March 1, 1966 C. MOESLY 3,237,581

BOAT HULL

Filed March 19, 1965 4 Sheets-Sheet 1

Fig. 1.

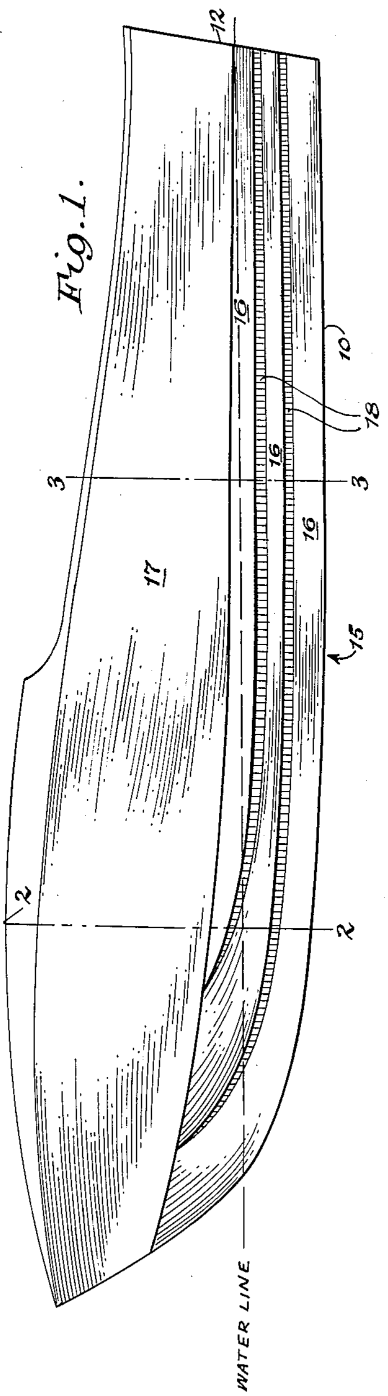
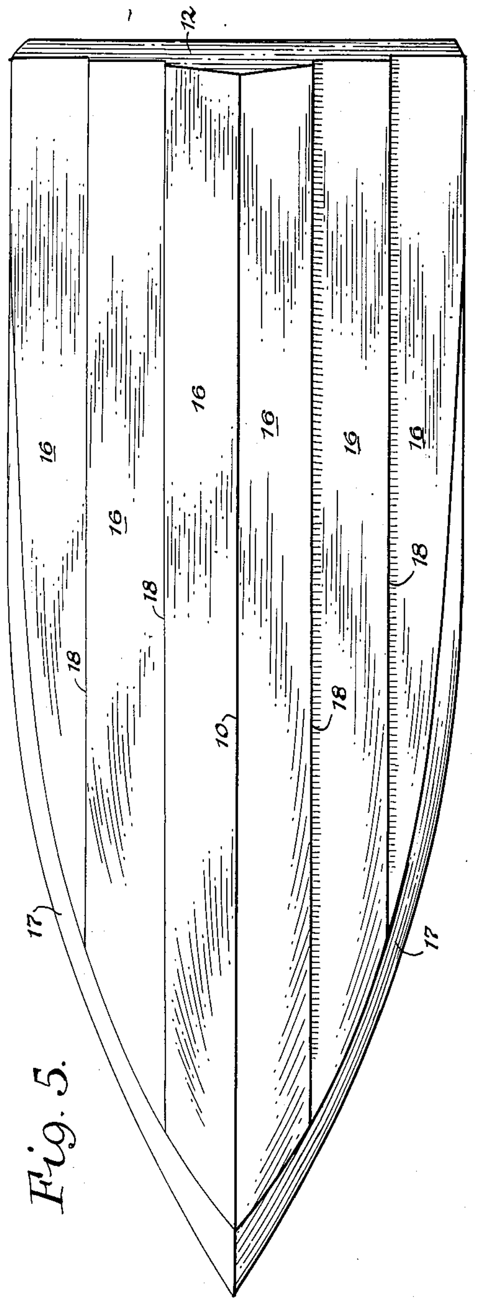


Fig. 5.



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March 1, 1966 C. MOESLY 3,237,581

BOAT HULL

Filed March 19, 1965 4 Sheets-Sheet 2

Fig. 2.

