United States Patent

[11] **3,627,038**

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[33] **England**
[31] **53,548/68**

[54] **HEATERS**
5 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** ..... **165/126,** 126/110 AA
[51] **Int. Cl.** **F24h 3/06**
[50] **Field of Search** 165/48, 53–55, 121–123, 126; 126/110

[56] **References Cited**

UNITED STATES PATENTS

2,220,355	11/1940	Shurtleff	165/54 X
2,828,110	3/1958	Baker et al.	165/54 X
2,792,826	5/1957	Kilbury	126/110

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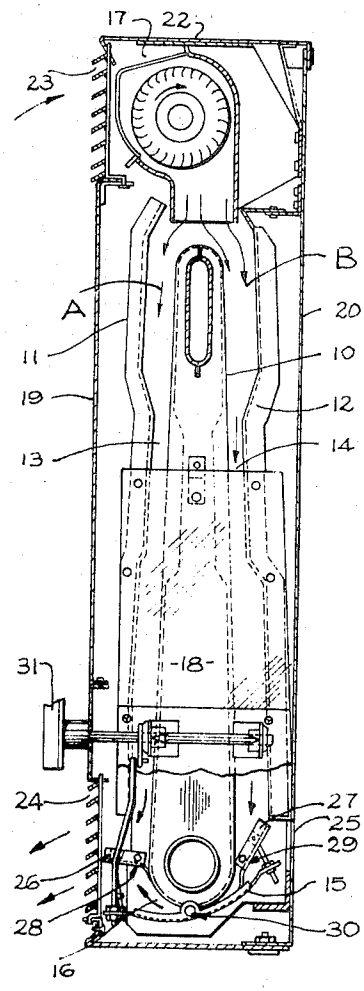
ABSTRACT: A space heater including first and second passages along which air is forced to flow on opposite sides of the heat-exchanger core to respective first and second outlets. Movable flaps are respectively associated with the first and second outlets and are coupled by lost motion devices to a pivotally mounted end member which defines in combination with the heat-exchanger core a third passage extending between said first and second outlets. The end member is setable into first intermediate and second positions and the coupling between the end member and the flaps is such that the end member is in its first position the flaps are arranged to direct air to the first outlet from both passages and when the end member is in its second position the flaps are arranged to direct air to the second outlet from both passages while when the end member is in its intermediate position the flaps are arranged to direct air from the first and second passages respectively to the first and second outlets.



Patented Dec. 14, 1971 **3,627,038**

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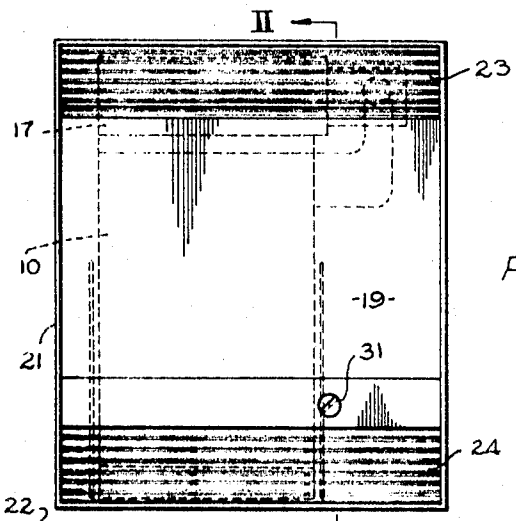

FIG. 1.

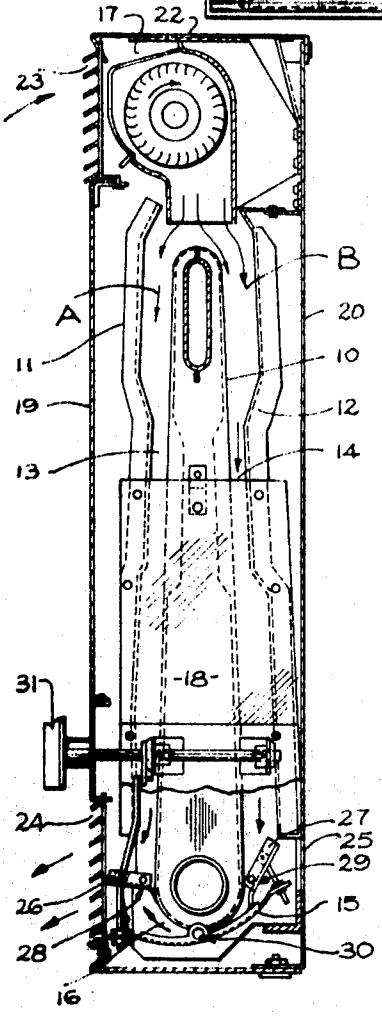

FIG. 2.

