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(54) **System for feeding pellets to a combustion device**

(57) A system (1) for feeding pellets to a combustion device (32), comprising a storage container (2) for said pellets and connection means (35) between said container and said combustion device which define a pas-

sage for a controlled flow of said pellets from said container to said combustion device, and feed means (18) for forcibly thrusting said pellets into said passage to feed said device.

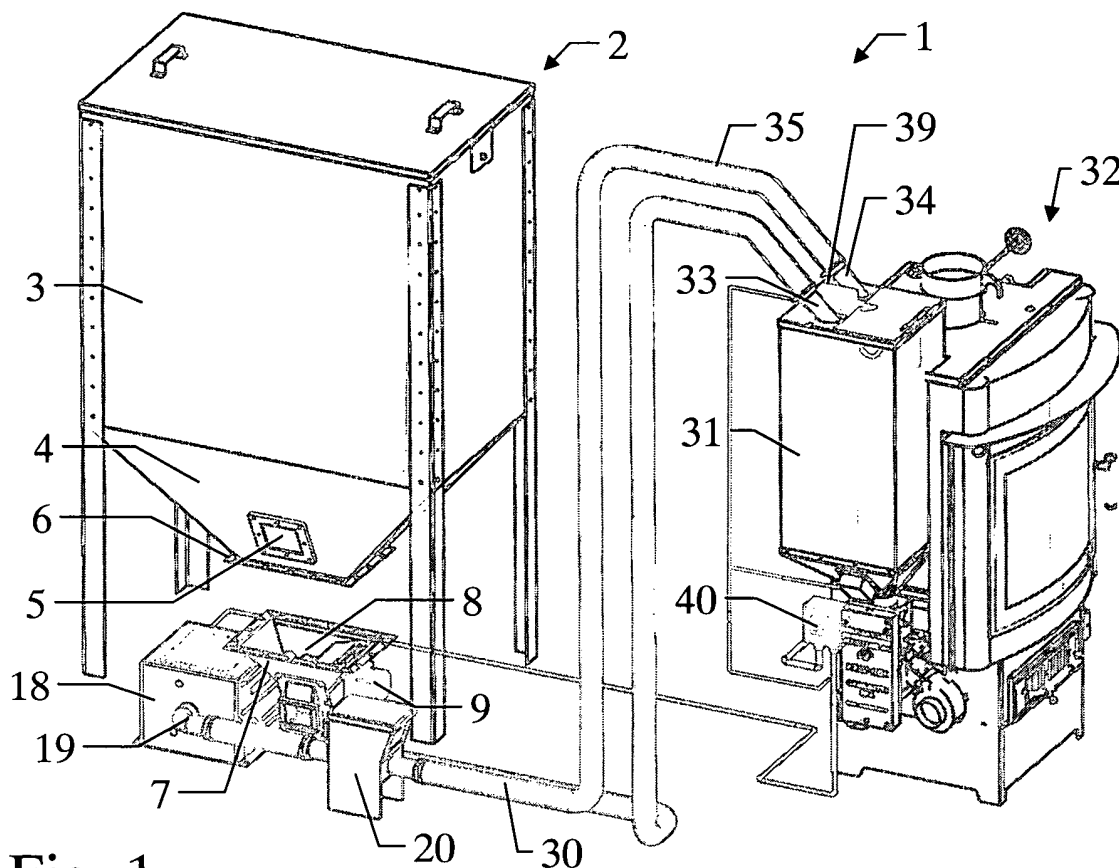


Fig. 1

Description

[0001] The present invention relates to a system for feeding pellets to a combustion device. More particularly, it relates to a system for automatically feeding pellets to a pellet-fed stove, fire, convection fire, convection stove or the like.

[0002] Known pellet-fed combustion devices for room heating include, adjacent to the burner, a vessel of small dimensions (30, 50 kg of pellets) connected to the burner via a shutter which, acting automatically, feeds the burner region with the pellet quantity necessary for combustion.

[0003] Known stoves have the drawback that this vessel has to be continuously filled manually each time it empties. This creates considerable problems, including transport, dust which disperses into the atmosphere, and limited stove self-sufficiency.

[0004] An object of the present invention is to provide a system for feeding pellets to a combustion device which overcomes the said drawbacks of the known art.

