Jan. 3, 1967 C. R. HILL 3,295,789

AIRSPACE CRAFT

Filed Nov. 4, 1963

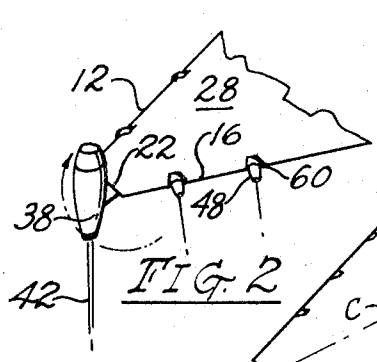


FIG. 2

FIG. 1

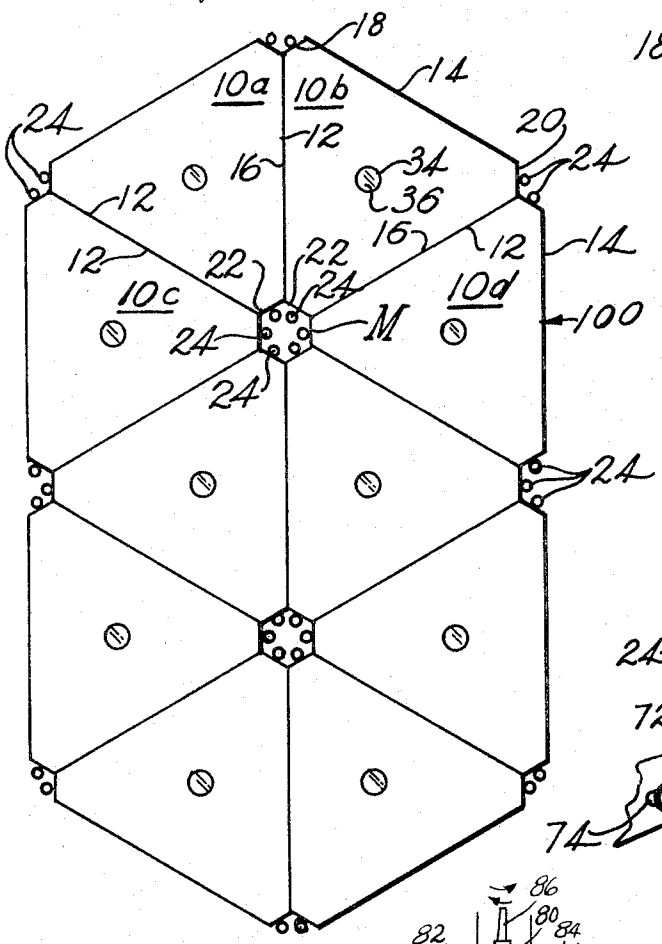


FIG. 3

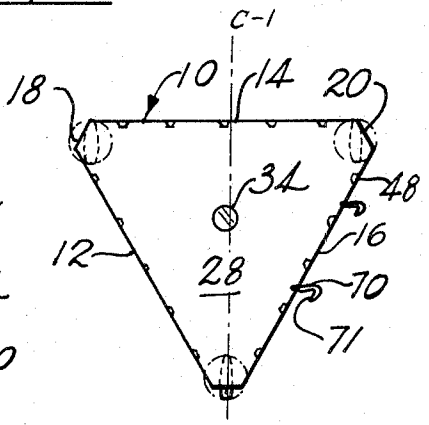


FIG. 4

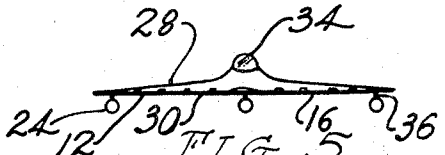


FIG. 5

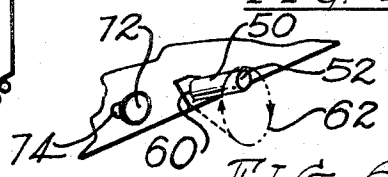


FIG. 6

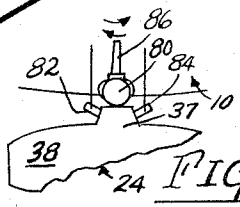


FIG. 7

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AIRSPACE CRAFT

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This invention relates to an air-space craft and particularly to the design of an outer space craft arranged for flight from ground to outer space and having further provision for the joining together in clusters of a plurality of identical space craft of the present configuration for the creation of a space station having individually removable space craft.

