April 23, 1968 W. P. CZERWINSKI 3,380,060

FOLDED MONOPOLE ANTENNA

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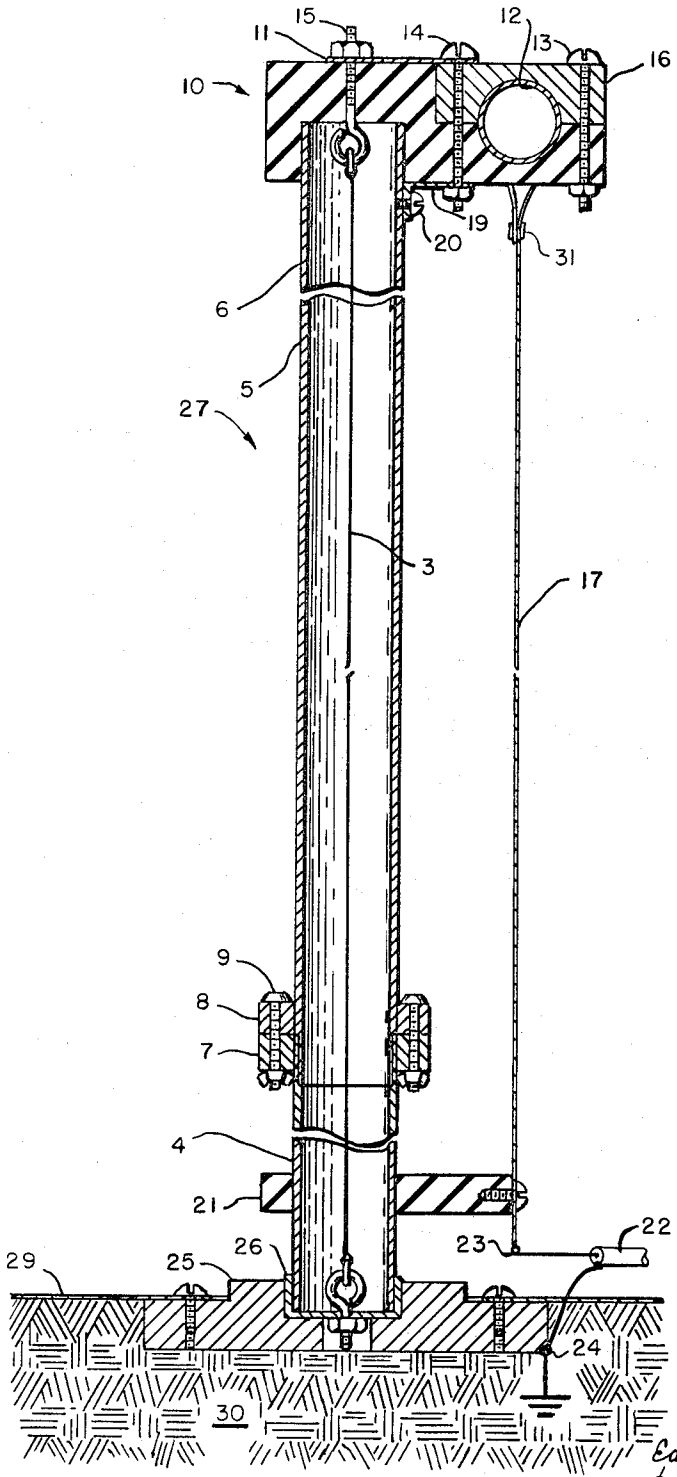
FIG. 1



INVENTOR,
WATSON P. CZERWINSKI.
BY Harry M. Saragovitz,
Edward J. Kelly, Herbert Berl
& Julian C. Keppler
ATTORNEYS