[0005] A further object of the present invention is to provide a system which provides a pellet-fed combustion device with much longer self-sufficiency than traditional systems.

[0006] Another object of the present invention is to provide a system which eliminates the need to manually refill the pellet vessel positioned adjacent to (or incorporated into) the combustion device.

[0007] Another object of the present invention is to provide a system which improves the quality of the environment in which the combustion device is installed, by eliminating a possible dust source.

[0008] These and further objects are attained by a feed system in accordance with the technical teachings of the accompanying claims. Further characteristics and advantages of the invention will be apparent from the description of a preferred but non-exclusive embodiment of the system for feeding pellets to a combustion device, illustrated by way of non-limiting example in the accompanying drawings, in which:

Figure 1 is a schematic perspective view of a system according to the present invention;

Figure 2 is a perspective detailed view of a transfer unit between a hopper and a pellet delivery pipe;

Figure 3 is a perspective view of a safety device of the present invention;

Figure 4 is a section through a nozzle and through a pipe portion in proximity to said transfer unit between the hopper and pipe;

Figure 5 is a section through a hopper with its screw.

[0009] With reference to said figures, these show a pellet feed system indicated overall by the reference numeral 1.

[0010] It comprises a large-dimension container 2 able to house indicatively a pellet quantity of about 250 kg or more. The container presents a parallelepiped portion 3

supported by uprights resting on the ground. The parallelepiped portion is sealedly closed upperly by a removable cover to give access to the container interior for its filling with pellets.

[0011] The lower part of the parallelepiped portion 3 is welded to a conveyor 4 provided with an inspection window 5 and terminating with a flange 6. The flange is bolted to a hopper 7, at the inlet of which a screw 8 is disposed, rotated by a gearmotor 9. The screw acts as a shutoff and control means for the flow of pellets delivered by the container 3. A transfer unit 10 is fixed via a coupling frame 10A to a side face of the hopper 9 in correspondence with an aperture, to connect the hopper interior to a tubular element 11. The transfer unit presents, welded to the frame, a convergent part terminating in a portion 13 which embraces the tubular element 11. A lateral window 14 facing the interior of the transfer unit is provided in the tubular element 11, the convergent portion 12 of the transfer unit presenting an inspection window 15. A convergent nozzle 16 is fixed in the tubular element to partially overlap the window 14. The cavity of this nozzle presents a first frusto-conical portion 16A to which, in the final part of the cavity, an asymmetric portion is connected which in its upper part continues the frusto-conical profile as a straight line, whereas in its lower part it presents a curved connection 16B with a rapid reduction of its passage cross-section.

[0012] Upstream of the transfer unit, a connector tube 19 is present, connected to the delivery of a pneumatic feed means comprising a fan enclosed in a casing 18. The casing and fan are positioned in use below the container 2, to reduce the overall size of the system.

[0013] Directly downstream of the hopper, below the container 2, there is a flame trap device 20. This flame trap device prevents flame returning to the container if conduits are obstructed. It comprises a chamber with an inlet 21 and an outlet 22, when in use the inlet 21 being connected to the outlet 11 A of the tubular element 11. The chamber of said device is defined by perimetral walls 23 and an inclined wall 23A on which a door 24, freely openable towards the chamber interior, is hinged along an axis A. The weight of the door maintains it closed, abutting against that face of the wall 23A inside the chamber. Any vacuum created in said chamber causes the door 24 to automatically open, to again close automatically when the pressure inside the chamber is restored. The device 20 also presents a filter mesh (not shown) facing the aperture 21.

[0014] The outlet 22 of the device 20 is connected via an antistatic flexible conduit 30 to a vessel 31 incorporated into or positioned next to a pellet combustion device or burner 32. When in use, the container 2, the pneumatic feed means 18 and the safety device 20 are located in a room remote from that in which the combustion device is located. Advantageously they are located outside the dwelling. In the illustrated embodiment, the combustion device 32 is a stove. The control logic for the vessel 31 and for the feed of pellets withdrawn from said vessel is

totally conventional. However the vessel 31 presents a pellet loading port 33 connected to said conduit 30. The vessel 31 also presents an air discharge port 34 connected via a return conduit 35 to the suction side of said fan 18. Advantageously the loading port and the discharge port are integrated into a cover for the vessel 31.

