

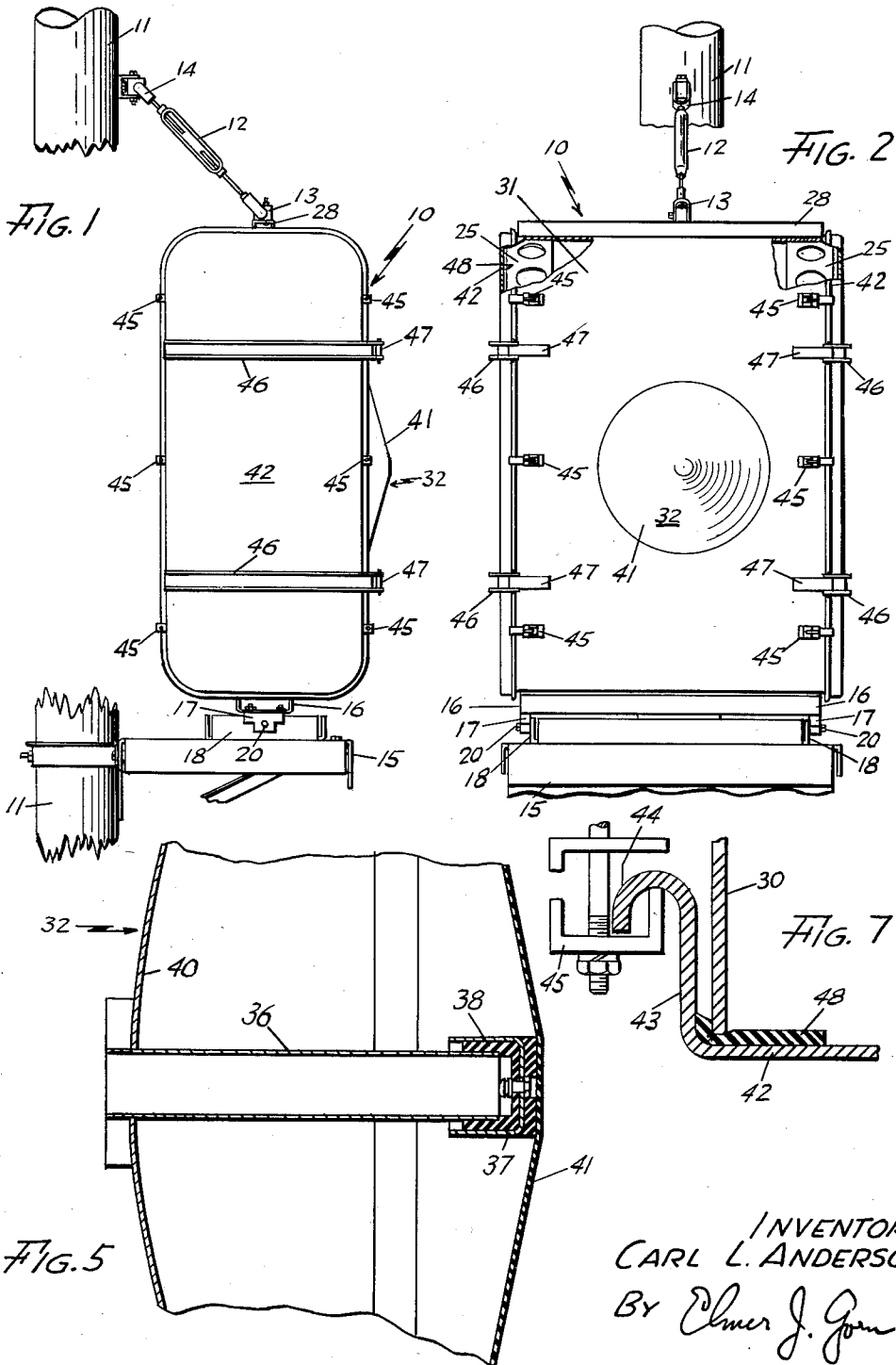
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C. L. ANDERSON
COMMUNICATIONS LINKS

