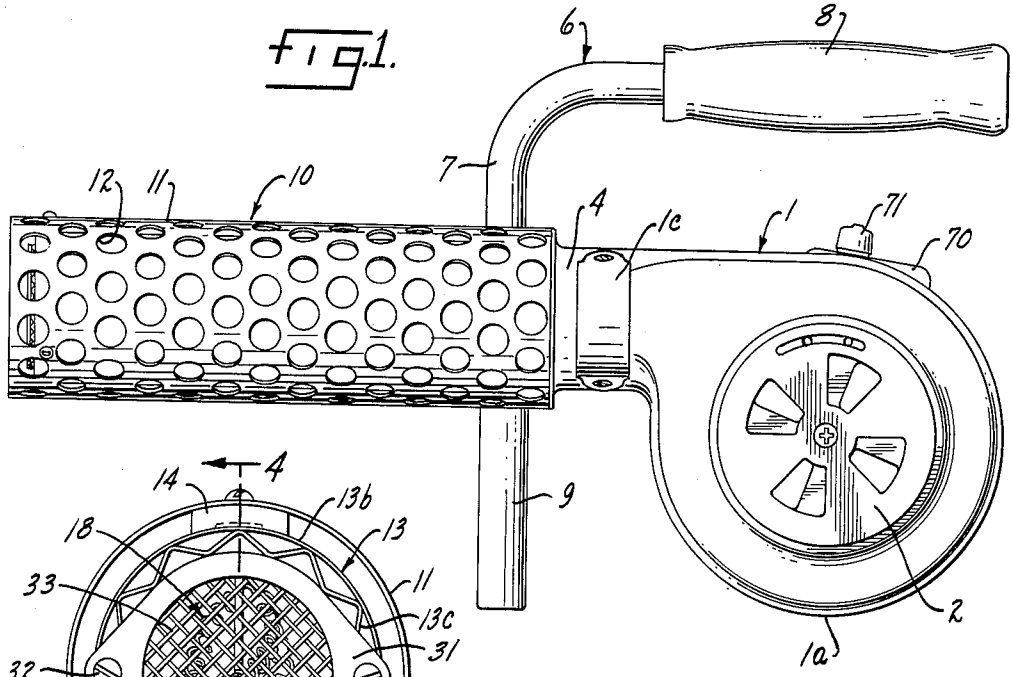
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HOT AIR BLOWER

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Fig. 1.



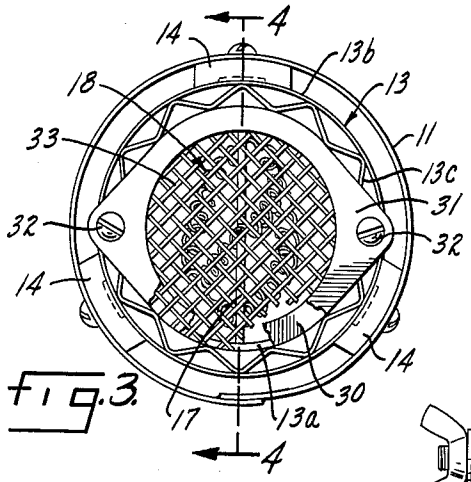




Fig. 3.

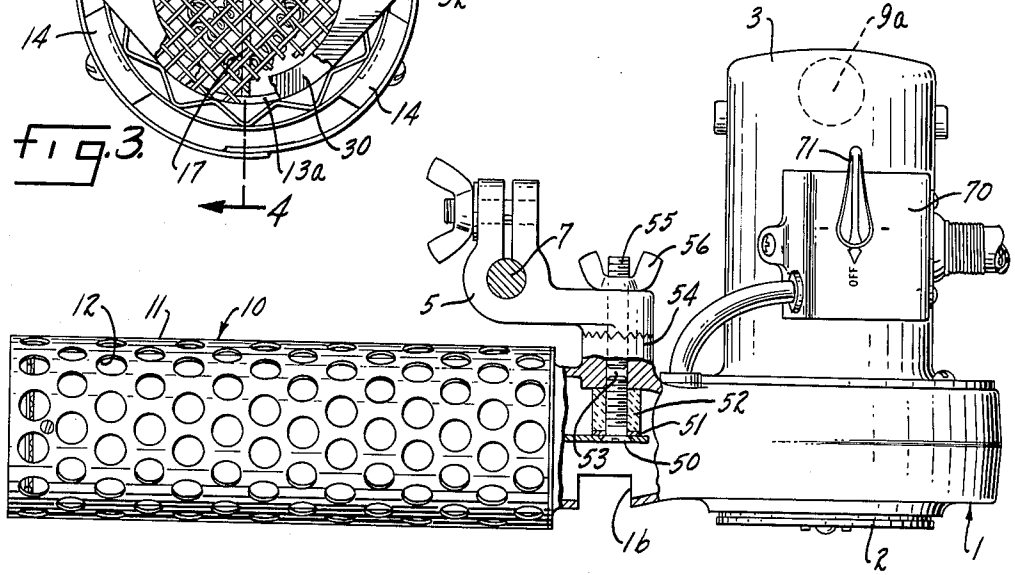



Fig. 2.

