LIQUID AIR.

Its Wonders, Properties and Capabilities.

One of the latest scientific marvels is the discovery by Mr. C. F. Tripler, of the liquification of air, and the wonderful uses to which it can be put. In an interesting paper in 'Pearson's Weekly' Mr. Tripler describes the uses to which the new agent can be put, and outlines the probabilities of the application.

'Liquid air,' it seems, is obtained by a process of great measure, wherein eight hundred cubic feet of ordinary air becomes one cubic foot of liquid, and it is in this great concentration that its potency lies. Its temperature is actually about three hundred and twelve degrees below zero.

In its expansion as it returns to its gaseous state lies a power of the highest efficiency, easy to control, ready to be harnessed and utilized. If a tumbler be filled with the liquid it boils vigorously, absorbing a portion of the heat around it, and at the end of half an hour has completely disappeared, indistinguishably mingled with the air about us, from which it differs only in its greater purity. The tumbler, meauwhile, has become thickly coated with frost. It has the appearance of pure water, except that it shows a pale-blue tint, which intensifies as the evaporation proceeds. There is no difficulty or danger in handling it, provided reasonable precaution is used, and the gases are not confined. It can be ladled up with a tin cup, and poured into almost any sort of dish, like so much water. If you chance to drop the cup, however, it will shatter like thin glassware. An oyster dipped for a moment in a bowl of the liquid becomes as cold as if it had remained in a refrigerator for hours. Raw beefsteak may be frozen until it rings, when struck, like a piece of bell-metal. While in this condition it may be broken in fragments with a hammer, and pounded into powder. Butter, similarly treated, may be reduced to a fine, dry dust; fruit and eggs may be pulverized in the same manner. Wool, under ordinary conditions, will not burn; it merely scorches and crisps, and gives off unpleasant odors. But when saturated in liquid oxygen, at the touch of a match it flashes up like so much gunpowder, and is gone in a moment. A mass of felt treated in the same manner burns more like dampened gunpowder, with a series of spluttering flashes, but it also is completely consumed.

Mr. Tripler describes an experiment giving a contrast of extremes of cold and heat which is without precedent. Pouring some of the liquid into a smooth glass tumbler, he says, I dip the bottom into a vessel of water. A thin casing of ice immediately forms about it, but at once begins to crack with the intense cold. By repeated immersion, however, adding coat after coat, I presently get a sort of ice-cup, thick enough to bear handling after the tumbler upon which it has been moulded has been withdrawn. This ice-cup I partially fill with the liquid, and when I dip into it the end of a steel wire, to which a lighted match is fastened, the hard metal burns explosively, like a fuse, with a brilliant effusion of sparks, so that the chilly crystal about it glows like a lamp. On inspecting the cup after this display of fire-works is ended, you will find that the sizzling metal has covered the bottom with beads and pellets of steel—we have actually melted iron into a crucible of ice! It remains to show the explosive power of this mysterious liquid. I saturate in the azure-tinted liquid a wad of oily cotton waste, and place it in a steel tube of great strength, open at both ends. When a spark is applied—which must be done from a safe distance—the tube is rent in fragments. If the wad were first wet with turpentine, the explosive force would exceed that of gun-cotton. This compound is well suited for use in shells or torpedoes and might easily be made a destructive agent of terrible efficiency in war; no thickness of armor-plate could resist its ruthless energy. Moreover, there would be no risk in the handling, as it is not exploded by concussion. It can be discharged only by contact with a spark; the whole effect is produced by rapid—practically instantaneous—combustion.

Liquid air is no mere curiosity of the laboratory, and lecture-room; its possible uses are manifold, and some of them are of incalculable importance. Doubtless the most obvious application is for purposes of refrigeration. Nothing can be imagined better adapted for such use, since liquid air furnishes a clear, dry cold, easily delivered at any temperature required. With its aid the transportation of fresh fruits, meat, and the like, to any distance, on either steamship or by rail, becomes a simple matter. In hotels and other large establishments, the same motive power which is used for running the lifts and driving the dynamos might be turned to account for all kinds of refrigeration; in the heat of summer it would be no more difficult to cool the air of our apartments than we now find it to warm them in winter nor would there be any deleterious gases produced, as by combustion, requiring to be carried off by pipes or flues. On the contrary, the incidental product would be like the purest and most bracing mountain air. The possibilities in medicine and surgery are numerous. By means of this process, air, absolutely free from germs, could be furnished in any amount; and if the stimulating effect of an excess of oxygen were desired, it could be had without trouble, quite free from the impurities which now often make this gas objectionable. The temperature of hospital wards, even in the tropics, could readily be cooled to any degree prescribed by the physicians in charge, and by keeping the air about yellow fever patients down to the frost point, the nurses would be perfectly protected from contagion, and the recovery of the patients themselves facilitated. Again, the cauterizing cold which liquid air is capable of producing might be used in cases of cancer with great advantage, since, while it absolutely destroys the flesh to which it is applied, its action is perfectly under control, and can be stopped in an instant.

Its possible use as a high explosive in war has already been adverted to. Further, military authorities are already making inquiries, as to its application to the cooling of guns when in action; and there is no obvious reason why it should not prove highly efficacious, and of great value in this way. Still more important, however, will be its service as a motive force on warships—or, indeed, on any ships. It can be handled with perfect safety in an ordinary engine, in the same manner as steam, but without requiring oppressive heat. Freed from the necessity of carrying an immense weight of coal, yet furnished with a motor capable of producing any amount of power needed, vessels would be able to make voyages of any length at a speed equalling that of the swiftest torpedo boats, running at the rate of from forty to forty-five miles per hour. And in submarine boats the motor itself would supply all the air required for breathing, abundant, pure and cool, instead of generating overpowering heat and stifling gases, as is the case at present. It is also worth while considering its application in connection with the difficult problem of aerial navigation, which would probably be solved, since all that is now wanted, practically, is a motor sufficiently strong, and light, and safe. With liquid air no fire would be needed—the heat of the surrounding atmosphere would be entirely adequate; and for this reason, and because there would be no moisture to affect them, the boilers could be made of paper. Aluminium, scarcely heavier than paper, yet nearly equal to copper in ductility, could be used for the coils and other necessary parts of the mechanism.

Reply to "Agricola."

Sir,—For some time past I have been most interested in reading the letters of different writers engaged in discussing school teachers and education, especially those of "Agricola." That writer has proven himself to be an enemy to the people of this province in general, and to school teachers in particular. He accuses teachers unjustly of working more for the salary than for the education of the pupils under them. This is a statement which "Agricola" has no warrant for making, and which he cannot prove. If teachers only worked in proportion to the salary they receive their labors would not be worth much. He accuses the people of this Island of being as a whole a drunken and lawbreaking people. This is another most absurd and uncalled for accusation. We are all aware that the people of the Dominion, and P. E. I. in particular, have long enjoyed the distinction of being a model to the rest of the world as a sober, industrious and law-abiding people. We have reason to boast of the sons of P. E. Island. Wherever they go they make good citizens and distinguish themselves above those going from the other provinces. As a rule the people going from P. E. I. meet with success wherever they go. We do not deny that there are some failures, but we must admit that those who fail abroad would as surely have failed at home. But the most unjust feature of "Agricola's" letter is that for all the drunkenness, crime, insanity and pauperism in this province, he holds the school teachers responsible. Surely, the poor teacher will have a lot to answer for when the day of reckoning comes.

The great bulk of crime and immorality of all kinds is governed by two laws, the law of heredity and the law of example. We all know if any of these passions or vices have been inherited by the child from its parents, they will break out despite the efforts of all the teachers in Christendom. And then we have the examples set by parents, (alas, too many), before their children of drinking, swearing, telling lies, cheating and so forth, which the child is bound to take up, because to every child the model man is it's father. Against these two laws the teacher has to struggle and very often is defeated in the end.

"Agricola" advocates a very radical change indeed in our school system. He would have our teachers learn all the trades, carpenter, blacksmith, etc., before they would be qualified to teach school, then, instead of teachers, we would have an army of Jacks-of-all-trades and masters of none. I believe such subjects as agriculture and botany should be taught in our schools, but to learn trades send the young man to a tradesman to learn the trade for which he is best adapted. Whatever occupation a person is engaged in, it is necessary for him to be instructed in the rudiments, at least of education. This is, I think, the object of our public schools to give each child, irrespective of the employment that child may be engaged in, an education which will enable him to read, write, spell, etc., and then when the child is of proper age, take him from school and apprentice him to the trade or calling for which he is best fitted.

One reason for so many of our young men and women seeking employment abroad is that there is nothing for them to do at home. If the professions are full so are the trades. One more carpenter or blacksmith than we have, would not be able to find employment. The farms are nearly all taken up, the fisheries are overcrowded. The professions are overcrowded; so are the trades, —then what is the young man or woman going to do? We live on a small island, cut off from the rest of the world. We have no large factories, such as are found in the States and different parts of the Dominion, no mines of coal, or any other minerals to be worked. Lumbering and shipbuilding are industries of the past and our population is always increasing, and must find an outlet somewhere. Our country is not self-sustaining. Is there any wonder then that our surplus population should be forced to leave their homes in search of employment?

Respectfully yours,
Filius Agricola.