It is likely that the continued exploration of outer space and even eventual flight to other places in outer space will require large manned stations outside the earth's pull of gravity to be used as intermediate positions and for logistic or other reasons. The flying or launching of large space stations into outerspace beyond the pull of earth's gravity is not presently feasible because of the difficulty involved in getting sufficient thrust or acceleration to place such a station in working order in a space position. It has been considered that such space stations are necessary and must be constructed piece-by-piece much like erecting a building structure on the ground. This entails many problems and much expense when one considers the effect of being beyond the pull of earth's gravity but having to launch each piece or element of the structure through the pull of gravity. The present invention provides a space craft which together with similar space craft may be joined as self-maneuverable modules to form a space station structure.

Generally described, without restriction on the scope of my invention as defined in the appended claims, the instant space craft is generally constructed in a triangular shape and, therefore, being symmetrical about a longitudinal plane vertically through the longitudinal center line of the craft. The craft is constructed similar to a wing section with a bubble or turret in the center serving as a central control and also as a space for operating personnel. The nacelles, which may accommodate any propulsion means, are located in each of the three corners of the triangular craft and each means is mounted whereby the thrust may be moved from a horizontal position with thrust extending rearwardly of the craft to a vertical position with thrust extending downwardly pushing the craft upwardly. Located along the edges of the craft between the three corner nacelles are individual propulsion units mounted nozzles or tubes or a propulsion system with deflection or other propulsion means movably mounted therein and extending from the edge of the craft. Each propulsion nozzle or tube or other propulsion means is adapted to move about its attached portion in the craft and thereby to circumscribe a circular or other pattern about the attached end to change thrust direction. In the present embodiment there are five such individual propulsion units on each side of the craft which may be used for guiding and driving the craft in any direction. Since the craft is triangular it will fly in any direction depending upon the thrust of the propulsion units. For outer space travel and exploration, the craft is provided with interlocking means on each edge for attaching to an identical craft of same construction whereby the craft may be clustered together locking their edges and any number of identical craft may be locked into a space station. In one form of the invention, vacuum devices are extended and pressed onto the surface of an adjacent craft and then evacuated to stick to the skin or surface of the craft thereby resiliently locking adjacent craft together. They are released by breaking the vacuum in the suction attachment.

An object of the present invention is to provide a triangular space craft with propulsion units mounted for movement on the corners and intermediate whereby utmost maneuverability is obtained.

A further object of this invention is to provide a space craft which may be attached to identical other space crafts to form the space station composed of a cluster of several identical of the present space craft.

A further object of the present invention resides in the use of propulsion units or means in each corner which may be moved from a horizontal to a vertical position and also in the use of intermediate propulsion units or engines mounted along the edges of a craft for flying readily in different directions.

Still another object of the present invention resides in the arrangement for attaching the adjacent edges of identical craft together whereby they may be locked temporarily to form a space station but are readily disengaged to allow individual craft to depart and to return or to be replaced by other identical craft.

Other and further objects and advantages of my invention will become apparent upon reading the following specification takn in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of a typical space craft constructed in accordance with the present invention.

FIG. 2 is a perspective view of one corner of the triangular craft shown in FIG. 1 and with the main corner propulsion unit rotated 90° from horizontal to vertical.

FIG. 3 is a top plan view of a space station formed by clustering or attaching together ten identical space craft of the sort shown in FIG. 1 with their adjacent edges locked detachably together.

FIG. 4 is a top plan view of the space craft shown in FIG. 1 with dotted lines representing another main propulsion engine adjustment for circular motion.

FIG. 5 is a front elevation view of the craft shown in FIG. 4.

FIG. 6 is a perspective view of a portion of the edge of the space craft shown in FIG. 1 illustrating the rotation of one of the fixed engines to describe a circular or other pattern and modified as to a detail.

