

THE MOLDS FOR A CONCRETE SHIP—OUTSIDE VIEW.

homogeneous body, and the union between his concrete and his embedded metal is perfect.

"Engineer Fougner does not have recourse to molds as the term is ordinarily understood in concrete construction. He forms his metal lath in a double wall and pours his cement in between. Some of the concrete, of course, works through the perforations and takes the shape of knobs upon the two outer surfaces. These knobs form, in turn, the anchorage upon which he lays the coating of the inside and the outside of his vessels. The steel bars that constitute the prime reinforcing feature are, as might be expected, set in place between the two separated walls of metal lath. The outer surface of the Fougner hulls is finished by hand, and this makes it possible to obtain a very smooth skin. As a result friction is surprisingly low; and in the case of the barges built, the boats have been found easy to tow.

"It is quite likely that the cement gun will be employed hereafter for laying on the bulk of the surface coatings of concrete, and only the smoothing up will be left to hand-work. It has been found advantageous to resort to water-proofing, especially where the vessels are exposed to frost. The process is said to be thoroughly satisfactory.

"By way of contrast, it is interesting to examine the pictures of concrete ship-construction as practised under the more familiar mold system. The two views of this which accompany the present discussion are of a vessel which will be launched some time in March at San Francisco. Its cost is estimated at \$750,000, against \$2,000,000 for the ordinary steel ship of the same size."

A warning not to be too sure that the concrete ship is going to replace the steel one is put forth editorially by *The Engineering News-Record* (New York, November 15), which is of the opinion that "rosy expectations are pretty far ahead of present knowledge." It says:

"One highly experimental ship of large tonnage is on the ways at San Francisco, a small, motor-driven vessel has been launched at Montreal, and several small ships have been built in Scandinavian countries. These represent the efforts of thoughtful engineers and business men to solve the tremendous problem of adapting concrete to the wracking and sudden strains of a ship at sea. Quite soon they and the committees appointed to investigate the question will be able to report the progress or the hopelessness, as the case may be, of the concrete ship. Until then the future will be veiled behind theory and experiment. For some time, however, there must be an orderly development in the size of ships experimented upon. There is no more relation between a concrete row-boat or launch and the 3,000-ton, 15-knot freighter demanded in the present shipping crisis than there is between the toy airplane and a giant *Caproni*. Step by step up through the scow, the barge, and the small-framed and formed hull must progress be made to the hoped-for large vessel for ocean travel. This is the normal course of all engineering design. On account of these necessary intermediate steps, it seems as tho there is at the present time a bigger field of practical work in the concrete barge for coast-wise, river, or canal trade. Here the gap between present knowledge and desired results is not so great and the possibility of immediate use is much nearer. If improved design and construction make such vessels seaworthy and permanent, as many of the early ones were not, some of the most serious problems of the big ship will be solved and at the same time some very necessary bottoms supplied."

BEWARE OF THE CALORIE

THE "GREATEST AMOUNT OF ENERGY for the least price" is not always what we ought to seek in buying food, tho it has been often advertised as desirable. Calories are important, but they are not the only thing to watch for in eating. An editorial writer in *The Journal of the American Medical Association* (Chicago) tells us that an undue regard for the calorie is apt to lead to "one-sided" regimens. Food that counts for little as "fuel" may furnish valuable salts and accessory compounds absolutely necessary to maintain life and growth. Sometimes substances quite devoid of nutritious qualities are valuable in food to give the required bulk, too concentrated a diet being often injurious. "Be cautious," our adviser concludes, "in accepting the invitation of the food-advertiser." Says the authority named above:

"In many respects—perhaps it should rather be stated, fundamentally—the food-problem is one of supplying digestible stores of energy. There is some danger, however, that the calorie may sometimes assume an unwise domination in the selection of human food-supplies. It is admitted that conservation should never mean undernourishment or malnutrition; but to avert possibility of these more remote dangers, wise buying of food must sometimes look beyond the energy measure in the selection of the dietary. We are impelled to this remark by reading the advertisement of a cereal food in a current journal address essentially to medical readers.

"The admonition is given to 'Eat food that will give you the most energy for the least money.' We may accept this advice and likewise admit the statement that 'calories measure food-energy the same as dollars measure money.' But when it is further added that 35 cents' worth of the advertised product will furnish 3,000 calories, a day's need, the implication of the sufficiency of this exclusive product as the sole constituent of the ration must be seriously questioned. It may be true, as the advertisement proudly proclaims, that more calories can be purchased in the form of the vaunted products for 10 cents than is the case in buying sirloin steak, lobsters, bananas, or even milk. Such standards of menu-making are objectionable, however, if they lead to a tendency to 'one-sided' regimens.

"To accept the advice, whether openly stated or implied, to live on a single dietary article, however inexpensive and digestible it may be, is to overlook the fundamental principles that are satisfied by variety in the diet. The fruits and green vegetables may be comparatively expensive when judged solely as sources of food-fuel; but they furnish salts and 'vitamines' and 'roughage' or 'ballast,' adding suitable bulk to highly concentrated foods like the cereals, meats, fats, and milk-products. No cereal or meat offers any considerable supply of lime to the organism; nor are the cereal proteins taken as a whole and by themselves ideal combinations from the standpoint of the present-day science of nutrition. The vegetables and fats are appropriate supplements to make a better balanced diet. In his aphorisms applicable to food-conditions in war-time, Bayliss has said, 'Take care of the calories, and the protein will take care of itself.' Yet this accomplished physiologist wisely guards against misunderstanding by adding that it is well to insure the presence of accessory factors by taking fresh fruit and salad.

"Let the novice be cautious in accepting the invitation of the food-advertiser when the latter overlooks the advice of the student of nutrition."

SOME AIR-RAID PSYCHOLOGY

ADAPTATION TO ABNORMAL CONDITIONS is strikingly shown by the behavior of the London population in the recent air-raids, which in some cases have occurred as frequently as five in one week. In London and its environs, says an editorial writer in *The Lancet* (London), the inhabitants have already gone a long way toward behaving in

LUMINOUS PAINT IN WAR

ARTICLES OF VARIOUS KINDS, coated with a "luminous paint" made of radium and zinc sulfid, are being turned out in quantity by an English firm for use in the Army and Navy. Zinc sulfid has long been known for its ability to "store" light. Exposure to sunlight will cause it to glow feebly for some time in the dark. By mingling with it an almost infinitesimal quantity of radium, the exciting function of the sunlight is rendered unnecessary and the glow is rendered practically permanent. Says a writer in *The Electrical Experimenter* (New York, December):

"Over 100,000 marching compasses are in daily use by the Allied armies, each fitted with a luminous radium dial readable at any time, even on the darkest night. Aeroplanes skim along through the night, the aviators guided by radium-bedecked compasses. At sea, the doughty little 'sub' destroyers shoot hither and thither with never a light to be seen—the radium-lighted compass-dial answers the question. The man using it can see the dial all the time, but you can not. Fig. 1 illustrates a clever use for 'luminous-paint' collars. These linen tabs present a luminous surface of ten square inches, and are for attachment to the back of the tunic, so that when the first line of men go over the top, they will not be mistaken for enemies in the dark by the second line of men who follow.

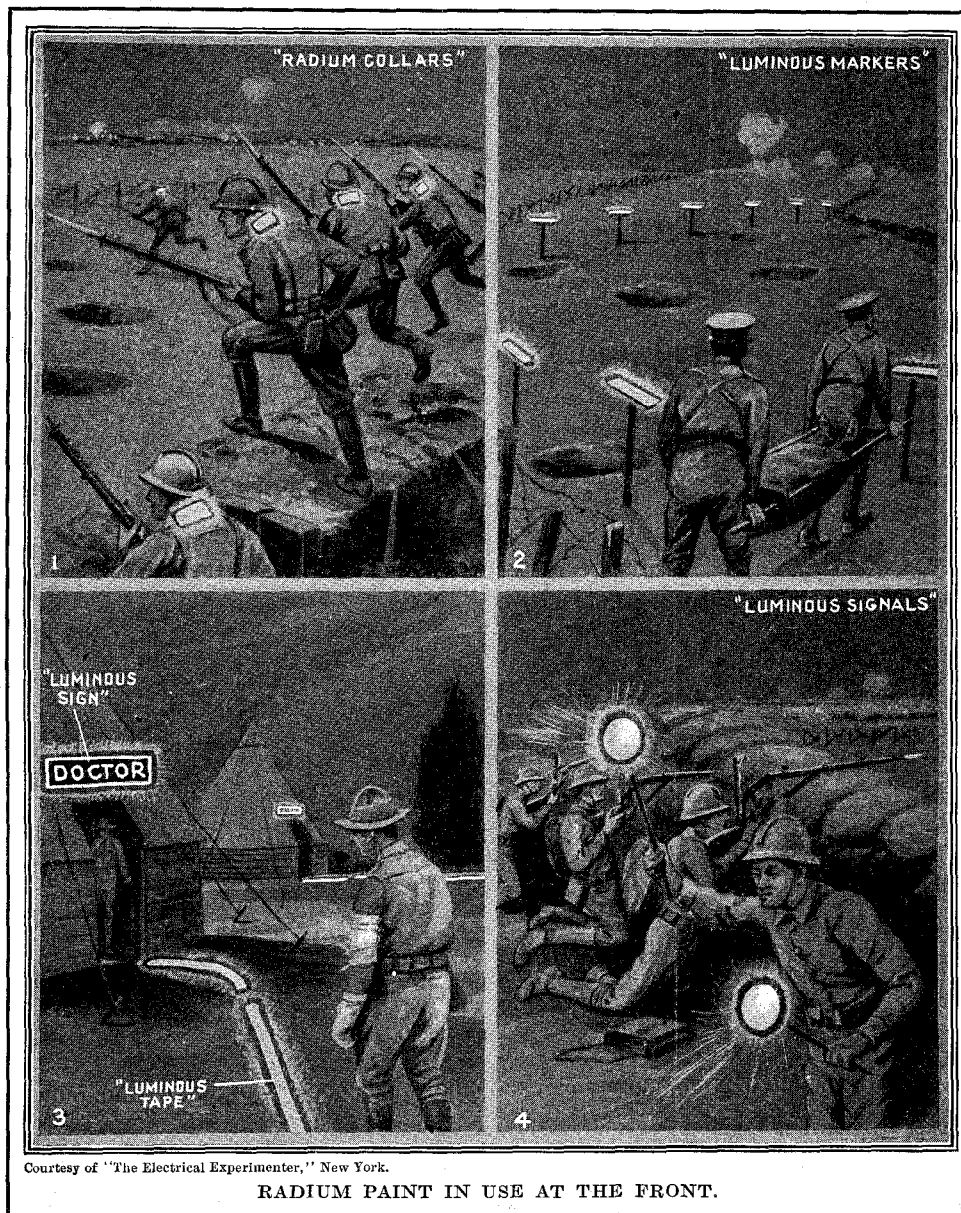
"The illustration, Fig. 2, shows a most useful beacon provided with a spike to be driven in the ground. They are also made in the shape of large buttons, the luminous painted top being covered with transparent celluloid, and surmounted on a small steel spike $\frac{3}{8}$ inch long, which, by pushing, enters into any woodwork, and when affixed to the top of short stakes driven into the ground and placed ten yards apart, afford a guide to relief-parties going and returning in the dark. One hundred of these, ten yards apart, will serve 1,000

yards, the stakes being placed in the day on chosen fairly level ground.

"One of the most useful articles for dark-night operations is 'luminous tape.' This tape, if placed on the ground and secured by stakes, metal rods, or stones, is prevented from being shifted by the wind. The 'tape-layer' places the tape in position during the day, choosing a safe path across the country, and diverting from the straight path according to the condition of the ground. The path should be wide enough for men to march four abreast up one side of the tape and returning the other side, say, in all, about twelve feet wide. Where this is not possible the tape-layer makes a break in the tape every few yards, and starts again continuously when the path is wider. Any obstacle in the way, such as a tree or post, could have a small length of tape tied around it (see Fig. 3).

"Should a ditch come across the path he would lay short pieces of the tape at right angles on either side of the ditch. In case of the ditch being over four feet deep, the man should have a luminous beacon with him and write on it the depth of the ditch, also the width, with a special pencil, and place it by the tape, when near the ditch.

"It is readily possible to form large letters out of this tape by nailing it up with zinc nails. Such signs as 'Fireman,'



RADIUM PAINT IN USE AT THE FRONT.

bulk with bravery and prudence. They have "steadily improved in courage and calm" and recover normal balance at once as soon as the strain of the actual raid is over. Says the writer:

"The evidence of medical men who reside in the attacked centers, or who have been present quickly on the scene of an accident, or who have been summoned to attend the victims of shock, all goes to show that the inhabitants of London have steadily improved in courage and calm as they have learned the measure and the sources of the dangers to which they are subjected; and we are glad to state positively that among those whose natural anxiety has been greatest—and there is not a soul among us who does not feel anxious during an aerial attack for himself as well as for those nearest and dearest to him—the power of recuperation has manifested itself with great rapidity. The recurrence of the dangers has tended not to exaggerate those dangers, as the enemy hoped fondly would happen if attack followed often upon attack, but rather has made the circumstances more tolerable; and it is this growing bravery which has become a feature of our psychology, and which accounts for the fact that a short relief from strain is almost invariably followed by a complete recovery of balance."