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(54) Improvements in or relating to feed devices.

(57) A feed device (1) for solid fuel domestic appliances comprises a hopper (2) with downwardly inclined sides (3) defining a discharge slot (4) beneath which is located a flat plate (6) in spaced relation thereto. The plate (6) is mounted on a central pivot (7) and is movable thereabout by a suitable low power low speed drive (5). A spreader device comprising two series of inclined spaced apart metal strips (8) is located below the plate (6). Fuel held within the hopper (2) flows out onto the plate (6) and assumes a natural angle of repose when the plate (6) is horizontal. Upon small angular movement of the plate (6), fuel is caused to flow off the plate (6) which in use is disposed evenly over a fire bed by the spreader device.

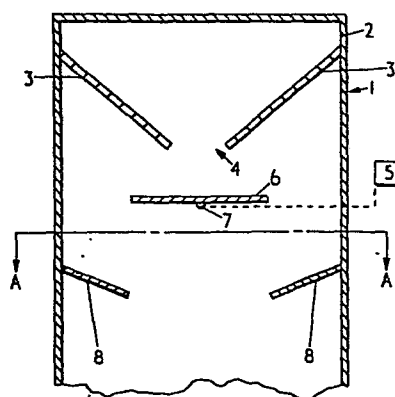


FIG. 1

CASE 4289IMPROVEMENTS IN OR RELATING TO FEED DEVICES

This invention concerns improvements in or relating to feed devices for use particularly although not exclusively in solid fuel domestic combustion appliances.

One of the needs especially in modern times is for a means of
5 automatically feeding solid fuel onto the firebed of a solid fuel burning appliances, thereby obviating the need for manual operation. It is desirable to provide a system giving incremental feed to maintain the correct combustion rate and thus output.

Various suggestions have been made in an endeavour to meet this
10 need. For example rotary valves or sliding plates have been proposed but these suffer from the disadvantages of high power consumption for the drive motors and they both involve a shearing or crushing action on the fuel. Particularly for the domestic market, low power, low cost mechanisms are required.

15 One of our earlier inventions described and claimed in GBPA 2 011 065 is directed to the use of a paddle wheel rotor which found successful application when used for singles size coal as it did not involve shearing of the fuel. However it provided a batch feed and attempts to modify this system to give an incremental
20 feed were unsuccessful. Also for larger sized fuel, for

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example doubles, the dimensions of the paddle wheel would become too great to accommodate within the confines of a domestic appliance.

An object of the invention is therefore to provide an improved feed device.

5 Accordingly the invention provides a feed device including in combination a hopper with at least two inclined bounding walls leading at relatively lower ends thereof to a discharge outlet, a plate disposed beneath the outlet at such a distance therefrom as to allow in use material from the hopper to assume a natural angle of repose,
10 and means for moving the plate such that in use upon movement of the plate material is caused to discharge from the plate.

The plate is preferably flat or substantially flat and is wider than the discharge outlet of the hopper.

The plate is conveniently mounted on a central pivot, movement
15 about the pivot in either direction in use occasioning the discharge of material from the plate.

The means for moving the plate may advantageously be a small slow speed motor, conveniently electrical, which is coupled via a crank arrangement to the pivot of the plate, thereby in use giving a
20 small angular movement of the plate. The degree of angular movement is conveniently of the order of 2° to 7° .

Alternatively, the means for moving the plate comprises a vibrator for transmitting intermittent vibrations to the plate thereby upsetting in use the natural angle of repose of material resting on
25 the plate.

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The angular orientation of the hopper walls is advantageously of the order of 35° to 45° to the horizontal.

Operation of this device will give an incremental feed of material from the hopper. However, in the case of a coal burning appliance, it is desirable in some cases to distribute the fed material evenly onto a firebed. This cannot be achieved by the device, which will discharge the coal onto the firebed into two piles. To avoid this problem, where necessary, the device may also include a spreader device located below the plate. Conveniently the spreader device comprises two series of spaced apart metal strips, each series being for location adjacent one edge of the plate at an angle of about 25° to the horizontal such that a proportion of the material discharged from the plate is deflected below the plate.

The present invention is preferably directed to a feed device for feeding solid fuel to a combustion appliance and a further aspect of the invention is directed to a solid fuel combustion appliance incorporating such a feed device.

By way of example, one form of feed device according to the invention is described below with reference to the accompanying drawings in which:-

Figure 1 diagrammatically illustrates the invention in cross section; and

Figure 2 is a plan view along the line A-A of Figure 1.

Referring to the drawings, a feed device 1 comprises a hopper 2 having at least two lower sides 3 inclined downwards a discharge outlet

in the form of a slot 4. The angle of inclination of the sides 3 is in this example 40° as a preference. It has been found by experiment that the width of the slot 4 should be of the order of 120 mm in order to feed doubles size coal efficiently, there being no upper limit.

5 A flat plate 6 is located directly beneath the slot 4 at a minimum distance, in this embodiment of 95 mm, and is mounted at its centre on a pivot 7. The minimum width of the plate 6 in this example is 256 mm. The combination of these dimensions ensures that in use material, for example solid fuel, in the hopper 2 flows out of slot 4
10 and assumes a natural angle of repose on the plate 6 when in a horizontal position at which no discharge therefrom occurs..

