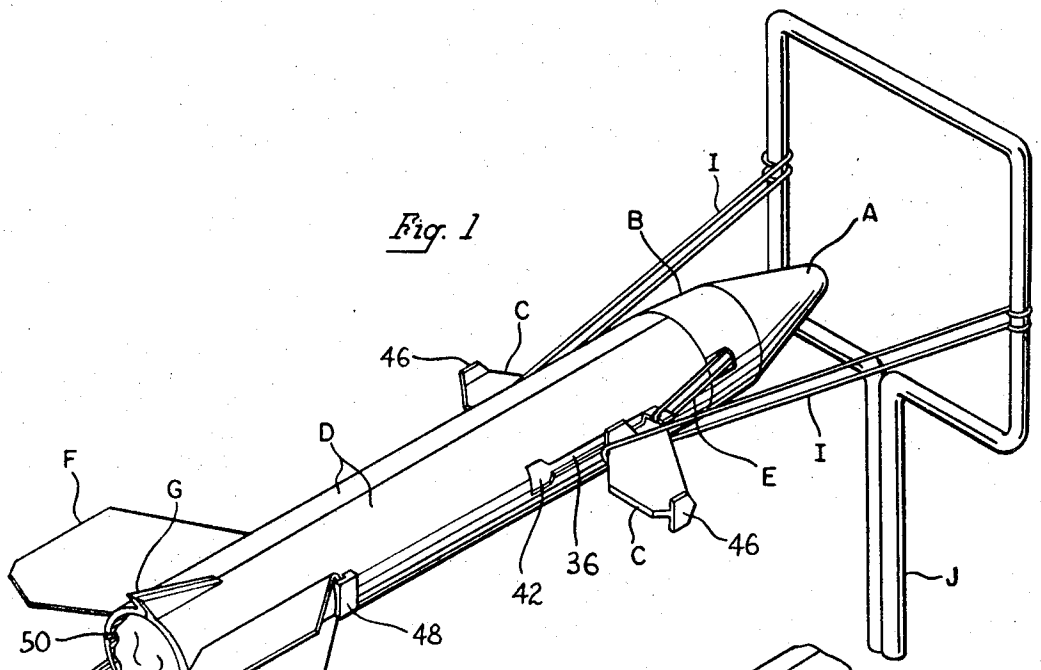
Sept. 9, 1969 R. J. NOVOTNY 3,465,472

AERIAL TOY ROCKET

Filed June 3, 1966 3 Sheets-Sheet 1

Fig. 1