[0015] The vessel 31 and the container 2 are sealed, and together with the aforescribed components and the flexible conduits 30, 35 form a closed circuit through which pressurized air circulates when the fan 18 is active.

[0016] In concluding the description of the invention it should be noted that the vessel 31 presents at least one photoelectric cell sensor 39 which senses the level of pellets contained therein. This sensor is connected to a control centre 40 for the fan 18 and screw 8.

[0017] The operation of the invention is apparent to the expert of the art from the foregoing description and is as follows.

[0018] When the pellet level within the vessel 31 falls below a preset level sensed by the photoelectric cell 39, the control centre 40 activates the fan 18 which pressurizes the circuit. The pellets which have passed from the remote container into the hopper are thrust by the air flow generated by the fan into the vessel 31, to restore its adjustable preset level.

[0019] A preferred embodiment of the invention has been described, however others can be conceived utilizing the same inventive principle.

Claims

1. A system for feeding pellets to a combustion device, comprising a storage container for said pellets and connection means between said container and said combustion device which define a passage for a controlled flow of said pellets from said container to said combustion device, **characterised by** comprising feed means for forcibly thrusting said pellets into said passage to feed said device.
2. A system as claimed in claim 1, **characterised in that** said feed means are of pneumatic type.
3. A system as claimed in claim 2, **characterised in that** said connection means comprise a hopper to convey said pellets from said container into a delivery conduit defining said passage.
4. A system as claimed in claim 3, **characterised in that** interception means are present between said hopper and said passage to enable or prevent the flow of said pellets into said conduit.
5. A system as claimed in claim 4, **characterised in that** said interception means comprise a screw driven by a gearmotor.
6. A system as claimed in claim 3, **characterised in that** said delivery conduit is pressurized by a pneumatic element positioned upstream of said hopper.
7. A system as claimed in claim 6, **characterised in that** said pneumatic element is a fan.
8. A system as claimed in claim 1, **characterised in that** a flame trap device is provided between said combustion device and said container to prevent flame returning towards said container.
9. A system as claimed in claim 8, **characterised in that** said flame trap device comprises a chamber connected to said conduit, a door being hinged to said chamber on an inclined wall thereof and swivelling towards its interior.
10. A system as claimed in claim 9, **characterised in that** said safety device comprises a filter element.
11. A system as claimed in claim 3, **characterised by** comprising, in proximity to said combustion device, a local vessel presenting a pellet entry port connected to said feed conduit.
12. A system as claimed in claim 1, **characterised by** comprising a return conduit provided between said combustion device and said pneumatic element, said return conduit together with said delivery conduit, said pneumatic device and said local vessel forming a closed circuit for air circulation.
13. A system as claimed in claim 11, **characterised in that** said return conduit is connected to a second port provided in said local vessel.
14. A system as claimed in claim 11, **characterised by** comprising a sensor for measuring the level of pellets in said local vessel, said sensor being connected to a control centre to activate said pneumatic device when the level of said pellets in said local vessel falls below a preset level, and to deactivate said pneumatic device when the level rises to the preset level.
15. A system as claimed in claim 14, **characterised in that** said sensors are photoelectric cells.
16. A system as claimed in one or more of the preceding claims, **characterised in that** said conduits comprise antistatic flexible pipes.
17. A system as claimed in claim 7, **characterised in that** said fan is enclosed in a casing.
18. A system as claimed in claim 3, **characterised in that** in proximity to the hopper, said conduit presents a convergent nozzle arranged to raise the flow ve-

locity to thrust said pellets towards said combustion device.

19. A system as claimed in claim 3, **characterised in that** said hopper and conduit are connected together by a transfer unit which comprises, from the hopper to said conduit, a frame for coupling to said hopper, a convergent portion for connection between said window and a lateral window provided in said conduit, and an inspection window in said convergent portion.
20. A system as claimed in one or more of the preceding claims, **characterised in that** said container presents an inspection window in proximity to its connection to said hopper.
21. A system as claimed in one or more of the preceding claims, **characterised in that** said container and/or said vessel are sealed.

