NAVIGATION

Ships Turn Like Crabs

Rotating propellers, to replace clumsy screw type, maneuver ships in less space through crowded waters and enable vessels to dock without tugs.

By BARBARA M. HALL

➤ A NOVEL kind of ship that can turn in its own length and move crab-like backward and sidewise is churning up a lot of interest in marine engineering circles. "Cycloidal" is the name of the new propeller that makes this possible. It consists of blades that look something like the agitator in your mother's washing machine.

Captains of the new rudderless ships can maneuver them into a crowded docking space the way a harassed motorist often dreams he could slide his car into a tight parking space.

It has taken a long time for cycloidal propulsion to arouse the interest of American marine engineers and men of the sea. Shortly after the first World War, Dr. Frederick Kirsten, professor of aeronautical engineering at the University of Washington, invented this radical change in the method of propelling ships through the water. Dr. Kirsten, holder of some 75 patents, was known as a designer of electric power stations, fluorescent tubing, elecric moth killers, wind tunnels and pipes.

Tried on Speedboat

Commercial marine men were not interested in the new propeller, so Dr. Kirsten installed a series of rotating blades on his own 38-foot speed boat. If nationwide publicity had been given the success of the cyclodial propeller at that time, the old type screw propeller might not have guided U S. warships in World War II. Raced against screw-propelled speed boats of identical horsepower, Dr. Kirsten's boat passed each craft with amazing maneuverability.

While Americans smoked Dr. Kirsten's pipe and benefited from his lighting and research corporations, it took the Germans to grasp his cycloidal propeller and put it to wartime use. Adopted and perfected by the Voith Schneider Company in Austria, rotating propellers soon appeared on many small river and harbor craft in Europe.

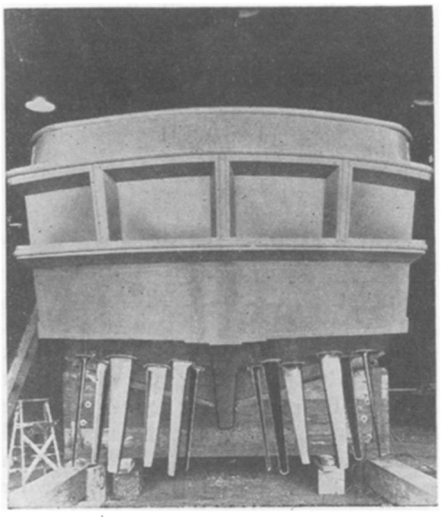
Unlike the cumbersome screw propellers, cycloidal blades are assembled and fitted into a well built into the underwater part of the stern. No rudder and complex stern construction are needed, for the control of the propeller is all tied into a central control stand in the ship's main engine room. Movement of this control lever one way or the other can reverse the ship without changing the engine throttle. To insure that the mechanisms within the propeller hub which is under water at all times remain dry, a special type of rubber gasket seal is used where each blade is joined to the hub.

Blades Are Narrow

Unlike the huge, fan-shaped screw propeller of most vessels, cycloidal blades are narrow and hang from the hub, like knives ready to dig into the water.

With cycloidal propellers, a captain can turn his ship on a dime or stop the craft in its tracks by changing the angle at which the blades turn. Mounted vertically on the rim of a horizontal disc, four or more blades, moved in a 360-degree circle, scull the vessel ahead. The entire disc is revolved by gearing driven by propulsion engines.

Here is the point at which the American and German ideas parted company. The Kirsten "fixed pitch" propeller, like the conventional screw propeller, requires a clutch and engine speed control to alter the motion of the ship.



TUBBY — Cycloidal propellers dip into water like washing machine blades.

The German "variable pitch" propeller also turns the ship by varying the pitch of the blades with one important addition: the angle of the pitch can be changed in any direction without slowing down the engines. No clutch is needed to turn the ship at any speed, yet the cycloidal propeller gives an effect similar to that of the clutch on your car.

More complicated and more expensive to build, the Voith Schneider propeller is now being perfected in the research laboratories of the Army Transportation Corps. Plans and sample wheels of the superior German model, captured from a Voith Schneider plant under shell fire in Heidenheim, Germany, during World War II, have supplied most of the technical information needed to develop the propeller in this country. The Germans had already installed cycloidal propellers on at least 100 fast minesweepers, two aircraft carriers, three catapult ships for sea planes, and four huge self-propelled cranes.

Propeller Passes Test

At Ijmuinden, Holland, a diesel-powered 135-foot German mine-sweeper, equipped with twin variable pitch propellers, was turned over to the Army Transportation Corps. When no deck space for the small captured ship could be found on American-bound freighters, the Army decided to take it across the Atlantic under its own power, even though the mine-sweeper was designed for coastwise service and not for long range cruising.

This was a lucky decision for the future of cycloidal propulsion, for the Voith Schneider propellers proved their seaworthiness under such severe weather conditions that the captain wrote in the log afterward: "without cycloidal propellers the craft certainly would not have survived the rough sea." Her arrival at historic Fort Monroe, Virginia, late in November, 1945, marked a significant event for U. S. marine engineering: the first successful ocean crossing by a rudderless craft equipped with rotating variable pitch propellers.

More than twenty years after his invention, Dr. Kirsten is back in the cy-

cloidal picture. While the Army combed Germany for variable pitch propellers, the Navy constructed two fixed pitch cycloidal propellers, with the aid of Dr. Kirsten.

Strange actions of the Navy landing ship 458 in recent tests of the fixed pitch model at Puget Sound finally aroused the interest of shipbuilders. During the test the LSM 458 saved a powerful tug from disaster when wind and tide conditions in Puget Sound were at their worst. Had the craft been equipped with screw propellers instead of the cycloidals, maneuvering limitations would have left both ships high and dry on the beach.

Superiority Proved

Once again cycloidal propellers proved superior to screw installations—this time for the Army. An Army 46-foot tug, equipped with a 110 horsepower gas engine and cycloidal propellers, in a tug of war with a 165 horsepower diesel tug, actually pulled the opposing ship backwards—even when handicapped by the conventional ship's head start.

In an attempt to duplicate the advantage of the German wheel at less cost and in a design more suitable for mass production in this country, the Army, with the aid of Dr. Kirsten, is installing variable pitch propellers on a 125-foot experimental mine planter. Tests have not yet been run on the mine planter, but by the time it is ready, the Army plans to have completed three or four additional cycloidal designs better than the German model.

Inland waters, crowded with harbor tugs, floating cranes, river towboats, buoy tenders, landing craft, and fishing boats, will see fewer traffic jams once cycloidal propellers take over. It won't be long before small craft, equipped with rotating blades, will move freely in and out of docks.

Cycloidal propellers for the largest—perhaps atomic powered—ships may be farther in the future. So far only smaller craft have been built for experimental tests. But to Dr. Kirsten and the many marine men who have adopted his invention, cycloidal propulsion is not to be limited to river and harbor boats.

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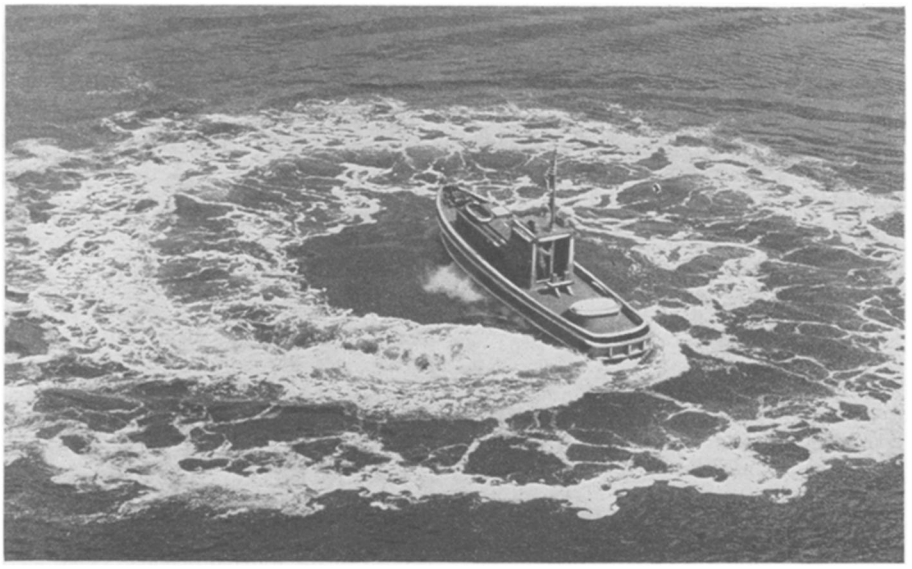
Canadian *birds,* that winter in the United States, eat the dark, gritty-looking fruits of the sumac and the pallid, gray-white berries of poison ivy; by digesting the pulp and not the seeds of these plants, the birds spread the seed far and wide.



CRABLIKE—Navy landing ship, equipped with rotating propellers, turns in its tracks.

GENERAL SCIENCE

Boys See Aircraft Shows

➤ TWO HUNDRED teen-age boys aiming for careers in science, especially aeronautics, from Detroit, Columbus, Cincinnati, Buffalo, Indianapolis and Cleveland are guests of the Navy at the National Aircraft Shows in Cleveland Nov. 15-24.

Each day for five days 20 boys, Navy Science Cruisers, will be flown by the Navy from their home cities to join their 20 fellow Cruiser-hosts in Cleveland. The 40 boys will be special guests of the Navy at the National Aircraft Shows and on a guided tour through the Cleveland laboratories of the National Advisory Committee for Aeronautics, seldom seen by the public. The visitors to Cleveland will be returned to their home cities by Navy planes at the end of the day of science sightseeing.

The 200 boys have been nominated as Cruisers for excellence in science as indicated by their school records and their science accomplishments. Many of them plan careers in aeronautics and scientific research. All of them are juniors and seniors in high school.

'The Navy is making a contribution to stimulating science among secondary school students," explained Vice Adm. Harold G. Bowen of the Navy's Office of Naval Research.

"We are concerned with increasing the number and improving the quality of scientists in this country. Scientific research and development has reached a point in our lives where to ignore it or even be casual about it would be folly of the highest order."

This is the second Navy Science Cruiser program. (See SNL, Oct. 19, 1946.)

Science News Letter, November 16, 1946

ASTRONOMY

Eleventh Magnitude Comet Is Spotted in Columba

➤ A FAINT comet has been located in the southern constellation of Columba, the dove. When spotted on Nov. 1, it was of the eleventh magnitude, far too faint to be seen with the naked eye or binoculars, according to a cablegram received at Harvard Observatory from Dr. J. S. Paraskevopoulos, superintendent of Harvard's Southern Astronomical Station.

Located by M. J. Bester of Bloemfontain, South Africa, the comet will be named after its discoverer. Mr. Bester also spotted a faint comet early in October, but this was later identified as the recurrent Comet Temple 2.

The new comet had moved into the constellation of Caelum, the graving tool, when sighted on Nov. 5 by Dr. G. Van Biesbroeck of the Yerkes and McDonald Observatories of the Universities of Chicago and Texas.

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