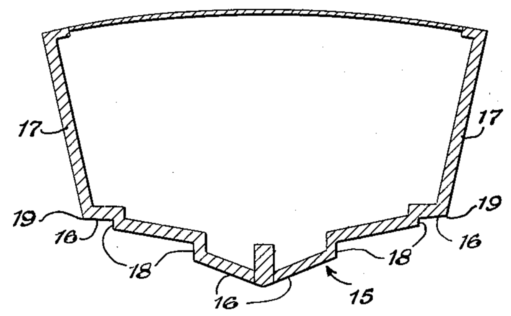


Fig. 3.

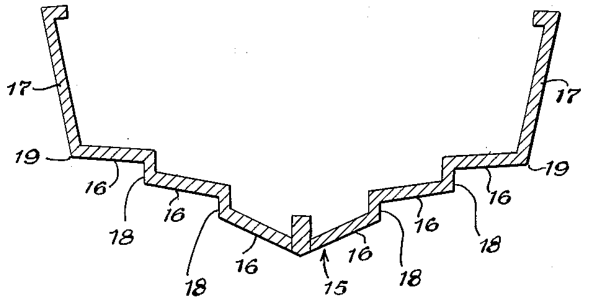
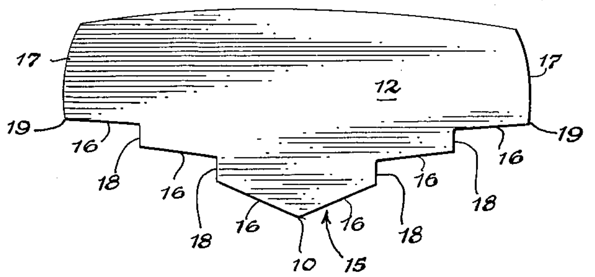


Fig. 4.



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March 1, 1966 C. MOESLY 3,237,581

BOAT HULL

Filed March 19, 1965 4 Sheets-Sheet 3

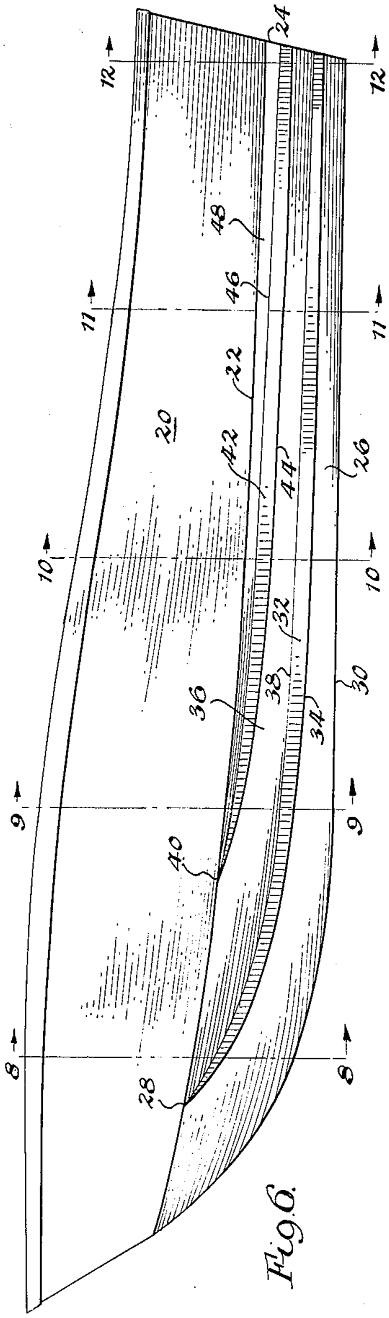

Fig. 6.