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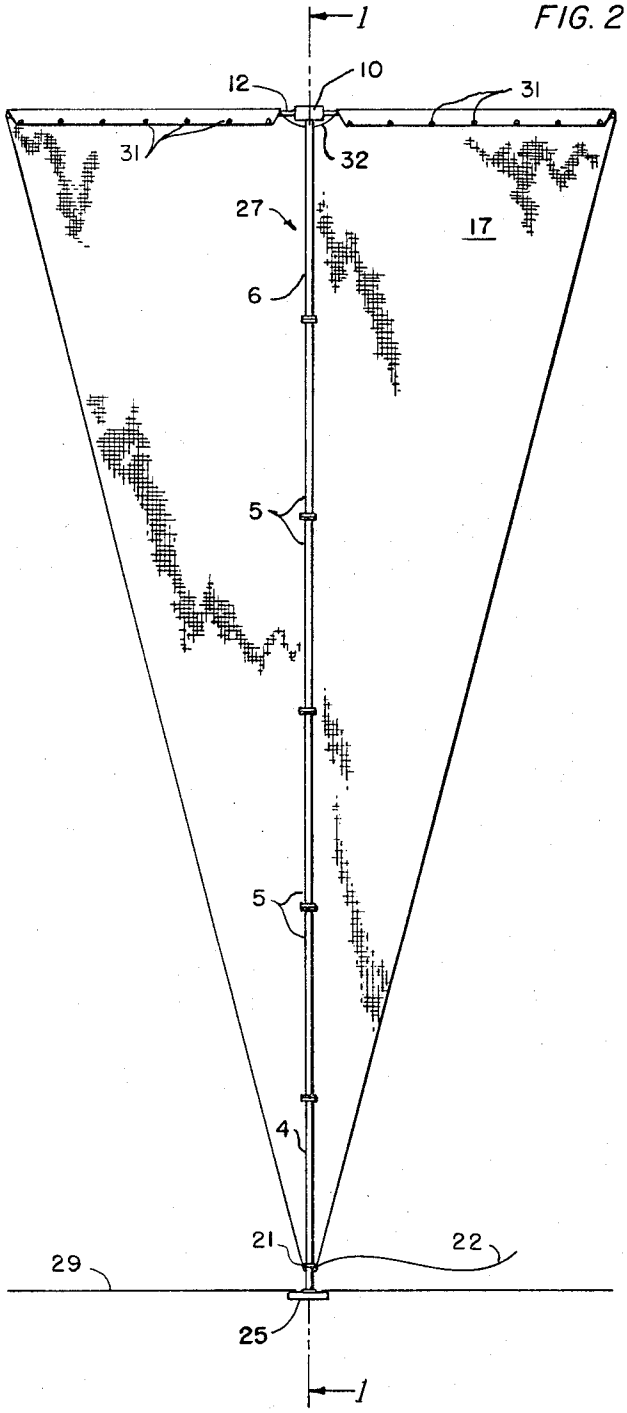
FIG. 2



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United States Patent Office 3,380,060 Patented Apr. 23, 1968

3,380,060

FOLDED MONOPOLE ANTENNA

Watson P. Czerwinski, Shrewsbury, N.J., assignor to the United States of America as represented by the Secretary of the Army

Filed Jan. 12, 1966, Ser. No. 520,830
6 Claims. (Cl. 343—830)

This invention relates to a novel and useful antenna and more particularly to an antenna of the folded monopole type which is particularly adapted for tactical military use because it is easily transported and erected; and is broadbanded and therefore useful over a wide range of the high frequency spectrum.

Briefly stated, the novel antenna comprises a folded monopole in the shape of an inverted U, one of the vertical members of which comprises a coaxial cable shorted and grounded at its lower end. This member provides support for the antenna and the coaxial line is arranged to provide distributed inductive loading over certain frequency ranges where the physical antenna dimensions are short in terms of the operating wavelength. A horizontal boom is centrally supported at the top of the coaxial line and the base of a triangular metallic screen is suspended from the boom to form the other vertical member of the antenna. The apex of the screen forms one input terminal of the antenna, the other terminal being grounded.

It is thus an object of the invention to provide a novel folded monopole antenna.

Another object of the invention is to provide a novel antenna particularly adapted for tactical military use.

A further object of the invention is to provide an easily transported and erected antenna with broadband characteristics in the high frequency region.

These and other objects and advantages of the invention will become apparent from the following detailed description and drawing, in which:

FIGS. 1 and 2 are side and front elevation view respectively of an illustrative embodiment of the present invention.

In FIG. 1, the vertically upstanding coaxial line **27** comprises a plurality of tubular outer conductors **4**, **5**, and **6** with flanges **7** and **8** at the mating ends thereof, held together by bolts **9**. The lower end of the line **27** is shorted by end cap **26**, which rests in a recess in base plate **25**. A flexible metallic ground screen **29** is connected to the base plate and rests on the ground **30**. The top of the coaxial line fits into a recess in the insulator bracket **10**, which may be composed of laminated mica. The center conductor **3** of the line comprises a steel wire stretched between a pair of eye-bolts at either end of the line. The upper eye-bolt **15** also serves to hold the mica laminations together and connects the center conductor **3** to conductive strap **11** which is attached to metallic cap **16** by means of bolt **14**. With this arrangement, the inner conductor **3** holds the insulator bracket securely in place and also aids in holding the detachable segments **4**, **5** and **6** of the outer conductor in place. A second conductive strap **19** is connected between bolt **20**, which is threaded into the outer conductor of the coaxial line, and the lower end of bolt **14**. The insulator bracket **10** and metal cap **16** centrally support a horizontal metallic boom **12**. The length of the boom **12** is approximately one half of the height of the coaxial line **27**. The boom **12** may be assembled in segments for ease of transportation, as is the coaxial line **27**. As shown in FIG. 2, the flexible triangular metallic screen **17** is suspended from the metallic boom **12** to form the second vertical member of the folded monopole. The base of the triangular screen is attached to the metallic boom **12** with an array of fasteners **31**. A semicircular section **32** is cut out of the triangular screen

