



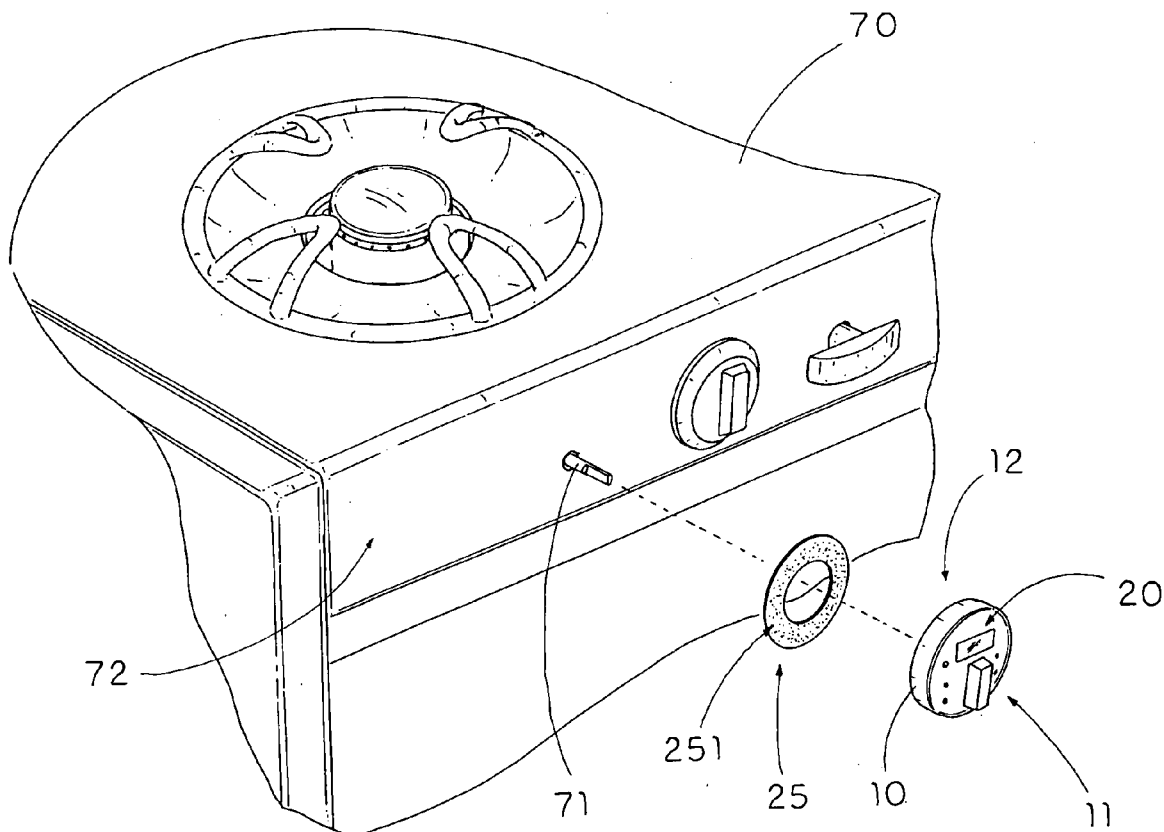
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(19) **United States**(12) **Patent Application Publication****Yu et al.**(10) **Pub. No.: US 2006/0234177 A1**(43) **Pub. Date: Oct. 19, 2006**(54) **TIME KNOB FOR GAS AND ELECTRIC HEATER**(52) **U.S. Cl. 431/86**(76) Inventors: **Shih-Szu Yu**, Bloomington, CA (US);
Stephen Cheng, Diamond Bar, CA (US)(57) **ABSTRACT**

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Raymond Y. Chan**108 N. Ynez Ave., #128****Monterey Park, CA 91754 (US)**(21) Appl. No.: **11/110,207**(22) Filed: **Apr. 19, 2005****Publication Classification**(51) **Int. Cl.**
F23N 5/00 (2006.01)

A timer knob arrangement for a heater includes an ignition button and a timer control. The ignition button is rotatably switched between a switched off position and an operation position with respect to an operation pin of the heater. The timer control includes a power unit, a runner wheel driven by the power unit and is rotatably supported by the ignition button at a position tangentially with respect to the operation pin, and a time control unit. When the time control unit is activated to actuate the power unit, the runner wheel is driven to rotate and to run on the operation surface, so as to drive the ignition button turning back to the switched off position for ensuring a flow of gas being shut off from the heater.