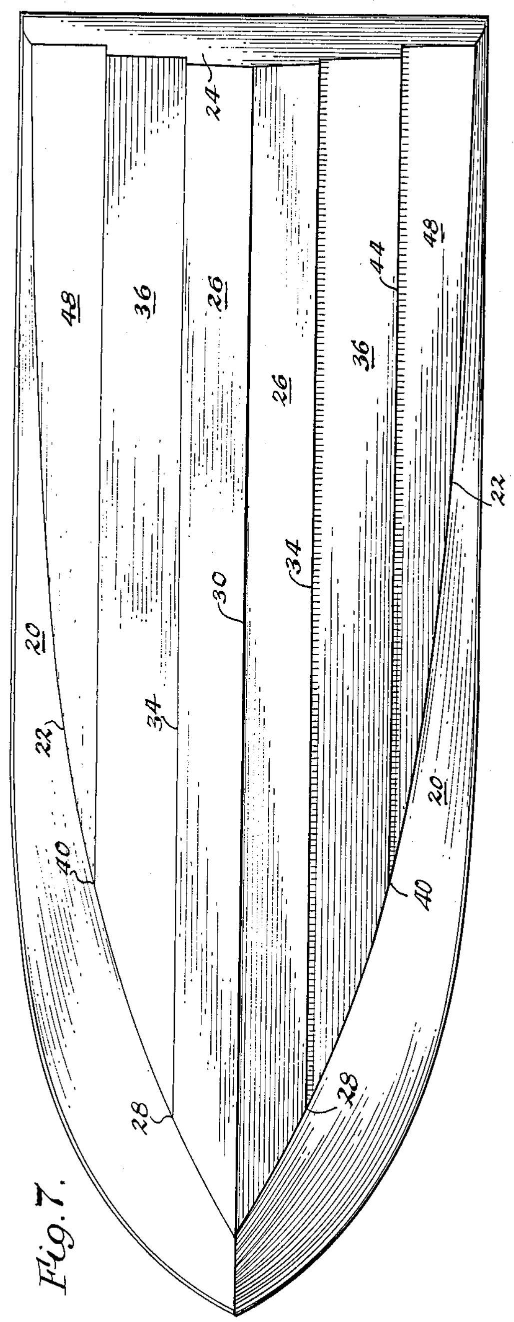

Fig. 7.

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Fig. 8.

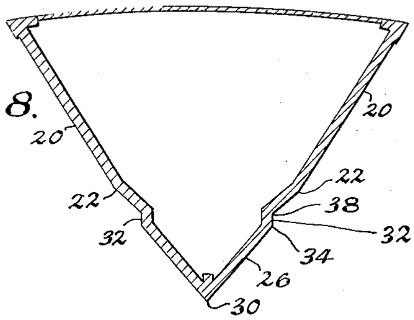


Fig. 9.

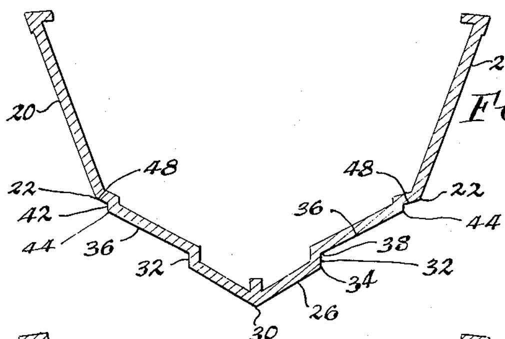


Fig. 10.

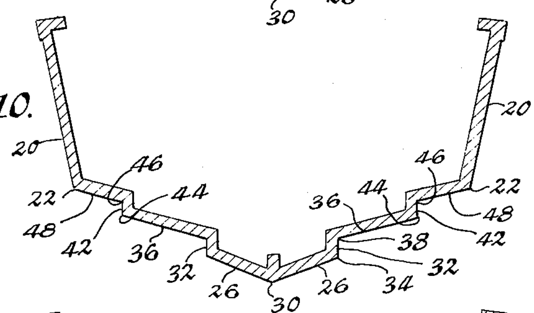


Fig. 11.

