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[54] **ANTI-BALLISTIC MISSILE SYSTEM**
3 Claims, 3 Drawing Figs.

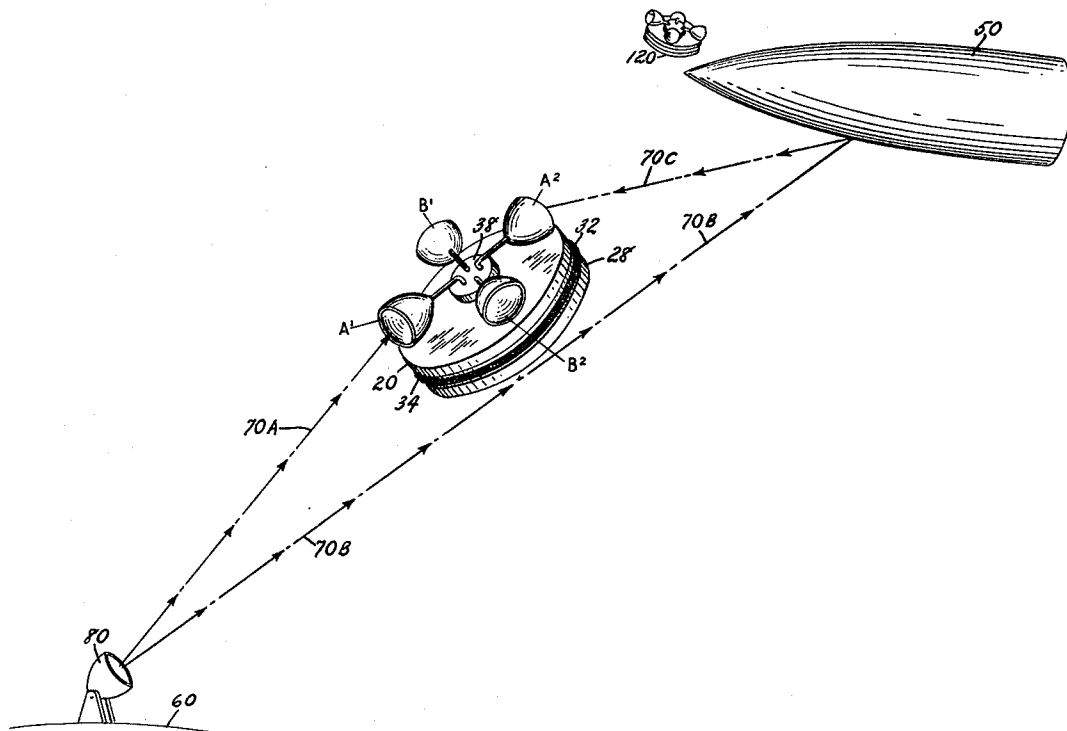
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343/7, 102/70.2
- [51] Int. Cl. **B64g 1/10**
- [50] Field of Search 244/155;
343/5, 7, 100.5A; 102/70.2P; 244/3.14; 102/8, 9

