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(54) **Title**: MOBILE WIND TURBINE

(57) **Abstract**: The present invention is directed generally to a mobile wind turbine, and in particular to a wind turbine mounted on a transportable rolling platform. In one embodiment, the apparatus comprises a tractor (10) pulling a trailer (12) having a wind turbine mounted thereon comprising one or more rotors (28).

# TITLE OF THE INVENTION

# MOBILE WIND TURBINE

## CROSS-REFERENCE TO RELATED APPLICATIONS

This provisional patent application incorporates by reference U.S. Provisional Patent Application Serial No. 61/100,749, filed September 28, 2008.

## BACKGROUND

The present invention is directed generally to a mobile wind turbine, and in particular to a wind turbine mounted on a transportable rolling platform.

## BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a rear three-quarter view of the presently-disclosed apparatus in an enclosed and unelevated configuration;

Figure 2 is a side view of the presently-disclosed apparatus in an enclosed and unelevated configuration;

Figure 3 is a front-side view of the presently-disclosed apparatus in a partially-open and unelevated configuration;

Figure 4 is a rear-side view of the presently-disclosed apparatus in a partially-open and unelevated configuration;

Figure 5 is a front-side view of the presently-disclosed apparatus in a partially-open and unelevated configuration;

Figure 6 is a front-side view of the presently-disclosed apparatus in a halfway-open and partially-elevated configuration;

Figure 7 is a front-side view of the presently-disclosed apparatus in a fully-open and partially-elevated configuration;

Figure 8 is a rear-side view of the presently-disclosed apparatus in a fully-open and substantially-elevated configuration;

Figure 9 is a three-quarter view of the presently-disclosed apparatus in a fully-open and fully-elevated configuration;

Figure 10 is a side view of the presently-disclosed apparatus in a fully-open and fully-elevated configuration;

Figure 11 is a front-side view of the presently-disclosed apparatus in a fully-open and fully-elevated configuration;

Figure 12 is a front-side view of the presently-disclosed apparatus in a fully-open and fully-elevated configuration;

Figure 13 is a three-quarter view of the presently-disclosed apparatus in a fully-open and fully-elevated configuration;

Figure 14 is a three-quarter view of the presently-disclosed apparatus in a fully-open and fully-elevated configuration;

Figure 15 is a side view of a rotor according to at least one embodiment of the present disclosure;

Figure 16 is a second side view of the rotor of Figure 15;

Figure 17 is a third side view of the rotor of Figures 15 and 16; and

Figure 18 is a side view of a blade angle control cam in accordance with one embodiment of the present disclosure.

## DETAILED DESCRIPTION OF THE DRAWINGS

FIGURES 1-2 are certain views of the presently-disclosed apparatus in an enclosed and unelevated configuration. The apparatus comprises a tractor 10 of conventional design and trailer 12 of conventional size and shape. It can be seen in these figures that the frame of trailer 12 is separated into a front segment 14 and a rear segment 16. The configuration shown in FIGURES 1-2 is the configuration in which the apparatus may be moved from one location to another over conventional roadways.

FIGURES 3-6 are certain views of the presently-disclosed apparatus in a partially-enclosed and unelevated to substantially-elevated configuration. As seen in these figures, side panels 18 may be lowered to the sides of trailer 12, thereby revealing the rotors 28 enclosed therein. Further, the front segment 14 and rear segment 16 of trailer 12 can be pivoted, in order to elevate the upper portion of the trailer 12, including the rotors 28.

FIGURES 7-14 are certain views of the presently-disclosed apparatus in a fully-open and fully-elevated configuration. FIGURES 7-10 show the rotors 28 aligned with the major axis of the trailer 12, while FIGURES 11-14 show the rotors 28 disposed at an angle thereto. In certain environments, it may be feasible to orient the trailer 12 to an optimal position for power generation based on prevailing wind conditions. In other environments, it may not be possible to orient the trailer 12 for optimal power generation. Under these conditions, the rotors 28 may be pivoted about the vertical axis in order to align with the prevailing wind and thereby optimize power generation. As seen in each of FIGURES 7-14, the lowered side panels 18 act as diverters or concentrators to direct ground-level wind up

into the rotors 28. The floor panel 20 of the trailer 12 may be profiled in such a manner as to increase the volume of wind flowing into the rotor 28.

As shown clearly in FIGURE 10, the rotors 28 are mounted for rotation on support members 42, 44, 46, 48 by respective shaft members 70 and 72, which are operably connected to one or more electric generators. A variety of specific rotor designs may be employed, depending on the particular application. One embodiment of a rotor operable with the present disclosure is shown in detail in FIGURES 15-18. As seen in these figures, each rotor 28 may be characterized by a set of circumferentially spaced, radially extending arm or spoke members 78 which are equally spaced and are each connected to a hub 79. Hubs 79 are mounted on shafts 70 and 72 for rotation therewith, respectively. Each rotor blade 80 includes a leading edge 80a and a trailing edge 80b, respectively, as shown in FIGURE 15. For a rotor having eight blades 80, the blades, preferably, may have an aspect ratio in a range of 6:1 to 10:1 and a symmetrical airfoil shape although other airfoil shapes, including variable shapes such as a variable camber blade, may be suitable. For a sixteen blade rotor, the aspect ratio may be in a range of 4:1 to 8:1. Rotor blades 80 are mounted for pivotal movement about their lengthwise axes, as illustrated in FIGURE 15, whereby each end of each rotor blade 80 is mounted at a pivot 81. Rotor blades 80 are mounted at their opposite ends at pivots 81 shown by example in FIGURE 15.

The rotor 28 includes rotor blade "lifting" force control means described herein below. Referring further to FIGURE 15, in one preferred embodiment, each rotor blade is connected to a cam follower 88 by an elongated blade pitch change link 84. Links 84 are connected at their outer distal

ends to the blades 80 at pivot connections 85, respectively. In response to generally linear longitudinal movement of the links 84, the pitch angle or angle of attack of the respective blades 80 and, hence, the blade lift forces may be varied in accordance with the teachings of patent application Ser. No. 11/411,540.

The inner ends of the links 84 are connected to respective cam followers 88. In at least one embodiment, the motions of cam followers 88 are controlled by a cam mechanism. One embodiment of a cam mechanism is shown in FIGURE 18. As can be seen in FIGURE 18, cam followers 88 are disposed partially in a circular groove or recess 90 formed in a cam member 92 mounted on hub 79. Hub 79 may be disposed on bearings 93 to allow rotation of the hub 79 relative to the cam 92. The profile of cam 92 is that of an eccentric circle, which is a suitable profile for certain applications. Alternate profiles may be more suitable for other applications. Groove 90 of cam 92 has a central axis 73a which is parallel to, but eccentric with respect to, the axis of rotation 73 of the shafts 70 and 72. Cam 92 may be connected to an actuator which is adapted to rotate the cam 92 into selected positions to effect varying the pitch or angle of attack of the blades 80 with respect to the direction of the wind. By selectively varying the pitch or angle of attack of the rotor blades 80, the generator 20 may efficiently utilize wind flow to rotate the rotor 28 and generate electrical power by way of the respective generators.

Referring now to FIGURE 16, there is illustrated a condition of the rotor 28 wherein the blades 80 are disposed in positions corresponding to a so-called full stall condition wherein blade "lift" forces and a net resultant

force acting on the rotor by wind flowing through the duct inlet 26 in the direction of arrow 65 will not effect rotation of the rotor. This may be provided as one limit position of the cam 92 as it is rotated by the drive motor 102. FIGURE 17, on the other hand, shows a condition of the rotor 28 wherein the blades 80 have assumed positions, respectively, which will produce a maximum resultant force tending to turn the rotor in a clockwise direction, viewing FIGURE 17 in response to air flowing in the direction of arrow 65. Exemplary blade angles with respect to wind direction, indicated by arrow 65, for the rotor positions shown in FIGURE 16 and 17 and are indicated in the drawing figures. The clockwise direction of rotation of the rotor 28 about the axis 73 is also indicated by the arrow 99 in FIGURE 17. In FIGURES 16 and 17, the rotor blade angles indicated are, of course, for the particular positions of the respective blades 80, as illustrated, and the pitch angles vary continuously with respect to arms 78, for example, as the rotor 28 rotates.

As noted above, the rotor set forth in FIGURES 15-18 is provided only by way of example. Those of skill in the art will recognize that a wide variety of rotor designs may be employed in connection with the novel teachings of the present disclosure.

CLAIMS

Claim 1. A mobile wind turbine comprising:

a trailer frame having wheels attached thereto;

a rotor, having an axis of rotation, secured to the trailer frame, having a set of circumferentially-spaced rotor blades attached thereto, each rotor blade being pivotable about a pivot axis aligned to the axis of rotation of the rotor, the pitch of each rotor blade being controlled by a mechanism according to the position of the rotor blade.

Claim 2. The mobile wind turbine of claim 1 wherein the pitch of each rotor blade is controlled by a cam and follower mechanism.

Claim 3. The mobile wind turbine of claim 1 wherein the trailer frame comprises a mechanism to elevate the rotor.

Claim 4. The mobile wind turbine of claim 1 further comprising a set of side panels operable to direct wind into the rotor.

Claim 5. The mobile wind turbine of claim 1 wherein the pitch of each rotor blade is controlled according to a pattern, and wherein the relationship between the blade pitch pattern and the rotor angle is adjustable by an actuator.

Claim 6. The mobile wind turbine of claim 1 further comprising an upwardly-convex floor panel disposed beneath the rotor.

1/10

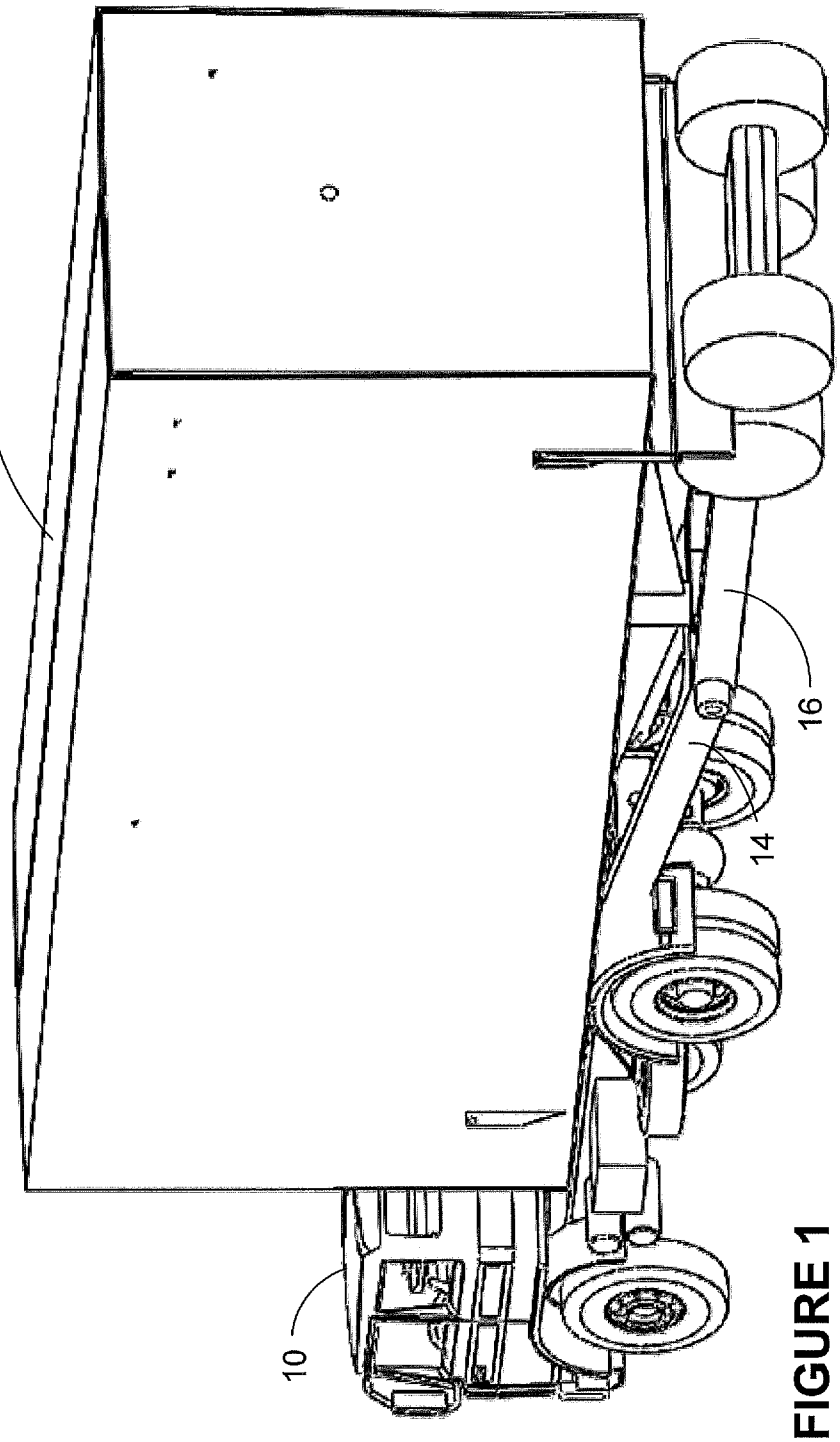



FIGURE 1

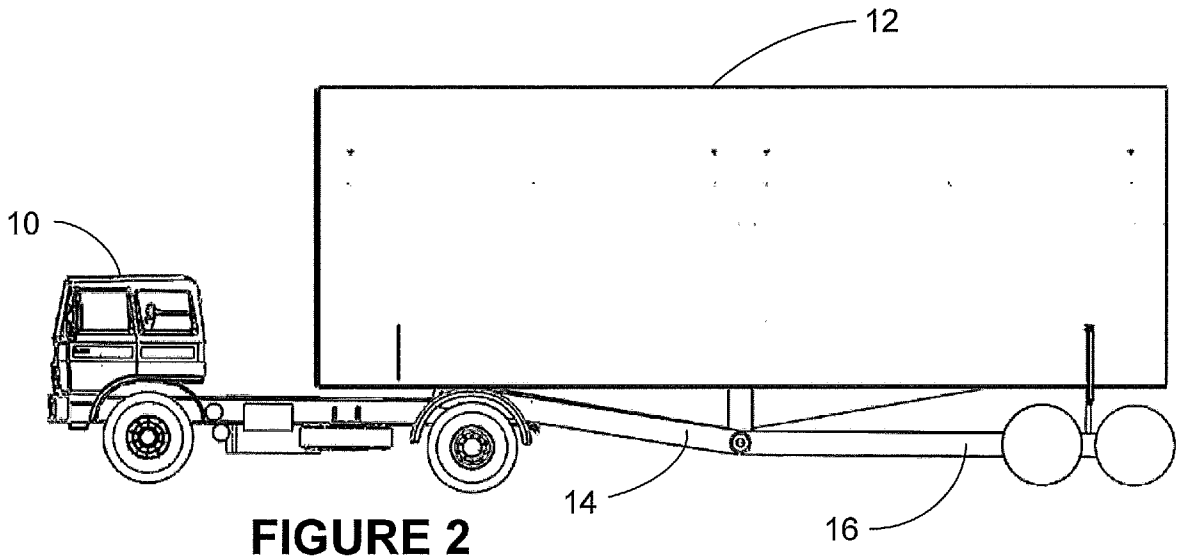
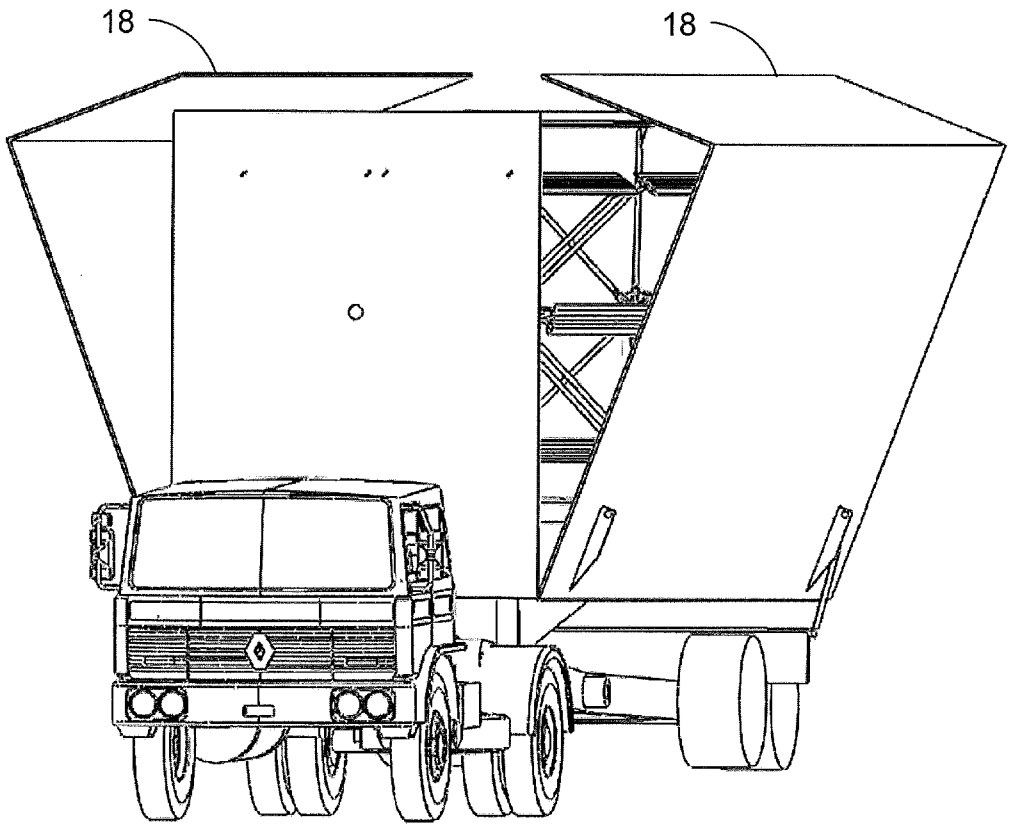



FIGURE 2

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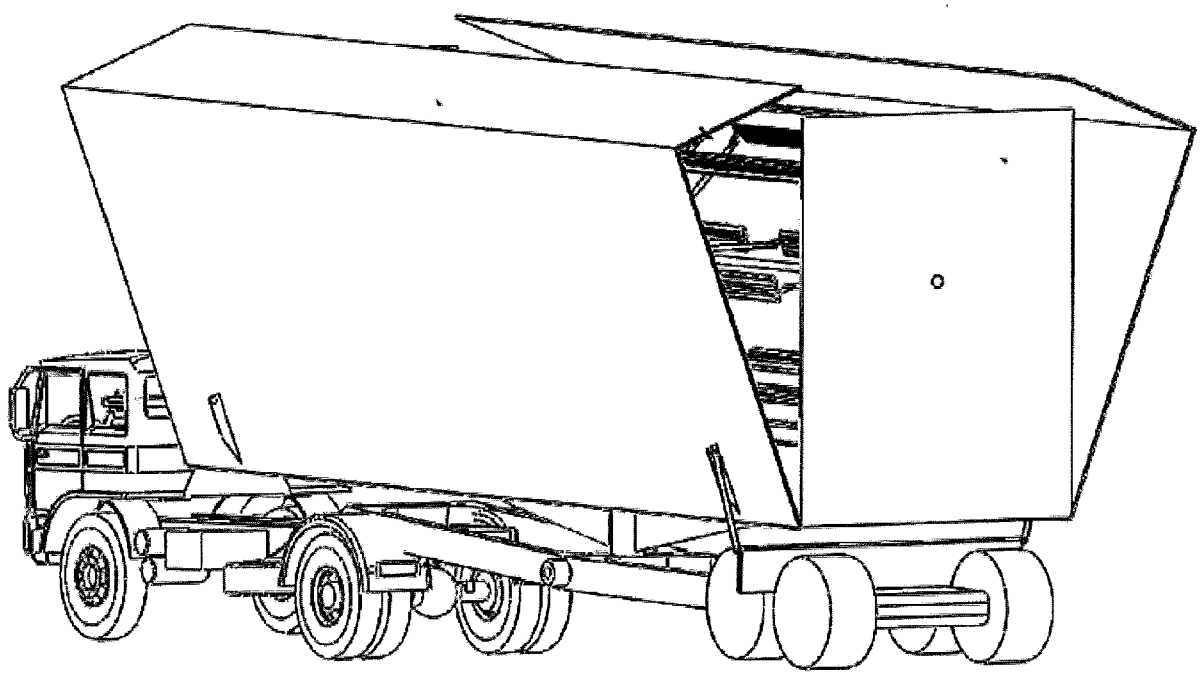

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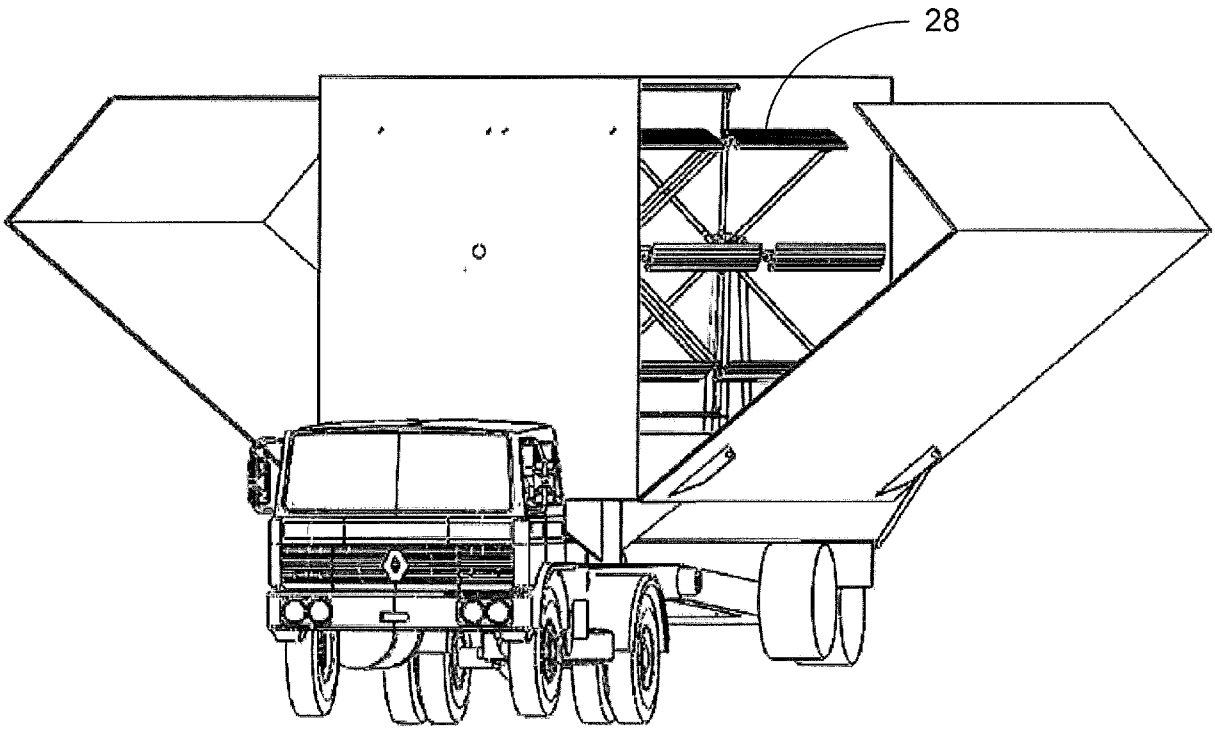


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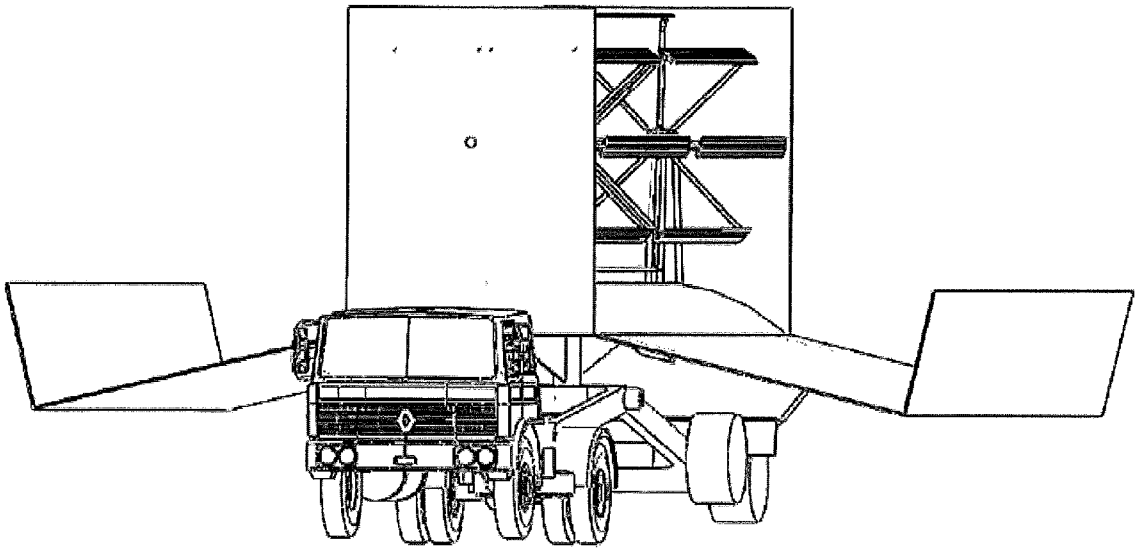

FIGURE 6

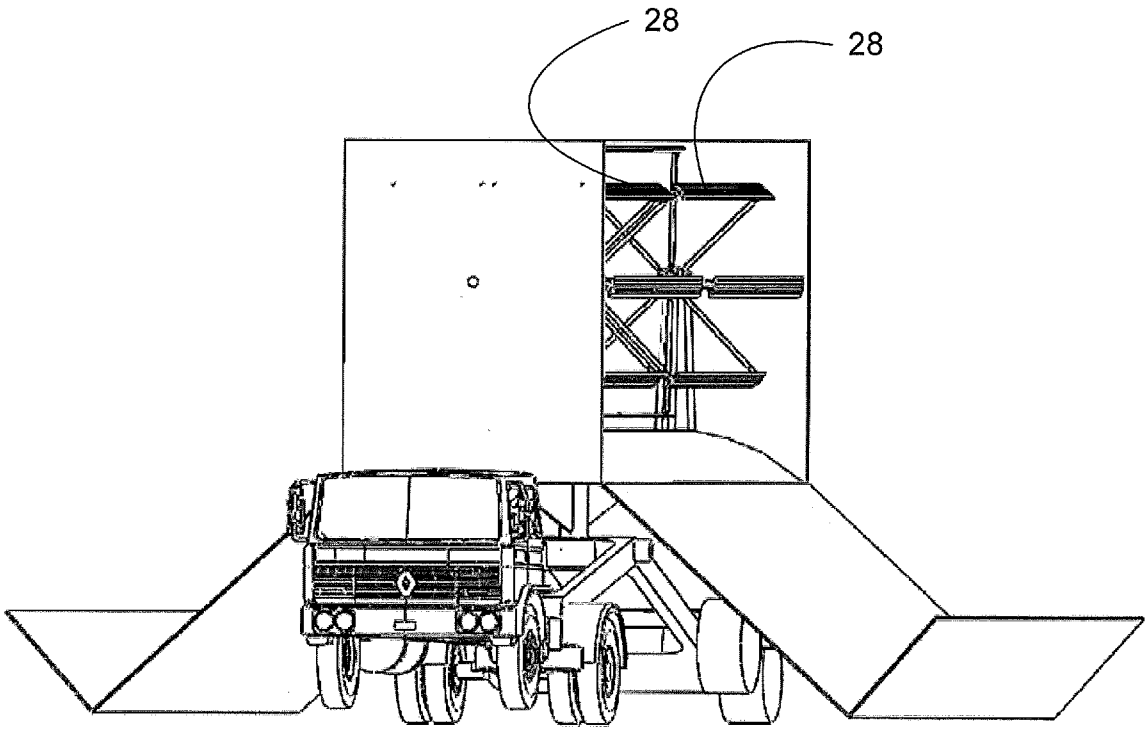


FIGURE 7

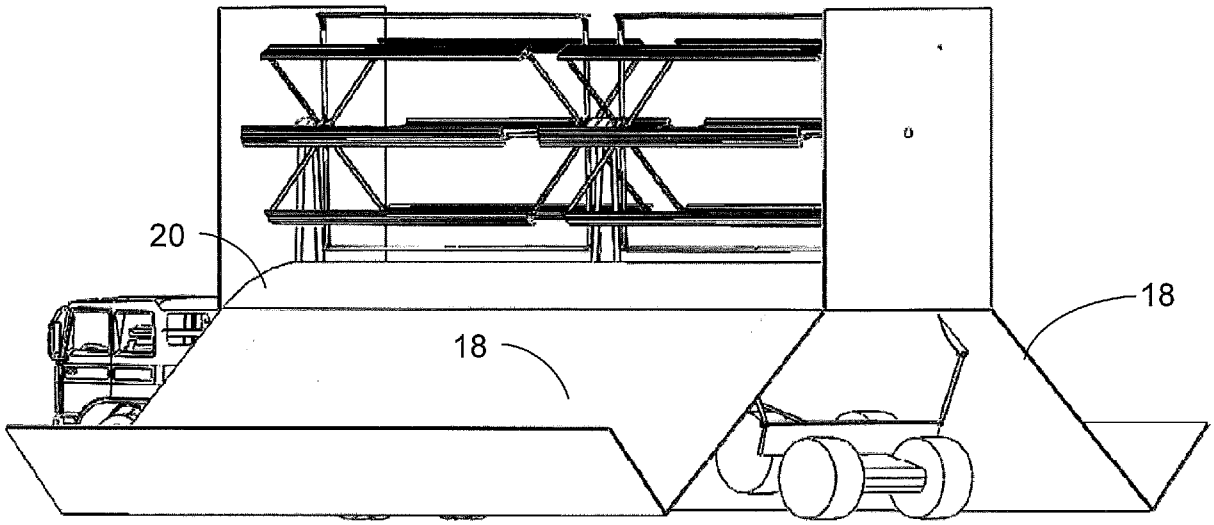


FIGURE 8

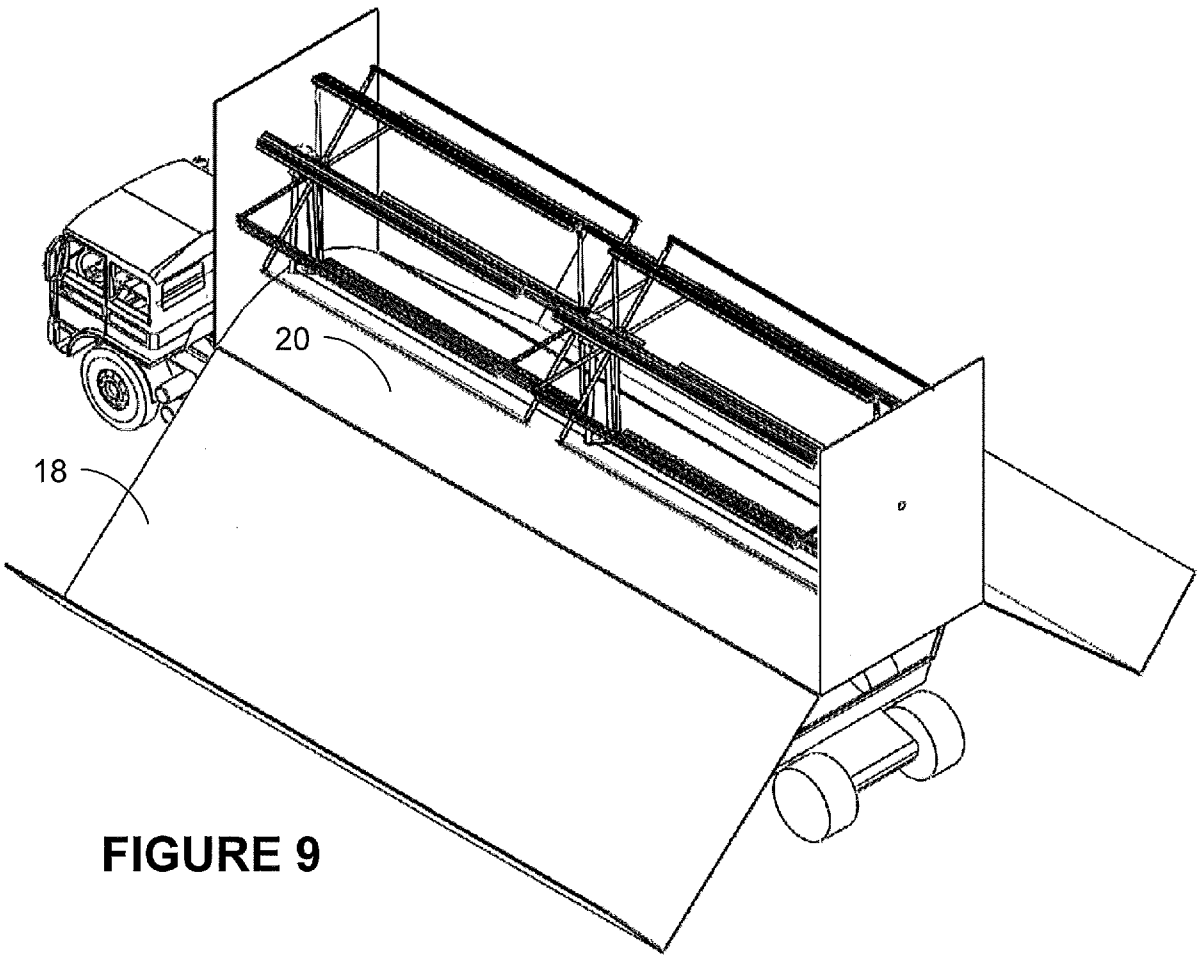


FIGURE 9

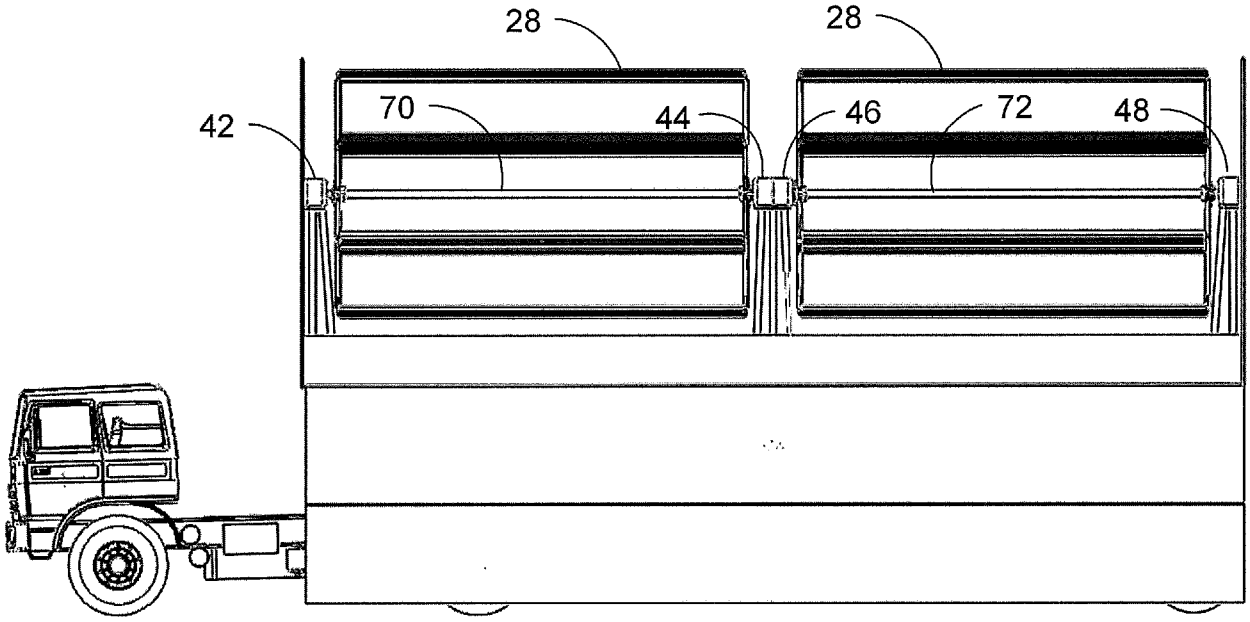


FIGURE 10

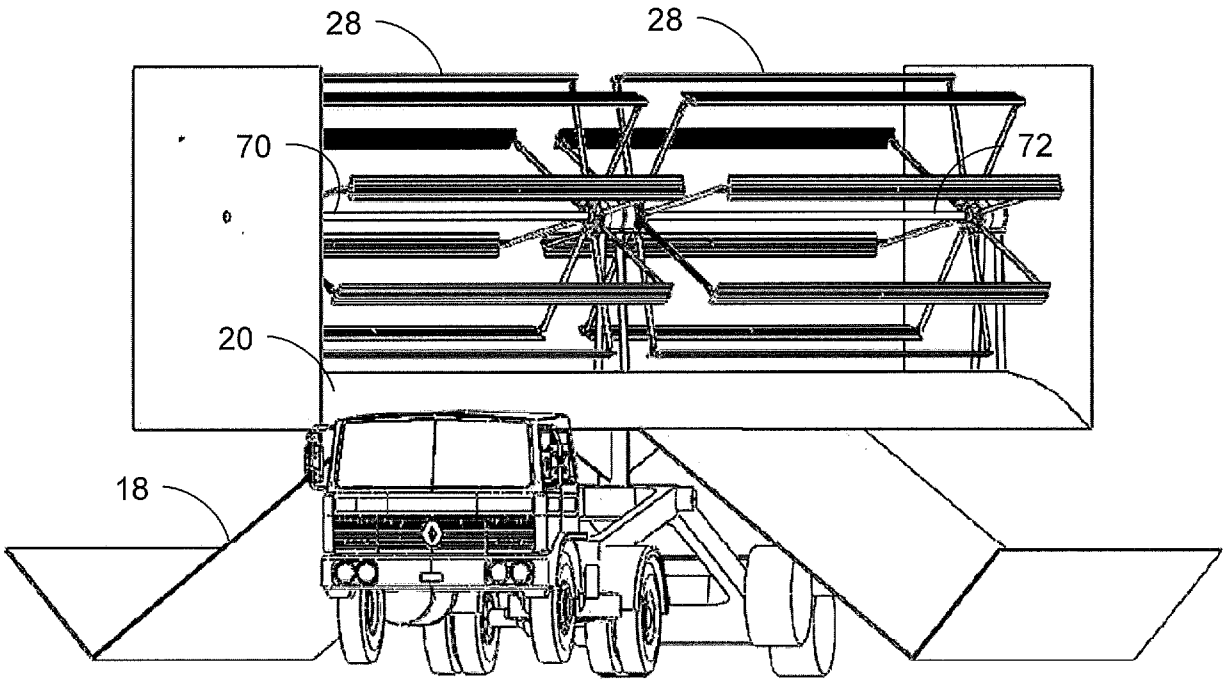


FIGURE 11

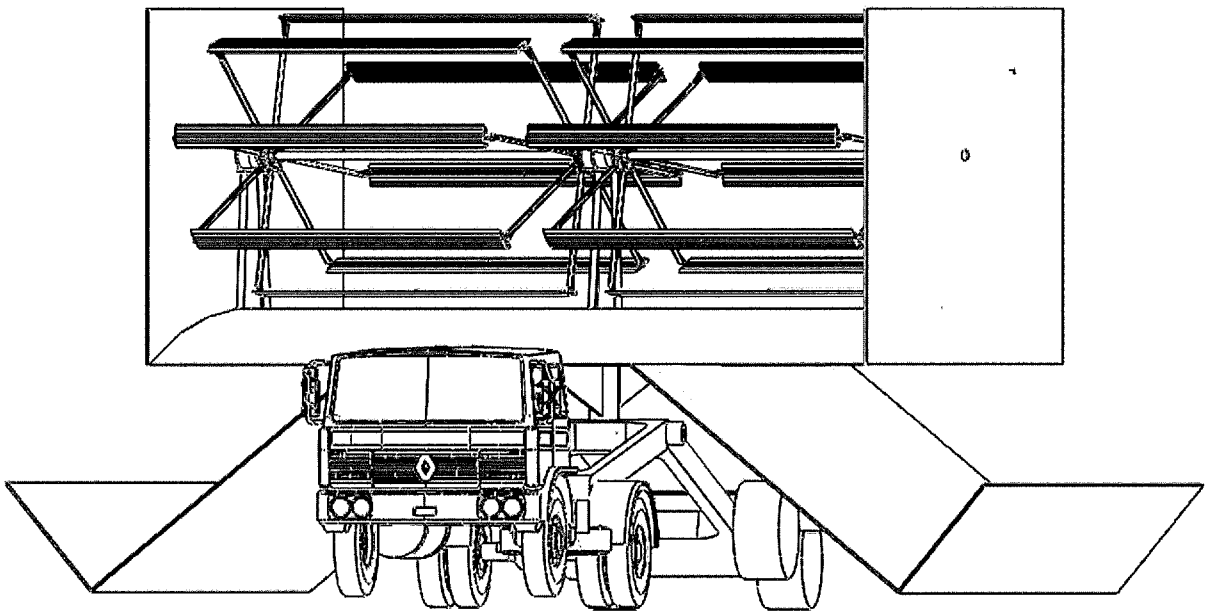

FIGURE 12

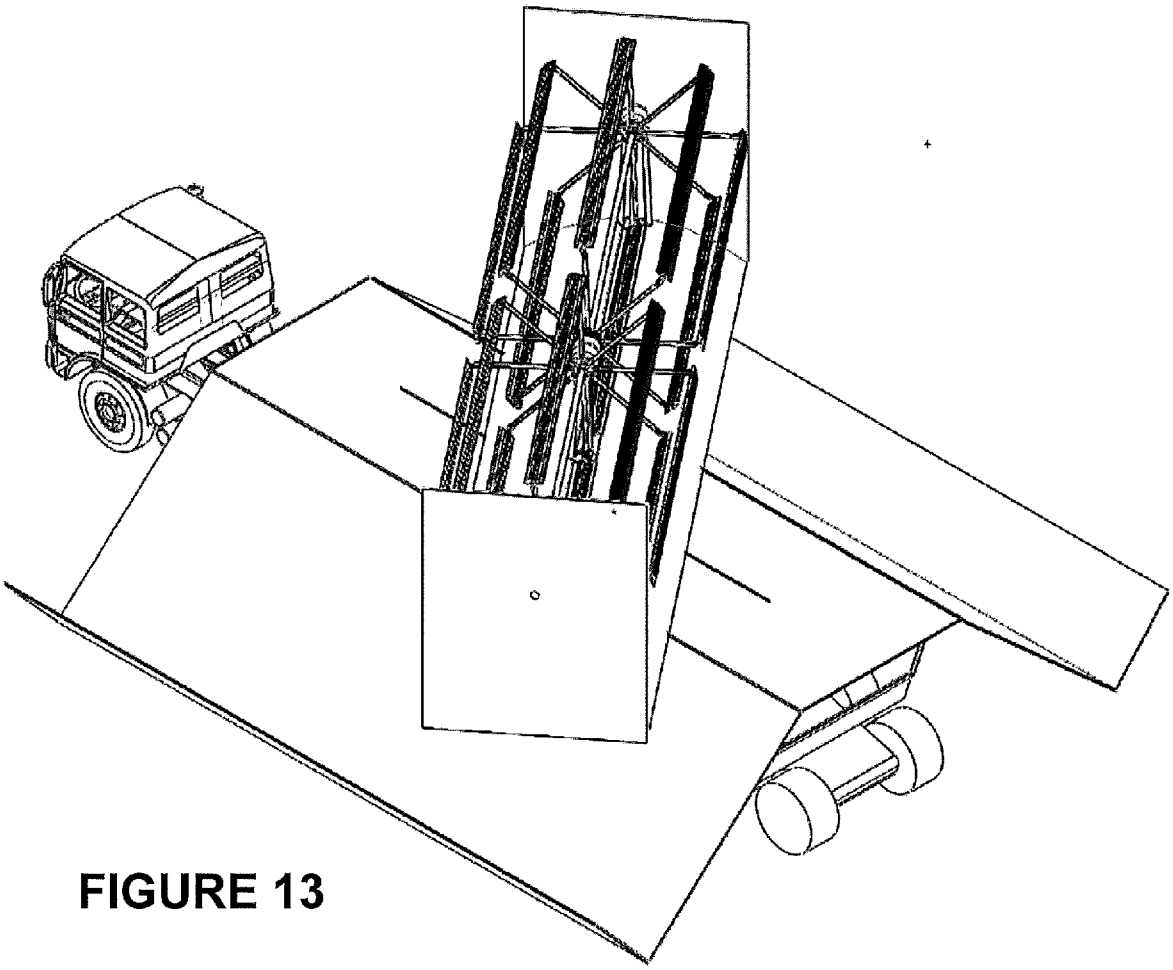

FIGURE 13

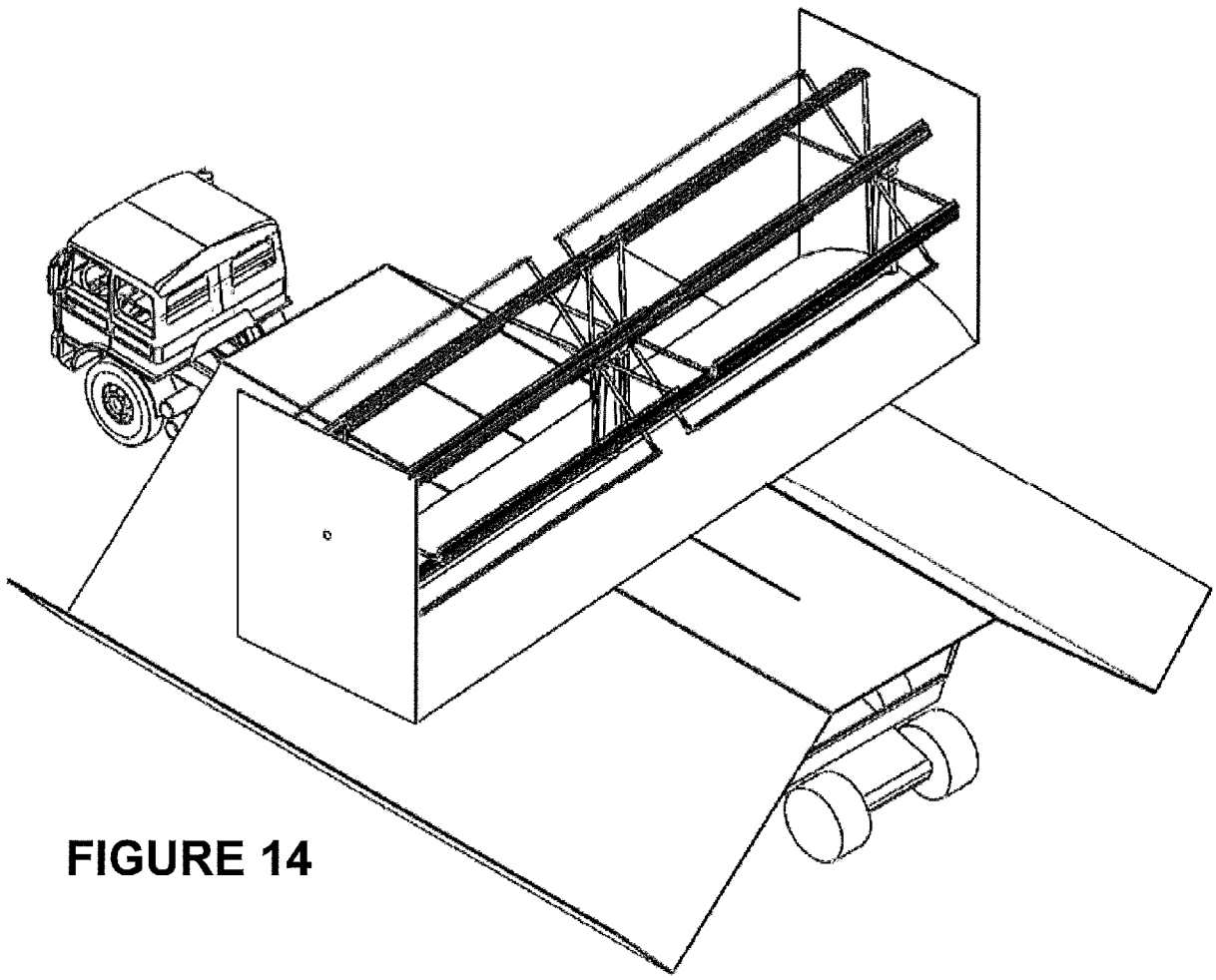

FIGURE 14

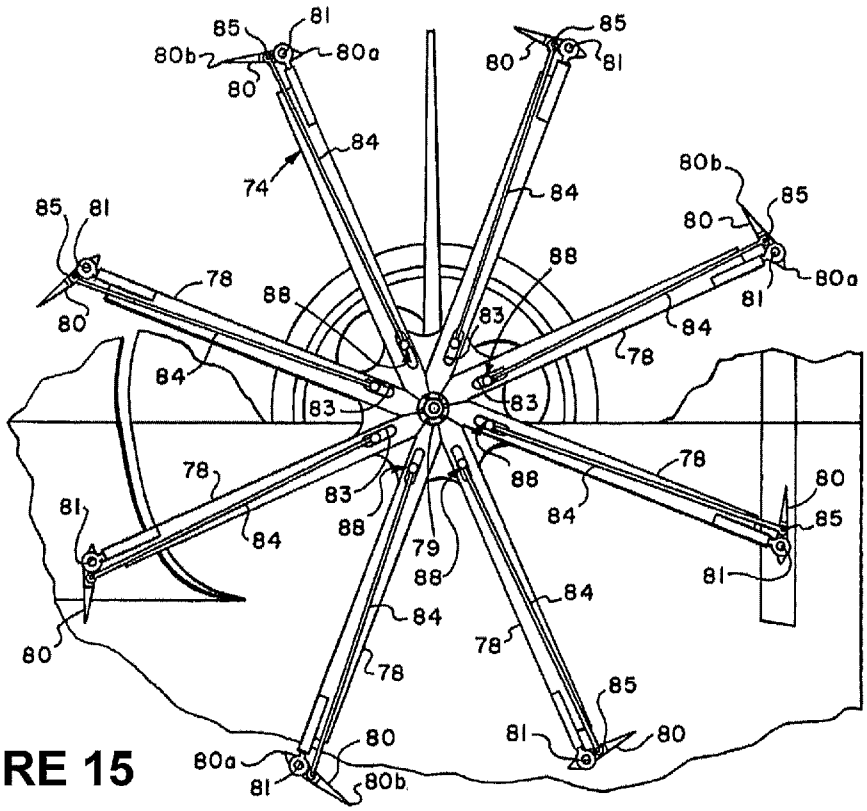


FIGURE 15

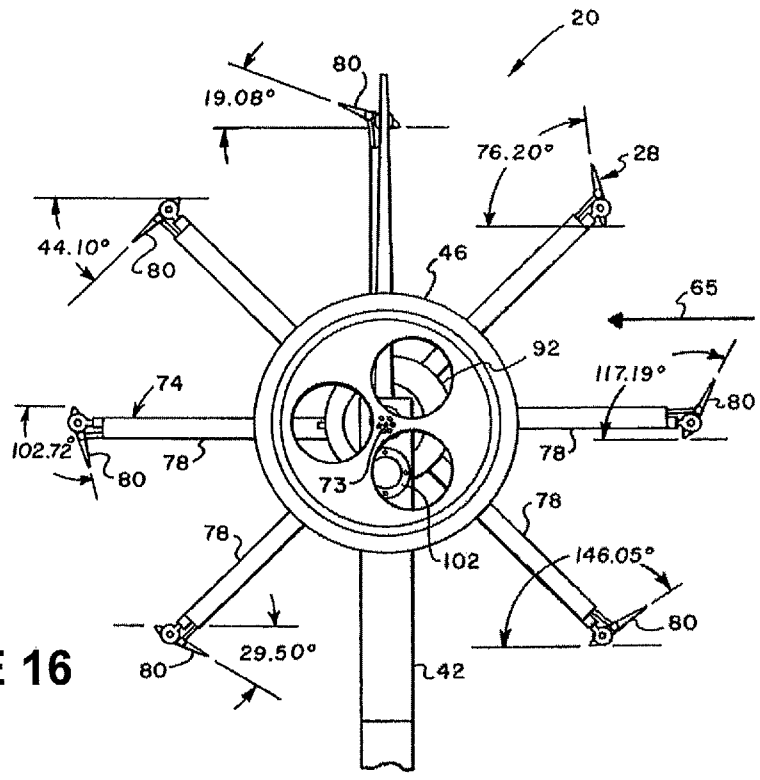


FIGURE 16

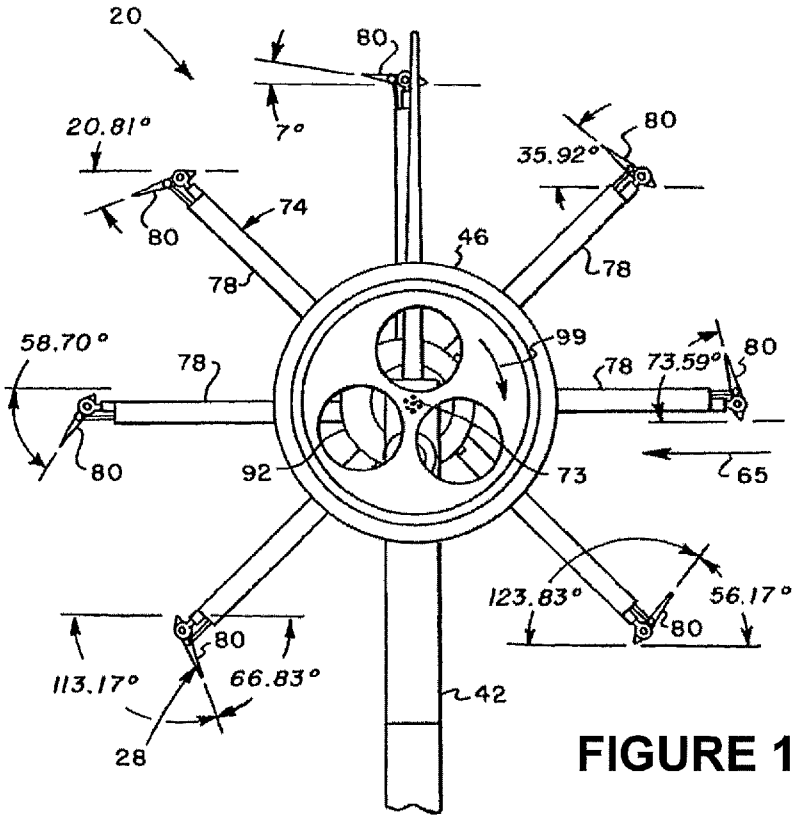


FIGURE 17

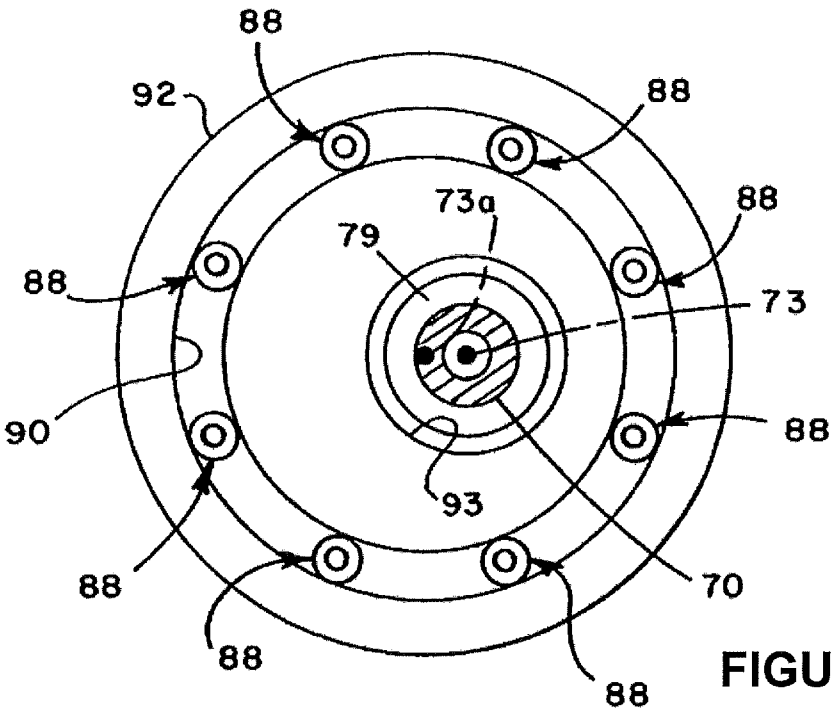


FIGURE 18