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CHEMICAL WARFARE

BULLETIN



JULY 1942





COVER PICTURE

Smoke is released from cylinders at Edgewood Arsenal to demonstrate gas cloud technique.

(Chemical Warfare Service photograph.)

CONTENTS

GAS USE BRINGS THREATS OF RETALIATION	- 111
CHEMICAL WARFARE CHRONOLOGY OF WORLD WAR II	- 115
GAS - - MEN AT WORK!	- 119
CIVILIAN PROTECTION	- 126
THREE PRACTICAL SUGGESTIONS	- 133
A "TAILOR-MADE" KIT FOR GAS CASUALTIES	- 136
"PRACTICE TEACHING" FOR GAS NONCOMS Maj. H. G. Merrill, C.W.S.	- 139
A TREATMENT FOR WHITE PHOSPHORUS BURNS Lt. Comdr. Duncan D. Walton, U.S.N.	- 141
C.W.S. PARTICIPATION IN INSTRUCTORS SCHOOL	- 144
CHEMICAL WARFARE THROUGH THE AGES	- 148
BOOK CORNER	- 153

CHEMICAL WARFARE BULLETIN



A review of developments in the
application of chemicals
to military effort.

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GAS USE BRING THREATS OF RETALIATION

Warning to Axis by United Nations Inspires Editorial Comment in American Newspapers

Warning by President Roosevelt and by the British Prime Minister that use of poison gas by the Axis will bring retaliation has unloosed a flood of editorial comment in the American daily press. Many newspapers profess to see desperation on the part of Hitler if he resorts to gas, which the Japanese are reported to have used against the Chinese, and hail the intimation that the United Nations are prepared to give our enemies more than they bargain for in kind.

As far away as are the Japanese, the Washington Post believes "they would do well to reconsider the implications of Jimmy Doolittle's expedition over their homeland," for, instead of dropping tons of incendiaries and demolition bombs," the next raiders could drop the gas bombs and gas sprays which our Chemical Warfare Service reports we are prepared to use . . . it is for the Japanese to choose whether the American planes which will shortly be flying over Japan in ever-increasing numbers will spread disaster solely among industrial objectives or, by the use of gas, among thousands of civilians as well."

The Washington Star wonders, "how Japanese morale would stand up against a rain of poison gas instead of incendiary bombs and high explosives." Nevertheless, it hopes that the world will be spared this form of warfare, commenting: "The United Nations certainly have no intention of starting it. But they know only too well the ruthlessness of their opponents, and they will have no alternative but to retaliate in ample measure if the Axis leaders begin playing the frightful game. Due warnings have been issued. It is for the Axis to decide."

"The world can expect to hear more from now on concerning the use and possible use of gas as a war weapon," declares the St. Louis Star-Times. "Hitler has repeatedly shown that he will stop at nothing in his desperation to win the war . . . Civilians have escaped few of the horrors of war and they cannot expect to escape this one."

In September, 1939, Hitler pledged himself not to use gas in war, comments the New York Times, but points out that this pledge "could be given with a seeming regard for humanity because he knew his armies were committed to the conquest of countries in a few weeks, and with motorized columns penetrating hostile territory at the rate of 50 miles a day there was little opportunity and no necessity to shell troops with gas or spray them from airplanes."

The Baltimore Sun views Churchill's challenge "uttered in the confident knowledge that it can be backed up." It sees increased bombings over the continent giving point to it.

"All belligerent governments have great stocks of gas and gas weapons prepared for instant use if this new horror is to be loosed upon the world," editorializes the Newark (N.J.) News. "There is but one plausible explanation of Hitler's failure to use gas, and that is the fear of retaliation." It puts it up to Hitler to commit "this penultimate horror at his own peril."

The New York Daily Mirror cites two reasons for Hitler not using poison gas, namely: "1. In total war you save your most effective weapon for the moment

of your most desperate need, or for the moment when a winner-take-all gamble might bring complete victory if you shoot the works. Neither of these moments has arrived for Hitler. Both are very near. 2. You cannot use gas with maximum effectiveness unless you control the air over your objective. Hitler failed to gain control of the air over England in September, 1940. With his Luftwaffe split between two fronts, he does not clearly control the air -- even over Germany."

"Only if we are taken by surprise, and with an enormous quantity of it, is poison gas likely to knock out many people," holds the Minneapolis Tribune. "Soldiers gassed have a better chance to get well than soldiers wounded by bullets or shells. If Germany and Japan employ gas, we can employ it against them even more effectively. The chemical industry of the United States, and of the world outside Germany, was a war baby in 1914-18; it is a whopper now."

