United States Patent [19]

Worley

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[45] **Mar. 26, 1974**

[54] **EDUCATIONAL TOY PARACHUTE**

[76] Inventor: **Ray Worley,** 10320 Wunderlich Ave., Cupertino, Calif. 95014

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[21] Appl. No.: **378,565**

[52] **U.S. Cl.** ..... **46/86 R**
[51] **Int. Cl.** **A63h 33/20**
[58] **Field of Search** ..... 46/86 R, 243 AV, 86 A, 46/86 B, 86 C

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Primary Examiner—Louis G. Mancene
Assistant Examiner—J. Q. Lever

[57] **ABSTRACT**

An educational toy missile capsule which preferably takes the form of a missile of the Apollo series and has an upper internal compartment which houses a parachute sail on a platform. The platform is slidably mounted in a pair of grooves inside the capsule and is generally locked in its lower position. A helical spring is attached to the platform so that it provides torsion that urges the platform into locking notches when the platform is in its lower position and biases the platform toward its upper, parachute releasing position so that it slides upward in its guiding grooves to force the parachute sail out the top of the missile capsule when it is released from the locking notches while itself being retained in the capsule by a retaining shoulder in the missile body. A timing motor is fixed in the lower internal compartment of the missile body, and the lower portion of the missile is fixed to the rotatable time setting shaft of the timing motor so that it is rotatable relative to the rest of the capsule and determines the time of release of the parachute sail after the timing motor is set in motion. The parachute ejecting platform is provided with a pair of tangs or ears which protrude into the lower compartment, and the lower rotatable part of the missile body is provided with a pair of protruding lugs that extend up into the lower compartment to engage the platform tangs and rotate the platform out of the locked position when the timing motor has run down so that the spring bias forces the platform to its "up" position, thereby forcing the parachute out of the missile body.

