United States Patent

[11] 3,593,858

[72] Inventor **Shelton Ruffin**
Rte. 1, Oak Grove, La. 71263

[21] Appl. No **707,825**
[22] Filed **Feb. 23, 1968**
[45] Patented **July 20, 1971**

[54] **HEAVY DUTY LIFT**
9 Claims, 3 Drawing Figs.

[52] U.S. Cl. **212/8,** 212/59, 212/144
[51] **Int. Cl.** **B66c 23/00**
[50] **Field of Search** 212/8, 9, 17, 33, 57, 58, 144

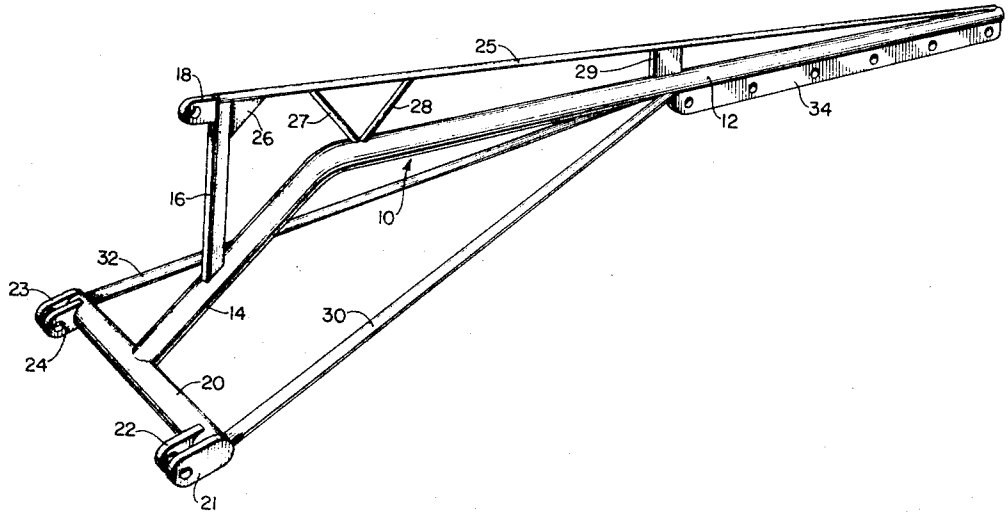
[56] **References Cited**

UNITED STATES PATENTS

322,756	7/1885	Sharp	212/57
2,382,767	8/1945	Zeilman	212/144
2,733,818	2/1956	Gregersen	212/8
2,878,946	3/1959	Wirkkala	212/59

Primary Examiner—Andres H. Nielsen
Attorney—John F. Sieberth

ABSTRACT: A lift device for use with farm tractors and similar mechanisms is described. Preferably the lift is used with and attached to the rear of farm tractors equipped both with conventional lifting arms and a conventional remote controlled double-acting hydraulic cylinder. The lift is capable of raising heavy loads to high elevations, is light weight, and can be installed and used by one operator. In addition the lift can readily be fabricated from low cost, readily available component parts.