The Cincinnati Times-Star opines that this war has certainly not been "a gentlemen's conflict." However, it finds the United States is not idle. "We have deadly gases in readiness. This country has not yet supplied every citizen with a mask, as has England, but it thinks enough of the gas menace to insist that every civilian defense worker have five hours of gas instruction, nearly half the total time spent on basic training. Such emphasis has not passed unnoticed."

"Just how impressive is the Nazi reiteration that Germany would not use poison gas?" asks the Scranton Tribune. "Yes, we'll trust Hitler. But we won't stop manufacturing gas masks."

"Gas for Gas" is the heading of an editorial in the Chattanooga Free Press which concludes: "There is no occasion for kid glove treatment of either Germany or Japan. Both these Axis nations have flagrantly violated all rules of civilized warfare and the 'no quarter' route is the only one feasible to deal with them."

"We'll have no qualms about using gas for freedom against those who try to spread fascism with its help," declares the New York Evening Post.

On Hitler's answer, according to the Richmond News Leader, "may hang the lives of more persons than have been slain in all the wars of modern times."

The Canton (Ohio) Repository assumes the Germans may resort to gas because gas warfare "is approximately 75 percent nerves and 25 percent physical."

Below are cartoons typical of those prompted in the American press by the British Prime Minister's retaliation threat. The one on the left, by Little in The Nashville Tennessean, is captioned, "The Last Resort". On the right is "Does the Madman Want to Commit Suicide?" by Lewis in the Milwaukee Journal.



It believes that "gas probably is more useful as a potential weapon than it will be in actual use."

Dire predictions won't come true "if the Germans are aware of the fact that they can be beaten in the use of poison gas," comments the Sioux City Journal. It adds: "The Germans simply cannot take it and won't take it when their enemies can give them more severe punishment. The German respiratory organs are just as susceptible to the horrible fumes of poison gas as are those of other peoples."

SIGN OF HITLER DESPERATION?

"If Hitler has resorted to the use of poison gas it must be considered a sign of desperation," to quote the Spartanburg (S.C.) Herald. "He has tried every trick of warfare since the invasion of Poland except the use of gas and it was not believed he would resort to it until all other weapons failed."

"If Hitler starts it he will be repaid in his own coin," promises the Davenport (Iowa) Democrat. "When Hitler resorts to the use of poison gas, it is unmistakable evidence that he is growing desperate."

Launching of a gas war would be "senseless," in the opinion of the Salt Lake City Tribune, "but that may not prevent the crazy paper-hanger from trying it."

"Gas is not a German secret, as it was for a time during the World War," asserts the Greensboro (N.C.) Record. It visions the Fuhrer, as a final desperate effort, adding fresh horrors to the "already abundant terrors and miseries of the present conflict."

"If the Germans want poison gas in this war they can have it -- in clouds!" quips the Mason City (Iowa) Globe-Democrat.

The Youngstown (Ohio) Vindicator reminds its readers that "from a military view gas is an unpredictable weapon," also that in this war "Germany will lack the initiative of surprise if she brings it into play."

"A good deal of horror-struck talk is going around about the possibility that some belligerent may presently introduce poison gas in this war," observes the Washington Times-Herald. "We think the only question that should concern our side is: Is poison gas an effective and efficient disabler of soldiers? The object in war is to kill or put out of action all the enemy soldiers you can, and as soon as you can. Never mind about the humane methods. War is not humane. At that, it is pleasanter to be hospitalized by a sniff of gas than by a shell splinter in the liver."

The Gadsden (Ala.) Times finds it difficult to see where the use of gas would be to the advantage of either side, "whereas the psychological effect upon the side inaugurating the plan would certainly be highly adverse."

The Waterloo Courier believes all belligerents are fully prepared for chemical warfare "which has not been adopted only because it would be equally disastrous for all sides." It adds that in view of Britain's growing air superiority, Churchill's threat to retaliate may prove effective.

"If Hitler does decide on an extended chemical warfare we may greet it as a sure sign that the Reich is tottering," comments the Hutchinson (Kans.) Herald. "And in this phase of the war, as Churchill suggested, Germany is apt to find she holds only part of the cards."

RETRIBUTION PROMISED

The Jackson (Miss.) Clarion-Ledger, believing that retaliation would be quick and sure, thinks "Hitler won't resort to gas unless in desperation he decides that only by using gas can he avoid quick and final defeat."

"Gas bombs on Berlin would bring the war back to its starting place," observes the Fort Worth (Tex.) Star-Telegram, which feels such desperation "is close at hand."

CHEMICAL WARFARE CH

Summary of News Dispatches Appea

1941

LONDON, Jan. 24 (AP) -- Ministry of Home Defense considers inaugurating regular gas alarm practices for civilians.

