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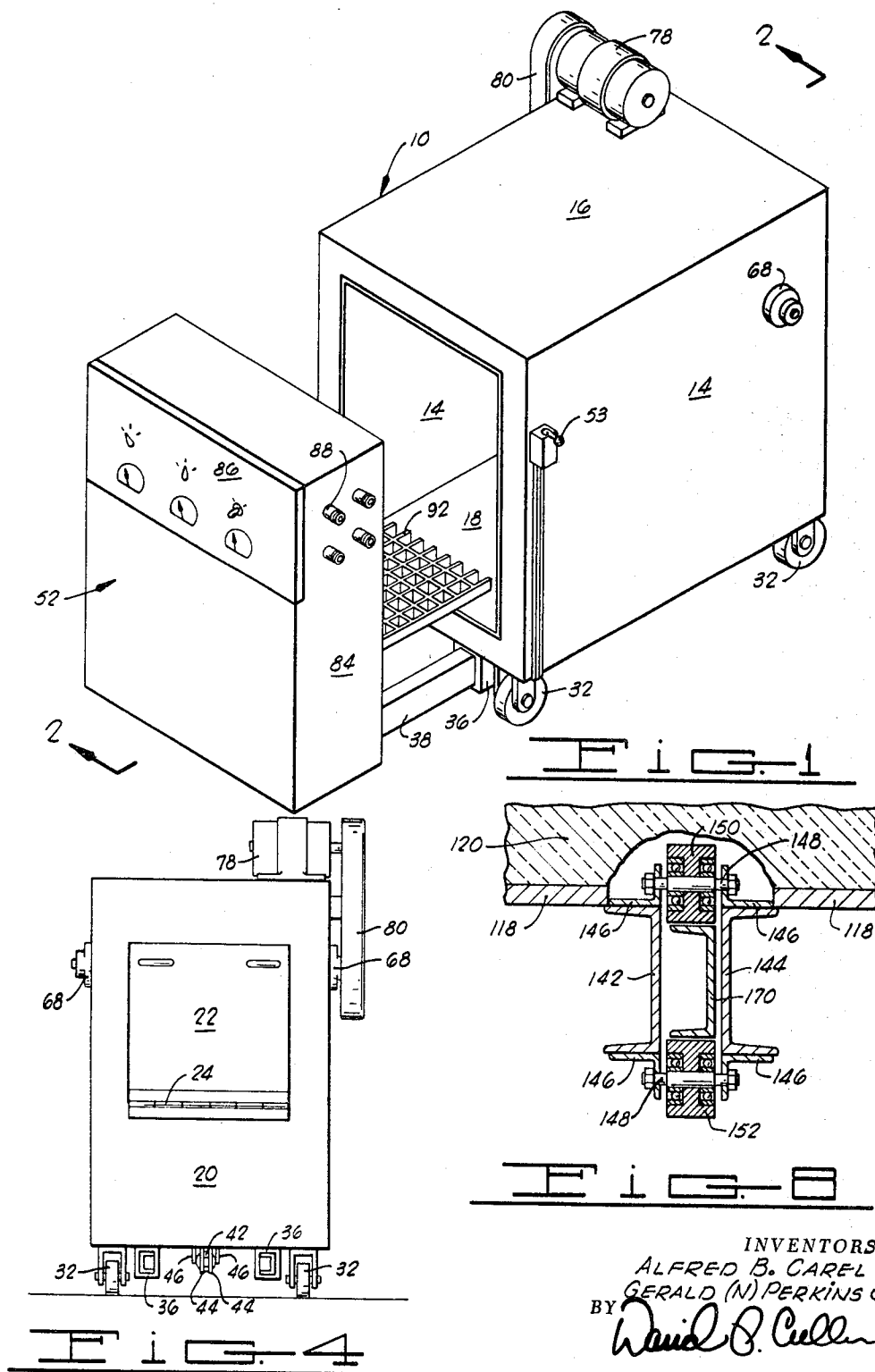
A. B. CAREL ET AL