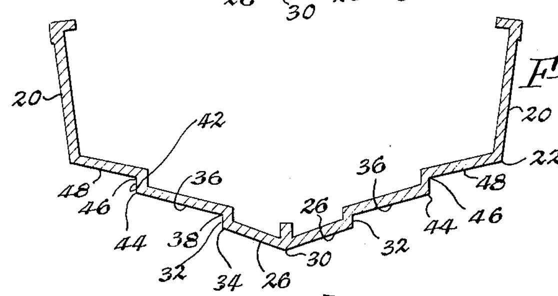
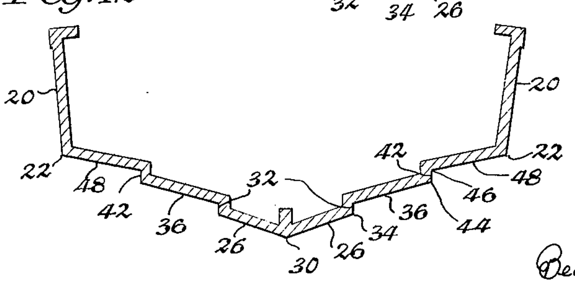


Fig. 12.



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United States Patent Office

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BOAT HULL
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11 Claims. (Cl. 114—56)

This invention relates to boats and more particularly to a new and improved form of high performance hull of the planing type. This application is a continuation-in-part of my copending application Serial No. 209,604 filed July 13, 1962.

The development of engines of greatly increased power for pleasure boat use has heightened the need for a boat hull that will provide improved performance characteristics at high speeds, and under higher load conditions in a variety of sea conditions. Boat hull designs in the past have generally been of distinct types which offer some desirable performance characteristics with a definite sacrifice of others. For instance, the extreme high speed planing hull such as a hydroplane with a substantially flat bottom is notoriously unseaworthy, while the round bottom hull is very seaworthy but, like all displacement hulls, has a "hull speed" beyond which it cannot be driven regardless of the power available. Many variations have been tried but even the best developments leave much to be desired in all around performance.

The primary object of the present invention is to provide a new and improved hull form for water craft which will provide characteristics of seaworthiness and speed which result in all around performance of a degree heretofore unattainable with previously known hull forms.

Another object of the invention is to provide a boat hull as aforesaid which will give a very high strength-to-weight ratio and may be constructed from any of the more popular hull building materials in use today including wood, aluminum or other metals and fiberglass.

Other objects and advantages of the hull form of the present invention will appear from the detailed description hereinbelow and the accompanying drawing wherein:

FIG. 1 is a side elevational view of a boat hull incorporating the design features of the invention;

FIG. 2 is a transverse sectional view taken substantially along line II—II of FIG. 1;

FIG. 3 is a transverse sectional view taken substantially along line III—III of FIG. 1;

FIG. 4 is a rear elevational view of the craft of FIG. 1;

FIG. 5 is a bottom plan view of the craft of FIG. 1;

FIG. 6 is a side elevational view of a boat hull constructed according to Table I;

FIG. 7 is a bottom plan view of the hull shown in FIG. 6; and

FIGS. 8–12 are cross sections of the hull taken at various stations as indicated by section lines VIII—VIII, IX—IX, X—X, XI—XI, XII—XII in FIG. 6.

As a general description the new hull design of the invention might be described as a hard-chined, V-bottomed hull with longitudinally extending generally parallel steps.

As seen in FIG. 1, the keel line 10 of my hull is generally flat relative to the horizontal from the transom forward through the first half of its length, and then sweeps upwardly in a relatively gentle arc. As seen in the sectional views at FIGS. 2, 3 and 4, the bottom of

the boat comprises a generally V-shaped bottom 15 which meets the topsides 17 at the hard chine 19. The bottom surface comprises a series of vertically stepped generally horizontal planing surfaces 16 connected by longitudinally running, substantially vertical risers 18 which are carried substantially parallel to the center line of the craft throughout their lengths. In the embodiment shown herein, I provide two risers on each side of the keel and this results in a hull having three generally flat planing surfaces 16 on each side of the hull with the two inboard surfaces which meet at the keel forming a relatively narrow center V-sectioned portion as best seen in FIGS. 2–4. The number and vertical dimensions of the vertical risers may be varied and the amount of dead rise of each bottom plane 16 may be varied, but it is an important feature of the present invention that each planing surface 16 has less dead rise than the next inboard planing surface and more dead rise than the next outboard planing surface.

The risers 18 are of substantially constant height throughout the midship portion of their lengths so that the surfaces 16 are vertically spaced at constant distance throughout most of their lengths. However, as the panels 16 approach the bow of the hull, they curve upwardly and are faired into the chine 19 which also curves upwardly but on a curve of a larger radius than the keel. The chine 19 makes one smooth curving line from the stem while each of the panels 16 drop away from the chine on a somewhat steeper curve until the desired vertical step is achieved, after which all surfaces run aft in substantially parallel manner.

