March 24, 1953 L. E. RABURN ET AL 2,632,848

ANTENNA

Filed Dec. 3, 1948

FIG. 1.

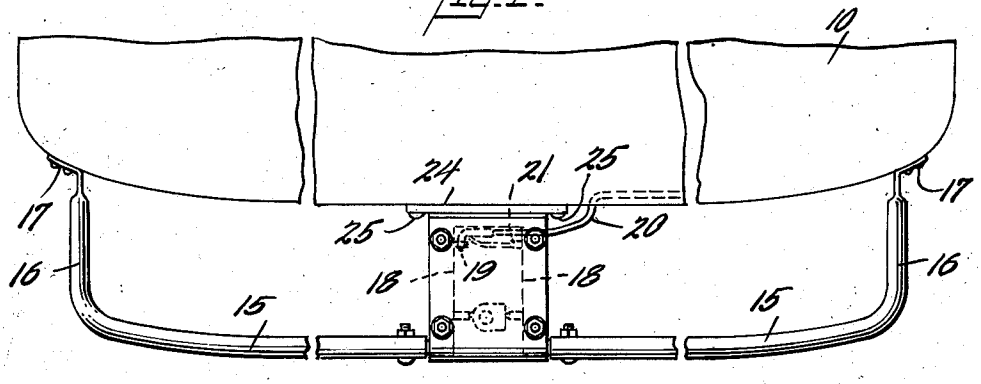


FIG. 2.

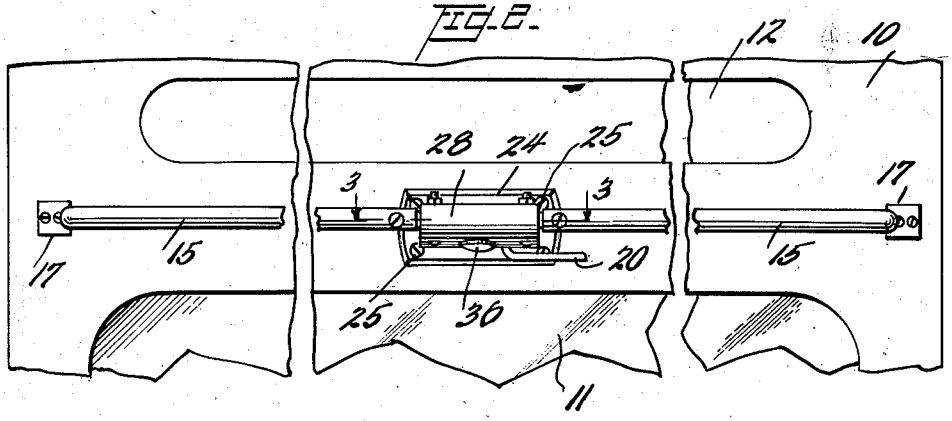


FIG. 3.

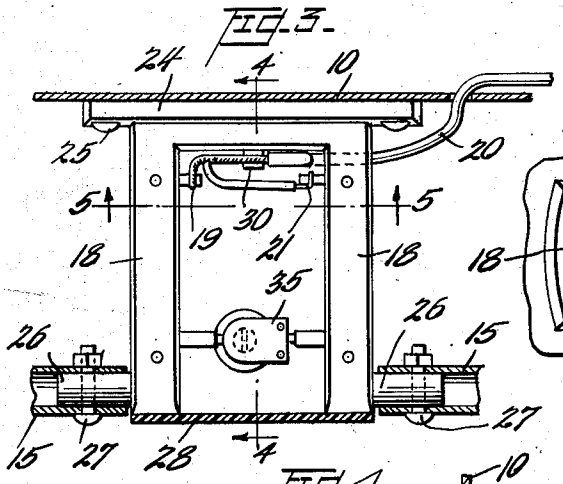


FIG. 5.

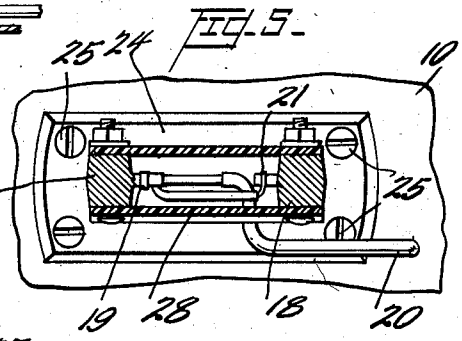
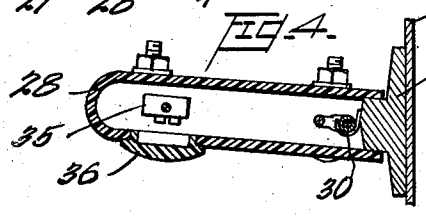


FIG. 4.