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MOVABLE OVEN ASSEMBLY

Filed Jan. 10, 1967

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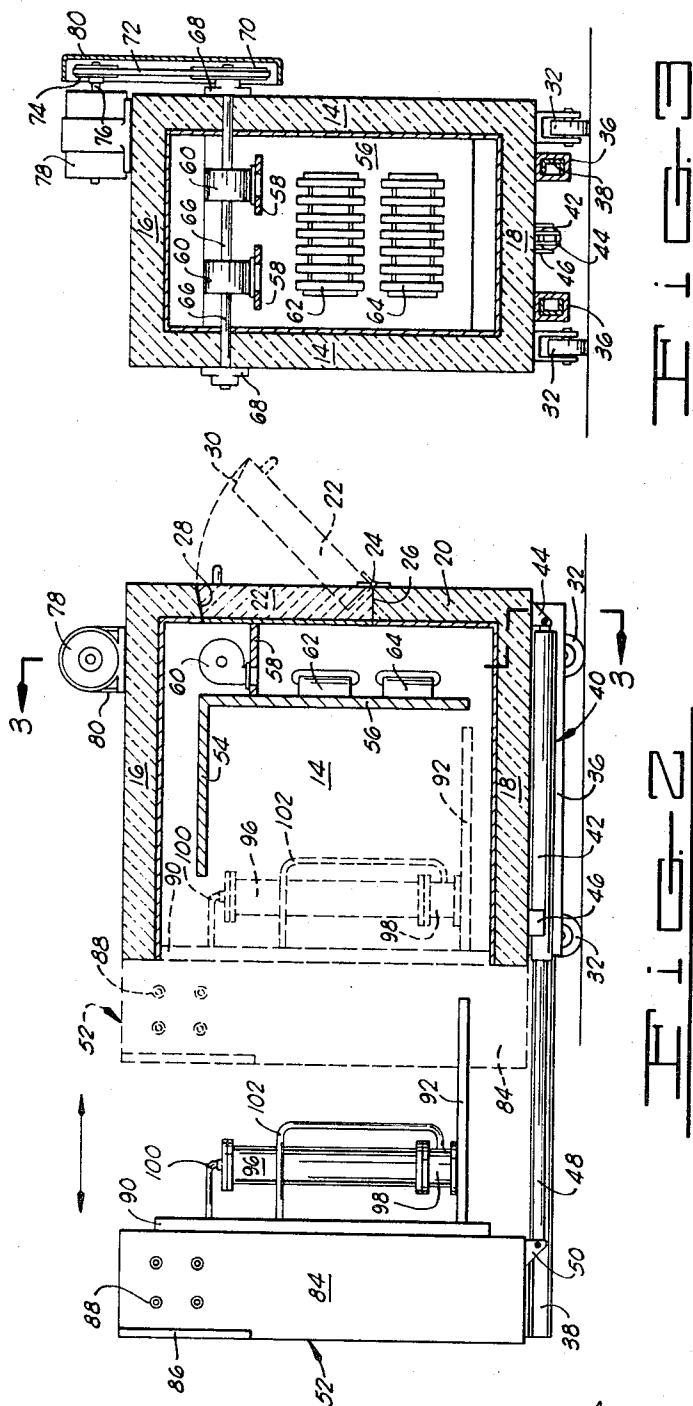
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Sheet 2 of 3



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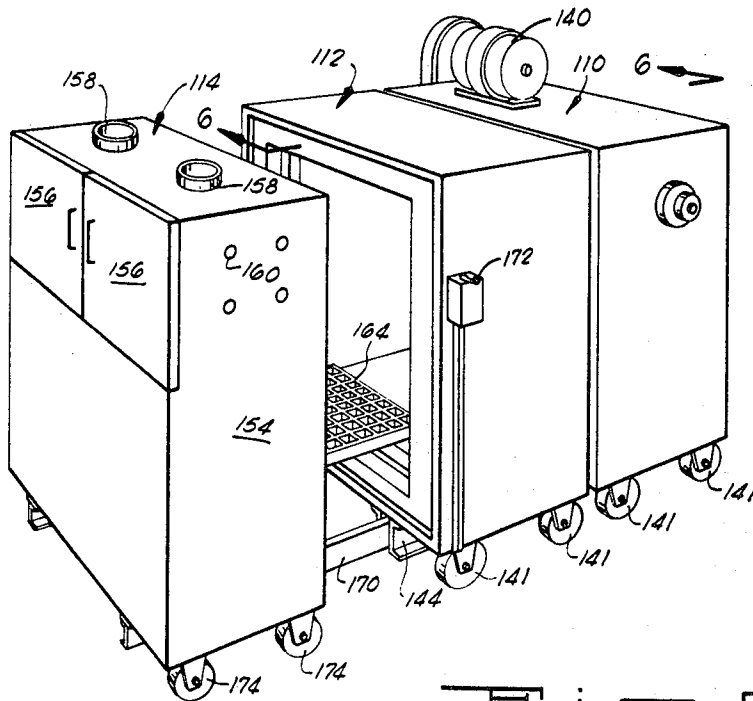


