May 22, 1962 R. WOODCOCK 3,036,280

WAVEGUIDE LOAD

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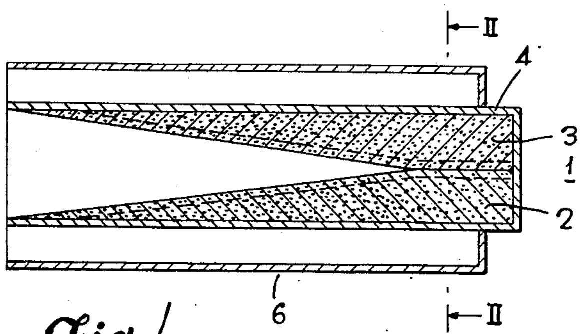

Fig. 1.

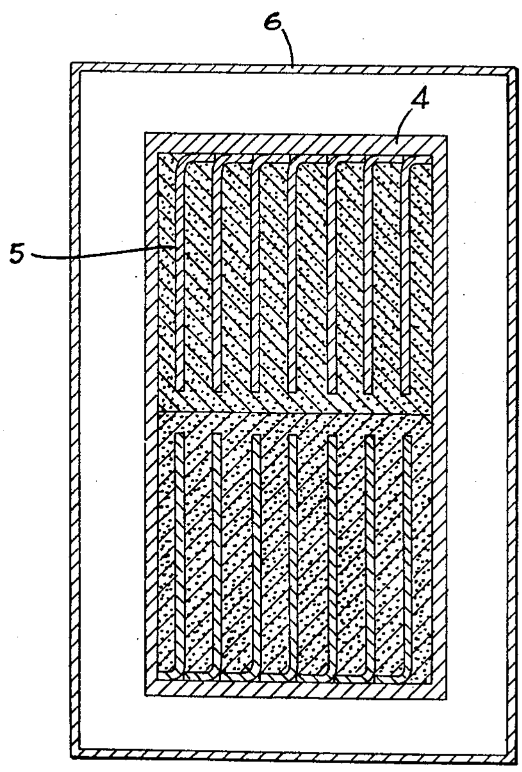

Fig. 2.

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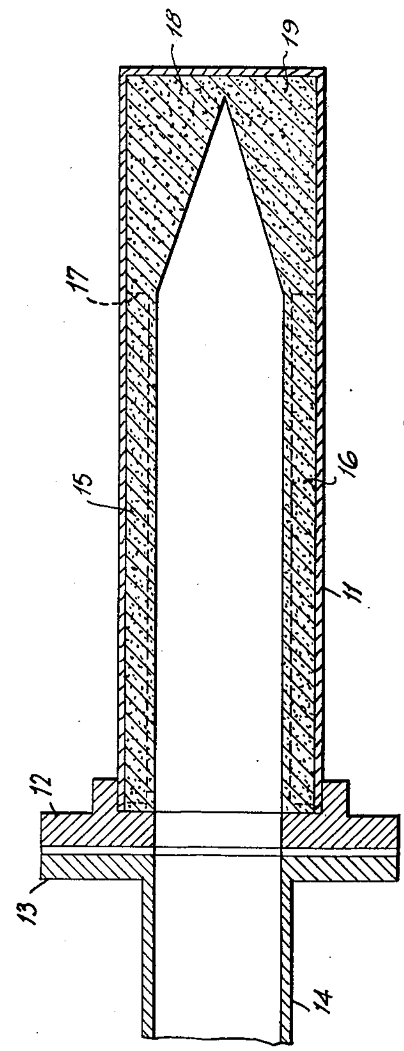

Fig. 3.

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WAVEGUIDE LOAD

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6 Claims. (Cl. 333—22)

This invention relates to waveguide load terminations of the kind that are provided to absorb energy incident in the waveguide.

Such load terminations usually comprise one or more bodies of a lossy substance positioned in the waveguide. The substance consists of iron dust which converts the incident energy into heat, the iron dust being embedded in a cement or resin binder. Such a composite body has poor thermal conductivity characteristics which limit the magnitude of the incident power that it can absorb.

It is an object of the present invention to provide a load termination capable of handling high incident powers.

According to the present invention a waveguide load termination comprises one or more bodies of a lossy substance positioned in a metal casing which body or bodies contain a plurality of metal plates embedded therein, the ends of which plates are secured to the wall of the casing to conduct heat from the body to the casing.