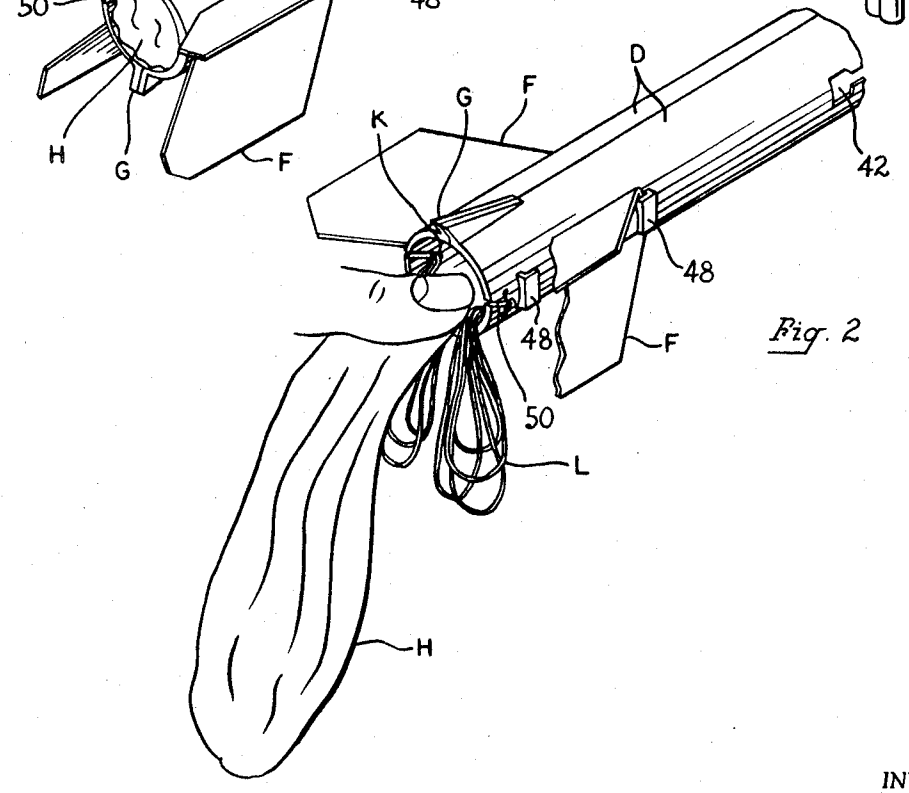


Fig. 2

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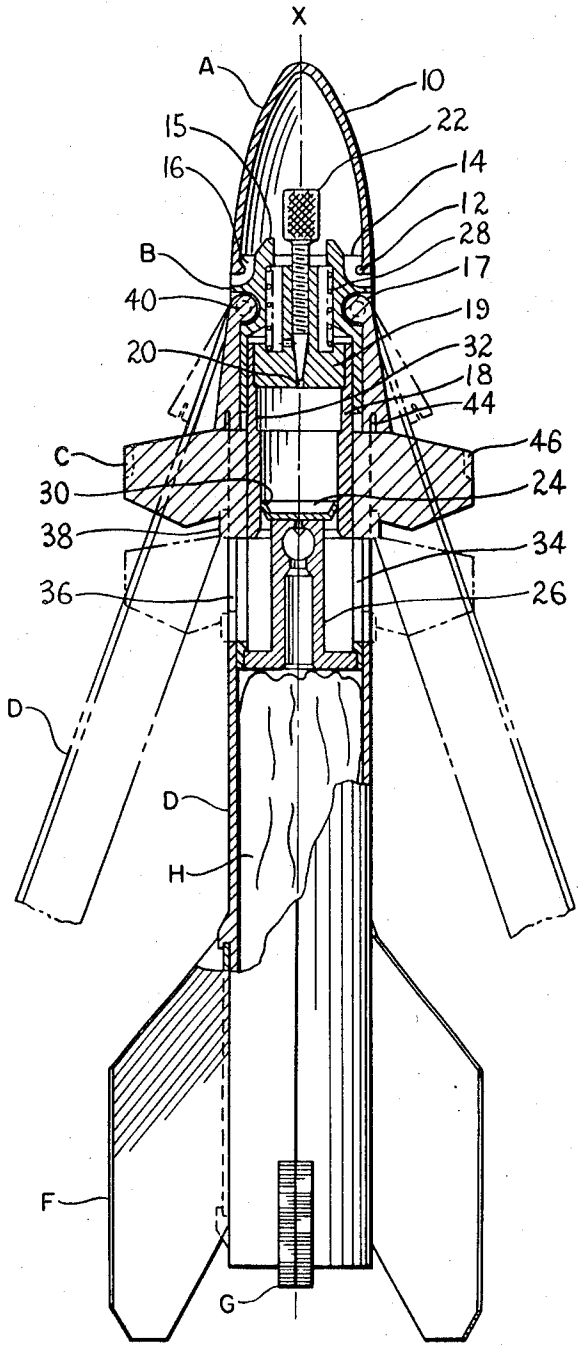

