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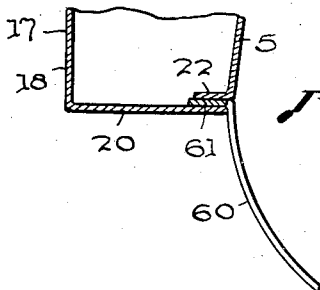
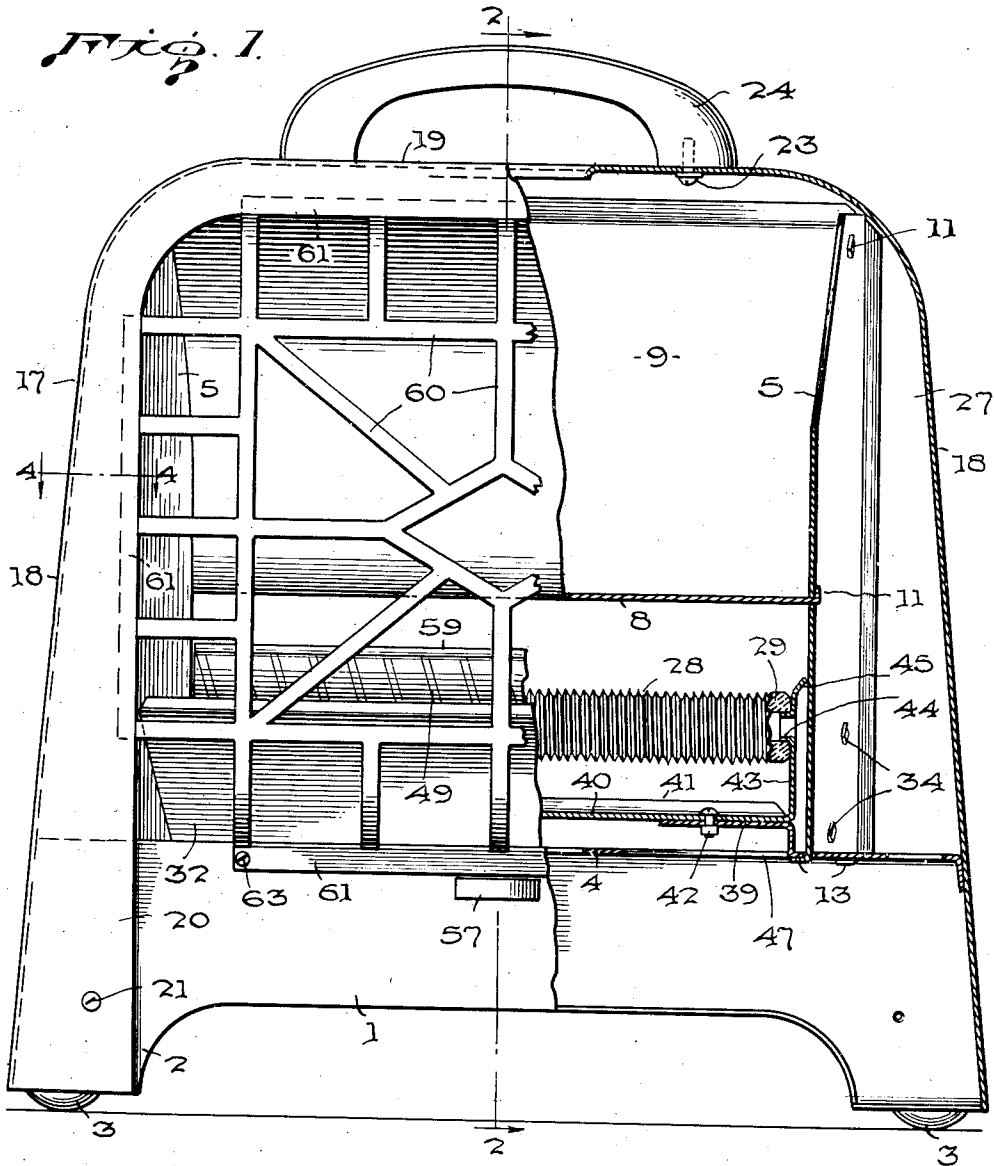
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2,479,425