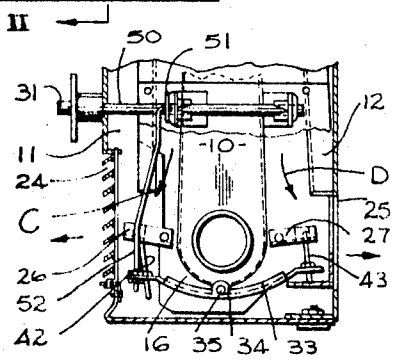

FIG. 3.

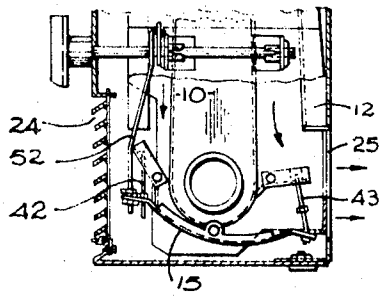

FIG. 4.

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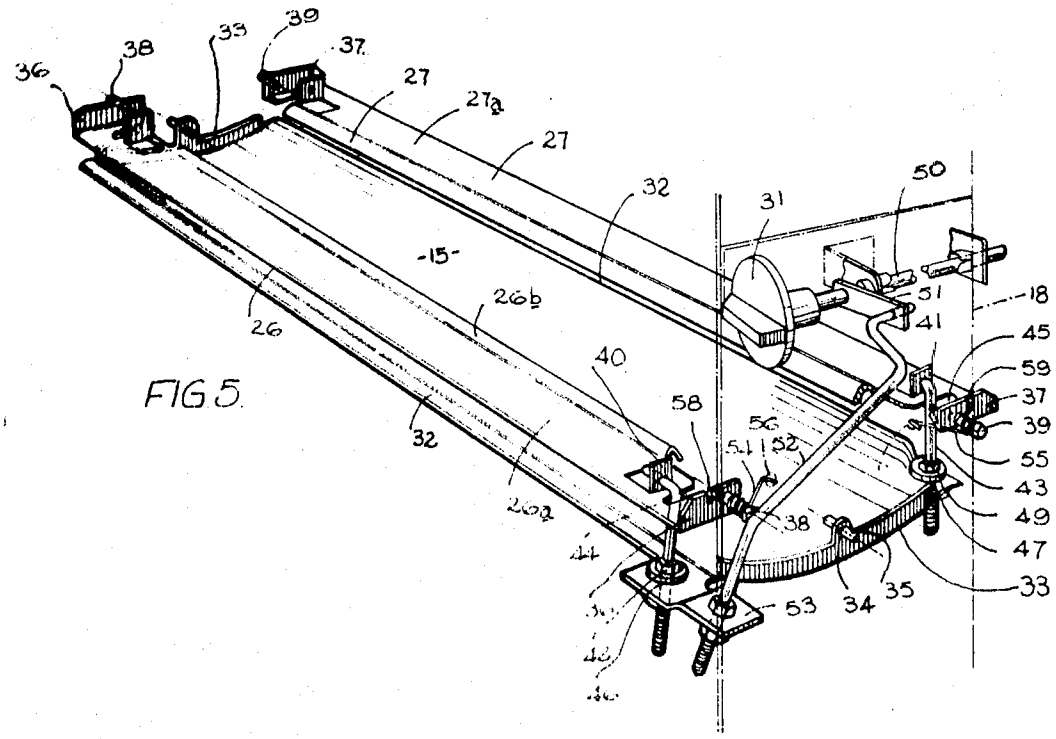

FIG 5

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HEATERS

This invention relates to space heaters of the type of heater in which air is forced to flow over a heat-exchanger core and is then discharged into a space to be heated. An example of such a heater is described in our British Pat. Specification No. 1,135,395.

Normally, a heater of this type is arranged to serve a single space and draws air from that space and discharges heated air back to the space.

Sometimes, however, it is desired to provide a heater of this type to serve two spaces either alternatively or together and it is an object of the present invention to provide a simple arrangement whereby a heater can be used in combination with two separate spaces being mounted, for example, on a wall between the spaces.