PATENTED JUL 20 1971

3,593,858

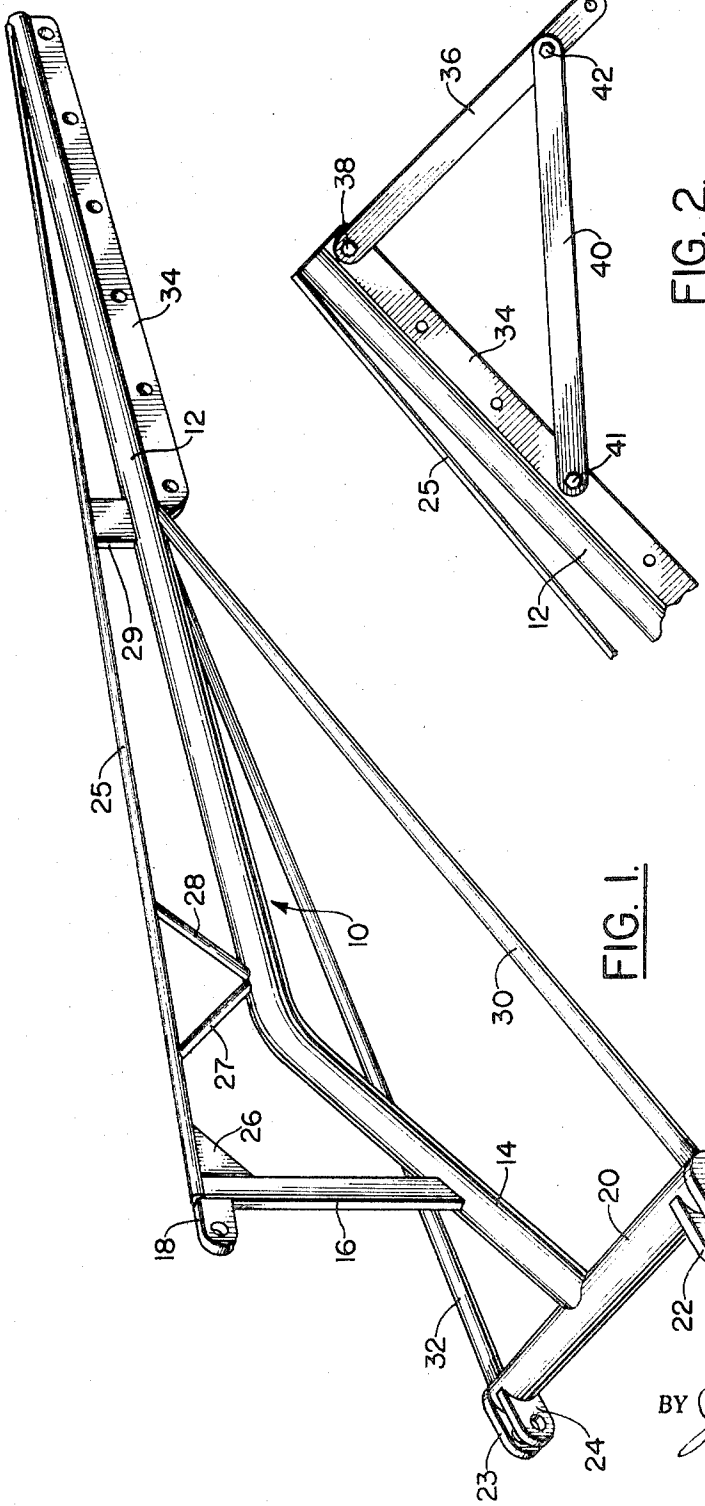


FIG. 1.

FIG. 2.

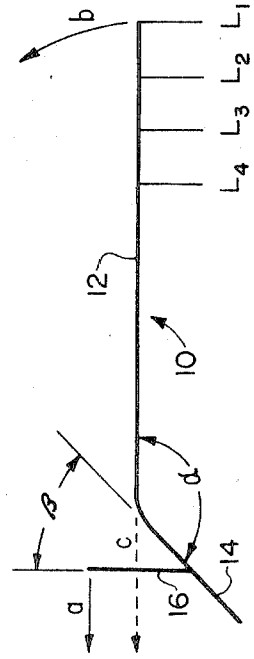


FIG. 3.

INVENTOR.
SHELTON RUFFIN
BY John F. Liebeth
ATTORNEY

HEAVY DUTY LIFT

This invention relates to a lift or hoist device adapted for use with farm tractors and similar equipment. More particularly, this invention relates to a heavy duty utility high lift which can readily and advantageously be employed with tractors or other vehicles equipped with a three point hitch wherein the upper connecting link involves a remote control hydraulic cylinder of the type which is standard equipment on modern farm tractors.

The objects, advantages, features, characteristics, and embodiments of this invention will become readily apparent from the ensuing description, appended claims and accompanying Figures of the Drawing in which:

FIG. 1 depicts in perspective a preferred overall lift construction in accordance with this invention;

FIG. 2 illustrates an optional jib construction which may be used in conjunction with the lift devices provided by this invention; and

FIG. 3 schematically represents in side view some of the geometrical aspects of the lift construction of this invention.

In accordance with its basic teachings, this invention provides a lift which comprises:

a. an elongate deflected pole defining an obtuse angle and having a longer segment and a shorter segment;

b. a gantry bar affixed to said shorter segment and extending above an imaginary line projected rearwardly from said longer segment;

c. means for pivotally attaching and supporting the pole in proximity to the rearward terminus of said shorter segment to permit arcuate motion of the pole in a vertical plane; and

d. means for pivotally connecting the upper end of the gantry bar to a reciprocative driving member having a relatively short linear stroke such that short rearward motion of the driving member will cause exaggerated vertical arcuate motion of the forward end of said longer segment.