PORTABLE ELECTRIC SPACE HEATER

Filed May 17, 1946

4 Sheets-Sheet 1



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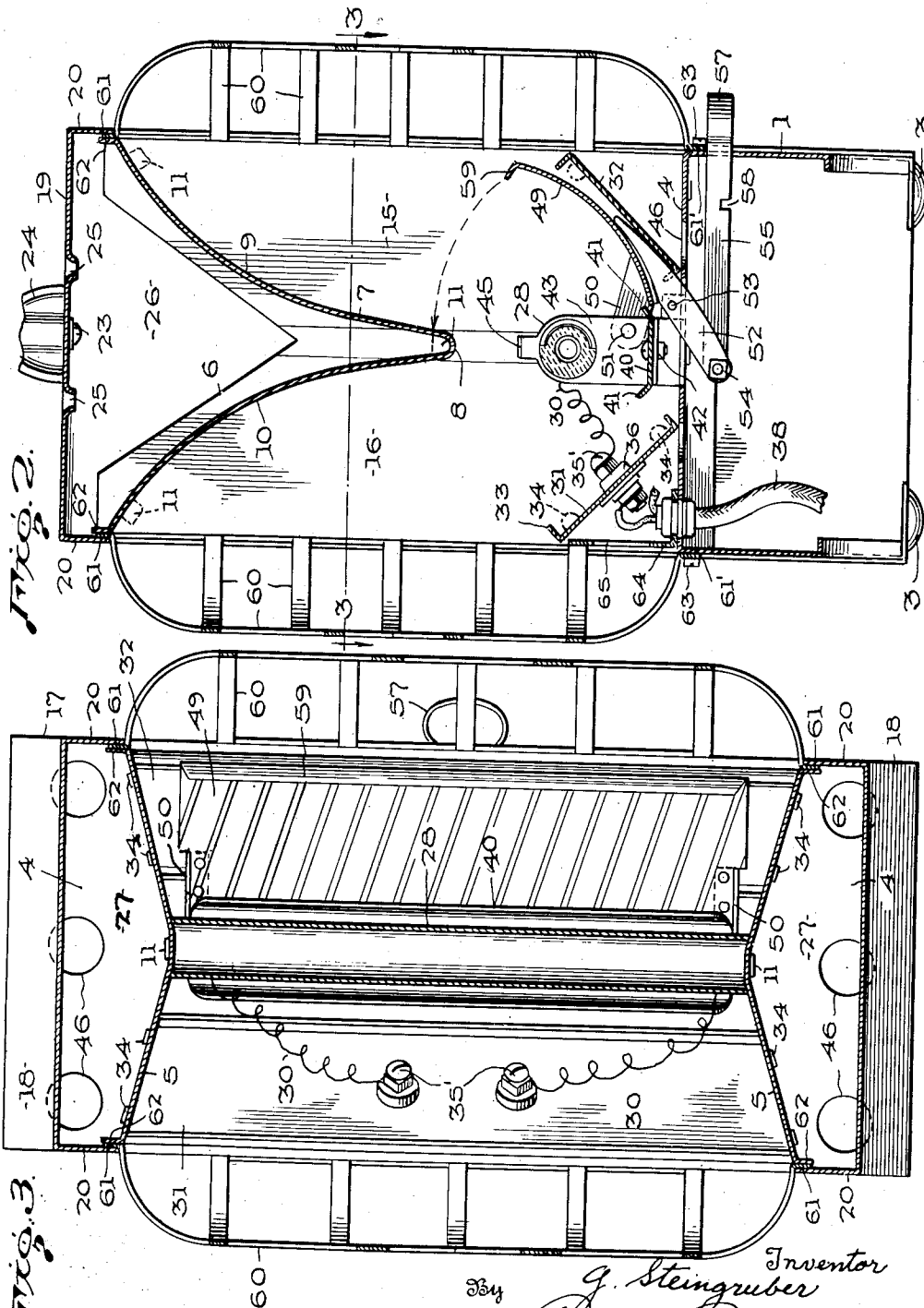
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Filed May 17, 1946

