LAYING PLANKING

It is placed across a framework of copper and bronze. Only 700 pounds of the 600,000 pounds of metal on the vessel will be iron or magnetic steel. Cables and anchor, for example, are of bronze. Bronze rivets cost more than a dime apiece, bronze bolts for planking cost about 62 cents each.

PHYSICS

Unique Sailing Ship Will Cruise Seas for Science

British Brigantine-Rigged Craft, the Research, Will Have Hull of Teak With Magnetic Iron Barred

IN A QUIET reach of the River Dart in Devon, England, the most unusual ship in the world is now rapidly taking shape.

It is the Royal Research Ship Research, half a million dollars' worth of sailing vessel which is to set out next year on a series of voyages which will both make maritime history and advance man's knowledge of the earth on which he lives.

The R. R. S. Research will conduct surveys of variations in the magnetic field surrounding the earth, and thereby aid every man, whether aboard ship or airplane, who has to steer by magnetic compass.

Because study of magnetic variations is its prime purpose, as little magnetic steel and iron as possible have been built into it. Thus, naval architecture has taken a seeming step backward, returning from an era of steam and Diesel power to sail, to enable a scientific stride forward.

There is nothing like the Research today, for the trim Brigantine-rigged craft replaces its only predecessor, the American ship "Carnegie," which blew up and burned off Samoa 10 years ago. Since research is the new vessel's purpose, its construction has been marked by international participation and the results of her voyages will be available to all. The services of W. J. Peters, former commander of the "Carnegie," which was operated by the Carnegie Institution of Washington, for example, have been loaned to the British Admiralty, which is building the Research.

By using often expensive and ingeniously contrived substitutes, the naval architects who have designed the Research have been able to dispense with all but 700 pounds of magnetic metal on the vessel. And this small amount, a tiny fraction of the 600,000 pounds of metal on the ship, is confined principally to the auxiliary engines and dynamo.

Crew members, who, with four scientists aboard will number 31, will not even be permitted to carry steel pocket knives. The cables, anchor and all bolts are of bronze. Cooking utensils will be of aluminum. Food will be packed in bottles or cartons; no packing cases will be allowed, in order to make sure there are no stray packing case nails affecting the accuracy of the studies.

Bronze Rivets

Special squads of men have, in fact, been detailed to watch carefully over the boat's construction to make sure no iron sweepings are left. Rust is carefully scraped out of holes drilled to receive bronze rivets costing a dime apiece before the rivets are driven home.

The hull is of teak, famous heavy wood of the tropical Far East. Ancient arts, such as caulking with oakum, to seal the spaces between planks, have been revived in the construction of the Research.

Fuel oil for the Diesel motor which will give the Research a 2,000 mile cruising range at a speed of six knots will be carried in bronze tanks. Other liquid supplies will be contained in teak. A special crankshaft of non-magnetic steel had to be designed for the Diesel engine.

The reason underlying the expensive forethought that has gone into the two-masted ship's construction is the fact that the earth's magnetic pole does not coincide with the North Pole, and that it is slowly shifting. Now located in western Canada inside the Arctic Circle, it was once much farther east. In order that navigation be accurate, detailed studies of how the compass reads at different points must be carried out. In order that they be accurate, no magnetic material can be permitted nearby as it would interfere with the readings.

A wealth of special scientific equipment is to be carried aboard the Research. Besides its magnetic variation studies, it will be equipped for investigating atmospheric electricity, meteorology and ocean soundings.

Nearly 10,000 cubic feet of teak have gone into the making of the hull in the yards of Philip & Son at Dartmouth. A special order had to be sent to Burma for some of the woods used. The two main-masts are to be of Columbian pine. Bronze is being used for the framework and propeller and aluminum bronze for the windlass and winches, standing rigging and other essential parts.

The rivets in particular proved an expensive problem. Each hole had to be drilled; if steel were used, 20 rivet holes could have been punched in the time taken to drill the hole for one rivet.

Though iron has been eliminated from bath fittings in every other respect—by installing enameled teak tubs, for example—the designers did find one steel part they have been unable to eliminate—razor blades. But crew members, as well as not being permitted to have steel knives, will not be allowed steel buttons on their clothing. The scientists and others who must keep records will have to use brass paper clips instead of the more familiar steel wire type. One or two chisels and a saw will have to be steel, but they will be stowed as far away from the instruments as possible.

The Research will indeed pick up where the Carnegie had to leave off, for its first voyage will be to the Indian Ocean, where the ill-fated American vessel was to have gone in 1930, the year following its unforeseen disastrous end. Already, the Research's captain, Commander D. H. Fryer, is getting ready for his novel duties by taking a long voyage on a sailing ship.

Science News Letter, April 1, 1939

YOU WON'T SEE THIS OFTEN

Skilled craftsmen revive an ancient art by pounding in strands of oakum, later to be sealed with tar, to make the R. R. S. Research hull watertight. The hull is of teak. The days of "wooden ships and iron men" are not coming back . . . the men can't be iron on this boat. Crew members won't be permitted steel buttons or knives.

ARCHAEOLOGY

Solve Math Problem Of Egyptian Workmen

TWO Egyptologists have set themselves an arithmetic problem: Knowing dimensions of a huge artificial lake at Thebes, and the brief time in which Egyptians dug it, how many workers were required?

Reporting their work in the Bulletin de l'Institut d'Egypte, R. Engelbach and J. W. Macaldin take a privilege that school boys would envy. They offer two answers.

Either Pharaoh Amenophis III put 242,652 men to work on this lake of his, or else he employed 777,262. Even the smaller number would populate a sizable city. The men were rushed to work on the lake project and 16 days later water was let in, and Queen Tiy and King Amenophis sailed regally on their newest possession.

That Egyptians could organize for so swift a job is impressive. Amenophis announced the news of the big lake on a commemorative scarab, which told practically everything a news reader would want to know except the amount of labor. That probably was not rated of news interest in 1396 B. C. The lake was over a mile long and over half a mile wide.

The Egyptologists get two answers as to laborers required because they do not know how far away the excavated earth was carried. If workmen dumped earth close to the lake, for the time being, 140,716 carriers would have been enough. If earth was removed to mounds farther off, 675,366 carriers were needed. In addition, the Egyptologists figure 50,968 diggers and an equal number of assistant diggers were required. They figure the problem by assuming the excavation was divided into bays in which gangs of diggers and carriers worked together. Egyptians work that way today.

Why Pharaoh Amenophis, one of Egypt's most glamorous and luxury-loving rulers, wanted the lake dug is uncertain. It may have been for his wife's enjoyment. Or it may have been designed as the private harbor for palace boats.

Science News Letter, April 1, 1939

PSYCHOLOGY

Color Blindness May Be In Mind as Well as Eyes

THE extremely close ties between the workings of the human mind and the human body are given new emphasis by an experiment in which color-blindness was produced by suggestion in a hypnotic trance.

When you see red, it is because of certain physical signals to the retina of your eye. But the interpretation of these signals as red—in fact the perception of them at all—depends upon your mental "set."

At Eloise Hospital, in Michigan, Dr. Milton H. Erickson hypnotized six persons with normal color vision and by suggestion deprived them of the ability to see red, green, red-green, or any color at all. The results he reported to the *Journal of General Psychology*.

It was not a simple task. First, under hypnotism the subjects were made completely blind. When they awoke from their trance, they were still blind and suffered from all the distress that you would feel if you suddenly roused from sleep without the ability to see.

This put them in a frame of mind to accept the restoration of sight upon any conditions set by the hypnotist. The condition was that they might see objects but not all colors. The suggestion of blindness for one color was carefully made so that the subject would lose all awareness of that color and even the name of it would become to him mere nonsense.

A strange incident occurred to emphasize the actual complexity of the relatively "simple" vision of color. One man who had in this manner lost his vision for red happened, more or less accidentally, to attempt to count his fingers. He