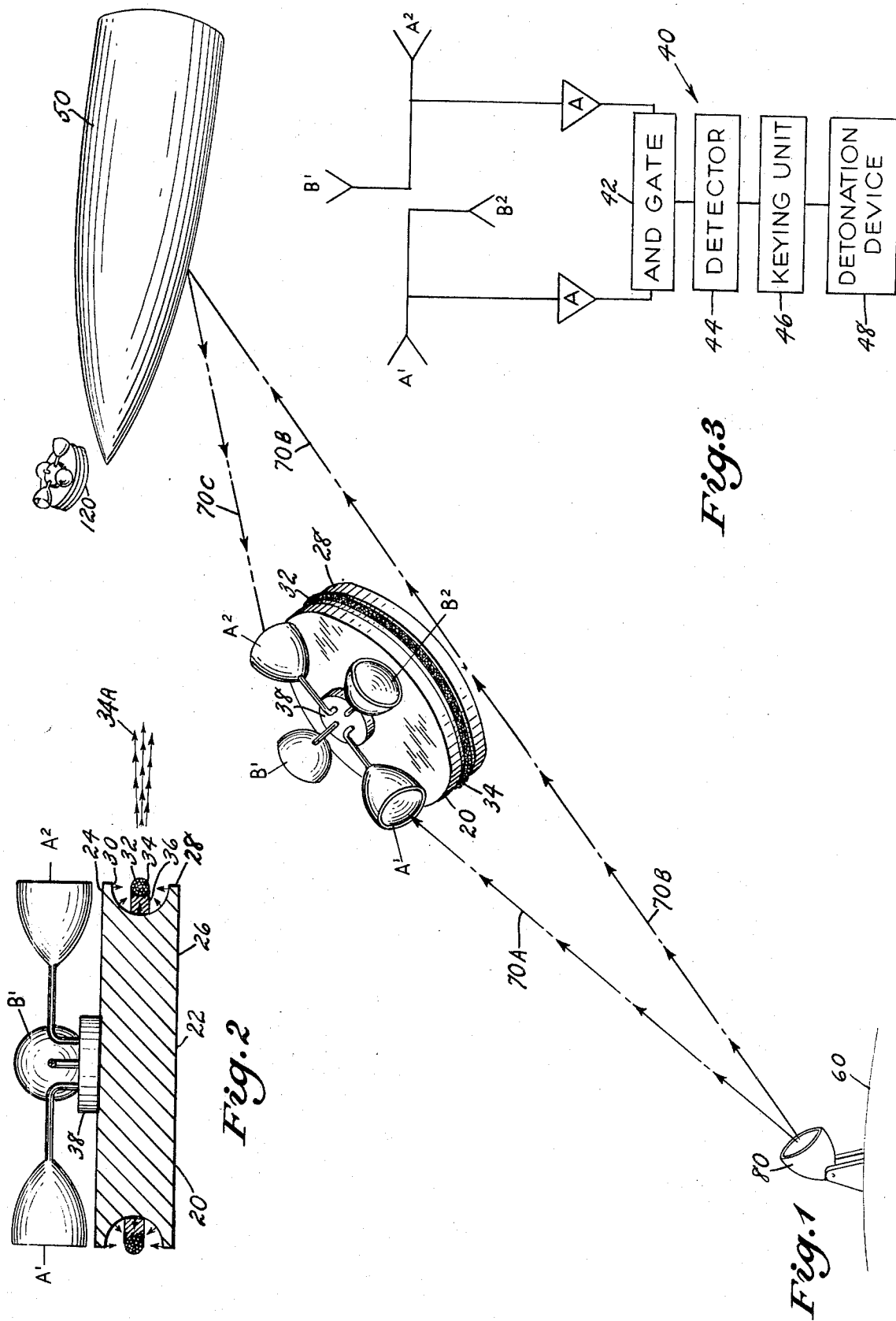
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ABSTRACT: Anti-ballistic missiles are deployed in space above the atmosphere over the target area, said missiles omniversally rotate about two separate rotational axes. A radar beam from a direction substantially opposite the direction of an oncoming enemy missile is received by one of a pair of antennas on the anti-ballistic missile which has a shaped charge directed toward a ring of pellets. When the radar beam is reflected from an enemy missile back to another one of the pair of antennas, the shaped charge is detonated and one or more pellets strike the enemy missile, destroy its warhead, detonating mechanism, and/or guidance system far from its target or otherwise so damage the missile that it will fall as a dud.





ANTI-BALLISTIC MISSILE SYSTEM

This invention relates generally to ballistic missiles and more specifically, it relates to an anti-ballistic system including missiles which will destroy or render inoperable other missiles. The race for supremacy in the missile field has given rise to the development of the intercontinental ballistic missile, or ICBM, as it is called. The ICBM has a thermonuclear warhead which has the destructive equivalent of millions of tons of TNT. In the event of a conflict between two warring countries, it would only be necessary for just a few of these missiles to detonate near their primary targets. The purpose of my anti-ballistic missile is to destroy either the warhead, the guidance system, or the detonating mechanism of the enemy ICBM. The launching site of an enemy ICBM is hundreds and perhaps thousands of miles from the target area. The enemy missile must travel at very high velocities otherwise it can easily be overtaken and destroyed by conventional aircraft. Accordingly, these missiles are lofted to altitudes which are substantially outside of the earth's atmospheric boundaries. Outside of the dense atmosphere, the ICBM's travel at speeds of five or six thousand miles per hour.