Inventors

Louis E. Raburn

Richard W. Anderson

By

Watson, Cole, Grindle & Watson

ATTORNEY

Patented Mar. 24, 1953 2,632,848

UNITED STATES PATENT OFFICE

2,632,848

ANTENNA

Louis Earl Raburn and Richard Warren Anderson, Evansville, Ind., assignors to Electronics Research, Inc., Evansville, Ind., a corporation of Indiana

Application December 3, 1948, Serial No. 63,366

8 Claims. (Cl. 250—33)

1

This invention relates to an improved antenna for mounting on a structure having a conducting outer surface, and especially on vehicles having a conducting skin, such as motor busses, aircraft, and the like. It is an object of the invention to provide an antenna for such uses in which the conducting surface constitutes a ground plane and forms an integral part of the antenna, the radiation pattern being reasonably circular.

In its preferred form the antenna of the invention is formed of metal and is devoid of insulators. Thus the structure is extremely rugged and is capable of withstanding the shocks normally incident to the intended use. At the same time, the structure is simple and inexpensive, neat in appearance, and inconspicuous.

More specifically, it is an object of the invention to provide an antenna for vehicular use which comprises a pair of substantially aligned radiating elements, disposed parallel to the vehicle skin, and mounted thereon by relatively short conducting legs.

Further objects and features of the invention will be apparent from the following description and the accompanying drawings, in which

Fig. 1 is a plan view of antenna constructed in accordance with the invention, showing the same mounted on the forward end of a motor bus.

Fig. 2 is a front elevation of the structure shown in Fig. 1;

Fig. 3 is a partial section taken on the line 3—3 of Fig. 2;

Fig. 4 is a section on the line 4—4 of Fig. 3; and

Fig. 5 is a section on the line 5—5 of Fig. 3.

To facilitate an understanding of the invention, the embodiment illustrated in the drawing is described specifically herein. It will nevertheless be understood that no limitation of the invention is thereby intended, such further modifications and alterations being contemplated as would normally occur to those skilled in the art to which the invention relates.

Referring first to Figs. 1 and 2, the antenna is shown in assembled relation on the front end of a bus 10, above the windshield 11, and below the usual route sign 12. This location is selected largely for convenience, since the antenna may be located on any conducting surface.

The antenna comprises a pair of elongated radiating elements 15 which are disposed substantially in alignment with each other and in parallelism with the metal skin of the vehicle. Elements 15 may be constituted by metal tubes,

2

each tube being bent inwardly at its outer end toward the vehicle body to provide a leg 16, the legs being flattened as indicated at 17 and there bolted or otherwise secured to the vehicle skin. At their adjacent ends, elements 15 are connected to the vehicle skin by adjacent legs 18, the legs serving as feeder sections for the radiating elements 15, as hereinafter more fully explained. It will thus be observed that the antenna may be described as comprising two generally U-shaped portions defining a common plane intersecting the conducting vehicle skin, the legs of each U portion being short and being conductively secured to the metal skin. The signal to be radiated is fed to the adjacent legs 18 by a coaxial transmission line 20, the outer and inner conductors being connected respectively to the legs 18 at 19 and 21.

As shown more particularly in Figs. 3–5 inclusive, legs or feeder sections 18 may constitute part of an integral U-shaped bracket of which the base 24 is bolted or otherwise secured as shown at 25 to the vehicle skin 10. Formed on each of the legs 18 of this bracket is a stud 26 dimensioned for reception in the adjacent end of a tubular radiating element 15, the parts being held in assembled relation by bolts 27. To improve the appearance of the device and to exclude dust from the several connections, the bracket is provided with a cover 28 of plastic or other suitable non-conducting material.

It will be noted that the outer conductor of the transmission line is grounded on the vehicle skin by connection to the base 24 of the casting intermediate the adjacent legs or feeder sections 18 of the antenna, as indicated at 30. This allows the impedance of the coaxial line with respect to ground to increase with that of the feeder section, thus establishing a balanced condition. The antenna is so dimensioned that the length of the supporting legs 16, 18, is less than and preferably only a small part of a quarter wave length of the signal to be radiated, while the length of each radiating element 15 is greater than a quarter wave length and is preferably approximately one-half wave length. In operation the adjustment should be such that at the transmitted frequency the inductive reactance of the legs or feeder sections will be equal to the capacitive reactance of the radiating elements 15. Where it is not possible to establish optimum operating conditions, for instance because of lack of space, shorter radiating elements 15 may be employed and suitable adjustment effected by a loading condenser 35, connected across the legs 18 as

shown in Fig. 3, and accessible through an opening in the housing 28 which is normally closed by a plug 36.