BRIGHTON, England, Feb. 17 (AP) -- Britain's first test of public preparedness for gas attacks was conducted here today with tear fumes.

LONDON, April 6 (CTPS) -- "What To Do About Gas" leaflet being distributed by Government to 15,000,000 persons.

LEBON, May 27 (CDN) -- Gas is expected to be used by Germans.

MOSCOW, July 11 (AP) -- Foreign Vice Commissar Lozovsky charges Germans are using "poisonous substances."

BERLIN, July 14 (AP) -- German press denies charge; says: "Repeatedly it has been stressed by German military leadership it will use no poison gas as long as its enemies refrain from using it."

MOSCOW, July 23 (UP) -- Russia claims captured Germans carried secret instructions in use of poison gas.

BERLIN, July 25 (UP) -- DNB news agency asserts Germany has no intention of using gas but warns she will if Russia employs this weapon first.

ISTANBUL, July 31 (INS) -- Turkey hears Germans will use gas on Russian front.

BANGKOK, Aug. 11 -- Thailand threatens to use gas against invaders.

CHUNGKING, Oct. 11 (UP) -- Chinese military spokesman charges that Japanese planes blasting at Chinese troops outside Ichang dropped 300 gas bombs which killed nearly 2000 Chinese soldiers.

SHANGHAI, Oct. 14 (UP) -- Japanese army spokesman denies reports from Chungking that Japanese flyers dropped gas bombs on Chinese troops near Ichang.

LONDON, Nov. 10 (INS) -- Reuter's dispatch from Chungking says Japanese used "a large number" of poison gas shells against Chinese at Chungmow.

VICHY, Nov. 15 (Reuter) -- Incendiary bombs of new type are dropped by British aircraft in Lower Seine.

CHUNGKING, Nov. 20 (AP) -- Spokesman of Chinese army in conference with foreign correspondents, accuses Japanese of starting germ warfare. He claims that on Nov. 4, Japanese planes dropped foodstuffs and clothing at Changteh and that many persons who ate the food or used the clothes developed symptoms of bubonic plague and died.

CHUNGKING, Nov. 26 (NEA) -- Pictures of Chinese soldiers show blisters from Japanese gas attacks.

NEW YORK TIMES, Nov. 26 -- Picture of Japanese using flame thrower against Chinese walled town.

MELBOURNE, Dec. 5 (New York Times) -- Australian cabinet orders gas masks.

SINGAPORE, Dec. 8 (INS) -- British communique says "it is reported unofficially but not confirmed" that Japanese fliers have dropped mustard gas bombs.

LONDON, Dec. 9 (AP) -- British inform Japan that she (Britain) will abide by terms of poison gas protocol of 1925 Geneva convention and asks Japan's assurance that latter will do likewise.

CBS radio dispatch, Dec. 19 -- Japan is said to be using thermit bombs in Pacific area.

Japanese radio broadcast, Dec. 19 -- Japanese forces occupying Guam claim to have found "a large quantity of poison gas."

CHUNGKING, Jan. 2 (UP) -- Japanese use "liquid fire" at Changsha.

SINGAPORE, Jan. 15 (NANA) -- Use of an irritant gas -- possibly mustard -- by Japanese in Kota Bharu area is reported.

CHUNGKING, Jan. 19 (AP) -- Chinese charge officially that Japanese resorted to poison gas near Kinglien.

WASHINGTON, Jan. 24 (AP) -- War Department denies Japanese radio charge that American and Philippine troops used gas shells on Bataan.

BATAAN, Jan. 27 (AP) -- Japanese prisoners are found carrying gas masks and gas antidotes.

CHUNGKING, Feb. 17 (INS) -- Fifty percent of Japanese shells used near Suiyan contain either tear or lewisite gas, according to Chinese military spokesman.

WASHINGTON, Feb. 20 (New York Times) -- War Department reports incendiaries dropped by Japanese planes on Bataan.

British radio broadcast, March 19 (New York Herald Tribune) -- London hears that Germans will use gas in Spring offensive against Russia.

CHUNGKING, March 20 (AP) -- Chinese high command says Japanese forces used poison gas at Toungoo, Burma.

MANDALAY, March 20 (Reuter) -- American volunteer pilots employ incendiaries to stampede elephants bearing Jap arms.

LONDON, March 25 (New York Times) -- Fourteen men and women subject themselves to mustard gas burns to test antidote.

SIDNEY, March 25 (Reuter) -- New South Wales plans to distribute million gas masks to civilians.

CHUNGKING, March 31 (UP) -- Chinese communique says Japanese used gas at Toungoo, Burma.

CHUNGKING, March 31 (AP) -- Chinese Government spokesman accuses Japan of starting germ warfare.