 A low power slow speed electric motor 5 is provided and is coupled to the pivot 7 to impart a slow oscillatory motion to the plate 6. An angular movement either side of the horizontal neutral
15 position of up to 7° has been found to give a discharge of material, for example fuel, from the plate in increments. It has also been determined by experiment that a motor speed of less than 1 rpm and an angular movement in either direction of 6° gives a good result. At
20 motor speeds of between 1 rpm and 5 rpm and an angle 3° , good results have also been obtained.

 Mounted below the plate 6 is a spreader device 9 comprising two series of spaced apart metal strips 8. Each series of strips slopes at an angle of about 20° to the horizontal towards the centre of the device, their lower ends being located adjacent one edge of plate 6.
25 In this instance, the strips are 25 mm wide and spaced 40 mm apart.

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The distance between the lower ends of the series of strips is 330 mm and the vertical distance from the plate 6, when horizontal, to the lower end of the strips 8 is 92 mm. As the material discharges from the plate 6 it falls onto one of the series of strips 8. A proportion of the material is deflected by the strips to below the plate 6, and the rest falls through to spaces between the strips 8, thus producing an even bed of material.

The feed device of the present invention is particularly applicable to a domestic combustion appliance in which an incremental feed of solid fuel is required. The intermittent or continuous actuation of the motor to move the plate provides the desired feed characteristic at low cost and automatically and the spreader device provides an even firebed. The dimensions given herein are especially suitable for feeding doubles size coal, but may be altered according to the material to be fed.

CASE 4289/EUROPATENT CLAIMS:

1. A feed device includes in combination a hopper with at least two inclined bounding walls leading at relatively lower ends thereof to a discharge outlet, characterised by a plate (6) disposed beneath the outlet (4) at such a distance therefrom as to allow in use material
5 from the hopper (2) to assume a natural angle of repose, and means (5) for moving the plate such that in use upon movement of the plate material is caused to discharge from the plate.
2. A feed device according to claim 1 characterised in that the plate (6) is flat or substantially flat and is wider than the discharge
10 outlet (4) of the hopper.
3. A feed device according to claim 1 of 2 characterised in that the plate (6) is mounted on a central pivot (7).
4. A feed device according to any one of the preceding claims characterised in that the means for moving the plate (6) is a low speed
15 power electrical motor (5).
5. A feed device according to claim 4 as dependent on claim 3 characterised in that the motor (5) is coupled to the pivot (7) to give bi-directional angular movement to the plate (6).
6. A feed device according to claim 5 characterised in that the
20 angular movement in either direction is in the range 2° to 7° .
7. A feed device according to any one of the preceding claims characterised in that the angular inclination of the walls (3) is in the range 35° to 45° .
8. A feed device according to any one of the preceding claims and
25 further characterised by a spreader device (9) located below the plate (6).
9. A feed device according to claim 8, characterised in that the spreader device (9) comprises two series of spaced apart metal strips

(8), each series being provided for location adjacent one edge of the plate (6) at an angle to the horizontal such that a proportion of the material discharged from the plate (6) is deflected below the plate (6).

- 5 10. A feed device according to claim 9 characterised in that the angle is approximately 25° .