FIG. 6

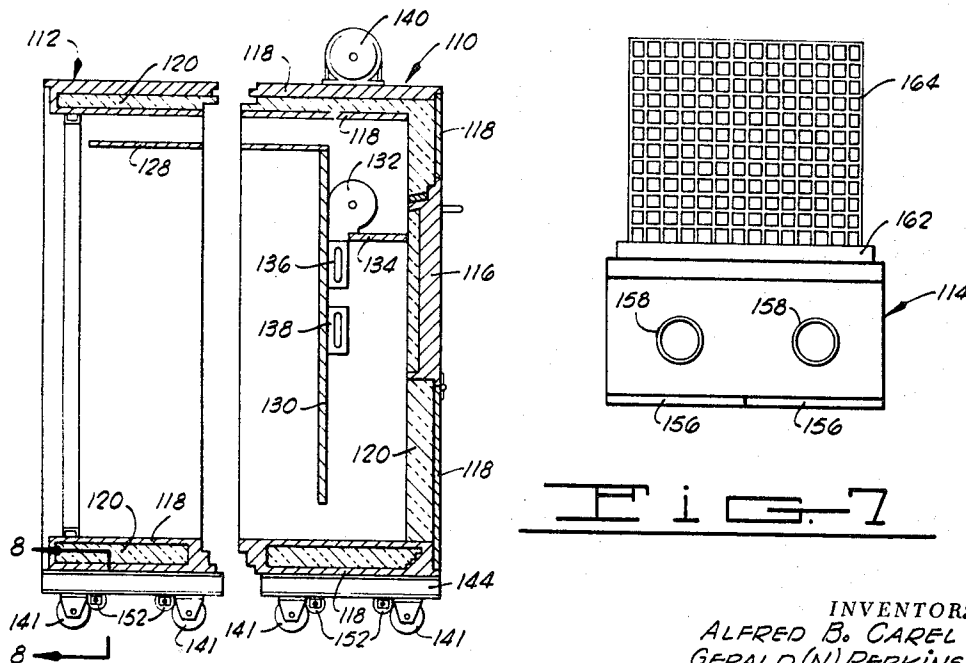


FIG. 7

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MOVABLE OVEN ASSEMBLY

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20 Claims. (Cl. 263—6)

ABSTRACT OF THE DISCLOSURE

An oven assembly which is useful in scientific laboratories, and in pilot plant facilities. The oven is of two-part construction in which one of the parts is movable relative to the other, and functions, when in one position, as a cover sealing an opening in the other part of the oven. The oven is preferably a forced draft type in which the part having the opening therein contains baffle means which forms an air flow channel. The movable part of the oven carries instrumentation for controlling operations conducted within the oven. The movable part of the oven is adapted to detachably support large laboratory process apparatus, and is geometrically configured so that when it is moved away from the second part of the oven, the apparatus supported thereon becomes accessible from at least three sides. When the movable part of the oven is moved into juxtaposition to the second part to cover the opening in the latter part, the apparatus supported on the movable part is enclosed within the oven.

BACKGROUND OF THE INVENTION

Field of the invention

The field of technology to which the present invention appertains is that of apparatus for providing a controlled temperature environment in which physical or chemical processes can be conducted on a laboratory or pilot scale. More specifically, the present invention relates to laboratory and pilot plant ovens adapted to contain large apparatus during the heating of the oven, and openable to provide access to the apparatus and equipment positioned in the oven.

Description of the prior art

Various types of housings and other enclosing structure have been heretofore constructed for the purpose of providing an elevated temperature environment in which various articles, equipment and materials can be heated or retained at a constant elevated temperature. These structures have ranged in size and function from large kilns into which dillies, trucks, or other movable carriages can be moved bodily through open doorways, to relatively small muffle furnaces and laboratory ovens which have hinged or sliding doorways providing access to the interior of the oven.

In instances where relatively bulky, heavy articles are to be moved into an oven or furnace of medium size, it has been proposed to provide some type of retractable platform connected to the main oven housing, but movable through an opening in such housing for the purpose of supporting and conveying the objects to be heated into and out of the main housing at appropriate times. Examples of these types of ovens are depicted and described in U.S. Patent 2,672,246 to C. A. Barnett et al. and U.S. Patent 2,630,927 to Carl F. Mayer. In these patents, a plurality of vertically stacked drawers are movable on tracks and rollers into and out of a main housing in which objects carried on the drawers can be subjected to forced draft heating. The presence of plural, stacked drawers in these ovens, however, limits the available space which may be occupied in the main housing by an

object carried on any one of the drawers. There is not available, to my knowledge, an oven which can be easily used to enclose large and bulky laboratory and pilot plant equipment which must be frequently moved and disassembled, or altered in shape in a way which requires access to such equipment from several sides thereof. In general, the ovens presently available and enclosing a large enough volume to accommodate equipment of this type have a limited access to the interior thereof, which makes the assembly and introduction of equipment into the oven, or its removal therefrom, time-consuming and difficult.

Summary of the invention

The present invention is an oven assembly which is highly useful for heating large pieces of laboratory or pilot plant equipment which are bulky and which must be frequently altered in their geometric configuration during use, or replaced in the heated environment of the oven by other equipment. The oven of the invention is particularly well adapted for enclosing large preparative gas liquid chromatography columns in a way such that the columns can be quickly and easily altered in overall length and number of column sections at any time desired. Broadly described, the oven of the invention comprises a housing having an opening therein, and channel defining means carried within the housing and spaced from the interior surface of the housing to form a flow channel in the housing. Heating means is located within the flow channel, and air circulating means is located in the oven for moving air through the flow channel. A cover member is attached to the housing and is positioned for closing the opening in the housing. The cover member carries a rack which is positioned for projecting into the interior of the housing when the cover member closes the opening in the housing. The rack is at least partially open to permit air to flow from the flow channel past and through the rack.

