Jan. 2, 1962 R. A. BRIDWELL 3,015,711

REFLECTOR FOR RADIANT HEATING

Filed March 3, 1959 2 Sheets-Sheet 1

Fig. 1

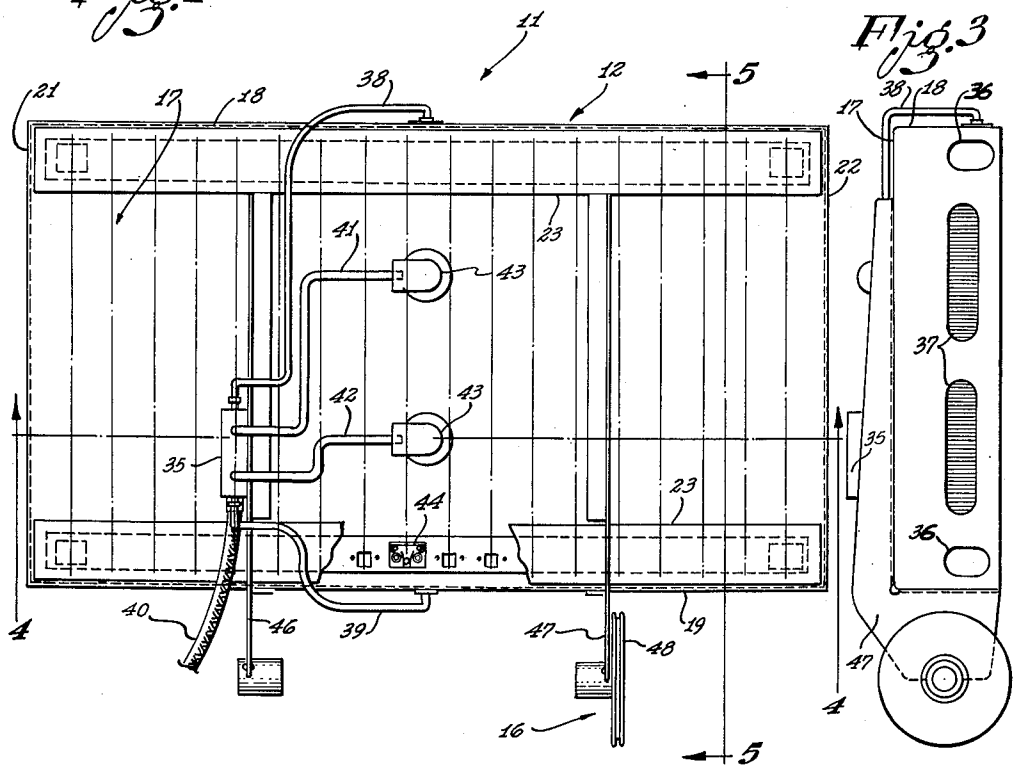
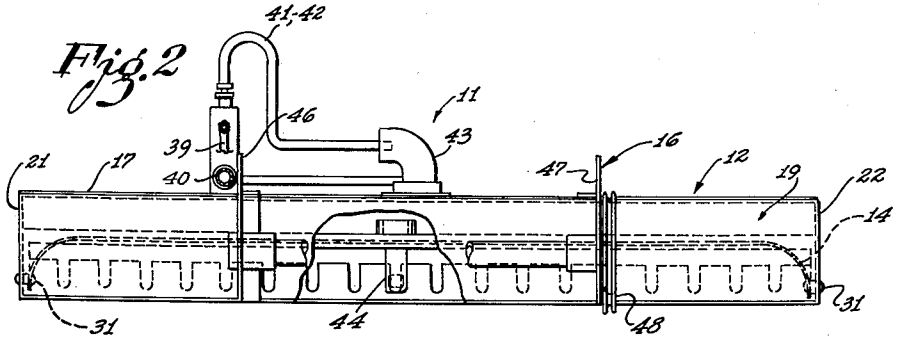