4 Sheets-Sheet 2



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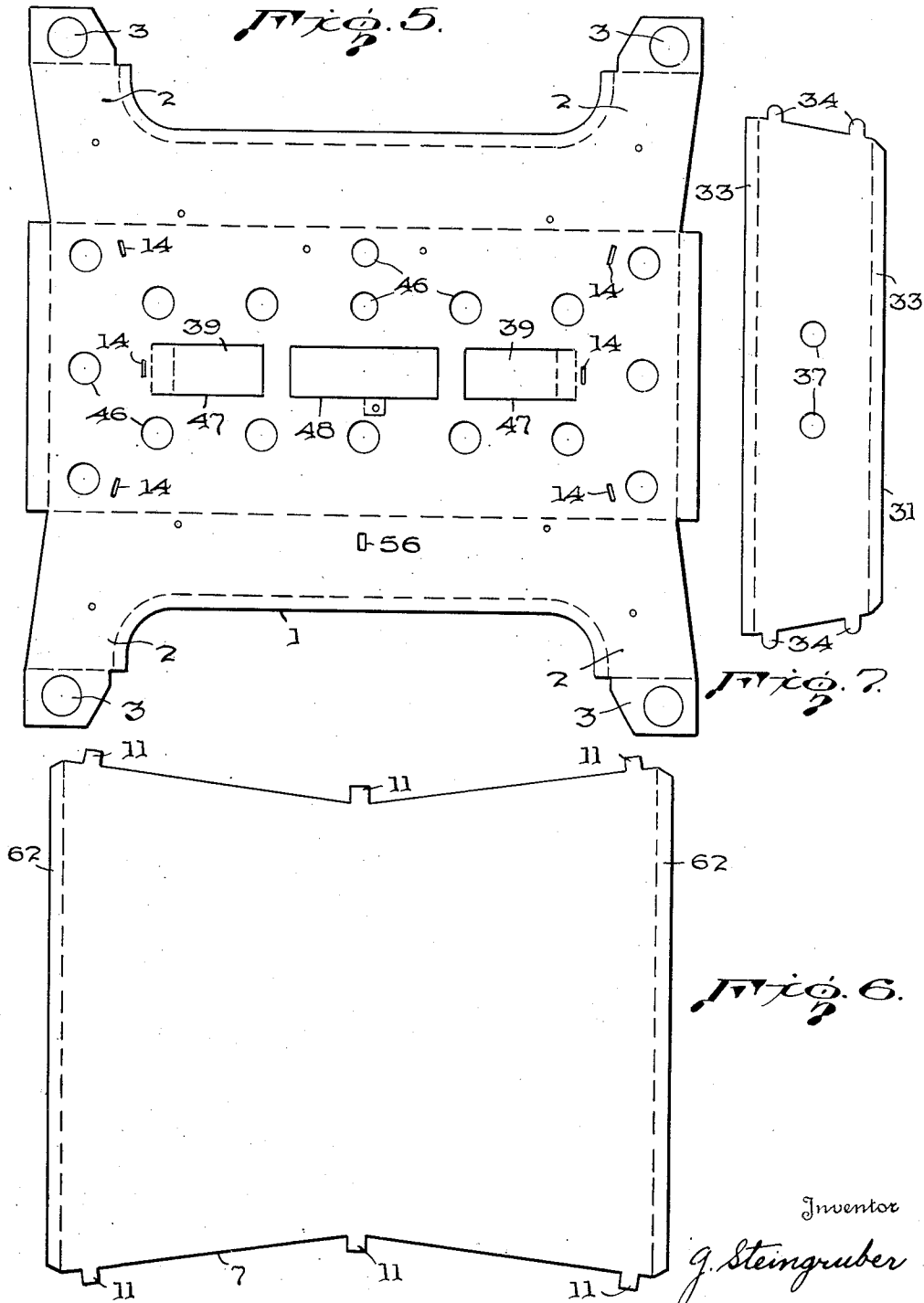
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PORTABLE ELECTRIC SPACE HEATER

Filed May 17, 1946

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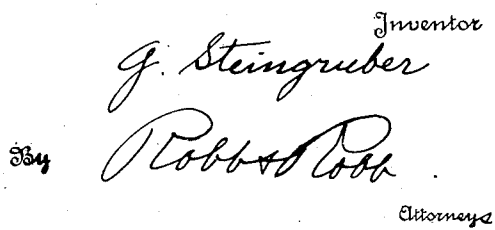
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Filed May 17, 1946

2,479,425

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UNITED STATES PATENT OFFICE

2,479,425

PORTABLE ELECTRIC SPACE HEATER

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Application May 17, 1946, Serial No. 670,385

18 Claims. (Cl. 219—38)

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The present invention relates to electric heaters, and more particularly, to a new and improved portable electric space heater having for its primary objects, among others, simplicity of construction and assembly, compactness in size, lightness in weight, high efficiency and economy in operation, and neatness and attractiveness of appearance.

A further principal object of the invention is to provide an electric heater of the aforementioned type which is constructed practically wholly of sheet metal, the component parts of which are reduced to a minimum number, and each part having the form of a sheet metal stamping and having provision for simply and quickly attaching the same together mechanically in assembled form, largely without screws or other separate fasteners, and without resort to welding or other relatively expensive operations requiring special skills.