It has long been known that thermonuclear explosions release large quantities of hard radiation. In outer space these radiations can travel for very long distances and they can penetrate considerable thickness of steel or other metals of which missiles are constructed. It was originally hoped that these hard radiations would function as an anti-missile device, since they generate considerable heat. Also, these X-rays cause the electronic guidance and detonating devices to become confused and/or inoperative. Unfortunately, the radiations are of very short duration. In addition to this is the fact that the radiation decreases in intensity in inverse proportion to the square of the distance from the exploding thermonuclear device. It necessarily follows, therefore, that the effective radius of such an anti-missile device is severely limited in both time and distance. If a means could be made for prolonging the X-radiation and creating a radiation girdle so that it would serve as a wall or barrier, then the thermonuclear anti-missile would be more effective. Unfortunately such a method would only be effective until such time as a more effective shielding method was devised for ballistic missiles.

I have therefore given considerable thought to this problem and I have come to the conclusion that until the state of the art advances to the desired point, another type of anti-ballistic missile is required, one which is within the realm of our present capabilities. My system is based in part upon the same principle which once served as a barrage umbrella, used to ward off attacking airplanes. Initially I provide a number of explosive charges which are substantially disc shaped. The rim of the disc is shaped so as to concentrate the greater proportion of the explosive force in a radially outward direction. In the focal area of this shaped charge I place a very large quantity of small steel pellets. When the shaped charge is detonated, the pellets are projected radially outward. In the absence of any atmosphere, these pellets will not burn up and they will achieve velocities of many thousands of miles per hour. The entire explosive device is an anti-ballistic missile device and may be called a space mine. A series of these relatively inexpensive space mines are lofted into orbits so that there will always be a girdle of space mines crossing the probable trajectory of the invading ICBM's. Sufficient spin about two rotational axes is imparted to each space mine so that it will always be omniversally rotating while located in a plane which is tangent to the earth's surface.

Unlike its seaborne counterpart, these space mines cannot be detonated by the proximity of an ICBM. They will only be detonated if they are in the direct beam of a particular radar signal and if that radar signal is also reflected back from the ICBM to the space mine. The combination of these two impinging signals trigger the space mine.

If foreign objects of suspicious origin are detected, by radar, then the radar beam would be directed toward the suspicious missile. Any space mine which was close enough to the suspi-

cious missile so that it shared that same radar beam, would automatically explode.

In order to be detonated, the space mine must receive not only the direct signal from earth, but must also receive a reflected signal from the enemy missile.

In addition to the direct radar signal and the reflected radar signal, there must also be a detonating signal which is radiated from a separate antenna. The antenna which radiates the detonating signal is linked to the radar antenna. The reason for this is that the radar signal is a pulse of very short duration, and it is highly improbable that the reflected pulse and the primary pulse would strike the proper antennas at the same instant. Therefore, the detonating beam is a continuous signal of a different frequency which is only aimed by the radar beam. The radar frequency will not detonate the space mine. Also, it must be understood that the antenna system on the space mines is not limited to the size shown on the accompanying drawings. The antennas will most probably be of the unfolding type and they will open to full size when the mines have finally reached their orbiting altitude.

Another means of assuring reasonable accuracy of the pellets is the orientation of the antennas. The detonating signal can only trigger the mine when it is aligned with the proposed target, and this is determined by the alignment of the antennas. Finally, it is necessary that the signal receivers be made of materials which are not rendered inoperative in the presence of hard radiation, otherwise the enemy could detonate several thermonuclear devices and thus render the space mines useless, at least for a period of time.

If all conditions are not suitable when the enemy missile is close to a particular space mine, that particular mine will not detonate. In that case the next successive nearest mine will take over the destruction of the enemy missile. If the enemy tries to saturate any vital area with its missiles it would only be necessary to detonate a single mine at a time.

The mines will be relatively inexpensive and several mines may be lofted into orbit with a single rocket. The advantage of sowing such mines is the fact that they can be swept out of space at a later date if hostilities end. Also, there would be no danger to friendly personnel who are sweeping these mines, whereas if the enemy attempted such operations the mines could be deliberately detonated.