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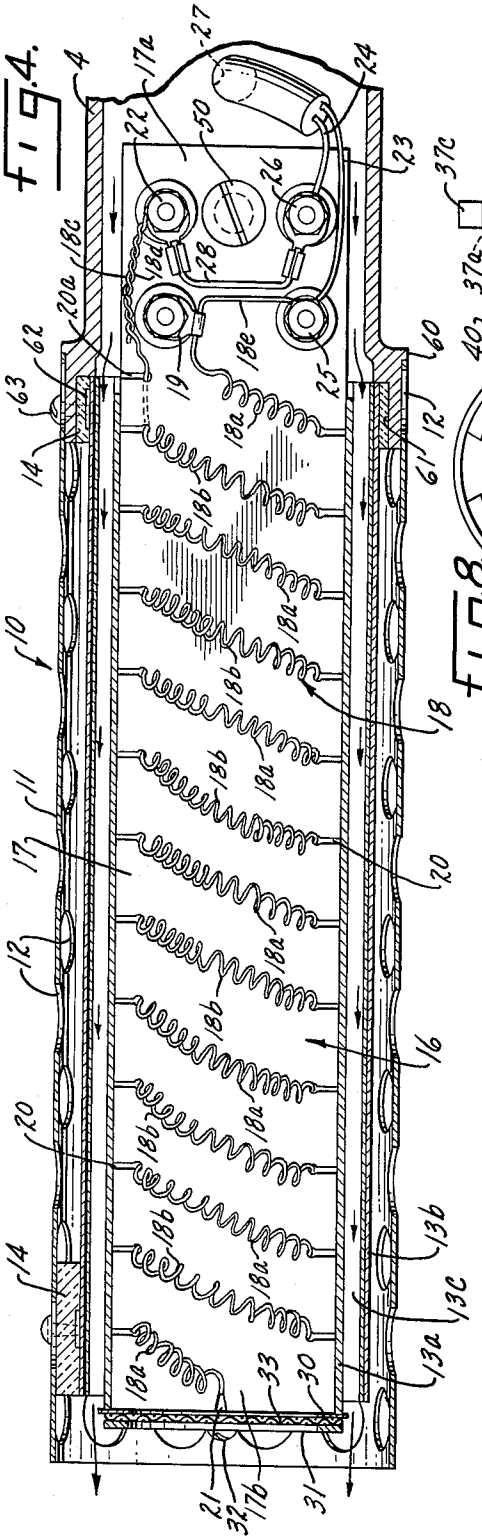


FIG. 4.

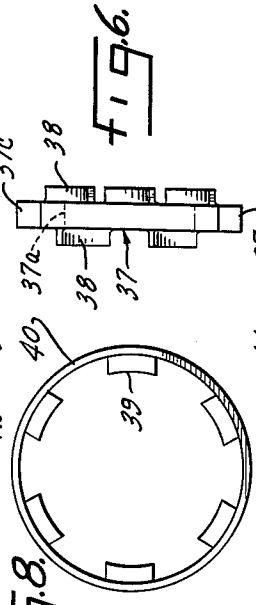


FIG. 6.



FIG. 8.

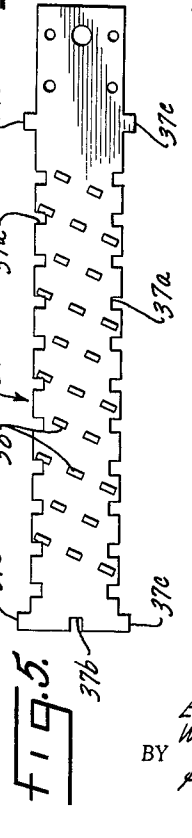


FIG. 5.

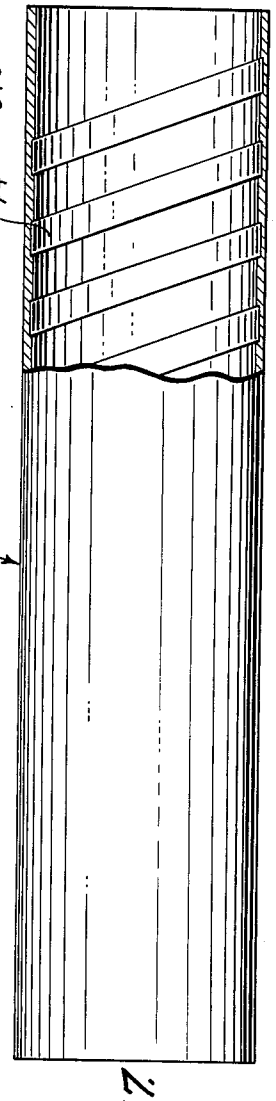


FIG. 7.

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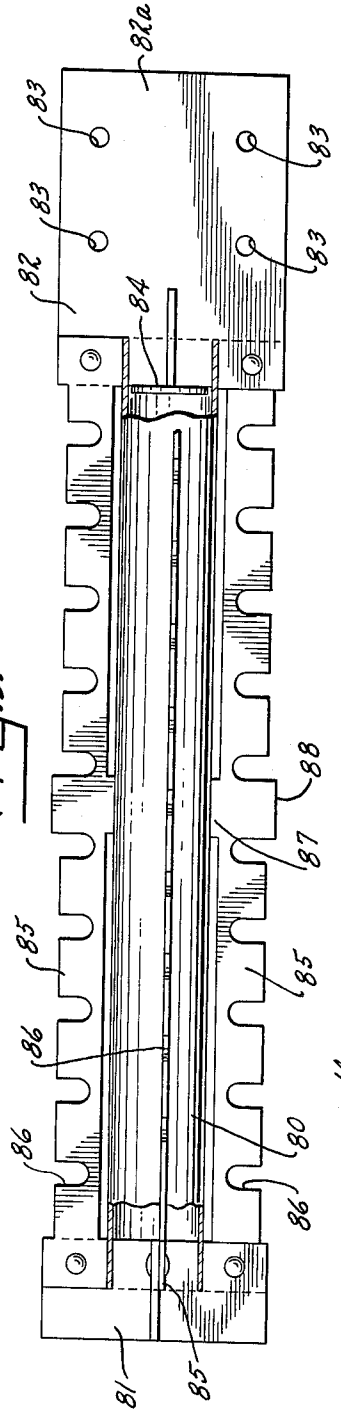



FIG. 9.

