Dec. 26, 1944. M. C. SCHWAB 2,365,778

MOBILE DEVICE FOR REPELLING THE ATTACK OF ENEMY AIRCRAFT

Filed Sept. 16, 1941 3 Sheets-Sheet 1

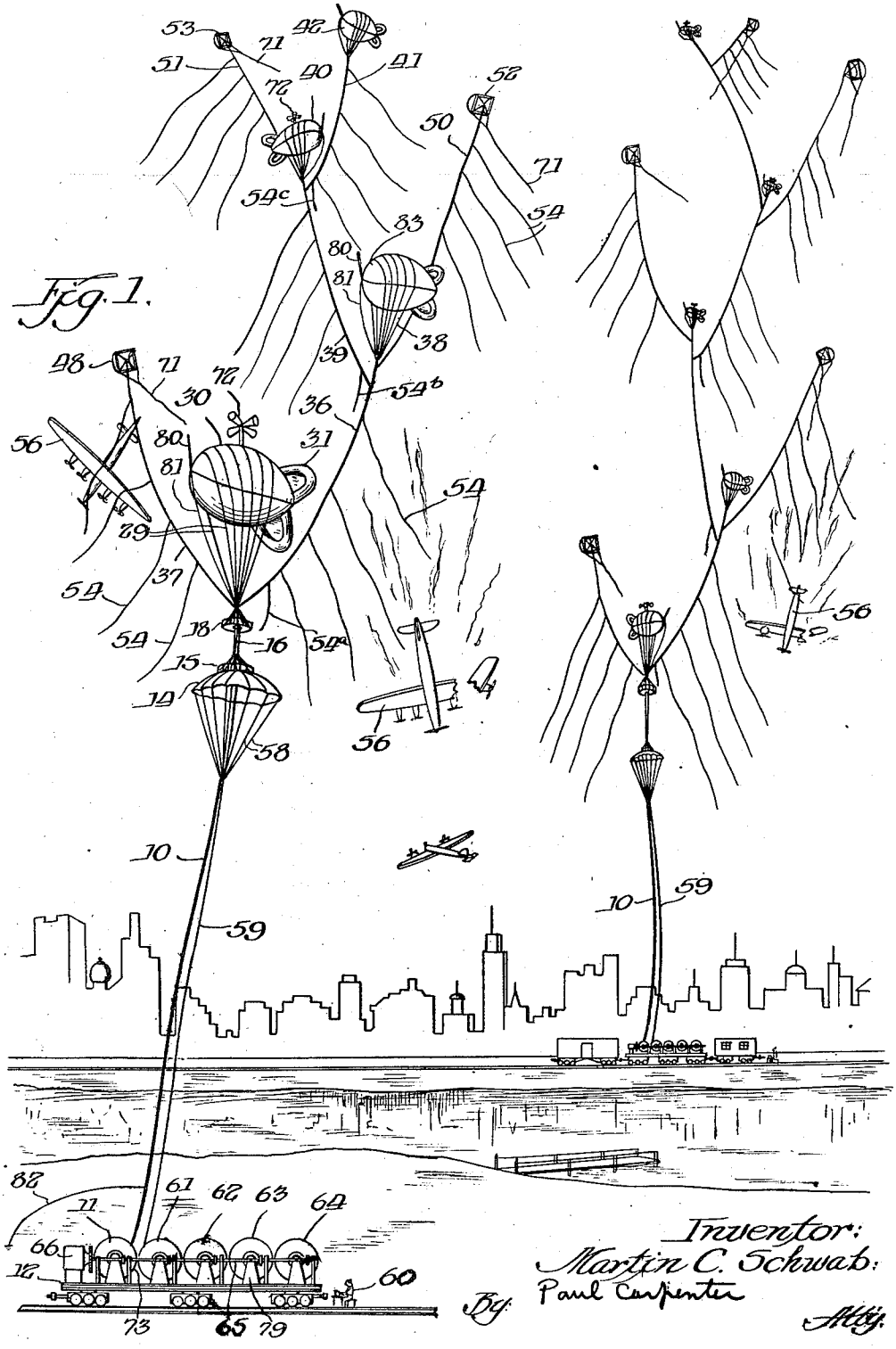

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Fig. 2.