Fig. 3

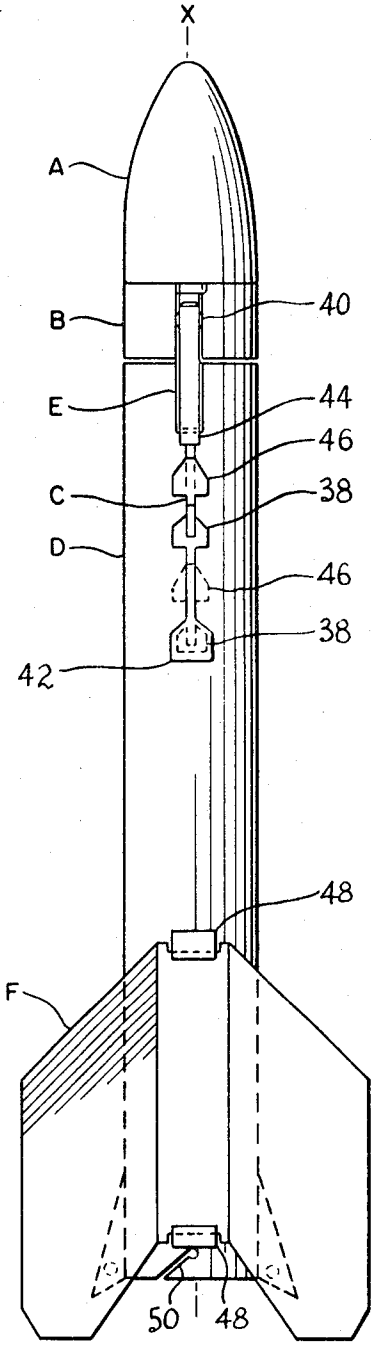

Fig. 4

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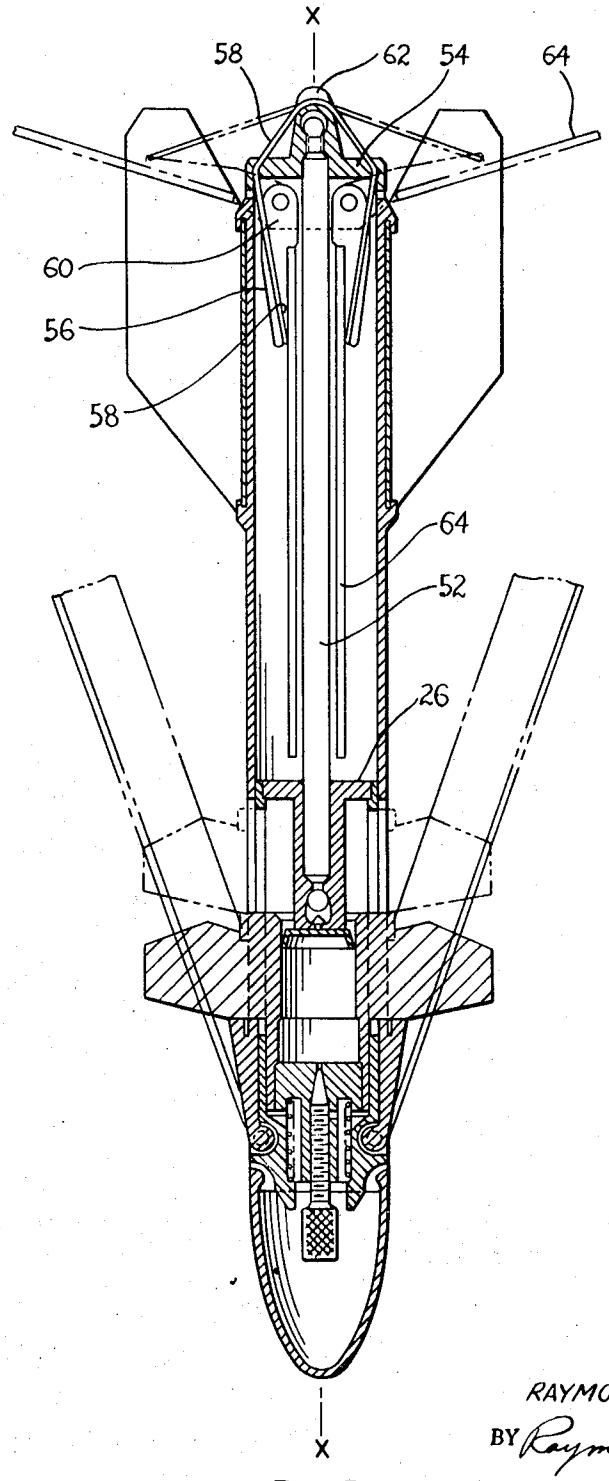

Fig. 5

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3,465,472

AERIAL TOY ROCKET

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Int. Cl. A63h 33/20, 27/14
U.S. Cl. 46—74 7 Claims

ABSTRACT OF THE DISCLOSURE

A rocket toy catapulted upward into the air having an adjustable pneumatic timer. The timer automatically deploys either a parachute or rotors, from readwardly opening split body housings, at a predetermined time somewhere in its trajectory to slow the rocket's descent. The body sections are held together by lugs on fins which extend through slots in the body sections and move rearwardly in said slots in response to the timer. The rearward portion of each slot is provided with an opening corresponding to the size of the lugs to permit the body sections to open.