8 Claims, 9 Drawing Figures

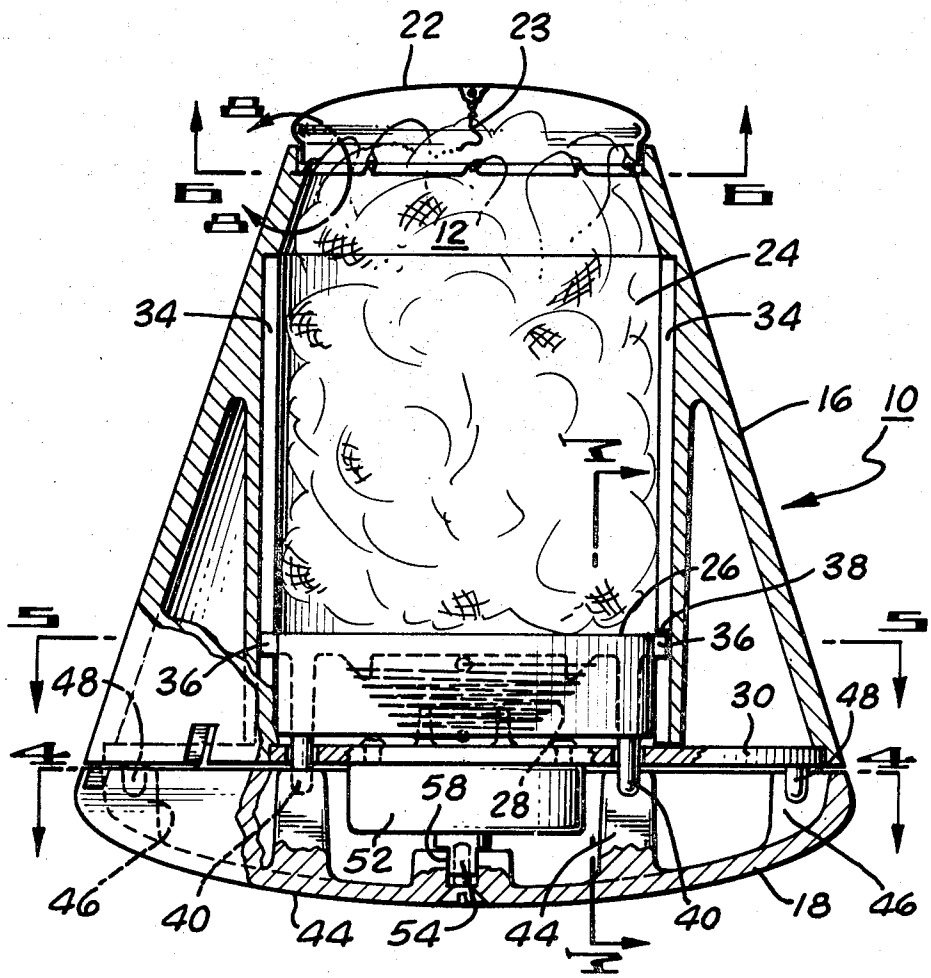


FIG_1

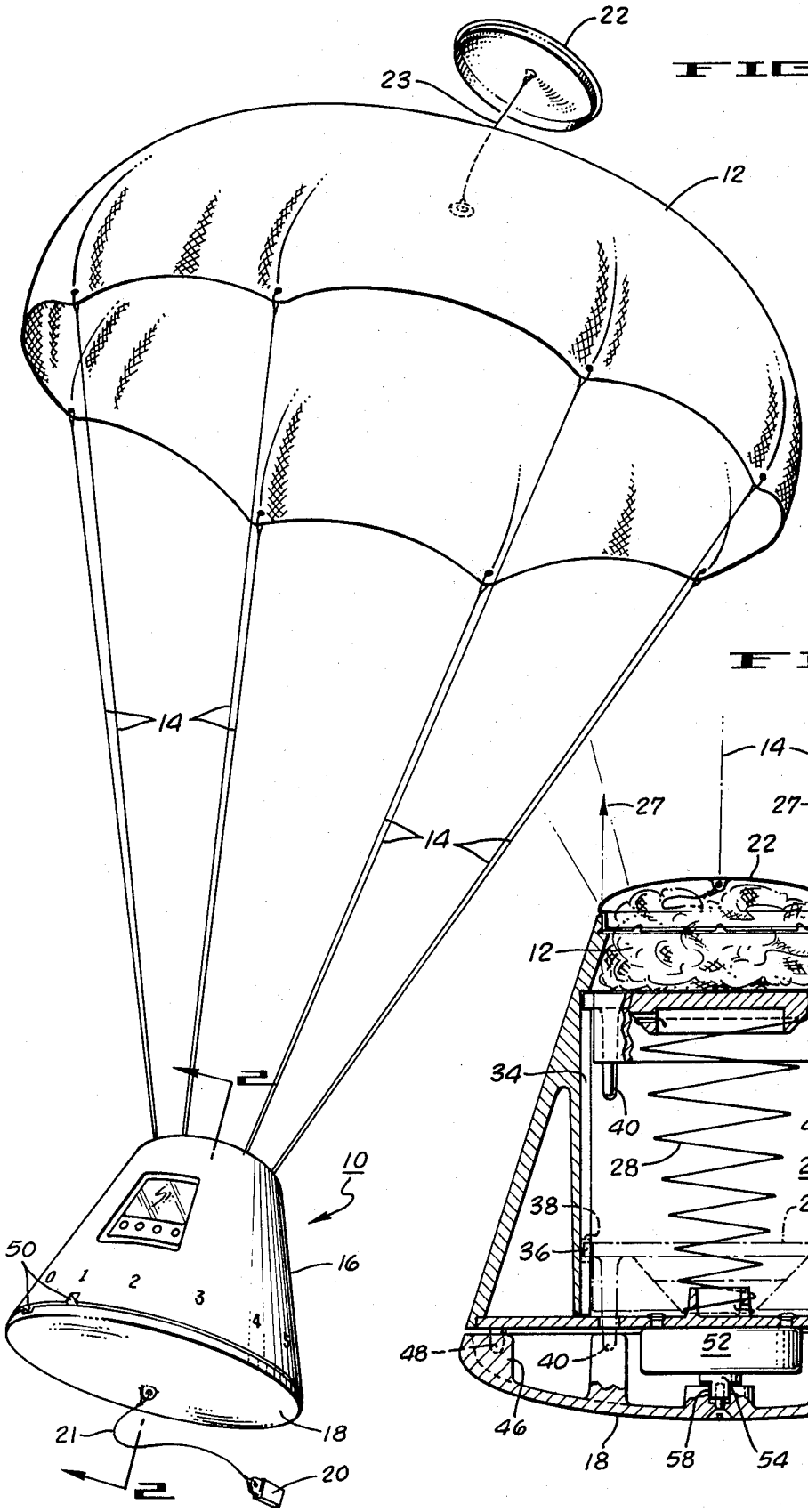

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FIG_2

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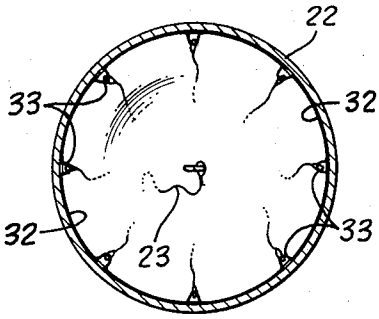