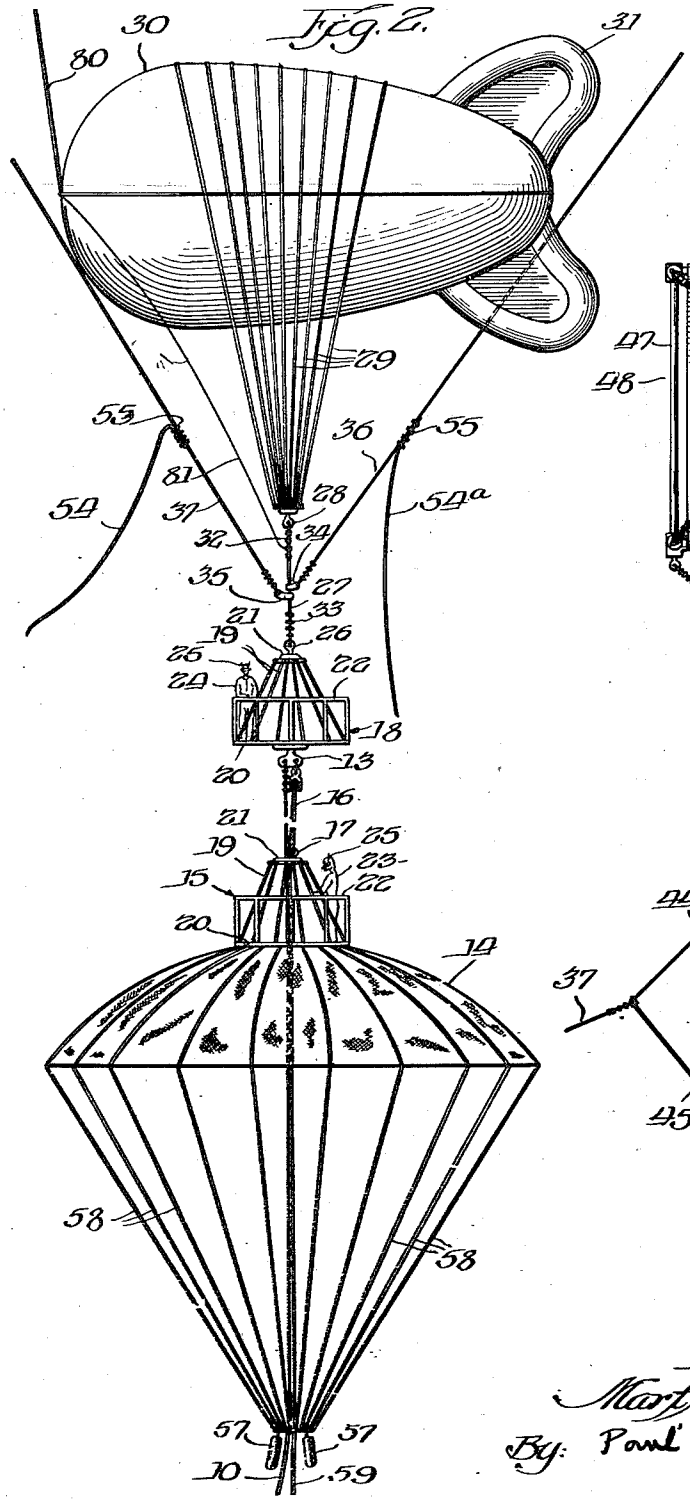


Fig. 3.