FIG. 7 is a view of a propulsion unit mounting and means to position it.

The space craft of the present invention is designated generally by the reference numeral **10** and is a composite body somewhat of aircraft design similar to a wing section and arranged symmetrically about a longitudinal center line C–1 with three identical edges **12, 14, 16** having respective corners therebtween **18, 20, 22**. Each corner has mounted thereat an individual propulsion unit or means **24**. The unit **24** shown is a jet that is mounted on a nacelle.

It is to be understood at the outset that the areodynamic design of the surface of the craft, which is much like a wing section, is considered to be a matter within the knowledge of an expert aeronautical engineer. Therefore, the wing flow formula and details are not set forth and do not per se constitute any claimed invention herein. In is only required that the section of the thickness of the craft **10** be in accordance with good sound aeronautical design to produce satisfactory flow across the surface when the craft is moving in normal flying condition. Likewise, the particular construction of the craft as to materials used and the exact design of the structure of the body is not set forth in detail since this is a matter of aeronautical design well within the possession of qualified aeronautical engineers. Conventional materials presently known for outer space travel and for critical

entry and re-entry problems may be utilized in the construction of the present craft. There is an upper skin or surface **28** covering the top of the craft and a bottom skin or surface **30** covering the bottom of the craft which is substantially planar and flat whereas the top **28** is curved somewhat as a wing flow section consistent with conventional aeronautical design. Plastic or "Plexiglas" bubble **34** covers a cockpit or compartment **36** formed within the center portion of the craft **10** and herein is located the seats and control for the pilot, co-pilot and other crew members. The size of the compartment **36** as well as the craft **10** itself is a matter of design and again is something well within the knowledge of an aeronautical engineer calculating the amount of propulsion as relates to the flow of the section.

Each propulsion unit **24** is mounted on a structural support **36** attached to the corner of the craft **10**. Supports **36** are universal in mechanical arrangement having means both to allow vertical rotation of jet nacelles **38** as well as horizontal rotation as shown in FIG. 4. This is accomplished by providing a swivel where support **36** connects to the craft **10** and providing a rotating joint **40** where the jet nacelles **38** connects to the support **36**. As shown in FIG. 2, each one of the jet nacelles **38** is capable of being rotated to a vertical position to cause the thrust **42** to direct itself downwardly. Likewise, the jet nacelles **38** may be returned to horizontal position causing the thrust **42** to direct itself rearwardly. Rearwardly as used herein refers to the direction to the rear of or opposite from the direction of the movement or intended movement of the craft **10**.

Located within the body created by the skin **28** and the bottom **30** of craft **10** along each of the edges **12**, **14**, **16** is a plurality of individual propulsion means or engines **48** each comprising a nozzle or deflector or jet tube **50** extending outwardly but being retractable inwardly to a retracted position and having a nozzle end **52** from which is emitted a jet thrust. The end **60** of nozzle **50** is mounted on a swivel attached to the edge of the craft **10** and the tube or nozzle **50** is movable about the swivel to circumscribed a pattern substantially shown in FIG. 6 or any line of movement within that circular pattern as for instance diagonally across or along any diameter of the circle **62**. With conventional provision for rotating the nozzles **50** or changing the propulsion thrust by means of deflectors, the thrust may be directed in any desired direction from straight up to straight down or 45° forward to lend any combination of thrust desired by the pilot of the craft **10**.

In the operation of the device for level, or what may be considered within the pull of earth's gravity flight as accomplished by usual aircraft the engine **24** may be directed as desired for steering or propelling the aircraft in the desired direction and the supplemental or auxiliary engines or propulsion means **48** likewise may be adjusted to provide level flight and proper inclination as selected and controlled by the pilot.

When it becomes necessary to rise beyond the earth's pull of gravity the engine jet nacelles **38** are rotated to a vertical position as shown in FIG. 2 and the individual nozzles **50** are rotated to a down thrust position opposite from that shown in FIG. 6 and suitable thrust is obtained by propulsion derived from each engine to exceed the approximately 18,000 miles an hour at a height of from 40 to 60 miles necessary to pass beyond the pull of earth's gravity. Upon reaching the outer orbit or position, the craft may be directed as desired by the operator through the control of the engines **24** and **48** and then suitable rendezvous position may be arranged for the space station shown in FIG. 3.