Fig. 3




Fig. 2




INVENTOR:
Robert A. Bridwell

By Willard M. Graham
Agent,

Jan. 2, 1962 R. A. BRIDWELL 3,015,711

REFLECTOR FOR RADIANT HEATING

Filed March 3, 1959 2 Sheets-Sheet 2

Fig. 4

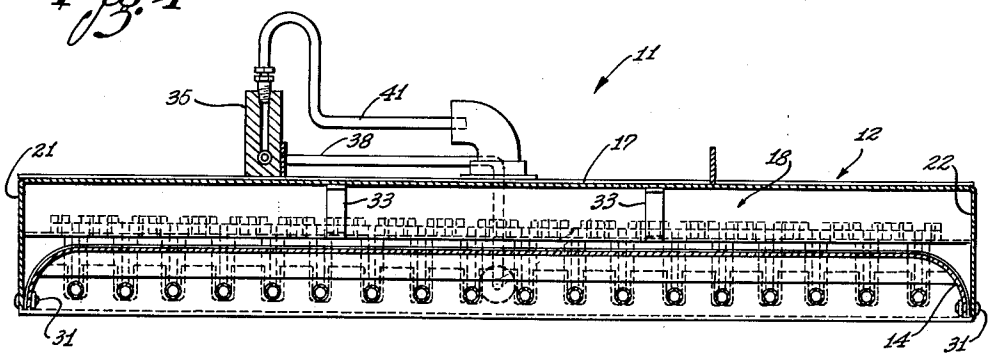
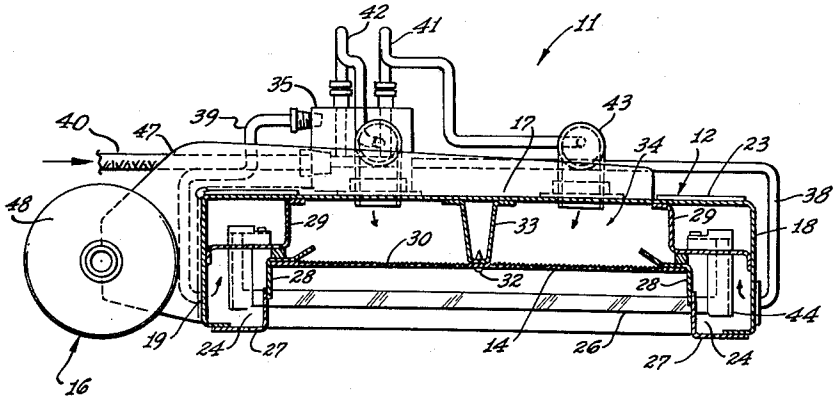



Fig. 5




INVENTOR:
Robert A. Bridwell

By Willard M. Graham
Agent

United States Patent Office 3,015,711 Patented Jan. 2, 1962



3,015,711

# REFLECTOR FOR RADIANT HEATING

Robert A. Bridwell, Lynwood, Calif., assignor to Northrop Corporation, Beverly Hills, Calif., a corporation of California

Filed Mar. 3, 1959, Ser. No. 796,880
1 Claim. (Cl. 219—34)

This invention relates to heating devices and more particularly to a reflector assembly having utility in carrying out a radiant heating operation.

It is well known in the metal working art that certain metals and their alloys must be heated to a predetermined temperature if they are to be fabricated successfully. This is particularly true of titanium and magnesium sheets and alloys thereof if they are to be fabricated without the occurrence of fractures, cracks, tears, etc. In addition to the above other unusual conditions are encountered in the fabrication of titanium, manganese and like sheets. For example, if titanium or manganese sheets are heated to a maximum allowable temperature and subsequently allowed to cool to a lower temperature prior to fabrication an elongation loss of the metal, proportional to the temperature loss of the metal, will be experienced.

It is, therefore, recognized that certain types of sheet metal material must be heated to a maximum allowable temperature and subsequently fabricated at or as near this temperature as possible. The most satisfactory method known to date to carry out the above operation is by a radiant heating operation as disclosed in copending application, U.S. Serial Number 779,243, filed December 9, 1958.

