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cubic foot of water, or of anything else? In other words, why does not any body have the same weight as the amount of air it displaces, in which case you say it could never fall to the ground? An answer to this would be very much appreciated. A. It is quite true that gravity is the cause of weight as we know it on the earth. But it is equally true that the weight of any body is determined by the quantity of matter it contains. A pail full of melted lead does not weigh the same as the same Lail full of water. No one can think that. Yet the two have the same magnitude or bulk. To use your illustration, a cubic foot of air does not weigh the same as a cubic foot of water because it does not contain the same amount of matter. It contains about one eight-hundredth part as much matter as a cubic foot of water contains, and weighs about one eight-hundredth part as much. You seem entirely to overlook the essential feature of weight, namely, the quantity of matter which is weighed. If you take the same quantity of several substances, say one cubic inch, and

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weigh them, you find that their weights are in proportion to their densities. This ratio of volume to weight is constant for the same material and is always the same as compared with any other material taken as a standard. This gives us what is called specific gravity. Water is taken as the standard, and iron weighs 7.7 times as much as water. Lead weighs 11.3 as much as water. Every sub-stance has its own specific gravity. If a substance has the same specific gravity as water it does not sink or rise in water. If a substance has the same specific gravity as air it does not sink or rise in air. It stays just where it may happen to be. If a balloon is lighter than air it rises in air. A ball of lead falls in air because it weighs more than the air it displaces. There is more matter in a cubic inch of lead than in a cubic inch of air, about 800 x 11.3 times as much, or about 9,000 times as much, and that is the reason why a ball of lead falls in the air. In a fine mote in the sunbeam there is but little more matter than in the air it displaces, and that is the reason the mote floats slowly down to the carth in the sunbeam.

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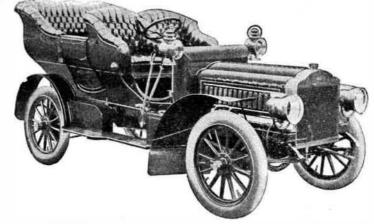
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