LOGY OF WORLD WAR II

American Daily Press for 1941 and 1942

CHUNGKING, April 7 (UP) -- Chinese Minister of Foreign Affairs charges that Japan frequently employed bacterial warfare against China.

WASHINGTON, April 4 -- War Department reports Japanese try new flame bomb on Corregidor.

CHUNGKING, April 6 (UP) -- Chinese Foreign Ministry formally notifies legations and embassies that Japan has frequently resorted to bacterial warfare.

BERNE, April 8 (New York Times) -- Germany said to plan using new type flame thrqwer on Russian front.

LONDON, April 15 (UP) -- R.A.F. is using new type of phosphorus bomb on Germans.

MELBOURNE, April 16 (New York Times) -- Incendiary bombs are showered on Japanese-held Kupang in Netherland Timore.

LONDON, April 18 (UP) -- British reported to be using small balloons to float incendiaries on enemy.

NEW YORK, April 25 (INS) -- Archduke Otto, pretender to Austro-Hungarian throne, claims Germany is making gas in Austria.

British press service, April 25 (New York Times) -- Incendiaries and explosives caused heavy damage in Lubeck, bombed by R.A.F. March 28.

LONDON, April 26 (New York Herald Tribune) -- R.A.F. hammers Rostock, Germany, with incendiaries.

KUIBYSHEV, April 27 (AP) -- RedStar newspaper reports Germans using flame throwers and smoke screens.

LONDON, April 30 (UP) -- British fliers bomb Paris war plants with incendiaries and explosives.

Japanese broadcast, May 4 (UP) -- Japanese spokesman charges Allies used poison gas in Burma.

MOSCOW, May 9 (INS) -- Soviet news agency charges German forces in Crimea used several mines containing poison gas.

CHUNGKING, May 9 (INS) -- Chinese communique states that Japanese launched a gas attack in northern Honan province April 29.

LONDON, May 10 -- Prime Minister Churchill warns Germany of reprisal if gas is used against Russia.

LONDON, May 11 (UP) -- Germany reported to be ready to loose new type of paralyzing nerve gas.

BERLIN, May 11 (AP) -- Berlin broadcasts recall Hitler's pledges not to use gas if Allies also refrain.

LONDON, May 11 (UP) -- Nazis reported to have constructed concrete gas reservoirs near eastern front and developed a six-barrelled gun which throws gas grenades and shells.

LONDON, May 12 (AP) -- Bucharest sources say new type of German mine caused Russians to erroneously believe Nazis used poison gas.

STOCKHOLM, May 12 (CTPS) -- Swedish correspondent in Berlin hears that Germans are using a "nerve gas" on Kerch Peninsula.

ROME, May 13 (Reuter) -- Berlin correspondent of Swedish newspaper is expelled from Germany for publishing news "without foundation" that Germans used nerve gas.

LONDON, May 13 (INS) -- Daily Express says German spokesman in Berlin admits that Nazis twice used gas in present war -- once in Poland and once in Russia -- but claimed incidents were "accidental."

LONDON, May 13 (AP) -- Reuter's dispatch from Stockholm reports gas masks reappearing in Berlin.

MOSCOW, May 17 (New York Herald Tribune) -- Russian soldiers enter battle of Kharkov with flame throwers.

Chungking radio broadcast, May 19 (Washington Daily News) -- Unexploded Japanese gas bomb found in Shensi Province weighs 200 pounds.

LONDON, May 20 (AP) -- R.A.F. drops 40,000 fire bombs on Mannheim, Germany.

Chungking broadcast, May 28 (INS) -- Poison gas attack by Japanese at Yanghsi is reported.

United Press broadcast, May 28 -- Chinese military spokesman charges Japanese poison gas affected one-third of a Chinese unit at Kienteh, in western Chekiang Province.

CHUNGKING, May 31 (UP) -- Japanese drive Chinese troops out of Kinhwa with poison gas, which is also used to capture nearby town of Lanchi, a Chinese Army communique said tonight.

LONDON, June 1 (AP) -- Three-fourths of Cologne was fired and great area of German Rhineland metropolis flattened by explosives and incendiaries dropped by 1000 bombers on May 30 in "greatest raid of aerial warfare," the British announced.

LONDON, June 2 (UP) -- More than 1000 bombers rain explosives and incendiaries on Krupp works at Essen.

BERLIN, June 4 (AP-From a German broadcast) -- British bombers use incendiaries for most part in raid on Bremen.

Navy communique of June 4 -- High explosives and incendiary bombs were dropped by Japanese planes on Dutch Harbor, Alaska, on June 3.

On June 6 President Roosevelt warns that if Japan proceeds in this form of warfare "we shall be prepared to enforce complete retribution."