A still further object of the invention is to provide a new and improved portable electric heater utilizing in combination the principles of heat reflection, radiation, and circulation, and through which air is circulated by induction and with superior effectiveness, without resort to mechanical aids, such as fans or blowers.

Another important and principal object of the invention is to provide a new and improved portable electric heater which is so constructed and arranged as to direct the heat in respectively opposite directions from opposite sides or faces of the heater, with the additional provision for selectively blocking the heat discharge, at will, in one direction so as to confine it to discharge at one side only of the heater.

Other and further objects and advantages of the invention will be hereinafter described and the novel features thereof defined by the appended claims.

In the drawings:

Figure 1 is a view, partly in elevation and partly in section, of an electric heater constructed in accordance with the present invention;

Figure 2 is a vertical sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a horizontal sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a fragmentary sectional detail view on an enlarged scale, taken on the line 4—4 of Figure 1, showing the manner in which the marginal edge of the grille is inserted between the outer shell and the end wall of the inner reflector assembly;

Figure 5 is a developed plan view of a sheet

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metal stamping from which the base of the heater is formed as a separate one-piece unit;

Figure 6 is a developed plan view of a sheet metal stamping which forms the reversely curved heat-flow dividing reflecting deflector which extends from side-to-side between the reflecting end walls within the upper portion of the heater;

Figure 7 is a developed plan view of a sheet metal stamping from which is formed one of the two stationary deflectors located in the lower portion of the heater;

Figure 8 is a developed plan view of a sheet metal stamping from which is formed the outer shell or casing of the heater; and

Figure 9 is a developed plan view of a sheet metal stamping from which is formed one of the two reflecting end walls of the reflector assembly.

Like reference characters designate corresponding parts in the several figures of the drawings, in which Figures 1 to 4 inclusive illustrate the heater in its assembled form, and Figures 5 to 9 inclusive illustrate typical sheet metal stampings from which certain of the component parts of the heater are formed. The heater will be first generally described with reference to Figures 1 to 4 inclusive, wherein 1 denotes the base of the heater which is formed preferably in one piece from a sheet metal stamping. The base is generally rectangular in horizontal plan, and at the four corners thereof, the base is extended downwardly to provide legs 2. At the lower extremity of each leg, there is preferably provided a spherical ball-like foot 3 to raise the legs slightly above the floor or other surface on which the heater is supported, to prevent the legs from scratching or otherwise marring the supporting surface.

Connected to the base unit 1 and extending upwardly from the upper sides thereof is a pair of laterally spaced end walls 5, 5. As will be best seen from reference to Figure 3, each end wall is bent laterally outwardly from the vertical central portion thereof so that the opposed end walls diverge outwardly from each other at the respectively opposite sides of a central transverse plane through the heater. The upper end of each end wall 5 is notched or otherwise cut away, as at 6, for the purpose which will hereinafter more fully appear.

Extending laterally from side to side between the end walls 5, 5, and connected thereto in any suitable manner, is a reversely curved heat-flow dividing deflector wall generally designated 7. The wall 7 is preferably made in one piece from sheet metal, and its lower end 8 is located a sub-

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stantial distance above the upper side 4 or platform of the base unit 1. From the lower end of the wall 7, the wall extends upwardly and forwardly and upwardly and rearwardly respectively at opposite sides of a central transverse plane through the heater. The curved portions of the wall 7 are respectively indicated at 9 and 10.

The preferred means for attaching the wall 7 to the end walls 5, 5 preferably have the form of integral tabs or ears designated 11 which extend through slots 12 formed in the respective end walls 5, 5. In assembling the walls, the ears 11 are inserted through the slots 12, and then the ears are bent over upon the end walls so as to lie flat against the outer faces of the same, thereby firmly attaching the walls together without the aid of welding or other expensive operations. The end walls 5, 5 are preferably attached to the platform 4 at the upper end of the base member 1, in the same manner, for which purpose, the end walls are each provided with tongues or ears 13 which are adapted to extend through slots 14 provided in the platform 4. After insertion of the ears 13 through the slots 14, the ears are bent over beneath the platform 4, and serve to rigidly attach the end walls to the base member 1, with the end walls disposed in an upright position.

The end walls 5, 5, and the reversely curved heat-flow dividing deflector 7 are preferably made of a material which may be given a high polish on at least the inner faces thereof, that is, the inner faces of the end walls 5, 5, and the concave faces of the curved portions 9 and 10 of the deflector 7. If preferred, these faces may be plated or otherwise finished, such as by means of chromium plating, to act as reflector surfaces.