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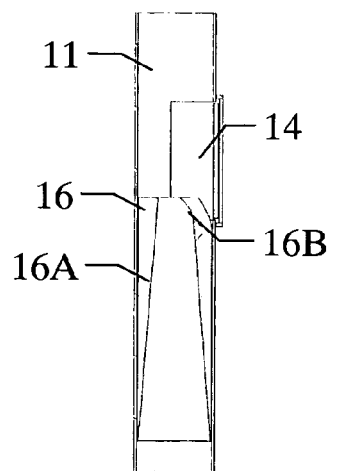
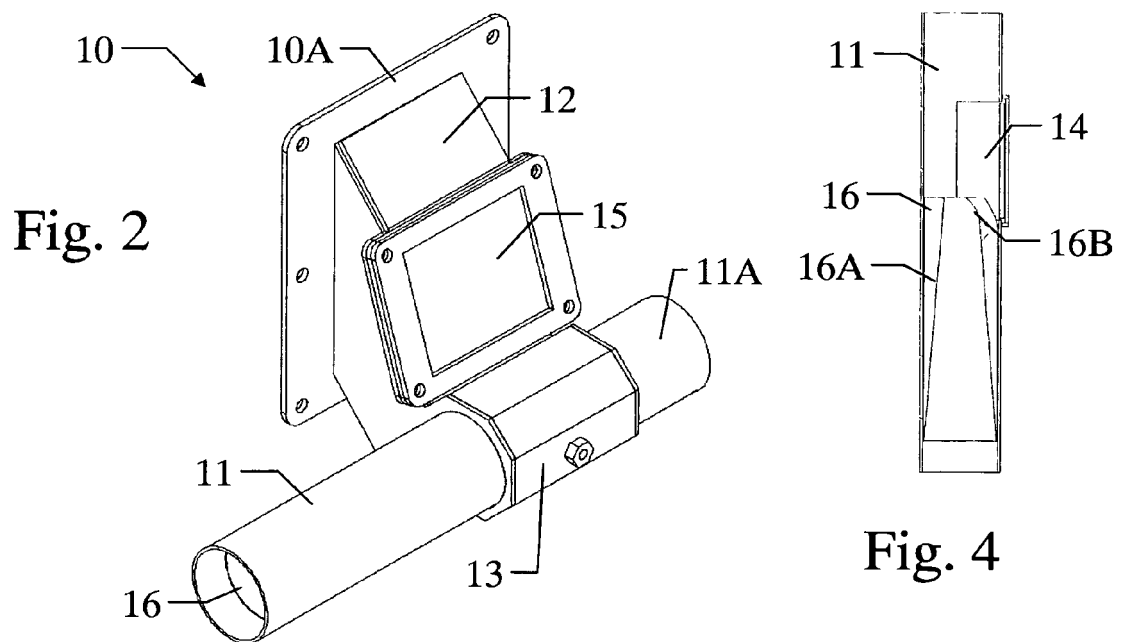
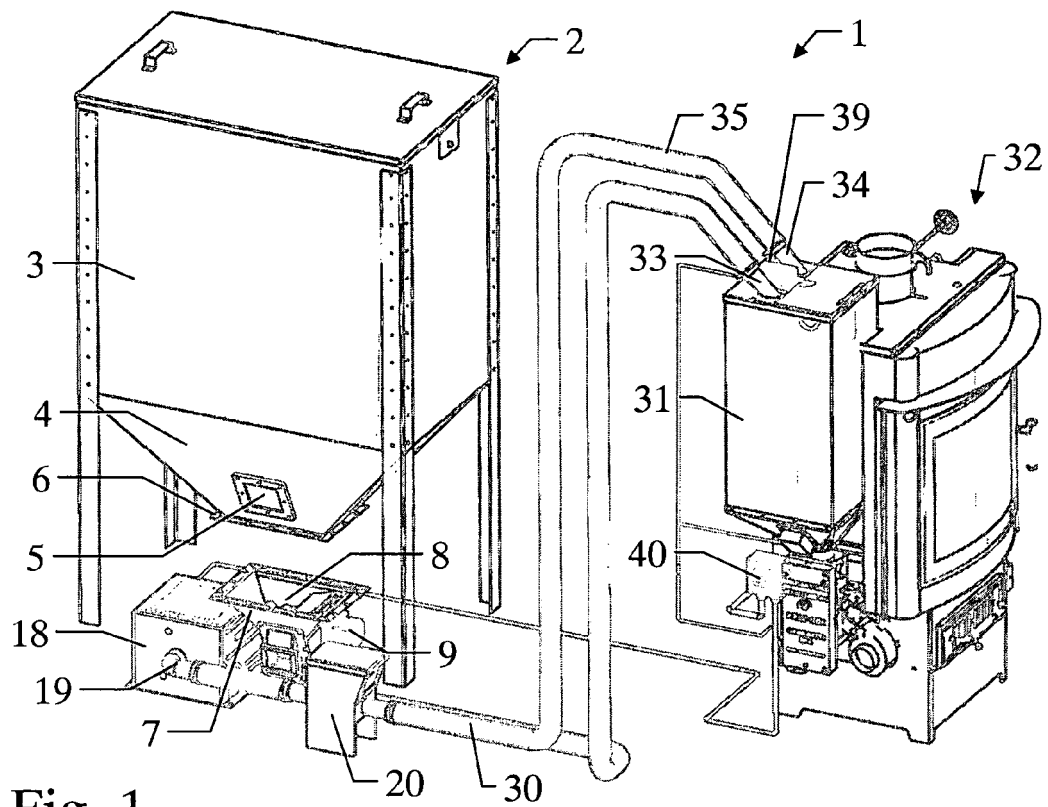
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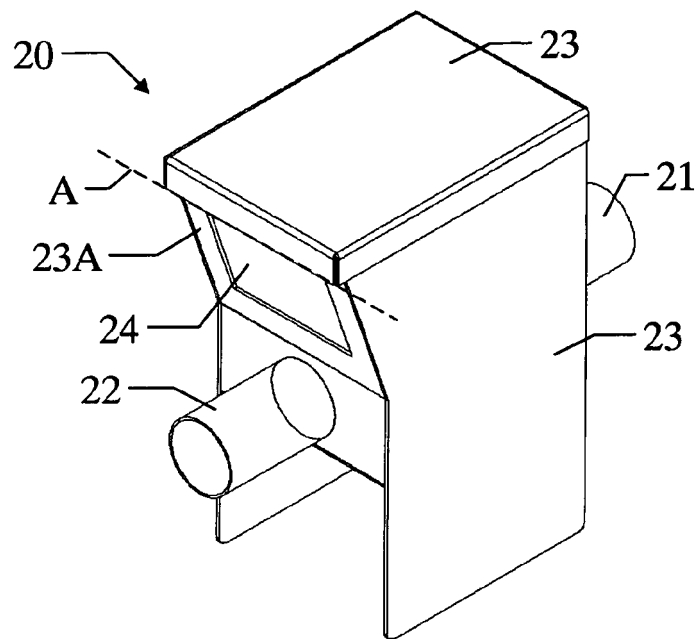