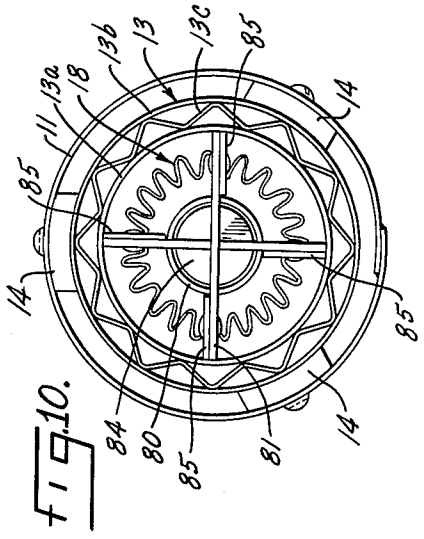



FIG. 10.

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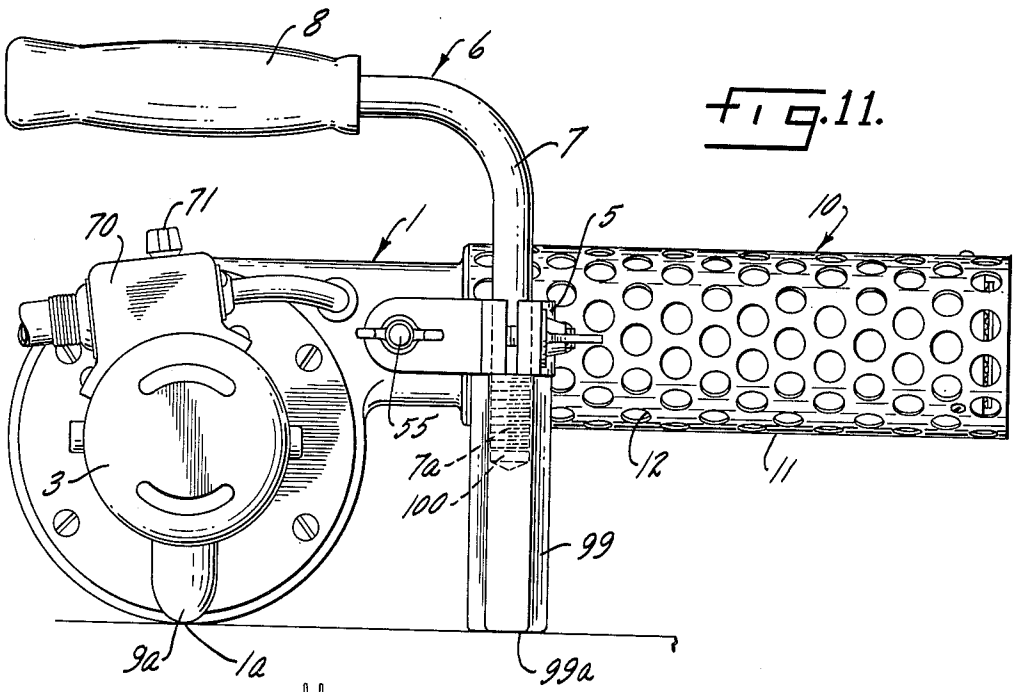



Fig. 11.

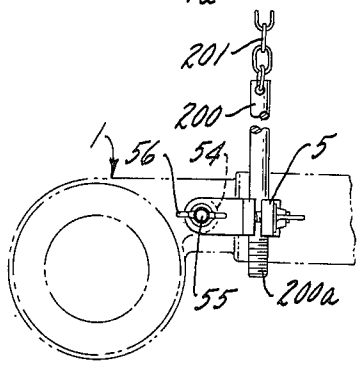



Fig. 12.

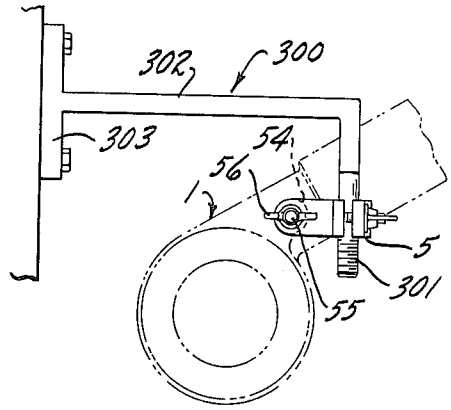



Fig. 13.

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United States Patent Office

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Patented Oct. 5, 1965



3,209,988

# HOT AIR BLOWER

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Filed June 24, 1964, Ser. No. 377,759
9 Claims. (Cl. 230—117)

This application is a continuation-in-part of co-pending application, Serial No. 189,760, filed April 24, 1962, entitled "Hot Air Blower," now abandoned.

This invention relates to heating devices and has particular relation to the field of hot air blowers.

One purpose of the invention is to provide a blower capable of delivering air at a maximum temperature with a minimum amperage and wattage.

Another purpose is to provide a hot air blower having an air-heating element of maximum life and duration.

Another purpose is to provide a hot air blower which may be handled with maximum safety.

Hot air blowers have been provided in the past and have incorporated a length of coiled wire wound about a corn-cob-like ceramic element within a blower nozzle. When electrical energy is passed through the wire it becomes heated and the air passing through the nozzle and in contact with the wire is heated thereby. In such prior structures, the wire is returned from the outer end of the ceramic member about which the wire is wound by passing the return portion of the wire through the inside of the comparatively massive ceramic core. Such heating elements have proved of such short life as to be unsatisfactory. Accordingly, it is one purpose of the invention to provide a heating element wherein all portions of the wire are exposed to the air passing thereabout and in which a core of minimum interference with air-flow is provided and in which the useful life of such heating element is of maximum duration.

Another purpose is to provide a hot air blower having means for insuring maximum contact between a heat-imparting element and the air passing through said blower.