As will be understood from the foregoing, the base member 1, together with the end walls 5, 5, and the heat-flow dividing wall 7, when assembled, form a unit defining above the platform 4 of the base member 1 two chambers respectively designated 15 and 16, one of these chambers lying at one side of a central median plane through the heater, and the other chamber lying at the opposite side of the median plane. The unit is enclosed within an outer shell or casing generally designated 17, this shell extending upwardly from the base member 1 at the opposite ends thereof, in spaced relation to the side walls 5, 5, forming outer side walls 18, 18, and also forming a top wall 19 above the upper extremities of the end walls 5, 5 and joining the side walls 18, 18 together. The outer casing or shell 17 is provided along its opposite marginal edges with flanges respectively designated 20, 20, these flanges being bent inwardly and lying at right angles to the end walls 18, 18 and the top wall 19, thereby giving to the outer casing a U-shaped form in cross section. At the lower ends of the outer shell or casing 17, the flanges 20, 20 are overlapped upon the base member 1 and are secured to the base member in any suitable manner, as by means of screws 21. The inner marginal edges of the flanges 20, 20 are preferably overlapped upon outwardly bent flanges 22 which are provided on the vertical edges of each of the end walls 5, 5, at the front and back of these walls, the flanges 20, 20 being extended inwardly from the end walls 18, 18 to the inner surfaces of the respective end walls 5, 5, and forming at the front and back respectively of the heater substantially rectangular openings through which the heat may be discharged from the heater at the front and at the back thereof.

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Suitably secured to the top wall 19 of the outer casing 17, as by means of screws 23, is a handle 24 by means of which the heater may be readily carried. It will also be noted that the wall 19 is provided with a pair of elongated slots 25, 25, located respectively at opposite sides of the handle 24, which serve as vents for the chamber 26 located in the upper portion of the heater, above the reversely curved heat-flow dividing wall 7. This chamber 26 is also in open communication with chambers 27, 27 at the opposite ends of the heater, these chambers being defined by the spaced walls 5, 5 and 18, 18, the communication being established by the notches or cut-outs 6 in the end walls 5, 5. The purpose of these vents 25, 25 is to prevent the entrapment of heat within these chambers, the vents allowing the heat to escape readily from the chambers and thereby keep the temperature of the outer casing 17 relatively low. Accordingly, the outer casing will remain cool and safe to handle, as well as eliminating any possibility of fire hazard should garments or other inflammable objects come into contact with the casing accidentally.

Mounted in the lower portion of the heater, and extending from side to side between the end walls 5, 5, approximately midway between the upper base plate or platform 4 of the base member 1, and the lower extremity 8 of the heat-flow dividing curved deflector 7, is a heating element generally designated 28, said heating element being of any suitable form, but preferably comprising a porcelain or other refractory mounting 29 of tubular form, having electrical resistance wire 30 wound thereon. The central axis of the heating element 28 is located on the central median plane through the heater, so that the heating element is disposed directly below the lower end 8 of the deflector 7, thereby causing the heat generated by the heating element to be equally divided by the member 7, with approximately one-half of the heat deflected forwardly by the curved portion 9, and the other half deflected rearwardly by the curved portion 10.

Also mounted in the lower portion of the heater, and extending from side-to-side between the end walls 5, 5, is a pair of stationary deflector plates 31, 32. These deflector plates are upwardly and outwardly inclined at an angle of approximately 45° to the horizontal and aid in deflecting and reflecting the heat in a generally upward direction. The longitudinal marginal edges of the plates 31, 32 are preferably flanged as at 33 to stiffen the plates, and each plate is provided with a plurality of tongues or ears 34 at the opposite ends of the same to interlock with slots 35 formed in each end wall 5, 5 in a manner similar to the connection of the reversely curved wall 7 with the end walls 5, 5. One of the deflector plates, as for example 31, carries a pair of terminal posts 35', 35', each of which extends through the plate and is insulated therefrom, as by means of a porcelain bushing 36 received in an opening 37 in the plate. The electrical resistance wire 30 of the heating element 28 is connected at each end to the respective terminals 35', and the terminals are in turn connected to a suitable extension cord 38 which may be plugged into any convenient electrical outlet or other source of power supply.

For convenience in mounting the heating element 28, the base plate or platform 4 of the base member 1 is preferably provided with two upwardly offset supporting arms 39 which are preferably struck out from the base plate as an in-

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tégral part thereof, the base plate being formed of sheet metal. While only one of the arms 39 is shown in Figure 1, it will be understood that a second arm is provided at the opposite end of the base plate, near the end wall 5.