Prior to describing the space station in FIG. 3, the aircraft **10** is provided with a space station, craft attaching arrangement consisting of a mechanical attachment device **70** retractably mounted on each edge of the craft and having a latching portion **71** thereon which may be

engaged by operation by remote control by the pilot within the bubble **34** to hook or attach with identical finger or attachment member **71** on an identical craft **10** and pressure exerted therebetween to resiliently lock the craft together.

An alternative form is shown in FIG. 6 wherein suction cup devices **72** are mounted on sleeves **74** retractably fitted to the edge of the craft **10**. By suitable power means provided within the craft, these suction devices **72** are extended outwardly to engage the skin of an identical craft **10** and to be pushed thereagainst. The suction cups **72** may be manufactured from vinyl or rubber or other material which is resilient and which has sufficient strength to stand up under normal use. After engagement with the skin of an identical aircraft a vacuum motor or pump will evacuate the air from within the suction cup **72** thereby firmly attaching the cup **72** to the opposite aircraft **10**. When it is desired to disengage the cup **72** it is only necessary to break the seal to allow air to flow into the suction cup **72**.

Referring to the space station **100** shown in FIG. 3 a plurality of identical craft **10** have been brought to a rendezvous point and one end of each craft has been directed to a center mooring position M and the adjacent edges of identical craft **10** such as edge **16** on crafts **10***a* and edge **12** on **10***b* and edge **12** on craft **10***c* and edge **16** on craft **10***b* with **10***d* and so on are locked together by one of the methods mentioned in connection with the description of FIG. 6.

According to FIG. 3, several craft **10** have been assembled in a cluster as a typical space station, each being joined to the adjacent identical craft **10** or module by a respective wing edge. It is apparent that such assembly can be readily built and expanded by the joining of the edges of adjoining craft **10**. It is also to be recognized that the placement of the propulsion units **24** and the individual units **48** is such that all of these units or part of them may be used as part of an entire package or space station assembly to move the station from one location to another. Propulsion units **24**, as seen in FIG. 7, have support **37** on a ball-and-socket **80** and are controlled in vertical movement by cable and lever systems **82**, **84** and in rotation by a rotatable rod **86**. Propulsion means **48** are mounted and controlled in the same way in the edges **12**, **14**, **16**.

While I have shown and described a particular embodiment of my invention, together with specific construction shape and details, this is by way of illustration only and is not to be considered as any sort of limitation on the scope of my invention as defined in the appended claims, since various modifications, eliminations, substitutions, changes, deviations, ramificatons, and departures may be made in the embodiment shown and described without departing from the claims.

I claim:

1. In a space station comprising a plurality of identical air-space craft of the character described:

(a) a space craft wing body having a top surface and a bottom surface,

(b) said craft being triangular in formation, and having an apex at each of the three corners,

(c) each corner of the aircraft supporting a main propulsion thrust means thereon,

(d) each of said thrust means being mounted for movement for selectively changing thrust direction,

(e) said thrust means being capable of movement to enable the thrust to be directed in different directions according to the flight desired,

(f) and means on said craft for combining with craft of identical construction all clustered about the center location with respective adjacent, co-extensive edges engaged to form a space station in outer space having a center cluster of propulsion means at the adjacent apices of the aircraft.

2. In a space station comprising a plurality of identical space craft of the character described:
(a) a space craft body having a top surface and a bottom surface,
(b) said craft being triangular in formation, and having an apex at each of the three corners,
(c) a main propulsion means on said air-space craft,
(d) said means in (c) being mounted for movement, and having a thrust that is changeable in direction for maneuvering the craft,
(e) said means in (c) being capable of movement to enable the propulsion thrust to be directed in different directions according to the flight desired,
(f) and means on said craft for combining craft of identical construction all clustered about a center location with respective co-extensive, adjacent edges engaged in outer space having a center cluster of propulsion means comprising the propulsion means at the apex of each aircraft as a space station formed by individual craft.