2,994,870

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2 Sheets-Sheet 1



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FIG. 6

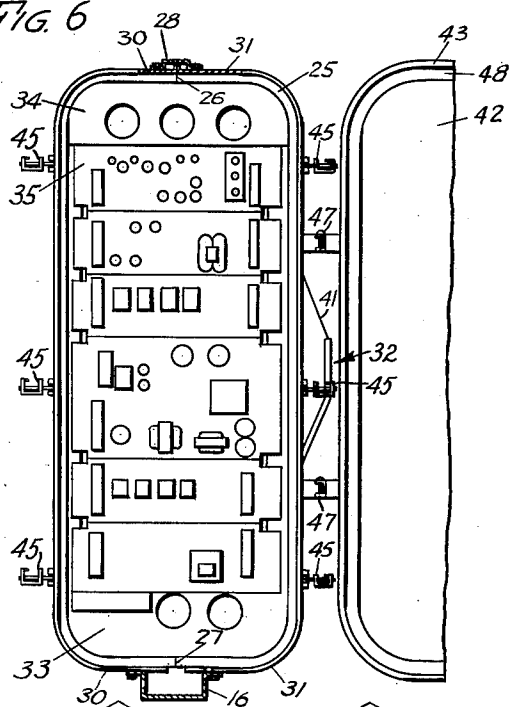


FIG. 8

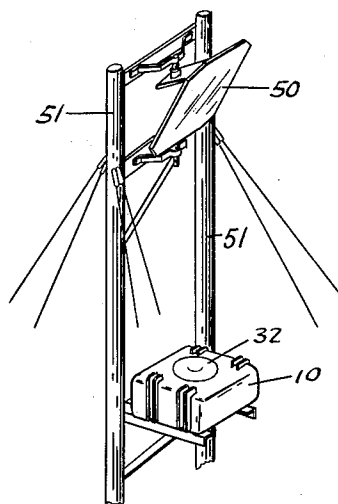


FIG. 4

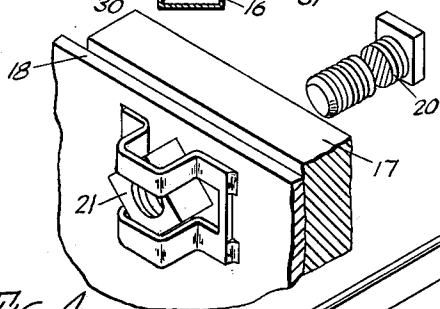
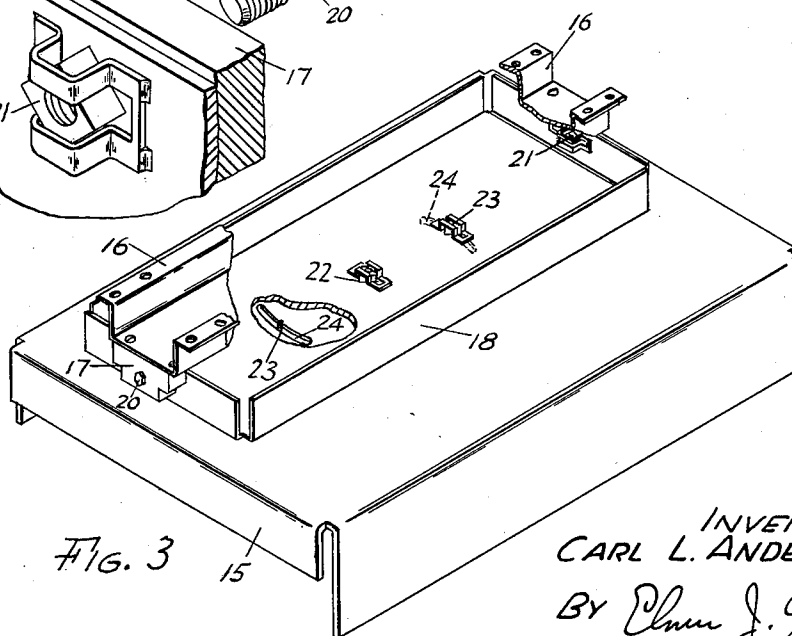


FIG. 3



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COMMUNICATIONS LINKS

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This invention relates to communications links and more particularly to the packaging of such links intended for microwave relays for rural telephones, industrial communication telemetering and the like.

Such links, especially for rural telephone service, must be reliable but low in production, installation and maintenance cost, providing at least single-channel, two-way facilities with identical links. Each link must be capable of being rigidly mounted on a guide pole, such as a telephone pole or tower, and yet be capable of independent azimuth and elevation adjustment to obtain exact directional orientation for optimum performance of the system. The units must withstand heat, cold, rain, wind, snow, etc. It is also desirable that the links be capable of being mounted both vertically and horizontally in association with a reflector.

