decimalized, ought to be encouraged. Weights of the tenth, hundredth and thousandth part of the standard ounce are now available to the trade, and fine balances with beams graduated to tenths and hundredths of the ounce, are also offered by manufacturers. Package goods for retail trade ought to come in 10, 20, 30, 40, 50 or 100 ounce containers, and liquids should come in containers of the same denominations of fluid ounces, the fluid ounce being newly defined as the volume of the standard ounce of water.

And there is an advantage of far-reaching importance in this project. The inch, equal to 25.4 millimeters, which is the most precise as well as practicable value which can be given the inch, produces 304.8 mm to the foot; or 30.48 mm to the tenth of the foot, the cube of which is 28,316.877072 cubic millimeters, from which it follows that the weight of the cube of the tenth of the foot of water is 28,316.877072 milligrams. But the kilogram, while projected as the weight of the liter of water, has been found to be the weight of 1.000,027 liters of water, which means that the liter of water weighs 1,000,000/1,000,027 kilograms, and that the cc of water weighs 1,000,000/1,000,027 grams. Applying the correction, we find that the cube of the tenth of a foot of water weighs 28,316.112536 milligrams. As the standard ounce is 28,350.2 milligrams in weight, the weight of the cube of the tenth of the foot of water is but 34.1 milligrams less than the weight of the standard ounce. The weight of the grain is 64.8 milligrams, so that by reducing the standard ounce 341/648 or .526 of a grain, or from 437.5 grains to 436.974 grains, we can produce a new ounce which is precisely equal to the weight of the cube of the tenth of the foot of water, and of which 1,000 would equal one cubic foot, just as 1,000 grams equal 1 cubic decimeter of water.

Let us, therefore, have a new American standard ounce, precisely equal in weight to the ounce measure of water, defined as the volume of the cube of the tenth of the foot, and then let the standard American ounce be divided into decimal sub-multiples corresponding to the dimes, cents and mills of the dollar, and be used in decimal multiples for retail trade weights. The change from our present weight standards would only be about one per thousand (or more precisely, 1 per 900), which is well within the tolerances allowed for trade weights. The change would accordingly be entirely negligible in trade and contracts, and would give us a scientific precision in weights, and a correlation of weights and volumes that leaves nothing to be desired.

The so-called long ton in America should be abolished by law, as it has already become obsolete by custom in a large part of the country. The long ton is now unknown in the great coal and metalliferous mining trades of the Rocky Mountain region. The all-important ton-mile of the railroads, in universal use the country over, is based on the standard ton of 2,000 pounds.

The Troy pound may be regarded as obsolete, and the long ton as obsolescent, and accordingly as nonexistent in the United States, except in the historical sense.

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## PECULIAR HAIL

WHILE engaged in field work for the Illinois Geological Survey in the vicinity of Oregon, Illinois, the writer observed a hail storm that had certain peculiar characteristics. The storm occurred about mid-afternoon on August 7, and was observed in Oregon, which is in Rock River Valley, about 100 miles west of Chicago.

The preliminary meteorological conditions were: (1) A gentle two-hours' rain in the early forenoon, followed by clear skies; (2) increasing cloudiness towards noon with heavy storm clouds formed in the northwest, from which a hard rain passed to the south and another to the north and east; (3) increasing sultriness after noon until it became very oppressive prior to the close approach of the storm, and (4) an apparently heavy rain moving from northwest to the north and east, followed by the formation or splitting off of a smaller storm in the northwest, which spread rapidly west and south as it moved southeastward toward Oregon. In the latter storm heavy, dark clouds were moving swiftly, with considerable "boiling" in the southeast portion. High wind and heavy rain appeared to be approaching rapidly, accompanied by some violent lightning and thunder, but less than is common in a typical thunderstorm.

The storm reached Oregon from the northwest as a sudden squall of wind, quickly followed by large raindrops, with a few hail of uncommon size. Leaves began to be abundantly blown and beaten off the trees. The hail increased rapidly in size and quantity so that the lawns were soon covered as though by a layer of coarse quartz gravel. This continued for about three minutes, with considerable wind and rain, then the storm rather rapidly subsided, until the sun was shining about 15 minutes after the first hail fell. In one district only was the wind violent, as evidenced by overturned trees and shattered windows. Outside of this limited area few windows were broken.

Most of the hail was of a size and form not observed hitherto by the writer in his experience with hail storms in the Mississippi Valley and the northern Rocky Mountains. Hail measured immediately at the close of the storm with dimensions of 2″ x 1″ x ¾″ were plentiful, and a few were 2½″ x 2″ x 1¼″. One stone 2″ x 3″ was reported. Hail about one inch

across was the dominant size, with apparently few less than one half inch in diameter.

Much of the hail was of peculiar form as well as of uncommon size. The smaller stones were spherical to subspherical, and had a frosted appearance. Some were markedly discoidal with a frosted nucleus surrounded by relatively clear ice. This nucleus exhibited clearly in many specimens concentric layers of clear and frosted ice surrounding a more or less frosted core. This type of hail attained a maximum diameter of one inch or slightly more. The larger stones had a different form, characterized by fantastic outlines and unequal diameters. Many had the appearance of a mass of small pieces of hard candy that had stuck firmly together. Others resembled a group of blunt crystals studding a portion of the wall of a geode. Still others consisted of an irregular solid mass with more or less cylindrical, bluntly spinose projections up to one half inch long and one eighth inch thick.

These bizarre large hail appeared to have resulted from several small stones becoming frozen together during their formation and descent, with the interstices perhaps filled with added ice. The rounded outlines of some of the individual stones could be observed, and were brought into relief through melting. The spinose projections on the masses of aggregated stones are inexplicable by the writer, for they showed no trace of a composite nature, but appeared to have formed as distinct homogeneous projections.

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## THE NEW YORK STATE FORESTS

IN SCIENCE for November 2, 1923, resolutions passed by the executive board of the American Engineering Council advocating abolishing the constitutional protection of the New York state forests were printed.

The citizens of that state have invariably voted down that proposal in whatever form it has been presented, and recently they did so again by a decisive majority. This is not because any intelligent person is opposed to scientific forestry or the proper use of the power resources of that region. It is because there exists no machinery in the state government to insure the continued application of any system of real forestry to those lands if they are opened up to commercial exploitation, and because the laws and the constitution do not appear to provide any safe and reliable means for establishing any. The forests would be in charge of officials whose term of service would be likely to end after the next election, and if a good administration saved any of the forest, it would only be for the bad one following to make away with.

That until the problem of the continued proper administration of those forests is solved, any breaking down of their present constitutional protection means their destruction is a fact so self-evident as to require no discussion. The resolutions ignore this completely.

People familiar with the Adirondack and Catskill regions will be curious to learn where the "great volume of ripened timber" that is stated to be decaying away is located.

The increasing practice of securing the indorsement of prominent scientific and professional organizations for schemes and proposals without the members having knowledge or understanding of the things they are represented as approving is an evil that can not fail to affect adversely not only the organizations, but the public's respect for scientific opinion.

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## THE PROFESSOR AND HIS WAGES

WHILE in other circumstances I might hesitate to trespass on your columns to the exclusion of more important matter than controversy, self-defense is an excuse which makes even trespass lawful. It is a pity that Mr. Welsh read my letter with so little attention before he started to answer it, and rebuke me for "theorizing without that judgment and knowledge of 'how much' that only experience in the field dealt with teaches."

Item, he accuses me of overestimating the rewards of the business man in my little table of comparison with the professor: "The profits assumed for the merchant are much beyond the average." Quite so! If Mr. Welsh will reread my letter he will find the words "Admitting that not all merchants are as successful as Mr. Smith . . ." I specifically stated that I was comparing two unusually successful and competent men, one in business, the other in teaching. If Mr. Welsh supposes that the *average* college professor gets $4,000 a year, or that the average teacher ever obtains a professorship in any large institution, he will find little confirmation in the various studies of university, college and secondary school conditions made by the Rockefeller and Carnegie Foundations.

Item, he accuses me of dismissing "quite lightly" the risk of capital in business, a point on which I laid particular stress: "The rewards of the entrepreneur are and should be higher than those of the salaried man because his risks are greater. . . ."

Item, Mr. Welsh justifies the higher incomes of businessmen on the ground that they are a selected class and the "average professor should not be compared with the successful businessman but rather with the latter's employees." Which reminds me strongly of my own statement that "we need not assume that the average instructor or professor is as