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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

WANTED—A RELIABLE AEROPLANE MOTOR.

Unless the builders place at the disposal of the aeronaut a motor which can run with absolute reliability as long as there is a pint of fuel left in the tanks, further progress of the aeroplane, at least as regards length of flights, seems destined to be greatly retarded. Not many moons ago a 24-horse-power automobile set out upon the roads of Massachusetts to see how far it could travel without a stop. It ran ten thousand miles. To-day the aeroplane operator takes his seat, grasps his levers, and starts his engine, with the forlorn hope that it may continue to run until he has covered some modest stretch of time or space. Every moment that he spends in the air, he is watching anxiously for the first signs of that fatal "missing" which marks the probable end of his flight. Latham, with a machine which is apparently perfect in balance and control, sweeps easily through the first half of the distance across the English Channel, when, suddenly, motor trouble begins, and he must perforce float ingloriously into the sea. The Wright brothers, with an aeroplane which is the perfection of lightness, strength, and control, at the present writing have spent some weeks in Washington wrestling with the obstinacy of their motor.

Apart from its motor, the aeroplane must be considered to have already reached a high stage of excellence. Instances of failure of the planes while in the air are very rare; indeed, we do not recall a recorded instance for many months past of the failure of a flight through the breaking of the wings or body of the machine. The control, in the best machines, appears to be perfect.

Why is it, one asks, that an internal-combustion engine which will drive one machine over a continuous stretch of ten thousand miles of country without stopping, cannot drive another machine through the air without showing all the eccentric obstinacy and the hundred and one ways of breaking down which characterized the motor of the early days of the automobile? The anomaly is certainly difficult to explain; and we can only suggest a few of the conditions, which, in the aggregate, may account for the present unreliability of the gasoline motor in aerial work.

In the first place, then, many if not most of the aeroplane enthusiasts are obsessed by the fetish of "light weight"; and under this obsession they make the mistake of trying to build a light-weight motor of their own. The result is a machine which is usually too frail for its work. The problem is further complicated by the fact that this motor is mounted upon what, at best, is an unstable platform. Now, as a matter of fact, the duty laid upon the aeroplane engine is far heavier than that upon the automobile engine; for whereas the latter runs at from 800 to 900 revolutions per minute, the aeroplane motor is always being driven at its highest speed, which is usually from 1,200 to 1,400 revolutions per minute. The automobile engine is mounted on a very rigid steel frame, designed to maintain everything in true line; whereas the frame of the aeroplane is light and flexible, and where gearing is interposed between crank shaft and propeller shaft, there is a liability of the parts being sprung out of line and twisting and wrenching stresses set up. Where the engines are run at such high speed, particular care should be taken to insure that the parts function properly. Magneto ignition, forced lubrication, ample cooling surface whether by air or water, and generous bearing surfaces in the wearing parts, should characterize every aeroplane motor. Reliability rather than excessive weight-saving should be the first consideration.

The time is ripe for some firm in this country, that has had long experience in motor construction, to take up the building of motors specially suited to the aeroplane and the dirigible. These motors should embody the ripe experience and the high-class materials and careful workmanship which characterize the best automobile motor practice at the present time. There is no essential condition of the problem to prevent the construction of an engine that will drive an aeroplane in the air continuously, until the last drop of gasoline has been drawn from the tank. Practical aviation is to-day awaiting the production of a thoroughly reliable motor.

A SENSIBLE "CIVIL CALENDAR"

We have received from an advertising firm in San Francisco a copy of a proposed calendar, whose aim is to avoid the acknowledged drawbacks of the Gregorian calendar by substituting one that is better suited to the requirements of our day-by-day life. Although the Gregorian calendar dates from the year 1582, long before that many and various improvements had been suggested for conveniently dividing the 365 days of the year into weeks and months. Our correspondents ask: "Are we not again far enough advanced beyond the times of 1582 to adopt certain other changes?" and they offer a calendar which divides the 52 weeks of the year into 13 months, each having exactly 28 days. The first of January and the first of every one of the twelve succeeding months fall on a Sunday, and the 28th or last day of each month, therefore, falls on a Saturday. The obvious advantage of this arrangement is that, since each day of the week must be one of four numbers out of the 28 (Sunday for any month of the year being either the 1st, 8th, 15th, or 22nd, Tuesday either the 3rd, 10th, 17th, or 24th, etc.), if one knows the day of the week, it is possible to find the day of the month quickly and without reference to a calendar.

The additional month necessary under this system is named by its sponsors "Vincent"; and it is placed in the calendar between June and July.

Thirteen months of 28 days each, however, give a total of only 364 days for the year, and, to accommodate the odd day, it is proposed that between Saturday, the last day of December, and Sunday, the first day of January, there should be a day to be known as "Anno Day." It is not recognized as a calendar day, and beyond its name, has no other distinction to separate it from the last day of December. Any labor done on Anno Day would have to be a matter of special contract or agreement. No interest or rental will accrue upon that day, and for all such purposes it would be considered a part of Saturday, December 28th. Leap Year is provided for by an extra day between Saturday, Vincent 14th, and Sunday, Vincent 15th. This would be known as "Mid-anno Day" and it would be treated in all respects similarly to Anno Day.

Although there can be no question of the simplicity and convenience of the proposed calendar, in respect of any prospect of its immediate and world-wide adoption, we fear it must be classed with those two other great desirables, the "metric system" and the "longer daylight day." We are not more firmly convinced of the advantages of this and those propositions for simplifying and rendering easier and more pleasant the round of daily life and its duties, than we are that to bring about these suggested improvements will take many years of arduous and persistent agitation.

MEDIEVALISM IN MODERN CHEMISTRY.

In the Revue Générale de Chimie Pure et Appliquée, Gustave D. Hinrichs publishes an article in which he criticises severely the return of modern chemistry to medieval ideas—in Hinrichs's opinion, medieval error.

While one cannot but regret the intensely acrid tone in which the author writes, and the almost directly personal character of some of his remarks, one is forced to admit that there is some justification for his criticism. At the same time Hinrichs's article draws attention to some really very interesting parallelisms between the ultra-modern conceptions of chemistry and certain dicta of the ancient alchemists. Thus he quotes from Berthelot's work "Les Origines de l'Alchimie" (1885), the following passages: "According to the view of the alchemists, lead was the parent of the other metals. From it were produced the three metals copper, tin, and iron."

"From lead also silver was made. This idea must have seemed quite natural to the ancient alchemists, who recovered silver from argentiferous lead by cupellation."

Again, in his work "Archéologie et Histoire des Sciences" (1906), Berthelot quotes from Chinese writings:

"There are some who say that *tan cha* absorbs the vapors of green *yang* (orpiment), giving rise to a mineral, called *kong che*, which in the course of two hundred years becomes converted into native cinnabar. After two hundred years more this cinnabar changes into silver, and this after the lapse of another two hundred years, under the action of *Ki* or *ta ho* (the Great Unity), is turned into gold." Compare with this the statements of Ramsay before the French Association for the Advancement of Science, in 1908:

"Helium is the gaseous product of radium emanation."

And again:

"In the presence of water neon is produced; copper is changed into lithium."

And, more particularly with reference to the passage quoted above from a Chinese author, note the following *résumé* of the modern doctrine, as expounded for example by Arrhenius in his book, "Theorien der Chemie.":

The transmutation of radium comprises the following series of steps:

I. Radium undergoes gradual disintegration. In 1,300 years it is reduced to one-half its original amount, giving rise to

II (*a*) An emanation, which in the course of 4 days produces:

(*b*) Radium A, which in turn splits up, in 5 minutes, with formation of

(*c*) Radium B; this again, in 21 minutes forms

(*d*) Radium C; in 28 minutes this latter gives

III (*e*) Radium D. The substances radium A, B, C, D are solids, and are transformed in 40 years into

(*f*) Radium E. This in 6 days generates

(*g*) Radium F, probably identical with polonium. In 143 days this decomposes into

(*h*) An inactive substance, of which it is unknown whether it is subject to any further transformations.

In the same work the time required for the transmutation of uranium into radium is given as 2,500 million years. This gives for the entire series of transformations 2,500,001,300 years, 153 days and 54 minutes.

Hinrichs here criticises the spurious appearance of great exactitude which is given by this statement to the minute of a period embracing millions of years. In point of fact this criticism is based on a peculiar misunderstanding, for while we may know a period of six minutes, say correctly to the minute, the statement of the longer periods obviously cannot be accurate to nearly such a small interval of time, and there is evidently no justification for adding together, as Hinrichs does, the successive periods in order to obtain the aggregate period. For the lesser intervals fall far within the range of the error in the estimation of the long period of 2,500 million years, and are simply negligible in comparison with it.

As for Ramsay's statement with regard to the transmutation of copper into lithium, attention is justly drawn to the recent experiments of Madame Curie, which seem to conclusively refute Ramsay's views. For Madame Curie has shown that if the work is carried out with scrupulous care, in platinum vessels (instead of quartz, as used by Ramsay), there is no sign of any "production" of lithium. Hartley also has shown that both quartz and copper, and in fact practically all minerals, contain lithium.

Hinrichs's paper contains many other criticisms, some of which appear, perhaps, hardly justified. We have selected for presentation here only some of the most valuable and interesting suggestions in an article written in a destructive rather than constructive spirit.

KEEPING MILK BY CHILLING IT.

One method of keeping milk consists in sterilization by heating to 230 deg. F., but this process changes the flavor of the milk, renders it indigestible and alters its chemical composition. Pasteurization at 176 deg. F. and simple boiling at 212 deg. F. are less objectionable, but although the germs of disease are destroyed by these methods other microbes are not destroyed and the milk, consequently, does not keep very long. Freezing is seldom effective because of the difference in the freezing points of the various constituents of the milk, so that when the milk is melted it does not possess its original uniform and homogeneous character. Cooling to a temperature slightly above the freezing point has the advantage of leaving undisturbed the homogeneity, flavor, digestibility and nutritive value of the milk, and when the cooled milk is again warmed to the temperature of the air it is found to have undergone no alteration that can be detected by the microscope or chemical or biological tests. Besides, the cooling checks the multiplication of bacteria. The milk should be cooled immediately after it is drawn, or after pasteurization or boiling if these processes are adopted. When the milk is cooled to 35½ deg. F. it may be kept several days at any temperature lower than 53 deg. F.

The annual prize of $5,000 instituted by King Leopold of Belgium in 1874, will, for the year 1911, be awarded for the best work in French, Flemish, English, German, Italian, Spanish or Portuguese on "The progress of aerial navigation, and the most effective means for its encouragement." The works submitted for competition must reach the Belgian Minister for Science and Art before March 1st, 1911.