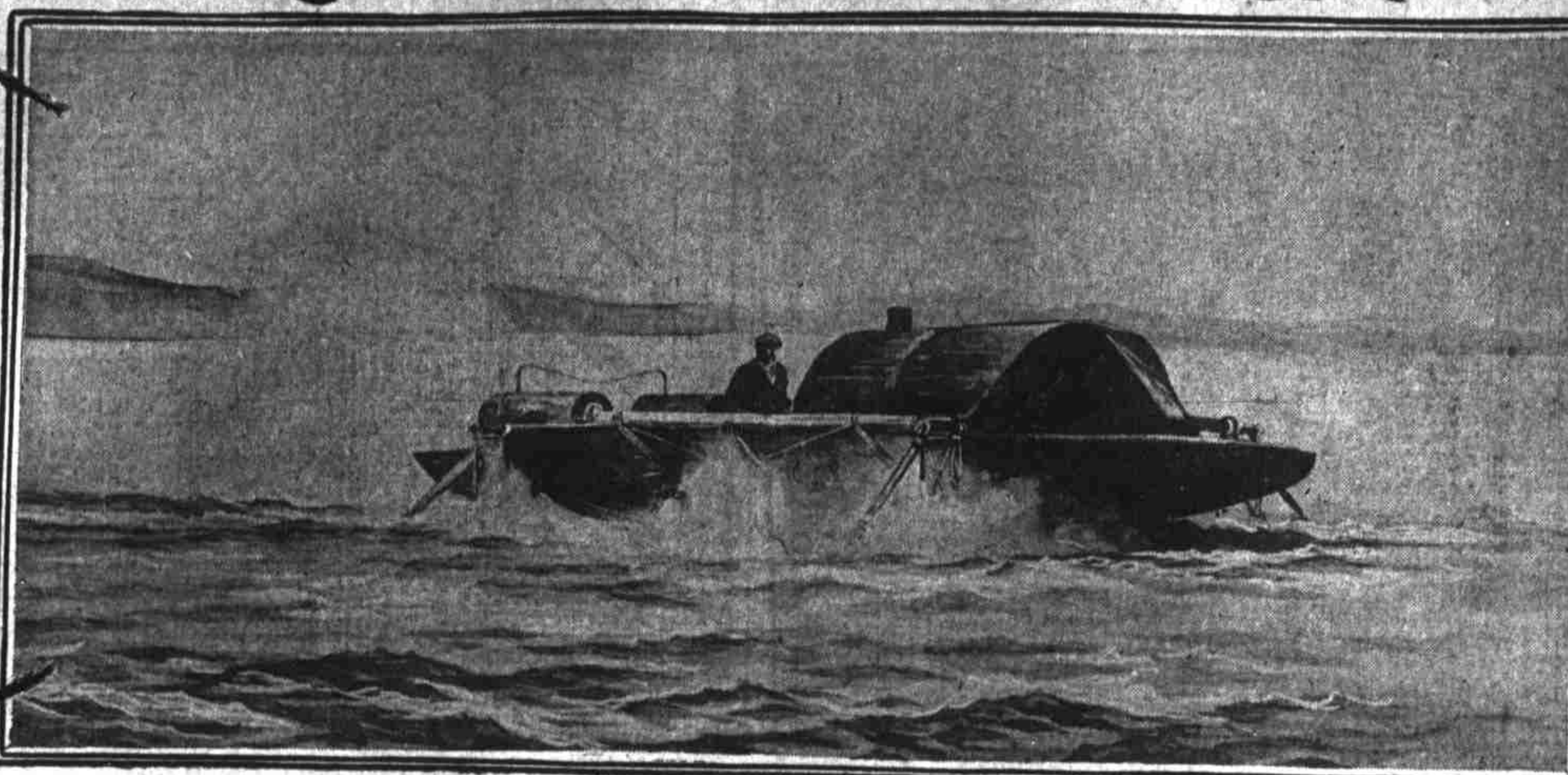