To carry out the above heating operation satisfactorily it is necessary to utilize a reflector assembly of the type disclosed herein. Such a reflector assembly embodies novel cooling features and is of light weight construction rendering it easily movable between heating and non-heating positions.

An object of this invention is to provide a reflector assembly usable in carrying out a radiant heating operation which includes a reflector panel mounted in the assembly in a manner allowing adequate thermal expansion thereof without excessive restriction and which can be easily and quickly removed from the assembly for polishing or replacement thereof.

Another object is to provide a reflector assembly usable in carrying out a radiant heating operation which includes a reflector panel the non-reflecting side of which embodies means which materially improves the heat emitting qualities thereof.

Another object is to provide a reflector assembly usable in carrying out a radiant heating operation which embodies means for cooling the assembly's reflector and separate cooling means for the heating elements, particularly their end portions.

Another object is to provide a reflector assembly usable in carrying out a radiant heating operation which is of light weight construction and, therefore, is easily and quickly movable by mechanical means.

Although the characteristic features of the present invention are particularly pointed out in the appended claim, the invention itself, also the manner in which it may be carried out, will be better understood by referring to the following description taken in connection with the accompanying drawings forming a part of this application and in which:

FIGURE 1 is a plan view of the reflector assembly as disclosed herein with portions broken away to clarify the construction thereof.

FIGURES 2 and 3 are side and end views, respectively, of the reflector assembly shown in FIGURE 1 with portions of FIGURE 2 broken away for clarification purposes.



FIGURES 4 and 5 are sectional views of the reflector assembly taken on the lines 4—4 and 5—5, respectively, of FIGURE 1.

Referring now to the drawings, a preferred embodiment of the reflector assembly as disclosed herein is identified in its entirety by the numeral **11**. The reflector assembly includes a housing structure **12**, a reflector panel **14** and arm members **16** which enable the assembly **11** to be mounted in operating apparatus of a type as disclosed in the aforementioned copending application.

In the embodiment shown the structure **12** constitutes an elongated structure of shallow box-like configuration. The structure **12** is further characterized in that it is constructed of sheet metal and includes a top **17**, sides **18** and **19** and ends **21** and **22** all of which are solid except for outlet ports formed therein. The lower side of the structure **12**, as viewed in FIGURES 2, 4 and 5, is unobstructed except for structure defining cooling passages or ducts **24—24** to be described later. Mounted on the top **17**, extending lengthwise of the structure **12** at locations adjacent the sides **18** and **19**, are a pair of strengthening strips **23—23**.

Formed inside the structure **12**, extending lengthwise thereof and at positions adjacent sides **18** and **19**, are the aforementioned passages **24—24** adapted to carry air or other fluid for cooling the ends of the heating members **26**. The passages **24—24** are defined by the sides **18** and **19** and angle strips **27**, **28** and **29** as best seen in FIGURE 5. The strips **27**, **28** and **29** are secured together as by welding or the like and terminate in abutting relation with respect to the ends **21** and **22**. Thus it will be seen that the strips **27**, **28** and **29** cooperate with the sides **18** and **19** to define respective passages located at each side of the structure **12** and extend the full length thereof.

The reflector panel **14** constitutes a metallic member of shallow U-shaped configuration in section as viewed in FIGURE 4. The panel is mounted in the structure **12** in an inverted position between the passages **24—24** with edge portions of its upper surface frictionally contacting the strips **28—28**. The panel is held in this position by bolt means **31**, which pass through the ends **21** and **22** and the arcuate terminal ends of the panel **14** and by sheet metal screws **32** and clips **33—33** which depend from the top **17**. Inasmuch as the panel **14** is not secured to the strips **28** it will be apparent that the panel may be easily and quickly removed for polishing or replacing by removing the bolt means **31** and screws **32**. It will also be seen that the arcuate ends of the panel **14** and the clips **33** allow limited expansion of the panel so that the latter is not unduly restrained as the panel expands during a heating operation.

