Nov. 18, 1969 N. E. RYALL 3,478,994

TRAFFIC SIGNAL PLUMBING APPARATUS

Filed Oct. 6, 1967 2 Sheets-Sheet 1

FIG. 1

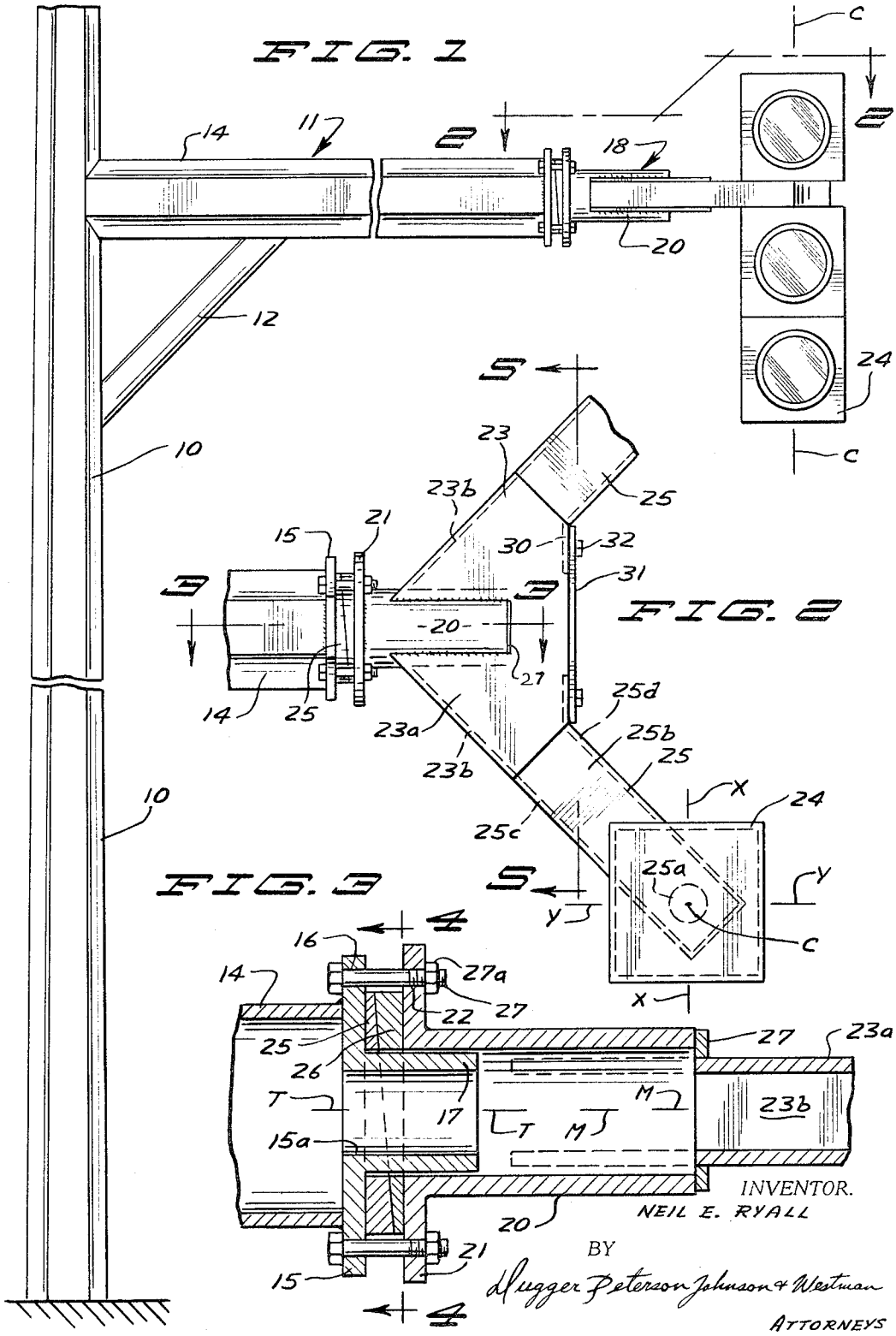


FIG. 2

FIG. 3

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TRAFFIC SIGNAL PLUMBING APPARATUS