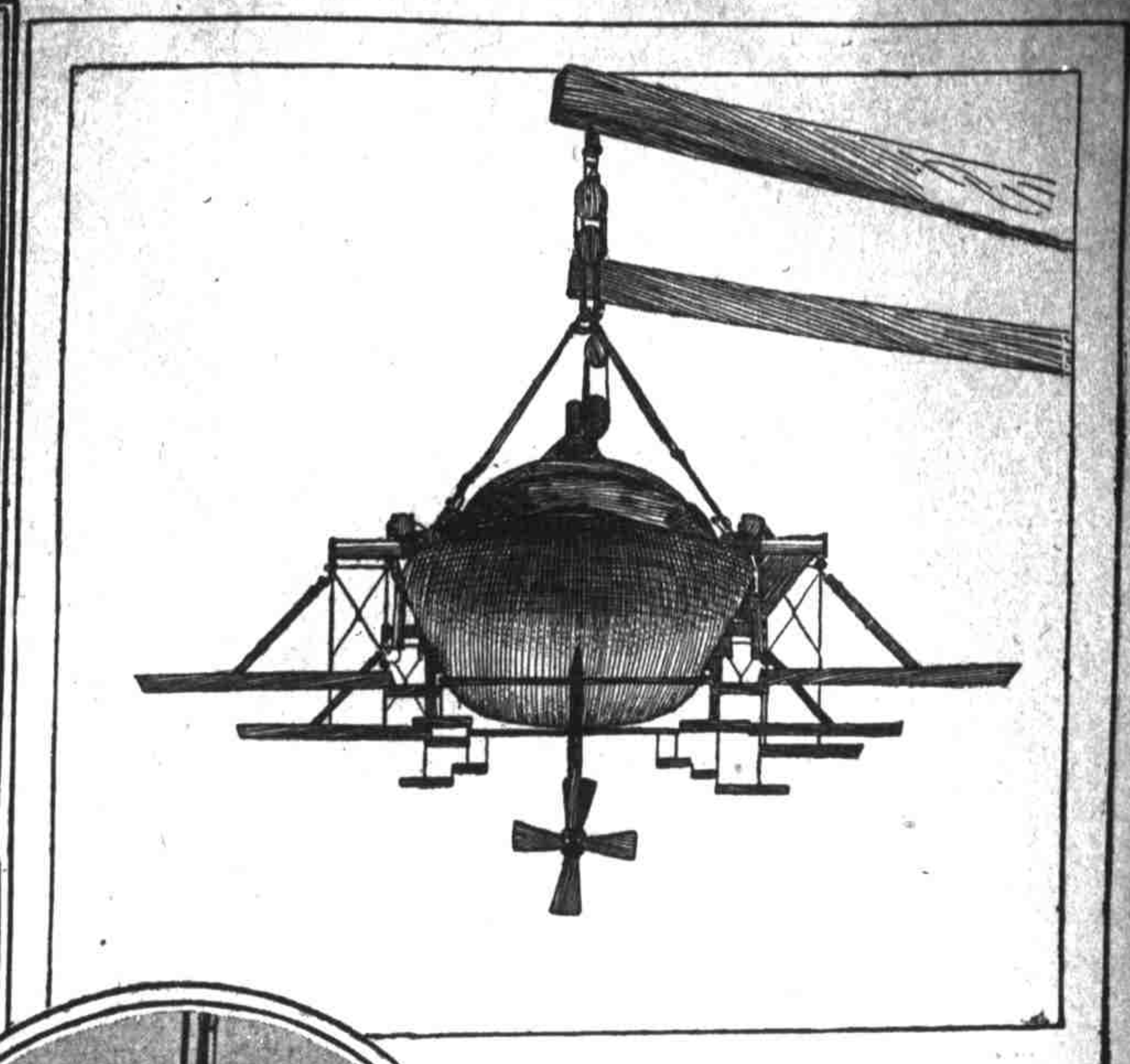
ACROSS THE OCEAN IN THIRTY HOURS