Mounted on the upper sides of the arms 39, and extending laterally from side to side between the end walls 5, 5 is a horizontally disposed baffle 40, the marginal edges of which are preferably oppositely and upwardly inclined in an outward direction, as indicated at 41, 41. This baffle may be attached to the arms 39 in any suitable manner, as by means of screws 42. At the extreme ends of the baffle 40, the baffle is extended upwardly in the form of upright arms 43, there being one of said upright arms at each end of the baffle. An annular boss 44 is struck out from each arm 43 in an inward direction and serves to engage in the end of the tubular insulated support 29 of the heating element 28. The extreme upper end of each arm 43 is provided with a bendable tab or tongue 45 which is adapted to be bent outwardly against the end wall 5 at each end of the heating element 28, when the heating element has been mounted between the arms 43, 43. Since the walls 5, 5, and the arms 43, including the tongues 45, are all preferably made of sheet metal, they will be relatively resilient or springy, so that when the heating element 28 is mounted between the arms 43, 43, and the tongues 45 are bent into engagement with the end walls 5, 5, the heating element 28 will be more or less yieldingly or resiliently supported, which serves to protect the heating element against undue shock during handling of the heater, as well as allowing for expansion of the heating element without damage to the same.

In order to allow air to freely enter the heater, the base plate or platform 4 is provided with a plurality of openings 46 which are distributed substantially over the entire area of the base plate. In striking out the supporting arms 39, this leaves relatively large openings 47 in the base plate beneath the arms, and in addition, there is preferably provided another large opening 48 between the openings 47. Air can therefore freely enter the bottom of the heater, not only at the bottom of the chambers 15 and 16, but also at the bottom of the chambers 21, 21. The horizontally disposed baffle plate 40 serves to prevent the air from passing directly into contact with the heating element 28, which might unduly cool the heating element, and causes the air to flow around the baffle, and thence upwardly around the heating element. As the air is heated, it rises upwardly and is divided in opposite directions, and the heated air will be discharged partly at the front and partly at the back of the heater in the normal position of operation.

In order to selectively control the air flow and heat discharge through the heater, there is preferably provided a movable baffle or closure member 49. This baffle 49 has the form of a curved plate which extends from side to side between the end walls 5, 5, and is provided at each end with an arm 50 which is pivotally connected at 51 to the upright heating element supporting arm 43. Swinging movement is imparted to the member 49 in any suitable manner, as by means of a lever arm 52 which is pivotally connected at a mid-point, as at 53, to a tongue or ear struck upwardly from the base plate or platform 4 of the base member 1. The upper end of the lever arm 52 is disposed in abutting contact with the outer face of the baffle member 49, and the lower

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end of the lever arm is pivotally connected at 54 to an actuator bar 55 which is extended forwardly through the front face of the base member 1, which is provided with a slot or opening 56 through which the actuator bar 55 is freely slidable. The outer end of the actuator bar 55 terminates in an operating handle 57, and the actuator bar is preferably provided with a notch 58 which may be interlockingly engaged with the edge of the slot 56 to positively lock the actuator bar in its outwardly extended or manipulated position. Normally, the movable baffle 49 will assume the position shown in full lines in Figure 2 of the drawings, dropping to this position when the handle 57 of the actuator bar 55 is shoved inwardly. By pulling the handle 57 outwardly, the baffle member 49 will be caused to rock in a counterclockwise direction, as viewed in Figure 2, until its flanged upper edge 59 comes into engagement with the lower portion of the curved wall 9 of the heat-flow dividing wall 7, as indicated by the broken lines and the arrow in Figure 2. When in this position, the baffle member 49 serves to block off the heating element 28 from the chamber 15, so that all of the heat generated by the heating element will be confined to chamber 16 at the opposite side of the heater. Under such conditions, the heater may then be placed near a wall, or in a corner, or near some other object with the blocked side of the heater next to the same, without danger of overheating the object or setting the same afire.

To restore the heater to a condition causing the heat to be discharged from both sides thereof, it is simply necessary to push the handle 57 of the actuator bar 55 inwardly so as to rock the lever 52 to the position in which the upper end of the lever abuts the stationary deflector plate 32, thereby allowing the curved deflector 49 to drop by gravity to the full line position shown in Figure 2. The deflector 49 preferably has its inner face polished or otherwise finished to give the same good reflecting qualities.

When the heater is in use, that is, when the heating element 28 is energized, the resistance wire 30 becomes incandescent and glows. The glow effect is reflected in the associated reflecting walls, and by reason of the outwardly diverging arrangement of the ends walls 5, 5, the reflection is multiplied so as to produce a plurality of reflected images of the heating element, thus giving the effect of a plurality of heating elements in the heater, and creating a very pleasing and attractive illusion.

