## WHICH GAS?

### Some Speculations on the New Weapon

Some valuable opinions on the whole subjects of poisoned bombs and hand grenades were expressed to a representative of "The Observer" by several members of the professorial staff at University College, who suggested various methods by which the Germans may be accomplishing their dastardly object.

So much, it was explained, depended upon what was meant by the word "asphyxiation." If, as seemed probable, it meant that our men had been killed or rendered unconscious by a poisonous gas or liquid, then it was, of course, a flagrant breach of The Hague Convention, and the civilized world would take note of it.

As to what agent had been employed, possibly a port-mortem examination of the victim would be necessary to determine its exact nature. Whatever gas or liquid is used would have to be cheap, heavy, not easily decomposed by heat, and easy of manufacture. Liquid chlorine, which is very cheap, would probably fulfil these conditions better than any other agent. If a hand grenade filled with this irritant poison were broken in a trench on its being evacuated, it would be impossible for any troops to take possession of it for several hours. It could also be used in the form of a shrapnel shell.

Among the possible agents mentioned by one of the experts present were carbon monoxide and arsenic hydride He inclined, however, to the belief that a heavier gas than carbon monoxide would be used, as its density is only about 14 as compared with 14.4, the density of the air, so that it would tend to rise. It has no smell, moreover, and he imagined from the reports that the men had experienced an unpleasant odour after the explosion. If, as we had been informed, the effects were noticed a mile and a quarter behind the lines it must have been a nauseating gas. Arsenic hydride was a much heavier and very poisonous gas, but was easily decomopsable by heat. It might, however, escape so rapidly in the explosion that decomposition through the heat would not take place to a great extent. If our men had been poisoned very rapidly it was conceivable that this gas might have been employed, though it was more difficult to prepare and not so cheap as the others. The use of either of these gases would be a clear breach of the Hague Convention.

A great many substances, added our informant, could be used, which, although not fatal in the same concentration as other substances, would have an effect on the mucous membranes of the eyes, nose and throat. Such, for instance, is the liquid acrolein, which can be made cheaply from glycerine. If a large quantity of acrolein were produced in the neighbourhood of trenches, it would be rendered impossible for men to remain in them, owing to the effect of this violent irritant.

In reply to a question as to the best method of counteracting the effects of these poisonous bombs and other devices, our informant suggested a simple respirator moistoned with carbonate of soda, such as is used by the workmen employed in bleaching chambers. They tie a strip of wet flannel over the open mouth and breathe through it, allowing the air to return through the nostrils. They naturally must not breathe in air through the nose, or they would at once suffer from the effects of the fumes. A simple respirator of this fashion would probably be all that is required.

As to the question of the Allies retaliating on the Germans by using the same methods, this gentleman said it would, of course, be for the Government to decide how far we should be justified in doing so, but there would not be the slightest difficulty in paying them back in this own coin if we wish to do so. In selecting the agents to be employed, it would be necessary to call in a toxicologist to discuss the conditions as to the requisite ease of manufacture, cheapness, the power of the poison and so forth. "But there would be no difficulty," he added, "in making enough bombs to poison the whole German army. Even a jampot filled with a certain liquid would be quite enough to do a lot of damage."

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What is the nature of asphyxiation in warfare as we now know it? This phenomena may be divided, from a lay point of view, into three distinct classes, arising in the main from the following causes:—

(1) Asphyxiation resulting from the initial velocity (a) of the projectiles and the rapidity with which these are fired: (b) the "bursting height" of the shell and the ricochetting power prior to explosion.

(2) The material employed in the modern common and shrapnel shell.

(3) The material employed in grenades or bombs now in use by the Germans in the case of projectiles the sole objective of which is asphyxiation.

Let us consider number one. How can Teutonic bitterness against the French 75 shell best be accounted for in so far as it concerns asphyxiation? Why do not the projectiles of the German "77" gun (which is anatogous to the French "75") produce the same effect? Time after time it has been stated that the reason is the employment by the French in these shells of material especially for the purpose of asphyxiation, but the real answer is to be found in the low" bursting height" of the French missile, its phenomenal rapidity of fire and the fact that, unlike the German shell, it ricochets. If a German "77" gun be worked under conditions generally prevailing, it is only capable of being fired at the rate of about ten rounds per minute, whereas the French "75" possesse a firing rapidity of 25 rounds per minute. Thus we arrive at the case of what is termed cerebo medullary shock, commonly known as "shell shock," the effect of which is to arrest the function of the soldier attacked. He immediately falls into a torpor and becomes paralysed.

These phenomena have been observed in troops 30 to 40 yards away from the bursting point. They have been paralysed by the gas and wind of the shell. Amongst the noxious gases given off by shells now in use, carbon monoxide and hydric peroxide are capable of producing deadly asphyxiation. From ¼ to ½ per cent. of carbon monoxide present in the air may prove fatal.

After a battle many singular cases amongst soldiers of loss of memory have been reported from the base hospitals. That this may be due to carbon monoxide gas given off upon explosion has been amply proved by Pouchet, and subsequently by Bouchereau and Brian. Subsequent to French shell fire the Germans complained that many of their developed mania. The rapid distribution of carbon monoxide gas has long been known to produce this effect.

Thus are briefly dealt with classes Nos. 1 and 2 of asphyxiation in modern warfare. As to the employment of projectiles the sole object of which is asphyxia, I was recently assured in France by an expert of high authority tha the French are not making use of such means of exermination. One may scout the idea that the Germans have affected the discovery of any new gases, or even asphyxiating explosives. The number of gases which culd be employed with any degree of success for such purposes is extremely limited, and indications point to the present use by our enemy of carbon monoxide. It is, however, extremely doubtful whether material effect could be produced by these engines of terror at long range. Should the wind chance to veer, or to be in an adverse direction, the enemy would undoubtedly find himself hoist with his own petrad. In any event, the employment of asphyxiating bombs and grenades with the appliances at present in use will never be found in this war to have effected such material damage as to constitute a serious disadvantage to the Allies.



## NEW PETROL PRODUCING PROCESSES

(By H. Massac Buist.)

With the daily-increasing use of the motor in an ever-widening variety of forms for water service, and with the withdrawal of more and yet more draugh horses from the industrial communiy, which is in consequence compelled to take to motor taction at an earlier stage than the vast majoity of these new adherents to motorism had anticipated, the problem of increasing the world's fuel supplies becomes daily of more importance.

In all the leading countries alike in the Old Word and the New, mining engineers and chemists are busy pursuing their investigations. But as yet nothing has been forthcoming in what may be styled the commercial as distinct from the laboratory stage.

As far as the prosecution of this war is concerned, the situation is that the Allies are better off for petrol than could have been anticipated, while our enemy's plans in regard to motor fuel have woefully miscarried. The fact must not be overlooked in our calculations, however, that Germany is not taking the loss of Austria's Galician oilfields lying down. On the contrary, she is making heroic efforts, with notable success, in the direction of increasing her supplies of motor spirits distilled from the treatment of coal. Of course before the outbreak of war serious efforts had been begun in this country to foster the production of benzole, but the movement was not as far advanced as in Germany, where effort on a commercial scale had been in progress for a lenghier period.

Happily, the fortunes of war to date, in place of pinching us for petrol, and so making it absolutely imperaive for us to have such an alternative form of motor fuel produced at home, have resulted in appreciably easing the situation in regard to our imported supplies of petrol.

Nevertheless, the fact remains that even if we go through this war without experiencing the least difficulty in obtaining as much petrol as we want from overseas, still the increasing need for reducing costs, which is bound to be experienced when this period of nightmare expenditure terminates, dictates that we must devise means whereby the world shall yield not ny an increased supply of motor fuel to satisfy the greatly enarged demand for it, but also sufficient to ensure a margin by way of surplus.

This is needed, in the first place, to enable us to keep better supplies in this country than we have been able to glean hitherto. Of course, the authorities will have learned a lesson from this war that will result hereafter not in their hampering the storage of fuel in this country, but in their deliberately encouraging it by providing every facility to that end.

There is also the business of reducing costs. This can only be done by making a given quantity of raw material treated yield a bigger proportion of motor fuel. Hence the importance that attaches to the paper read recently by a United States Govment offiical, Dr. Walter D. Snelling, before the American Institute of Mining Engineer, on obtaining gasolene (the American word for petrol) from syntheltic crude oil.

By his process it is possible to reconvert paraffin, vaseline, rod wax and other natural hydocarbons into a synthetic crude oil and to obtain from 50 to 70 per cent of gasolene or petrol as white a water in color. The experiments are wholly of a laboratory nature, but the results obtained go to indicate that the principles involved may in due time be applied to commerical work on a large scale.

At the same time, Dr. Walter F. Rittman, Chemical Engineer to the United States Bureau of Mines, has devied other processes, which also promise to be of great value in the way of enlarging the production of motor fuel. His processes are the result of the application of mathematics, physics and chemistry to the process of petroleum cracking, the work being done in the laboratories of Columbia University.

It is claimed that the Rittman cracking system not only secures petrol to an amount varying from 50 to 75 per cent., but also, according to Mr. C. H. Claudy, enables benzole and olecol to be obtained at will.

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Members of the English parliament cannot bearrested for debt durin the Parliamentary sessions, or for 14 days before or after each session.

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Kansas has a larger per capita wealth than any State in the Union, but it has fewer millionaires. "This" says The Garnett Review, judically "is as it should be."—Kansas City Star.

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To release men for war service, young lady booking clerks are being appointed on the Wycombe branch of the Great Western Railway.

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English arrivals offer American coins dated 1830, indicating that owing to the war old treasure chests have been invaded.

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Sir Edward Grey, Bart., has entered his 54th year, having been born in Chester Square, London, on April 25, 1862.