In a preferred embodiment of the invention, the housing of the invention is completely open at one side thereof, and the cover member is dimensioned to form a closure for this open side of the housing. The cover member is slidably connected to the housing and is movable relative to the housing by a suitable actuating means which preferably is a fluid actuated piston and cylinder system. The movable cover member carries instrumentation which remains accessible outside the oven in all positions of the closure member. The rack carried by the cover member extends horizontally and is secured to the cover member in a location such that a plurality of large preparative gas liquid partition chromatography columns or other bulky apparatus can be supported thereon and connected to the instrumentation for control therefrom. When the cover member is moved to a position in which it closes the housing, the rack carried thereby and the channel defining means cooperate to form a major portion of a circuitous air flow pathway in which chromatographic columns, or other apparatus carried on the rack, are subjected to intimate contact with the circulating air.

From the foregoing description of the invention, it will have become apparent that an important object of the invention is to provide an oven assembly which is large enough to accommodate relatively large laboratory apparatus, but which can be opened to permit such apparatus to be instantly accessible from several sides for repair, replacement or alteration.

A more specific object is to provide an oven assembly in which large equipment may be heated, but which permits such equipment to be instantly removed, and the heated interior of the oven to be very rapidly cooled to ambient temperature.

An additional object of the invention is to provide an

oven assembly which can be used for heating a plurality of preparative gas liquid chromatography columns by a forced draft of heated air.

Another object of the invention is to provide an oven having an opening in one side thereof large enough to permit passage through the opening of equipment sufficiently large to fill the available space in the interior of the oven.

Yet another object of the invention is to provide a large portable oven assembly which can be disassembled into a plurality of sections to facilitate moving the oven assembly through doorways and similar openings of relatively restricted area.

Additional objects and advantages of the invention will become apparent as the following detailed description of the invention is read in conjunction with the accompanying drawings which illustrate certain preferred embodiments of the invention.

Brief description of the drawings

FIGURE 1 is an isometric view of an oven assembly constructed in accordance with the invention.

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1.

FIGURE 3 is a sectional view taken along line 3—3 of FIGURE 2.

FIGURE 4 is a view in elevation of the rear side of the oven housing forming a part of the oven assembly of the invention.

FIGURE 5 is a perspective view of a different embodiment of the oven assembly of the invention.

FIGURE 6 is a sectional view taken along line 6—6 of FIGURE 5.

FIGURE 7 is a plan view of the cover member and rack sub-assembly used in the embodiment of the invention depicted in FIGURE 5.

FIGURE 8 is a sectional view taken along line 8—8 of FIGURE 6.

Description of the preferred embodiments

Referring now to the drawings in detail, and particularly FIGURES 1—4, the oven assembly of the invention as depicted in FIGURE 1 includes an oven housing designated generally by reference numeral 10 and including a pair of vertically extending, substantially parallel side walls 14, a top 16 and a bottom 18. The oven housing 10 also includes a back wall 20 which includes a large door 22 hingedly connected at 24 to the back wall 20 and dimensioned to close an opening 26 formed through the back wall 20 to the interior of the oven housing. Seating of the door 22 is facilitated by a beveled edge 28 formed in the back wall 20 of the housing and a mating beveled edge 30 formed on the door 22. The construction of the walls 14, 16, 18 and 20 of the housing 10 includes a suitable thermal insulating material.

Secured to the bottom wall 18 of the housing 10 are a plurality of casters or rollers 32 which facilitate rolling movement of the oven assembly from one location to another. Also secured to the under side of the bottom wall 18 are a pair of horizontally spaced, elongated, parallel guide channels 36. The guide channels 36 used in the embodiment of the invention illustrated in FIGURES 1—4 are each substantially rectangular in cross-section as most clearly illustrated in FIGURE 3, and are dimensioned to slidably receive a pair of elongated guide members 38 carried by a movable portion of the oven assembly as hereinafter described. A piston and cylinder assembly designated generally by reference numeral 40 is preferably positioned between the guide channels 36 and along the center of the lower surface of the bottom wall 18 of the housing 10. The piston and cylinder assembly 40 includes an elongated cylinder 42 which is secured at one of its ends to a suitable bracket 44 located adjacent the rear wall 20 of the oven housing 10, and at its other end to a suitable bracket 46 located adjacent the

front of the oven housing. A piston 48 is reciprocally mounted in the cylinder 42 and is attached at its free end to a bracket 50 carried by a movable cover or closure member designated generally by reference 52, and hereinafter described in greater detail. A power fluid control lever 53 for actuating the piston 48 is mounted on the side wall 14 of the oven housing 10. The piston 48 is preferably air actuated, but may also be actuated hydraulically.