FIG_6

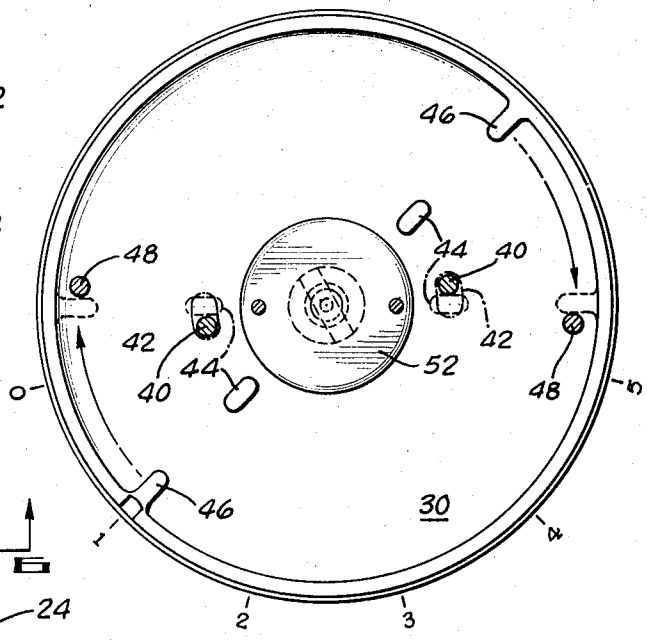


FIG_4

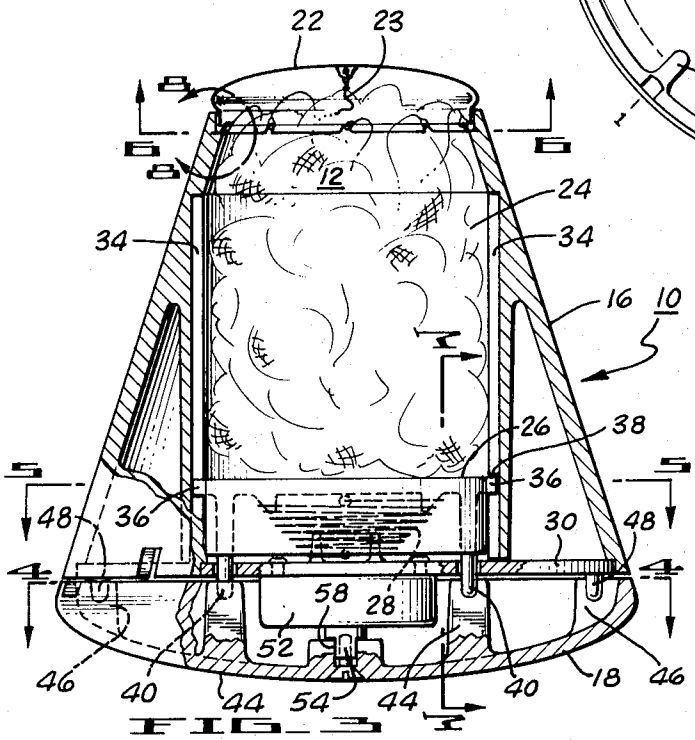


FIG_3

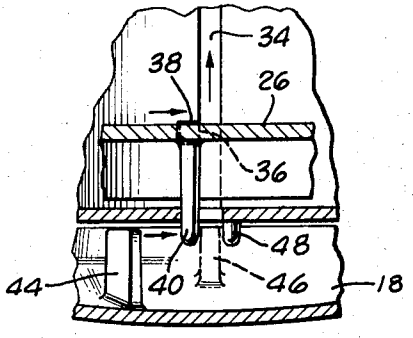


FIG_7

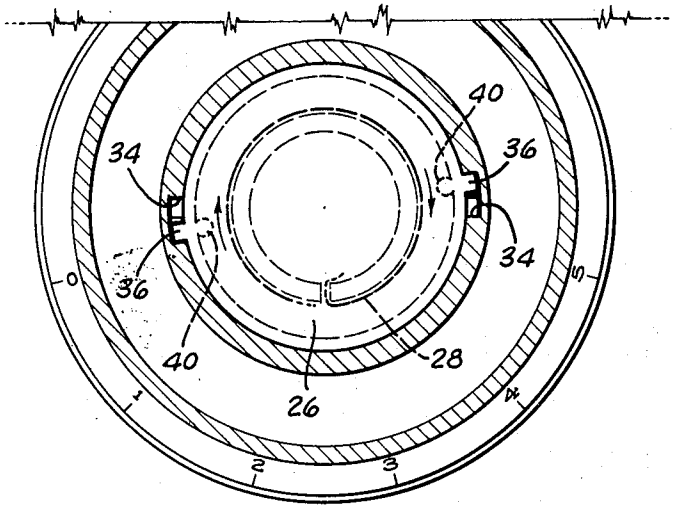


FIG_5

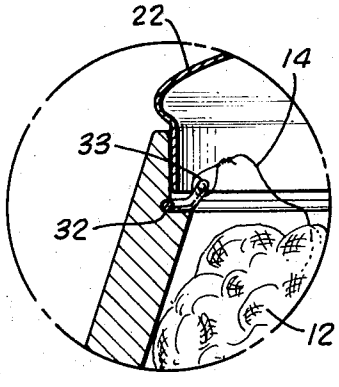


FIG_8

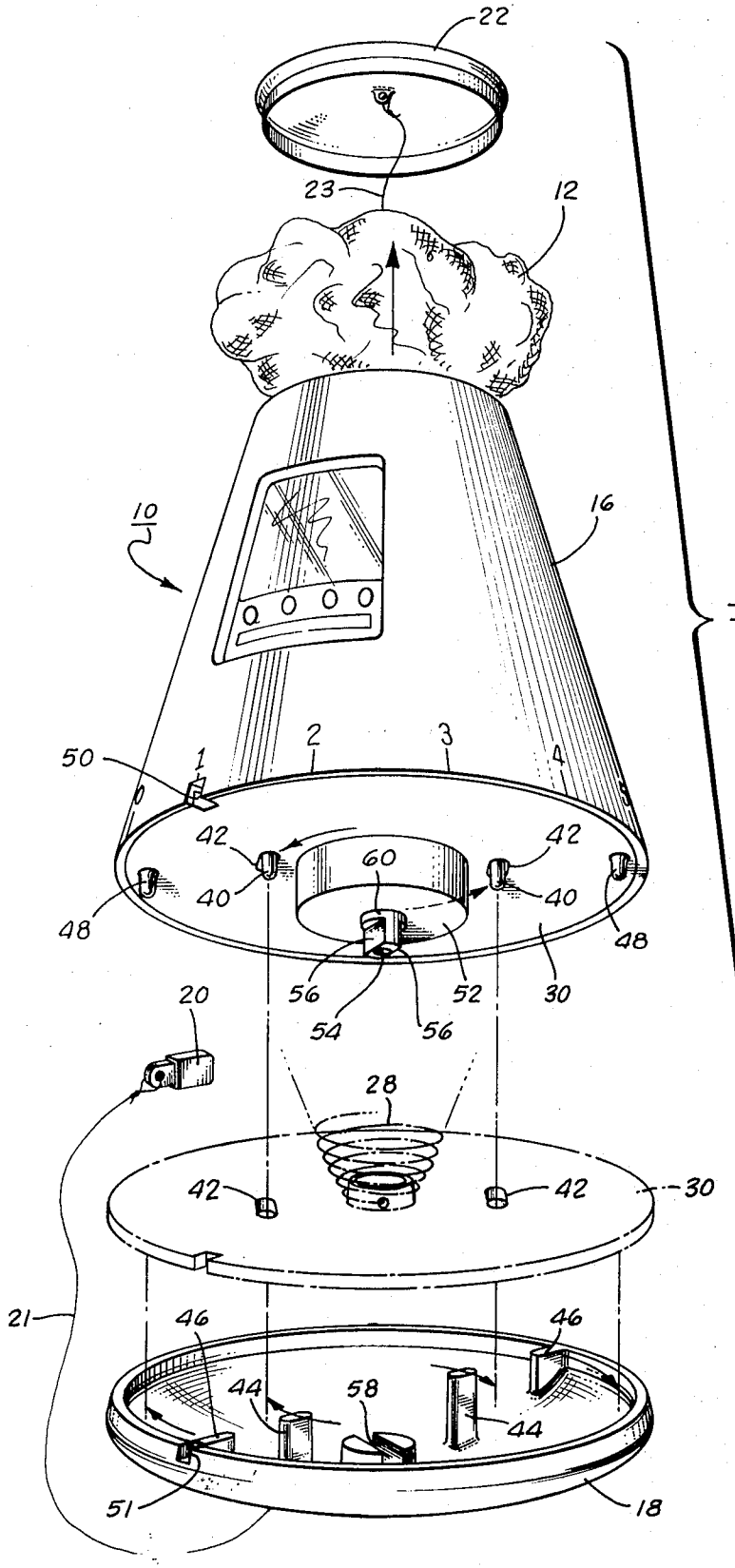

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FIG_9

EDUCATIONAL TOY PARACHUTE

SUMMARY AND OBJECTS OF THE INVENTION

The missile emulates the take-off and landing operational modes of the Apollo series and teaches by demonstration the relationships between time of flight and distance in both free flight and return under parachute because the time for parachute ejecting can be set over a wide range. That is, the chute can be set to eject at the top of the height that can be achieved by the missile launcher or at any point along its flight either on its way up or during its return to earth. Thus, object lessons are taught in the possible time-distance relationships as well as relationships of acceleration and deceleration for the missile ascending and descending both with and without parachute.

In carrying out such objects a parachute sail is contained in and secured to the body of a missile capsule and forcibly efected at a preselected time after launching, or release, by securing the sail in the missile body under a spring load and providing a time mechanism which can be programmed to release the spring-loaded parachute ejector at a variable but preset time. The novel features which are believed to be characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, together with further objects and advantages thereof may best be understood by reference to the following description taken in connection with its accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of one embodiment of the toy capsule returning to earth under full sail;

FIG. 2 is a central vertical section through the capsule along section lines 2—2 of FIG. 1 showing the condition of parts in solid lines positioned to eject the parachute and parts in phantom in the locked position prior to chute ejection;

FIG. 3 is a central vertical section like FIG. 2 except showing the parachute fully contained within the capsule and all parts held to prevent chute ejections;

FIG. 4 is a plan view of a section through the capsule taken along section lines 4—4 of FIG. 3 and illustration parts in position to maintain the parachute locked in the container and with arrows to illustrate how it is released and ejected;

FIG. 5 is a partially broken away plan view of a section through the capsule taken along section lines 5—5 of FIG. 3 again illustrating the parts viewed in position to keep the parachute locked in the housing and again arrows indicate the direction of rotation required to release and efect the parachute;