Striking a 33-mile Speed



Position of Planes Shown as Boat is suspended

What May Result from Cooper Hewitt's Invention of the Gliding Boat

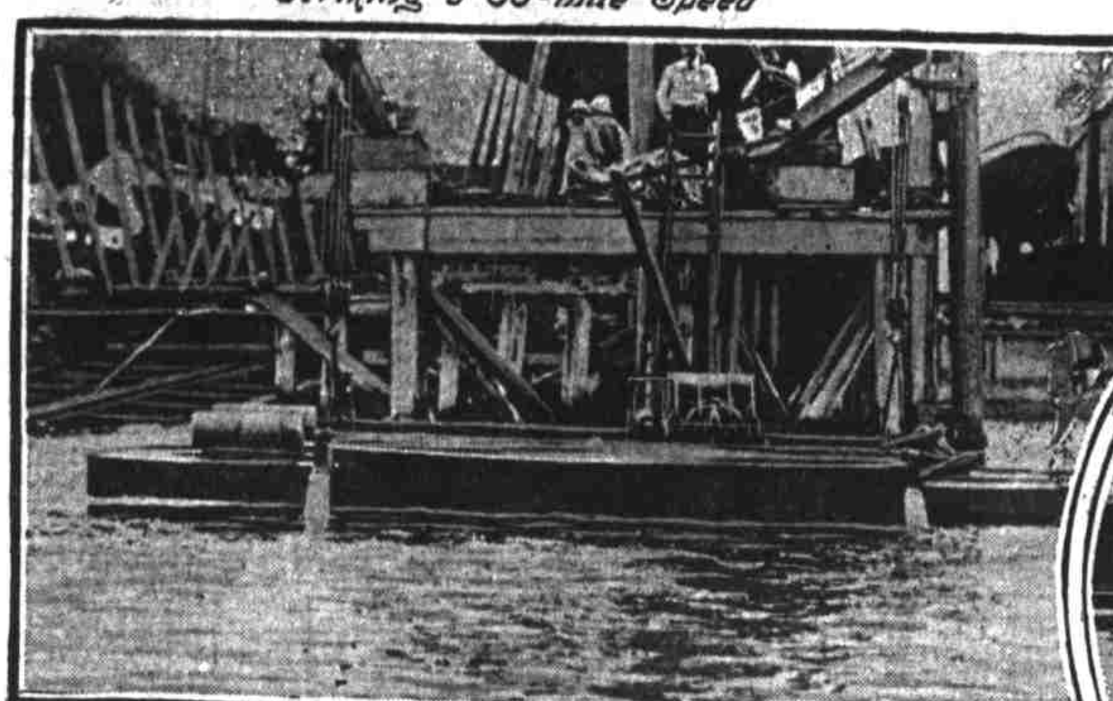
WONDERFUL water craft, half airship and half boat, speeding over the ocean at the tremendous pace of 100 miles an hour—this is the spectacle that may soon be presented to sea travelers.

Such, at any rate, is predicted by eminent marine architects and engineers, after examining the new gliding craft invented by Peter Cooper Hewitt, father of the Cooper Hewitt converter and the Cooper Hewitt light.

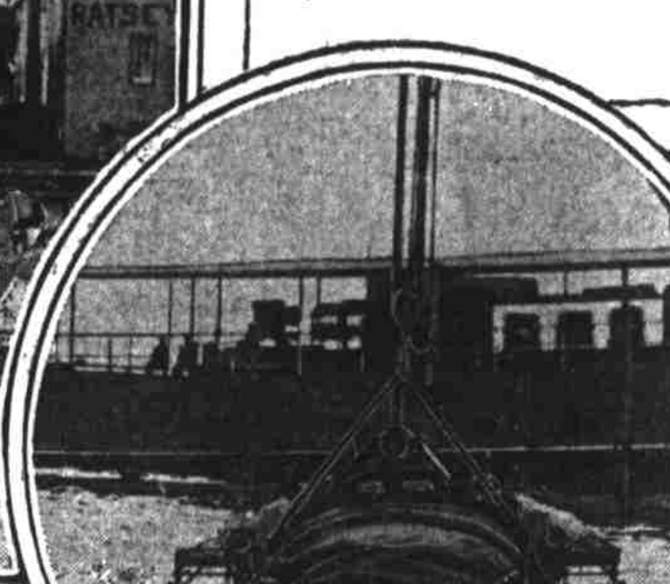
This new boat, embodying a principle discovered by accident, actually flies over the surface of the water. Going at the rate of thirty-eight miles an hour, as the experimental craft has done, the hull is lifted entirely out of the water, diminishing by that much the resistance and consequently accelerating speed.

Slightly inclined planes are used to lift the vessel from the water. It is believed that large, ocean-going craft may be hoisted thirty feet above the surface—or above the highest waves—and will be enabled to fly along, regardless of storm or rolling billow, at a speed of 100 miles an hour.