TOKYO, June 6 (AP) -- Japanese broadcast declares United States is seeking a "pretext" to resort to gas.

On June 6 the Office of Facts and Figures quoted Chungking authority for the statement that "no less than 1,000 gas attacks" were made by the Japanese in five years of war on China.

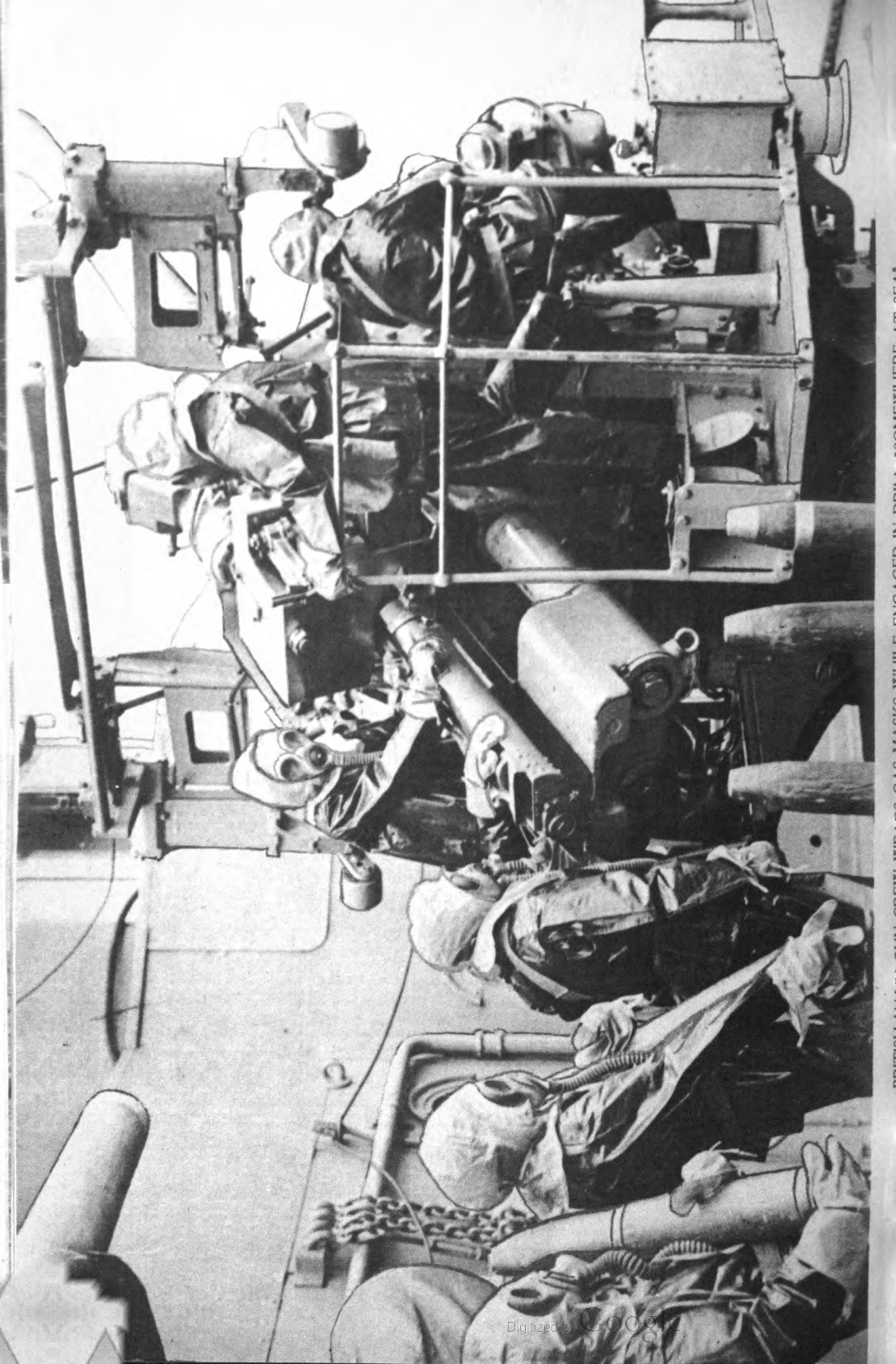
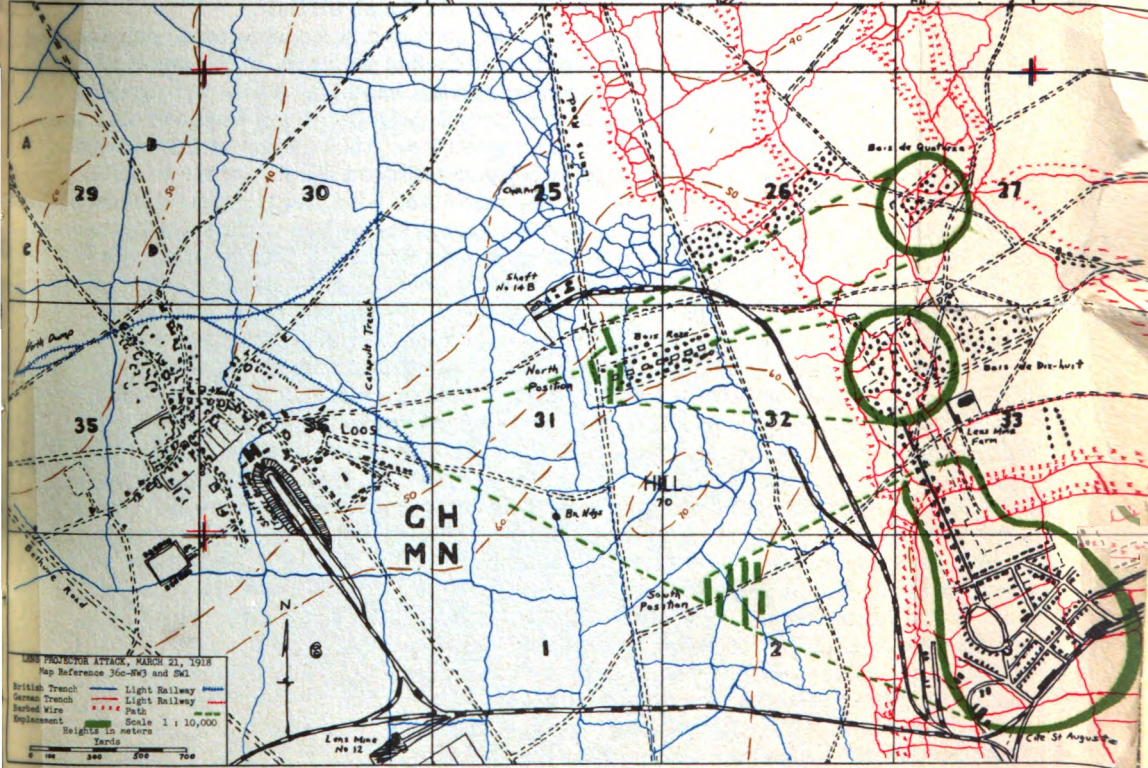
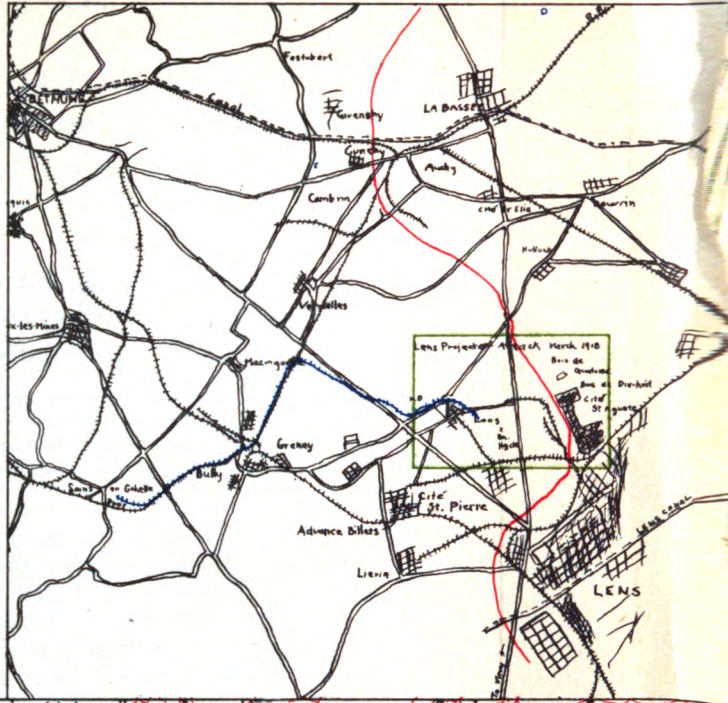