3. In a space station comprising a plurality of identical air-space craft of the character described:
(a) a space craft body having a top surface and a bottom surface,
(b) said craft being triangular in formation, and having an apex, at each of the three corners,
(c) propulsion means on said craft at each of the three corners thereof,
(d) said propulsion means having thrust capable of movement to positions to enable the propulsion thrust to be directed in different directions according to the flight desired,
(e) and means on said craft for combining with craft of identical construction all clustered about a center location with respective, co-extensive, adjacent edges engaged to form a space station in outer space having a center cluster of propulsion means comprising all of the propulsion means of each adjacent apex of each adjacent aircraft and the other apices of some of the aircraft in the cluster also being clustered with other aircraft about another center cluster location, whereby a space station may be formed from any number of identical aircraft clustering about one center location and all engaged to extend and build onto other locations as well.

4. In an air-space craft of the character described:
(a) an air-space craft wing body having a top surface and a bottom surface,
(b) said craft being triangular in formation,
(c) each corner of the aircraft having a main propulsion means thereon,
(d) each of said propulsion means in (c) being mounted for movement from a horizontal to a vertical position and also being mounted to rotate 360° in many different planes one plane at a time,
(e) said propulsion means being capable of movement to different positions to enable the propulsion to be directed in different directions according to the flight desired,
(f) secondary engine propulsion units mounted on each of the edges of said craft and each of said propulsion units having a propulsion thrust directed therefrom,
(g) and each of said propulsion units being adjustable thereon whereby the thrust from said units may circumscribe a selected pattern as controlled from within the aircraft.

5. The device in claim 4 including means on the air-space craft adjacent the edges thereof for attachment to another identical space craft to form a cluster of such craft as an outer space station.

6. In an air-space craft of the character described:
(a) a space craft wing body having a top surface and a bottom surface,

(b) said craft being triangular in formation,
(c) each corner of the aircraft supporting a main propulsion engine thereon,
(d) each of said engines being mounted for movement from a horizontal to a vertical position and also being mounted to rotate 360° in many different planes one plane at a time,
(e) said engines being capable of movement to different positions to enable the propulsion to be directed in different directions according to the flight desired,
(f) secondary engine propulsion units mounted on each of the edges of said craft and each of said propulsion units having a propulsion nozzle extending therefrom,
(g) and each of said propulsion nozzles on said secondary units being attached to the edge and being movably mounted thereon whereby the ends of said nozzles may circumscribe a pattern as directed.

7. In a space station comprising a plurality of identical air-space craft of the character described:
(a) an air-space craft wing body having a top surface and a bottom surface,
(b) said craft being triangular in formation,
(c) each corner of the aircraft supporting a main propulsion engine thereon,
(d) each of said propulsion means in (c) being mounted for movement from a horizontal to a vertical position and also being mounted to rotate 360° in many different planes one plane at a time,
(e) said engines being capable of movement to different positions to enable the propulsion to be directed in different directions to the flight desired, desired,
(f) secondary engine propulsion units mounted on each of the edges of said craft and each of said propulsion units having a thrust therefrom,
(g) each of said thrusts from secondary units being adjustable as to direction,
(h) means on said craft for attaching to the craft of identical construction,
(i) said craft then being clustered together with identical craft along respective and adjacent sides thereof to form a space station which utilizes selectively the propulsion units of each of said craft in a combined propulsion arrangement.

8. In an air-space craft of the character described:
(a) a space craft body having a top surface and a bottom surface,
(b) said craft being triangular in formation,
(c) a main propulsion means on said air-space craft,
(d) said means being adjustable to change the direction of propulsion,
(e) said means in (c) being capable of movement to different positions to enable the propulsion to be directed in different directions according to the flight desired,
(f) secondary engine propulsion means on said craft,
(g) said secondary engine propulsion means being attached to the respective edges and including respective propulsion outlets movably mounted thereon whereby said respective propulsion outlets may circumscribe a pattern as directed,
(h) means on said craft for combining with craft of identical construction into a space station.

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