Fig. 3

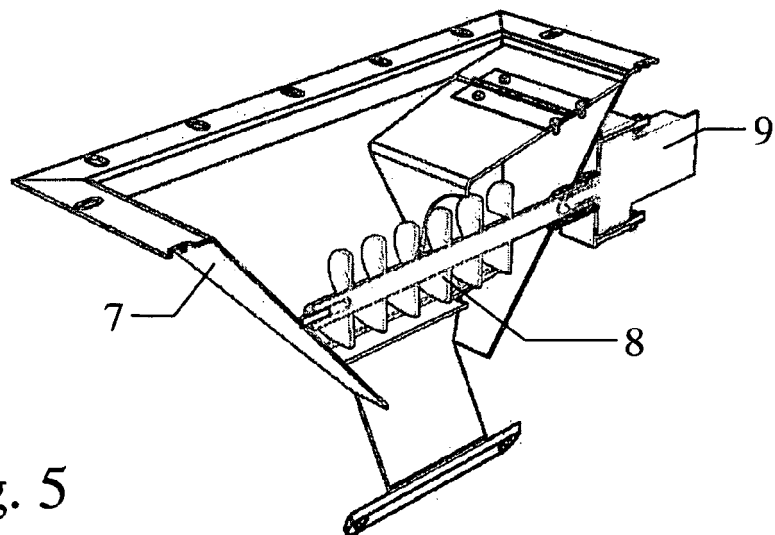


Fig. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5672

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 March 2008	Examiner Gavriliu, Costin
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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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