While the means of (c) above may be of various types and constructions, it is generally preferable to provide a lateral two point hitch assembly to which is attached the rearward terminus of the shorter segment of the deflected pole.

The means of (d) above likewise may be of various types and constructions although generally speaking a form of linkage involving a hydraulic cylinder is most convenient. Thus when this preferred linkage is utilized in combination with the preferred lateral two point hitch assembly noted above, the overall lift is connected to the tractor or other suitable vehicle by means of a three point hitch. For example, when the lift constructions of this invention are to be linked to a farm tractor by means of the preferred modes of attachment, the means of (c) above comprise a transverse support member carrying a pair of pivotal hitch assemblies adapted to operatively engage the lifting arms of the tractor and the means of (d) above involve linkage to a double-acting cylinder associated with the tractor. As is well known, modern farm tractors are almost universally equipped with such lifting arms and remotely controlled double-acting hydraulic cylinders.

Although the extent of the deflection in the foregoing pole may be varied to accommodate the size and nature of the device with which the lift construction is utilized, the obtuse angle in the pole is preferably in the range of about 115° to about 155°. This permits the lift to be readily utilized with modern farm tractors.

As noted above the gantry bar is affixed to the shorter segment of the deflected pole and extends above an imaginary line projected rearwardly from the longer segment of the pole. It will be appreciated of course that the length, positioning and angular deflection of the gantry bar relative to the shorter segment of the pole may be varied depending upon the vehicle or power source with which the lift is to be associated. When providing a lift construction of this invention for use with modern farm tractors, especially those equipped with double-acting hydraulic cylinders having an 8 to 10 inch stroke, it is desirable that the gantry bar be substantially perpendicular to the imaginary line projected rearwardly from the longer segment of the deflected pole. In addition, the gantry bar will most often be affixed to the shorter segment of the pole at a locus intermediate the ends of that shorter segment.

Referring now to FIG. 1, a particularly preferred lift of this invention involves an elongate deflected pole indicated generally by the numeral **10**, this pole having a longer segment **12** and a shorter segment **14**. Gantry bar **16** extends upwardly from segment **14** and carries near its top, lug **18** permitting pivotal attachment to a hydraulic cylinder (not shown). The lateral two point hitch assembly discussed above is positioned in proximity to the terminus of shorter segment **14** of pole **10**. This assembly comprises transverse bar **20** carrying two spaced-apart pairs of laterally positioned plates **21**, **22** and **23**, **24** fitted with apertures to receive pivot bolts (not shown). This enables pivotal connection of the lift to the conventional lifting arms (not shown) of modern farm tractors and like vehicles. Thus the lift is pivotally supported by means of a three point hitch assembly involving lug **18**, plates **21**, **22** and plates **23**, **24**.

Elongate reinforcing member or rod **25** extends between approximately the upper end of gantry bar **16** and approximately the upper forward end of longer segment **12** of pole **10**. For added strength, gusset **26**, brace rods **27**, **28** and plate support **29** are provided. Thus rod **25** works in concert with pole **10** preferably via various points of attachment.

An elongate bracing member, viz., braces **30** and **32**, respectively, extends between approximately each respective outer end of transverse bar **20** and a locus intermediate the ends of the longer segment **12** of pole **10**.

Preferably, the forward end of longer segment **12** of pole **10** is provided with means for detachably attaching a load at various distances from the opposite end of the pole. Thus in the form depicted in FIG. **1**, plate **34** is affixed to the underside of the forward end of longer segment **12** and is provided with a plurality of apertures for hooking, tying or otherwise attaching a load to the lift.

When employed with the power auxiliaries available on conventional farm tractors, the lift may be raised or lowered by force supplied by the lifting arms alone, by the hydraulic cylinder alone, or by the combination of these. The power source utilized will to some extent be dependent upon the elevation to or from which the lift is to be operated. For example, the lift can be raised to or lowered from an intermediate elevation simply by raising or lowering (as the case may be) the lifting arms of the tractor. In other words, the hydraulic cylinder need not be actuated to effect such intermediate raising or lowering; the cylinder assembly may simply be used as the upper pivotal connection of the three point hitch. Alternatively, intermediate elevations may be achieved by suitably activating the hydraulic system without actuating the lifting arms. However, where the lift is to be raised to its highest elevation or lowered to its lowest elevation, the lifting arms and the hydraulic cylinder assembly will both be actuated.