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FIG. 4

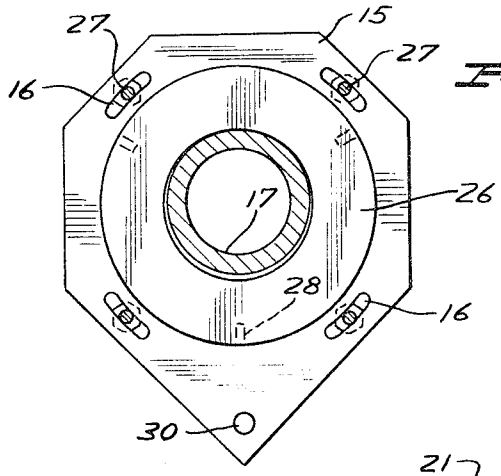


FIG. 5

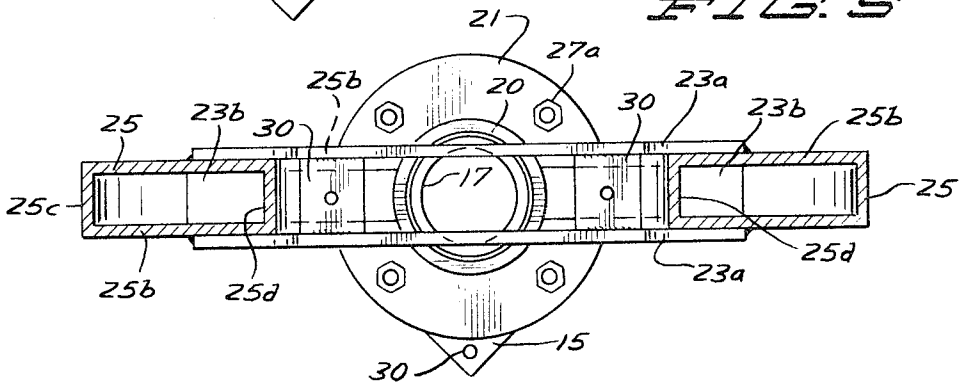


FIG. 8

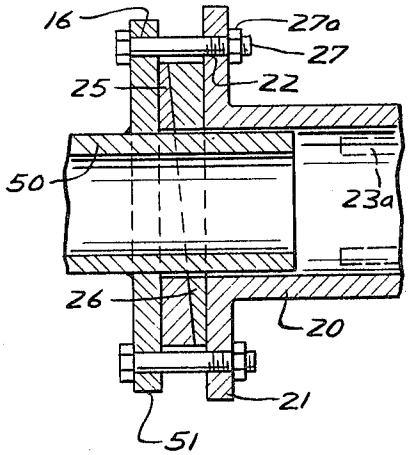


FIG. 6

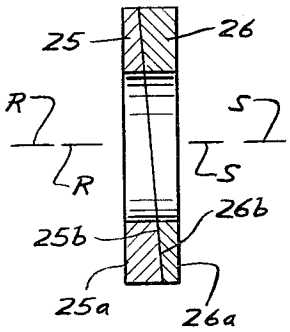
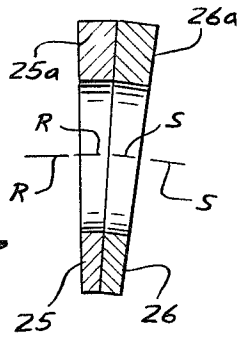


FIG. 7



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TRAFFIC SIGNAL PLUMBING APPARATUS

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U.S. Cl. 248—276 12 Claims

ABSTRACT OF THE DISCLOSURE

A signal unit mounting assembly that mounts signal units is mounted on a mast arm assembly on a standard with adjacent flanges of the assemblies bolted together, the bolts being extended through arcuate slots in one flange. Bias cut adjustment rings on a tube of the mast arm assembly are clamped between the flanges whereby adjustably rotating one or both of the adjustment rings and the signal unit flange, the signal units are plumbed. The signal unit assembly includes a box mounting member that is generally triangular in plan and arms extending outwardly of said member to mount the signal units.