The effect of the design of my hull is that at slow, displacement speed, the water will part at the bow and flow along the bottom as in conventional craft. As speed is increased, the bow shape imparts substantial dynamic lift to the hull and this lift will be imparted to all surfaces that are not vertical. As the speed increases further the inboard planing surfaces begin to support the weight of the boat without the full assistance of the outboard planing surfaces and, at high speed the outboard planing surfaces may rise out of contact with the water. Thus at high speeds the boat will be supported only on the more inboard planing surfaces, and this in effect, increases the length-to-width ratio of the hull and permits the hull to ride on the panels which have the greatest amount of dead rise. This gives a softer ride and less drag because of less skin contact surface.

When the boat is being driven at high speeds in rough or choppy seas, and comes down in a trough or penetrates a wave, the outboard planes are again brought into contact with the water and thereby contribute to buoyancy and dynamic lift. The vertical stepping of the planing surfaces greatly eases pounding effects on the hull because the various planes contact the water successively, resulting in a series of small shocks rather than a single, severe and jolting shock as would be the case in other hulls. The smaller shocks are easily absorbed by the weight mass and the result is a relatively soft, cushioned ride.

Due to the generally V-shape of the bottom, water flows laterally as well as rearwardly in relation to the boat. The lateral movement acts to release back pressure forces as the water flows off the edges of the steps, and this also reduces skin friction as the water skips the vertical surfaces **18** and portions of the next adjacent planing surfaces **16**. Because the planing surfaces **16** have progressively less dead rise additional lift will be imparted to the hull, because of the greater degree of deflection of the water at the outboard planing surfaces than at the inboard planing surfaces. Thus this difference in dead rise obtains maximum lift from the water as it moves outboard and loses its inertia. The mixing of air with water as it tumbles off the steps and deflects from the planes **16** also assists in decreasing pounding shock effects and parasitic drag.

This hull design provides a very dry boat to ride in, and the relatively deep, narrow center section of the hull greatly increases the performance of the boat by making it easy to maintain a straight course at all speeds; by permitting only a small amount of slippage in tight turns; and by offering high resistance to any broaching tendency. It will also be apparent that the hull design of my invention inherently provides a hull of high strength-to-weight ratio because of the stiffener effects of the vertical rise **18**.

With reference now more particularly to FIGS. 6, 7, the hull shown therein will be seen to include a pair of similar side members, one of which is indicated by the reference character **20**. The lower edges **22** of these side members define the chines of the hull which extend generally horizontally forward from the transom **24** to the bow. The inboard panels **26** are of substantially uniform width from the transom to the points (as at **28**) where they intersect the chines and are tapered from these forward to join their respective chines, as shown. The inner edges **30** of these inboard panels are joined at the keel and each angles upwardly from the keel outwardly by a predetermined amount. It will be seen from Table I hereinbelow, the amount of angularity is of least amount at the transom and progressively increases from there forward to the chine. It is to be understood, however, that these inboard panels may have the same or substantially the same angularity throughout their lengths so long as their angularity does not decrease going forward of the hull. In most instances, however, particularly when the power plant or plants are mounted aft or at the transom, the inboard panels will be relatively flat adjacent the transom and will increase substantially in angularity toward their points of intersection with the chine.

The vertical riser panels **32** are joined along the outer edges **34** of the inboard panels **26** and thus extend substantially parallel to the hull center line or keel. The center panels **36** are joined along their inner edges **38** to the riser panels **32** in stepped relation above the respective outer edges **34** of the inboard panels **26**. The center panels, like the inboard panels, are of substantially uniform width from the transom forward to the points **40** at which they intersect the chines and taper forwardly thereof. Also, like the inboard panels, the center panels may have the same or substantially the same angularity throughout their lengths, provided that the inboard panels are similarly fashioned. In any event, the center panels are of less angularity, at any station, than are the inboard panels, and any change in angularity of the center panels along their lengths will be similar to the corresponding change in angularity of the inboard panels. This latter effect is illustrated in Table I.