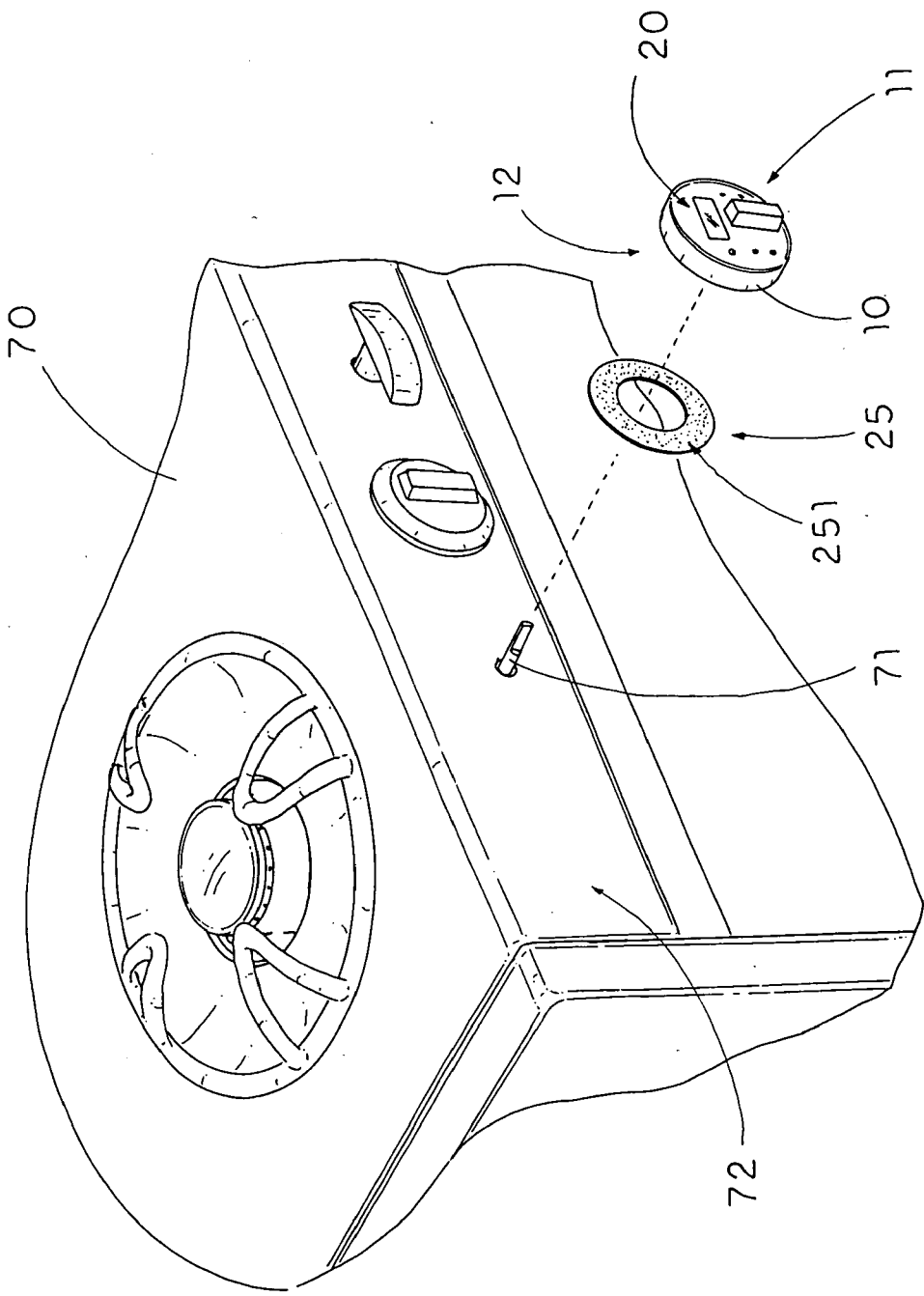


FIG. 1

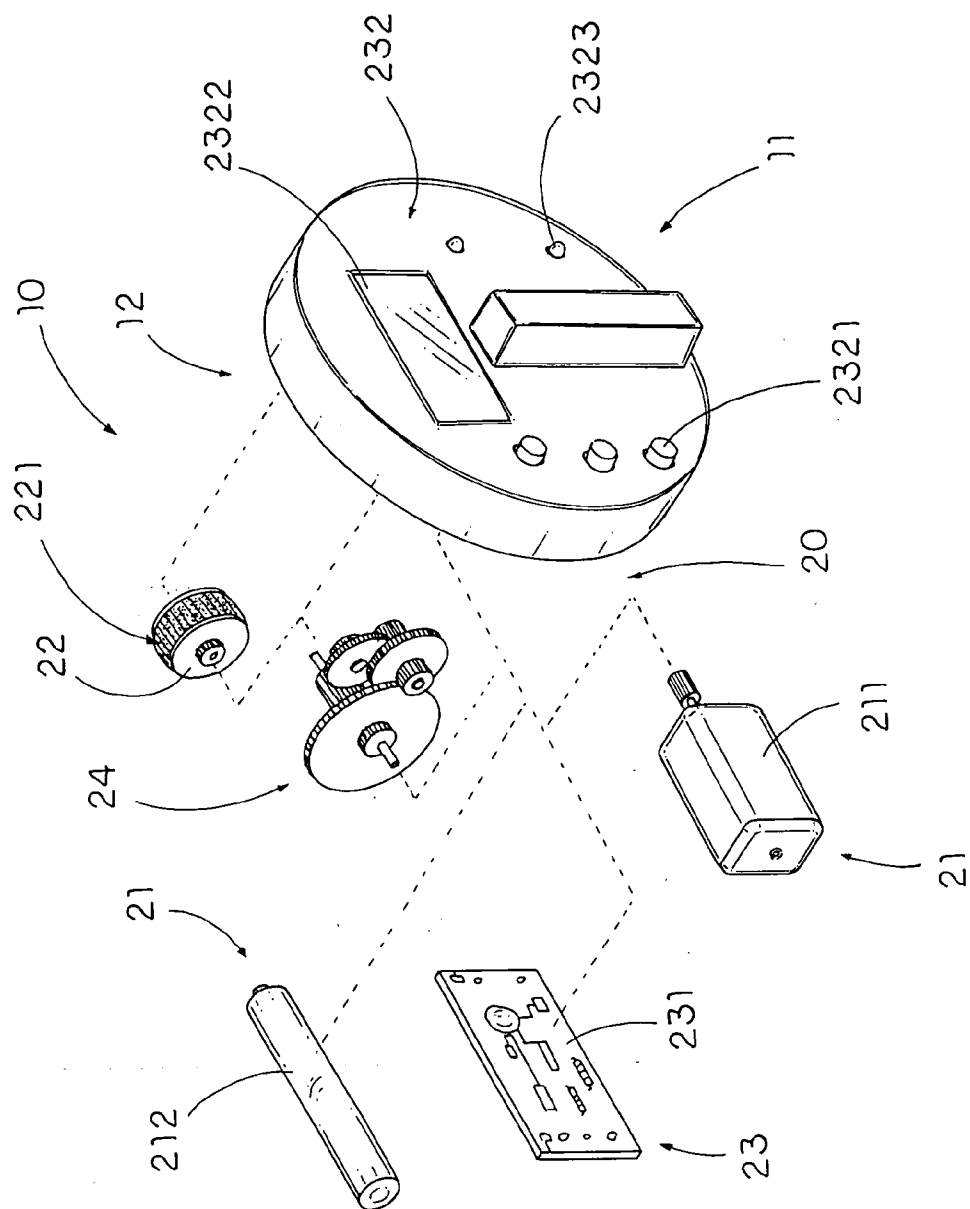


FIG.2

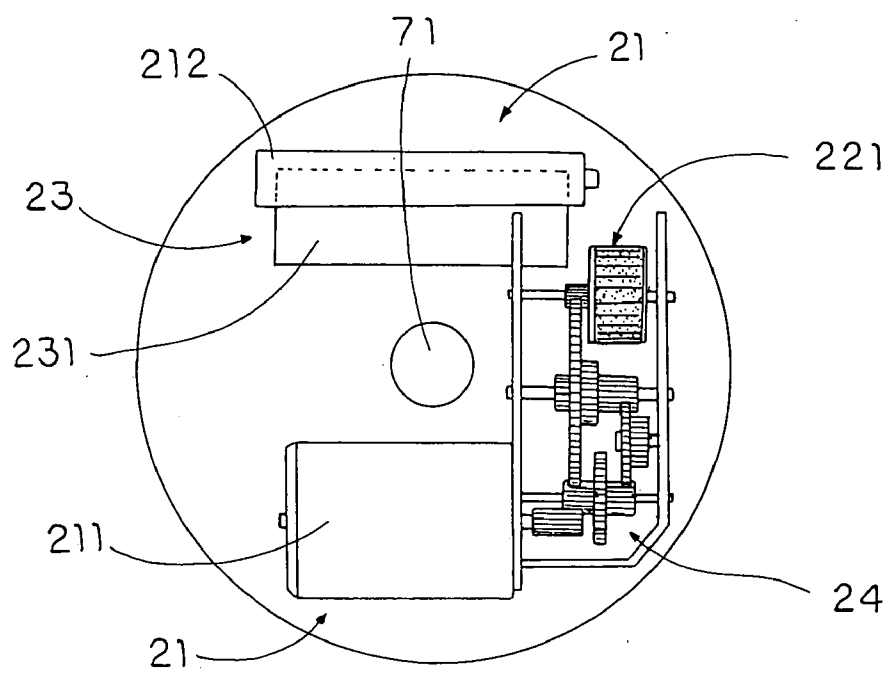


FIG. 3

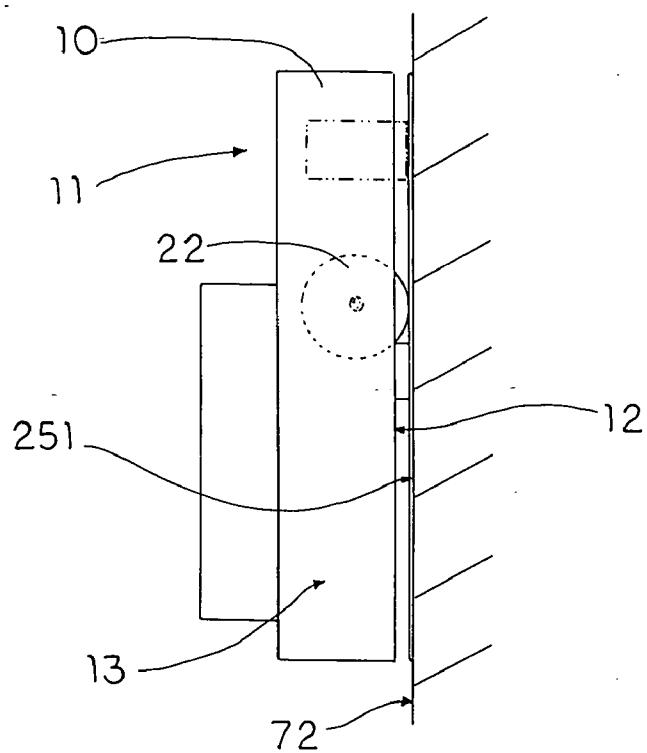


FIG. 4

TIME KNOB FOR GAS AND ELECTRIC HEATER**BACKGROUND OF THE PRESENT INVENTION****[0001] 1. Field of Invention**

[0002] The present invention relates to a heater, and more particularly to a time knob arrangement for a gas or an electric heater which is capable of automatically shutting off an ignition button after a predetermined period of time.

[0003] 2. Description of Related Arts

[0004] A conventional heater, such as a domestic gas heater for use in kitchen, usually comprises a housing, a heater unit provided on the housing for controllably generating fire, and an actuation unit operatively provided on the housing to communicate with the heater unit for selectively turning the heater unit on and off. The heater unit usually comprises an operation pin rotatably extended from the housing, wherein the actuation unit, which is usually embodied as an actuation button, is rotatably engaged with the operation pin for rotating the operation pin to turn on or turn off the heater unit.

[0005] One inherent problem for this kind of conventional gas heater is that once it has been turned on, it will still be on until the user manually turns it off by rotating the actuation button in a predetermined direction. As a result, where the gas heater is needed for an extended period of time, the user has no choice but to stay in the vicinity of the heater and wait until, say, the cooking is finished. Then, the user can turn off the heater manually and free to do anything else.

[0006] There are two possible solutions to this problem. First, over the years, electric heaters have been developed in which heat is generated not by fire, but by converting electrical energy to heat energy. As a result, these electric heaters usually comprise sophisticated electric circuits for controlling a conversion process between electrical energy and heat energy. The implication of this solution is of course, to phrase out the traditional gas heaters, which may not be suitable for all kinds of cooking.

[0007] Second, people may simply buy other equipments which provide automatic on-off control for extended cooking. For example, some rice cookers have been incorporated with fuzzy logic for controlling temperature and on-off status in response to a pre-set time schedule or the temperature condition inside the rice cooker. As a result, when the user want to cook, say soup or Chinese porridge, he/she may put the appropriate ingredients into the rice cooker and set the corresponding time schedule. Obviously, the user has to spend extra money in purchasing additional equipments for specific cooking purposes.

