power output lead **15**. The power output to the leads **15** and **16** along with the power output from the other rectifying modules of the layer **3** are conducted to the electrical load using the leads **4** and **5** (see FIG. **1***a*).

In FIG. **3***b* a schematic view is given to show one embodiment of a circuit to combine the output power from all the modules using a series-parallel circuit to produce a convenient final output voltage to leads **4** and **5**. In this schematic, the module output powers of the rectifying modules **8** carried by the leads **19** and **21** in the vertical column are connected in parallel so that the total current of all modules in the vertical columns are added at a constant output voltage. Also, as shown in FIG. **3***b* the total output of each column is added in series so that the resultant output voltage to the load is the sum of the output voltages of each column.

In FIG. **3***c* the sectional view shows an embodiment of a construction of the vacuum thermal barrier and the condenser plates **22**, **10**, **23**, and **18** by which the electric voltage fluctuations are transmitted from the higher temperature module **7** to the lower temperature module **8**. The condenser plates **22**, **10**, **23**, and **18** are constructed on the substrates **34** and **35** which form the opposite walls of the enclosed vacuum. These two adjacent walls of the substrates **34** and **35** are also plated as shown with a metallic coating **33** having a low net effective emissivity such as gold. The plated area of the walls covers all the area of both adjacent walls with the exception of the areas containing condenser plates **22**, **23**, **10** and **18** and a small separation area between the metallic coating **33** and the condenser plates. This separation area as shown in FIG. **3***c* electrically insulates the condenser plates **22**, **23**, **10** and **18** from the metallic coating **33** on the walls. This metallic coating enables the vacuum thermal barrier to minimize the amount of the heat loss by radiation across the walls of the vacuum. An embodiment of the thermal barrier shown as layer **2** in FIGS. **1***a*, **1***b* and **2** is comprised of an assembly of condenser plates **22**, **23**, **10** and **18** and the metallic coating layer **33** shown in FIG. **3***c* and the spacing support walls shown in FIG. **1***a*.

FIG. **4** is a schematic view of module **7** wherein a resistor or resistance film **26** is used as the source of the electric energy fluctuations.

FIG. **5** is a schematic view of the rectifying module **8** in which a diode **24** is connected to lead **17** with opposite polarity to that of diode **12**. The other terminal of diode **24** is connected to lead **19** to provide a path for the rectified current in the module. FIG. **6** shows module **8** wherein the low impedance capacitor **25** is added to isolate the rectified output voltage from module **7**.

Referring now to FIG. **7**, there is shown a sectional view of layer **42** which is added adjacent to thermal conducting film **37** for the efficient conversion of radiation energy to thermal energy. This is another embodiment of the invention for converting solar radiation or other radiation to useful electric power. The incoming solar radiation is normally incident on plane **44** of layer **42**. Plane **44** is divided into contiguous square cells **44***a*, **44***b*, **44***c*, etc., in both dimensions of plane **44** by walls **46***a*, **46***b*, **46***c*, **46***d*, etc., in horizontal planes normal to the plane of the drawing and by walls **39***a*, **39***b*, **39***c*, etc., in vertical planes parallel to the plane of the drawing. On the back surface of each cell of the parabolic surface **38** is typically coated with an aluminum, silver, or other reflecting surface layer **52** so as to reflect all the incoming normally incident solar radiation into the round hole **40** in the surface of the reflecting paraboloid. This round hole is placed in the plane normal to the axis of the paraboloid at the focus of the paraboloid. The reflecting surface is supported by thermal insulating material **41**. The sides of the cylindrical hole **40** as well as the flat back side of the insulating material **41** are coated with a reflecting layer **52** so as to direct all incoming solar radiation against the thermal conducting layer **37** to be absorbed and converted to thermal energy. On the left side the thermal conducting layer **37** is spaced from the collecting layer **42** by the spacing supports **54** made of thermal insulating material such as glass. On the right side the thermal conducting layer **37** is in thermal contact with layer **1** of the invention. (See FIGS. **1***a*, **1***b* and **2**). This radiation collection layer **42** may be made of some thin and flexible material such as quartz with the dimensions of each round hole **40** in each small cell typically being as small as 1 micron in diameter and the thickness of layer **42** being as small as 10 microns.

The linewidth of the conductors for the module circuits using electron beam microfabrication may typically be of the order of 10^{-4} to 10^{-6} cm. Micro circuit manufacturing techniques may be used in the fabrication of the modules which can range in size according to the power output requirements. The maximum power requirements can be achieved using module size larger than the physical limit on circuit miniaturization given in a paper by R. W. Keyes in the May 1975 issue of the Proceedings of the IEEE (pp. 740–767). In this paper, the applicable limit on circuit miniaturization is the electromigration damage to conductors and this limit allows conductors carrying the maximum current requirements of this device to be smaller than 10^{-6} cm in diameter. Using larger conductors and increasing the area of modules **7** and **8** in the plane of layers **1** and **3** of FIGS. **1***a* and **2** up to 10^{-6} square centimeters gives a power output capability of the layers **1** and **3** of the order of 10 KW per square meter in the plane of layers **1** and **3** in FIGS. **1***a* and **2**.

A review of microcircuit manufacturing techniques is given in a paper by H. I. Smith in the October 1974 issue of the Proceedings of the IEEE (pp. 1361–1388), and also in a paper by A. N. Broers and R. H. Dennard in Semiconductor Silicon 1973 (pp. 830–841). Other techniques in addition to electron beam microfabrication are feasible for the microfabrication of the circuits of this invention. Among these techniques, X-ray lithography using sensitive polymers as electron resist material may be utilized for simplicity and low cost. The manufacture of micro circuit components for the instant invention can be accomplished using the micro circuit technology described by H. Sobel in the August 1971 issue of the Proceedings of the IEEE (pp. 1200–1211) and by M. Coulton in the October 1971 issue of the Proceedings of the IEEE. Diodes **9**, **12**, and **24** may typically be classical Schottky barrier diodes or quantum or tunnel diodes. The Schottky diodes may be of the type described by Fetterman et al in Applied Physics Letters, Jan. 15, 1974, page 70. The tunnel diodes may be of the type described by Twu et al in Applied Physics Letters, Nov. 15, 1974 or by Javan in the IEEE Spectrum, October, 1971, page 91. For the rectifying diodes **12** and **24**, increasing the nonlinearity increases the efficiency of the device. As shown in the paper by J. C. Yater in the October 1974 issue of the Physical Review A (pp. 1361–1369), the non-linearity obtainable from classical diodes enables the Carnot cycle efficiencies to be obtained. For quantum effect or