Background of the invention

The invention relates to apparatus for mounting, adjustably positioning, and retaining a signal unit in an adjusted position to be vertical both in a vertical plane parallel to the direction of oncoming traffic and in a vertical plane perpendicular to the above mentioned vertical plane.

In prior art apparatus, for example, such as U.S. Patent No. 2,970,289 to Loomis, the signal unit may be adjusted to have its axis of elongation located in a vertical plane of the axis of elongation of the mast arm; but there is no suggestion in this patent of providing structure where the signal unit may be adjusted to also have its axis of elongation located in a vertical plane that is perpendicular to the vertical plane of the axis of elongation of the mast arm when such adjustment is necessary or desirable.

Summary of the invention

During the initial installation of a signal unit, or subsequent to the initial installation, the axis of the signal unit that preferably should extend vertical may be located out of the vertical line formed by the intersection of a pair of vertical planes where one vertical plane is perpendicular to the other. After installation, when the signal unit was initially installed to be properly vertically aligned, due to high winds resulting in the mast arm bending, or the mounting pole bending, or the mounting pole being inclined to the vertical due to settling of the ground, the signal unit becomes misaligned. In order to be able to easily mount a signal unit in a proper vertical alignment, and easily adjust a signal unit to a properly vertical aligned condition, and overcome the above mentioned limitation of the Loomis apparatus, this invention has been made. That is, with this invention, within a limited range, the angle of extension of the signal unit mounting assembly relative the direction of elongation of the mast arm may be adjusted between positions being coextensive therewith and extending in any desired direction that forms an acute angle with the axis of elongation of the mast arm. Additionally, the signal unit may be adjustably rotated a limited amount about its central axis relative the mast arm without dismounting the signal unit assembly from the mast arm assembly. Also, there has been provided a signal unit mounting member whereby a pair of signal units may be easily mounted in horizontal spaced relationship.

FIGURE 1 is a front view of the first embodiment of the apparatus of this invention, portions of the standard and mast arm being broken away;

FIGURE 2 is an enlarged fragmentary plan view of the plumbing apparatus of FIGURE 1, said view being generally taken along the line and in the direction of the arrows 2—2 of FIGURE 1;

FIGURE 3 is a still further enlarged fragmentary vertical cross-sectional view of the apparatus of FIGURE 2, said view being generally taken along the line and in the direction of the arrows 3—3 of FIGURE 2;

FIGURE 4 is a transverse cross-sectional view generally taken along the line and in the direction of the arrows 4—4 of FIGURE 3 to more clearly show the mounting of the adjustment rings and the arcuate adjustment slots of the mast arm flange;

FIGURE 5 is a transverse cross-sectional view generally taken along the line and in the direction of the arrows 5—5 of FIGURE 2 to show the signal unit mounting members, the closures for the mounting member and the mounting member tube not being illustrated;

FIGURE 6 is a cross-sectional view of the adjustment rings in relative positions whereby the signal light mounting member extends directly outwardly of the mast arm and coaxially therewith;

FIGURE 7 is a view corresponding to FIGURE 6 other than that the adjustment rings have been turned relative to one another to give a maximum deviation of the direction of extension of the signal light mounting member relative the mast arm in one direction; and

FIGURE 8 is a fragmentary longitudinal cross-sectional view of a second embodiment of the apparatus of this invention.

Referring now to FIGURE 1, there is shown a mast that includes an upright standard **10**, a mast arm assembly, generally designated **11**, and a brace **12** connected to the standard and mast arm assembly. The mast arm assembly includes a horizontally elongated, tubular mast arm **14** that at one end is welded to the standard. The mast arm may be polygonal or circular or other desired shape in transverse cross-section. To the opposite end of the mast arm there is welded a flange **15** that has a plurality of arcuately elongated adjustment slots **16** (see FIGURE 4) and an aperture **15***a* that opens to the interior of the mast arm. Welded to the surface of the flange **15** opposite mast arm **14** to extend coaxially relative the adjacent end portion of the arm is a short tube **17** that is circular in transverse cross-section. The slots **16** are equally radially spaced from the central axis T—T of the tube **17**.