to accommodate the bracket **10** which supports the boom **12**. The fasteners may be of the snap-type in which case the screen **17** may be easily detached and folded or rolled during disassembly. The apex of the triangular screen extends almost to the ground where it is spaced from the coaxial line and secured by the dielectric spacer **21**. A coaxial feed line **22** has its center conductor connected to terminal **23** at the apex of screen **17** and its outer conductor grounded to base **25**. The feed line **22** is connected ot a transmitter or receiver, not shown. Insulated guy lines may be used to stabilize the entire structure.

In operation, at applied frequencies at which the coaxial line **27** is less than a quarter wavelength in height, the conductive strap **19** is removed. The signal path in this case would be from input terminal **23** upward through screen **17**, to metallic boom **12**, through metallic cap **16**, conductive strap **11**, bolt **15** and thence down the coaxial line **27** to ground. The shorted coaxial line is inductive at less than one quarter wavelength and therefore acts as a series distributed inductor which loads the antenna and increases its effective electrical length. At higher applied frequencies at which the height of the coaxial line **27** approaches one quarter of a wavelength, the strap **19** would be used to connect the boom **12** directly to the outer conductor of the coaxial line **27**. This in effect puts the inner and outer conductors of the coaxial line in parallel and the device no longer functions as a transmission line but merely as a conductor. Since the combined lengths of the metallic screen **17** and the coaxial line **27** are now approximately one half of a wavelength, no inductive loading is required for efficient antenna operation. The large surface area of the metallic screen **17** results in a broadbanding of the antenna and the triangular shape with the base remote from ground and the apex near ground results in a minimum of capacity between this element and ground. Further, the large surface area of the metallic screen **17** relative to the area of the outer conductor of the coaxial line **27** provides an impedance transformation which aids in matching to the antenna feed. All of the metallic parts of the antenna may be constructed of aluminum or some other light weight conductive material.

While the invention has been illustrated in connection with an illustrative embodiment, the inventive concepts disclosed herein are of general application. Accordingly, the invention should be limited only by the scope of the appended claims.

What is claimed is:

1. A folded monopole antenna comprising a vertically upstanding coaxial line with its lower end short-circuited by means of an end cap and electrically connected to a ground screen, an insulator bracket mounted atop said coaxial line, the inner conductor of said coaxial line comprising a steel wire attached to said insulator bracket at its upper end and to said end cap at its lower end, a horizontal metallic boom centrally supported and laterally spaced from said coaxial line by said insulator bracket, a flexible triangular metallic screen having its base attached to said metallic boom and its apex extending nearly to said ground screen, a conductive connection between the upper end of said inner conductor and said horizontal metallic boom, a removable conductive connection between said horizontal metallic boom and the upper end of the outer conductor of said coaxial line, and means to feed said antenna between said apex and said ground screen.

2. The antenna of claim **1** wherein said outer conductor of said coaxial line and said horizontal metallic boom each comprise a plurality of detachable segments.

3. The antenna of claim **1** wherein the length of said

base is approximately one half the height of said coaxial line.

4. A broadbanded folded monopole antenna comprising, a vertical coaxial line having its lower end short-circuited and connected to ground, a bracket atop said coaxial line for centrally supporting a metallic horizontal boom, a triangular metallic screen having its base attached to said boom and its apex extending nearly to said ground, means to feed said antenna between said apex and ground, the length of said base being approximately one half the height of said coaxial line, a conductive connection between said boom and the center conductor of said coaxial line, and a removable conductive connection between said boom and the upper end of the outer conductor of said coaxial line.

5. A broadbanded folded monopole antenna comprising a vertical coaxial line having its lower end shorted and connected to ground, a triangular metallic screen suspended in a vertical plane from the top and to one side of said coaxial line, the base of said triangular metallic screen being adjacent the upper end of said coaxial line and the apex of said triangular metallic screen being adjacent ground, means to feed said antenna between said apex and ground, and a conductive connection between said base of said triangle and the upper end of the inner conductor of said coaxial line.

6. The antenna of claim 5 further including a removable conductive strap connected between the upper end of said triangular screen and the upper end of the outer conductor of said coaxial line.

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ELI LIEBERMAN, *Primary Examiner.*

M. L. NUSSBAUM, *Assistant Examiner.*