According to the invention we provide a space heater comprising a heat-exchanger core, a casing defining with the core first and second passages for air to be heated, the passages being separated by the core, first and second air outlets at the ends of the first and second passages respectively, the outlets being adjacent to an end of the core, and impeller means for causing air to flow along the passages to the outlets, a movable end member from said end of the core and defining therewith a third passage extending between said outlets, first and second flaps associated with, and movable to control, the first and second outlets respectively, each of the flaps being movable between an open position in which the associated outlet is open and the flap is located to direct air from its associated passage through the outlet and a closed position in which it substantially closes its associated outlet and allows air from its associated passage to flow into the third passage, means for moving the end member between first, intermediate and second positions, and linkage means between said end member and said flaps so that when the end member is in its first position the first and second flaps are in their open and closed positions respectively, when the end member is in its second position the first and second flaps are in their closed and open positions respectively and when the end member is in its intermediate position both flaps are in their open positions.

In this arrangement, when the end member is in its first position all the air will be discharged through the first outlet. The air from the second passage passes into the third passage and thus to the first outlet and the air from the first passage passes directly to the first outlet. When the end member is in its second position, all the air will pass out of the second outlet. The air from the second passage passing directly to the second outlet and the air from the first passage passing through the third passage to the second outlet. When the end member is in its intermediate position both outlets will be open and air will pass from the first passage through the first outlet and air will pass from the second passage through the second outlet, there being no flow of air through the third passage.

It will be appreciated that if the first and second outlets are directed to two different spaces to be heated, control of the end member will allow heat to be fed to both spaces or to either one depending on the position of the end member. If the heater is placed against a wall in one of the spaces then a duct can pass through the wall from one of the outlets to the other space to be heated.

The heater may have a single air inlet in one of the spaces or it may have two air inlets with control means arranged so that when air is being delivered to one space it will be drawn from that space whereas when air is being delivered to the other space it will be drawn from that other space and when air is being delivered to both spaces air will be drawn in from both spaces. The control means may be operated by further linkage from the end member if desired or by separate control means.

Preferably each flap in its open position positively directs air from its associated passage to its associated outlet and positively obstructs airflow from its associated passage to the third passage. Conveniently each flap is mounted for pivotal movement and in its closed position effectively forms an extension of its associated passage past the associated outlet to the third passage, whereas in its open position it extends transversely at said end of its associated passage.

Preferably, the end member is also mounted for pivotal movement. The flaps may be spring urged to their open positions and the linkage means may include a lost motion device permitting the end member to move to its first and second positions leaving, respectively, the first and second flaps in their open positions under the influence of the springs, while causing the second and first flaps respectively to move to their closed positions.

A particularly simple form of linkage comprises a rod pivoted to each flap and slidable in an aperture in the end member, the rod carrying an abutment to engage the end member. The collar is spaced from the end member when lost motion is required.

Preferably the means for moving the end member is an overcenter mechanism so arranged that the end member can only remain in any one of said first, intermediate and second positions, the springs on the flaps acting associated with the linkage to urge the end member to one of its positions, preferably the intermediate position.

Preferably, the end member is so arranged that it assists in closing the outlets. Thus when the end member is moved to its first position and the second outlet is closed, this closure is preferably effected both by the second flap and the end member, the second flap substantially closing the second outlet and the end member completing said closure. Conversely, when the end member is in its second position and the first outlet is closed, the first flap substantially closes the first outlet and the end member completes the closure.

An embodiment of the invention will now be described in detail by way of example with reference to the accompanying diagrammatic drawings in which:

FIG. 1 shows the front-elevational view of a space heater,

FIG. 2 shows, to a larger scale, a vertical section on the line II—II of FIG. 1 with the end member in its first position,

FIG. 3 is a view corresponding to the lower part of FIG. 2 showing the end member in its intermediate position,

FIG. 4 is a view corresponding to the lower part of FIG. 2 showing the end member in its second position, and

FIG. 5 is a perspective view of a linkage system for moving the end member between its three positions and simultaneously moving the flaps as appropriate.

The space heater illustrated comprises a heat-exchanger core **10** which is surrounded by an inner casing defining an airflow duct. The inner casing comprises front and rear plates **11** and **12** respectively spaced forwardly and rearwardly from the core **10** so as to define in combination therewith first and second passages **13** and **14**. Beneath the lower end of the core **10** and spaced downwardly therefrom, there is provided an end member **15** which is of curved shape and defines in combination with the core a third passage **16**. The inner casing is open at its upper end, and impeller means in the form of an electrically driven fan **17** is provided to force air into the upper end of the inner casing and down the first and second passages **13** and **14** as indicated by arrows A and B respectively. The inner casing is completed by a pair of side plates **18**.

The inner casing is housed within an outer casing which includes front and rear panels **19** and **20** respectively, side panels **21** and a top panel **22**. The outer casing may be open at the bottom if the heater is intended to stand upon a supporting surface, or it may be closed by a bottom panel (as shown).

