitoring system is detected.

Various switches allow an operator to control the monitoring system. A reset switch 342 is pressed to initialize the system and commence operation. The reset switch 342 is also pressed after an alarm condition occurs to deactivate all of the alarms and reinitialize the system. A silence switch 341 is pressed to deactivate the audible alarm 351. The operator may want to turn off the audible alarms, since he or she is then aware of the condition, without restarting the monitoring system, such as during a repair process. A system off switch 344 allows the operator to deactivate the entire system 110 and silence audible alarm 352. An Occupied/Vacation switch is used to indicate a desired operational mode. As discussed below, different testing processes may be used when the building is occupied and unoccupied. Some heating system problems are readily recognizable by a building occupant, such as a burst pipe. However, the system needs to be able to detect such conditions and notify the operator, when the building is not occupied. The Occupied/Vacation switch 343 is a toggle switch used to select the desired operational mode.

FIGS. 3a-3c illustrate circuit diagrams for a monitoring system according to a first embodiment of the present invention. FIG. 3a illustrates the circuitry for the testing system. FIG. 3b illustrates the circuitry for controlling the zone valves for testing purposes. FIG. 3c illustrates the alarm tie in for the security system or auto-dialer.
circuitry of the monitoring system include various relays which provide the necessary delays, light the LEDs and activate alarms.

[0024] As illustrated in FIG. 3a, the circuitry of the monitoring system is connected to a voltage source 410, such as a low voltage transformer. As discussed above, power may be provided by a connection to building power or to a battery. The reset switch 342 operates to disconnect and reconnect the power source 410 in order to initialize the monitoring system. Then power is supplied to the system, LED 310 is lit. An alarm circuit 420 operates to control the alarms. As discussed above, the system alarm and boiler alarm are handle separately. The circuitry for the system alarm 440 is illustrated in FIG. 3b. The circuitry for the boiler alarm 420 is part of the test circuit illustrated in FIG. 3a. The silence switch 341 is used to activate/deactivate the audible alarm 351 using an audible alarm circuit 422. A time delay relay 412 is used in the standby circuit 430 to control the lockout/standby condition. The time delay relay 412 is used to prevent overtesting of the system, even when the thermostats may be turning on and off frequently. According to an embodiment of the invention, the time delay relay 412 is designed to provide a 60 minute delay. Of course, a longer or shorter time could be used. Also, the time may be adjustable.

[0025] Upon initialization or resetting of the system, the unit is in standby mode and LED 311 is lit. The system then awaits activation of one of the thermostats in the heating system. The thermostat inputs are illustrated in FIG. 3b. If either of the three thermostats activates, then relay 2 of the circuit of FIG. 3b activates the testing system. When activated, the system turns on the zone valves for all of the zones, using the circuitry illustrated in FIG. 3b. The power circuit 441 provides power to the transformer for the circulating pump. In the embodiment illustrated in FIGS. 3a-3c, the heating system includes a single circulating pump. Of course, as discussed above, the heating system may include multiple circulating pumps. With such a system, additional circuitry would be used to activate each of the respective circulating pumps. When the test is activated, the zone control valves 32, 42, 52 are turned on using zone control circuits 442, 443, 444. The system also activates the test mode circuitry through relay 2 in the start test circuit 445.

[0026] During the test mode, a second time delay relay 411 is used to control a maximum time for the test mode. According to an embodiment of the invention, a maximum test period of 15 minutes is used. Of course, other time periods could be used. Also, the test period could also be dependent upon the occupied/vacation mode switch since the time for testing under vacation mode will likely be longer than for occupied mode. When in test mode, each of the test LEDs 321, 322, 323 are lit by the test circuits 424, 425, 426.

[0027] In order to successfully complete a test mode for each zone, an output from a thermal sensor on the zone must be received. Thermal sensors are connected to each of the output and input pipes for the heating system. Under occupied mode, the thermal sensors on the output pipes are used. For vacation mode, the thermal sensors on the input pipes are used. Using the output pipes during an occupied state allows the test to be concluded more quickly, since the output pipe will begin heating as soon as hot water is flowing. However, in vacation mode, the system needs to ensure that heat is getting to the entire zone, not just leaving the boiler. Therefore, the input pipes are used for determining that the entire heating system has been traversed. Switch 343 controls which set of thermal sensors are used. The thermal sensors are set at a predetermined temperature level, such as 130 degrees. When that level is reached, the sensor triggers a respective relay which turns off the test LED and turns on the test completed LED. The circuitry also turns off the respective zone control valve, unless it is still being operated by the thermostat.

[0028] Once all of the zones have completed the test mode, the system resets to lockout mode. However, if any of the zones has not completed testing when the time delay relay 411 closes, the alarms are activated.

[0029] FIG. 3c further illustrates an alarm tie-in circuitry. If power is lost or the system detects a problem with the boiler, the system can notify an operator or the condition. The notification can be provided to a security company. The security company may monitor other conditions for the building, such as break-ins and fire. Alternatively, the security company may just monitor the heating system. The tie-in may also connect to an auto-dialer for calling the owner or manager when certain problems occur. Any phone number or multiple phone numbers may be called by the autodialer. The system can also provide different types of conditions for activating the alarm tie-in. For example, the system may delay the alarm notification for a predetermined period of time for a power outage, but may activate the alarm notification immediately when a boiler problem is detected.

[0030] FIG. 4 illustrates the components of a monitoring system 110 according to a second embodiment of the present invention. In this embodiment, the monitoring system includes a programmed processor instead of the hardware circuitry of the first embodiment. The core of the monitoring system 110 is a controller 120. The controller 120 preferably a programmed processor having a variety of inputs and outputs. An appropriately programmed general purpose computer could be used as the controller. Similarly, a hardware-based processing device can be used. The controller 120 may use analog or digital inputs and outputs depending upon the nature of the hot water heating system to which it is connected.

[0031] The inputs to the controller 120 include various sensors 150, 160, 170 which are connected to the hot water heating system. Generally, each type of sensor is connected to components for one of the zones of the heating system. For example, as illustrated in FIG. 1, a set of flow sensors 150 include one flow sensor 151, 152, 153 connected to a corresponding outgoing pipe 30, 40, 50. A flow sensor 150 determines whether water is flowing in the pipe to which it is connected. Any type of known flow sensor 150 can be used with the monitoring system 110 of the present invention. Alternatively, as discussed below with respect to operation of the monitoring system, temperature sensors could be used in place of flow sensors. Temperature sensors 160 are connected to the incoming pipes 60, 61, 62, to determine the temperature of the pipes. Thermostat sensors 170 are connected to the electronic outputs of the thermostats to determine whether the thermostat is on or off.

[0032] The controller 120 includes various control outputs for controlling components of the heating system. As with the sensors, each control is connected to a corresponding one of the components for a heating zone. Pump controls 130 are connected to a corresponding pump 31, 41, 51 to start or stop operation of the pump. Of course, if the heating system uses
a single pump for all heating zones, then a single pump control 130 would be used. Similarly, valve controls 140 are connected to corresponding valves 32, 42, 52.

[0033] The monitoring system 110 includes a memory 180 connected to the controller 120. Information determined by the monitoring system is recorded in the memory 180. Such information may include times during which zones of the heating system were operating, times for heating system tests, and results of tests.

[0034] The monitoring system 110 also includes an alarm 180. The alarm 180 is used to notify an operator when the heating system is not functioning properly. The alarm 180 is connected to the controller 120. When the controller 120 determines that the heating system has a problem, the alarm 180 is activated. The alarm 180 may be of many known types and may include multiple types. For example, the alarm 180 may include a siren and/or light which are activated to provide an audio and/or visual indication of a problem. The siren and/or light may be located near the heating system, elsewhere within the building being heated, or at a distant location. Alternatively, the alarm 180 may include a message device for providing a message to an operator. The message device dial a programmed telephone number and play a message. It may send and email or text message to a programmed address. It may activate a pager. If the alarm 180 includes multiple types, it may activate different ones depending upon the nature of the problem determined by the monitoring system.