This invention relates to toys, particularly to an aerial toy simulating a rocket missile adapted to be catapulted substantially vertically upward into the air, deploying a parachute or rotors at a predetermined time somewhere in its trajectory to slow its descent.

Experimental investigations of similar type toys conducted by the inventor have revealed two basic deficiencies, namely:

(a) unreliable operation
(b) tedious and difficult parachute loading for children

The present structure and arrangement of parts overcomes the above deficiencies because of the following characteristics:

(a) simple, positive-action timer governs the opening of the rocket hollow longitudinally-split body sections within which are located a parachute or rotors
(b) rearward release of the parachute or rotors to effect reliable deployment thereof
(c) simple loading of the parachute thru the open aft end (formed by closing the rocket hollow longitudinally-split body sections) without first requiring tedious and difficult folding thereof

It is, therefore, an object of this invention to provide for an aerial toy rocket to reliably deploy either a parachute or rotors somewhere in its trajectory to slow its descent.

Another object of this invention is to make the loading of a parachute or rotors into the rocket body convenient for children.

Another object of this invention is to provide a toy having a simple, and reliable device for varying the time of deployment of the parachute or rotors during flight.

A still further object of this invention is to provide a toy, the descent mode of which is rapidly and simply convertible from a parachute to rotors or vice versa.

Still another object of this invention is to provide an inexpensive toy that is designed to be readily adaptable to mass fabrication and rapid assembly using inexpensive, high impact moldable plastics.

Other objects and the manner in which this invention is constructed and operated and certain additional advantages associated therewith will be apparent by referring to the following description and claims taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a perspective view showing the rocket about to be launched.

FIGURE 2 is a perspective view showing the parachuts being loaded into the rocket.

FIGURE 3 is a partial cross-sectional view illustrating the location of certain components when the rocket is loaded and the timing mechanism primed (fins fully forward) just prior to release from the launcher and also shows (in phantom) the position of the same components when the timing mechanism has completed its stroke (fins fully rearward) and the hollow longitudinally-split body sections are separated to permit deployment of the parachute.

FIGURE 4 is a side view of the rocket.

FIGURE 5 is a cross-sectional view showing the rotors folded and enclosed within the hollow longitudinally-split body sections of the rocket. It also shows (in phantom) the deployment position of the rotors.

With reference to FIGURE 1, the toy is constructed to generally resemble a rocket missile having a long slender cylindical shape with the nosepiece designated by the reference character A, the center body by B, the slidable fins by C, the hollow longitudinally-split body sections by D, the hollow longitudinally-split body section actuating elastic bands by E, tail fins by F, the gripping wedges by G, and the parachute by H; the launcher elastic bands I of the hoop launcher J are shown engaged with the slidable fins C. FIGURE 1 illustrates the manner in which the rocket is launched. One hand holds the hoop launcher J while the other hand holds the rocket by the hollow longitudinally-split body sections D via the gripping wedges G. Each launcher elastic band I is looped in turn around the slidable fins C and the rocket pulled back and aimed vertically upward. As the launcher elastic bands I of the hoop launcher J are stretched, the slidable fins C move forward and further restrain the longitudinally-split body sections D from being opened by the hollow longitudinally-split body section actuating elastic bands E. When the gripping wedges G are relased, the rocket is catapulted into the air and continues in rapid flight until such time as the slidable fins C move rearwardly and release the hollow longitudinally-split body sections D to deploy the parachute H. The in-flight deployment time of parachute or rotors, which is predetermined, is varied by removing the nosepiece A and manually turning an orifice regulating screw.

FIGURE 2 shows the parachute H being loaded into the rear body opening K of the rocket formed by the closure contact of the hollow longitudinally-split body sections D. Since rearward loading of the parachute H is used, no special folding of the parachute canopy or shroud lines M is necessary. The parachute is simply stuffed into the rocket rear body opening K.