Mounted within the oven housing 10 is a flow channel defining means which, in the illustrated embodiment, is formed by a pair of rigid baffle plates 54 and 56 extending substantially perpendicular to each other, and spaced from the top wall 16 and the rear wall 20 of the housing 10, respectively. The baffle plates 54 and 56 define an air flow channel adjacent the top wall 16 and rear wall 20 of the oven housing 10. Supporting brackets 58 are secured between the baffle plate 56 and the rear wall 20 of the housing 10 and support a pair of centrifugal blowers 60 or other devices suitable for inducing movement or flow of air within the housing. Mounted within the air flow channel on the back side of the baffle plate 56, and at a position below the blowers 60, are a pair of electrical heating element banks 62 and 64. The blowers 60 are driven by a common shaft 66 which is extended through the oven housing 10 and journaled in suitable bearing blocks 68 secured to the side walls 14 of the housing. One end of the shaft 66 outside the housing 10 is keyed to a pulley 70 which is driven in rotation by a belt 72 passed over a pulley 74 secured to the end of the drive shaft 76 of a motor 78. The motor is supported on top of the oven housing 10. A suitable belt guard 80 is supported in a protective position over the pulleys 70 and 74 and the belt 72.

The cover member 52 may be said to form a major subassembly of the invention, and is movable between the position shown in solid lines in FIGURE 2 and the position shown in dashed lines therein. The cover member 52 includes a relatively large, vertically extending instrument housing 84 which encloses various electronic and mechanical controls used for a purpose hereinafter described. The cover member 52 further includes an instrument panel 86 which faces away from the oven housing 10 and carries a plurality of instrument control elements, such as switch knobs, gauges and the like. At one of the side walls of the instrument housing 84, fittings 88 project through the housing to provide points of connection for electrical leads, sample conduits, carrier gas conduits or other fluid conduits used to supply fluid materials to any of a variety of types of equipment or apparatus which it may be desired to heat within the oven housing 10 during the operation of the oven assembly.

Secured to the side of the instrument housing 84 which faces the oven housing 10 is a sealing plate 90 which is dimensioned to project a short distance into the oven housing through an open side thereof, and to fit closely against the interior surfaces of the side wall 14, the top wall 16, and bottom wall 18 of the oven housing. Extending substantially horizontally from the sealing plate 90 adjacent the lower edge thereof is a supporting rack 92. The supporting rack 92 is preferably formed as an open grill work, and is secured to the sealing plate 90 at a location such that the horizontal plane occupied by the rack 92 is spaced vertically above the bottom wall 18 of the oven housing 10 when the cover member 52 is moved to its position of closure.

One of the most useful applications of the oven assembly of the present invention is its utilization for heating, or maintaining at a constant elevated temperature, a plurality of large preparative gas liquid chromatography columns. A chromatography column 96 of this type is shown as supported on the rack 92. The column 96 has its lower end spaced from the rack 92 by a suitable rigid spacer element 98, and has suitable fluid inlet and outlet conduits, 100 and 102, respectively, connected to the

upper and lower ends of the column, and connected to suitable tubes or conduits (not shown) carried within the instrument housing 84 and connected to the fittings 88 in one side of this housing.

Operation

Preparatory to the utilization of the oven assembly, it is first moved to a location where it may be conveniently semi-permanently stationed during the use of the assembly. Portability of the assembly is assured by the inclusion of the rollers 32 on the lower side 18 of the oven housing 10. After locating the assembly where desired, the cover member 52 is withdrawn to the open position depicted in solid lines in FIGURE 2 by actuating the cylinder and piston assembly 40 using the control lever 53. In this position of the cover member 52, the rack 92 is substantially completely exposed, and the apparatus or equipment which is to be heated may be assembled on the rack 92, and appropriate connections made to conduits, electrical leads and the like, included within the instrument housing 84. The length of the guide members 38 is such that relatively large or bulky equipment may be assembled on the rack 92 without difficulty, such equipment being accessible from at least three sides to permit intricate connecting and assembly operations to be performed.

As has been previously indicated, the oven assembly is particularly well adapted to facilitate the heating of a plurality of single or multi-sectioned preparative gas liquid chromatography columns, with such columns being positioned in a vertically extending or upright position on the rack 92, and connected at opposite ends through suitable conduits to the connecting conduits provided within the instrument housing 84. When the chromatography columns, or other apparatus which it is desired to subject to the elevated temperature environment within the oven housing 10, have been assembled on the rack 92, the cylinder and piston assembly 40 is energized by means of a suitable power fluid, and using the power fluid control lever 53 located on the side of the oven housing 10. Actuation of the piston and cylinder assembly 40 effectively retracts the cover member 52 to its position of closure as illustrated in dashed lines in FIGURE 2. Though they have not been illustrated, hatch dogs or suitable latching devices may be provided for retaining the closure member 52 in its closed position if desired. In this position of closure, the sealing plate 90 sealingly engages the interior surfaces of the walls of the oven housing 10 so that this housing is effectively closed on all sides. The blowers 60 and heating elements 62 can then be energized to commence the circulation of heated air, or in some instances, perhaps, an inert gas, within the oven housing 10. Control of the temperature, the rate of air circulation, and the flow of sample and carrier gas to the chromatographic columns or other apparatus within the oven, are all effected externally by use of the control elements and gauges on the control panel 86.