These purposes are accomplished in the present invention by attaching the mounting fasteners at top and bottom with the back against the supporting pole or the ground, and the antenna on the face with the electronic equipment mounted behind weather-tight doors on either side in such a manner as to be readily available for servicing. The unit is mounted on two heavy pivots at the bottom, allowing a front-to-back motion of the case. A large turnbuckle is fastened to the top center of the case by means of a universal joint. The other end of the turnbuckle is similarly fastened to the pole. Tightening or loosening the turnbuckle causes the case to tilt backward or forward on the base pivots and is the elevation adjustment of the unit. The base pivots are secured to a heavy plate capable of being rotated horizontally about a center. The plate, in turn, mounts and locks to a stable platform attached to the pole or other mounting structure. This provides the azimuth adjustment. Either adjustment may be made without unduly affecting the setting of the other adjustment. The case is formed of two pieces identical except for the opening for the antenna. These pieces are welded top and bottom. The chassis are mounted across the unit between front and back of the case.

Other and further advantages of this invention will be apparent as the description thereof progresses, reference being had to the accompanying drawings in which:

FIG. 1 is a side view of the equipment of the invention vertically mounted on a pole;

FIG. 2 is a front view of the equipment of the invention;

FIG. 3 is an isometric view of the manner in which the bottom of the equipment is attached;

FIG. 4 is a detail of the attachment structure of FIG. 3;

FIG. 5 is a detail of the antenna of the equipment;

FIG. 6 is a side view of the equipment with a door open showing the manner in which the chassis are mounted in the case of the equipment;

FIG. 7 is a detail of the manner in which the doors seal the case; and

FIG. 8 is an isometric view of the equipment mounted horizontally in association with a reflector.

In FIG. 1, the equipment designated generally by the reference numeral 10 is shown mounted vertically on a pole 11 by means of a turnbuckle 12 attached by means of universal joints 13 and 14 to the equipment and the pole, respectively. The equipment rests at the bottom on a platform 15 attached to the pole 11. A channel

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16 is fastened to the bottom of the case of the unit 10 along its center line and is fitted with a pivot block 17 at each end. The channel is rotatably mounted along its center line on folded up end projections of a pivot plate 18 by means of bolts 20 and captive nuts 21. The pivot plate 18 is secured at its center to the platform 15 by means of a bolt and captive nut 22 and is also affixed further out along its axis by means of two more bolts and captive nuts 23 arranged with each bolt passing through an arcuate slot 24 formed in the platform 15 to permit rotation in a horizontal plane when the nuts 22 and 23 are loosened. This mounting arrangement permits the equipment to be adjusted in elevation by the turnbuckle 12 with the bolts 20 and captive nuts 21 loosened and the nuts and bolts 22 and 23 tightened. With the bolts 20 and captive nuts 21 tightened and nuts and bolts 22 and 23 loosened, the equipment may be adjusted in azimuth to the extent of the arcuate slots 24.

The case of the equipment comprises, as best seen in FIG. 6, four pieces of metal 25 of U-shaped cross section formed in identical curves, arranged in pairs, each pair welded together at their upper and lower points of contact 26 and 27. The bottom channel 16 is attached to the lower points of contact 27 and a top channel piece 28 is attached to the upper points of contact 26 to form the frame of the case. The skin or cover of the case is formed by two curved pieces 30 and 31 of metal, identical except for a large opening formed in the front piece 31, shaped to accommodate an antenna subassembly 32. Cross pieces 33 and 34 and the chassis 35 for the electronic equipment are attached to the frame members 25. The antenna subassembly 32, as best seen in FIG. 5, comprises a wave guide 36 or other transmission line connected to an appropriate portion of the electronic equipment on chassis 35 and terminating in a first reflector 37, held in place by a member 38 of insulating material that permits the passage of radio frequency energy with a minimum of attenuation and a second conductive reflector 40, preferably of a paraboloid shape. This antenna is protected from the weather by a dielectric cover 41, also of a material permitting the passage of radio frequency energy with a minimum of attenuation. The electronic equipment on the chassis 35 is made accessible for maintenance, while being protected from the weather and dust by means of doors 42 formed with flanges 43 and lips 44 turned outward and back which come into contact with latches 45. The doors 42 are strengthened by two bars 46 to which are attached hinges 47. The closure of the doors is made weathertight by a flat strip 48 of resilient material, such as rubber. Thin edges of the skin pieces 30 and 31 press into this resilient strip 48 of relatively wide area, as best seen in FIG. 7. This construction permits considerably greater pressure to be applied to the area of the seal with the same closure force than would be the case with a wider area of contact. The result is to make a tighter seal.