Another purpose is to provide a hot air blower having means for retaining the air passing therethrough in contact with the heating element therein over a maximum duration of time.

Another purpose is to provide a hot air blower having means for directing the air passing therethrough into maximum contact with all portions of the heat-imparting element therein.

Another purpose is to provide a hot air blower nozzle having maximum heat insulating capabilities.

Another purpose is to provide a hot air blower having means for varying and controlling the temperature of the air delivered thereby.

Another purpose is to provide a heating element for hot air blowers wherein said heating element is of maximum simplicity and in which said heating element shall have a maximum useful life.

Another purpose is to provide a hot air blower having means for creating a back pressure upon the air passing therethrough.

Another purpose is to provide a nozzle for air blowers which nozzle shall be so constructed as to impart a maximum amount of heat to air directed therethrough by said air blowers.

Another purpose is to provide a hot air blower having a nozzle so designed as to employ a portion of the air passing therethrough for cooling purposes.

Another purpose is to provide a heating element for hot air blowers and the like comprising a support and a heating wire coil wrapped about said support in spaced



spiral portions from one end to the other of said support and in alternating spaced spiral portions from said other end to said first-named end of said support.

Another purpose is to provide a hot air blower having a heater element and a fuse link associated therewith.

Another purpose is to provide a nozzle for air blowers having a heating element therein and means for directing a maximum amount of air passing therethrough into contact with said heating element.

Another purpose is to provide a hot air blower having a safety-support means.

Another purpose is to provide a tri-point support means for an air blower.

Another purpose is to provide a level support means including a blower housing portion and a plurality of support elements spaced therefrom and lying in the same plane therewith.

Another purpose is to provide a blower support structure having a removable fixed length element.

Other purposes will appear from time to time during the course of the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

FIGURE 1 is a side elevation;

FIGURE 2 is a top plan view;

FIGURE 3 is a front end view, on an enlarged scale, of one form of the nozzle of the invention;

FIGURE 4 is a view taken on the line 4—4 of FIGURE 3;

FIGURE 5 is a detail view in partial cross-section and illustrating a variant form of a portion of the invention;

FIGURE 6 is an end view, on an increased scale, of the element illustrated in FIGURE 5;

FIGURE 7 is a side elevation, with part broken away, illustrating a variant form of an element of the invention;

FIGURE 8 is an end view of another variant form of an element of the invention;

FIGURE 9 is a side elevation of another variant form of an element of the invention;

FIGURE 10 is an end view of a nozzle of the invention incorporating the element illustrated in FIGURE 9;

FIGURE 11 is a perspective view illustrating a variant form of the invention; and

FIGURES 12 and 13 illustrate, on a reduced scale, various supporting methods usable with the invention.

Like parts are indicated by like numerals throughout the specification and drawings.

Referring now to the drawings, and particularly to FIGURE 1, the numeral 1 indicates a blower housing. The housing 1 is normally of a generally circumferential configuration and has an air-admission valve member 2 associated therewith. As illustrated at 3 in FIGURE 2, a motor means is secured to housing 1. The motor 3, normally electrically powered, drives a suitable impellor or air blower (not shown) within the housing 1 for delivery of air at a generally predetermined velocity to the outlet 4 of the housing 1. Since the housing 1, valve 2, motor 3 and outlet 4, as well as the impellor within housing 1, are well known elements, they will not be further described in detail herein.

An ear or bracket 5 projects laterally from the outlet portion of housing 1. The ear 5, which may be formed in the nature of a clamping element, receives and secures an upright portion 7 of handle member 6. Rearwardly extending from the upper end of handle portion 7 is a handle portion 8 for gripping by the operator. With the ear 5 formed as a clamping member, it will be understood that the handle 6 may, when desired, be removed therefrom and a fixed support may be

clamped by the member 5 to hold the blower of the invention in a desired, substantially fixed position.

Removably engaged with the ear 5 is a downwardly depending foot member 9. The member 9 may threadably engage an end of handle portion 7 within or beyond the ear 5 or, alternatively, the member 9 may itself engage the ear 5. The member 9 extends to a point substantially level with the bottom edge 1*a* of housing 1 and serves as a a means limiting the forward tilt of housing 1, as will appear further hereinbelow. A second foot member 9*a* is indicated in dotted lines in FIGURE 2 and may comprise an element secured to the bottom of motor 3 and terminating in the plane of the lower end of member 9 to provide, with member 9*a* and the housing edge 1*a*, a three-point or triangular support for the blower assembly.

Secured to outlet 4 of housing 1 and extending therefrom and in substantial alignment therewith is an elongated blower nozzle member generally indicated by the numeral 10. The nozzle member 10 includes an outer cylindrical hollow tubular jacket 11 having a plurality of perforations 12 therein. The member 11 is formed of relatively thin metal and the apertures 12 are of a maximum number consistent with strength and rigidity in the member 11.

Within member 11, and of a length only slightly less than the length of member 11, is a hollow tubular member 13. The member 13, as illustrated, is formed of heat-resistant material. We find it convenient, for example, to form the member 13 of a material having an inner sheet 13*a* and an outer, spaced sheet 13*b* formed of asbestos material and having a longitudinally corrugated layer 13*c* positioned therebetween and forming longitudinal air spaces therebetween, as best illustrated in FIGURE 3. The inner tubular layer 13*a* may be formed also of asbestos and may, in such case, have a metallic foil inner liner (not shown) secured thereto. Preferably, however, the member 13*a* comprises a hollow tube formed of Micarta and while of the same length as members 13*b* and 13*c*, is longitudinally offset as appears in FIGURE 4.