Upon completion of a heating operation in which the cover member 52 is in its closed position, it may be desirable to quickly reduce the temperature in the oven to ambient temperature in order to permit a different temperature control operation to be carried out in the housing 10. For this purpose, the cover member 52 can be moved outwardly by energization of the piston and cylinder assembly 40 so that the entire front of the oven housing 10 is open. The hinged door 22 in the back wall 20 of the oven housing 10 can also be opened downwardly to permit heated air to escape through the back wall of the housing. It will be noted that the hinged door 22 also functions to provide access to the blowers 60 and the banks 62 and 64 of heating elements disposed between the baffle plate 56 and the back wall 20 of the oven housing 10.

The described construction of the oven assembly of the invention provides numerous advantages in any situation in which it is desired to heat heavy, bulky equip-

ment of the type frequently used in laboratories and small pilot installations. This equipment may be assembled or built up on the rack 92, and any necessary operating connections quickly made to the instrument housing 84. During the construction or assembly of the apparatus or equipment to be heated, access may be had to the parts thereof from both sides, from the rear, and from the top by virtue of the large horizontal spacing between the cover member 52, when opened, and the oven housing 10. When the cover member 52 is retracted to its closing position, the apparatus supported on the rack 92 is spaced from the bottom wall 18 of the oven housing 10, and the heated air which is moved through the air flow channel formed by the baffle plates 54 and 56 can circulate in a circular path around the inside of the housing 10, contacting the equipment or apparatus carried on the rack 92 during such circulation. The heated air can flow freely through the open metal grill work which preferably forms the rack 92.

A modified embodiment of the invention is illustrated in FIGURES 5-8. In this embodiment of the invention, the oven assembly can be considerably larger and heavier than the assembly depicted in FIGURES 1-4, and is comprised of a plurality of individually portable sections. The sections of the oven assembly depicted in FIGURES 5-8 include a rear housing section 110, a forward housing section 112, and a cover member or closure section 114. Each of the sections 110, 112 and 114 has at least one dimension which is sufficiently small to permit the section to be moved through a door or other opening of restricted area.

As best depicted in FIGURES 5 and 6, the rear housing section 110 includes top, bottom and side walls as hereinbefore described, and also includes a back wall having a hinged door 116 providing access to the interior of the oven housing through the back wall. The walls of the housing sections 110 and 112 are preferably constructed with a relatively rigid insulation material 118, such as magnesia-binder board, providing structural strength for the walls of the sections, and a relatively thick Fiberglas insulation material 120 providing thermal insulation for the sections. It will be noted that the rigid material 118 and the Fiberglass insulation material 120 are shaped with a plurality of interfitting or interlocking projections and shoulders formed at the free edges of the side, top and bottom walls of the sections 110 and 112 so that these two sections may be mated and interlocked when the oven assembly is readied for use.

As in the case of the embodiment of the invention shown in FIGURES 1-4 and hereinbefore described, a flow channel defining means is positioned within the oven housing formed by the rear and forward housing sections 110 and 112, respectively, and, in the illustrated embodiment, is made up of a pair of perpendicular baffle plates 128 and 130. The baffle plate 128 is divided into two coplanar portions, one of which is carried by the forward housing sections 112, and the other of which is carried by the rear housing section 110. Suitable blowers 132 are mounted on supporting brackets 134 extending between the baffle plate 130 and the rear wall of the housing section 110 for directing air downwardly past a pair of heating element banks 136 and 138. A motor 140 is mounted on top of the rear housing section 110 for driving the blowers 132 in the manner hereinbefore described in referring to the embodiment depicted in FIGURES 1-4.

Each of the housing sections 110 and 112 is supported on sets of rollers 141 so that when the sections are detached from each other, each section may be individually rolled to a new location. It will also be noted in referring to FIGURES 5, 6 and 8 that each of the housing sections 110 and 112 carries a pair of parallel guide channels which are each formed by two opposed parallel elongated channel members 142 and 144. Stated differently, pairs of the channel members 142 and 144 are mounted on opposite sides of each of the housing sections 110 and

112, with the pairs of channel members carried by each of the housing sections aligned when the housing sections are mated or joined. The channel members thus form two elongated guide channels which extend from the open forward portion of the oven housing to the rear wall of the rear housing section 110.

It will be noted in referring to FIGURES 6 and 8 that at horizontally spaced points along the channel members 142 and 144, opposed L-shaped brackets 146 are secured by welding or other suitable means to the flanges of the channel members, and function to journal shafts 148 which rotatably support a pair of oppositely positioned upper and lower guide member rollers 150 and 152. The upper guide member rollers 150 extend into suitable recesses formed in the bottom wall of the housing sections 110 and 112 so that they may roll freely about their rotational axes.