In order to prevent the clothing or other inflammable objects from accidentally getting too close to the heating element 28, such as might cause the same to accidentally catch on fire, the heater is provided at each of its opposite sides with a grille or guard designated 60, the grilles extending over the area of the generally rectangular openings at each side of the heater, and preferably being bowed outwardly so that the outer side of each grille is spaced substantially outwardly from the face of the heater proper. The shape and design of the grille may be varied to suit individual preferences from the standpoint of attractiveness, and by reason of the outwardly bowed arrangement of each grille, the grilles minimize the possibility of setting the floor or other supporting surface and floor coverings afire if the heater be accidentally tipped over. The grilles may be attached to the heater in any suitable manner, such for example, as by providing the marginal edges of the grille with flat bars 61 at

each end and at the top thereof, and an additional flat bar 61' at the bottom. The bars at the opposite ends of the grille are inserted between the flange 20 of the outer casing 17, and the vertical flange 22 on the respective side walls 5, 5, as best shown in Figure 4 of the drawings. In a similar manner, the upper bar 61 is inserted between the flange 20 at the top of the casing 17, and an upwardly turned flange on the upper end of the respective curved deflector walls 9 and 10, the latter flange being designated 62. While the bars 61 around each grille will be securely wedged between the flanges as just described, provision is preferably made for positively preventing displacement of the grilles, as by disposing the lower bar 61' upon the outer face of the bottom member 1, and securing the bar to the bottom member in any suitable manner, as by screws 63.

With the exception of a few of the parts of the heater, the heater is wholly composed of sheet metal, and the component parts may be stamped from sheet metal blanks as illustrated in Figures 5 to 9 inclusive. After the blanks have been stamped out and bent into the shape of the component parts, they can be quickly and easily assembled with a minimum of effort and without any welding whatsoever, which is particularly advantageous from the standpoint of low cost of production of the heaters, and eliminates the use of specially skilled labor. The construction of the heater also reduces the number of component parts to a minimum, while attaining the advantages of high efficiency and economy of operation.

As a further precaution against the danger of contact with the electrical terminals 35', particularly when the heater is used around children, a special guard plate 64 is disposed in an upright position at that side of the heater where the terminals are located, with the guard plate disposed at the outer side of the terminals and extending upwardly from the base plate or platform 4, to a point near the upper edge of the stationary deflector 31. The guard plate is of such a size as to block off the zone in which the terminals 35' are located, and thus prevent children from sticking their fingers through the grille 60 into contact with the terminals 35'. If preferred, the guard 64 may have decorative perforations 65 therein, but such perforations should be small or very narrow so as not to permit the entrance of a child's finger therethrough.

While the specific details have been herein shown and described, the invention is not confined thereto as changes and alternations may be made without departing from the spirit thereof as defined in the appended claims.

I claim:

1. An electric heater of the class described, comprising a base member having legs formed at the bottom thereof and a horizontal base plate at the upper side, a pair of laterally spaced end wall members carried by the base member and extending upwardly from the base plate aforesaid, with the respective end wall members spaced inwardly from the respective ends of the base member, a deflector member connected to the aforementioned end wall members and extending laterally therebetween, said deflector member being reversely curved from a point above the base plate and substantially on a lateral median plane through the base member, to provide a forwardly and upwardly curved deflector portion and a rearwardly and upwardly curved deflector portion, an outer casing extending upwardly from the bottom of the base member at its opposite

ends, to a point above the upper extremities of the end wall members, said casing including a top wall arranged horizontally above the end wall members and the reversely curved deflector member, and also including side walls spaced outwardly from the end walls aforesaid and defining an air chamber therebetween and an electrical heating element arranged substantially horizontally between the end wall members intermediate the lower extremity of the reversely curved deflector member and the base plate, with the heating element disposed on the central median plane of the base member.

2. An electric heater as defined in claim 1, wherein the end wall members are provided with bendable tongues extending through openings in the base plate of the base member, for rigidly connecting the end wall members to the base plate.

3. An electric heater as defined in claim 1, wherein the end wall members are provided with bendable tongues extending through openings in the base plate of the base member, for rigidly connecting the end wall members to the base plate, and the reversely curved deflector member is also provided with bendable tongues extending through openings in the respective end wall members for rigidly connecting the deflector member to the end wall members.