Experience has shown that the lift constructions of this invention possess a number of advantageous features. For example, a lift such as depicted in FIG. **1** can be fabricated at relatively low cost from readily available low-cost component parts. Spot welding or related techniques are conveniently used in such fabrication operations. Moreover, the lift of this invention is very easy to install on a tractor or related device. It has been found that one man can effect this installation in a matter of a few minutes.

Furthermore, the lift construction of this invention is very sturdy and durable. In fact, a unit of this invention attached to a large sized farm tractor was found capable of lifting a heavier load than a more expensive tractor which was designed for the sole function of heavy duty loading and unloading operations. Thus the lift construction of this invention renders common farm tractors and like vehicles capable of not only performing their usual functions but the function of raising and lowering heavy loads as effectively, if not more effectively, than expensive lift devices which have no other utilities.

Still another advantage of the lift construction of this invention is the fact that loads can be raised to relatively high levels. For example, a commercial farm tractor was equipped with a lift having a horizontal length of essentially 12 feet and proportioned generally in accordance with FIG. 1. By combined use of the lifting arms and the double-acting hydraulic cylinder (8 inch stroke) the forward end of the pole was readily raised to an elevation approximately 13 feet above ground level and could of course be raised and lowered to any intermediate height.

Still other advantages of this invention include the facts that the lift construction is light in weight and that it can be used for a wide variety of farm and commercial lifting and transporting operations. By way of example, the lift may take the place of winch trucks or front-end loaders which are generally too expensive for most farm and utility uses. Because the lift can be installed quickly by one operator, labor costs are kept to a minimum. For example, a single operator can utilize the present device for loading heavy objects on high surfaces such as truck beds, freight cars, and the like.

One of the features of this invention is the fact that the gantry bar extends above an imaginary line projected rearwardly from the longer segment of the deflected pole. In the first place, the force exerted upon the overall lift by the pushrod or ram of the hydraulic cylinder is applied at the upper end of the gantry bar. Therefore because this upper end is elevated in this manner the amount of leverage applied to the overall system is considerable and contributes materially to the ability of the lift to raise and carry heavy loads. In the second place the extension of the gantry bar above this imaginary line enables the upper portion of the gantry bar to serve as a connection for rod **25** which greatly reinforces the load carrying ability of pole **10**.

FIG. **2** depicts an auxiliary jib construction which may be used in conjunction with the lift when it is desired to transport wide loads. It will be seen that this jib involves arm **36** which may be affixed at various locations to plate **34** by means of an aperture therein and pivot bolt **38**. The opposite end of arm **36** is provided with aperture **39** for attachment to the load. Knee brace **40** is affixed to plate **34** by means of bolt **41** and to arm **36** by means of bolt **42**. In this way, arm **36** is deflected outwardly from pole **10** and held in this position so that as pole **10** is raised, the load remains suspended generally below but out of contact with longer segment **12** and the remainder of the associated parts of the overall lift.

FIG. **3** further represents schematically some of the features of the present lift construction. More particularly, it will be seen from FIG. **3** that gantry bar **16** extends above imaginary line C projected rearwardly from longer segment **12**. As noted above, the angle of deflection (depicted as alpha in FIG. **3**) is preferably in the range of from about 115° to about 155° and for best results gantry bar **16** is substantially perpendicular to imaginary line C as shown in FIG. **3**. This means that angle beta represents the difference between 180° and the degrees represented by angle alpha. For use with most common farm tractors angle alpha is most preferably in the order of about 135° with angle beta being in the order of about 45°.

By virtue of the foregoing features illustrated by FIG. **3**, a relatively short rearward movement of the top of gantry bar **16** (i.e., motion as depicted by arrow *a* on FIG. **3**) results in exaggerated vertical arcuate motion of the forward end of segment **12** (as depicted by arrow *b* of FIG. **3**).

FIG. **3** also illustrates the fact that various loads may be simultaneously carried by pole **10** such as by attachment at two or more loci schematically depicted as L_1, L_2, L_3, and L_4. Moreover, a single load may be carried at various distances from the opposite end of the pole, for example, it may be attached to the forward end (locus L_1) or it may be attached at a point closer to the rearward terminus of the pole, such as at L_2, L_3, or L_4. This feature is advantageous in that the lifting force becomes greater as the load is affixed closer to the rearward terminus of the pole. Thus it is possible to raise a heavier load at L_4 than at L_1 although of course the load at L_1 can be raised to a higher elevation.