The vertical riser panels **42** extend along the outer edges **44** of the center panels **36** parallel to the risers **32** and the inner edges **46** of the outboard panels **48** are joined to the riser panels **42** in stepped relation above the outer edges **44** of the center panels, as shown. The outer edges of the outboard panels are coincidental with the chines or lower edges **22** of the side members **20** and thus are of generally tapering shape from the transom forward. The angularities of the outboard panels are less than the angularities of the center panels and are, in general, of very little angular variation along their lengths, even

though substantial angular variation occurs in the inboard and center panels. This is illustrated in Table I.

TABLE I

Deadrise in degrees off horizontal

	Inboard panel	Center panel	Outboard panel
Fig. 8	47	39	----------
Fig. 9	34	27	14
Fig. 10	25	17	10
Fig. 11	22	15	10
Fig. 12	21	13	10

It will be appreciated that three or more panels may be provided on each side of the keel, disposed in symmetrical relation with respect thereto. It will also be appreciated that variation in deadrise may be accomplished by either varying the angularity of the panels, or by varying the widths, or by a combination of both. Also, the heights of the vertical risers may be varied to achieve greater or lesser stepping effect to accommodate for the aforesaid variations in deadrise. In this respect, the vertical heights of the risers may be as little as about ¾" or may be as great as about 6". In any event, it is to be understood further that the above combinations of variables will be such that the inboard panel as well as the center panel display an increase or a maintenance of fixed angularity from stern to bow to the exclusion of a decrease in angularity in this direction. Generally speaking, the same is true of the outboard panel but some circumstances may dictate that the outboard panels have forward portions which are reversed as to angularity, that is, below the horizontal.

While only one specific embodiment of the boat hull of the invention has been shown and described in detail, it will be understood that various changes and modifications may be made therein without departing from the spirit of the invention and the scope of the appended claims.

I claim:

1. A power boat hull comprising, in combination,
a pair of opposite side members having lower edge portions defining a chine extending generally horizontally from stern to bow,
a pair of inboard panels joined along their inner edges to define the keel of the hull and extending from the stern to said chine, said inboard panels being of substantially uniform width from the stern to said chine and each being angled upwardly from the keel outwardly to provide a predetermined amount of deadrise,
a vertical riser along the outer edge of each inboard panel,
a plurality of panels outboard of each vertical riser commencing at such vertical riser in stepped relation above the outer edge of said inboard panels, with successive outboard panels being stepped upwardly by intervening vertical risers,
and said panels being of successively less angularity from the keel outwardly at all stations along the length of the hull.

2. The hull as defined in claim **1** wherein there are three panels on each side of said keel.

3. The hull as defined in claim **2** wherein the inboard panel on each side increases in angularity from the transom forwardly.

4. The hull as defined in claim **3** wherein the center panel on each side increases in angularity from the transom forwardly.

5. The hull as defined in claim **4** wherein the outermost panel on each side increases in angularity from the transom forwardly.

6. A power boat hull having sides and a bottom,
said bottom being formed of a series of vertically stepped panels disposed symmetrically on either side

of the hull center line, vertical risers joining the adjacent edges of said panels and extending substantially parallel to the hull center line, said panels being angled upwardly from the horizontal outwardly of the hull center line but with such angularities decreasing between successive panels in the outboard direction at all stations along the length of the hull, the angularities of each said panels increasing from the stern toward the bow.

7. The hull as defined in claim **6** wherein there are three panels on either side of said hull center line.

8. The hull as defined in claim **7** wherein the inboard panel on each side increases in angularity from the transom forwardly.

9. The hull as defined in claim **8** wherein the center panel on each side increases in angularity from the transom forwardly.

10. The hull as defined in claim **9** wherein the outermost panel on each side increases in angularity from the transom forwardly.

11. The hull as defined in claim **7** wherein the angularities of said panels are as follows at equidistantly spaced stations on said hull from bow to stern thereof

commencing with station 1 spaced rearwardly from the bow by an amount equal to the spacing between stations:

	Inboard Panel	Center Panel	Outboard Panel
Station 1	47°	39°	----------
Station 2	34°	27°	14°
Station 3	25°	17°	10°
Station 4	22°	15°	10°
Station 5	21°	13°	10°

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