FIG. 6 is a view looking up into the capsule retainer cap along section lines 6—6 of FIG. 3 showing guy string connections between the capsule and the parachute sail and also between the parachute sail and retainer cap;

FIG. 7 is a broken away sectional view along section line 7—7 of FIG. 3 illustrating the locking and ejecting mechanism of the capsule;

FIG. 8 is a detailed broken away section view of the area enclosed in section 8—8 of FIG. 3 showing a single guy line connection between the parachute sail and capsule body as well as how the retainer cap fits in the capsule body; and

FIG. 9 is an exploded view of parts of the entire capsule to aid in understanding the relationship of all the parts.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

The missile **10** descending under parachute sail **12** is illustrated in FIG. **1.** As may be seen from the figure the missile body is in this embodiment given the configuration of the Apollo series. The sail **12** is connected to the missile body **10** by a series of guy lines **14** which are connected at one end to points equidistant around the periphery of the sail and at the other end to points equidistant around the upper portion **16** of the missile body so that the missile is carried in perfect balance on descent. It may also be seen from this figure that the lower portion of the missile body **18** has a key **20** connected by a line **21** and the sail **12** has a cap **22** (cap for the upper body portion) connected by a line **23** to the center of the sail **12.** The function of the cap **22** and key **20** will be explained subsequently.

The central vertical section through the missile body **10** of FIG. **2** shows the parts of the device just prior to ejection of the parachute sail **12.** Referral to the exploded view of FIG. **9** will help with a understanding of the assembly and location of parts. Reference to the section shows that the upper body portion **16** is a generally hollow frusto-conical member preferrably made of light weight molded plastic with a generally cylindrical or cup shaped cavity **24** which houses the sail **12** when the missile is fully assembled. Note that the sail is held in the cavity and the cavity closed by the housing cap **22.** Also contained in the cavity **24** is a platform **26** which is shown in its upper position in FIG. **2.**

Actually with the platform **26** in its upper position, the sail **12** is pressed against the body closure cap **22** so that both are pressed out of the upper body portion **16** and the sail **12** will be extended on its guy wires **14** as illustrated in FIG. **1.** This is indicated in FIG. **2** by the dotted arrows **27** which point upward.

The biasing force which presses the platform **26** upward in upper body cavity **24** is provided by a tapered helical spring **28** that is fixed at its upper end to the bottom of the platform **26** and at its lower end to the top side of a plate **30** which forms the bottom closure for the upper body portion **16.** As indicated by the phantom lines in FIG. **2,** when the platform **26** is in is lower position the helical spring **28** is compressed between the platform **26** and the bottom closure plate **30** thereby providing an upward bias (force) on the platform **26.** The compressed helical spring **28** may also be clearly seen in the sectional view of FIG. **3.**

The guy lines **14** are attached to the upper lip of the upper body portion **16** by means of a spring clip **32** (best seen in FIGS. **8, 7, 6,** and **2**) which fits in a groove just under the portion of the lip where the closure cap **22** is press fit. It will be noted that the spring clip **32** is provided with equally spaced bites **33** which protrude outward to form loops where the guy lines **14** are tied.

In order to reassemble the missile, the parachute sail **12** is pressed into the cavity **24** (see FIG. **3** particularly) until the platform **26** is depressed and the helical spring **28** compressed. The cap **22** is then press fit into place to close the missile body **10.** As has already been noted, the platform **26** is spring biased upward therefore special provision must be made to retain the platform **26**

in its lower position. This is accomplished through cooperation between vertical guiding grooves **34** which extend down diametrically opposite sides of the cavity **24** in the upper body portion **16,** outwardly extending ear-like tangs **36** on opposite sides of the platform **26,** retaining recesses **38** which are located at the bottom of the grooves **34** and the biasing helical spring **28.** The tapered helical spring is set so that it not only biases the platform **26** toward its upward position but it also torques the platform **26** for counter clockwise rotation when looking down at the top of the platform as illustrated in the view of FIG. **5.**

