to the public health, which calls for severe condemnation.

"The value of life is highest wherever sanitary regulations are best and social evils fewest, and no municipal management that would sanction impediments to the public health can escape censure."

One might suppose from these expressions that the adoption of meters would engender malaria, or that the annual rainfall upon the water sheds from which our cities derive their supplies would be greatly decreased by their use. We can assure our readers, however, that the writer of the quotations only means that the water will cost more to the consumers, and that consequently they will go unwashed, and take their whiskey straight rather than incur the increased expense.

Let us see what foundation there is for these fears.

First, the water furnished to any city costs a given amount, which aggregate cost will not be increased by the use of meters, except upon the money invested in them, and their depreciation, a mere trifle, scarcely worth considering in comparison with the entire cost, provided meters can be found having the proper degree of durability.

The aggregate cost of the water is provided for by taxation, which always falls directly or indirectly upon consumers. This taxation is at present notoriously unequal upon individuals when compared with the amounts they respectively use or waste; and what is more, it is equally notorious that those who are best able to pay, really do pay least in proportion to the amounts used.

Large manufactories, breweries, livery stables, hotels, etc., probably, on the average, pay less than half the price per cubic foot for the water used, than private establishments, under the present system. Meters, instead of increasing the aggregate taxation, would distribute it equally, so that the tax would fall lighter upon the poor than it now does, and the water instead of being made dearer would actually become cheaper to them.

As it is, the provident now pay for the wasteful, and the smaller consumers contribute to pay for what is used by the larger, an injustice so great that did the public appreciate its magnitude it would clamor for meters as the plain and obvious remedy.

In a question of simple purchase—for such it really is—it would seem there could not be two opinions as to whether the commodity purchased should be "sold by the grab" or accurately measured; and all the talk about the great value and utility of water only makes this more evident. If air or natural light had to be obtained by purchase the same rule would apply; but as these things do not cost money, and as they cannot be wasted, the comparison of water supply to the supply of air and light, is simply an absurdity. How would the public tolerate the general taxation plan in the distribution of gas? Yet that would be no more absurd than our present system of distributing water in cities and making the poor pay for what the rich consume.

No amount of blind denunciation can alter these facts, and no argument against the use of meters, except the fact that none in market have been found to answer the requirements of general use, can be brought forward, that does not equally apply to the use of weights and measures generally.

A GLANCE AT AERONAUTICAL SCIENCE--REVIEW OF A PAPER READ AT A MEETING OF THE AERONAUTICAL SOCIETY IN LONDON, BY W. CLARE.

If it be true that all sound knowledge is attained with difficulty, and that human progress is of necessity slow, certain it is that in the science of aeronautics—if it be yet proper to use the term science in this connection—this truth finds a remarkable illustration. It takes, it would seem, a very long time for mankind to get fledged. So far, every time he has attempted to try his wings, either their immaturity or his want of skill has rendered his attempts to fly unavailing.

If words and theories could take the place of wings, we should long ago have been disporting in the air like swallows; but the truth is that the fine spun theories which form the bulk of what is said and written upon this subject, lead rather towards failure than success. We are of those, however, who believe in the utility of the "study of failure," and there are few intelligent minds that can review the long list of devices, proposed or experimented with to enable man to navigate the air, without benefit.

But our purpose was to review a paper recently read by Mr. W. Clare, before the Aeronautical Society, in London, and to give in condensed form an expression of his opinions rather than our own upon this subject.

Passing over a somewhat lengthy introduction, in which he sought to prove that the problem of flight had occupied the attention of mankind from remote ages, we pass to a consideration of the errors which, according to that gentleman's statement, have hitherto prevented success, and the avoidance of which he is confident will insure the success of an apparatus of his own devising.

The first error which he points out is the supposition that heavy wings or heavy machinery must necessarily retard or render flight impossible. He thinks there is very little difference between flight in water and flight in air, and that such difference as exists, is purely a mechanical one. All that is necessary to flight is that our wings shall displace sufficient air in proportion to the weight of the apparatus, and there need be no apprehension of making them too heavy. In birds, the amount of wing surface, in proportion to weight, decreases as the weight increases.

The second error which, according to Mr. Clare, inventors are entertaining, is that air cells help the flight of birds. Upon this we will quote his own language.

"If, as is reasonable to suppose, these cells are fitted with an extremely rare gas, a power of buoyancy would of course be the result; but what a power! under the most favorable circumstances bearing something like the enormous ratio of $\frac{1}{4}$ per cent (·025) to the weight. Were, however, a bird thus buoyed up, as many still suppose, flight would be rendered impossible by that very buoyancy, as impossible as the flight of a balloon—by flight I mean of course controllable flight. This air-cell business is by far the weakest argument yet brought forward."