As best seen perhaps in FIGURES 3 and 4, the outer diameter of member 13 is less than the inner diameter of member 11. Spacers 14 may be positioned and held between members 11 and 13 at desired points therealong. We find it sufficient, for example, to position spacers 14 between the members 11 and 13 at points adjacent the opposite ends thereof, the members 14 at each end being circumferentially spaced, as best seen in FIGURE 3.

It will be understood that the member 13 may be formed of a metal tube having the members 13*c*, 13*b* about the outer surface thereof without departing from the nature and scope of the invention. In such event, the insulating tubular layer or member would continue to have therewithin an inner heat-reflecting tubular wall.

Positioned within the nozzle 10 and having a width substantially equal to the inner diameter of layer 13*a* is a heating element indicated generally by the numeral 16. The member 16 comprises a generally rectilinear core member 17 formed of heat-resistant material such as Micarta, ceramic or the like and having a width substantially equal to the inner diameter of layer 13*a*. The core member 17 is of minimum thickness consistent with substantial rigidity. In the preferred embodiment core 17 is of a length slightly greater than the length of nozzle 10 and has an end portion 17*a* extending into blower outlet chamber 4, as shown in FIGURE 4.

A heat transfer or imparting element is indicated generally at 18. The element 18 is formed of a length of coiled wire. One end of the coiled wire length is secured to a terminal adjacent the rearward end of the core 17, as indicated at 19. The core 17 has a plurality of indentations or notches 20 spaced at alternating positions along its opposite longitudinal edges. The length of wire coil 18 is wound in a spiral or helical path from the terminal 19 and about the core 17 toward the opposite or forward



end 17*b* of the core 17. Thus, the wire coil passes through a notch 20 adjacent the terminal 19, thence it proceeds in a forwardly inclined path on the opposite side of core 17 and passes through a notch 20 in the opposite longitudinal edge of core 17 and downstream from the first notch 20, from whence it proceeds in a forwardly inclined path to a third notch 20 and so on. While the wire coil 18 has a substantial diameter formed by the coils thereof, it will be understood that the notches 20 need only be of sufficient width to receive a single thickness of the wire of which the element 18 is formed. In its forward helical path, element 18 engages every other notch 20 in each edge of core 17, leaving the alternating notches 20 available for the purpose described hereinbelow. The portions of the forward helical path of element 18 visible in FIGURE 4 are indicated by the numeral 18*a*.

The outer or forward edge of the core 17 has a notch 21 formed therein. When the element 18 has passed through the last notch 20 in its forward helical path, it then passes through notch 21 in the forward edge of core 17 and from thence it is directed through a second helical path in a direction rearwardly of core 17, the element 18 in its rearward path being passed through the alternating spaced notches in the longitudinal edges of core 17 which were by-passed by element 18 in its forward helical excursion. The return helical coil portions of element 18 visible in FIGURE 4 are indicated by the numeral 18*b*.

Thus electrical energy is caused to pass in opposite directions in each alternating length of element 18 on each side of core 17.

It will be observed that the engagement of element 18 with the end notch 21 is effective to reverse the course of the element 18 and to provide for a helical return path wherein the portions of element 18 on either side of core 17 are parallel in the forward and rearward directed helical paths. The opposite end of element 18, after passing through the rearmost notch 20*a* on one side of core 17, is secured to a terminal, as indicated at 22. The end portion 18*c* of element 18 extends from the last notch 20*a* as a straight length of wire to terminal 22 and thence in a portion 18*d* twisted about portion 18*c* to form a resistance element of lesser heat intensity in the path of incoming, as yet unheated, air in chamber 4. Suitable conductors 23, 24 are secured to terminals 25, 26, respectively, and pass outwardly through a suitable aperture 27 formed in housing 1, as indicated generally in FIGURE 4.

A straight or uncoiled length 18*e* of the wire forming element 18 extends laterally of core portion 17*a* between terminals 19 and 25. A fuse link 28, formed of a material known to break at temperatures lower than that at which portion 18*e* will break, extends between terminals 22 and 26 and lies in a parallel path closely adjacent that occupied by wire length 18*e* whereby the heat generated by length 18*e* will be imparted to link 28. An access opening 1*b* in housing 1 is provided for replacement of fuse 28 and is closed by the cover 1*c* shown in FIGURE 1.

In FIGURE 3, we illustrate the outer end portion of nozzle 10. An annular member 30 is suitably clamped, as by the ring 31, to the outer end surface of member 13. The annular member 30 is formed of heat-resistant material, such as Micarta, and may be formed of the same material as that employed in forming core 17. The ring 31 may be secured to the outer end surface of member 13 by suitable connectors, such as those indicated at 32, which in turn may threadably or otherwise engage elements (not shown) adhesively secured within the outer end surface of member 13 between layers 13*a*, 13*b*. It will be observed that the inner diameter of member 30 is less than the inner diameter of layer 13*a*, also less than the width of core member 17. An open mesh screen 33 is held by member 31 between members 30 and 31 and

overlying the area defined by the inner diameter of member **30**. The screen **33** is of such wide mesh as to provide no substantial interference with the delivery of air outwardly from nozzle **10**.

Referring now to FIGURE 5, we illustrate a variant form of core, as indicated generally by the numeral **37**. The core **37** is generally rectilinear in shape, having flat sides and a plurality of spaced notches **37***a* in its opposite longitudinal edges as well as a notch **37***b* in its outer or forward edge in the manner described in relation to core **17**. The notches **37***a*, **37***b*, however, are of such size as to receive the coils of element **18**. Similarly, the core **37** has a major width less than the inner diameter of the hollow tubular nozzle with which it is employed. Spacer extensions **37***c* extend outwardly at the opposite ends of core **37** for contact with the inner wall of layer **13***a*. A plurality of air-directing louvers **38** are formed on the opposite sides of core **37**. The louvers **38** are arranged in parallel inclined planes, the paths of the louvers extending from one side of the core **37** being substantially perpendicular to the paths of the louvers extending from the opposite side of core **37**. The member **37** may be conveniently formed by casting the same of ceramic material. It will be observed that the louvers **38** lie in paths extending between alternately spaced notches in the opposite longitudinal edges of core **37** whereby the wire coil **18** follows a path paralleling the louvers **38**. It will be further observed that the louvers **38** are individually spaced from each other, providing passages for air movement axially of nozzle **10** therebetween. In this regard, it will be observed that the louvers **38** comprising alternate parallel groupings may be offset from each other axially of nozzle **10** and core **37** whereby air passing between adjacent louvers is forced to follow a tortuous path in its movement from one end to the other of core **37**.

