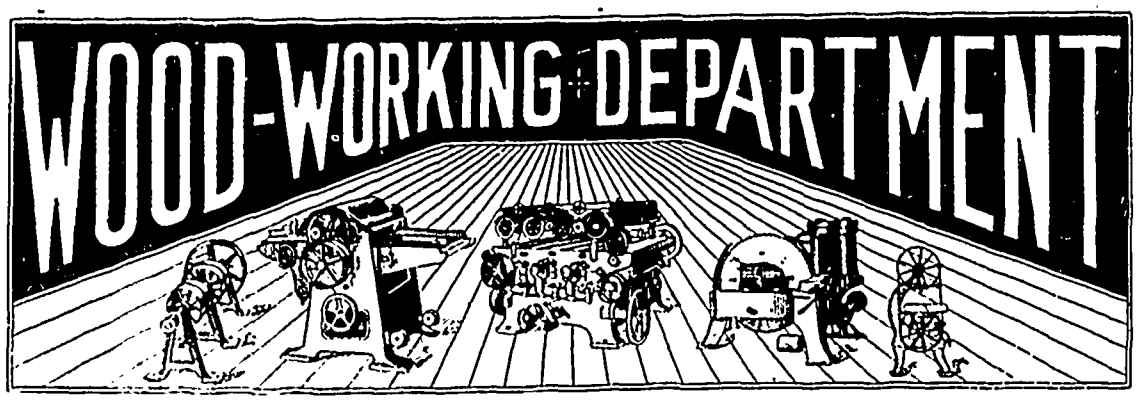

ELECTRICAL TESTS OF POWER REQUIRED BY WOOD-WORKING MACHINERY.

PROF. O. G. Dodge reports the following tests of power required by the woodworking machinery at the Washington Navy Yard: The mechanical h.p. delivered by the motor was determined by tests made under the same conditions as the previous power tests. This was necessary, as in many cases long leads were run to the motor and the drop was large. In other cases it was necessary to use a rheostat in series with the armature to obtain the required speed. Under these conditions the efficiency of the motor was a very variable factor, and a separate test was made in each case to determine the output of the motor. The column of mechanical output is therefore the proper one to use in determining the motor required, and the electrical h.p. to be delivered by the generator.

The work done is the heaviest that will be required of these particular machines:

Circular rip saw, 28" diameter; speed, 1,200 revolutions per minute, or 8,800 lineal feet per minute. Arbor pulley 5¼" diameter by 8½" face; hand feed; motor belted to saw shaft: Motor and saw, idle, 3.4 e.h.p.; ripping seasoned heart oak, 7⅝" thick; feed, 10 feet per minute, 19.3 e.h.p.

Circular rip saw, 24" diameter; speed 1,500 revolutions per minute, or 9,429 lineal feet per minute; hand feed; motor belt direct to 7" pulley on saw shaft: Motor driving saw, idle, 3.2 e.h.p.; ripping seasoned heart oak, 6" thick, 10 feet per minute, 12.8 e.h.p.; ripping seasoned white pine, 6½" thick, 15 feet per minute, 9.4 e.h.p.; ripping seasoned yellow pine, 2" thick, 45 feet per minute, 10.7 e.h.p.

Circular rip saw, 14" diameter; speed 2,200 revolutions per minute, or 8,067 lineal feet per minute; Arbor pulley, 3" diameter, 5" face; hand feed; motor belted to saw shaft: Motor, idle, .96 e.h.p.; motor and saw, idle, 2.7 e.h.p.; ripping seasoned heart oak, 3½" thick, 12 feet per minute, 6.3 e.h.p.

Circular rip saw, 12" diameter; speed, 2,200 revolutions per minute, or 6,914 lineal feet per minute; hand feed; belt pulley 3½" diameter and 3" face; motor belted direct to 3½" pulley on saw shaft; saw set to wabble for cutting grooves: Motor, idle, .96 e.h.p.; driving saw, idle, 2.2 e.h.p.; cutting groove in seasoned walnut, ⅜ × ⅜, 12 feet per minute, 3.6 e.h.p.

Band saw pulleys 72" diameters; speed, 160 revolutions per minute, or 3,017 lineal feet per minute; belt pulley 30" diameter, 8" face, power feed; motor belted to saw shaft: Motor and saw, idle, 12.1 e.h.p.; ripping seasoned ash, 10¾" thick, feed 6 feet per minute, 16.1 e.h.p.; ripping seasoned white pine, 16½" thick, feed 10 feet per minute, 16.1 e.h.p.; ripping yellow pine, 12" thick, 20 feet per minute, 18.8 e.h.p.

Band saw, pulleys 42" diameter; speed, 350 revolutions per minute, or 3,850 lineal feet per minute; belt pulley 16" diameter, 5" face; hand feed; motor belted to saw shaft: Motor, idle, .96 e.h.p.: Motor and saw, idle, 2.9 e.h.p.; ripping seasoned oak, 12" thick, feed 3 feet per minute, 5.7 e.h.p.; cross-cutting seasoned oak, 8" thick, feed 5 feet per minute, 5.7 e.h.p.; ripping live oak, 10" thick, feed 3.2 feet per minute, 5.7 e.h.p.

Band saw pulleys, 28" diameter; speed, 480 revolutions per minute, or 3,520 lineal feet per minute; belt pulley 12" diameter, 3½" face; hand feed; motor belted to saw shaft: Motor, idle, .96 e.h.p.; motor and saw, idle, 1.7 e.h.p.; ripping seasoned oak, 3" thick, feed 2½ feet per minute, 2.3 e.h.p.; ripping seasoned pine, 3" thick, feed 4 feet per minute, 2.3 e.h.p.; cross-cut seasoned oak, 3¼" thick, feed 4 feet per minute, 2.3 e.h.p.

Daniel's planer, machine bed 2 feet 5 in. by 21 feet 6 in.; belt pulley 13 in. diameter by 5¼ in. face; speed 350 revolutions per minute; speed of cutting edges of tool 10,400 feet per minute; power feed 12 feet per minute; motor belted to countershaft: Motor, idle, .96 e.h.p.; driving machine, idle, 3.9 e.h.p.: planing seasoned oak, cut 3/16 in. deep by 20 in. wide, 12 feet per minute, 6.2 e.h.p.

Hand cylinder planer or jointer, size of machine 24 in.; belt pnlley 4 in. diameter, 5 in. face; speed 3,200 revolutions per minute; speed of cutting edge of tool 4,000 feet per minute; hand feed; motor belted to shaft of tool: Motor, idle, .96 e.h.p.; driving machine, idle, 2.40 e.h.p.; planing white pine, cut 11/100 in. deep by 18 in. wide, 25 feet per minute, 4.80 e.h.p.

Cylinder planer, size of machine 24 in.; belt pulley 5 in. diameter, 5 in. face; 2,250 revolutions per minute; speed of cutting edges of tool 3,105 feet per minute; power feed; motor belted to shaft of tool: Motor, idle, .96 e.h.p.; driving machine, idle, 2.40 e.h.p.; planing pine, cut 1/16 in. deep, 18 in. wide, 11 feet per minute, 3.6 e.h.p.; planing oak, cut 1/16 in. deep, 6½ in. wide, 11 feet per minute, 3.6 e.h.p.

Boring machine, speed of bit 375 revolutions per minute; hand feed; motor belted to bit shaft: Motor, idle, .96 e.h.p.; driving machine, idle, 1.7 e.h.p.; boring, 4 inch hole in seasoned oak, 9.35 feet per minute, 2.3 e.h.p.

Boring machine, belt pulley 8 in. diameter, 3 in. face; speed 750 revolutions per minute; hand feed; motor belted to machine shaft: Motor, idle, .96 e.h.p.; driving machine, idle, 1.9 e.h.p.; boring 1 in. hole in oak, feed 3¾ in. in 5 seconds, 2.2 e.h.p.; boring 1⅝ in. hole in oak, feed 1 in. in 7 seconds, 2.2 e.h.p.

A POPULAR DRY KILN.

THE illustrations herewith presented show the operation of a cheap dry kiln which is extensively used on the Pacific coast, and which is claimed to possess considerable merit. The essence of success in drying lumber lies in the circulation of the air. Figure 1 shows the interior of the kiln. The air shaft, with damper to regulate the down pressure of the air, is situated between the outside door and a false door. The false door does not reach the floor of the kiln, consequently the hot moist air current does not come in contact with the cold air from the air shaft, but passes under the door. For a small distance into the kiln (enough to take in a car of lumber) the floor is solid; that is, there are no steam pipes underneath. The reason for this is to give the lumber a gradual heat. In other words, when one car is taken out the one nearest the false door is moved forward into a hot temperature. At the dry end of the kiln, and underneath the floor, is a

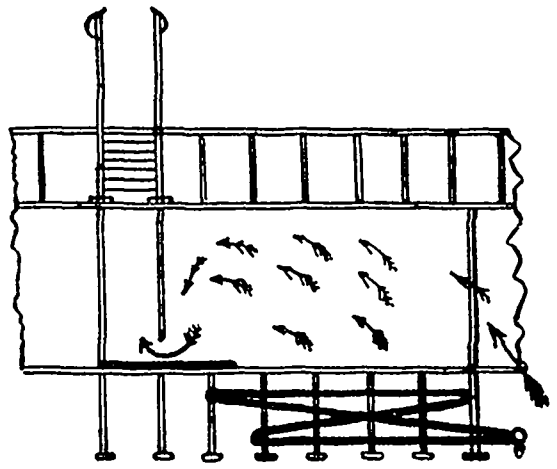

FIG. 1.

cold air duct, extending nearly the width of the structure and about four inches in diameter. The cold air forces the hot air to the top of the kiln and through the lumber and down at the other end through the opening under the false door. The passage of the hot air through the lumber makes the air damp and passes so fast that it prevents any sweating of the sides of the kiln or in any part of the lumber. The principle of this is that rapid

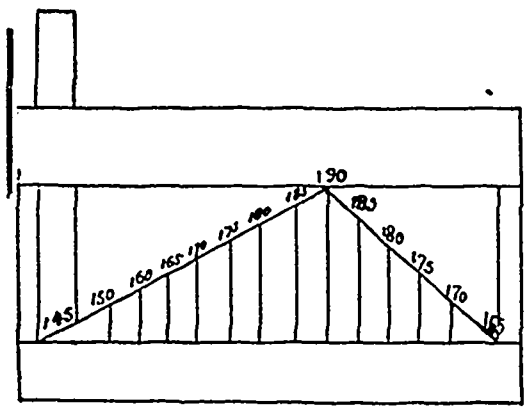

FIG. 2.

and strong circulation takes up the small particles of dampness as soon as they leave the lumber. In this way the damp hot air will start the water from the centre of the board through the cells or pores, thus drying the centre first, preventing checking, warping and twisting. So strong is the circulation that shavings are blown away at the wet end.

The pipes underneath the kiln are placed on an incline in order to carry off condensation of steam. At the first joint of the pipe, at the wet end, is a header. A bleeder carries the condensation through an independent pipe to the second header, which is at the cold air inlet. Here is another bleeder which carries the condensation to the outside.

Figure 2 gives an idea of the temperature, and is self-explanatory. From it can be seen that the area of very hot temperature is at about one-third the length of the kiln from the hot air end.

Spruce, cedar and fir has been dried in fairly good shape in 36 hours, without checking. About 800 feet of pipe is used to every 100,000 shingles, and lumber requires less. About 365 degrees serves to dry lumber in four days and 185 degrees for shingles.