The particular dimensions and materials of construction of the devices of this invention may of course be varied to suit the needs of the occasion. Particularly good results have been achieved by constructing a lift in accordance with FIG. **1** wherein pole **10** was made 2½" standard wall pipe, longer segment **12** being essentially 9'6" in length and shorter segment **14** being essentially 2'4" in length. Angle alpha was approximately 135°. Gantry bar **16** was made from an iron bar (3"× ½' in thickness and essentially 15½" in length). It was affixed to essentially the midpoint of the shorter segment **14** and arranged perpendicularly to the imaginary line projected rearwardly from longer segment **12** such that angle beta was essentially 45°. Rod **25** was made from three-quarter inch iron rod and braces **30** and **32** from 1¼" standard wall iron pipe. Plate **34** was made from 3"×⅜" iron plate, 5 inch in length, which contained a plurality of 1 inch apertures on 11 inch centers. The unit involved welded construction and was found to give trouble-free service when applied to various lifting and carrying operations with a commercial farm tractor equipped with a remotely-controlled double-acting hydraulic cylinder having an 8 inch stroke. The strength of this particular construction can be appreciated from the fact that it could be used to lift a 2-ton load attached to the forwardmost aperture in plate **34**. Indeed this construction was capable of lifting even greater loads when affixed to the more rearwardly-positioned apertures in plate **34**.

Because of the great lifting strength of the present lift construction, it is of course desirable to ensure, when seeking to raise exceptionally heavy loads, that the forward end of the tractor or other vehicle with which it is associated is sufficiently heavy to prevent overturning the tractor or vehicle. In those instances where the weight of the load would tend to overturn the tractor or similar vehicle, the same may either be temporarily weighted down at its front end or suitably braced to the ground or floor surface so as to prevent the possibility of overturning.

Inasmuch as the principles, features, advantages, and characteristics of this invention are susceptible to considerable variation without departing from the true spirit and scope of this invention, the foregoing specific exemplifications of a particularly preferred embodiment of the foregoing invention should not be construed as being limitative. By way of example, the particularly preferred lift just described involved longer segment **12** being essentially four times the length of shorter segment **14**. It will be appreciated and understood that this ratio may be varied, depending for example upon the particular uses to which the lift is to be put, the magnitude of the loads to be carried, the size and shape of the vehicle or other power source with which the lift is to be associated, and the like. Generally speaking however, the length ratio (longer segment:shorter segment) will range from about 8:1 to about 2:1; ratios in the range from about 6:1 to about 3:1 being preferred for most applications.

It is of course evident that the manner by which the hydraulic cylinder is linked between the body of the tractor or other vehicle and gantry bar **16** is susceptible to considerable variation. For example the outer end of the pushrod of the hydraulic cylinder may be connected to a lug or similar attachment means on the tractor and the opposite end of the cylinder pivotally connected via lug **18** to the gantry bar. The converse form of connection is also suitable, in which case the outer end of the pushrod is pivotally connected to lug **18** and the opposite end of the cylinder linked to the body of the tractor. Similarly, it is entirely practical to employ suitable supplemental connecting links (1) between the body of the tractor and either end of the hydraulic cylinder mechanism, (2) between lug **18** and either end of the hydraulic cylinder mechanism, or (3) between both (1) and (2). It has been found efficacious, for example, to insert between the attachment lug on the rearward end of one commercially marketed tractor and the hydraulic cylinder mechanism, an iron bar approximately 10 inches in length and 2"×¾" in thickness having 1 inch diameter holes on 8 inch centers. Such supplemental connecting links do not alter the functioning of the overall system, but do

permit the adaptation of a lift proportioned as in FIG. 1 to diverse tractors or other vehicles. These and other variations which may be utilized in the practice of this invention will now be evident to those skilled in the art and are embodied in the following claims.

I claim:

1. A portable lift for farm tractors or the like which comprises:

a. an elongate deflected pole defining an obtuse angle and having a longer segment and a shorter segment;

b. a gantry bar affixed to said shorter segment and extending above an imaginary line projected rearwardly from said longer segment;

c. means for pivotally attaching and supporting the pole in proximity to the rearward terminus of said shorter segment to permit arcuate motion of the pole in a vertical plane; and

d. means for pivotally connecting the upper end of the gantry bar to a reciprocative driving member having a relatively short linear stroke such that short rearward motion of the driving member will cause exaggerated vertical arcuate motion of the forward end of said longer segment;

the forward end of the longer segment of said pole being provided with means for detachably attaching a load at various distances from the opposite end of the pole.