The closure section 114, which is a major subassembly of the embodiment of the invention depicted in FIGURE 5, is best illustrated in FIGURES 5 and 7. It will be noted that the closure section 114 includes in instrument housing 154 which has a pair of hinged doors 156 in the front face thereof. The doors 156 may be opened to provide access to an instrument panel located within the instrument housing 154, and also to facilitate access to instrumentation provided for interconnecting apparatus to be heated in the oven assembly with external power supplies, sampling systems or the like. A pair of blower vents 158 extend through the top of the instrument housing 154, and are used to vent air drawn through the housing by suitable blowers provided therein for the purpose of cooling electronic equipment mounted in the instrument housing. A plurality of connector fittings 160 are provided in a side wall of the instrument housing 154 to facilitate the connection of air, water, electricity or the like through the instrument housing to apparatus or equipment to be heated in the oven assembly.

As in the case of the embodiment of the invention depicted in FIGURES 1-4, the closure section 114 has secured to the rear side thereof which faces the forward housing section 112 a sealing plate 162 (see FIGURE 7). The sealing plate 162 and a portion of the instrument housing 154 is preferably constructed in part of a rigid, high mechanical strength insulation material, and also includes a substantial portion of less rigid thermally insulating material, such as Fiberglas, for assuring that no significant amount of heat will escape from the oven when the closure section 114 is closed.

Secured to the sealing plate 162 adjacent the lower edge thereof is a horizontally extending rack 164 which is provided for the purpose of supporting relatively heavy and bulky equipment or apparatus which is to be assembled outside the oven housing sections 110 and 112 for subsequent heating in these housing sections. The rack 164 is preferably of perforated or grill-like construction, and is positioned in a horizontal plane which is spaced vertically above the lower wall of the housing sections 110 and 112. Heated air which is thus directed downwardly past the lower end of the vertically extending baffle plate 130 can pass up through the openings in the rack 164 into intimate contact with the apparatus or equipment carried on this rack.

The closure section 114 has secured to the under side thereof, a pair of parallel, elongated guide members 170 which are aligned with the guide channels formed by the two pairs of opposed channel members 142 and 144 carried on the under side of the housing sections 110 and 112. The guide members 170 are transversely dimensioned so as to be received between the rollers 150 and 152 of the channel guides. Thus, the closure section 114 of the oven assembly can be moved horizontally relative to the mating housing sections 110 and 112 to open the oven assembly to the position illustrated in FIGURE 5. As in the case of the embodiment depicted in FIGURES 1-4, a suitable piston and cylinder assembly (not shown) is secured be-

neath the mated housing sections 110 and 112, and the free end of the piston is secured through a suitable bracket to the instrument housing 154. The cylinder of the piston and cylinder assembly, in having one of its ends attached to the rear housing section 110 and the other to the front housing section 112, functions to maintain these sections in their joined or mated relationship. By the use of a suitable power fluid control lever 172 disposed on the side of the front housing section 112, the piston may be reciprocated in the power cylinder to extend or retract the closure section 114 when desired.

A further feature of the embodiment of the invention depicted in FIGURE 5 is the inclusion of a plurality of casters or rollers 174 mounted on the bottom side of the closure section 114. With this arrangement, the instrument housing 154 can be entirely detached from the oven housing sections 110, 112 and individually rolled to a different location at any time desired. It is thus possible to modify or completely change the instrumentation within the instrument housing 154 by independently moving the closure section 114 to a location which is more convenient for effecting such change that the operating location of the entire oven assembly. Moreover, as has been previously explained, the closure section 114 has at least one dimension such that it may be easily moved through doorways or other openings of restricted area. It should be pointed out that the preferred construction of the closure section 114 contemplates that the rollers 174 will be spaced above the floor or other supporting surface which contacts and supports the wheels 141 at a time when the guide members 170 are positioned in their respective guide channels formed by the pairs of channel irons 142 and 144. Stated differently, the entire closure section 114 is entirely free and clear of any supporting surface beneath the instrument housing 114 when the oven assembly is completely assembled. This arrangement assures that no vibration or bumping will be experienced as the closure section 114 is extended and retracted during use of the oven assembly.

The embodiment of the oven assembly depicted in FIGURES 5-8 provides several advantages with respect to the embodiment depicted in FIGURES 1-4. A much larger assembly can be constructed due to the sectional character of this embodiment. This permits the oven assembly to be dismantled into several sections when it is desired to move the assembly from one location to the other. Each of the sections carries rollers imparting easy portability, and is dimensioned to permit the individual sections to be passed through openings of restricted area. Better access is also afforded by the sectional construction to the interior of the oven housing formed by the mating housing sections 110 and 112.

From the foregoing description of the invention, it will have become apparent that the present invention provides a highly useful oven assembly which can be employed for the controlled heating of relatively large apparatus or equipment. The oven assembly permits such equipment or apparatus to be quickly assembled or modified without difficulty, since such equipment and apparatus is readily accessible from several sides when the cover member or closure section of the oven assembly is extended to a position in which it is spaced horizontally from the oven housing. The large opening which is provided in one side of the oven housing, together with the inclusion of a large door in the opposite side of the oven housing, permits the interior of the housing to be rapidly cooled to ambient temperature.

Although certain preferred embodiments of the invention have been herein described in order to clearly illustrate the principles which underlie the invention, it is to be understood that various modifications and structural changes can be made in the depicted and described embodiments without departure from these principles. For example, although the cover member of the oven has been described as pneumatically or hydraulically

actuated, in some arrangements of the invention, movement of the cover member can be satisfactorily accomplished manually. All modifications and changes of this type are therefore deemed to be circumscribed by the spirit and scope of the invention except as the same may be necessarily limited by the appended claims or reasonable equivalents thereof.

What is claimed is:

1. An oven assembly which comprises:
an oven housing having an opening therein;
flow channel defining means carried within said oven housing and spaced from the interior surface thereof to form a flow channel;
heating means located in said oven housing;
means for moving a gas through the flow channel formed by said flow channel defining means;
a cover member movably attached to said oven housing for movement between a first position in which said cover member sealingly closes the opening in said oven housing and a second position in which all of said cover member is spaced from said oven housing; and
a perforate, gas pervious rack carried by said cover member for projecting into said housing when said cover member is in said first position, said rack being configured to permit flow of gas from said flow channel to a position immediately above said rack.
2. An oven assembly as defined in claim 1 wherein said housing and said cover member include a quantity of thermal insulation material.
3. An oven assembly as defined in claim 1 wherein said oven housing comprises a plurality of detachably joined sections each of substantially rectangular cross-section and forming, when joined, a housing of generally right parallelepiped configuration.
4. An oven assembly as defined in claim 1 wherein said oven housing is of generally right parallelepiped configuration having one side thereof open to constitute said opening in the oven housing.
5. An oven assembly as defined in claim 3 wherein said cover member is detachably connected to one of said sections and further characterized to include rollers on each of said sections and on said cover member to facilitate individual portability of each of the sections and the cover member by rolling movement.
6. An oven assembly as defined in claim 1 and further characterized by a power means for moving said cover member and said housing relatively toward and away from each other.
7. An oven assembly as defined in claim 2 further characterized by a power means for moving said cover member and said housing relatively toward and away from each other.
8. The apparatus defined in claim 7 wherein said power means comprises a fluid piston.
9. The apparatus defined in claim 1 wherein said rack comprises an open metal grill work.
10. The apparatus defined in claim 1 and further characterized by guide members projecting from said cover member toward said housing, and guide channels carried by the bottom of said housing for receiving said guide members.
11. The apparatus defined in claim 9 further characterized by guide members projecting from said cover member toward said housing, and guide channels carried by the bottom of said housing for receiving said guide members.
12. The oven assembly defined in claim 11 wherein said rack projects from said cover member into said housing at a position adjacent the bottom of the housing.
13. An oven assembly which comprises:
an oven housing having a bottom and an open side;
a cover member movably mounted on said oven housing

- ing for movement between a first position covering said open side to close the oven housing, and a second position spaced horizontally from the open side of the oven housing;
- power means connected between said oven housing and said cover member for moving the cover member between said first and second positions;
- an apparatus supporting rack extending horizontally from said cover member and dimensioned to cover a major portion of the bottom of said oven housing when said cover member is in said first position, said power means including extensible means connected to said cover member and dimensioned to locate the second position of said cover member a sufficient distance from said oven housing that a major portion of said supporting rack is outside said oven housing when said cover member is in said second position; and
- means for directing a moving current of heated air to the upper side of said supporting rack when said cover member is in said first position.
14. An oven assembly as defined in claim 13 wherein said means for directing a moving current of heated air comprises:
heating elements in said oven housing;
flow channel defining means in said oven housing; and
means for moving air across said heating elements and through said flow channel defining means.
15. An oven assembly as defined in claim 13 wherein said oven housing comprises a plurality of detachably joined sections, each of said sections having rollers mounted on the lower side thereof to facilitate portability of each section.
16. An oven assembly as defined in claim 15 and further characterized to include rollers secured to the lower side of said cover member and positioned above the rollers on said oven housing sections when said cover member is movably mounted on said oven housing.
17. An oven assembly as defined in claim 13 wherein said cover member is further characterized as including an instrument housing having an instrument panel forming a portion thereof.
18. An oven assembly as defined in claim 13 and further characterized as including at least one gas liquid partition chromatography column detachably mounted on said rack.
19. An oven assembly as defined in claim 14 and further characterized to include a door in said oven housing.
20. An oven assembly as defined in claim 19 wherein said cover member is further characterized as including an instrument housing having an instrument panel forming a portion thereof; and
said apparatus supporting rack is an open metal grid work having openings therethrough; and
said flow channel defining means includes a vertically extending baffle plate spaced from an inside wall of said oven housing and having its lower end positioned adjacent an end of said open metal grid work when said cover member is in its first position covering said open side of the oven housing.

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JOHN J. CAMBY, *Acting Primary Examiner.*

U.S. Cl. X.R.

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