The signal light mounting assembly, generally designated **18**, includes a tube **20** that at one end has an annular flange **21** welded thereto, flange **21** having a plurality of bolt receiving apertures **22** (see FIGURE 5) that are equally radially spaced from the central axis M—M of the tube **20**. The internal diameters of flange **21** and tube **20** are sufficiently greater than the outside diameter of tube **17** to permit the tube **20** extending, within a limited range, at selected various angles of inclination and directions of extension relative the direction of extension of the central axis of tube **17** in a manner set forth hereinafter.

Welded to the tube **20** to extend axially outwardly therefrom in a direction opposite from flange **21** is a generally box shaped signal unit mounting member **23**, mounting member **23** advantageously having top and bottom walls **23***a* that are generally triangular in plan view such as shown in FIGURE 2 and sidewalls **23***b* that diverge outwardly at equal angles relative the central axis M—M of tube **20**. As may be noted from FIGURES 2 and 3, a rectangular cutout is provided in the central apex portion of walls **23** to have the tube **20** extend thereinto

and in part open into the interior of the mounting member, the inside and outside diameters of the tube **20** being greater than the vertical dimension between the opposite outer surfaces of walls **23***a*. A closure member **27** is attached to each wall **23***a* and the adjacent portion of tube **20** to block passage of foreign material from the ambivalent atmosphere into the tube **20**. Further, the edges of walls **23***a*, **23***a*, **23***b*, **23***b* are welded to the adjacent outer surface portions of tube **20**.

Each of the corner portions of the mounting member **23** opposite tube **20** is cut away at an angle to mount and have an arm **25** open therein. The arms **25** may be rectangular tubular construction outwardly of the mounting member **23** and have closed ends opposite member **23**. Thus, arms **25** have a sidewall **25***c* that extends coextensive with the adjacent sidewall **23***b* of member **23**, and an opposite sidewall **25***d* having an edge forming a close fit with a plate **30** and top and bottom walls **25***b* that extend into mounting member **23** along the adjacent inner surface of the respective wall **23***a*. Advantageously, each of the arms **25** extends outwardly from the mounting member **23** at equal angles to the central axis of the tube **20** and spaced therefrom. It is to be understood that the arm mounting corner portions of member **23** may be cut at different angles, for example, to permit the arms extending 180° relative one another, or by cutting away parts of walls **23***b*, to have the arms diverge in an opposite direction from that illustrated.

The outer end portions of the arms **25** are provided with aligned apertures **25***a* in top and bottom wall **25***b* to facilitate mounting the signal units. Each signal unit may include one or more light boxes extending above respective arm **25** and one or more light boxes extending below respective arm **25**. Preferably the light boxes mounted on each arm are aligned to extend perpendicular to the axis of elongation of the respective arm **25** and to the common plane of said axis of elongation and the tube **20** axis M—M.

Adjacent each arm **25** and intermediate the arms **25** a mounting plate **30** is welded to the walls **23***a* adjacent the edges thereof that extend between the arms **25**. A closure plate **31** is removably attached to plates **30** by cap screws **32** to close the access opening to the interior of the box between said arms. By providing the closure **31**, it may be removed and the wiring (not shown) extending through the mast arm and tube **20** may be connected in the mounting member **23** to the wiring (not shown) that extends through the arms **25** from the signal unit. This facilitates connecting the wiring during the initial assembly and making repairs.

If only one signal unit is to be mounted on member **23**, member **23** may be modified by having an end wall instead of closure **31** and the signal unit mounting arm joined to the end wall to open therethrough and extend outwardly of the end wall in coaxially aligned with tube **20**. In this case the openings in member **23** for arms **25** would be blocked.