2. The device of claim 1 further characterized in that the means of (c) comprise a lateral two-point hitch assembly.

3. The device of claim 1 further characterized in that said obtuse angle is in the range of from about 115° to about 155° and in that said gantry bar is substantially perpendicular to the imaginary line projected rearwardly from the longer segment of said pole.

4. The device of claim 1 further characterized in that an elongate reinforcing member extends between approximately the upper end of said gantry bar and approximately the upper forward end of the longer segment of said pole.

5. The device of claim 1 further characterized in that the means of (c) comprise a transverse support member carrying a pair of pivotal hitch assemblies adapted to operatively engage the lifting arms of a tractor and in that an elongate bracing member extends between approximately each respective outer end of said transverse support member and a locus intermediate the ends of the longer segment of said pole.

6. The device of claim 1 further characterized in that the means of (c) comprise a transverse support member carrying a pair of pivotal hitch assemblies adapted to operatively engage the lifting arms of a tractor and in that said gantry bar is affixed to said pole intermediate the ends of the shorter segment thereof and is positioned and adapted to be actuated by a hydraulic cylinder associated with the tractor.

7. The device of claim 1 further characterized

in that said obtuse angle is in the range of from about 115° to about 155°;

in that said gantry bar is substantially perpendicular to the imaginary line projected rearwardly from the longer segment of said pole;

in that an elongate reinforcing member extends between approximately the upper end of said gantry bar and approximately the upper forward end of the longer segment of said pole;

in that the means of (c) comprise a transverse support member carrying a pair of pivotal hitch assemblies adapted to operatively engage the lifting arms of a tractor;

in that an elongate bracing member extends between approximately each respective outer end of said transverse support member and a locus intermediate the ends of the longer segment of said pole;

in that said gantry bar is affixed to said pole intermediate the ends of the shorter segment thereof and is positioned and adapted to be actuated by a double acting hydraulic cylinder associated with the tractor; and in that the lower forward end of the longer segment of said pole is provided with said means for detachably attaching a load at various distances from the opposite end of the pole.

8. The device of claim 1 further characterized in that said obtuse angle is in the range of from about 115° to about 155°; in that said gantry bar is substantially perpendicular to the imaginary line projected rearwardly from the longer segment of said pole; and in that the length ratio, said longer segment: said shorter segment, is in the range of from about 8:1 to about 2:1.

9. A portable lift for farm tractors or the like which comprises:

a. an elongate deflected pole defining an obtuse angle in the range of from about 115° to about 115° and having a longer segment and a shorter segment;

b. a gantry bar affixed to said shorter segment and extending above and being substantially perpendicular to an imaginary line projected rearwardly from said longer segment;

c. means for pivotally attaching and supporting the pole in proximity to the rearward terminus of shorter segment to permit arcuate motion of the pole in a vertical plane, said means comprising a transverse support member carrying a pair of pivotal hitch assemblies adapted to operatively engage the lifting arms of a tractor;

d. means for pivotally connecting the upper end of the gantry bar to a reciprocative driving member having a relatively short linear stroke such that short rearward motion of the driving member will cause exaggerated vertical arcuate motion of the forward end of said longer segment;

e. an elongate reinforcing member extending between approximately the upper end of said gantry bar and approximately the upper forward end of the longer segment of said pole; and

f. an elongate bracing member extending between approximately each respective outer end of said transverse support member and a locus intermediate the ends of the longer segment of said pole.

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,593,858 Dated July 20, 1971

Inventor(s) Shelton Ruffin

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

Column 3, lines 54-56, delete the sentence reading "This means that angle beta represents the difference between 180° and the degrees represented by angle alpha."

Column 4, line 5 reads -- made 2-1/2" --, should read -- made of 2-1/2" --.

Column 4, lines 8 and 9 reads -- (3" x 1/2' in thickness --, should read -- (3" x 1/2" in thickness --.

Column 4, line 15 reads -- 5 inch in length --, should read -- 5 feet in length --.

Column 6, line 32 reads -- 115° to about 115° --, should read -- 115° to about 155° --.

Signed and sealed this 7th day of March 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents