TORNADOGUARD - Baloons

Method and apparatus for a tornado dispersing guard.

The invention relates to the method and device to disperse tornadoes and reduce damage caused by this atmospheric phenomenon.

The description below includes a new hypothetical explanation of the mechanism that allows for the formation of tornadoes, and a way to protect territory against their destructive effects.

Up to this day, the most frequently reported active ways to protect or reduce damage caused by tornadoes involve the distortion of conditions conducive to the growth of energy within tornadoes. Given the scale of the problem most of these approaches (ideas) remain in the concept phases. According to the process described in German Patent DE 4109054, when a meteorological service determines characteristic climate and weather parameters for the formation of tornadoes, planes would be dispatched to drop explosive gas-loaded balloons, specifically hydrogen gas, over the center of the expected vortex formation. The balloons are equipped with run-time starters, triggered by a change in barometric pressure or via remote radio signal. The explosions are initiated in layers and time intervals to disturb the formation of the rotating vortex. A British Patent GB 2225342 describes a solution which would have a destructive effect on a tornado by use of a shock wave created by an explosion of cargo introduced into the axis of a resulting pending tornado. DE 4220695 describes the structural solution for an aircraft to adapt to the implementation of such a method… Another solution which is the subject of German Patent DE 1200603 introduces chemicals inside the initial vortex formation, that once mixed in, form an explosive mixture. They are then ignited into an explosion and hence disrupt the process of tornado formation. By use of airplanes, rounds of bullets filled with chemicals are dropped into the area of tornado formation, which are dispersed by rotating nozzles. There are also known approaches involving the changing of cloud structure, for example, by spraying from planes or shooting silver iodide rockets in order to condense water vapor and thus reduce the energy and mass of rotating air.

It is generally known that tornadoes occur most frequently at the southwestern edge of the storm cloud referred to as a super cell. Smaller tornadoes may also form in low cloud cover and even in the absence of a cloud. Previous studies and publications on the formation of atmospheric vortexes, and particularly tornadoes, exclude the impact of electrical polarization of clouds and the Earth's magnetic field.

I am hereto bringing up the hypothesis that during the evaporation of water, while it is traveling upwards, a separation of electric charges takes place, a partial ionization of the air.

Hot, moist air in contact with cool air acquires a positive electric charge, which is carried into the upper layers of the atmosphere, while heavier cold air acquires a negative charge. This is the main mechanism of cloud electrification, resulting in a powerful electrostatic voltage difference within the clouds as well as between the clouds and the earth. In relation to the surface of the earth, the bottom or base storm cloud has a negative charge, while its upper layer has a bigger positive charge. These charges are unloaded by lightning.

From observations and documentation concerning this topic, it is known that lighting does not occur under the south-western base part of the storm cloud formation in the vicinity of tornadoes. The gradient of the electric field, that is pointing down, in this area of the cloud is too small for an electrical break through to occur. This gradient causes the air particles to be accelerated electrically in a linear movement from top to bottom, creating a wind known as "burst down"; this wind is powered mainly by the electric field.

At this stage the Earth's magnetic field (EMF) plays an important role. An electrically charged particle of air moves within the magnetic field and is then governed by Lorentz' laws, according to which a force is created propelling it into a rotary motion. This force is proportional to the size of the particle load, its linear velocity, and the strength of the magnetic field.

The direction of this force is perpendicular to both, the velocity vector as well as to the direction of the magnetic field lines. Therefore it is for this reason that an ionized air particle in the Earth's magnetic field in the northern hemisphere will move (looking from the top) with a counter-clockwise spiral motion.

While overcoming the strong forces of neutral particles, ionized particles, mainly from water vapor, set into motion a large portion of the storm cloud, and the bottom portion of this cloud takes on the shape of a slowly rotating disk, known as the wall cloud. When the Lorentz forces fall on the particles they cause that their movement is constantly accelerated and the force increases. As a result of that event the bottom portion of the storm cloud (the base) starts forming into a conical vortex which looks like and is the beginning of the tornado. The swirling air behaves like an accelerating spinning rotor of an electric motor powered by a large gradient of electrical potential, directed toward the ground. After a period of time this vortex reaches the earth's surface.

According to the above description of the phenomenon, it can be deduced that a tornado is a form of electrical discharge occurring between the storm cloud and the ground. A sharp intake of negatively charged objects from the surface of the earth are carried upwards into the inside of the vortex, and on the outside of the vortex form strong centrifugal forces and turbulence in the form of destructive winds. Over time, the tornado cloud discharges the accumulated electric charge, which was its power source. Once the electric charge is exhausted, the tornado funnel collapses, distorts and fades.

Because of the different directions of the EMF relative to the earth's surface, in the northern hemisphere the direction of rotary motion of air masses in both tornadoes and hurricanes are counterclockwise, and in the southern hemisphere clockwise.

The method being put forth to protect a territory against the destructive effects of tornadoes, is to reduce or change the direction of the electric field in a stormy atmosphere conducive to the formation of tornadoes, because it is the root cause of a tornado's power. In the case of an approaching danger of a tornado formation, a protective barrier composed of many electrical wires would be created. Electric wires with one end are lifted up into an altitude of several km, with the opposite ends grounded.

This protective barrier would be formed at a distance of 2 to 4 km, in the direction between west and south geographically, from the borders of the protected area. Fractal-like shaped discharges will take place on the surface of metallic coated balloons, and loads of electric charges will descend to the ground through electric wires, which will significantly reduce the gradient of the electric field between the storm cloud and the earth. The reduction of the electric field which comprises the main power of the tornado vortex, performed through this method will cause it to disperse or significantly weaken it within an appropriately safe distance from the protected zone. It would be advantageous for the main line of the protective barrier to be comprised of grounded electric wires, placed in a zig-zag pattern formation and spaced out from each other by approximately 30 to 80 meters. It would also be advantageous if the ground wires were connected to a local water supply network (sewer system) in order to collect the most electric charges from the greatest possible surface area. The device comprised of a balloon (similar to a helium-filled weather balloon) filled with gas lighter than air, preferably helium, and its metallic coating is electrically expanded with many strings of electrically conductive foil, where the strings are connected to one end of the shell. The coating of the balloon would be mechanically and electrically connected to the ground with an electrical cable. In the construction of the device, regular non-metallic coated latex balloons can also be used instead of metallic coated; in that case, the element of discharge of the electrical potential difference will be only the wire that is being carried up by a non-conductive latex balloon.

The significance of the solution lies in that the balloon is kept in standby mode, ready for flight inside a silo whose upper outlet has a cover with an accelerator, and is engaged when danger is signaled. In the bottom portions of the silo walls exist air-control holes, and at the bottom is a spool wound with electrical cable.

For the most simple, effective solution, the spool is mounted in a fixed vertical position coaxial (parallel axes) with the silo as well as with the electrical wire that is cross-wound around it. The preferred type is a coned shaped spool, with the smaller pointy end facing up.

The spool can also be setup to rotate, mounted horizontally on the silo's side (wall). It is advantageous to have the electric wire pass through an eyelet (grommet) mounted above the spool. Under the conditions of an obvious presence of a whirlwind, the unwinding of the

electrical cable will be helped by a rounded edge sliding collar mounted on the inner edge of the silo's outlet.

Because of the inertia of the reel, in the solution which uses the rotating spool, it is advisable that in an idle state, a portion of the electrical wire be unwound to the length of the height of the silo, and freely placed rolled up on a flat surface. Once the balloon is lifted, the further lifting will be assisted by the wind.

An advantageous solution is one where the rotating spool is connected through a clutch coupled with a drive unit winch. The clutch while the cable is being unwound is, of course, normally open, the spool spins freely disconnected from the power unit. Such a solution - after a tornado threat has passed through - allows for the possibility to pull the electrical cable and balloon back in for its re-use.

A full understanding of the invention will allow for a sample execution of the protective barrier to protect a city by the method.

Fig.1 shows the location of a protective barrier relating to a protected zone. Figures 2 and 3 show the design solutions of two protective devices shown in schematic cross-section and perspective.

At a distance of about 3 km from the outer buildings of a city in a region with high incidence of tornadoes a barrier B has been built, which includes a protected zone of P, an arc in directions between west and south geographically. Protective barrier (B) consists of multiple devices, each of which has a silo s with a balloon that has an electrical cable (2) with a length of about 3 km attached to it. The other end of the electrical cable 2 is grounded and connected to a local metal installation of water system or a low-resistance network grounding system. The silos s are spaced at distances of about 50 meters b, in a zig-zag pattern relative to the fundamental line of discharge barrier (B). Immediately after receiving a distress signal of tornado danger, the balloons (1) are freed from the silos, and they unwind and lift many of the electrical wires (2) into the atmosphere. Electrical wires (2) reduce the electrostatic voltage which is taking place between the thundercloud and the earth and above all, change the electric field from vertical to horizontal, which causes the dispersion of the oncoming tornado.

The device in the solution shown in Figure 2 has a cylindrical silo made of concrete, used to store a balloon (1) in a ready state for flight. Balloon (1) filled with helium has a metallic coating, covered with many strings of electro-conductive film, with one end connected to the shell.

This type of construction enables for an efficient collection of electric charges from the cloud through micro discharges called fractal. The upper outlet of the silo s is closed with lids (3) with propulsion (4) initiated by distress signal. The balloon's coating (1) is mechanically and electrically connected with the steel electric wire (2) of about 3 km length, which is wound on a conical spool in a cross coil pattern. Spool (5) is mounted fixed in a position coaxial with the silo

(s). The other end of electric wire (2) is connected with the grounding conductor wire (10), buried in the ground and connected to a network of metal plumbing (water sewer system). In the bottom portions of the silo walls exist air-control holes (9), which in addition to fulfilling maintenance/service access function, fulfill the task of bringing air into the space s underneath the balloon, which after the opening of lids (3) ensures a fast lifting of the balloon (1). The proper unwinding of the electrical cable (2) is ensured by the coaxially mounted cable grommet (11) over the spool (5), as well as, the rounded edge sliding collar (8) mounted on the inner edge of the silo's s outlet.

The solution in the embodiment shown in Fig. 3 differs from the above described in Fig. 2 by the cylindrical spool 5 which is pivotally mounted on a horizontal axis and in relation to the side surface of the silo axis, tangential to silo (s). In this solution, due to the inertia of spool (5), a preliminary unwinding of a part of the electrical cable (2) is favorable, with length greater than the height of the silo's, and a free positioning of it loosely in a wound state on a plane within the silo's. Spool (5) is connected through a coupling (7), with a winch drive unit (6). The clutch is normally open and during the phase of balloon release and ascension there will not exist an increased resistance to the unwinding of the electrical cable (2). After risk of danger passes it is possible to wind the electrical cable (2) with the balloon (1) back into the silo s and allows for their re-use.

Patent Claims

1. Method to protect a territory by dispersing (scattering) of tornadoes, based on the reduction and changing of the direction of the electric field of clouds, characterized in that immediately after receiving a signal of an impending danger of a tornado, a protective barrier (B) is created by the unwinding of many electrical wires (2) within the atmosphere, that by one end are lifted by balloons (1) to the height of several kilometers, and by the other grounded, which a protective barrier (B) is formed 2 to 4 km from the borders of the protected zone (P) which extend into directions between the West (W) and south (S) geographically.

2. The method according to 1, characterized by the basic line of protective barrier (B) is formed by grounded electrical cables (2) spaced in a zig-zag pattern and the spacing between adjacent ones is about 30 to 80 m.

3. Method according to claim 1 or 2 characterized by, the electric grounding wires (2) connect to the local water supply.

4. Device for dispersing air whirlwinds, equipped with a balloon filled with a gas lighter than air, preferably helium, having a metallized layer coating and electrically constructively extended with many strings of an electrically conductive foil, with one end connected to the shell layer coating, and where the coating is mechanically and galvanically connected by an electrical cable to the ground, characterized in that it has a silo (s) to store the a balloon (1) in a standby for flight, whose upper outlet is closed by lids (3) with a drive (4) actuated by a signal of danger,

where in the bottom part of the silo wall (s) are air control holes (9) and at the surface is set a spool (5) wound with an electrical cable (2).

5. The device according to claim 4 characterized in that the spool (5) is mounted fixed in a position coaxial with the silo (s), and the electric cable (2) is wound cross-coil pattern.

6. The device according to claim 5, characterized in that spool (5) has a conical shape with pointed side directed upwards.

7. The device according to claim 4, characterized in that spool (5) is mounted pivotally on an horizontal axis and relative to the side surface is in a position tangential the axis of the silo (s).

8. The device according to claim 5 or 7, characterized in that coaxially within the silo (s), over spool (5) is mounted a cable grommet (11) through which electric cable (2) is threaded.

9. The device according to claim 4 or 5 or 7, characterized in that on the inner edge of the silo outlet (s) is mounted a sliding rounded collar (8).

10. The device according to claim 7 characterized in that during idle state, a part of the electrical cable (2), with a length greater than the height of the silo (s) is unwound from the reel (5), and freely placed wound on a plane.

11. The device according to claim 7 or 8 or 10 characterized in that the spool (5) is connected through a clutch (7) with a winch drive unit (6).

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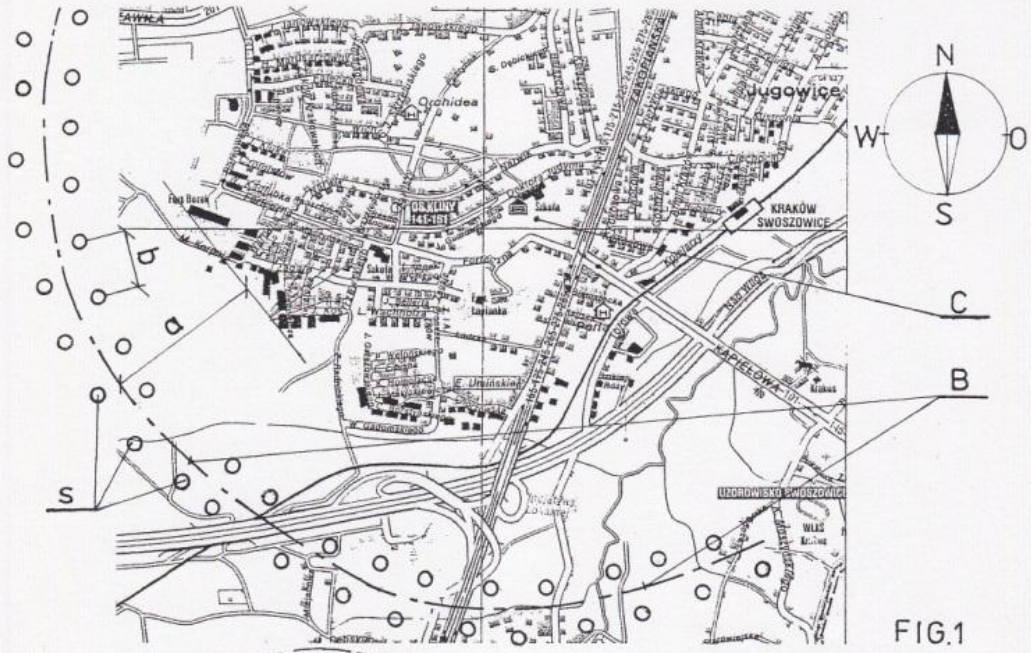
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FIG.1

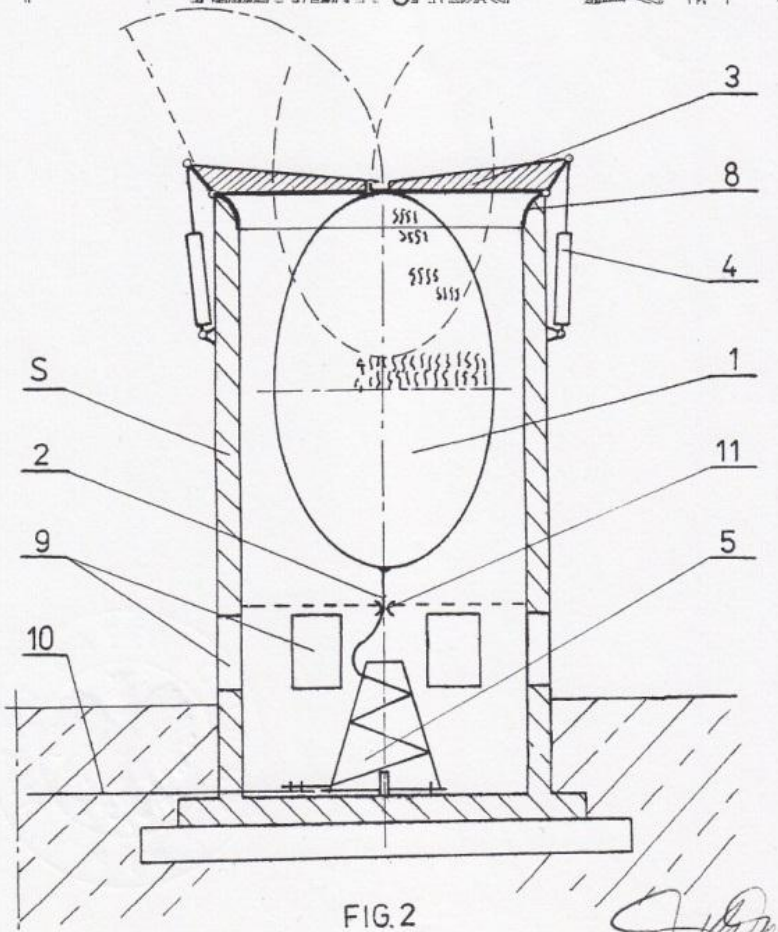
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FIG.2

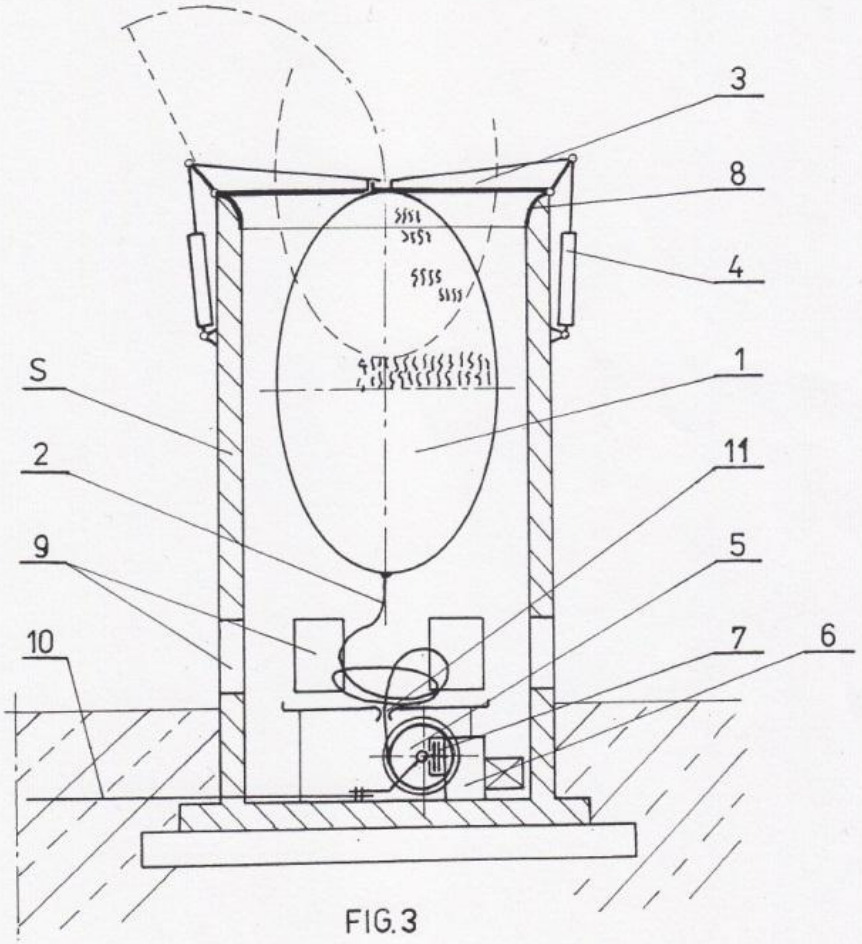

FIG.3