Located on tube **17** intermediate flanges **15** and **21** are a pair of adjustment rings **25**, **26** that have the same inside and outside diameters. The adjustment rings have annular, flat surfaces **25***a* and **26***a* respectively and axial opposed flat surfaces **25***b* and **26***b* respectively, that are of substantial thickness. As may be noted from FIGURES 6 and 7, the annular rings are cut on a bias whereby annular surface **26***a* is perpendicular to the central axis S—S of ring **26** and the plane of surface **26***b* is inclined to the aforementioned central axis. Likewise, the plane of surface **25***a* is perpendicular to the central axis R—R of ring **25** and the plane of the surface **25***b* is inclined relative the central axis of ring **25**. Each of the rings is provided with a radially outwardly opening aperture **28** into which a spanner wrench may be extended for angularly rotating the respective ring about tube **17**. For retaining the mast arm assembly and signal mounting assembly in a fixed adjusted position, relative to one another with the adjustment rings between clamped flanges **15**, **21**, a plurality of nuts **27***a* and bolts **27** are provided, the bolts being extended through apertures **22** and arcuate slots **16**.

The flange **15** may be of various vertical shapes other than that shown in FIGURE 4 as long as it has a central opening, a flat surface to abut against substantially the entire annular surface of an adjustment ring, and bolt openings outwardly of the adjustment rings. The flange **15** is advantageously provided with an opening **30** to have a safety chain (not shown) connected to said flange and to the signal unit.

Referring to FIGURE 8, the second embodiment of the invention includes a mast arm **50** that is circular in transverse cross-section, only the end portion of the arm remote from standard being illustrated. A flange **51** is welded to arm **50** inwardly from its terminal end. Assuming arm **50** is of the same diameter as tube **17**, the rings **25**, **26** and flange **21** are attached to flange **51** in the manner described with reference to the first embodiment, the terminal end portion of the mast arm outwardly of flange **51** being extended through said rings and into the tubular member **20**.

For purposes of simplifying the description of the invention, the wiring for the signal units has not been described or illustrated. However, such wiring would extend through the mast arm, tubes **17**, **20**, member **23** and arms **25**.

In using the apparatus of this invention, it may be preassembled on the ground and the standard **10** mounted to have the mast arm extend over a highway with the signal unit facing oncoming traffic together with any necessary subsequent adjustments being described hereinafter being made for plumbing the signal unit to extend vertically; or the standard **10** mounted on the ground with the mast arm extending over the highway and the unit **18** subsequently mounted on the support arm assembly **11**. For purposes of facilitating the description of this invention, it will be assumed that the standard **10** is set in the ground with the mast arm extending outwardly over the highway. Now, the adjustment rings **25**, **26** are positioned on tube **17** with the flat surface, for example surface **25***a* of ring **25** adjacent flange **15** and surfaces **25***b*, **26***b* adjacent one another. The signal unit support assembly **18** having the signal units **24** mounted thereon is hoisted and moved to a position that the signal units extend generally vertically, i.e. central axis C—C of FIGURE 1 and C of FIGURE 2 of said unit extends as near vertical as practical, and the tube **17** extends into flange **21** and tube **20**. The bolts are extended through the arcuate slots and the apertures in flange **21** and the nuts loosely threaded on the bolts. The adjustment rings **25**, **26** are rotated relative one another (the inside diameters of the rings being sufficiently larger than tube **17** to permit one ring being rotated 180° relative the other in abutting engagement therewith) and to the flanges (if necessary) together with any necessary rotation of flange **21** about the central axis of tube **17** such that the axis of elongation C—C of each signal unit extends vertically both in a plane parallel to the direction of the oncoming traffic (vertical plane of line Y—Y of FIGURE 2) and a vertical plane perpendicular to the preceding mentioned vertical plane (vertical plane of line X—X of FIGURE 2) whereby the axis C—C of the respective signal unit is or as nearly as possible, considering the accuracy of construction and assembly of members **20**, **21**, **23**, **25**, coextensive with the intersection of vertical planes of lines X—X and Y—Y. Then the nuts **27***a* are tightened whereby the adjustment rings **25**, **26** are clamped between the flanges in the adjusted position and the flange **21** is prevented from being rotated relative to flange **15**. If necessary, one or more nuts may be loosened and the adjustment rings or flange **21** rotated relative to the tube **20** to bring the signal unit in the proper vertical alignment provided that true vertical alignment

was not obtained during the initial tightening of the nuts, and then the nuts tightened.