[0035] FIG. 3 illustrates the monitoring operation 200 of the system according to an embodiment of the present invention. The monitoring operation 200 is a loop programmed into the controller 120. Once activated, the loop starts at step 210. The first step 210 determines whether a thermostat is turned on. As noted above, each of the thermostats are monitored. Depending upon desired operation, step 210 may determine whether any of the thermostats are turned on or whether only a particular one is turned on. Since the thermostats operate on independent schedules, one could be turned on at all times. Thus, according to an embodiment of the invention, only one thermostat is used to control operation of the monitoring system. However, all of the thermostats are monitored. The times during which the thermostats operate may be recorded in the memory. Also, the monitoring system may determine whether any thermostat is turned on for too long a time or for too long a time. Such monitoring is easily included within the monitoring system of the present invention, but not part of the general monitoring process illustrated in FIG. 3.

[0036] When a thermostat turns on, the process moves to step 220. At step 220, the system determines whether a minimum time has elapsed since the last system test. The thermostat may turn on and off frequently. A full system test may not be required as frequently. Therefore, a minimum time is set for the system test. If the minimum time has not been met, the process continues at step 230. At step 230, the sensors for the zone which is on are monitored. At step 270, the process determines whether the monitored sensors are within specified ranges. Monitoring of sensors and determination of problems are discussed below with respect to the system test.

[0037] If a thermostat is not turned on, as determined at step 210, the process determines, at step 240, whether a maximum time has been reached since the last system test. Ambient conditions may prevent a thermostat from turning on. Also, the thermostat may have failed. The system should still be tested periodically, such as every hour or every day. Thus, even if the thermostat is not turned on, the system will conduct a test when the maximum set time is reached. Of course, the system could be tested in accordance with preset times. However, such operation would be inefficient. The heating system must be operated during the testing process and operating the heating system requires energy. The process as illustrated in FIG. 3 allows testing when the heating system is already operating, but also controls the process to prevent the too frequent or infrequent testing of the heating system.

[0038] A full heating system test occurs at step 250. A heating system test results when the selected thermostat turns on after the minimum time as elapsed (from step 220) or when the maximum time has elapsed (from step 240). For a full system test, all of the heating systems are turned on. The valve controls 140 and pump controls 130 are activated. Under normal operation, activation of the controls will cause hot water to pass through all zones of the heating system. The controls are activated only long enough to test the system. Then, they are deactivated. Of course, if any of the thermostats are on when the controls are deactivated, the pump and valve for that zone will remain on for normal operation of the heating system.

[0039] While the system is activated, the sensors are monitored (step 260) to determine (step 270) whether the system is operating properly. Specifically, the flow sensors 150 and temperature sensors 160 are used to determine proper operation. First, the flow sensors 150 are checked to determine whether water is flowing through the outgoing pipes. If water is not flowing through any of the pipes, the problem is recorded in the memory 180 and the alarm 170 is activated. After a predetermined period of time, the temperature sensors 160 are checked. The temperature sensors provide the temperature of the incoming pipes. If water is properly flowing, hot water will pass completely through each zone from the outgoing pipe to the incoming pipe during the predetermined period of time. The hot water returning in the incoming pipe will heat the pipe. Thus, the temperature sensor can be used to determine whether hot water is flowing in the pipe. If the temperature of the pipe is not above a threshold after the predetermined time, then hot water is not flowing entirely through the system. The problem is recorded in the memory and an alarm is activated. Temperature sensors could be used instead of the flow sensors for the outgoing pipes. If water is flowing in the pipes, the outgoing pipe will also get hot from the flowing water. The period of time and temperature threshold for the outgoing pipe would be different than those values for the incoming pipe to account for the differences in location and water temperature within the heating system.

[0040] Having disclosed at least one embodiment of the present invention, various adaptations, modifications, additions, and improvements will be readily apparent to those of ordinary skill in the art. Such adaptations, modifications, additions and improvements are considered part of the invention which is only limited by the several claims attached hereto.

1. A method for monitoring a hot water heating system for a building, the heating system having at least one thermostat for controlling the flow of hot water through pipes from a boiler to a heating zone of the building, the method comprising the steps of:
determining when the at least one thermostat is activated; determining whether hot water is flowing in the pipes of the heating system when the at least one thermostat is activated; and activating an alarm after determining that hot water is not flowing in the pipes.