As illustrated in FIGURE 8, elements **39**, corresponding substantially to the louvers **38**, may be formed on and extend inwardly from the inner wall surface of a tubular nozzle layer in which core **17** may be placed. For example, the tubular nozzle **40** of FIGURE 8 could be molded of ceramic material with the inwardly directed louvers **39** formed in the molding process. In such event the louvers may be arranged in the manner described above in relation to louvers **38**, to cause the air passing through nozzle **40** to follow the path of element **18**.

Referring now to FIGURE 7, we illustrate a variant form of nozzle element indicated generally by the numeral **43**. The member **43** is formed of a hollow tubular length of metal or ceramic material or the like. The member **43**, when formed of metal, may be surrounded or wrapped by any suitable heat-insulating material, such as asbestos. In a particular installation, for example, the member formed of elements **13***b* and **13***c* may be employed as an insulating member surrounding the member **43**. The inner surface of member **43** has formed therein a spiral groove **44**. The groove **44** is of sufficient width to overlie the coil thickness of element **18**. It will be understood that the element **18** would not be positioned within or received within the groove **44**, but that the groove **44** follows a helical path substantially identical with and closely, adjacently overlying the path followed by the element **18**. The groove **43**, like the louvers **38** and **39** described above, are arranged to direct some of the air along the path of element **18** to provide additional heat-transfer contact between element **18** and the air passing through nozzle **10**.

The core member, such as the core **17**, is held by a screw or bolt **50** which passes through an asbestos washer **51** and a ceramic sleeve or spacer **52** into a threaded passage **53** formed in the housing **1**. As best seen in FIGURE 2 the passage **53** may extend into a boss **54** for reception of a fastening means such as bolt **55**, the latter being staked in passage **53** for reception of wing nut **56** to hold the bracket **4** on boss **54**.



Referring now to FIGURE 4 it will be observed that the outlet portion **4** of housing **1** has an annular enlargement or collar **60** about which the inner end of jacket **10** is positioned. An annular recess **61** is formed within the collar **60** and a spacer member **14** is positioned between the inner surface of collar **60** and the layer **13***b* of member **13**. The spacer **14** has a fastener element **62** adhesively held therein and the member **14** is adhesively held to layer **13***b*. A fastener **63** extends through jacket **10** and collar **60** for connection with fastener element **62**. The inner end of layer **13***b* abuts the base of recess **61**. It will be observed that the inner diameter of chamber portion **4** is in alignment with the space between layers **13***a*, **13***b* of member **13** and that said diameter is outwardly offset at a point inwardly spaced from the inner end of said layers and, further, that layer **13***a* is outwardly ofiset from layer **13***b* and member **13***c*. Hence, as indicated by the arrows in FIGURE 4, a portion of the air passing through outlet **4** of blower housing **1** is caused to enter and pass through the space between layers **13***a*, **13***b* escaping in a hollow tubular column of air from the forward end of nozzle **10** and about the circumference of members **31**, **33**, **30**, thus serving to further insulate and cool the insulating layer **30** and jacket **10**. While the hollow tubular column of air emanating from between layers **13***a*, **13***b* will be of lesser temperature than the air passing through screen **33**, it will be understood that said hollow tubular column of air has acquired heat in its passage between layers **13***a*, **13***b*.

A switch box **70** is positioned on motor **3** and carries a switch lever **71**. The switch **70** may be suitably wired to provide for the off position illustrated in FIGURE 2, and for operation of the motor **3**, and consequently of the impellor within housing **1** at more than one speed. Similarly the switch **70** may be wired to provide for delivery of electrical energy of varying amounts to element **18**. Additionally, the switch **70** may incorporate a time delay device whereby when the switch lever **70** is moved to the off position, electrical energy is first withdrawn from element **18** while the motor **3** continues to be energized and thus to deliver a cooling blast of air through nozzle **10** for a suitable period before motor **3** is de-energized, thus protecting the element **18** and nozzle **10** from any deleterious effects which may stem from residual heat remaining therewithin when heat-absorbing air no longer passes through nozzle **10**.

Referring now to FIGURES 9 and 10, there is illustrated a variant form of core which may be formed of a central hollow tubular member **80** which in turn may be formed of Micarta or the like. At the opposite ends of the tube **80** and arranged in inter-penetrating relationship therewith are four-armed spider elements, the element **81** being positioned at the outer end of tube **80** and the element **82** being positioned at the inner end thereof. Two of the four arms of element **82** are formed by an integral plate member **82***a* apertured as at **83** to provide for attachment of terminals **19**, **22**, **25** and **26**, as illustrated in FIGURE 4. Secured to the four arms of web **82** and positioned within hollow tube **80** adjacent its inner end is a disc **84** having a diameter slightly less than the inner diameter of tube **80**. Secured at their opposite ends to the arms of webs **81** and **82** is a set of four rack members **85**. Each of the rack members **85** is an elongated, relatively thin flat strip having a plurality of notches **86** formed therein and corresponding substantially to the notches **37***a* illustrated in FIGURE 5. The opposite edge of each of the racks **85** has, intermediate its ends, an oppositely directed abutment or enlargement **87** positioned to contact the outer surface of tube **80** and to space the remainder of said opposite edge from the outer surface of tube **80**. Similarly, an enlargement **88** rises above the edge in which notches **86** are formed and lies in the plane of the corresponding edges of webs **81** and **82**, it being understood, as best seen in FIGURE 10, that the outer edges of webs **81** and **82** are in contact with the inner layer **13***a* of member **13** and

that heating element **18** is wound about the core illustrated in FIGURE 9 and through the notches **86** in the manner described in relationship to FIGURE 4. As best seen in FIGURE 10, the core of FIGURE 9 results in the arrangement of element **18** in a helical coil, the cross-sectional configuration of which is substantially circular.

