



EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.01.2024 Bulletin 2024/01

(21) Application number: **23173372.6**

(22) Date of filing: **15.05.2023**

(51) International Patent Classification (IPC):
F24B 1/189 ^(2006.01) **F24B 5/02** ^(2006.01)
F23L 11/00 ^(2006.01) **F23L 13/02** ^(2006.01)
F23J 11/00 ^(2006.01) **F24F 11/34** ^(2018.01)
F24F 13/14 ^(2006.01)

(52) Cooperative Patent Classification (CPC):
F24B 5/02; F23J 11/00; F23L 11/00; F23L 13/02;
F24B 1/1895; F23J 2213/70; F23J 2215/40

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **28.06.2022 FI 20225586**

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(54) **FLUE DAMPER ARRANGEMENT**

(57) The invention relates to a flue damper arrangement (100) comprising a flue damper (101) and a first arm (102) for moving the flue damper, a hatch (103) adapted to open by gravity, a triggerable release switch (104) to keep the hatch closed, one or more smoke and/or carbon monoxide detectors (105) as well as a release switch controller (106). The said one or more smoke and/or carbon monoxide detectors are adapted to measure the smoke and/or carbon monoxide content of the air and to transmit a signal to the controller when the smoke and/or carbon monoxide content of the air reaches a given limit value. The release switch controller is adapted to receive the signal and to trigger the release switch after receiving the signal, with the result that the hatch of the flue damper opens and no smoke and/or carbon monoxide is formed outside the flue.

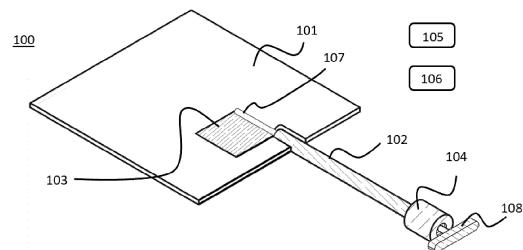


FIG. 1 A

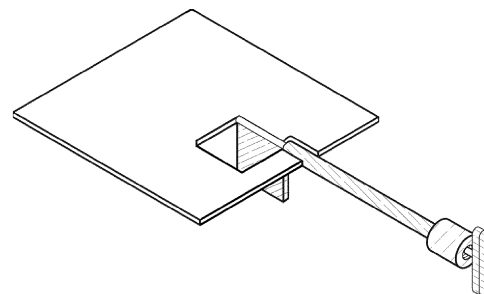


FIG. 1 B

Description

FIELD OF THE INVENTION

[0001] The invention relates to a flue damper arrangement in which the flue damper comprises a hatch that opens by gravity, the opening of the hatch being controlled based on the smoke and/or carbon monoxide content of the air.

BACKGROUND

[0002] The flues of fireplaces are usually equipped with a manually openable and closeable flue damper. The flue damper is opened when there is a fire burning in the fireplace and closed only after the combustion process is complete. This ensures that no carbon monoxide is formed in the indoor air. The problem is that the flue damper often is not used in an optimum way: it is either closed too early, with the result that carbon monoxide is formed in the indoor air, or too late, with the result that the recovery of heat energy diminishes.

[0003] One way of solving the problem described above is to provide the flue damper with an opening allowing any formed carbon monoxide to exit into the flue, also when the flue damper is closed. In this case, the heat energy is not stored in the best way possible.

[0004] The Finnish utility model publication FI9267 discloses a system comprising a flue damper, a motor operating the flue damper and a carbon monoxide detector installed in the flue. As the carbon monoxide detector detects carbon monoxide in the flue, it transmits a signal to the motor which changes the position of the flue damper, and, if the flue damper is closed, the motor opens the flue damper. Correspondingly: if the detector does not detect carbon monoxide, it gives the motor a signal based on which the motor closes the flue damper.

[0005] According to FI9267, the bottom of the flue damper is toothed, and an electric motor operable by a remote control or a toggle switch is provided at the frame of the flue damper, for the purpose of changing the position of the flue damper by means of a gearwheel. The system described in this specification is quite complicated. Another problem is that, if a power blackout occurs, the flue damper may get jammed, allowing carbon monoxide into the indoor air. Thus, there still exist a need to develop alternative flue damper arrangements.

