

MILITARY SCIENCE

No Flying Devastation For Cities

Visions of Airplane Swarms Dropping Death All Myth, Says Gen. Gilchrist; Closed Windows Good Protection

By FRANK THONE

WAR, the next war, will blot out great cities. So we are told by a whole hierarchy of the prophets of doom. These Jeremiahs stand in the market place (or its modern equivalent, the Sunday newspaper) and foresee death riding on the wings of swarming airplanes that darken the sky, and raining down dreadful poison gases that will kill off the civil population, down to the last infant in the cradle. When the soldiers return from the front, they say, there will be no one to welcome them home. There may not even be any homes, these apocalyptic scribes predict; for their imaginations picture gases that will rot wood and fabric, that will rust and crumble steel.

All this is very fine for providing a shuddery thrill, and to give you a big nickel's worth of Sunday morning reading. But are these direful things really going to happen if another great war breaks out?

Exorcising a Bogy

No! declare soldiers and chemists, emphatically and indignantly. No enemy is going to depopulate New York or San Francisco, no matter how great his malice. Nor could we inflict such woe on any foreign metropolis, even if we should be so filled with the anger of battle that we should desire to do so. Gen. H. L. Gilchrist, Chief of the Chemical Warfare Service, and Dr. H. E. Howe, editor of *Industrial and Engineering Chemistry*, a leading professional journal, have turned a little cold, scientific attention on the great gas bogy that hangs over our cities—and he has vanished!

In the first place, it is pointed out, there is no war gas so deadly that the least whiff of it will kill you. There is no gas suitable for military use that will penetrate any gas mask or find its way into any gas-tight room or dugout. There is no gas cheap enough to be used for wiping out whole cities without first wiping out the whole treasury of the warring nation that might resort to such strategy.

All this talk about new and "secret" gases is just a lot o' bunk, Gen. Gilchrist will tell you bluntly. The gases that figure in all chemical combat plans of the present day are the same gases that were in the hands of the combatants at the close of the World War: phosgene, mustard gas and lewisite. And while they are all of high military effectiveness in their several ways, none of them will pass through the soda-lime and charcoal of a gas mask; indeed, none of them will come in through the cracks around a reasonably tight window. The well-fitted windows of an ordinary house or office building offer considerable protection against them.

In the city that is surely coming in the immediate future, a cloud of any of the known war gases would have even less chance to penetrate into the buildings and reach the inhabitants. For with the coming into general use of air-conditioning plants for apartments, business blocks and even small homes, as they are now used in movie palaces, de luxe passenger trains and the Houses of Congress, we shall unquestionably see an entirely new style in architecture: buildings with windows not built to open at all; or perhaps even with no windows whatever, for we may come to prefer the even illumination of electric lights to the uncontrolled and fickle light of the sun. And it will be a relatively simple matter to add a "detoxicator" to the air-conditioning apparatus.

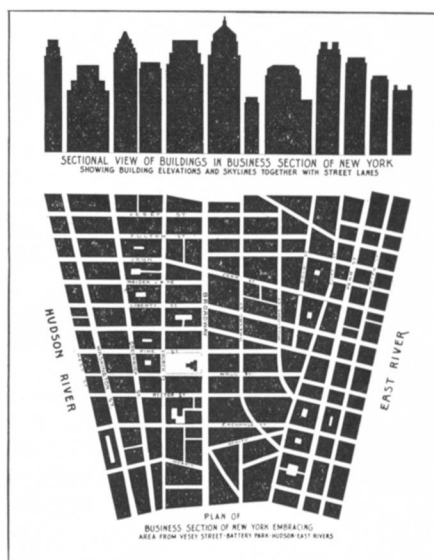
That Slaughter of Civilians

But suppose a large part of the population should be caught in the open, unprovided with the civilian gas masks with which Soviet citizens are now being equipped, and which are said to be contemplated for Frenchmen as well. Suppose an air fleet should put down a blanket of phosgene or mustard gas and lay them out in windrows. Would the rescue parties find them all corpses, with the life gone out of them beyond retrieving?

For answer, Gen. Gilchrist points to the casualty record of the A. E. F. in the World War. Of the 258,338 wounded in battle, 34,249 died on the battlefield. Of this number, only 200

deaths were due to gas; the rest suffered from gunshot, shellfire and other causes. Of the remainder, the 224,089 who were removed to the hospital, 70,552 were suffering from gas, 153,537 from weapons other than gas. Of the gas sufferers, 1,221 died; of the other casualties, 12,470 died. The percentage of deaths among the hospitalized gas casualties was 1.73; among the wounded from other causes the death rate was slightly over eight per cent. There is no reason to suppose that the percentage would be materially different if a civilian population were gassed. So it would take a simply impossible number of gas-bombing raids over any large city to kill off its whole population, even assuming you laid everybody out at every visit, and that each time 1.73 per cent. of the population died.

It will seem paradoxical, but the fact is that a modern American city is a far better place in which to face a gas raid from the air than a comparable area at the front would be. To be effective, a military gas must be fairly heavy, and hug the ground. If it forms a layer more than twenty feet thick, the gas from a practicable quantity of shells or bombs is too diffuse to have any effect. But twenty feet is an inconsiderable height in a modern city. If a plane raid



PROTECTED BY ITS TOWERS

Gen. Gilchrist's chart of lower Manhattan, showing relative areas of streets and buildings. Hits in streets might be effective at lower levels, unless windows are kept shut. Hits on roofs or walls are ineffective.

should begin showering a city with gas, the alarm cry might well be, "To the skyscrapers!" Get a few stories above the ground, and you're safe, even with the windows open.