Models are denounced by Mr. Clare, who thinks pure theory can alone solve the problem of flight, and claims that most valuable discoveries and improvements have been made without their aid; a statement which we think he fails to substantiate.

He does not believe in steam as a motor for flying machines, and regards the steam engine as far too wasteful a machine ever to meet the requirements of aerial navigation. On this head he remarks:

"Birds feel the air and seem to guide their flight by nervous sensation; machinery, I fear, will never accomplish this, though man undoubtedly will. Dr. Smyth, in his experiments with the wings of a pigeon dried in an extended position, found that, however cleverly and closely he imitated the motions of a pigeon by means of a spring, he could raise no weight except very occasionally, and then by jerks, which proves that great power is not required so much as a successful manipulation of a small power.

"Will it be considered superfluous here to remind you that, though birds of the struthious or ostrich order do not fly, weight is by no means the cause of their failure? You will perhaps allow me to quote in a parenthesis the quaint old naturalist Buffon's contrary opinion on this subject. He says, 'The ostrich is generally considered as the largest of birds, but its size serves to deprive it of the principal excellence of this class of animal—the power of flying. The medium weight of this bird may be estimated at 75 lbs. or 80 lbs., a weight which would require an immense power of wing to elevate into the atmosphere; and hence all those of the feathered kind which approach to the size of the ostrich, such as the cassowary, the dodo, neither possess, nor can possess, the faculty of flight.'"

Mr. Clare regards this explanation of Buffon as very unsatisfactory, and says he has been unable to reach any satisfactory reason why ostriches and some other large birds cannot fly.

He thinks the cause of the stand-still in the Aeronautical Society is that men do not consider the subject of "aerostation" or "aviation" to be a real science, but bring forward wild, impracticable, unmechanical, and unmathematical schemes, wasting the time of the society, and causing it to be looked upon as a laughing stock by an incredulous and skeptical public.

Somewhat inconsistently he thus gives a description of an apparatus as impracticable as any yet reported as having been exhibited before the Society, in the use of which men shall be taught to fly by suspending them at the end of long ropes.

Finally, he exhorts the brethren with still greater inconsistency (after having maintained that theory was equal to all emergencies) to *do something*, and not let another year pass in "dreamy speculation and unprofitable theorizing;" which advice we hope they will be able to follow, and that the personal risk which their efforts entail may not largely thin the ranks of the Aeronautical Society.

THE HISTORY OF A DEFUNCT HORSE.

A young gentleman just out of college, once remarked that it was exceedingly insalubrious to inhale the obnoxious effluvia arising from the cadaverous carcass of a defunct horse. He was undoubtedly right, and science has found a way of remedying the evil. They now make so many things out of the dead body of a horse that the animal must be a remarkably fine one if he is worth as much when alive as he is in the retorts and kettles of the chemist. As soon as the horse is dead, his blood is sought by the manufacturers of albumen, and by sugar refiners, and by the burners of lamp black. Not a drop of it is allowed to go to waste.

The mane and tail are wanted for hair cloth, sieves, bow strings, and brushes. The skin is converted into leather for cart harness, for boots and shoes, and strong collars. The hoofs are used for combs, horn work, glue, and in old times were the chief source of the spirits of hartshorn, now obtained from the gas house. The flesh is boiled down in the rendering vat, and much oil and fat is obtained from it. Some of the choice bits may find their way into cheap restaurants, and play the part of beef steak, or help to enrich the hasty plates of soup of those establishments. The flesh left after all has been extracted from it that is of any service, is sometimes burned to be used as a manure, or is worked up into nitrogenous compounds such as the cyanides, to be used by the photographer for taking our pictures.

The stomach and intestines make valuable strings and cords for musical instruments, and out of the bones so many useful articles are manufactured that it is almost impossible to make out a complete list of them. Among them are buttons, toys, tweezers, knife handles, rulers, cups, dominoes, balls, and the residue from all these things is burnt into bone black to be used by the sugar refiner, who thus puts in a second claim upon the dead horse; and some part of the bone black is burned white to be used by the assayer in testing for gold; and when the refiner and assayer have finished with it, it is converted into super-phosphate to serve as a valuable manure on our land. The teeth are used as substitutes for ivory; and the iron shoes if not nailed up over the door to ensure good fortune to the household, are worked up into excellent wrought metal. Some portion of the bone black is converted into phosphorus for the manufacture of matches, and lately a valuable bread preparation is made of the phosphate, and medicines are prepared for the cure of consumptives.

ICE BY MACHINERY.

The excessive heat of the present season and the enhanced price of ice invite attention to a subject that has been frequently discussed in these columns, but which does not appear to have been practically settled by the companies who have undertaken to manufacture ice by machinery. The question is, Can ice be made artificially in a northern climate so cheaply as to come into competition with the natural crop of the winter? We believe that it can, and in this belief are sustained by the opinions of all scientific men who have studied the subject as well as by the facts and figures of actual application. The reason why we have not refrigerating machines as common as stoves, and as cheap as cast-iron can make them, is that there has been no demand for them and consequently no regular manufacture. Stoves are a necessity, and we have as many patterns and varieties as there are days in the year; and yet patents on them have not ceased, and will not cease to be taken out as long as man continues to heat his house or cook his food. But cooling stoves, if we may be allowed the expression, are not an absolute necessity and have not therefore been so generally studied and improved upon as our heating apparatus.

It is not necessary for us to report what we have frequently published concerning the various methods resorted to for the artificial production of cold, but we can confine ourselves to what appears to be the most successful machine of any thus far invented. The production of cold by the liquefaction of a gas and the subsequent absorption of that gas by the action of chemical affinity, is the most philosophical of any method thus far proposed. The gas that fulfills both these conditions is ammonia. It is easily converted into a liquid at seven or eight atmospheres of pressure, and it has such an affinity for water that it is rapidly absorbed without the necessity of any further application of heat. It is only necessary to heat aqua ammonia in one end of a closed U-shaped apparatus to soon find the other limb filled with the liquid gas; and as soon as this takes place, if the heat be removed the gas returns to its original water so rapidly as to produce intense cold. The particular machine by which this result is accomplished was exhibited in Paris in 1867, by M. Carré, and has been largely imported into this country. Dr. Barnard, the learned President of Columbia College, says of this invention that a machine of the annual productive capacity of thirteen hundred thousand pounds of ice can furnish ice at less than a quarter of a cent a pound. "It is here assumed, however, that the manufacture will be carried on in the country, where the rent of premises will not be a heavy charge, and the expense of distribution is not allowed for. One thousand tuns of ice may therefore be manufactured at an outside expense, loss and waste being included, of ten thousand dollars or less; and this may be delivered to customers at twenty dollars per tun, or one cent per pound, with an annual profit of ten thousand dollars." This estimate of Dr. Barnard's covers all of the necessary outlay for rent, wear and tear of machinery, and permanent investment, and still leaves an ample margin of profit for the company. The agent for the sale of the Carré apparatus in this country, M. Bujac, states that at the Louisiana Ice Manufacturing Company's Works at New Orleans, six No. 1 machines are now producing from 72 to 76 tuns of ice daily at a cost of $3·00 a tun, and at the works of Messrs. J. P. Morris & Co., Philadelphia, by improved machinery it is calculated that eight pounds of solid ice can be made for one cent. We thus have the testimony of experts, and the actual results of practice, going to show that, by the ammonia process, ice can be made at a cost far below the price at present demanded by our monopolizing ice companies. Why is it, with these facts so prominently presented to us, that so few capitalists have been found to place their money in an enterprise that would confer a great boon upon the community while it at the same time yielded a handsome profit upon the capital invested. Ice has become a necessity, and there is no reason why we should not have it in unlimited quantity and at a reasonable price.

SCIENTIFIC INTELLIGENCE.

NAPHTHALINE AND ITS USES.

Naphthaline is one of the products of the distillation of coal tar. It is commonly associated with anthracene, and until recently there were not sufficient uses known for it to render its manufacture and preservation worthy of notice. Now that its associate anthracene is likely to come into demand, more attention is bestowed upon napthaline, and the inquiry arises for what uses is the substance applicable. We have on a previous occasion spoken of a fine dye that is made from it, and we hear that this pigment is meeting with much favor. Naphthaline is a pure white substance similar to alabaster. It crackles like sulphur in the hand, and also becomes negative electric when rubbed with silk. It can be used as a solvent for indigo and for the sulphides of arsenic, tin, antimony, also for phosphorus, sulphur, iodine, benzoic and oxalic acids. This property can be taken advantage of for the purpose of adding these substances to other mixtures and may be applicable to india-rubber, collodion, etc.

Even when purified, naphthaline possesses a strong persistent odor, recalling the smell of coal tar creosote, and this has suggested its use as a disinfectant and as a remedy against the ravages of moths and other insects among woolens, plants, and objects of natural history. Where its somewhat disagreeable odor does not stand in the way it can be very advantageously substituted for camphor.

Now that we are likely to have this interesting substance

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