2. The method for monitoring a hot water heating system according to claim 1, wherein the step of determining whether hot water is flowing includes the step of determining a temperature of pipe of the heating system.

3. The method for monitoring hot water heating system according to claim 2, wherein the temperature of the pipe is determined at an output from the boiler.

4. The method for monitoring hot water heating system according to claim 2, wherein the temperature of the pipe is determined at a return to the boiler.

5. The method for monitoring hot water heating system according to claim 2, wherein the temperature of the pipe is determined at a location which depends upon a operational parameter of the heating system.

6. The method for monitoring hot water heating system according to claim 2, wherein the step of determining whether hot water is flowing includes the step of determining whether the temperature of the pipe exceeds a threshold temperature within a predetermined time.

7. The method for monitoring hot water heating system according to claim 1, wherein the alarm includes a visual indicator.

8. The method for monitoring hot water heating system according to claim 1, wherein the alarm includes an audio output.

9. The method for monitoring hot water heating system according to claim 1, wherein the alarm includes a communication device for providing a notification of the alarm to a remote location.

10. The method for monitoring hot water heating system according to claim 1, the heating system having a plurality of thermostats for controlling the flow of hot water through pipes from a boiler to a plurality of respective heating zones of the building, wherein the step of determining when at least one thermostat is activated includes the step of determining when any of the plurality of thermostats are activated, the method further comprising the steps of: opening all pipes from the boiler when any of the plurality of thermostats are activated; and closing each pipe corresponding to a thermostat which is not activated when hot water is determined to be flowing in such pipe; and wherein the step of activating an alarm includes activating an alarm if hot water is not flowing in any pipe of the heating system.

11. The method for monitoring hot water heating system according to claim 10, further comprising the step of determining a time period since all pipes were opened, and wherein the step of opening all pipes occurs only when the time period exceeds a predetermined time period.

12. The method for monitoring hot water heating system according to claim 10, further comprising the steps of: determining a time period since all pipes were opened; and closing each pipe when the time period exceeds a predetermined time period.

13. A system for monitoring a hot water heating system for a building, the heating system having at least one thermostat for controlling the flow of hot water through pipes from a boiler to a heating zone of the building, the system comprising: at least one temperature sensor attached to at least one of the pipes; a circuit for determining when the at least one thermostat is activated; a time delay circuit for determining whether the at least one temperature sensor registers a temperature above a threshold within a predetermined time after the at least one thermostat is activated; and an alarm circuit providing an alarm when the temperature sensor does not reach the threshold within the predetermined time.

14. The system for monitoring hot water heating system according to claim 13, wherein the at least one temperature sensor is positioned on an output pipe from the boiler.

15. The system for monitoring hot water heating system according to claim 13, wherein the at least one temperature sensor is positioned on a return pipe to the boiler.

16. The system for monitoring hot water heating system according to claim 13, wherein the at least one temperature sensor includes at least one first temperature sensor positioned on an output pipe from the boiler and at least one second temperature sensor positioned on a return pipe to the boiler, the system further comprising: an input for selecting one an output of the first temperature sensor and the second temperature sensor to be used in connection with the time delay circuit.

17. The system for monitoring hot water heating system according to claim 13, wherein the alarm circuit includes a speaker to provide an audio output.

18. The system for monitoring hot water heating system according to claim 13, wherein the alarm circuit includes an output for providing a notification of the alarm to a remote location.

19. The system for monitoring hot water heating system according to claim 13, further comprising a display providing a visual indication of operation of the system.

20. The system for monitoring hot water heating system according to claim 13, the heating system having a plurality of thermostats for controlling the flow of hot water through pipes from a boiler to a plurality of respective heating zones of the building, the system further comprising: at least one relay for controlling opening and closing of pipes; a relay control circuit connected to the at least one relay for opening all pipes from the boiler when any of the plurality of thermostats are activated, and closing each pipe corresponding to a thermostat which is not activated when the temperature when a corresponding one of the at least one temperature sensors reaches a predetermined threshold.

21. The system for monitoring hot water heating system according to claim 20 further comprising: a second time delay circuit for preventing operation of the at least one relay before a predetermined time all pipes were previously opened.