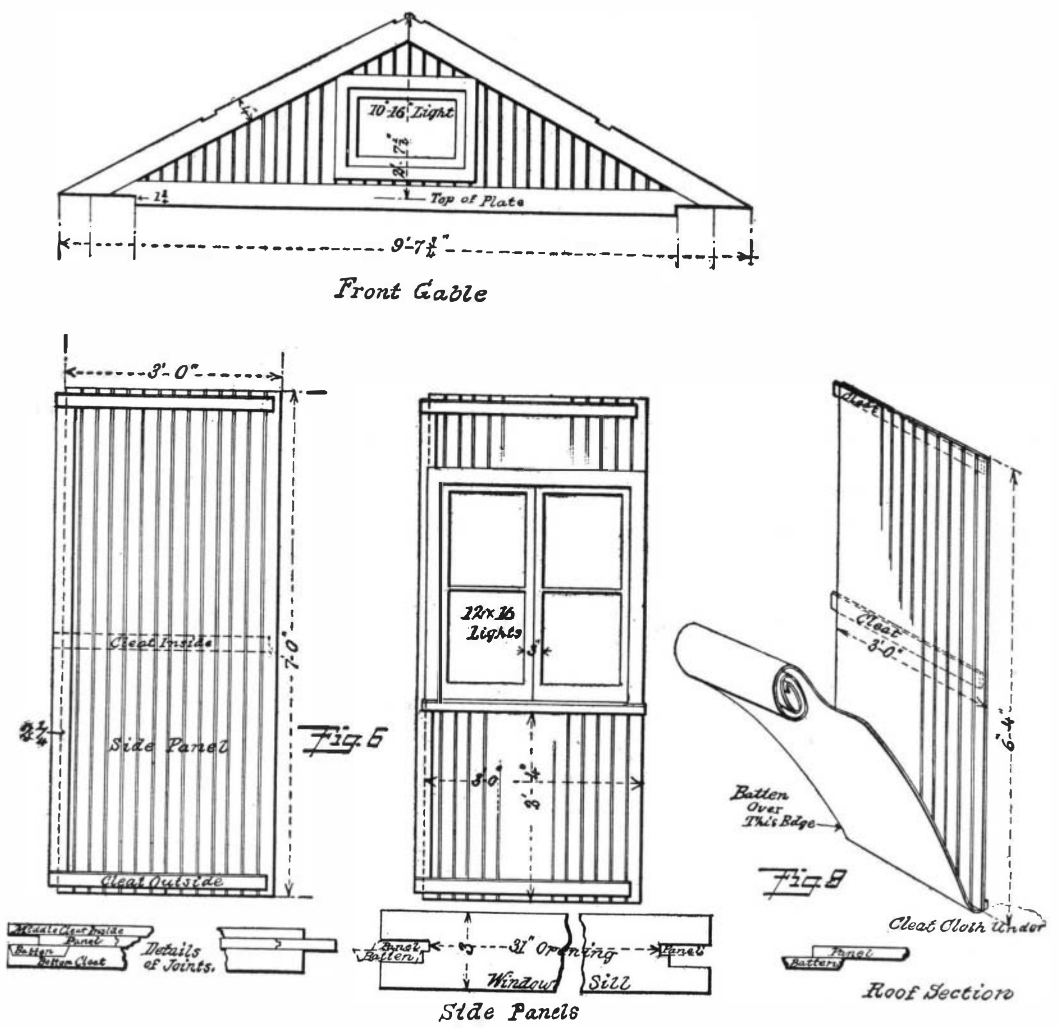
the other 5 inches wide, are beveled and put together with long wire nails. They are then put in place, and pieces of the 7/16-inch siding, 2 feet 9½ inches long, are slipped under the ridge boards to level up between the battens, and stove bolts are put through the ridge board, understrip, and roof section. This fastening adds much to the strength of the roof. Finish boards of the 7/16-inch material should be cut and fitted at the gable edge of the roof to give a neat appearance. To stiffen the door opening, brace boards should be put across inside from plate to post at the upper corners of the opening.

In the work of erecting the building no fastenings are to be used but bolts and screws, and to facilitate the work, provide two bitstocks, one for a screwdrive bit, the other for a proper size gimlet. After the house is finished, it should have three coats of paint well brushed into the grooves in the beading, etc. The inside of the doors should also be painted, since they are frequently exposed to the weather.