The upper and lower edges of the front panel are spaced respectively downwardly and upwardly from the top panel and the bottom of the heater so as to define an air inlet opening **23** at the upper end and a first outlet opening **24** at the lower end. The rear plate **20** includes an aperture which serves as a second outlet opening **25** opposite to the first outlet opening **24**. Louvres or grills may be provided in the inlet opening **23** and first outlet opening **24** as shown, and possibly also in the second outlet opening.

Between the end member **15** and the lower ends of the front and rear plates **11** and **12** of the inner casing, respective flaps

26 and 27 are provided adjacent to the first and second outlet openings 24 and 25.

The first and second flaps are pivotally mounted at 28 and 29 respectively, and the end member 15 is itself pivotally mounted at 30. Linkage means are provided whereby the end member and the two flaps can be set into any one of three positions by means of a control knob 31 so as selectively to cause air heated by the heat exchanger core 10 to be delivered either to the first outlet 24, or to the second outlet 25, or to both of these outlets simultaneously. The manner in which this is achieved will now be described in more detail.

The end member 15, which is substantially of part cylindrical shape is formed with rounded lips at its lateral edges and with respective upstanding flanges 33 at its ends. Each flange 33 is provided with a central extension 34 which is apertured and carried by a pivot pin 35 fixed in the appropriate sideplate 18. The end member 15 can thus be pivoted from the first position shown in FIG. 2 in which one of its rounded lips 32 is at a higher level than the other, through an intermediate position as shown in FIG. 3 in which the two lips are level with each other, to a second position shown in FIG. 4 in which said other lip is raised above said one lip.

The flaps 26 and 27 include respective outer flap portions 26*a* 27*a* and respective inner inverted channel portions 26*b* 27*b*. At opposite ends the flaps 26 and 27 are formed with upstanding flanges 36 and 37 respectively, and these flanges are apertured to receive pivot pins 38 and 39 respectively. The flaps are thus pivotable through the range of positions shown in FIGS. 2 to 4.

The first and second flaps 26 and 27 each include a respective upstanding lug 40, 41 which is apertured pivotally to receive the turned-over end of a rod 42, 43 respectively. The rods extend downwardly through slots 44 and 45 formed in the flaps 26 and 27 and extend through respective collars 46, and 47 which are carried by the end member 15 adjacent its respective lateral edges. The rods 42, 43 are screw threaded and each carried thereon a respective abutment nut 48, 49.

It will readily be apparent that the rods 43 and 42 serve as respective lost motion devices since the lateral edge portions of the end member 15 are free to move downwardly away from the abutment nuts 48 and 49, and upward movement of the lateral marginal portions of the end member 15 will only be transmitted to the flaps if such marginal portions are raised to above a predetermined height dependent on the spacing of the nuts 48 and 49 from the upper ends of the rods 42 and 43 respectively. It will be understood that the adjustable abutment nuts could be replaced by fixed abutments secured to the rods if desired.

The control knob 31 is secured to a rearwardly extending spindle 50 on which is mounted a crank arm 51. The crank arm 51 is connected by a crank rod 52 to an extension 53 of the end member 15.

The flaps 26 and 27 are biased into their respective open positions by means of torsion springs 54 and 55 mounted on the pivot pins 38 and 39, each with a respective end located in a hole 56, 57 in the sideplate 18 and their other ends respectively received in slots 58 and 59 formed in the flanges 36 and 37. The slots 58 and 59 are laterally offset from the pivot pins 38 and 39 so as to urge the flaps to their open positions as shown in FIG. 3.

With the end member 15 in its intermediate position as shown in FIG. 3, both the first and second flaps 26 and 27 are in their open positions relative to the first and second outlet openings 24 and 25. It will thus be apparent that with the flaps in these positions air flowing down the first passage 13 as indicated by the arrows A is positively deflected outwardly by the first flap 26 as indicated by the arrow C towards and through the first outlet opening 24. Similarly the air flowing down the second passage 14 as indicated by the arrows B is positively deflected outwardly as indicated by the arrow D by the second flap 27 so as to divert the air towards the second outlet opening 25. Since the first and second flaps extend substantially transversely across the lower ends of the passages 13 and 14 they serve positively to block the flow of air from these passages to the third passage 16 so that there is no airflow in such passage.