Referring now to FIGURE 11, it will be observed that an elongated leg element or support post **99** extends downwardly from attaching bracket **5**. The outer configuration of element **99** may be hexagonal, as shown, or otherwise noncircular for ease of engagement by a suitable hand tool. At its end adjacent bracket **5**, element **99** has an axial, threaded well (shown in dotted lines at **100**) formed therein for reception of a threaded end *7a* of handle **7**. The end edge surface of element **99** which borders well **100** abuts bracket **5** to support nozzle **4**, **10** in a horizontal plane and the bottom or foot *99a* of element **99** lies in the plane of supports *1a*, *9a*.

As illustrated in FIGURE 12, the structure illustrated at **54**, **55**, **56** and **5** enables the blower to be suspended from above and freely movable, when desired, for application of heat to a variety of spaced points. In such case a vertical rod **200** is clamped by member **5** and is flexibly supported at its upper end, for example by chain **201**. The rod **200** can be provided, as indicated, with a threaded end portion *200a* for engagement by member **99** when the operator desires to rest the device upon a relatively level surface and a suitable handle (not shown) may be secured to housing **1**, housing **3** or rod **200** when the operator does not wish to employ rod **200** as a handle means.

Illustrated in FIGURE 13 is a fixed support **300** including a rod portion **301**, a lateral portion **302** and a mounting portion **303**, the latter being secured to a surface such as a wall adjacent the work or area to be heated. The opposed radially toothed, grooved or serrated surfaces of members **54** and **5** have been offset to show the blower partially in dotted lines as angularly disposed in FIGURE 13, it being understood that the same might be accomplished with respect to the suspension shown in FIGURE 12.

The use and operation of the invention are as follows:

Air entering through valve **2** is delivered at an increased, normally predetermined, velocity to housing outlet **4**. From outlet **4** the air passes rapidly through nozzle **10**, only a fraction of a second being provided for the air to be heated within nozzle **10**. The air is passed over, through and around the helix formed of element **18** and outwardly through screen **33**. Since the element **18** is arranged in a forward helix on opposite sides of the core and is arranged in an interlaced return helix on opposite sides of said core, the paths of said helixes lying in parallel planes, all portions of the heat-imparting element **18** are equally exposed to the passage of air and to the cooling effect thereof upon the element **18**. Thus is eliminated any separate return wire or wires per se. No portion of element **18** is shielded from the cooling effect of air passing thereabout and all portions of element **18** are available for heat-transfer to the air passing through nozzle **10**. The core being of relatively thin, flat configuration presents a minimum resistance to the flow of air and a minimum area of non-heat-transfer material in contact with the air.

Further, the employment of the return portion of the heat-imparting element **18** for the heat-imparting function is effective to provide a maximum heat transfer from the element **18** to the air passing thereabout and to provide a higher temperature to said air with a reduced amount of amperes and watts. For example, known prior devices have required 22 amperes and 2,600 watts to produce air at 1,000 degrees temperature. The device of the present invention has produced air at 1,200 degrees temperature and has required but 15 amperes and 1,800 watts to do so.

The annular member **30**, having an inner diameter less than the innermost diameter of nozzle assembly **10**, is effective to create a back pressure within the nozzle **10** and to retain or impede the passage of air therethrough, providing for maximum length of contact time between said air and the heat-imparting element of the invention.

The insulating tubular layer element **13** and the perforated jacket **11** spacedly surrounding it have proved fully effective to protect the operator against injury. With the blower of the invention in full operation the jacket has been grasped with the bare hand without discomfort.

Foot member **9**, being spaced forwardly of and at the level of the bottom *1a* of housing **1**, is effective to impede unintended forward tilting of the blower of the invention and consequent delivery of heated air to the surface on which housing **1** rests.

In FIGURES 5–10, we illustrate variants designed also to provide the desired maximum effective contact between element **18** and the air passing through nozzle **10**.

The employment of the louvers **38**, **39** and groove or rifling **44**, illustrated in FIGURES 5–8, is effective to provide a tortuous path for the air passing through the nozzle **10**. The arrangement of the louvers **38** directs said air in a helical path corresponding to that of the element **18**. A portion of the air passing through the nozzle **10** is directed through a tortuous, substantially axial, path, through the spaces between the louvers **38**.

The same is true of the arrangement of FIGURE 8 wherein louvers such as those indicated at **38** are directed inwardly from a tubular wall surrounding heat element **18**.

Similarly, the employment of the spiral groove **44** or "rifling," as illustrated in FIGURE 7, tends toward the direction of at least a portion of the air passing through the nozzle **10** in a helical path corresponding to that of the element **18**. The direction of the air passing through the nozzle **10** into paths corresponding to that of the interlaced helical paths of the element **18** aids in providing a maximum contact of said air with the heat-imparting element **18** and a consequent maximum transfer of heat therebetween.

The fuse link **28**, replaceable through housing aperture *1b*, is positioned in parallel adjacent relationship to a straight portion of element **18**. Thus link **28** is exposed not only to the heat created by passage of electrical energy through it, but is exposed also to the heat produced by portion *18e* of element **18**.