SUMMARY

[0006] The invention aims at presenting a flue damper arrangement for closing and opening a flue of a fireplace, comprising a flue damper, a first arm for moving the flue damper, a flue damper hatch adapted to open by gravity, a triggerable release switch to keep the hatch closed, one or more smoke and/or carbon monoxide detectors as well as a release switch controller. The one or more smoke and/or carbon monoxide detectors are adapted

to measure the carbon monoxide content of the air and to transmit a signal to the controller in a situation where the carbon monoxide content of the air reaches a given limit value. The release switch controller is adapted to receive the signal and to trigger the release switch after receiving the signal, with the result that the hatch of the flue damper opens and no smoke and/or carbon monoxide is formed outside the flue.

[0007] Preferred embodiments of the invention are described in the dependent claims.

FIGURES

[0008]

Figure 1 shows an exemplary flue damper arrangement according to the invention, with the hatch of the flue damper closed (A) and open (B).

Figure 2 shows the operating principle of the hatch of an exemplary flue damper arrangement equipped with a solenoid.

Figure 3 shows the operating principle of the hatch of an exemplary inventive flue damper arrangement equipped with an electromagnet.

DESCRIPTION

[0009] Figure 1 shows a flue damper arrangement 100 according to a non-limiting embodiment of the invention for closing and opening a flue of a fireplace. The arrangement comprises a flue damper 101 and a first arm 102 for moving the flue damper between a first position and a second position, transversely to the flue, wherein, in the first position, the flue is closed, and, in the second position, the flue is open. The flue damper comprises a hatch 103 adapted to open by gravity when the flue damper arrangement is appropriately installed in the flue of the fireplace. The flue damper arrangement also comprises a triggerable release switch 104 to keep the hatch closed, one or more smoke and/or carbon monoxide detectors 105 as well as a release switch controller 106.

[0010] Typically, the first arm of the arrangement is welded to the flue damper. Preferably, the first arm is hollow, allowing the hatch 103 of the arrangement to be connected to the release switch 104 by a second rotatable arm 107 extending inside the first arm. Preferably, the second arm is made of a ferromagnetic material, such as steel.

[0011] The second arm comprises a first end attached to the hatch 103 by welding, for example, and a second end preferably equipped with a handle 108 for rotating the second arm. Preferably, the hatch is made of metal, such as steel. The center of mass of the system formed by the hatch 103 and the second arm 107 being located outside the longitudinal axis of the second arm, the hatch does not stay closed, unless supported, when the flue

damper is closed.

[0012] Preferably, the handle is rotatable between a first position and a second position, the hatch 103 being closed and opened when the handle is in the first position and in the second position, respectively. This makes it easy to observe, based on the position of the handle, whether the hatch is opened or closed, as shown in figure 1.

[0013] Preferably, the release switch is adapted to prevent the second arm from rotating when the release switch is closed and to allow the second arm to rotate while the release switch is opened. Preferably, the release switch is selected from a group comprising a solenoid, an electromagnet and a relay.

[0014] Figure 2 shows the operating principle of a release switch 204 according to an exemplary embodiment and equipped with a solenoid 209. In this embodiment, the second arm 207 has an aperture 210 into which the solenoid is fixed. As the release switch 204 receives a signal from a carbon monoxide detector, for example, via a release switch controller, the solenoid retracts out of the aperture 210 of the second arm, causing the hatch 203 to open by gravity.

[0015] Figure 3 shows the operating principle of a release switch 304 according to another embodiment and equipped with an electromagnet 311. As the release switch 304 receives a signal from a carbon monoxide detector via a release switch controller, it is demagnetized and the hatch 303 opens by gravity.

[0016] The flue damper arrangement comprises one or more smoke and/or carbon monoxide detectors. Smoke and/or carbon monoxide detectors are generally known. The carbon monoxide detectors are preferably installed outside the flue when the flue damper arrangement is in use. They are placed in the ceiling, close to the flue, for example.

[0017] The carbon monoxide detector is adapted to monitor the carbon monoxide content of the air and to transmit a signal to the release switch if the CO content reaches a predetermined limit value, such as 50 ppm. The carbon monoxide detector may also make a warning sound.