If the control knob 31 is rotated in such a direction as to lower the crank rod 52, the end member 15 and the flaps 26 and 27 move to the positions shown in FIG. 2. As the crank rod 52 moved downwardly the end member 15 tilts about the axis defined by the pivot pins 35, and the forward edge of the end member 15 moves downwardly. However, since the rod 42 is freely slidable in the collar 46 the flap 26 remains in its open position. The rear edge of the end member 15, however moves upwardly and in doing so abutment of the collar 47 with the nut 49 causes the rod 43 to be raised. The second flap 27 is thus pivoted away from its open position against the force of the torsion spring 55 to its closed position as shown in FIG. 2. In doing so, the crank arm 51 passes through a vertical position so that once the crank arm passes over center the spring 55 acts to hold the crank arm 51 in its overcenter position. In this position, the second flap 27 effectively forms an extension of the rear plate 12 so as to direct air therefrom away from the second outlet opening 25 and into the third passage 16, which due to the movement of the end member 15 is effectively directly in series with the second passage 14. The second flap 27 and the end member 15, thus, in combination substantially close the second outlet opening 25.

In an analogous manner, the first flap 26 can be moved to its closed position and the second flap 27 can be moved to its open position by rotation of the control knob 31 in such a direction as to cause the crank rod 52 to move upwardly from the position shown in FIG. 3.

It will be evident, that, in moving the end member 15 from either its first position or its second position to its intermediate position, the crank arm 51 moves through a vertical position after which one or other of the torsion springs 54 and 55 assist movement of the end member 15 in this direction so as to bias it into its intermediate position.

The heat-exchanger core may be arranged to be heated in any desired manner and does not form part of the present invention. However, it may, for example, contain a gas burner as described in our British Pat. specification No. 1,135,395. Alternatively, the core 10 may be heated electrically or by means of a liquid circulated therethrough.

It will be appreciated that when a heater having the above arrangement is secured to a wall of a space to be heated, a duct can be taken from one of the outlets 24 and 25 through the wall to a further space on the other side thereof. Assuming that the outlet 25 is thus ducted, when the end member 15 is in its first position as shown in FIG. 2 all the air will be delivered into the first space. When the end member 15 is in its second position as shown in FIG. 4 all the air will be passed through the duct into the second space. When the end member 15 is in its intermediate position as shown in FIG. 3 then air will be delivered to both spaces. It will be seen, therefore, that a heater having this arrangement is suitable for use in a domestic situation where it may be placed for example, on the wall of a hall and used to heat both the hall and a room on the other side of the hall wall. As described above, the air drawn into the heater may be drawn in from one of the spaces, e.g. through the inlet opening 23, irrespective of the arrangement for the delivery of the air. Alternatively two inlets and respective control flaps may be provided so that the air is drawn in from the space in which the heated air is to be delivered. In this case such flaps would be connected to the linkage system described above to coordinate opening and closing thereof with opening and closing of the flaps 26 and 27.

I claim:

1. A space heater comprising:

a. a heat-exchanger core;

b. a casing defining with the core first and second passages for air to be heated, the passages being separated by the core;

c. first and second air outlets at the ends of, and associated with, the first and second passages respectively, the outlets being adjacent to an end of the core;

d. impeller means for causing air to flow along the passages to the outlets;

e. a movable end member spaced from said end of the core and defining therewith a third passage extending between said outlets;

f. first and second flaps associated with, and movable to control, the first and second outlets respectively, each of the flaps being movable between an open position in which the associated outlet is open and the flap is located to direct air from its associated passage through the outlet and a closed position in which it substantially closes its associated outlet and directs air from its associated passage into the third passage;

g. means for moving the end member between the first position in which it directs air entering the third passage from the second passage to the first outlet, a second position in which it directs air entering the third passage from the first passage to the second outlet, and an intermediate position between said first and second positions in which air flows from the first and second passages to the first and second outlets respectively, and

h. linkage means coupling said end member and said flaps so that when the end member is in its first position the first and second flaps are in their open and closed positions respectively, when the end member is in its second position the first and second flaps are in their closed and open positions respectively, while when the end member is in its intermediate position both of said flaps are in their open positions.

2. A space heater according to claim 1 wherein the end member is mounted for pivotal movement.

3. A space heater according to claim 2 including spring means urging the flaps to their open positions and respective lost motion devices in said linkage means between said flaps and said end member permitting the end member to move to its first and second positions leaving, respectively, the first and second flaps in their open positions under the influence of said spring means while causing the second and first flaps respectively to move to their closed positions.

4. A space heater according to claim 3 wherein said means for moving the end member is an overcenter mechanism releasably held in first and second overcenter positions corresponding to said first and second positions of the end member by said spring means.

5. A space heater according to claim 4 wherein said spring means urge the end member to its intermediate position when said overcenter mechanism is in an intermediate position between its first and second overcenter positions.

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