Referring now in greater detail to FIGURE 3 (which is symmetrical about axis X—X) the nosepiece A is hollow and resilient and comprises a streamline front portion **10**. A nosepiece internal lip **12** detachably secures the nosepiece A to the center body B. The center body B is cylindrical in shape and hollow and has an external lip **14** to mate with and detachably secure the nosepiece internal lip **12**. Attached to the fore end of the center body B and protruding into the hollow nosepiece A are the center body lugs **15** which detachably secure one end of the hollow longitudinally-split body section actuating elastic bands E. Center body relief grooves **16** prevent interference of the hollow longitudinally-split body section actuating elastic bands E with the nosepiece internal lip **12** when it engages the external lip **14** of the center body B. Hinge cavities **17** located in the fore end of the center body B permit the hollow longitudinally-split body sections D to be pivotally and detachably secured to the center body B. Enclosed within the center body B is a hollow slidable cylinder **18** to which are fixedly attached

the slidable fins C. One end of the hollow slidable cylinder **18** is closed and has a cylinder head boss **19** extending toward the fore end of the center body B and contains an air flow restricting orifice **20** therein. Also contained within the cylinder head boss **19** and cooperating with the restricting orifice **20** is an orifice regulating screw **22** which regulates the air flow restrictive characteristics of the restricting orifice **20**. A resilient piston **24** is detachably secured to the center body B via the hollow piston support **26**. A spring **28** biases the hollow slidable cylinder **18** to move toward the rear of the center body B. However, the air trapped within the volume defined by the resilient piston **24** and the hollow slidable cylinder **18** restricts the velocity of the hollow slidable cylinder **18** since the compressed air must flow thru the restricting orifice **20**. The thin resilient piston lip **30** of the resilient piston **24** acts as a gas seal in cooperation with the cylindrical walls of the hollow slidable cylinder **18** and insures air flow thru the restricting orifice **20**. As the hollow slidable cylinder **18** moves rearward, the resilient piston lip **30** loses contact with the walls of the hollow slidable cylinder **18** by virtue of the hollow slidable cylinder relief diameter **32**. As a result, the restricting orifice **20** is no longer flow controlling and the hollow slidable cylinder **18** now moves rearward with a rapid motion.

The slidable fins C protrude thru the center body fin slots **34** and the hollow longitudinally-split body fin slots **36**. The fin restraining lugs **38** prevent pivotal movement of the hollow longitudinally-split body sections D about the spherical hinges **40** which are confined within the hinged cavities **17** of the center body B. However, referring to FIGURE 4 (also symmetrical about centerline X—X), at the end of the stroke of the slidable fins C, the fin restraining lugs **38** are in clearance alignment with the hollow longitudinally-split body relief openings **42** and the hollow longitudinally-split body sections D will snap open because of the action of the hollow longitudinally-split body actuating elastic bands E which are detachably secured to the hollow longitudinally-split body sections D at the hollow longitudinally-split body elastic band securing slots **44**. Fin limit stop lugs **46** assure a definite opening position for the hollow longitudinally-split body sections D.

The tail fins F are detachably secured to the hollow longitudinally-split body sections D by the tail fin securing lugs **48**.

Parachute shroud line slots **50** are located in the aft end of the hollow longitudinally-split body sections D. Half of the shroud line L of the parachute H are fastened to each of the hollow longitudinally-split body sections D thereby tending to rapidly deploy the parachute into the air during flight.

FIGURE 5 (symmetrical about center line X—X) shows the rocket converted to the auto-rotation descent mode. The parachute H is replaced by the following assembled structure: A rotor post **52** is inserted within and is detachably secured to the hollow piston support **26**. A rotor hub **54** is detachably secured to the other end of the rotor post **52**. The rotor hub **54** is capable of freely revolving about the rotor post **52**. Hingedly attached to the rotor hub **54** are the rotors **56** which are biased to open by the action of the rotor elastic band **58**. The rotor elastic band **58** is detachably secured to the rotors **56** near the rotor hinge **60** and is guided over the rotor hub **54** via the rotor hub slot **62**. The rotor blade **64** is canted at a given angle with respect to the plane of the rotor hinge **60** in order to permit the rotors **56** to rotate during auto-rotation descent.

