Correspondence.

European Fire Engines.

To the Editor of the SCIENTIFIC AMERICAN:

In your article on European Fire Engines, published in the SCIENTIFIC AMERICAN for January 17, 1903, certain mis-statements are made in a note, which we feel called upon to correct. The system of supplying the hose with water directly from the hydrant by means of a snort connecting hose under the pressure in mains has long been known and applied in German cities where street hydrants have been installed. In village communities, where there is no system of supply pipes, but where the head of the water is considerable, iron pipes are driven into the soil, by which pipes the subsoil water is directly fed to the hose.

Every hand pump and likewise our own motor-driven fire engine is provided with a device, whereby it is possible, without uncoupling the section-hose, to draw water from without or from the tank on the engine. This device is merely a three-way valve, the application of which in this connection seems to have escaped the notice of the author of your article.

The provision of a water-tank on the engine is advantageous for the reason that it renders it unnecessary to carry a separate water receptacle. A water receptacle in a fire engine is never unnecessary, since in some cases it may be very serviceable, for example, if a water pipe should burst.

It is true that in Vienna water casks of 1,000 liters capacity are used; but if the city had the water-supply system referred to in the article, it would be unnecessary to employ these casks.

Freiburg i. B., April 8, 1903. GRETHER & Co.

[Our correspondents acknowledge that the incorporation in their machine of a water-tank obviates the necessity of carrying one along. Why is one at all necessary if the engine is directly connected with the hydrant by the three-way valve? It is said that such a tank is "never superfluous." Why not? If a hydrant break, water can be taken from another. Of what use is a tank on the truck unless there be other trucks with tanks at hand to keep it filled? Clearly, the tank must be used for something; and if the hydrant be used, the need of a tank is not very apparent. What the conditions may be in Vienna now, we do not know; but we were careful to state in the footnote to the article criticised that the conditions described prevailed in Vienna several years ago. And that statement was made on the strength of actual observation. —ED.]

The Duodecimal System Again.

To the Editor of the SCIENTIFIC AMERICAN:

Referring to the article of N. Y. Hubbard, on page 299 of SCIENTIFIC AMERICAN of April 18, allow me to say: All of Mr. Hubbard's objections to duodecimals fade away, *provided* the arithmetic is brought to that change along with all tables. Duodecimals would then have all the advantages claimed for decimals, and many that decimals never can have.

Try to teach a child fractions by means of a decimal numeral frame, and see how poorly you will succeed compared to the same effort with the aid of a duodecimal frame. Seek to pack a hundred different articles each by tens in boxes, and see how great a proportion of them will be utterly unmanageable, and then see how readily they will nearly all conform to the necessity of the situation by packing in dozens. When you have them in boxes, try your hand at packing the boxes by tens in cases, and see how soon your troubles begin, and how difficult they will be to get rid of. But try packing them in dozens, and see how readily you will solve the problem in almost every case.

The great superiority of duodecimals in the practical, everyday affairs of trade, commerce, and ordinary business is so great, that no laws in any manufacturing or commercial country can be made that can compel the use of decimals to the displacing of dozens and grosses.

James Watt, Thomas Jefferson, John Quincy Adams, Abbe Gabriel Mouton, and N. Y. Hubbard may have spoken favorably of decimals, but it would have been impossible for either of them to show that eight, nine, twelve, or sixteen was in any way inferior to ten as a base number for the practical affairs of life, while as a matter of fact either one is superior, and twelve is almost infinitely superior to ten. You can divide ten by two and five without a remainer, and that is the limit; but you can divide twelve by two, three, four, and six.

We believe every reader of the SCIENTIFIC AMERICAN would be interested in the editorial opinion of the paper as to whether, in the practical business affairs of the world, twelve would or would not be superior to ten as a base number, and given a system of numbers based thereon, whether duodecimals would not be superior to any system that can be devised from the use of decimals. R. C. ELDRIDGE.

Niagara Falls, N. Y., April 17, 1903.

Automobile News.

It has been definitely decided that the Gordon-Bennett race will be held on July 2. The race will be followed by a fortnight devoted to tours, hill-climbing contests, motor-boat races, etc., in Ireland. It is expected that many English and American motorists will attend and participate in these events.

As a result of the so-called eliminating trials for contestants to represent America in the Gordon-Bennett Cup race, it has been decided to send, in addition to Alexander Winton, Louis P. Mooers with his Peerless racer, and Percy Owen with his Winton. The latter succeeded in covering 5 miles in 5 minutes, 25 seconds, but Mooers' machine was not in very good shape and did not make any startling bursts of speed. H. S. Harkness was present at the trials, but the new racer he is having specially built was not ready. He will probably go to Ireland as a substitute, however, after running his racer in the Paris-Madrid race the last of May.

In the Nice-La Turbie hill-climbing contest on April 1, which was brought to an abrupt end by the fatal accident to Count Zborowski, one of the first three contestants who preceded him and were also mounted on Mercedes machines, came within one-fifth of a second of equaling Gabriel's record of 15 minutes, 45 seconds, made last year, while another, Hieronymus by name, made 1 minute, 18 1-5 seconds better time than Gabriel, and established a new record of 14 minutes, 26 4-5 seconds.

At the annual speed trials held at Nice on April 7, Leon Serpollet on his steam racer covered a kilometer from a flying start in 29 1-5 seconds. This was 3-5 of a second better time than he made last year, and, it being the third time he has won the Rothschild cup, according to the rules he is now the owner of it. No less than eight contestants broke the mile record from a standing start of 1 minute, 9 seconds, until then held by Augieres. The best time made in this event was that of Mr. Alfred Harmsworth in a 60 horse power Mercedes car. This was 1 minute, 3.72 seconds.

Two other interesting events that occurred during the Nice automobile week were the brake and consumption tests. The former test consisted in running the cars down a hill in a minimum and a maximum time, and having them make four stops during the descent. A maximum distance of 65 feet was allowed in which to make a stop. The best showing was made by three Rochet-Schneider cars, which made stops in 19.68, 39.37, and 55.77 feet respectively, the times taken in descending the hill being 19 and 20 minutes. In a test made running down hill backward, stops were made in 6.06, 8.43, and 10.49 feet.

Each contestant in the fuel consumption test was allowed 100 grammes (3.53 ounces) of gasoline per 50 kilogrammes (110.23 pounds) of gross weight of his machine. A 6 horse power Renault voiturette and two 6 horse power de Dion "Populaire" machines made the best records. The fuel consumed, distances covered, and times were as follows:

Cars	Gasoline Consumed	Distance Traversed	Time
6 h. p. Renault Voiturette	1.890 kgs. 4.166 lbs. .666gals.	33.702 kms 20.928 miles	h. m. s. 1 27 24
6 h. p. de Dion Bouton 'Populaire"	1.880 kgs 2.380 lbs. .380gals.	31.483 kms. 19.550 miles	h. m. s. 1 33 39
6 h. p. de Dion-Bouton 'Populaire"	1.066 kgs. 2.350 lbs. .376gals.	31.050 kms 19.282 miles	h. m. s. 1 33 30

The Automobile Club of America will hold a commercial vehicle test on May 20 and 21. There are six classifications of vehicles according to the load carried, the loads ranging from 750 to 20,000 pounds. According to the rules, a vehicle may carry 300 pounds more or less than specified in the class in which it is placed, provided the dead load carried, exclusive of driver and observer, be at least 50 per cent of the weight of the vehicle. Electric vehicles will be allowed one stop for charging, but the current used will count against them. Stops made by gasoline or steam trucks or delivery wagons for fuel or water will also be penalized. A 40 mile route around the city will be covered each day, the first day without stops and the second with a certain number according to the size and weight of the vehicle. An accurate account of fuel consumption will be kept, so that the cost per ton-mile with the different kinds of power can be figured. The contest will doubtless throw some light on the cheapness of automobile transportation when wear and tear and depreciation of machinery and batteries are left unconsidered.

The Bailey automobile bill, which was passed by the New York State Legislature on April 22, has some peculiar clauses in which its originator evidently attempted to make automobiling impossible. One of them is to the effect that no automobile shall pass a person walking, or driving a horse on the highway, at a greater speed than 8 miles an hour. As most horses are capable of slightly exceeding this speed for some distance if urged, an automobilist overtaking a horse-drawn vehicle may be compelled to take its dust for several miles before it will come within the limit at which he is allowed to pass. Another clause forbids a faster speed than 10 miles an hour when passing a school house on week days or a church on Sunday. The only feature of the bill that is to be commended is the clause making it impossible for the authorities of any city or town to pass an ordinance compelling a slower speed than 8 miles an hour in the built-up part of the city, 15 miles an hour where the houses are 100 feet apart, and 20 miles an hour in all other places.

Engineering Notes.

Some interesting and valuable particulars regarding turbine air compressors have been announced in a lecture by the Hon. C. L. Parsons, the inventor of the steam marine turbine. The Parsons Company is now making a specialty of this apparatus, and some very remarkable results in contrast with air compressing plants have been attained. In one case a compressor driven by an electric motor, supplying air at a pressure of 2 pounds per square inch, delivered 3,500 cubic feet per minute, and the efficiency of the plant as measured by the ratio of air horse power to electric horse power was 61 per cent. With the Roots blower, which was previously used, the efficiency measured was only 41 per cent. In another similar plant in work at a foundry near Leeds, 11,300 cubic feet of free air is supplied per minute at 3 pounds pressure. In this instance the air turbine is driven by a steam turbine running at 5,200 revolutions per minute, and the air horse power is 61 per cent of that theoretically obtainable from the steam used.

Dr. Robert H. Thurston, of Cornell University, says that two controlling tendencies mark the improvement in the efficiency for commercial purposes of every product of the engineer's labor; their resultant varies as the one or the other is in the ascendant. These are increasing costs with increasing efficiencies, and advancing expenditures with diminishing gain. As the outgo for increments of efficiency and economy continues, the gain by increased efficiency is partly, or wholly, or more than wholly, compensated by the simultaneous increment of cost. With the crude apparatus of the earlier stages of uneconomical and incomplete industrial systems, there usually exist great opportunities for improvement by refinement of the apparatus and by systematizing the industry at, often necessarily, increased cost in the form of invested capital. Later, the possibility of further improvement lessens, and the costs to secure any given gain increase, until it ultimately becomes a fact that more must be paid for a given gain than it is worth, and the net outgo on the improved apparatus or system becomes, interest and sinking fund included, more than that on a less perfected machine or system. What may be called a "golden mean" is thus always found at that stage at which the cost of additional economies will exceed the necessary cost of securing them and where the result of securing them is loss rather than gain. The resultant of the two tendencies takes a direction which thus tends toward the unprofitable, and a limit may thus always be expected to be found, beyond which further refinement is financially undesirable.—Cassier's Magazine.

Of late years the size of gas engines has much increased. Many makers are now building machines of 2,500 horse power, and are ready to double this efficiency. The development of large gas engines is closely connected with the evolution of the fuel-gas processes, and it is noteworthy that the first gas engines in England above 400 horse power were operated with producer gas, while many of the large gas engines in Europe have been built for use with blast furnace gas. In August, 1902, two English firms had under construction over fifty gas engines varying in size from 200 to 1,000 horse power. A classified list of engines made or making shows 327 such with an aggregate horse power of 182,000, or about 560 horse power per machine. The last volume of the United States census reports 18,500 combustion engines in the country, with a total capacity of 165,000 horse power, or only about 9 horse power on the average. This state of things is not likely to last long. One American firm has already sold over 40,000 horse power of large engines, most of them of 2,000 and several of 1,000 horse power. Another has recently built two 4,000 horse power gas compressors and a number of 1,000 horse power gas engines. The gas engines of the larger sizes are extensively used for generating electric light and power, but there is a decided tendency to employ the smaller sizes direct as motors. Cheap fuel gas processes will bring the gas engine to replace the electric motor for very many purposes, and we may look for development along these lines in the near future.