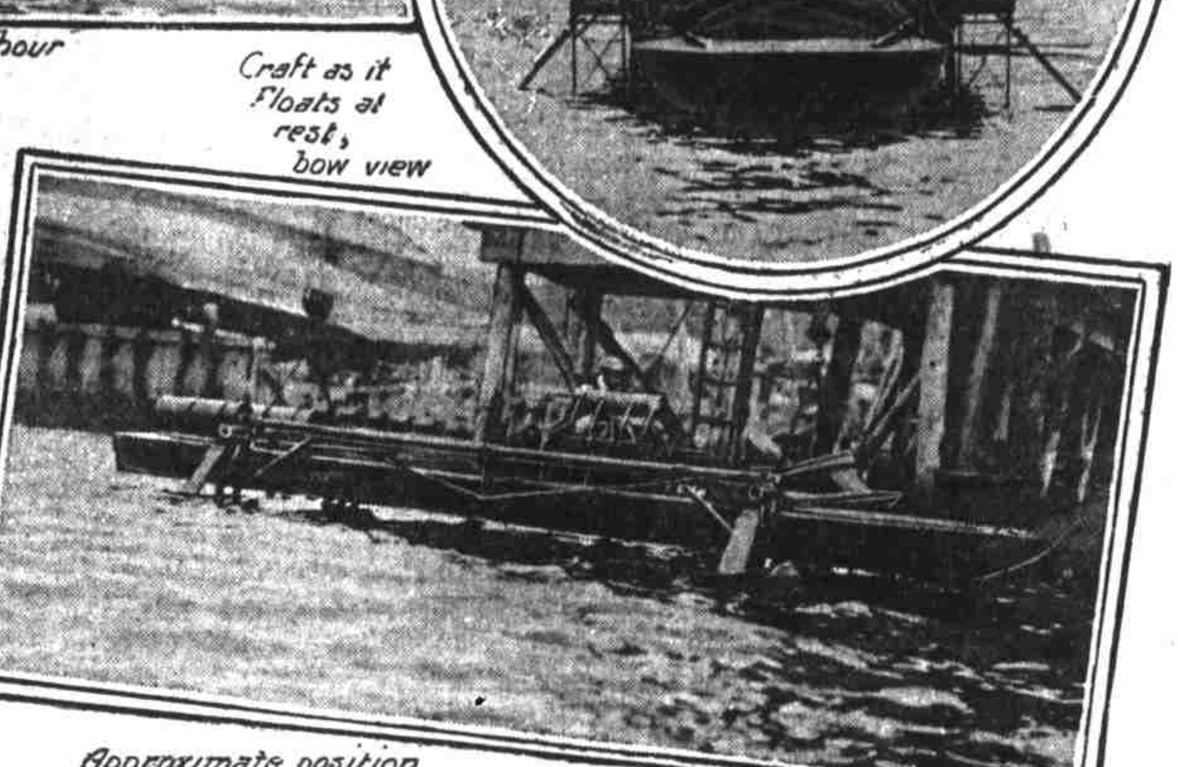
Across the ocean in 30 hours! Even the fleetest seagoing greyhounds of today will seem like canal barges in comparison. Sea sickness will be banished and Europe will become America's next door neighbor.



Approximate position in water at 6 miles an hour



Craft as it Floats at rest, bow view



Approximate position in water at a 30 mile Speed

AS YET Mr. Hewitt's experiments have been confined to his first model, a craft 27 feet long and weighing about 2630 pounds.

With two passengers aboard, this flying vessel has made thirty-eight miles an hour on Long Island sound. And it has not been pushed to the limit of speed!

Mr. Hewitt has no doubt that, even with this model, which is about 1000 pounds heavier than it might be, he could speed along at fifty miles an hour; but thus far he has not allowed the craft to travel that swiftly. "The chance of striking a log or a big wave at the rate of fifty miles an hour," he says, with a sort of dry humor, "should be avoided, if possible, with such a small craft."

For many years marine architects have found that the great obstacle in the way of swift ocean traffic has been the fact that, with any great rise in speed, the resistance of the water to the boat increases enormously.

This is so to such an extent that to double the speed in an ordinary vessel it has been found that eight times the power is necessary; to triple the speed, twenty-seven times the power.

It has been the dream of the marine architect to construct a boat which would not have to cut through the water, but which would glide over it. The only resistance that would be met in such a case would be the air and the support of the boat. It was found that boats could be lifted out of the water by means of planes.