Likewise, if the signal units have initially been aligned with the vertical, but for example due to settling of the earth the pole **10** shifted a few degrees from the vertical, the nuts may be loosened and one or more of the adjustment rings and/or the flange rotated again to bring the signal units into vertical alignment (axis C—C coextensive with the intersection of the vertical planes of lines X—X and Y—Y). Thus with the apparatus of this invention, the signal units may be easily plumbed during the initial installation of the signal units; or subsequent to the installation, the signal units may be readily plumbed in the manner previously indicated. Further, tube **17** retains rings **25**, **26** adjacent flange **15** when the nuts **27***a* are loose and also aids in supporting the tubular end of assembly **18** (tube **20**) in the event the assembly **18** is being mounted after the standard has been set in the ground at its desired location. Thus, the signal units may be more easily aligned than if tube **20** were not provided.

As an example of the invention, but not otherwise as a limitation thereto, the following dimensions are given. Advantageously the short tube **17** has an outside diameter of 2⅜ inches, the tube **20** has an inside diameter of 2⅝ inches, and the adjustment ring an inside diameter of 2 17/16 inches and an outside diameter of 4⅛ inches. The angle of inclination of the surfaces **25***b*, **26***b* respectively of the rings **25** and **26** is advantageously 5° relative the central axis of the rings. With rings having such a 5° inclined surface, the direction of extension of axis M—M relative axis T—T may be varied from 0–5° upwardly, downwardly, to the left, to the right, and etc.

What is claimed is:

1. For mounting a signal unit that preferably has an axis extending vertically on a standard having a general horizontally extending mast arm, signal unit mounting apparatus comprising a first flange fixedly joined to said mast arm, a signal unit mounting member for mounting the signal unit, said mounting member having an end portion, a second flange fixedly joined to said end portion, one of said flanges having angularly spaced, arcuately elongated adjustment slots and the other having angular spaced circular apertures, first means between said flanges for adjustably varying the angle of inclination of one flange relative the other within a limited range, and retaining the flanges in spaced relationship, and second means for releasably connecting said flanges to retain the first means in the desired adjusted relationship between said flanges, said second means comprising bolts extended through the slots and circular apertures so that one flange may be angularly adjusted relative the other flange, each bolt being extended through one of said slots and one of said apertures and means on said bolts for releasably retaining said flanges in condition to clamp the first means between said flanges and thereby retain said first means and flanges in a desired adjusted relationship.

2. The apparatus of claim **1** further characterized in that said first means comprises a pair of rings each having an annular surface extending substantially perpendicular to its central axis and an opposite surface inclined relative the annular surface.

3. The apparatus of claim **2** further characterized in that the angle of inclination of the opposite surface of each ring relative the respective ring central axis is the same, that one of said surfaces of one ring abuts against one flange, that one of said surfaces of the other ring abuts against the other flange and that the other of said surfaces of said rings abut against one another.

4. The apparatus of claim **2** further characterized in that second flange has a central opening, that a tube having a substantially smaller outside diameter than the inside diameter of the rings is fixedly attached to the first flange to extend generally coextensively with the mast arm and is of an axial length to extend through said rings and into said opening when the second means connects said flanges.

5. The apparatus of claim **4** further characterized in that the mounting member includes a second tube having one end portion joined to said second flange and a second end portion, and means for mounting a signal unit joined to said second end portion, said second tube being of a substantially larger inside diameter than the outside diameter of the first mentioned tube, and the first mentioned tube being of a length to extend a substantial distance into the second tube when the second means connects said flanges.