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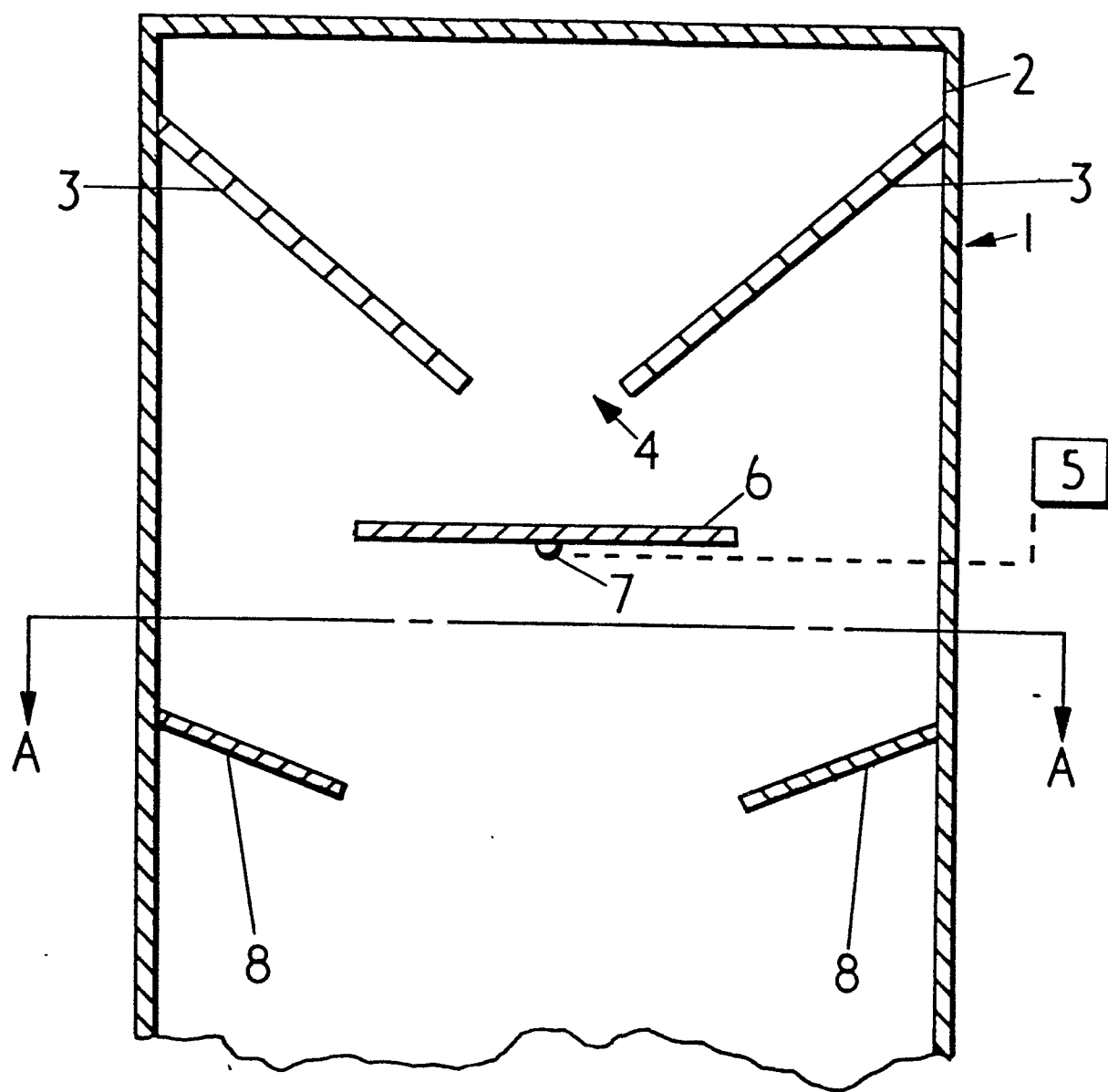


FIG. 1

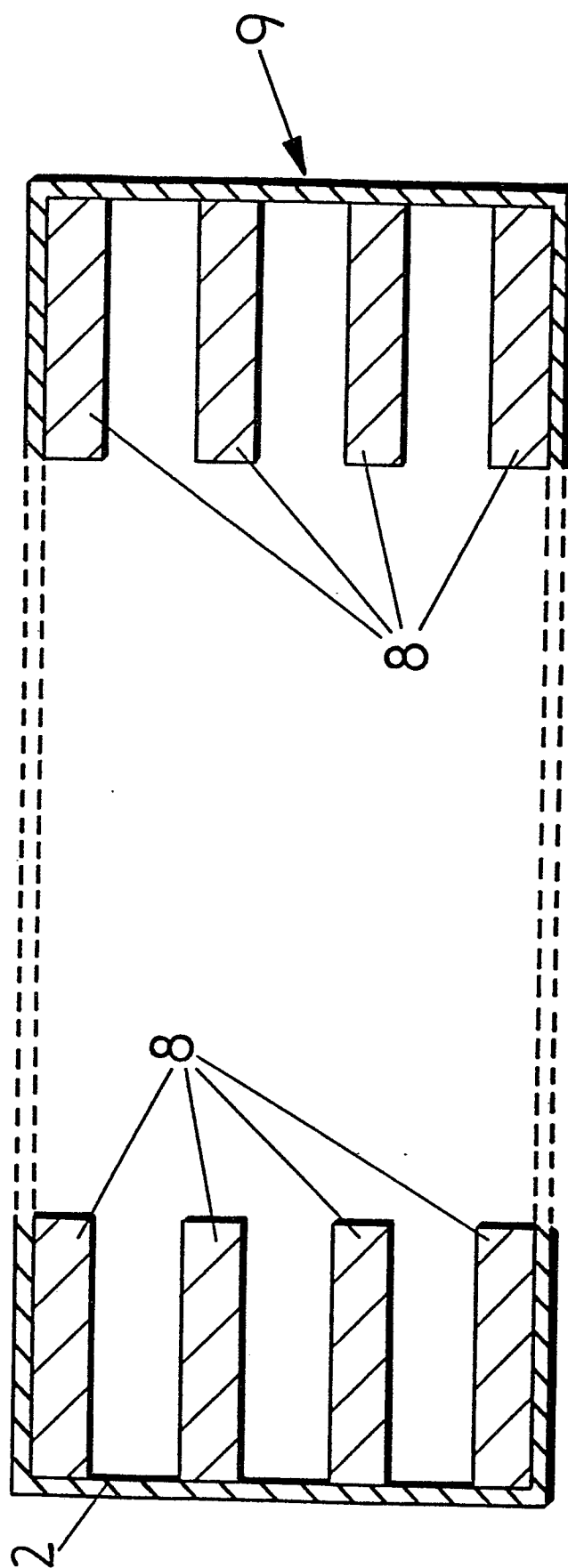


FIG. 2