The tendency of the plane to rise in the direction in which it is propelled has been known for centuries by kiteflyers; and this principle, when applied to boats, was successful to a degree.

As long ago as 1860 the British government carried on experiments on this line, and in 1896 Count de Lambert, a Frenchman, actually built a boat which was lifted out of the water by means of planes attached to its keel, and several gliding crafts appeared on the Seine.

But there were two obstacles in the way of the development of gliding crafts for a long time. In the first place, the engine, until the invention of the gasoline engine, could not be easily secured light enough to be lifted out of the water by means of planes.

In the second place, after the gasoline engine was made available, the great obstacle met was this: When the boat began to go at great speed, there was nothing to prevent the planes from rising to the surface of the water themselves, it being their tendency to rise in the direction they were propelled.

CONQUERED GREAT OBSTACLE

It is this great obstacle of the rising of the planes out of the water, when they are supposed to support and hold the boat on a constant level, that Mr. Hewitt has met and conquered in his little craft. And, in doing so, experts believe that he has removed practically the greatest obstacle to swift water traffic.

Instead of eight times the power being necessary to double the speed, only approximately double the power is necessary.

Nothing more simple in construction and appearance can be imagined than this little craft, which has been seen frequently this summer on Long Island sound. It is a shallow structure, 27 feet long, with a 4½-foot beam. In appearance it resembles nothing so closely as the body of a rowing shell, wider, of course, with a gasoline motor in the bow.

The shell is made of mahogany, and is really the least important part of the boat. Its function simply amounts to this: It carries the machinery and floats the remainder of the craft when it is at rest on the water. In motion, it represents only so much dead load, or weight, to be lifted and carried by the planes.

The important part of the structure is a strong steel frame, similar to an automobile frame, which extends along the sides of the shell and across either end. In other words, the frame is placed over the shell, straddling it.

From this steel frame, at each of its four corners, are suspended perpendicular flat steel arms, which are dropped into the water, extending about eighteen inches below the bottom of the hull.

To the arms are fastened steel planes, each one of them having a slight slant upward, from the back to the front, the slant of the bottom ones being one in eight. There are two sets of planes, front and rear, similar in arrangement.

The lowest planes are the four main planes, two in front and two in the rear. They have a surface of two square feet, eight square feet in all, which is sufficient to support the total weight of the boat at a speed of thirty miles an hour.

These four main planes are always submerged. There are several other planes above these, both larger and smaller, and these at times emerge from the surface, although they, too, assist in raising and supporting the boat out of the water at slower speeds.

The single-screw propeller turns just back of the front set of planes and it likewise is always submerged when the boat is in motion.

In the fore part of the boat is the eight-cylinder gasoline engine of about 100 horsepower. In the rear part there are seats for two passengers. In the stern, on each side of the shell, is a gasoline tank.

In motion, this apparently simple craft operates in this manner: The screw drives the boat forward, and the slightly slanted planes hung from the ends of the steel frame rise in the water according to the tendency of the plane to rise in the direction in which it is propelled.

The function of the planes is not to increase the speed, but to lift and maintain the boat out of the water, so that the only resistance to its progress shall be the resistance of the air and that of its support. The greater the speed, the greater the friction of the planes with the water, and the greater the lifting power, and, consequently, the higher the rise of the boat out of the water.

When the boat reaches a speed of from twelve to sixteen miles an hour, it is already out of the water. At the rate of sixteen miles an hour, the topmost planes begin to leave the water; the four main planes, however, remain submerged. When the boat is going at the highest rate of speed almost all of the topmost planes are out of the water.

One might expect that, if the speed were still further increased, there would be nothing to prevent all of the planes, including the lower main ones, from issuing out of the water, and that the boat would thus lose the support which holds it suspended in the air.

This was an obstacle that was met before in this sort of craft, and was not overcome. The function of the planes being to lift the boat out of the water and maintain it there, the problem amounted to this: The boat should be kept at a constant level, neither sinking into the water nor rising so far out of it as to carry its main supporting planes to the surface.

Mr. Hewett's device has means, not only of supporting the boat above the level of the water, but of keeping the main supporting planes below the surface at all times.

In the first place, his four main supporting planes, with an area of eight square feet, are placed so deep in the water that no speed which his present craft could attain would be sufficient to bring them altogether to the surface. But, even if speed sufficient to bring them to the surface ordinarily could be attained, he has a contrivance which would prevent it.