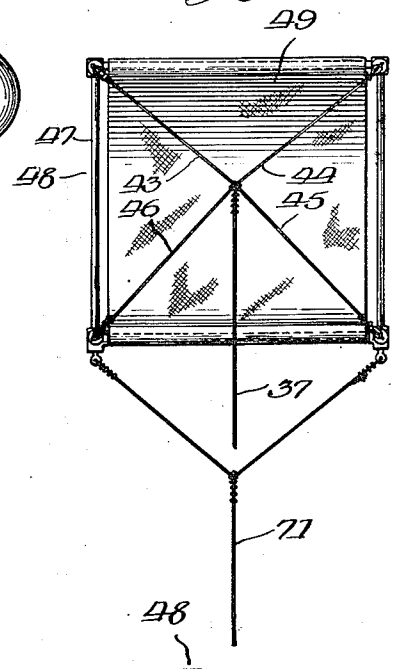
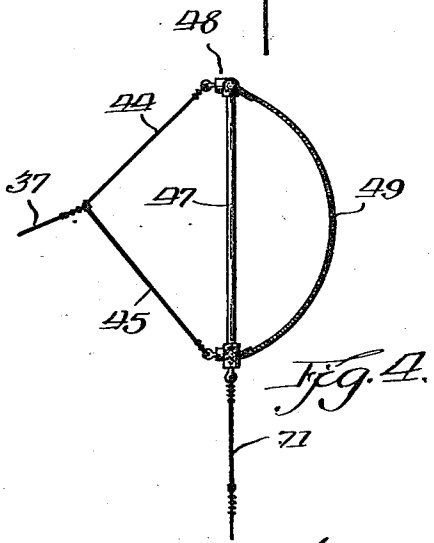


Fig. 4.



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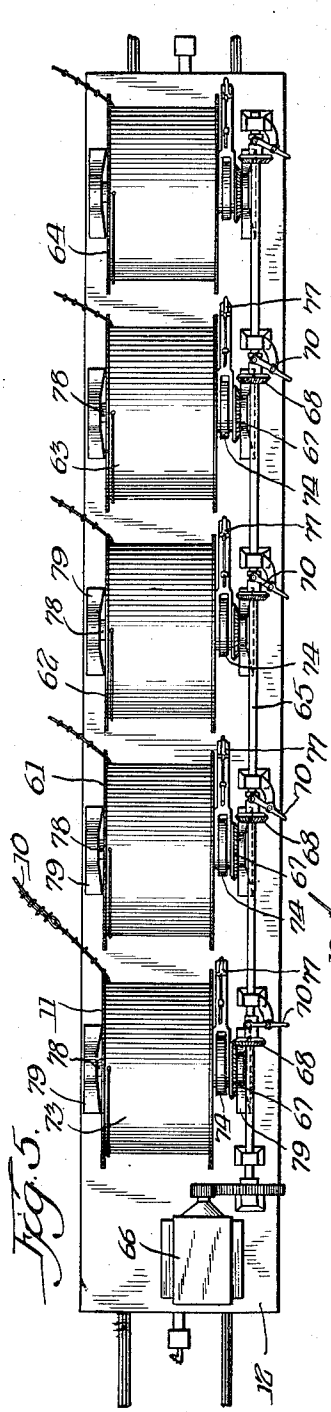

Fig. 5.