It will be appreciated that the antenna described herein is in a very general sense a shunt-fed folded dipole. However, the band width of the antenna is more satisfactory than that of a standard dipole and the radiation pattern is far less directional.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. An antenna for mounting on a vehicle having a conducting outer surface, comprising a pair of substantially aligned elongated radiating elements disposed generally parallel to said surface, and spaced in the direction of their length, each of said elements being provided at each of the opposite ends with a conducting leg extending toward and conductively secured to said surface, and a transmission feed line connected to the two adjacent legs on the said elements.

2. An antenna for mounting on a vehicle having a conducting outer surface, comprising a pair of substantially aligned elongated radiating elements disposed generally parallel to said surface, each of said elements being provided at each of the opposite ends with a conducting leg extending toward and conductively secured to said surface, and a transmission feed line connected to the two adjacent legs on said elements, said radiating elements having a length greater than one fourth, and said legs having a length substantially less than one fourth, the wave length of the signal to be radiated.

3. An antenna as claimed in claim 2 in which the radiating elements have a length substantially one-half of the wave length of the signal to be radiated.

4. An antenna for mounting on a vehicle having a conducting outer surface comprising a pair of substantially aligned elongated radiating elements disposed generally parallel to said surface, and spaced in the direction of their length, said elements being provided at the ends thereof with conducting legs extending toward and secured to said surface, and a transmission feed line connected to the two adjacent legs on the said elements, the lengths of the said elements and the said legs being such that the capacitive reactance of said elements is substantially equal to the inductive reactance of said legs.

5. An antenna for mounting on a vehicle having a conducting outer surface comprising a pair of substantially aligned elongated radiating elements disposed generally parallel to said surface, each of said elements being provided at each of the opposite ends with a conducting leg extending toward and conductively secured to said surface, a transmission feed line connected to the two adjacent legs on the said elements, and a variable loading condenser connected across said adjacent legs.

6. An antenna for mounting on a vehicle having a conducting outer surface, comprising a pair of substantially aligned elongated radiating elements disposed generally parallel to said surface, and spaced in the direction of their length, each of said elements being provided at each of the opposite ends with a conducting leg extending toward and conductively secured to said surface, and a coaxial cable feeding said antenna the outer conductor of said cable being grounded to said skin intermediate the adjacent pair of legs and being connected to one of said adjacent legs, the inner conductor being connected to the other of said adjacent legs.

7. An antenna for mounting on a vehicle having a conducting outer surface comprising a pair of substantially aligned elongated radiating elements disposed generally parallel to said surface, said elements being provided at the remote ends thereof with conducting legs extending toward and conductively secured to said surface, and a generally U-shaped conducting bracket having a base conductively secured to said surface and having outwardly directed legs conductively secured respectively to the adjacent ends of said elements, and transmission line connections on said bracket.

8. An antenna for mounting on a vehicle having a conducting outer surface comprising a pair of substantially aligned elongated radiating elements disposed generally parallel to said surface, said elements being provided at the remote ends thereof with conducting legs extending toward and conductively secured to said surface, a generally U-shaped conducting bracket having a base conductively secured to said surface and having outwardly directed legs conductively secured respectively to the adjacent ends of said elements, and a coaxial cable having the inner and outer conductors thereof respectively connected to said last-named legs to feed said antenna, said outer conductor being grounded on said bracket base intermediate the bracket legs.

LOUIS EARL RABURN.
RICHARD WARREN ANDERSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,044,779	Hanson	June 23, 1936
2,133,855	Fyler	Oct. 18, 1938
2,151,997	Springer	Mar. 28, 1939
2,210,491	Lewis	Aug. 6, 1940
2,324,462	Leeds	July 13, 1943
2,414,266	Lindenblad	Jan. 14, 1947
2,416,246	Wheeler	Feb. 18, 1947
2,452,073	Schivley et al.	Oct. 26, 1948
2,471,256	Wintermute	May 24, 1949

OTHER REFERENCES

Tele-tech, March 1947, page 58.
Proceedings of IRE, January 1948, page 68.