The lower surface of the panel **14** is highly polished to reflect a maximum of heat emitted by the members **26**. The upper or non-reflecting side of the panel **14** is grooved in a longitudinal direction as indicated by the numeral **30** and coated with a material increasing the heat emitting qualities thereof.

As positioned in the structure **12** the panel **14** cooperates with the top **17** and strips **29—29** to define a passage **34** which extends the full length of the structure **12** to provide means for cooling the panel **14**.

Apertures **36** and **37** are provided in the ends **21** and **22** and communicate respectively with the passages **24** and **34** to provide exit ports for air or other cooling fluid flowing through the passages **24** and **34**.

Mounted on top of the structure **12** is a distribution head **35** for diverting air or other cooling fluid to the passages **24** and **34**. Air at super-atmospheric pressure, originating at a pressure source (not shown), is directed to the head **35** through a supply conduit **40**. From a com-

mon chamber or bore located in the head 35 the pressurized air flows directly to the passages 24—24 via conduits 38 and 39 which enter the passages at approximately their midpoint. Pressurized air directed to the passage 34 flows through conduits 41 and 42 which terminate in elbow type pipe fittings 43 which in turn communicate with the passage 34. The arrangement of the ends of the conduits 41 and 42 with respect to the fittings 43 is such that as air flows from the conduits 41 and 42 it provides an aspirating effect drawing ambient air into the passage 34. Therefore, the panel 14 is not only cooled by pressurized air flowing through the conduits 41 and 42 but also by ambient air.

In the instant reflector assembly heat is provided by energizing a plurality of quartz type heating members 26. The members 26 are mounted directly below the panel 14 and extend laterally of the structure 12 with their ends respectively mounted in the passages 24—24. The ends of the heating members are secured in receptacles 44 which depend from horizontal portions of the strips 29.

Construction of the assembly 11 is completed by two arm members 46 and 47 which are welded to and extend from the structure 12 in a lateral direction. Both of the arm members carry bearing means at their outer ends and the member 47 also carries a cable receiving sheave 48. The arm members 46 and 47 provide means whereby the reflector assembly may be mounted in suitable operating apparatus.

From the above description it will be seen that a reflector assembly fulfilling the many objects of the invention is provided. With a reflector assembly of the above type the temperature of titanium sheets has been raised from room temperature to 1500° F. yet the temperature of the panel 14 has not exceeded 500° F. The above results have been achieved in tests of five (5) minutes continuous duration or sixty (60) minute intermittent duty with the heating members 26 cycling on and off for approximately one and one-half (1½) minutes per cycle.

While in order to comply with the statute, the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise a preferred form of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claim.



What is claimed is:

In a reflector assembly the combination comprising: a bottomless box-like housing having top, side, and end walls; plate means cooperating with said side and end walls to partially close the bottom side of said housing and define elongated minor chambers adjacent each side wall of said housing; a reflector plate mounted on said housing closing the remainder of said bottom side and cooperating with said plate means top and end walls to define a major chamber; conduit means communicating with said minor chambers adapted to deliver pressurized fluid to said minor chambers; conduit means communicating with said major chamber adapted to deliver pressurized fluid to said major chamber; said last named conduit means including aspirator means whereby ambient fluid is also caused to enter said major chamber; and at least one of said end walls defining apertures through which fluid may exit from said major and minor chambers.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 1,231,196 | Rankin et al. | June 26, 1917 |
| 1,823,535 | Frutkow et al. | Sept. 15, 1931 |
| 2,131,484 | Ringwald | Sept. 27, 1938 |
| 2,822,457 | Hatch | Feb. 4, 1958 |
| 2,822,458 | Hatch | Feb. 4, 1958 |
| 2,844,699 | Miskella | July 22, 1958 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 160,486 | Great Britain | Mar. 22, 1921 |
| 745,700 | Great Britain | Feb. 29, 1956 |