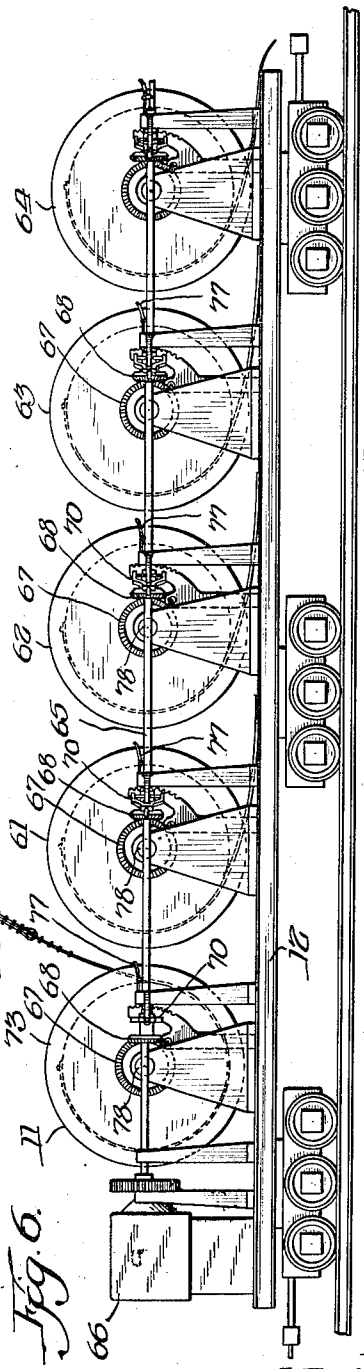

Fig. 6.

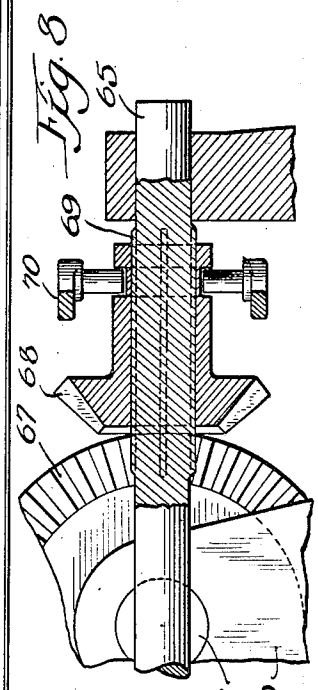

Fig. 8

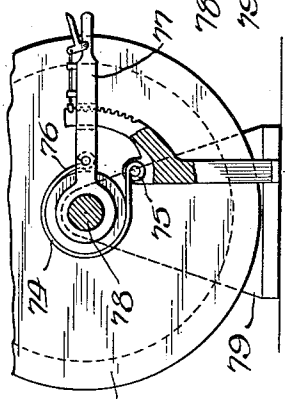

Fig. 7

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Patented Dec. 26, 1944 2,365,778

UNITED STATES PATENT OFFICE

2,365,778

MOBILE DEVICE FOR REPELLING THE ATTACK OF ENEMY AIRCRAFT

Martin C. Schwab, Chicago, Ill.

Application September 16, 1941, Serial No. 410,986

2 Claims. (Cl. 89—1)

This invention relates to national defense, and more particularly to a device for protecting municipalities and other vital areas against the attack of enemy bomber planes and low-flying strafing planes.

Captive balloons have been employed in London and other cities to keep attacking enemy bombers at high altitudes. My invention comprises a plurality of captive balloons having a common anchorage and a common line of connection with the anchorage. A feature of the invention is the fact that the balloons may be disposed at various altitudes, both high and low, from a common mooring cable, to protect against attack from bombers operating at high levels as well as strafing planes flying at low levels; for example, the balloons at high levels may be positioned from 30–40 thousand feet above the ground, while the lowermost balloons may be only a thousand feet above the ground, it being understood that balloons may be disposed at altitudes between the uppermost and lowermost levels. The balloons may be disposed at the high levels mentioned, due to the provision of a plurality of lifting units on a common anchorage and branching out from a main mooring cable.

A feature of the invention is the provision of streamers in the form of cables or heavy steel wire depending from the mooring lines of the balloon and adapted to snare the propellers of planes encountering such cables or shearing off the wings of planes striking the suspended cables at high speeds. A further feature of the invention is the fact that the mooring lines for the balloons are anchored upon a mobile unit, such as a railway flatcar or a motor truck. In most metropolitan centers, belt lines and railways intersect and surround the city, and it will be seen that the units comprising a plurality of captive balloons may be readily transferred from one part of a city to another, depending upon the location of vital plants, powerhouses, bridges and the like which are the object of attack.