4. An electric heater as defined in claim 1, wherein the outer casing is provided with marginal flanges overlapping the base member at the front and back thereof and secured thereto.

5. An electric heater as defined in claim 1, wherein the outer casing is provided with marginal flanges defining heat outlets of substantial area at the front and back respectively of the heater, between the end wall members.

6. An electric heater as defined in claim 1, wherein the outer casing defines another chamber above the reversely curved deflector member and communicating with the pair of chambers between the respective end wall members carried by the base member and the side walls of the outer casing.

7. An electric heater as defined in claim 1, wherein the outer casing defines another chamber above the reversely curved deflector member and communicating with the pair of chambers between the respective end wall members carried by the base member and the side walls of the outer casing, and the base plate of the base member is provided with a plurality of openings for admitting air into the respective chambers and into the space between the end wall members below the heating element.

8. An electric heater as defined in claim 1, wherein the outer casing defines another chamber above the reversely curved deflector member and communicating with the pair of chambers between the respective end wall members carried by the base member and the side walls of the outer casing, and the base plate of the base member is provided with a plurality of openings for admitting air into the respective chambers and into the space between the end wall members below the heating element, the top wall of the outer casing having an air outlet opening formed therein.

9. An electric heater as defined in claim 1, wherein the outer casing is provided with marginal flanges defining heat outlets of substantial area at the front and back respectively of the heater, between the end wall members, and a grille mounted over each heat outlet.

10. An electric heater as defined in claim 1, wherein the outer casing is provided with marginal flanges defining heat outlets of substantial area at the front and back respectively of the heater, between the end wall members, and a grille mounted over each heat outlet, with the marginal edges of the grilles inserted behind the marginal flanges of the outer casing at the opposite ends and at the top of each grille, and the lower marginal edges of the respective grilles being attached to the base member.

11. An electric heater as defined in claim 1, in combination with a movable deflector member pivotally supported intermediate the end wall members at one side of the heating element for movement towards and away from abutting contact with the lower end of the reversely curved deflector member.

12. An electric heater as defined in claim 1, in combination with a movable deflector member pivotally supported intermediate the end wall members at one side of the heating element for movement towards and away from abutting contact with the lower end of the reversely curved deflector member, and actuator means for moving said last-mentioned deflector member as aforesaid.

13. An electric heater as defined in claim 1, in combination with a movable deflector member pivotally supported intermediate the end wall members at one side of the heating element for movement towards and away from abutting contact with the lower end of the reversely curved deflector member, and the surfaces of the end wall members, the reversely curved deflector and the movable deflector, which face the heating element, being characterized as reflecting surfaces.

14. An electric heater as defined in claim 1, wherein the end wall members outwardly diverge with relation to each other at opposite sides of the central median plane through the heater.

15. An electric heater as defined in claim 1, in combination with a baffle plate disposed horizontally below the heating element in spaced relation to the same.

16. An electric heater as defined in claim 1, in combination with a baffle plate disposed horizontally below the heating element in spaced relation to the same, said baffle plate having an arm extending upwardly therefrom at each end thereof, with means on said arms to engage and support the heating element between said arms.

17. An electric heater as defined in claim 1, in combination with a baffle plate disposed hori-

zontally below the heating element in spaced relation to the same, said baffle plate having an arm extending upwardly therefrom at each end thereof, with means on said arms to engage and support the heating element between said arms, said arms being disposed in spaced relation to the respective end wall members, and having bendable portions at their upper extremities to yieldingly engage the end wall members when bent into contact therewith after mounting the heating element between the arms.

18. A portable electric space heater, comprising an outer casing open at the front and at the back thereof, a base member including a horizontal base plate disposed adjacent to the bottom of said casing, a pair of laterally spaced upright walls arranged within said casing and extending upwardly from the base plate to the top of the casing, a reversely curved wall disposed between the upright walls and spaced above the base plate, with a portion of said reversely curved wall extending upwardly and forwardly from a point substantially midway between the front and the back of the casing, to the front of the casing, and with another portion extending upwardly and rearwardly to the back of the casing, a horizontally disposed heating element arranged below the reversely curved wall aforesaid and in spaced relation to the base plate, said base plate having provision for admitting air there-through into the casing to be heated by the heating element and subsequently discharged at the front and back respectively of the casing, and a movable deflector member pivotally mounted adjacent to the bottom of the casing above the base plate and at one side of the heating element, said movable deflector extending laterally between the upright walls and being movable towards and away from abutting engagement with the reversely curved wall to selectively block the discharge of heat from one side of the casing, while confining the heat discharge to the opposite side of the casing.

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