It is desirable to shape and position the bodies to minimise reflections. One arrangement is is provide tapered or wedge-shaped bodies the thickness of which increase in the direction of propagation of energy. Alternatively parallel-sided slabs can be used, the internal surface or surfaces of which are coincident with the wall of the adjacent waveguide section.

In carrying out the invention means may be provided for extracting heat from the casing.

In order that the invention may be more fully understood reference will now be made to the accompanying drawings, in which:

FIG. 1 shows one embodiment of the invention in sectional elevation;

FIG. 2 is an enlarged section on the line II—II of FIG. 1; and

FIG. 3 shows another embodiment of the invention in sectional elevation.

Referring now to the drawings a waveguide termination 1 comprises two wedge-shaped bodies 2 and 3 positioned within a rectangular casing 4 of dimensions corresponding to the dimensions of an adjacent waveguide section. Wedge-shaped bodies 2 and 3 each increase progressively in thickness in the direction of propagation of incident energy until they meet and fill the entire cross-section of the casing. By this means incident energy can be absorbed with a minimum of reflection.

The bodies 2 and 3 each comprise a cement or resin binder filled with iron dust. They also contain a plurality of copper plates such as 5, the outlines of which are shown dotted in FIG. 1, and which emerge proud of the bodies 2 and 3 at their faces in contact with the wall of the casing. These edges of the plates are bent over and soldered to the interior face of the casing to provide good thermal conductivity. It will be noted that the opposite edges of the plates do not break the interior surface of the wedges and so do not extend into the transmission portion of the waveguide.

Casing 4 is surrounded by a water cooling jacket 6. Alternatively air cooling fins can be provided.

Copper plates 5 each lie in planes perpendicular to

the electric vector of energy incident in the guide and thus do not appreciably affect the electrical characteristics of the load. At the same time, however, they serve to rapidly extract heat from the interior of the wedges to the walls of the casing whence the heat can be removed by water cooling as shown or air cooling.

Referring now to FIG. 3 an alternative embodiment of the invention is illustrated in which parallel-sided slabs of lossy material are provided. As shown therein a casing 11 is secured to a flange 12 which abuts against a similar flanges 13 terminating a length of transmission waveguide 14. Casing 11 is somewhat larger in cross-section than waveguide 14 and is provided with two parallel sided slabs 15 and 16 of lossy material the internal surfaces of which coincide with the internal surfaces of waveguide 14. These slabs each comprise a cement or resin binder filled with iron dust and contain a plurality of copper plates such as 17 the outlines of which are shown dotted. These plates terminate some distance before the inner surfaces of the slabs and extend to the outer surface to make thermal contact with the wall of casing 11.

Slabs 15 and 16 absorb the greater proportion of energy incident from waveguide 14. In order to prevent reflections from the very small fraction of energy that is not absorbed in the slabs wedge-shaped terminations 18 and 19 are provided at the end of the casing. These wedge-shaped bodies do not require copper plates to be embedded in them as only a small fraction of the energy remains to be absorbed by them.

What I claim is:

1. A loaded waveguide terminal section comprising an electrically and thermally conductive circumferential wall, a plurality of thermally conductive metal plates extending into the waveguide from the circumferential wall and having their outer ends bent over to lie parallel to the waveguide wall and secured thereto in a thermally conductive manner, and a body of lossy material positioned between and in good thermal contact with the plates, whereby in use electromagnetic wave energy is absorbed in the lossy material, and the resulting heat is conducted by the plates to the thermally conductive circumferential wall of the waveguide.

2. A waveguide terminal section according to claim 1, in which the metal plates at their inner ends are covered by the lossy material.

3. A waveguide terminal section according to claim 1, in which the waveguide is of rectangular cross-section and the metal plates lie parallel to one another and to one pair of opposite walls of the waveguide.

4. A waveguide terminal section according to claim 1, in which the body of lossy material is wedge-shaped and is so arranged in the waveguide section that the thickness of the wedge-shaped body increases in the direction of propagation of energy along the terminal section.

5. A waveguide terminal section according to claim 1, in which a cooling water jacket embraces the circumferential wall of the waveguide.

6. A waveguide terminal section according to claim 1, in which heat dissipating fins are mounted on the outside of the circumferential wall of the waveguide.

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