A particular object of the invention is the provision of a plurality of lifting units in the form of captive balloons so that if one or more captive balloons are destroyed, the device, including the depending cables or wires, will be maintained aloft by the remaining units. A further feature of the invention is the provision of sails or kites secured to the mooring lines of the balloons and adapted to maintain the unit aloft even after a number of captive balloons comprising the unit have been destroyed; and in the event that substantially all of the captive balloons have been destroyed, the sails will tend to retard the descent of the units. The sails also serve to keep the unit spread out so that a greater area will be protected and the unit will not assume a compact form.

A further feature of the invention is the provision of observation towers for human observers and listening posts at the upper levels of the system provided with automatic sound detecting and amplifying means, to detect the approach of enemy aircraft.

The invention will be readily understood from the following description, in conjunction with the accompanying drawings, in which:

Fig. 1 is a panoramic view of the invention in operation;

Fig. 2, a view in elevation of a captive balloon comprising a part of the system, its mooring lines, observation posts and a parachute comprising a portion of the invention;

Fig. 3, a front elevation of a sail adapted to maintain the cables aloft and in spaced position from the other units of the system;

Fig. 4, a side elevation of the sail shown in Fig. 3;

Fig. 5, a plan view of a flatcar upon which are maintained a plurality of large heavy winches adapted to control the elevation of the members of the balloon system;

Fig. 6, a side elevation of the flatcar and winches shown in Fig. 5;

Fig. 7, a fragmentary enlarged elevational view of one of the winch constructions taken along a line parallel to the drive shaft for the winches and between the shaft and the winch drum; and

Fig. 8, a fragmentary enlarged view, partly in section, of the gears operating the winches, taken along the drive shaft of the winches.

Referring to the drawings, and particularly to Fig. 1 showing a panoramic view of the invention, the reference character 10 indicates a mooring line, preferably of heavy steel cable, leading from a heavy winch 11, rigidly mounted above a parachute 14. The line 10 leads through the parachute and through an observation post 15 mounted above the parachute 14. A block and tackle 16 extends from the eye bolt 13 mounted at the lower end of an upper observation post 18 through an eye member 17 on the upper end of the lower observation post 15, and has a mooring line 59 leading to the ground and secured to the winch 61. The two observation posts 15 and 18 are of substantially the same construction and comprise guy lines 19 extending from the periphery of a platform 20 to a ring member 21 mounted above the platform. The listening posts are pro-

vided with safety rails 22 disposed above the edges of the platform 20, thus affording the observers 23 and 24, who are equipped with ear phones 25, with a reasonably secure observation post.

Secured to the ring member 21 of the upper observation post 18 is an eye bolt 26 having secured thereto one end of a mooring cable 27 the other end of which is secured to an eye bolt 28 on which are also fastened a plurality of spaced retaining lines 29. The lines 29 are looped about a balloon 30 substantially enclosing it in a fixed position. The balloon 30 is comprised of a bag of rubber or a rubber compound filled with a lifting gas, such as helium or hydrogen, and may be provided with a tail member 31 adapted to hold the balloon into the wind. The main mooring cable 27 is provided with a plurality of upper and lower stop rings 32 and 33. Slidably mounted on the cable 27 between the stop rings 32 and 33 are two or more shackle members 34 and 35 having pivotally secured thereto branch cable members 36 and 37, respectively, formed of somewhat lighter weight cable or wire than the main cables 27 and 10.

As shown in Fig. 1, the branch cable 36 leads to a second captive balloon 83 which may be disposed 5,000 feet above the first mentioned balloon 30, which may, in turn, be retained approximately 5,000 feet above the ground, although it is to be understood that the distances between the balloons at different levels and above the ground may be varied considerably. The balloon 83 is moored by a plurality of retaining lines 38 disposed in the manner previously described in connection with balloon 30. Detachably secured to the cable 36 is another branch cable 39 leading to a third captive balloon 40 disposed at a higher level, such as 5,000 feet, above the balloon 83. Likewise, leading from the cable 39 may be another branch cable 41 having secured thereto a captive balloon 42 disposed at still a higher level. Additional branch cables and additional captive balloons disposed above the balloon 42 may be provided within the scope of the invention to afford protection in still higher levels.