The panels, and all parts requiring time in the making, can be put together in a shop of limited space, and given a coat of priming paint before erecting the building. This coat should be of white lead and oil, possibly shaded with lampblack ground in oil, and thinned well with turpentine, so that it will strike into the pitchy surface of Georgia pine.

The house shown has been in use for a year, and has proved both tight and strong, in contradiction to the critics of the plan, who thought it would do all sorts of undesirable things under the heat and rains of summer. It is most essential that it be well painted before the weather acts upon it, and that it be kept well painted.



THE GABLE AND SIDE PANELS.

LUMBER BILL.

Side Panels and Roof Panels.—Matched and beaded Georgia pine ceiling stuff, 7/16 inch by 2½ inches by 14 feet. Lengths to cover 700 square feet; add ¼ for matching .... 875 square feet

Sills, Mudsills, and Joists.—Rough hemlock, 2 sticks 2 inches by 6 inches by 16 feet; 1 stick 2 inches by 6 inches by 20 feet; 4 sticks 2 inches by 4 inches by 19 feet; 2 sticks 2 inches by 3 inches by 16 feet .... 119 feet

Upper Frame.—2 inches by 3 inches dressed hemlock, posts, 2 sticks 14 feet; rafters, 2 sticks 12 feet; plates, 2 sticks 16 feet; 2 sticks 20 feet (1 for plate ties) .... 62 feet

Floor.—Third quality pine flooring, matched and dressed, 16 feet long, cover 180 square feet, add ¼ .... 225 feet

Framing Boards.—Of same stuff, 8 4 inches by 14 feet, 2 8 inches by 16 feet; cleats, 2 6 2¼ inches by 3 feet; next to doors, 1 8 inches by 16 feet; joist supports, 2 2 inches by 14 feet. approximate .... 150 feet

Finish Boards.—Second quality pine, ⅞ inch dressed and ripped, corner boards, 2 5 inches by 14 feet, 2 6 inches by 14 feet; base and eaves, 2 7 inches by 16 feet, 2 3½ inches by 16 feet; base and rear plate, 2 7 inches by 16 feet, 1 2½ inches by 12 feet .... 76 feet

Roof and Ridge Boards.—Georgia pine, ⅞ inch dressed, 5 4 inches by 18 feet, 1 5 inches by 18 feet; window sills, white pine dressed, 1 2 inches by 3½ inches by 7 feet .... 44 feet

AN INTERESTING EXPERIMENT AND ITS EXPLANATION

BY ALFRED P. MORGAN.

Ordinarily, the precipitate produced by mixing two chemicals in solution is formed more or less slowly. But in the following experiment we have a case where two different speeds of reaction are shown. The first takes several seconds before it is complete, while the second is quicker than a flash. The experiment also shows just when that action takes place.

When iodine is added to a starch solution, or *vice versa*, the solution is colored blue. This is a well-known test for either free iodine or starch.

Prepare a solution, A, of starch in water, and add to it some sulphurous acid. Prepare a separate solution, B, of potassium iodate, and add to it a little sulphuric acid. These last two substances form potassium sulphate and iodic acid, in accordance with the following reaction:

$$2KIO_3 + H_2SO_4 = K_2SO_4 + 2HIO_3.$$

The iodic acid is the only constituent which plays any part and need be considered in the experiment proper. Pour A + B together quickly into a glass vessel and watch it closely. In a few seconds the solution will change like a flash to a deep blue. The explanation and reactions are as follows:

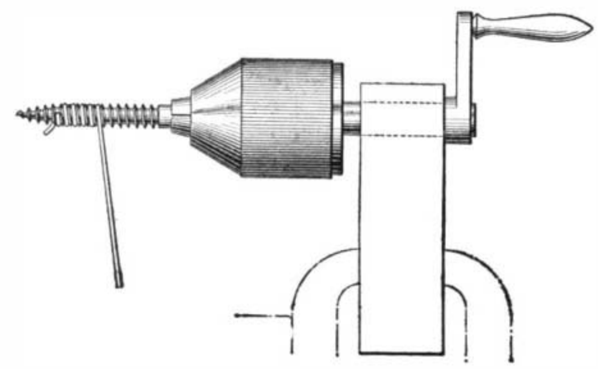
$$HIO_3 + 3SO_2 + 3H_2O = HI + 3H_2SO_4$$
$$5HI + HIO_3 = 5I + 3H_2O$$
$$SO_2 + 2H_2O + I = H_2SO_4 + 2HI.$$

The iodic acid unites with the sulphurous acid to form hydriodic acid and sulphuric acid. The iodic acid then unites with some of the hydriodic acid and forms iodine. But the iodine does not get a chance for existence, because it is immediately taken up by some of the sulphurous acid and formed into iodic acid. This process keeps on as long as there is any sulphurous acid present, and the solution remains clear, for there is also no free iodine present. But just as soon as the last molecule of sulphurous acid disappears, the whole solution turns blue so quickly that one looks twice before believing. The blue color generally flashes in from 20 to 40 seconds, depending upon the concentration and strength of the solutions. With a little experimenting the solution may be made to change in a predetermined time. It is a good idea to use a small part of the solution, and time it before mixing the remainder. Care should be taken not to use too much sulphurous acid.

HOME-MADE SPRING WINDER.

BY J. O. BROUILLET.

Not long ago the writer was called upon to replace a broken spring in a machine. It had to be done at a moment's notice, as the work could not be held up.



HOME-MADE SPRING WINDER.

The supply of springs was exhausted. The writer was given a piece of No. 60 wire, but no one had such a thing as a winder, so he was obliged to make one, and had a spring within a half hour.

In a junk pile was found a piece of soft steel, 4 x 1½ x ½ inch wide, with a ½-inch hole in one end. A ½-inch lag screw was placed in a brace, a pinhole was drilled in the gimlet end of the screw, then putting the screw through the hole in the steel, which was held in a vise, the spring was easily wound.

This suggested the construction of the spring winder illustrated herewith. A piece of soft steel, 4 x 1¼ x 1¼ inch, forms the body. A ½-inch shank, fitted with a chuck taking from 0 to ½ inch, was run through the hole at the top and provided with a crank handle.

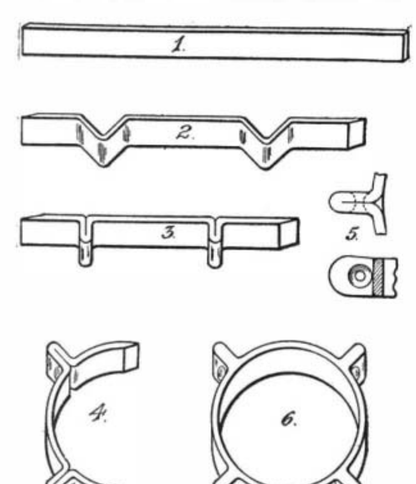
An assorted lot of lag screws serves for the open springs, and rods are used for the close springs and springs of oval or odd shapes.

FORGING A MASTHEAD OR BOOM RING.

BY I. G. BAYLEY.

On account of the severe strains to which the lugs on a masthead are subjected, they and the ring are usually made from one and the same piece of iron, instead of the former being welded on after the ring is made. The ring is made in two halves, the iron being cut sufficiently long to make two lugs, and go half way round the masthead or ends of main or jib boom. The comparative length of the iron is given in Fig. 1. The diameter of the bands, of course, varies, and the section of iron used is in proportion. The position of the lugs is marked out, and the bar heated and bent into shape (Fig. 2), the ends being shaped for welding, when the two halves are brought together, to form the circle. The lugs are closed and welded in the next heat (Fig. 3). Fig. 4 shows the half band, a similar one being made in the same manner. The holes for the wire ropes are countersunk on both sides, and are made at the roots of the lugs, close up to the bands. They are flattened out when being welded, their depth being a little more than the depth of the band, to give more metal in the direction of the pull.

To give a smooth surface on the inside of the band, a piece of metal called a "fish" is welded in the "gutters" formed at the roots of the lugs. These several details are shown in Fig. 5. The two halves are next welded, as shown in the completed band (Fig. 6). The outside edges of the band, top and bottom, are rounded off, and all sharp corners on the lugs removed, to prevent any accidental wear on the ropes. The top of the mast or ends of the booms are cut down to a shoulder, the thickness of the bands in width, and the bands driven on.



PROGRESSIVE STEPS IN THE FORGING OF A MASTHEAD.