[0008] One may appreciate that none of the above solutions are really satisfactory. In both of these solutions, the user has to purchase additional equipment which has timer control so as to allow him/her to pre-set a time schedule for the cooking in question. Moreover, as a matter of fact, some of these equipments are expensive.

SUMMARY OF THE PRESENT INVENTION

[0009] A main object of the present invention is to provide a time knob arrangement for a gas or an electric heater which

is capable of automatically shutting off after a predetermined period of time. In other words, the user is able to pre-set a time schedule for a gas or electric heater.

[0010] Another object of the present invention is to provide a time knob arrangement for a gas or an electric heater comprising a timer control which is arranged to controllably turn off an ignition button of the gas heater or the electric heater so as to shut off the gas heater or the electric heater.

[0011] Another object of the present invention is to provide a time knob arrangement which does not involve complicated or expensive mechanical or electronic components so as to minimize the manufacturing cost as well as the ultimate selling price of the present invention. In other words, the present invention should be affordable for a majority of household's users.

[0012] Another object of the present invention is to provide a heater comprising a time knob arrangement which is capable of automatically shutting off after a predetermined period of time, wherein the timer knob arrangement comprises a timer control which is arranged to controllably turn off an ignition button of the heater for shutting off thereof.

[0013] Accordingly, in order to accomplish the above objects, the present invention provides a timer knob arrangement for a heater which comprises an operation pin rotatably extended from an operation surface, comprising:

[0014] an ignition button having an actuation side, an opposed engaging side defining a receiving cavity therebetween, and a pin holder provided at the engaging side for substantially engaging with the operation pin that the engaging side is facing towards the operation surface of the heater, wherein the ignition button is rotatably switched between a switched off position and an operation position with respect to the operation pin; and

[0015] a timer control, which comprises:

[0016] a power unit received in the receiving cavity of the ignition button;

[0017] a runner wheel which is driven by the power unit and is rotatably supported by the ignition button at a position tangentially with respect to the operation pin, wherein a portion of the runner wheel is protruded from the engaging side of the ignition button for substantially running with the operation surface of the heater; and

[0018] a time control unit which is received in the receiving cavity and is arranged to actuate the power unit in a timely manner such that when the time control unit is activated to actuate the power unit, the runner wheel is driven to rotate and to run on the operation surface, so as to drive the ignition button turning back to the switched off position for ensuring the heater being shut off from a power source.

[0019] These and other objectives, features, and advantages of the present invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] **FIG. 1** is a schematic diagram of a timer knob arrangement according to a preferred embodiment of the present invention.

[0021] **FIG. 2** is an exploded perspective view of a timer knob arrangement according to a preferred embodiment of the present invention

[0022] **FIG. 3** is a schematic diagram of the timer knob arrangement according to the above preferred embodiment of the present invention.

[0023] **FIG. 4** is a sectional side view of the timer knob arrangement according to the above preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0024] Referring to **FIG. 1**, **FIG. 2** and **FIG. 4** of the drawings, a timer knob arrangement for a heater **70**, such as a gas-operated heater, is illustrated. The heater **70** comprises a main casing having an operation surface **72**, and a stove unit supported by the main casing, wherein the stove unit comprises an operation pin **71** rotatably extended from the operation surface **72**, and adapted to generate controlled fire by gas. According to a preferred embodiment of the present invention, the timer knob arrangement comprises an ignition button **10**, and a timer control **20**.

[0025] The ignition button **10** has an actuation side **11**, an opposed engaging side **12** defining a receiving cavity **13** therebetween, and a pin holder provided at the engaging side **12** for substantially engaging with the operation pin **71** that the engaging side **12** is facing towards the operation surface **72** of the heater **70**, wherein the ignition button **10** is rotatably switched between a switched off position and an operation position with respect to the operation pin **71**.

[0026] On the other hand, the timer control **20** comprises a power unit **21**, a runner wheel **22**, and a time control unit **23**. The power unit **21** is received in the receiving cavity **13** of the ignition button **10**.

[0027] The runner wheel **22** is driven by the power unit **21**, and is rotatably supported by the ignition button **10** at a tangential position with respect to the operation pin **71**, wherein a portion of the runner wheel **22** is protruded from the engaging side **12** of the ignition button **10** for substantially running on the operation surface **72** of the heater **70** in a circular locus.