The upper end of the branch cable 37, as best shown in Figs. 1, 3, and 4, is secured to the ends of four guy lines 43, 44, 45 and 46 extending inwardly from the ends of the frame 47 of a sail or kite member 48. Secured to the frame 47 and cut to flare outwardly and filled with the wind is a sailcloth 49 which may be formed of heavy canvas or, more preferably, is formed of a strong fireproof material which is preferably semi-translucent so as to be not readily observable. Thus, the sail may be made from such materials as a high strength rayon, oiled silk, or "Koroseal" coated fabrics. Branch cables 50 and 51 are removably secured to cables 36 and 39, respectively, and have secured at the ends thereof in a manner previously described additional kites 52 and 53, respectively, which may be similar in construction to the kite 48 and are spaced therefrom at different altitudes. The branch cables 37, 50, and 51 to which the members are secured may be of lighter weight than the other branch cables and therefore may be formed of a heavy manila or hemp rope; or sections of these lines may be formed alternately of steel cable or wire and rope and spliced together to prevent the spreading of fire if one of the kite members should catch on fire.

Depending from some or all of the branch cables are a pluraltiy of steel wires 54 which may be several hundred or a thousand feet long. The depending wire members 54 may be detachably secured to the branch cables by cable clamps 55 or in any other suitable manner. Since the depending wires stream downwardly from the various forked branch cables, and hence cover considerable area above the anchorage, they afford a very effective device for destroying enemy aircraft, since they are not readily visible to a plane flying at high speed, particularly at night, and the destruction of enemy aircraft 56 is readily accomplished upon contact with one of these snare wires, either by entanglement of the propellers or shearing of the wings. Additional snare wires 71 may be suspended from the lower ends of kites 48, 52 and 53 and also serve as tails for the kites.

The sail members 48, 52, 53 tend to spread out the branch cable members of the device, particularly since the direction of the wind may vary somewhat at the different altitudes at which the sails are disposed. It will also be seen that by providing a series of captive balloons having a relatively high lifting force at various altitudes, if one or two of the balloons are destroyed the remaining balloons will serve to support the device. If a number of balloons are destroyed, the sail members 48, 52 and 53 will act as parachutes and check the rapid descent of the cable members to the ground.

The parachute 14 serves as a medium for permitting the descent of the observers 23 and 24, since the parachute may be released from its closed position and descend to the ground by releasing the block and tackle members 16, paying out the running part 59 of the tackle from the winch 61, since the weight members in the form of sandbags secured to the ends of the guy lines 58 of the parachute tend to lower it rapidly along the path of the cable 10. In normal operation the parachute is not in the open position shown in the drawings but is furled and held adjacent the cable 10 by stops which may readily be removed when the observer desires to descend.

As shown in Fig. 1, a plurality of these devices, including a series of captive balloons disposed at varying altitudes, together with the snare wires and sail members providing auxiliary support for the device, may be stationed at various points in a metropolitan district so that enemy aircraft attacking the region may be forced to operate from extremely high levels where the accuracy of the attack is exceedingly impaired.

One or more of the captive balloons 30, 40 and 83 may be provided with automatic sound detecting equipment 72, particularly adapted to detect the approach of enemy aircraft before they are visible, and amplifiers to transmit the sound to the observers 23 and 24 who in turn may transmit the information to the operator 60 on the ground.

Since captive balloons are frequently struck by lightning and thus destroyed, I prefer to provide the balloons of my device with a lightning arrester, which may comprise a pointed steel rod 80 extending above the top of the balloon and which is connected at its lower end 81 to the cable on which the balloon is mounted. A ground may be provided adjacent the flatcar on which the device is anchored, in the form of a perforated copper plate disposed several feet below the ground and buried in coke layers; and this plate is detachably connected by a rubber line 82 to the main mooring cable so that it may be

rapidly released when the cable is reeled in. Likewise, the portion of the cable passing through the observation posts is preferably provided with an insulating coating to protect the observers.