The state of our present knowledge permits the use of computers to determine the number of space mines which would be necessary to provide a statistically good anti-ICBM girdle or girdles.

In those instances where a missile bearing a fusion warhead is launched from an aircraft or submarine from a relatively near location, where the transit time is very short, (because of high velocity) such missiles may be kept in a low trajectory. Such low trajectory missiles could conceivably reach their target not ever being exposed to the destructive force of my space mines. In such instances, a multitude of space mines can be trajectoried into a barrage screen toward an approaching missile or missiles, and these mines would serve as interceptors at very close range.

It must be understood that the present mines are relatively small and light, therefore, they could be floated on high flying captive balloons.

Similarly the space mine may be in the form of a hydrogen bomb which may utilize the above described means of detonation.

In the drawings in which similar reference characters designate corresponding parts in the several views:

FIG. 1 is a schematic view showing an embodiment of the invention;

FIG. 2 is a sectional view partly in elevation showing a space mine; and

FIG. 3 is a schematic diagram.

As seen in FIG. 1, a space mine 20 is seen, and another one 120 is indicated some distance away. The mines are in space above the earth's atmosphere and are omniversally rotating about two separate rotational axes providing a combined

spinning and tumbling motion which constantly shifts the position of the pairs of antennas A^1-A^2 and B^1-B^2 to produce a scanning effect. The lofting of the mines 20 into space and the spinning and tumbling are accomplished by rocket launching or the like in a manner well known in this art.

Since the mines 20 are substantially identical, a detailed description of one will suffice for all. Mine 20 has a body 22 composed of explosive having upper and lower surfaces 24 and 26 and a circular side wall 28 which has an annular groove 30 so that the body 22 is in the form of a shaped charge at the focus of which is disposed a ring 32 of pellets 34 preferable composed of hardened steel or the like. The ring 32 may be composed of any suitable material to retain the pellets in position until the mine is fired, and the ring 32 is maintained in predetermined position by the support 36.

Secured to the surface 24 is ray resisting or absorbing casing 38 within which is carried an integrated circuit generally indicated by reference character 40 shown schematically in FIG. 3. The antennas A^1-A^2 and B^1-B^2 are mechanically connected to said casing and electrically connected to the circuit 40.

In the circuit 40 the AND gate 42 will pass an impulse to the detector 44 only when it gets a signal from both antennas A^1 and A^2 or B^1 and B^2 . From here the impulse travels through the detector 44, through the keying unit 46 to the detonation device 48, which activates explosive body 22.

Upon activation the explosive body 22 as a shaped charge impels the pellets 34 radially at very high speeds generally along the paths indicated 34A in FIG. 2 for example at 5000 miles per hour, and one or more of these pellets strike the enemy missile 50 either damaging its guidance mechanism, its detonation mechanism, or cause the missile 50 to explode at a harmless distance from the target area 60.

Detonation of the mine 20 only occurs when a radar beam

70A, projected from radar transmitter 80, is received by one of the antennas in either pair and radar beam 70B strikes the missile 50 and is reflected as beam 70C and is received by the other of the antennas, in the pair.

Where additional ignition precaution is desired a separate signal is imposed upon the radar beam which activates the keying unit 46.

I wish it to be understood that I do not desire to be limited to the exact details shown and described, for obvious modifications will occur to a person skilled in the art to which the present invention relates.

I claim:

1. A space mine anti-ballistic system for use against an enemy missile comprising: a plurality of space mines each having an explosive charge, detonating means for said charge, and a pair of coaxial antennas, one of which pair receives a radar signal reflected from said enemy missile, and the other of which receives a radar signal from a direction opposite that of said antenna and said detonating means, which allows said signal to actuate said detonating means when said antennas receive the same radar signal, one directly and the other as reflected from the enemy missile, and at least one radar tracking station capable of projecting a radar signal to track said enemy missile; said space mines being in orbit about the surface of the earth, and continuously executing rotation about a pair of angularly disposed axes in a plane which is tangent to the earth's surface so as to provide a combination spin and tumbling motion.

2. A system as set forth in claim 1 in which the explosive charge is shaped.

3. A system as set forth in claim 2 in which the mine has pellets in the focus of said shaped charge.

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