PHOTO BY AP/WIDE WORLD. CAPTION: MILITARY AIRCRAFT WITH F-105S. PHOTO BY AP/WIDE WORLD. CAPTION: MILITARY AIRCRAFT WITH F-105S.

ATTACK AT LENS

Map at right indicates the Lens operation with reference to the front as of March, 1918.

Larger map (bottom) details the projector attack by the 1st Gas Regiment.



GAS - - MEN AT WORK!

Tactics Used by 1st Gas Regiment in Projector Attack at Lens During First World War

by

***Thomas H. Beddall
Who Participated in This Operation
as a 1st Lt., Gas Regiment***

EDITOR'S NOTE - - Most people have a fair idea how infantry, artillery, cavalry, tank, and aviation units operate. But the actual functioning of chemical troops is not so well known. The following account of a projector attack by the 1st Gas Regiment details a field operation in the first World War, besides making interesting and historic reading.

The first overseas contingent of the 1st Gas Regiment (then called the "30th Engineers, Gas and Flame") sailed from Hoboken, December 26, 1917, on the transport "President Grant," later renamed the "Chateau Thierry." Arriving at Brest, January 10, 1918, this pioneer chemical unit, consisting of 25 officers and 564 men, reached Wizernes 10 days later. From here it marched to the British gas school at Helfaut, a village 45 kilometers from the front, where the only visible signs of war were the Boche night air raids on the nearby St. Omer airfield.

For six weeks, the officers attended lectures and demonstrations covering the use of gas cylinders, Livens projectors, and Stokes mortars, which knowledge they in turn imparted to their men. Further training was obtained by platoons and sections being assigned to companies of the Special Brigade, Royal Engineers.

Operations Order 117 of March 13, stated that "1500 drums of CG and 500 drums of NC will be fired . . . on a date to be communicated later in order to inflict casualties." Projector positions were designated and wind limits, special codes, communication channels, and precautions for troops in the line of fire were given in detail with coordinated "Instructions to Sections Officers." Two positions were selected. The targets for the North position were enemy supply depots in the Bois de Quatorze and in the Bois de Dix-huit, while the target for the South position was an enemy troop concentration in Cite St. Auguste, a part of the town of Lens.

Forward billets for the operation were established in the cellars of the evacuated workmen's houses of Cite St. Pierre, about two kilometers from the front line and approximately four kilometers south of the projector positions. The gas munitions depot was located at Sains-en-Gohelle, 10 kilometers west of the projector positions and about the same distance from the base billets at Verquin. A light railway line equipped with gasoline motive power connected the Sains-en-Gohelle depot with "North Dump," a siding in the rear of the positions. Light railway trucks were manned by hand from the sidetrack at "North Dump" to within 1000 yards of the projector positions.

The rolling terrain was dotted with coal mines, railroad sidings, brick yards, colonies of workmen's cottages (Cites), and embraced the village of Loos and the town of Lens. Few trees, houses or railroad tracks had survived 30 months of continuous shelling. The coal mine steel head shaft at Loos, named "The Tower Bridge" by the Tommies, was still standing, and the many spoil banks (fosse) and brick "stacks" afforded excellent cover. The chalky soil was covered with a network of

deep trenches. At the base of Hill 70, the Canadians had placed an 18-pounder field piece in a well camouflaged pit to fire point blank at targets offered in a tank raid.

One section of the 3d Platoon of Company B was stationed at Verquin when the other section was at Cite St. Pierre, and frequent reliefs were arranged. The base billet section worked in the daytime at the Sains-en-Gohelle munitions depot preparing the material and loading it on the light railway trucks. The advance billet section worked at night on the projector positions, and both sections were assembled on the positions for the projector discharge.

PORTABLE WIND STATION

The officers were equipped with a luminous dial watch, map case, message book, compass with luminous sights, and a homemade cane. The last item formed the principal component of a portable wind station. A cigarette paper was tied to one end of 36 inches of wool yard and the other end was tied to the top of the cane planted upright on an exposed elevation. After a little practice with the Beaufort scale, it was a simple matter to determine wind velocity and direction by the position of the cigarette paper. Wind readings were dispatched at frequent intervals in code to the operation commander at the infantry brigade post of command. On one occasion such a message in code read, "Rotten salvage balls," which meant, "Wind variable to calm - Lt. Ball."

The first job of the section officers was to make thorough reconnaissance on the ground at night. The projector positions were located, wooden stakes painted with luminous paint on one side were set by compass on line of fire, and battery locations were marked on the ground with cotton tape placed at right angles to the line of fire.

The advance billet section slept from 5:00 A.M. until 1:00 P.M. (if there wasn't an "alert" formation or "stand to" under arms for several hours at daybreak). Breakfast was served at 1:30 P.M. and dinner ("tea") at 5:20 P.M. At 7:30 P.M., the section turned out under arms and marched to the projector positions. The route was to the west of the town of Loos and along the light railway line to the



LOAD!
Installing gas cylinders in
Livens projectors.

"North Dump." As soon as it was dark (around 9:00 P.M.) the light railway train arrived at the "North Dump" with about 20 falt cars, each loaded with from 1200 to 1400 pounds of material. On one occasion as a squad was pushing a truck on the bridge over "Catapult" trench, machine gun bullets split open three steel projectors. The total weight of the projector material handled over the trench railway, the first two weeks in March, was 170 tons.