The equipment may also be mounted on its back, as best seen in FIG. 8, with the radio frequency energy propagated upward by the antenna 32 to a reflector 50 adjustably mounted on two poles 51 or other appropriate supports. The reflectors change the direction of the propagated energy to the desired direction. The equipment may be mounted on a platform 15 and plate 18 of FIG. 3 to permit adjustment to direct the energy on the center of the reflector, although this may not be necessary.

The result is a rugged weather and dirt-proof communications unit that is economical to build and maintain.

This invention is not limited to the particular details of construction, materials and processes described, as many equivalents will suggest themselves to those skilled

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in the art. It is accordingly desired that the appended claims be given a broad interpretation commensurate with the scope of the invention within the art.

What is claimed is:

1. A compact all-weather radio communication apparatus comprising, in combination, directive antenna means for radiating and receiving radio frequency energy, radio communication means connected to said antenna means, common support means for said antenna means and said communication means, common means enclosing said communication means and said antenna means in hermetically sealed relationship, closure means in said enclosing means for providing access to said communication means and said antenna means, first mounting means for mounting said support means for limited movement about a horizontal axis, second mounting means for mounting said first mounting means on a vertical standard or the like for limited movement about a vertical axis, means for maintaining said second mounting means in a selected position independently of adjustment of said first mounting means, and means for maintaining said first mounting means in a selected position independently of adjustment of said second mounting means, whereby said directive antenna means are mounted in compact hermetically sealed relationship with said communication means for adjustable orientation to a selected direction of radiation.

2. A compact all-weather radio communication apparatus comprising, in combination, directive antenna means for radiating and receiving radio frequency energy, radio communication means connected to said antenna means, common support means for said antenna means and said communication means, common means enclosing said communication means and said antenna means in hermetically sealed relationship, closure means in said enclosing means for providing access to said communication means and said antenna means, first mounting means for mounting said support means for limited movement about a horizontal axis, second mounting means for mounting said first mounting means on a vertical standard or the like for limited movement about a vertical axis, said second mounting means comprising a substantially horizontal support plate fixedly mounted on such vertical standard and a substantially horizontal support carriage mounted on said support plate for relative rotation therewith about a vertical axis, means for clamping said support plate and said support carriage together to prevent relative movement therebetween, and means for maintaining said first mounting means in a selected position independently of adjustment of said second mounting means, whereby said directive antenna means are mounted in compact hermetically sealed relationship with said communication means for adjustable orientation to a selected direction of radiation.

3. A compact all-weather radio communication apparatus comprising, in combination, directive antenna means for radiating and receiving radio frequency energy, radio communication means connected to said antenna means, common support means for said antenna means and said communication means, common means enclosing said communication means and said antenna means in hermetically sealed relationship, closure means in said enclosing means for providing access to said communication

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means and said antenna means, first mounting means for mounting said support means for limited movement about a horizontal axis, second mounting means for mounting said first mounting means on a vertical standard or the like for limited movement about a vertical axis, said second mounting means comprising a substantially horizontal support plate fixedly mounted on such vertical standard and a substantially horizontal support carriage mounted on said support plate for relative rotation therewith about a vertical axis, means for clamping said support plate and said support carriage together to prevent relative movement therebetween, said first mounting means comprising a second support carriage mounted on said first support carriage for relative movement therewith about a horizontal axis, and means for maintaining said first mounting means in a selected position independently of adjustment of said second mounting means, whereby said directive antenna means are mounted in compact hermetically sealed relationship with said communication means for adjustable orientation to a selected direction of radiation.

4. A compact all-weather radio communication apparatus comprising, in combination, directive antenna means for radiating and receiving radio frequency energy, radio communication means connected to said antenna means, common support means for said antenna means and said communication means, common means enclosing said communication means and said antenna means in hermetically sealed relationship, closure means in said enclosing means for providing access to said communication means and said antenna means, first mounting means for mounting said support means for limited movement about a horizontal axis, second mounting means for mounting said first mounting means on a vertical standard or the like for limited movement about a vertical axis, said second mounting means comprising a substantially horizontal support plate fixedly mounted on such vertical standard and a substantially horizontal support carriage mounted on said support plate for relative rotation therewith about a vertical axis, means for clamping said support plate and said support carriage together to prevent relative movement therebetween, said first mounting means comprising a second support carriage mounted on said first support carriage for relative movement therewith about a horizontal axis, said first mounting means being connected to the bottom of said common support means, and turnbuckle means connected between such vertical standard and the top of said common support means, whereby said directive antenna means are mounted in compact hermetically sealed relationship with said communication means for adjustable orientation to a selected direction of radiation.

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