[0028] On the other hand, a time control unit **23** is received in the receiving cavity **13**, and is arranged to actuate the power unit **21** in a timely manner such that when the time control unit **23** is activated to actuate the power unit **21**, the runner wheel **22** is driven to rotate and to run on the operation surface **72**, so as to drive the ignition button **10** turning back to the switched off position for ensuring a flow of gas being shut off from the heater **70**.

[0029] As shown in **FIG. 4** of the drawings, the runner wheel **22** is rotatably supported within the receiving cavity **13** of the ignition button **10** having the portion protruded from the engaging side **12** of the ignition button **10** to contact with the operation surface **72** of the heater **70**. In order for the runner wheel **22** to substantially run on the operation surface **72**, the runner wheel **22** is preferably embodied as having an outer circumferential running surface **221** which has a high coefficient of friction so that when it is driven to rotate by the power unit **21**, the outer circumferential running surface **221** of the runner wheel **22** is adapted

to fictionally engaged with the operation surface **72**, in such a manner that an opposite reaction force of the rotation of the runner wheel **22** when it is driven to run on the operation surface **72** drives the ignition button **10** to rotate with respect to the operation pin **71** so as to shut off the heater **70**. According to the preferred embodiment, the outer circumferential running surface **221** is made of rubber and adapted for substantially running on the operation surface **72** to drive the ignition button **10** turning back to the switched off position.

[0030] In order to optimally control a rotational movement of the runner wheel **22**, the timer control **20** further comprises a gear unit **24** operatively communicating between the power unit **21** and the runner wheel **22** for regulating a rotational speed thereof. The consequence is that when the power unit **21** generates a rotational power at a certain rotational speed, the gear unit **24** will transfer this rotational power to the runner wheel **22** according to an overall gear ratio and produce a corresponding rotational speed of the runner wheel **22**.

[0031] According to the preferred embodiment of the present invention, the power unit **21** comprises a motor **211** supported within the receiving cavity **13** for generating the rotational force, and a power supply **212** electrically connected with the motor **211** for providing it with the necessary electrical power. Therefore, the power supply **212** is preferably embodied as a rechargeable or replaceable battery supported in the receiving cavity **13** of the ignition button **10** and is adapted to be periodically recharged via a power inlet provided on the ignition button **10**.

[0032] The time control unit **23** comprises a timer circuitry **231** supported in the receiving cavity **13** and electrically connected with the power unit **21**, and a time setting device **232** provided on an actuation side **11** of the ignition button **10** and electrically connected with the timer circuitry **231** for illustrating timer information of the heater **70**. The time setting device **232** is provided on the actuation side of the ignition button **10** to set a time interval for activating the timer circuitry **231** in a timely manner so as to actuate the power unit **21** to drive the runner wheel **22** to rotate.

[0033] Referring to **FIG. 1** to **FIG. 4** of the drawings, the time setting device **232** comprises a timer controller **2321** for setting the time period after which the ignition button **10** will be turned for shutting off the heater **70**, and a timer indicator **2322** for displaying the relevant working status of the timer control **20**. For instances, the timer controller **2321** may be embodied as a conventional mechanical timer controller **2321** which activate the power unit **21** when a pre-set time is up. In such a case, the timer indicator **2322** may be embodied as a plurality of marks provided on the timer controller **2321** wherein the user is able to pre-set the period of time the timer controller **2321** is going to elapse. Alternatively, the timer controller **2321** can be embodied as an electronic time control which sends an electrical signal to the power unit **21** when the pre-set period of time is up. In such a case, the timer indicator **2322** is embodied as a mini screen indicating the time which is to be elapsed.

[0034] Moreover, the time setting device **232** further comprises a time alert device **2323** electrically connected to the timer circuitry **231** for generating an alert signal when the timer circuitry **231** is activated to drive the runner wheel **22** to rotate.

[0035] In order to enhance the running performance of the runner wheel 22, the timer control 20 further comprises a runner panel 25, having a runner track 251, attached on the operation surface 72 of the heater 70 for fictionally engaging with the outer circumferences running surface 221 of the runner wheel 22 such that the runner wheel 22 is capable of substantially engaging with the runner track 251 so as to substantially run thereon when the runner wheel 22 is driven to rotate by the power unit 21. Accordingly, the runner track 251 is arranged to have a high coefficient of friction so as to ensure sound engagement with the runner wheel 22.

[0036] In other words, the runner track 251 of the runner panel 25 has a predetermined roughness to fictionally engage with the runner wheel 22 and has a predetermined curvature with respect to a running path of the runner wheel 22 to drive the ignition button 10 traveling from the operation position to the switched off position.