[0018] The smoke detector is adapted to monitor the smoke content of the air and to transmit a signal to the release switch if the smoke content reaches a predetermined limit value. The smoke detector may also make a warning sound.

[0019] The release switch controller is adapted to receive the signal transmitted by the smoke and/or carbon monoxide detector and to trigger the release switch after receiving the signal. As the release switch is triggered, the hatch of the flue damper arrangement opens.

[0020] The release switch controller controls the operation of the release switch in accordance with the signal, such as a sound or light, received from the smoke and/or carbon monoxide detector. The release switch controller can be, for example, a signal amplifier increasing the amplitude of the smoke and/or carbon monoxide detec-

tor's signal. The controller may also be capable of storing an electric charge. This allows the arrangement to also function in a situation where the charge and/or voltage of a battery provided in the arrangement drops.

[0021] When the hatch is open, it can be closed by rotating the handle until the hatch closes, followed by closing the release switch.

[0022] Typically, the one or more smoke and/or carbon monoxide detectors, the release switch controller as well as the release switch are operated by electricity, such as by a battery, an accumulator and/or grid power. If the power supply stops, the release switch, preferably, is automatically triggered in order to prevent any formation of carbon monoxide and smoke in the indoor air, also when there is a system failure.

Claims

1. A flue damper arrangement (100) for closing and opening a flue of a fireplace, the arrangement comprising a flue damper (101) and a first arm (102) for moving the flue damper, **characterized in that** the flue damper comprises a hatch (103) adapted to open by gravity **and in that** the flue damper arrangement comprises

- a triggerable release switch (104) to keep the hatch closed,
- one or more smoke and/or carbon monoxide detectors (105) and
- a release switch controller (106),

wherein the one or more smoke and/or carbon monoxide detectors are adapted to measure the smoke and/or carbon monoxide content of the air and to transmit a signal to the release switch controller when the smoke and/or carbon monoxide content of the air reaches a given limit value, and wherein the release switch controller is adapted to receive the signal and to trigger the release switch after receiving the signal.

2. The flue damper arrangement according to claim 1, **characterized in that** the first arm (102) is hollow, and, in the arrangement, the hatch (103) is connected to the release switch by a rotatable second arm (107) extending inside the first arm (102).

3. The flue damper arrangement according to claim 2, **characterized in that** the second arm (107) comprises a first end and a second end, the first end being attached to the hatch (103) and the second end being equipped with a handle (108) for rotating the second arm.

4. The flue damper arrangement according to claim 3, **characterized in that** the handle (108) is in a first

position when the hatch (103) is closed and in second position when the hatch is open.

5. The flue damper arrangement according to any one of claims 2 - 4, **characterized in that** the second arm is made of a ferromagnetic material. 5
6. The flue damper arrangement according to any one of claims 2 - 5, **characterized in that** the release switch is adapted to prevent the second arm from rotating while the hatch (103) is closed. 10
7. The flue damper arrangement according to any one of claims 1 - 6, **characterized in that** the release switch is selected from a group comprising a solenoid, an electromagnet and a relay. 15
8. The flue damper arrangement according to any one of claims 1 - 7, **characterized in that** the one or more smoke and/or carbon monoxide detectors are adapted to measure the carbon monoxide content of the air from the outside of the flue. 20
9. The flue damper arrangement according to any one of claims 1 - 8, **characterized in that** the release switch is adapted to be installed outside the flue. 25
10. The flue damper arrangement according to any one of claims 1 - 9, **characterized in that** the one or more smoke and/or carbon monoxide detectors, the release switch controller and the triggerable release switch are adapted to be electrically driven, and the release switch is adapted to be triggered in a situation where the supply of electrical power is hindered. 30
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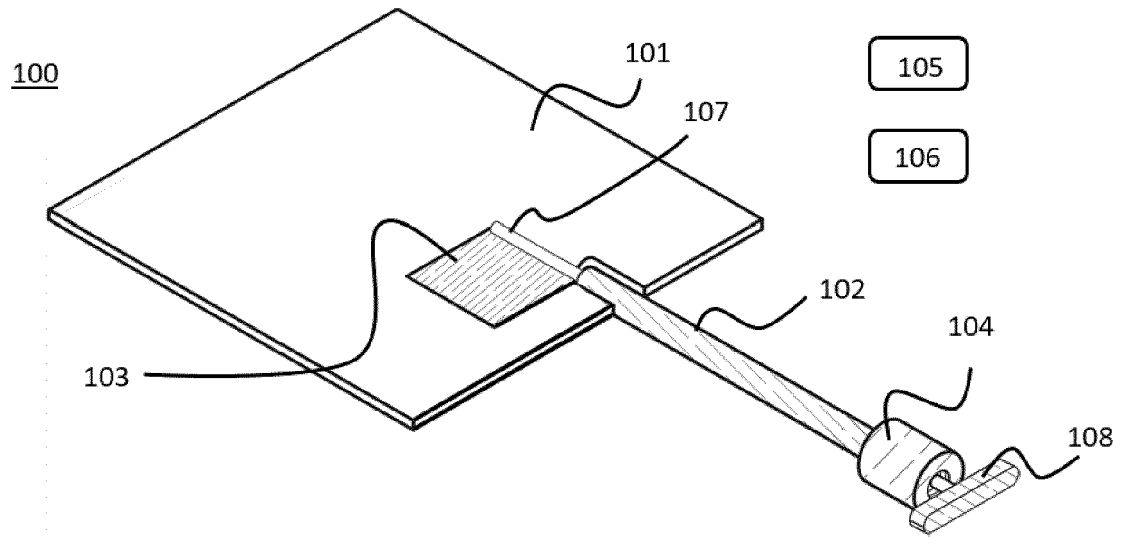