Since the entire auto-rotation device is pre-assembled, the rocket is rapidly and conveniently converted from parachute descent to auto-rotation descent by inserting the rotor post **52** into the rear end of the hollow piston support **26** to which it is then detachably secured. Deployment of the rotors **56** is identical to that used for the parachute H. At a predetermined time in the flight path of the rocket the hollow longitudinally-split body sections D open and the rotors **56** are free to deploy because of the action of the rotor elastic band **58**.

Loading of the rocket using the rotors **56** first requires that the rotors **56** be folded against the rotor post **52** and then enclosed by the hollow longitudinally-split body sections D.

Launching of the rocket using the auto-rotation device is identical to that using the parachute H.

I claim:

1. A toy rocket adapted to be impelled into the air comprising, in combination, a hollow center body; timing means substantially enclosed within said hollow center body; hollow longitudinally-split body sections pivotally attached at one end to said center body; means to bias said hollow longitudinally-split body sections to open; slidable fins attached to said timing means; said slidable fins having restraining means cooperating with said hollow longitudinally-split body sections to restrain the opening thereof; said hollow longitudinally-split body sections having an elongated slot disposed fore and aft and having fore and aft ends; said aft end of said slot in communication with an enlargement thereof and cooperating with said fin restraining means of said slidable fins to release said hollow longitudinally-split body sections when said fin restraining means is in clearance alignment with said enlargement of said slot; a cavity formed by the closure contact of the aft portions of said hollow longitudinally-split body sections; descent means enclosed within said cavity; said descent means released upon the opening of said hollow longitudinally-split body sections to slow the velocity of said rocket toy through the air.

2. A construction in accordance with claim **1** wherein said timing means consists of a cylinder having an open and a closed end; a piston supported within said hollow center body and cooperating with said cylinder; spring means adapted to urge said cylinder to slide within said hollow center body toward said piston; a restricting orifice disposed within said closed end of said cylinder to control the velocity of said cylinder toward said piston.

3. A construction in accordance with claim **2** wherein said restricting orifice cooperates with means to change the flow characteristics thereof.

4. A construction in accordance with claim **1** wherein said hollow center body has fore and aft ends; a nosepiece attached to said fore end of said hollow center body; said hollow longitudinally-split body sections having fore and aft portions; tail fins attached to said aft portions of said hollow longitudinally-split body sections.

5. A construction in accordance with claim **1** wherein said descent means consists of a parachute having shroud lines detachably secured to said aft portions of said hollow longitudinally-split body sections.

6. A construction in accordance with claim **1** wherein said descent means comprises, in combination, rotor blades pivotally attached at one end to a rotor hub; a rotor post having an aft and fore end; said aft end of said rotor post rotatably secured to said rotor hub; said rotor post at said fore end detachably secured to said aft end of said hollow center body.

7. In a toy rocket to be impelled into the air and having descent means attached thereto, a mechanism for releasing said descent means at a predetermined time during the flight of the toy rocket comprising: A hollow center body having slots longitudinally disposed and symmetrically arranged therein; said hollow center body having fore and aft ends; a cylinder adapted to slide within said hollow center body and having a closed and open end; a piston cooperating with said cylinder; a cantilever support enclosed within said hollow center body and attached to the rear end thereof; said piston attached to the fore end of said cantilever support; a restricting orifice disposed within said closed end of said cylinder; means for controlling the flow restriction characteristics of said orifice; means to urge said closed end of said cylinder toward said piston; hollow longitudinally-split body sections pivotally at-

tached at one end and substantially enclosing said hollow center body; means to bias said hollow longitudinally-split body sections to an open position; said hollow longitudinally-split body sections having a slot disposed fore and aft and in communication with an enlargement thereof at the aft end of said slot; said slots of said hollow longitudinally-split body sections in alignment with said slots of said hollow center body; fins attached to said cylinder and projecting thru said hollow center body and hollow longitudinally-split body section slots; said fins having restraining means to cooperate with said slot of said hollow longitudinally-split body sections to release said hollow longitudinally-split body sections when said restraining means is in clearance alignment with said enlargement of said slot of said hollow longitudinally-split body sections.

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U.S. Cl. X.R.

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