It is for the purpose of maintaining the level of the boat that he has two series of planes, the upper and the lower, and the boat can neither sink to the surface nor rise so far out of it as to draw the lower planes out.

The upper series of planes, some small and some large, are so placed that they, too, are in the water when the boat starts, and help raise and support it out of the water.

As the speed increases, however, one at a time they emerge from the water. When each emerges so much supporting power is lost, and the craft remains at that level until the speed is changed.

If the speed is increased, the main supporting planes will drive the boat out of the water a little further, and the boat will skim along at a slightly higher level. For each speed there is a different level.

Each one of the surface planes, coming out of the water, one at a time, and then dipping in again, operates to maintain a perfect level for the boat at a given distance above the water. The surface planes might be called the maintaining planes, while the four lower main planes might be called the supporting planes.

When it reaches the speed of sixteen miles an hour, the boat is perceptibly out of the water. Its appearance at this and higher speeds is peculiar. It glides over the water, a long, narrow shell, swifter than any motor boat, with a long line of spray in its stern.

It goes as smooth as if it were skimming along ice, but the space between the bottom of the hull and the water is easily discernible. It does not rock or pitch in its motion, but shoots along straight as a bird. It has been remarked that one of the results of the invention, if utilized for ocean steamships, will be that seasickness will be unknown.

There is another contrivance for offsetting the tendency of the planes to rise out of the water besides that of having surface planes to maintain the level. It can be done by adjusting the slant of the planes.

Mr. Hewitt has found that the slant of the planes should be from about one in seven to one in ten. It is obvious that, if the angle of the planes is great from back to front, the boat will be driven out of the water sooner than if the angle is smaller.

The story of the construction of Mr. Hewitt's wonderful little craft is as much that of a discovery as an invention. In principle, it might be called an airship as much as a sea vessel. At any rate, it was while studying the art of flight that Mr. Hewitt found that he had really solved the problem of swift ocean traffic.

Before he wished actually to attempt flight, there were certain practical problems, he said, connected with aerial travel which he wished to solve and which could only be solved by experiment.

BEGAN WATER EXPERIMENTS

With this object in view, Mr. Hewitt, instead of experimenting in the air, turned his attention to water as a medium for experiment in the problems which he wished solved. His reason for this was that he considered water a more advantageous medium for experimentation.

In the first place, water is a heavier medium, its weight being approximately 800 times that of air. Mr. Hewitt figured accordingly that the supporting surfaces of the aeroplane, such as wings or planes, and similarly the propeller, would only have to be made 1-800 the weight in water to have the same effective lift and power as they would have in air.

The water device being so much smaller, made his experimentation—always a great expense to the inventor—much more economical. He intended after having solved his problems by means of the water device to apply the results to the construction of an aeroplane, merely making its appurtenances 800 times larger.

While experimenting, however, the performances and promise which his water device gave of high speed impressed him, and he became convinced of the future of immensely high speed on water.

In order to have a large transatlantic steamer built as a gliding craft, the planes would have to be constructed large enough to carry its monster hull thirty feet out of the water, that being practically the height of the waves above the trough of the sea in midocean.

Every experiment has indicated that the principle is better adapted to large vessels than to small vessels. It is too early yet to tell what the development of the demonstration may bring forth in transoceanic travel. This is as yet really only a laboratory craft, and only an inventor knows what a gap there is between the laboratory and the commercial product. But as for swift ocean traffic, a hundred miles an hour, the problem will be up to the engineers. Propellers for that high speed will have to be constructed.

"I have been greatly impressed, aside from the peace aspects of the craft, of its possibilities in war," said Mr. Hewitt. "For torpedo boats and messenger boats, a gliding craft would be more than available.

"Experts say that in naval warfare guns cannot be trained accurately on a vessel going swifter than thirty miles an hour. So a torpedo boat going sixty miles an hour could practically do pretty much as it pleased."

Mr. Hewitt was asked whether his planes, which were so delicately constructed, would not be liable to great injury when going at tremendous speed through the water by striking derelicts, or even small objects, liable to do more injury and danger than the hull of a boat.

"Well," he answered, "you might consider it so. But on a large vessel the planes will be proportionately large. They will be made of steel and will brush aside objects in their way just like a propeller. They are liable to no more injury than a propeller today.

A PROLIFIC INVENTOR

"As for icebergs and derelicts, they are fatal to ships crashing into them. But note this! In a gliding craft you have two chances, at least; if your planes are injured, you drop down on your flotation hull; while in an ordinary boat, if your hull is injured, you have the chance of dropping to the bottom."

"Have you ever met with any accident while going at great speed?"

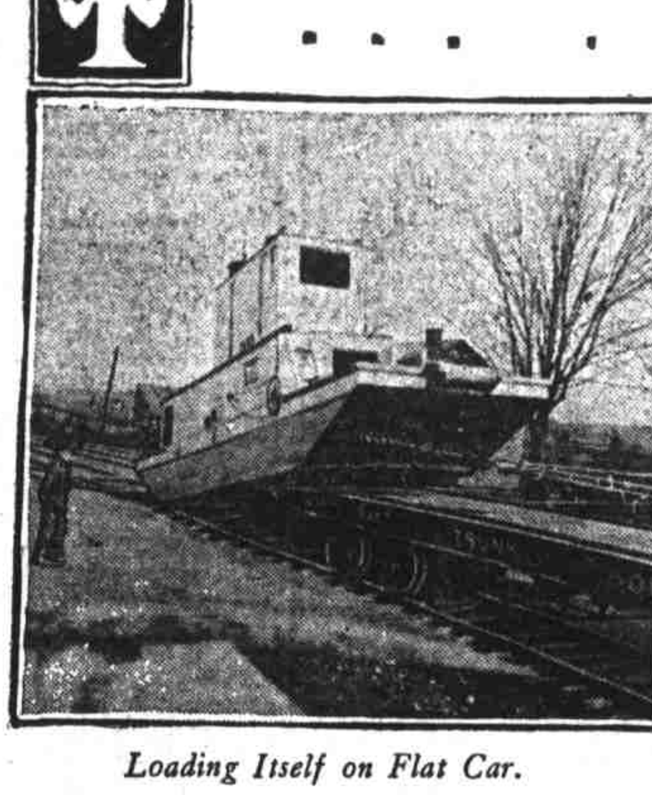
"Why, yes. About a month ago I hit a log. It was about five feet long and eight inches thick, and its weight I estimated at about 250 pounds, because it was pretty well soaked.

"I was going at the time at about thirty miles an hour. The gliding craft stopped dead when it struck and dropped into the water. It was towed in and hoisted up on the davits to see what had happened. The planes had driven into the log about two inches, and the log was stuck there, and had to be pried off with a bar."

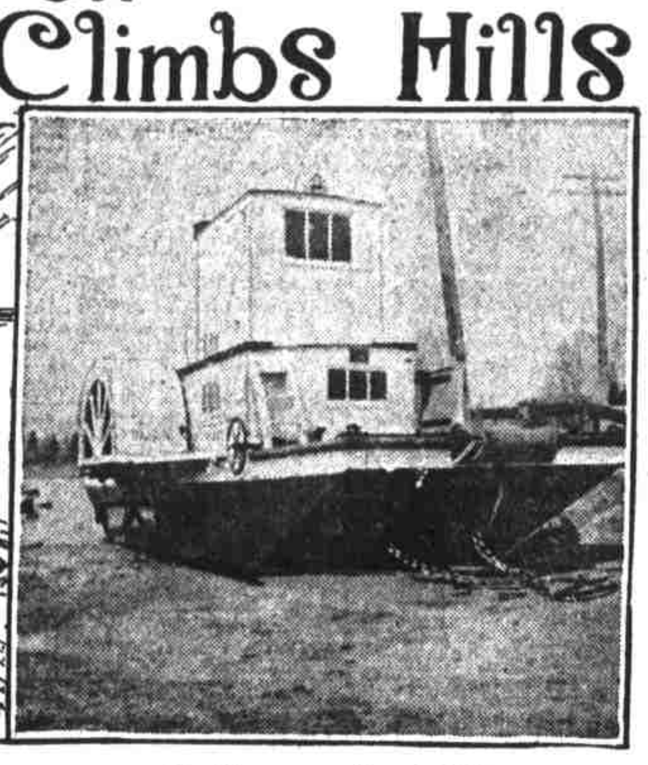
What is considered Cooper Hewitt's greatest invention, and by some in its possibilities one of the great inventions of the age, is the Cooper Hewitt converter, or valve, for converting alternating electric currents into direct currents. When more fully developed, it has been said that this invention will have an effect upon future electrical industries which will be enormous.