[0037] The operation of the present invention is follows: referring to FIG. 3 of the drawings, when the heater 70 is turned on, the user, by operating on the time control unit 23, may pre-set a predetermined time after which the ignition button 10 is driven to shut off the heater 70. After that predetermined time has elapsed, the timer circuitry 231 is arranged to activate the power unit 21 which in turn drives the runner wheel 22 to rotate. Since the runner wheel 22 is fictionally engaged with the runner track 251 of the runner panel 25, when it is driven to rotate, the ignition button 10 is driven to turn in a direction which shuts off the heater 70. As a result, the ignition button 10 'automatically' returns to its normal position where the heater 70 is shut off.

[0038] In order to stop rotation of the runner wheel 22 at the appropriate time, the timer circuitry 231 is pre-programmed to stop activating the power unit 21 after a predetermined period of time is elapsed since the power unit 21 has been activated. This predetermined period of time may be determined as the maximum possible time for the ignition button 10 to travel from the operation position to the switched off position. Alternatively, for sophisticated programming of the timer circuitry 231, the predetermined period of time may be set in such a manner that predetermined discrete intensities of the heater's 70 fire can be maintained. In other words, the user may choose discrete intensities of the heater's 70 fire before finally shutting off thereof.

[0039] It is worth mentioning that the heater 70 may be embodied as either gas-operated or electrically-operated. In either case, the user of the present invention does not need to purchase extra equipment for cooking involving extended period of time. With the time knob arrangement of the present invention, the user does not need to stay in the vicinity of the heater 70 and it is capable of being automatically shut after the predetermined period of time has elapsed.

[0040] From the forgoing descriptions, it can be shown that the above-mentioned objects have been substantially achieved. The present invention provides a time knob arrangement for a gas or an electric heater, such as a gas-operated stove, which is capable of automatically shutting off after a predetermined period of time.

[0041] One skilled in the art will understand that the embodiment of the present invention as shown in the drawings and described above is exemplary only and not intended to be limiting.

[0042] It will thus be seen that the objects of the present invention have been fully and effectively accomplished. Its embodiments have been shown and described for the purposes of illustrating the functional and structural principles of the present invention and is subject to change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

What is claimed is:

1. A timer knob arrangement for a heater which comprises an operation pin rotatably extended from an operation surface, comprising:

an ignition button having an actuation side, an opposed engaging side defining a receiving cavity therebetween, and a pin holder provided at said engaging side for substantially engaging with said operation pin that said engaging side is facing towards said operation surface of said heater, wherein said ignition button is rotatably switched between a switched off position and an operation position with respect to said operation pin; and

a timer control, which comprises:

a power unit received in said receiving cavity of said ignition button;

a runner wheel which is driven by said power unit and is rotatably supported by said ignition button at a position tangentially with respect to said operation pin, wherein a portion of said runner wheel is protruded from said engaging side of said ignition button for substantially running with said operation surface of said heater; and

a time control unit which is received in said receiving cavity and is arranged to actuate said power unit in a timely manner such that when said time control unit is activated to actuate said power unit, said runner wheel is driven to rotate and to run on said operation surface, so as to drive said ignition button turning back to said switched off position for ensuring said heater being shut off from a power source.

2. The timer knob arrangement, as recited in claim 1, wherein said runner wheel has an outer circumferential running surface which is made of rubber adapted for substantially running on said operation surface to drive said ignition button turning back to said switched off position.

3. The timer knob arrangement, as recited in claim 1, wherein said timer control further comprises a runner panel, having a runner track, adapted for attaching on said operation surface of said heater to guide said runner wheel running on said operation surface, such that when said runner wheel is driven to rotate by said power unit, said runner wheel substantially runs on said runner track of said runner panel to drive said ignition button turning back to said switched off position.

4. The timer knob arrangement, as recited in claim 2, wherein said timer control further comprises a runner panel, having a runner track, adapted for attaching on said operation surface of said heater to guide said runner wheel running on said operation surface, such that when said runner wheel is driven to rotate by said power unit, said runner wheel substantially runs on said runner track of said runner panel to drive said ignition button turning back to said switched off position.

5. The timer knob arrangement, as recited in claim 3, wherein said runner track of said runner panel has a predetermined roughness to fictionally engage with said runner wheel and has a predetermined curvature with respect to a running path of said runner wheel to drive said ignition button traveling from said operation position to said switched off position.

