constant for varying pressures in the chest. Without the balance plate, the power required increased with the pressure and amounted to .38 horse-power for the pressure previously used. While the saving shown here is slight, the value of the balance plate for much larger valves is unquestioned, and no doubt results in a net saving when the parts are in perfect working condition, but it would seem that in a small engine receiving the ordinary care, its presence may become detrimental in the course of time, owing to its tendency to increase the leakage due to poor contact between the valve and seat.

METALLICS.

A heavy expense in conducting the asphalt business is the price of barrels for containing the product. No cheap substitute has yet been found.

Most of the oil asphaltum made in California is a by-product from the distillation of lubricating and illuminating oils and lighter products from crude petroleum, which has an asphaltic base.

Internal strains in iron and steel are the result of stresses within the mass of the piece, some parts being in tension and some in compression, each part striving to relieve itself from strain and make the piece assume a form in which all parts are at rest.

R. S. Woodward has computed that, assuming the average density of the earth's crust to be 2.75, the density at the center is 10.74, and at 100 miles depth it is 3.03. Owing to the rigidity of the rocks, no increase in density is manifest above a depth of five miles.

Calumet and Hecla copper is particularly free from natural impurities, showing 99.89 per cent. of copper; 0.1 per cent. of oxygen, and 0.01 per cent. of iron and arsenic. Its electric conductivity, when drawn to 0.104-in. diameter, as 99.5 to 100 Mathiesson standard.

Aluminum bronzes containing less than 4 per cent. aluminum are easily worked, but beyond that point the bronze becomes hard to work. Such a bronze can be rolled, but wire cannot be drawn from it. With 6 per cent. and over of aluminum the metal cannot ever be rolled.

Pure gypsum contains 79.1 per cent. of calcium sulphate and 20.9 per cent of water. Deposits of gypsum large enough to be worked for plaster are, however, rarely even approximately as pure as this. Gypsum used for plaster usually carries varying, and often high, percentages of clay, limestone, dolomite, iron oxide, etc.

When alloyed with copper, aluminum acts similarly to zinc, but much more strongly, so that an addition of 1 per cent. aluminum produces as much effect as 3.5 per cent. of zinc. Aluminum bronzes are much stronger than ordinary brasses, but those containing 10 per cent. or more of aluminum are so hard that they cannot be worked.

Portland cement made in the United States is formed from four combinations of materials: Argillaceous limestone and pure limestone; marl and clay; chalk and clay; hard limestone and clay or shale. More than half of the total portland cement of the United States is now made from the first-mentioned pair, but that from the last-mentioned group is rapidly increasing.—*Eng. and Mining Journal.*

COMPARATIVE STRENGTH OF GREEN TAMARACK AND GREEN NORWAY PINE.

A series of tests to determine the relative strength of green tamarack and green Norway pine timber has recently been made by the Forest Service of the United States Department of Agriculture at the timber testing laboratory at Purdue University, Lafayette, Indiana. The material was furnished by the Kettle River Quarries Company of Minneapolis, and nearly all of it grew in St. Louis County, Minnesota. The strength values obtained apply only approximately to timber of the same species grown elsewhere.

Bending tests were made upon beams with a span of thirteen feet six inches and ranging from four by ten to six by twelve inches in cross-sections. From these tests, showing the strength and stiffness of sound green tamarack and Norway pine in structural sizes, the results were as follows:

Strength (Modulus of rupture)	Tamarack	4,600 lbs. per sq. in.
	Norway pine	4,000 " " " "
Stiffness (Modulus of Electricity)	Tamarack	1,240,000 " " " "
	Norway Pine	1,189,000 " " " "

Green tamarack thus appears to be uniformly stronger and stiffer than green Norway pine. When oven-dry tamarack weighs twenty-nine pounds per cubic foot and Norway pine about twenty-four pounds per cubic foot.

Tamarack is usually of slower growth than the pine. Bending tests on small clear pieces indicate that strength decreases in tamarack when the rate of growth is faster than an inch in eight years, and in Norway pine when the growth is faster than an inch in ten years. Comparative tests on the seasoned timber of the two species will be made later.

AN ALLOY of sixty parts copper, one part tin and thirty-nine parts zinc, is found to offer great resistance to the action of sea water, and has been largely used in naval construction.