FIG. 1 A

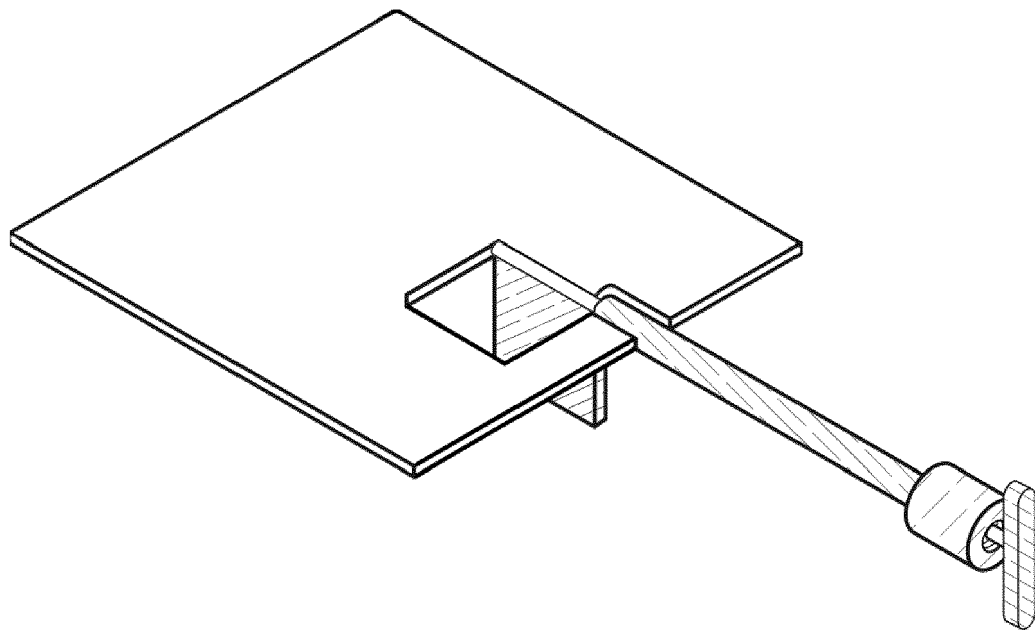


FIG. 1 B

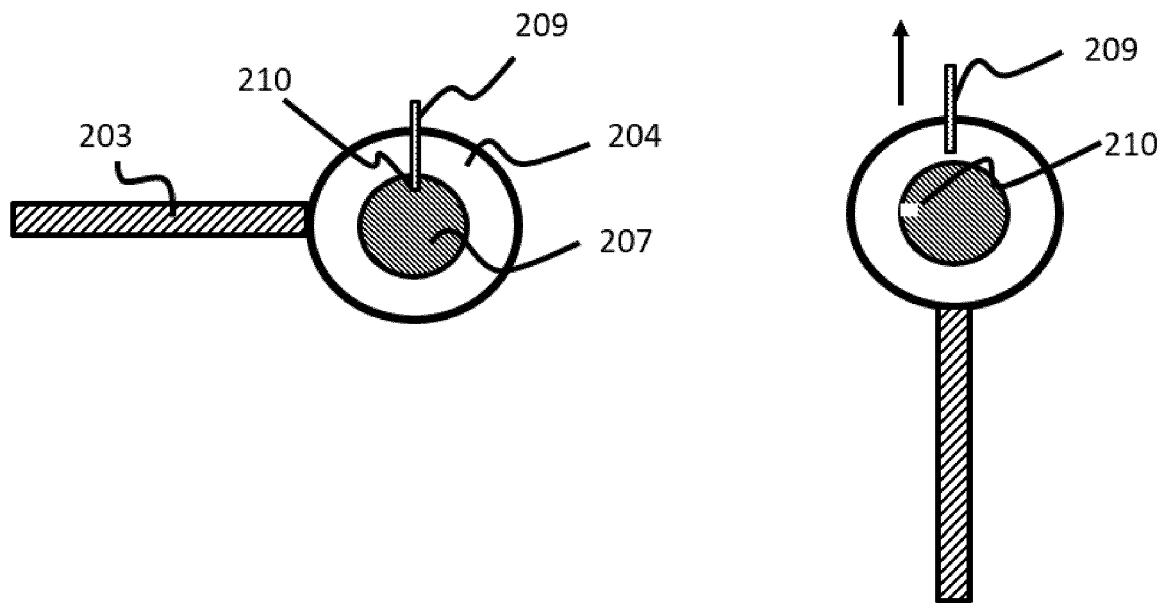


FIG. 2

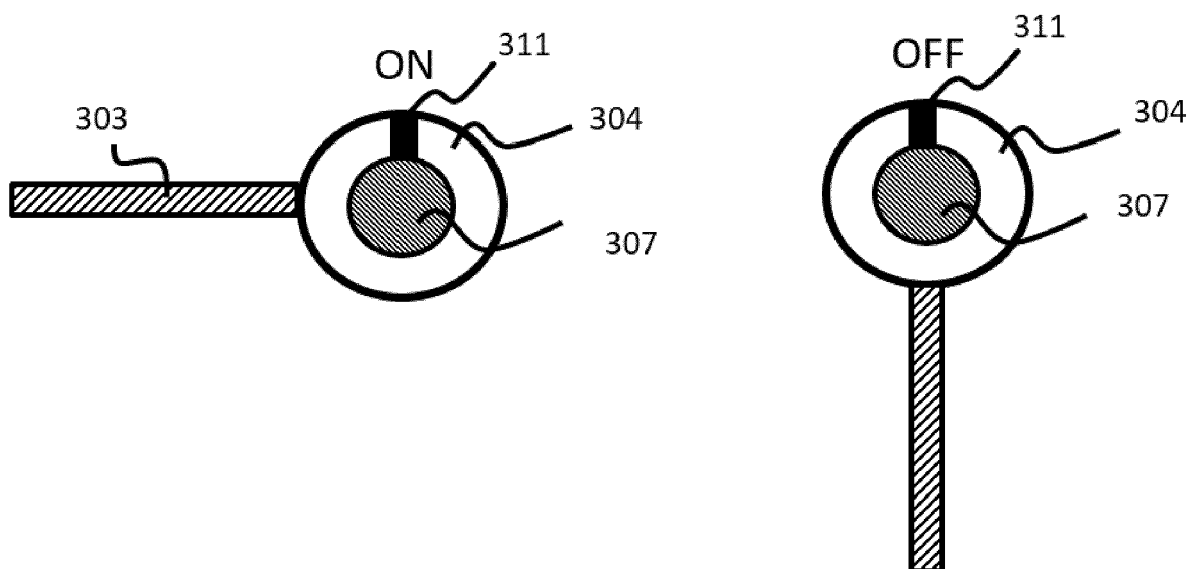


FIG. 3



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Application Number

EP 23 17 3372

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Place of search The Hague		Date of completion of the search 27 October 2023	Examiner Fest, Gilles
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
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