In addition to the heavy duty winch 11 mounted on the flatcar 12, a plurality of other winches of similar construction is preferably mounted on the flatcar to aid in the raising and lowering of the device. As shown in the drawings, there are five winches 11, 61, 62, 63 and 64, although fewer or a greater number of winches may be employed, depending upon the number of branch cable members employed on the device.

In lowering the device, the cable 10 is wound around the drum of winch 11. When the lower end of the branch cable 36 is near the ground, the trailing end of the lower snaring cable 54*a* secured to the branch cable 36 is fastened to the drum of winch 62 and reeled in as the end of branch cable 36 is unsnapped from its shackle 34, and wound around the drum with the snaring cable 54*a* until the branch cable 39 is on the ground when the trailing end of its lowermost snaring cable 54*b* is secured to the drum of winch 63 and reeled in with the branch cable 39 and its depending cables 54 which are preferably unclamped and removed. In like manner, the other main cable members, such as 41, may be secured to the winch 64 and to the captive balloons at the uppermost end thereof, drawn to the ground and deflated.

As previously mentioned, the lower end of the running part 59 of tackle 16 is secured to the drum of winch 61 and is adapted to draw down parachute 14 and the observation post 15 mounted above it. In raising the device to its operative position, the members are released in reverse order. For instance, the branch mooring cable 41 is first unwound from its winch 64 and drawn upwardly by reason of the high lifting power of the balloon 42. The upper end of the branch cable 39 is then secured to the shackle at the lower end of the cable 41 and likewise unwound so that the balloons may draw it upwardly. In like manner, the branch cables 36 and the main mooring cable 10 are likewise secured to the lower ends of the adjoining cable members and drawn upwardly as the winch drum is unreeled. The sail members 48, 52 and 53 are partially rolled up when on the ground, and just before being raised are partially unfurled, and as the wind catches the partially furled sails, which are not provided with stop members, the sails open up and become completely filled, as shown in Fig. 4.

The winches 11, 61, 63 and 64 are preferably driven by a common drive shaft 65 operated by a suitable source of power, such as a Diesel engine 66, mounted upon the flatcar 12. The winches are preferably provided with suitable brake and clutch members to engage or disengage the winches. For instance, each winch may be provided with bevel gears 67 and 68; the gear 68 being slidably mounted upon a splined portion 69 of the drive shaft 65. The gears may be brought into and out of engagement by the pivotally mounted hand lever 70. In Fig. 5 the gears 67, 68 of winch 11 are shown in operative engagement while the gears of the other winches 61, 62, 63 and 64 are shown disengaged. The braking mechanism mounted at one end of the drum 73 of each may comprise a Prony brake including a brake band 74, one end 75 of which is fixedly mounted while the other end 76 is secured at an intermediate position on the arm 77 carried on the drum shaft 78. As shown in Fig. 7, when the arm 77 is turned downwardly the band 74 firmly binds the shaft 78. The braking mechanism is mounted on a standard 79.

What I claim is:

1. In a mobile device for repelling the attack of aircraft, including a ground vehicle, a plurality of winches carried thereby, a mooring cable reelably secured to one of said winches, an eye bolt on said cable remote from said ground vehicle, and captive balloons supporting said eye bolt and said cable in the air, escape apparatus consisting of a block and tackle attached to said eye bolt, a captive parachute attached to one end of said tackle, the other end of said tackle being attached to another of said winches, whereby said parachute can be returned to said ground vehicle along the path of said cable by unreeling said tackle, and an observation platform on top of said parachute to enable an operator to make observations while said parachute is descending.

2. In a mobile device for repelling the attack of aircraft, including a ground vehicle, a plurality of winches carried thereby, a mooring cable reelably secured to one of said winches, and captive balloons supporting said cable in the air, an escape device comprising a captive parachute slidable upon said cable, an observation platform on top of said parachute, means anchoring said parachute and observation platform on said cable, and means for releasing said parachute and its associated observation platform, thereby causing said parachute and platform to slide down said cable.

MARTIN C. SCHWAB.