Mr. Hewitt has always been interested in flight, but it was not until of late years that he actually turned his attention to the solution of the problem. Upon the actual designs and figures of his present device he has been at work about two and a half years.

This Steamboat Runs on Land and Climbs Hills



Loading Itself on Flat Car.



Starting on a Land Trip.

IN THE wilds of the Canadian timber lands, and elsewhere in the world, a remarkable boat has come into use on the rivers and lakes.

Not only does it run on water, but, like a wagon, travels on land. By power created within itself it can sail the waters, can climb out on land, crawl over hills and, if necessary, load itself on freight cars.

It is capable of moving a boom of 60,000 logs. Men engaged in felling timber in the Canadian forests live and sleep in the vehicle-craft.

The boat, which is called the Alligator because of its reptile-like movements, is manufactured by a concern at Simcoe, Ontario. The boat has been used in the Canadian forest since 1899. At present eighty-three are in service in various parts of the world.

UPON its completion at the shipyard, and after its machinery is started, the boat crawls slowly across the yards, and, without other power than that furnished by its own mechanism, rears its ungainly bulk, and climbs over suitable scaffolding, apparently of its own volition, upon the flat car, to be carried to its destination.

There, after crawling down and into the water, it steams slowly away to the Canadian wilds.

Here it will glide as placidly over the surface of the waters as an ordinary boat, and then creep slowly out upon the bank like the uncanny monsters of old-time allegories, and proceed in the same manner through forest and morass, across apparently impassable swamps, up hill and down dale, dragging or carrying an enormous burden of logs, supplies, men, horses, provender and ofttimes a sawmill.

The boat is operated only by four concerns in the United States. Two are in Michigan and two in New York. Its use is confined chiefly to remote and wild places, where ordinary boats are not to be taken.

In these wilds the gigantic creature, which can pass over land and water, has proved of invaluable service to man. In South America, where a number are now in use, it carries men into the inmost depths of the forests, and, after their work is done, men can live in the boat, secure from wild beasts and in homely and comfortable conditions.

The Alligator is a steamboat and steam winch combined. The engine can be thrown in gear to drive the paddle wheels like an ordinary steamboat. If desired, the power may be applied to drive a cable drum located in the bow of the boat, holding a mile of ⅝-inch steel wire cable, which is used in warping upon the water and in conveying the boat across portages by land.

The scow-shaped hull measures about 45 by 11 feet beam, and is decked with berths for sleeping accommodations. The boat is not built for grace and beauty, but for strength and durability.

The sides are made of pine six inches thick, while the bottom is of solid white oak, covered with steel boiler plate. So great is the power furnished by the 22-horsepower boiler and the 20-horsepower engine that it can easily convey a log-boom of 60,000 logs under favorable weather conditions.

The manner in which the Alligator is made to travel on land, climb hills—scaling heights with an elevation of one foot in three—load itself on a flat car and descend into valleys is an ingenious one.

On the bottom of the boat, six feet apart, are two runners of steel. Near the bottom and attached to the bow of the boat is a heavy chain, to which is fastened a single-block pulley. Another single-block pulley is taken to a tree on the side of the road and made fast.

The cable is passed round the block at the tree, brought back round the block at the bow chain and fastened to a tree opposite the first on the roadside. Power is then applied to the steel cable drum, and, as the rope winds on the drum, the boat moves forward, keeping a straight course between the two anchorages.

To guard against tipping, the boiler is of special design, hung on an axle in the center. A screw arranged on the front end enables the fireman to tip it forward or back in going up or down grade. The helm is hung with a hinge, so that it will lift up on land, dropping back to its former position of its own accord when on the water.

No roadway is required for a run on land, logs and skids being thrown a few feet apart across the pathway to keep the shoeing from grinding on the rocks and earth. The boat can travel from one to two miles a day.

With the growth of our rapid civilization has come an enormous demand for timber of all kinds. As the demand has increased, the supply has diminished, until lumbering operations have been driven northward. Of late years they have penetrated regions inaccessible to ordinary methods and conveyances.

Especially is this true in the Canadian forests, where abound numerous chains of small lakes, connected by small and uncertain outlets. To reach them the way lies over hills and hollows, through narrow winding waterways, cut up by riffles and rapids, where portages are often necessary.