6. The timer knob arrangement, as recited in claim 4, wherein said runner track of said runner panel has a predetermined roughness to fictionally engage with said runner wheel and has a predetermined curvature with respect to a running path of said runner wheel to drive said ignition button traveling from said operation position to said switched off position.

7. The timer knob arrangement, as recited in claim 1, wherein said timer control further comprises a gear unit operatively communicating said power unit with said runner wheel to regulate a rotational speed thereof, such that when said power unit generates a rotational power, said gear unit transfers said rotational power to said runner wheel in accordance with a gear ratio of said gear unit which enough to drive said ignition button traveling from said operation position to said switched off position.

8. The timer knob arrangement, as recited in claim 2, wherein said timer control further comprises a gear unit operatively communicating said power unit with said runner wheel to regulate a rotational speed thereof, such that when said power unit generates a rotational power, said gear unit transfers said rotational power to said runner wheel in accordance with a gear ratio of said gear unit which enough to drive said ignition button traveling from said operation position to said switched off position.

9. The timer knob arrangement, as recited in claim 6, wherein said timer control further comprises a gear unit operatively communicating said power unit with said runner wheel to regulate a rotational speed thereof, such that when said power unit generates a rotational power, said gear unit transfers said rotational power to said runner wheel in accordance with a gear ratio of said gear unit which enough to drive said ignition button traveling from said operation position to said switched off position.

10. The timer knob arrangement, as recited in claim 1, wherein said time control unit comprises a timer circuitry electrically connected with said power unit and a time setting device provided on said actuation side of said ignition button to set a time interval for activating said timer circuitry in a timely manner so as to actuate said power unit to drive said runner wheel to rotate.

11. The timer knob arrangement, as recited in claim 2, wherein said time control unit comprises a timer circuitry electrically connected with said power unit and a time setting device provided on said actuation side of said ignition button to set a time interval for activating said timer circuitry in a timely manner so as to actuate said power unit to drive said runner wheel to rotate.

12. The timer knob arrangement, as recited in claim 4, wherein said time control unit comprises a timer circuitry electrically connected with said power unit and a time setting device provided on said actuation side of said igni-

tion button to set a time interval for activating said timer circuitry in a timely manner so as to actuate said power unit to drive said runner wheel to rotate.

13. The timer knob arrangement, as recited in claim 9, wherein said time control unit comprises a timer circuitry electrically connected with said power unit and a time setting device provided on said actuation side of said ignition button to set a time interval for activating said timer circuitry in a timely manner so as to actuate said power unit to drive said runner wheel to rotate.

14. The timer knob arrangement, as recited in claim 10, wherein said time setting device comprises a timer indicator provided on said actuation side of said ignition button for indicating said time interval of said timer circuitry and a time alert device electrically connected to said timer circuitry for generating an alert signal when said timer circuitry is activated to drive said runner wheel to rotate.

15. The timer knob arrangement, as recited in claim 11, wherein said time setting device comprises a timer indicator provided on said actuation side of said ignition button for indicating said time interval of said timer circuitry and a time alert device electrically connected to said timer circuitry for generating an alert signal when said timer circuitry is activated to drive said runner wheel to rotate.

16. The timer knob arrangement, as recited in claim 12, wherein said time setting device comprises a timer indicator provided on said actuation side of said ignition button for indicating said time interval of said timer circuitry and a time alert device electrically connected to said timer circuitry for generating an alert signal when said timer circuitry is activated to drive said runner wheel to rotate.

17. The timer knob arrangement, as recited in claim 13, wherein said time setting device comprises a timer indicator provided on said actuation side of said ignition button for indicating said time interval of said timer circuitry and a time alert device electrically connected to said timer circuitry for generating an alert signal when said timer circuitry is activated to drive said runner wheel to rotate.

18. The timer knob arrangement, as recited in claim 1, wherein said power unit comprises a motor supported within said receiving cavity to drive said runner wheel to rotate and a power supply which is embodied as a replaceable battery electrically connected with said motor for providing electrical power thereto.

19. The timer knob arrangement, as recited in claim 13, wherein said power unit comprises a motor supported within said receiving cavity to drive said runner wheel to rotate and a power supply which is embodied as a replaceable battery electrically connected with said motor for providing electrical power thereto.

20. The timer knob arrangement, as recited in claim 17, wherein said power unit comprises a motor supported within said receiving cavity to drive said runner wheel to rotate and a power supply which is embodied as a replaceable battery electrically connected with said motor for providing electrical power thereto.

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