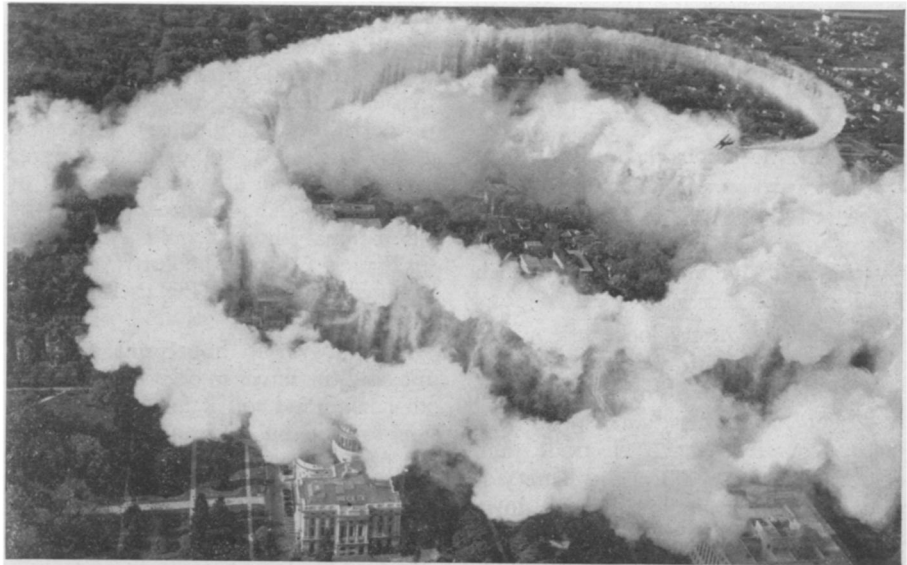
Again, those same tall buildings greatly reduce the chances of gas bombs falling in the streets, where they must fall to have any appreciable effect. At a liberal estimate, only one-fourth of a downtown business district is used for streets and alleys; the rest is under roofs. Bombs scattering their contents on roofs would of course be largely wasted. The heavy gas would flow down the eavespouts or over the edges like water; or would simply be caught behind the breast-walls until the wind blew it away. Moreover, bombs dropped from planes do not plunge straight downward; they follow on oblique course, influenced by the forward speed of the plane at the moment of launching. Therefore many of them would dash themselves against the sides of the buildings, here again they would have much diminished effect. The bricks would soak up much of the contents, Gen. Gilchrist says.

The City's Inherent Defenses

To be sure, if a bomb thus driving down aslant should chance to hit a window, it would be just too bad for the people in that particular room, but by the same token the effects would be prevented from reaching anybody else.

The explosive force of the bombs themselves must be discounted. The purpose of a gas projectile is to deliver the gas; so as a rule only enough explosive is included to break the casing and scatter the contents. If you want to put in enough TNT to blow down the neighboring walls, or even to shatter the windows, you have that much less room for gas. And your prospective victims can strengthen their lower-story windows against you in various ways—for one, by installing shatter-proof glass like that used in windshields.

But most effective of all the city's inherent gas defenses is its irregular skyline. A tall town like Manhattan is an artificial mountain range—a range with some right respectable peaks in it, too, when you come to think of it. And like every mountain range intersected with a maze of narrow canyons, it is the scene of constantly swirling air currents. You have only to remember what the news pictures of confetti and ticker-tape showered on a visiting celebrity look like, to know what would happen to a cloud of gas released into those same canyons. In



NOT PRACTICABLE WITH POISON GAS

Because an airplane can protect the capitol of California, in Sacramento, by laying a smoke screen over it, like this, some believe that an airplane could kill off all its people by letting loose a cloud of poison gas. General Gilchrist dissents.

normal weather the wind would sweep it out in very short order.

But what of gases that might settle to the bottoms of these canyons, and lurk at street level waiting for the people to come out? The vesicants, or blistering chemicals, like mustard gas and lewisite, are just such ground-huggers. Well, here again the city has an advantage. Its hard, even, glazed paved streets would not offer these gases the same hospitality that they find on the uneven, vegetation-covered, porous soil of the battle front. And the street-flushing machines and fire-hoses with which even small cities are equipped are gas-ridders such as line officers dream of and long for, but cannot have.

Another service is rendered to the people of a possibly threatened city by its mountainous skyline. To plant a row of gas bombs accurately along a street, a plane must fly very low. It is a poor metropolis that does not provide many high buildings, making low flight dangerous or impossible, and furthermore providing beautiful vantage-points for the planting of machine guns and pom-pom cannon for the livelier reception of raiding planes that might penetrate the ring of heavier anti-aircraft guns that will be located farther out.

Anyway, why waste time and ammunition on civil populations? Killing civilians is dreadfully expensive business. Gen. Gilchrist has made a study of the bombings of London and Paris that took place during the World War. In London there were 1,413 civilians killed

and 3,408 wounded, and the industrial morale possibly damaged somewhat. But it cost the wrecking of 29 Zeppelins and 41 big bombing planes, the detonation of 280 tons of bombs and the time of a lot of highly trained fighting men—not to mention the investment in the lives of those shot down. Casting up a total of the tangible expenditures only, Gen. Gilchrist has calculated that each London civilian killed by the German air raids cost the German government \$27,000. It would have been much cheaper and would have done their side more good if they had stuck to business on the West Front and dropped their bombs on soldiers and batteries and ammunition dumps.

Furthermore, the psychological effect was a boomerang. Instead of being thrown into a panic by the raids, the English were made fighting mad. Many a Briton who might have stayed home and escaped his military liabilities a while longer found his way to the trenches just for a chance to get a whack at the fellow who had been taking a whack at him.

So it is highly likely that unless somebody does really discover one of those highly improbable "secret gases," chemical warfare is likely to stay at the front, to be used for strictly military objectives when conditions are favorable.

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