The employment of a portion of the abundance of air delivered through outlet **4** as a cooling medium by passing it through the insulating member **13** results in maximum protection of the operator and in capturing the heat which might otherwise be lost through member **13**. The delivery of this cooling or insulating air in a hollow tubular air blast surrounding the hot cylindrical air blast through nozzle outlet screen **33** aids in retaining and directing said hot blast on the object to be heated.

In FIGURES 9 and 10 the core there illustrated provides a helical heating element **18**, the cross-sectional configuration of which is substantially circular, whereas that of element **18**, when employed with cores **17** or **37**, is somewhat elliptical, as best seen in FIGURE 3. The disc **84** permits a small amount of cooler air to flow about its edge to cool the tubular core portion **80**. The racks **85** hold element **18** in spaced relationship substantially equidistant from the outer tubular surface of member **80** and the inner tubular layer *13a* of nozzle assembly **10**. Hence a hollow tubular column of air is created between members **80** and *13a* and is in maximum contact with a hollow, tubular, helically coiled heating element **18** throughout its passage through nozzle **10**.

The structure of FIGURE 11 includes a support element or foot member **99** threadably engaging handle **7** and abutting bracket **5** to guarantee maintenance of nozzle **10** in spaced parallel relationship with the surface on which the entire structure rests and thus to insure against accidental direction of hot gases upon such surface.

Whereas preferred embodiments of the invention have

been illustrated and described, it will be understood that further modifications will suggest themselves to those skilled in the art upon a reading of the foregoing specification. Accordingly, the foregoing description should be taken as merely illustrative and not definitive, and the scope of the invention should be limited only by the following appended claims.

There is claimed:

1. In a blower, a blower housing, motor means secured to said housing, handle means secured to and extending above said housing, said blower housing having a bottom edge and a nozzle extending from said housing at a level above said bottom edge, a foot member secured to said housing forwardly of said housing bottom edge and extending from the level of said nozzle to a point substantially level with said bottom edge in substantially the same vertical plane as said bottom edge, and a second foot member extending beneath said motor means to a point substantially level with said bottom edge and spaced laterally from the plane occupied by said first-named foot member and said bottom edge.

2. In a blower a substantially circular blower housing, a nozzle extending laterally from an upper portion of said housing, a motor means extending from said blower housing in a plane substantially perpendicular to that occupied by said nozzle, a support post secured to said nozzle and extending downwardly therefrom to the horizontal plane occupied by the bottom edge of said housing and a foot member extending downwardly from the lower outer end portion of said motor means to said last-named plane.

3. In a blower a substantially circular blower housing, a nozzle extending laterally from an upper portion of said housing, a motor means extending laterally from a central portion of said blower housing in a plane substantially perpendicular to that occupied by said nozzle, a support post secured to said nozzle and extending downwardly therefrom to the horizontal plane occupied by the bottom edge of said housing and a foot member extending downwardly from the lower outer end portion of said motor means to said last-named plane, said post, housing bottom edge and foot member being in triangularly spaced relationship with each other.

4. In a blower a substantially circular blower housing, a nozzle extending laterally from an upper portion of said housing, a motor means extending from said blower housing in a plane substantially perpendicular to that occupied by said nozzle, a support post secured to said nozzle and extending downwardly therefrom to the horizontal plane occupied by the bottom edge of said housing and a foot member extending downwardly from the lower outer end portion of said motor means to said last-named plane, and a handle member rising vertically above said post and extending laterally over said housing.

5. In a blower a substantially circular blower housing, a nozzle extending laterally from an upper portion of said housing, a motor means extending from said blower housing in a plane substantially perpendicular to that occupied by said nozzle, a support post secured to said nozzle and extending downwardly therefrom to the horizontal plane occupied by the bottom edge of said housing and a foot member extending downwardly from the lower outer end portion of said motor means to said last-named plane, and a handle member rising vertically above said post and extending laterally over said housing, said support post threadably engaging said handle member.

6. In a blower a substantially circular blower housing, a nozzle extending laterally from an upper portion of said housing, a bracket adjustably secured to said nozzle, a motor means extending from said blower housing in a plane substantially perpendicular to that occupied by said nozzle, a handle carried by said bracket and rising upwardly therefrom, a support post secured to said handle in contact with said bracket and extending downwardly therefrom to the horizontal plane occupied by the bottom edge of said housing and a foot member extending downwardly from the lower outer end portion of said motor means to said last-named plane.



7. In a blower a substantially circular blower housing, a nozzle extending laterally from an upper portion of said housing, a bracket adjustably secured to said nozzle, a motor means extending from said blower housing in a plane substantially perpendicular to that occupied by said nozzle, a handle carried by said bracket and rising upwardly therefrom, a support post secured to said handle in contact with said bracket and extending downwardly therefrom to the horizontal plane occupied by the bottom edge of said housing and a foot member extending downwardly from the lower outer end portion of said motor means to said last-named plane, said post having an axially disposed, threaded well formed in an end surface thereof, said handle having a threaded end portion formed and adapted for passage through said bracket and engagement in said well.

8. The structure of claim 4 characterized by and including a boss extending laterally from said nozzle, a clamp rotatably mounted on said boss and extending radially therefrom in a plane paralleling said nozzle, means for selectively locking said clamp on said boss at a variety of radially extending positions and means carried by an outer portion of said clamp for removably securing said clamp to said support post.

9. The structure of claim 4 characterized by and including a boss extending laterally from said nozzle, a clamp rotatably mounted on said boss and extending radially therefrom in a plane paralleling said nozzle, means for selectively locking said clamp on said boss at a variety of radially extending positions, said locking means including mating serrated surfaces on said boss and clamp and threaded means for urging said surfaces toward each other, and jaw means carried by an outer portion of said clamp for removably securing said clamp to said support post.


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