6. For mounting a signal unit that has an axis that preferably is vertical on a standard having a pole and a generally horizontally extending mast arm, said mast arm having a terminal end portion, signal unit mounting apparatus comprising a signal unit mounting member having an end portion, a pair of adjustment rings each having a central axis, a generally annular surface inclined at an acute angle relative its central axis and an opposite annular surface, and means for being fixedly attached to each of said end portions to clamp the rings with one of said ring surfaces in abutting relationship with one of said surfaces of the other ring in selected adjusted angular positions adjacent said end portions and intermediate the mounting member end portion and the pole, and mountingly connecting the signal unit mounting member to the mast arm end portion to permit limited adjustment of the direction of the angle of extension of the mounting member relative the mast arm through angular adjustment of at least one ring.

7. The apparatus of claim **6** further characterized in that said mounting member end portion has an opening and that said means includes a tubular member having a first end portion and being of a substantially smaller diameter than the inside diameter of said rings to extend through said rings and into the mounting member opening and means for fixedly joining said tubular member to the mast arm end portion to extend away therefrom.

8. The apparatus of claim **6** further characterized in that said means includes a first flange fixedly attached to said terminal end portion, a second flange attached to said mounting member end portion and means for releasably connecting said flanges to clampingly retain said rings between said flanges.

9. The apparatus of claim **8** further characterized in that said first flange has a circular opening, that said mast arm has a circular outer surface, said mast arm extending through said flange opening and into said mounting member end portion.

10. The apparatus of claim **8** further characterized in that said flanges have circumferentially spaced bolt openings, the flange bolt openings of one flange being arcuately elongated and the bolt openings of the other flange being circular, and that the last mentioned means includes bolts extended through the bolt openings of said flanges, said bolt openings being about equally radially spaced from the central axis of the mast arm and means on said bolts for holding the flanges together.

11. Apparatus for mounting a unit having a given axis and permitting adjustably positioning said unit to mount the unit to have the above axis vertically comprising a standard having an outwardly extending mast arm, said mast arm having a central axis and a terminal end portion, a first flange fixedly mounted on said terminal end portion and having a central opening coaxial with said mast arm central axis, an axially elongated tube having a first end portion fixedly joined to said first flange to extend coaxially relative said mast arm axis, a unit mounting member having a central axis and a hollow end portion of a larger inside diameter than the outside diameter of said tube with its axis extended through said first end portion, a second flange fixedly connected to said mounting member end portion, said second flange having a central opening coaxially aligned with the mounting

member axis, a pair of adjustment rings each having an inside diameter larger than the outside diameter of said tube positioned on said tube intermediate said flanges, each ring having a generally flat surface axially opposite to its central axis and an inclined surface axially opposite its flat surface that is inclined relative the respective ring central axis, and means for mountingly connecting the flanges together in selected adjusted, relative angular positions within a limited range to clampingly retain the rings in selected adjusted angular position between the flanges to retain the mounting member axis in the selected adjusted angular relationship relative the mast arm axis to permit plumbing the unit when it is mounted on said mounting member.

12. For mounting a signal unit that has an axis that is preferably vertical on a standard having a pole, a signal unit mounting member having a first tubular end portion, a first flange fixedly joined to the first tubular end portion, a pair of adjustment rings each having a central axis and a generally annular surface inclined at an acute angle relative its central axis, a mast arm portion for being joined to the pole to extend generally horizontally, a second tubular portion having a first end portion, an intermediate portion extended through said rings and a second end portion within said first tubular end portion, and means including a second flange for fixedly joining said second tubular portion first end portion to

the mast arm portion and releasably connecting the first flange to the mast arm portion to permit limited adjustment of the direction of the angle of extension of the mounting member relative the mast arm portion through angular adjustment of at least one ring and clamp said rings in an adjusted position between said flanges, said second flange being fixedly secured to the mast arm portion.

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U.S. Cl. X.R.

52—38; 285—181; 287—129

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(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,478,994 Dated November 18, 1969

Inventor(s) Neil E. Ryall

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 71, after "that" (first occurrence), insert --said--. Column 7, line 4, "axially opposite" should be --perpendicular--.

SIGNED AND
SEALED
MAR 10 1970

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents