

An attack for fifteen minutes means fifty tons of chlorine per mile of front. Chlorine is taken up to the trenches in cylinders each containing sixty-five pounds of the liquid. The cast-iron cylinder weighs roughly about 65 pounds more; that means one hundred tons of material to be carried up to the trenches to make an attack of fifteen minutes. The cylinders are clumsy things; they must be carried up at night so that the enemy cannot see them; they must be brought up along a communication trench probably half a mile long with a crook in it at every ten yards or so, and one of those cylinders are required to every yard of trench. It takes four men to a cylinder; two men carrying and two to relieve them every hundred yards or so.

The only preparation for an attack of this kind on our front was intended to cover a small raid. When this gas was to be brought up, the command was given that in carrying these cylinders nobody was to mention the word gas or cylinders, because sound travels pretty well and the trenches are not very far apart. You can imagine the delights of lugging around cylinders weighing about 130 pounds, and all done in the dark. Before that, we were all anxious to make a gas attack, but this experience cured all such desire.

Besides carrying up these cylinders there were other preliminary preparations. The cylinders were to be placed in the ground. We had to set boxes each holding four cylinders. That is so that the gas would be well protected from shell fire. That was all done a long time ahead. As a matter of fact, now practically the whole line from one end to the other is equipped with boxes in the fire step so that gas can be brought up and delivered from any point on short notice. Well, supposing you have made that preparation, you have arranged with the divisions on either side to have a smoke attack for perhaps two or three miles, the artillery has its orders and everything is to break out on a certain signal, about one o'clock in the morning. One o'clock in the morning comes and the wind dies or turns around another way, and the affair is called off for another night, when the same thing happens again, and after about a week of that sort of performance, the objective of that raid is no longer there, or probably the Germans know you have gas and you lug the cylinders out again.

Then, the gas shells are another proposition. I do not know whether the Allies are using gas shells or not. They were not when I left last summer, but they may have started since. These are not very effective. The Germans used two kinds. The most effective are what are known as tear shells. They contain a gas which is not poisonous in the quantities used, but it irritates the eyes and gives the same feeling as would peeling onions. Protection against this is afforded by means of goggles which exclude all the air, and that is plenty of protection. If the gas is very strong the irritation may be sufficient to affect the nose and throat and even cause vomiting. It is not poisonous, however, and the effects are only temporary. As soon as one gets to fresh air the trouble is all gone. The other kind of shells used by the Germans are poisonous. They have very much the same effect as phosgene. The poisonous effect of these shells is not very great, though, because it is difficult to get sufficient concentration. When one of those shells breaks they have to follow it with another shell pretty quickly to get any effect, so, though the Germans used those quite plentifully around our trenches, nobody was gassed.

When the gas was first used at Ypres in April, 1915, our men had no protection whatever against it. They did

not get the worst of it at that time, but the French troops were completely cleaned out on two miles of front. Evidently the German general staff had no idea how effective the gas was going to be because they made no preparation to follow it up the way they might have done. Immediately after that attack protection began to be devised. The women of England made over a million respirators, of a kind, in three days on an appeal from Lord Kitchener. They were crude, of course; simply a small pad stuffed with cotton, with a piece of elastic to hold it over the mouth. This was supposed to protect the mouth and nose. The pad was soaked in a solution of sodium carbonate, but it was difficult to breathe through. Immediately following those was a type which covered the nose better. It was soaked in a solution of hypo and sodium carbonate, and if carefully put on was quite effective against chlorine. Shortly after that the first helmet type of respirator was produced. It was simply a bag of flannel with a similar solution plus glycerine. It was not a good respirator in many ways. The men breathed in and out in a small space all the time and the doctors said they would smother. But that was not the case. They got enough fresh air but it was not very comfortable. That combination of chemicals is perfectly good against chlorine.

But about July, 1915, word was brought that the Germans were preparing phosgene to be used against us, so some protection had to be devised. A new respirator was brought out which was an improvement on the former one. The chemicals used on the pad were caustic soda and carbolic acid. It was effective against chlorine and to some extent against phosgene. The helmet was much more comfortable than the other, but the protection was far from perfect. It would not protect against the amount of phosgene that could be used in summer weather, but it was the best that could be had at that time. However, the Germans did not use the phosgene until December, 1915. It was rather cold and these helmets furnished perfect protection against the amount used at that attack. Something better was being worked on all the time that this helmet was being used, and last spring a helmet was issued that was protection against phosgene and a whole assortment of gases. It had one defect, namely, that it generated a certain amount of formaldehyde which was very irritating on the eyes, so much so that men were likely to get the idea that they were being gassed when they were not, so that they would take off their helmets and try to put on others, many casualties then occurring. However, the men were warned against this.

Later on, a helmet with rubber sponge goggles was brought out. This was designed to protect the eyes against this formaldehyde, also to protect them from the gas from tear shells. These helmets look very heavy but the men soon get to feel quite at home in them. I have some helmets used by the Germans, and the chemicals used in one are charcoal and potassium carbonate. The chemical protection is perfectly good but there are a lot of other faults in their respirator. The weight of the box drags the helmet down and it does not fit properly, so the gas gets into the man's nose and mouth. There are other helmets made by the Germans which I have examined, but they all have some defects, and on the whole we have better protection against gas than the Germans have. Since last June the British have worked up this feature of warfare so perfectly that now we are making more gas attacks and better ones than the Germans are making, and I think the Germans are very sorry they ever started the use of gas.