Assuming that there is no interference to the counter rotation of platform **26** when it is pressed down, the tangs **36** slide down the guiding grooves **34** until the platform **26** reaches the bottom of the grooves at which time the rotational bias of the helical spring **28** rotates the platform so that the tangs **36** slide into the retaining recesses **38** and the platform cannot rise again (even though it is biased upwards) until a clockwise rotating force is applied to move the tangs **36** back into the grooves **34.**

In order to understand how the platform **26** is freed to cause ejection of the chute sail **12,** the configuration of the lower part of the ejecting platform **26** and the lower body portion **18** along with the cooperation therebetween must be considered. First, note that the bottom portion of the platform **26** has a pair of diametrically opposed downwardly extending lugs **40** which protrude through elongated apertures in the bottom plate **30** into the internal part of lower body portion **18.** FIG. **4** shows (solid line) the platform **26** in locked down position and the parts of the lower body portion **18** in position where "lockdown" can occur.

The lower body portion **18** is provided with internal diametrically opposed upwardly extending tabs **44** which are spaced to match the downwardly extending lugs **40** on the platform **26.** Thus, when tabs **44** are rotated counter clockwise (looking down as in FIG. **4**) they engage lugs **40** and rotate the platform **26** until the tangs **36** thereon are moved out of the recesses **38** into the vertical grooves **34** in the cavity **24** of upper body portion **18** and the helical spring **28** presses the platform **26** upward (see arrows of FIG. **7**) which, in turn, ejects chute sail **12** and top cap **22.**

Diametrically opposed shoulder stops **46** are provided inside the lower body portion **18** near the outer periphery to match downwardly extending nipples **48** on the bottom of bottom closure plate **30** so that the lower body portion **18** will stop rotating when the chute sail **12** has been ejected. Note also that when the lower body portion **18** and upper body portion **16** are in the ejection position, the platform **26** cannot be lowered because the tabs **44** on the lower body portion **18** remain in the "eject" position. Therefore, in order to lower the platform **26** and insert the sail **12** the lower body portion **18** is rotated to the position illustrated by the solid lines in FIG. **4** (the number **1** position) and the key **20** is inserted in the matching slot **50** and **51** in the upper body and lower body portions respectively. The platform **26** may then be lowered and will be locked in position by reason of the torsional or rotational bias of the tapered helical spring **28.**

The timing action and rotational force for the lower body portion **18** is provided by means of a conventional timing motor **52** which is fixed to the center of the bottom closure plate **30** for upper body portion **16** and enclosed by the lower body portion **18.** The shaft **54** of the timing motor **52** is aligned with the vertical axis of the missile housing **10** and has a pair of lands **56** on its lower end which fit in a slot **58** on the lower body portion **18.** The lower body portion **18** is securely fixed to the motor shaft **54** by a screw **60** which extends through the lower body portion **18** into the end of the shaft **54.** Thus, the lower body portion **18** rotates the timer motor shaft **54** when it is rotated and visa versa.

Assume now the chute **12** in the missle **10,** platform **26** depressed and the key **20** locking the lower body portion **18** to upper body portion **16,** in order to set the time for ejection of the chute, the key is removed from its slot **50,** the lower body portion **18** is rotated by the desired amount to set the desired time and the missile is tossed in the air or otherwise launched. After the set time has elapsed, that is, the timer has rotated the lower body portion **18** relative to the upper body portion **16** by the set amount the chute sail **12** is ejected and the missile floats to the ground.

While particular embodiments of the invention have been shown and described, it will of course be understood that the invention is not limited thereto since many modifications in these arrangements, and in the instrumentalities employed may be made. It is contemplated that the appended claims will cover any such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. An educational toy missile capsule having a housing, a parachute sail portion enclosed within said housing, a plurality of flexible guy lines each having one end attached to said sail portion at points spaced around its periphery and the opposite ends thereof each attached to a portion of said body at intervals whereby said sail portion supports said housing in a balanced manner when said sail is filled with air, retaining means positively to retain said sail portion in said housing, ejector means forcibly to eject said sail portion whereby air is captured in said sail portion thereby to spread said sail portion, timing means for activating said ejector means, and means for preselecting a time over a range of times at which said timing means activates said ejector means thereby providing for selection of the time lapse after launching at which the said sail portion is ejected thereby selecting the time during missile flight when said sail portion becomes effective.

2. An educational toy missile capsule as defined in claim **1** wherein said housing comprises a hollow upper portion defining a cup-like cavity to receive said parachute sail and guy lines and a cap portion attached to the said sail portion releasably held over the said cavity to enclose said parachute sail; and a lower housing portion mounted for rotation substantially in a plane orthogonal to the vertical axis of said housing whereby rotation in one sense sets the said timing means, the degree of rotation determines the time lapse to activation of the said ejector and rotation to the end of travel in the opposite sense activates the said ejector means whereby the said sail portion and said attached cap are forcibly ejected at the time set.

3. An educational toy missile capsule as defined in claim **2** wherein said ejection means included a platform member mounted in the said cavity defined in the upper portion of said housing for slidable motion along the vertical axis thereof and a spring member biasing

said platform toward the top of said housing, said retaining means holding said platform down and said spring member in its biased condition when said timing means is set whereby said sail portion is retained in said body and said spring member forces said platform member upward in said housing when said retaining means is released whereby said platform member forces said sail and cap portion to be ejected.

4. An educational toy missile capsule as defined in claim 2 wherein said timing means includes a timer motor rigidly mounted to the bottom of said upper housing portion and having a rotary shaft for setting the time lapse of said timer, the shaft of said timer motor being essentially aligned with the vertical axis of said upper housing body, said lower housing portion rigidly mounted on the said shaft of said timer motor whereby rotation of said lower housing portion rotates said timer motor shaft and rotation of said timer motor shaft rotates said lower housing portion and key means for locking and releasing the position of said lower housing portion with respect to said upper housing portion.

5. An educational toy missile capsule as defined in claim 3 wherein said timing means includes a timer motor rigidly mounted to the bottom of said upper housing portion and having a rotary shaft for setting the time lapse of said timer, the shaft of said timer motor being essentially aligned with the vertical axis of said upper housing body, said lower housing portion rigidly mounted on the said shaft of said timer motor whereby rotation of said lower housing portion rotates said timer motor shaft and rotation of said timer motor shaft rotates said lower housing portion and key means for locking and releasing the position of said lower housing portion with respect to said upper housing portion.

6. An educational toy missile capsule as defined in claim 4 wherein said retaining means includes ear-like tangs protruding outwardly from the periphery of said platform, tang mating recess means located around the lower internal portion of the said cavity in the upper housing portion and the said spring member which biases said platform upward, said spring member comprising a tapered helical spring retained between the bottom of said platform and the bottom of said upper housing portion and secured to both to rotatably bias said platform by said tangs are spring biased into the said tang mating recess means, said internal cavity of said upper housing portion having shoulders defining vertical guides offset from but open to said tang mating recess means whereby said platform freely rises under the said spring bias when said tangs are rotated from said recesses to the said guide grooves.

7. An educational toy missile capsule as defined in claim 5 wherein said retaining means include ear-like tangs protruding outwardly from the periphery of said platform, tang mating recess means located around the lower internal portion of the said cavity in the upper housing portion and the said spring member which biases said platform upward, said spring member comprising a tapered helical spring retained between the bottom of said platform and the bottom of said platform by said tangs are spring biased into the said tang mating recess means, said internal cavity of said upper housing portion having shoulders defining vertical guides offset from but open to said tang mating recess means whereby said platform freely rises under the said spring bias when said tangs are rotated from said recesses to the said guide grooves.

8. An educational toy missile capsule as defined in claim 7 wherein said ejector means includes lugs on said platform extending into the said lower housing portion and matching tabs on the inside of said lower housing portion which engage said lug when the said timing motor shaft rotates the said lower housing portion to the end of the preselected time period such that said platform is rotated to the extent necessary to move the said tangs from said mating recesses to the said grooves whereby said platform is forced upward in said upper housing portion thereby to eject said parachute sail.

* * * * *