CAMOUFLAGE

Carrying parties composed of infantry reserve troops transported the material from the end of the light railway to the projector positions, and infantry covering parties guarded the positions against enemy night raiding parties. Ordinarily, the section on the position was engaged in trenching and projector setting, but on some occasions acted as carrying party and on other as covering detail. Upon completion of the night's work, the projectors were camouflaged and the paths leading from the end of the railway were covered with loose soil. If the footprints were not eradicated, the paths appeared on aerial photographs in the form of branches of a tree and informed the enemy of some unusual activity. Frequent checks were made on the effectiveness of the camouflage by the Canadian Air Corps. About 4:00 A.M., work ceased for the night and the weary men marched back to advance billets at Cite St. Pierre -- and a hot supper. As one wag put it, "the enlistment posters calling for chemists, plumbers and pipe fitters should have read, 'Wanted, for the 30th Engineers, ditch diggers, piano movers and hod carriers.'"

The operation order provided that only the officer commanding Special Companies, First Army, could give final approval for the attack, and that it would be given in code to the company commanders and confirmed by the firing of a special rocket signal. Actual discharge was at the sole discretion of the section officer on the position, as he was charged with the responsibility of firing only if the weather conditions at the zero hour were within the limits given in the operations order.

Zero for Operation 117 was set for 11:00 P.M., March 15, 1918. On that day and on the 16th and 17th, the weather was unfavorable and the men remained at advance billets. At 1:00 P.M., March 18th, it was believed that weather conditions would be favorable and preparations for the attack were made as soon as it was dark. Discharge wires were run out, the batteries were hooked up and tested. However, as zero hour approached the wind died down and the operation was cancelled. The wires were rolled up, the canvas covers replaced, and the position and paths camouflaged. On the nights of the 19th and 20th, weather conditions were still unfavorable and the men did not go to the projector positions.

"JAPAN" WAS THE CODE WORD

At 1:00 P.M., March 21st, the code word "Japan" (the operation will take place) was transmitted to Special Company Commanders. At dark the projector position was prepared for an 11 o'clock "zero hour." At 10:45, the wind had died down and M Special Company Commander, from his post at the Canadian Infantry Battalion Headquarters, cancelled the order to fire the projectors at the South position. At 10:57, an enemy barrage (probably in preparation for a raid) fell on the South projector position as the men were rolling up the discharge wires. At zero hour, Lt. Col. A.E. Kent, R.E., in command of the British First Army gas operations, sent up the rocket signal from the Canadian Infantry Brigade Headquarters at Cite St. Pierre, and B and O Special Companies discharged 3298 projector drums on the town of Lens.

Lieutenant Jenkins, R.E., M Special Company section commander at the North position in the Bois Rase under authority of his operation order, which stated



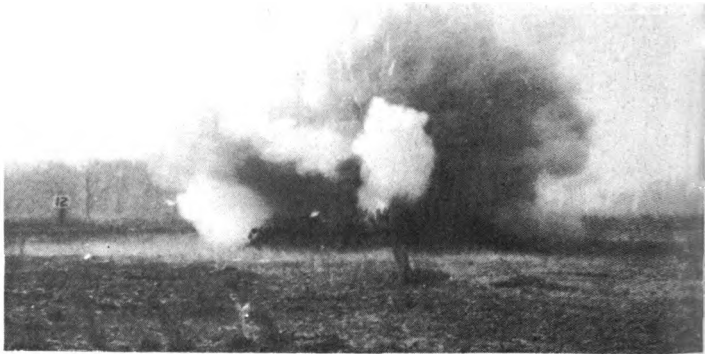
A LIVENS PROJECTOR INSTALLATION.



LIVENS PROJECTORS MAY BE SEEN
IN THE AIR JUST AFTER
BEING FIRED.



LIVENS PROJECTOR EMPLACEMENT
AT MOMENT OF FIRING.



SMOKE CLOUD (TITANIUM TETR.
CHLORIDE) PRODUCED FROM
LIVENS PROJECTOR BOMBS



that if the wind were favorable in his sector he was to give the order to fire when he heard the projector discharge to the south of him mistook the B Special Company projector discharge for that of our South position and gave the command to fire. Only 430 of the 450 projectors installed on the North position were discharged, as 20 projectors had been destroyed by shell fire.

NOTES FROM AUTHOR'S DIARY

"On the night of March 21st, while the German spring offensive was raging to the south, the greatest simultaneous projector operation ever undertaken was launched on a three-mile front extending from Lens to Hill 70 near Loos. The wind blew at four miles per hour from the west. The troops holding the line in front of us and on our immediate flanks were withdrawn to a place of safety. Promptly at 11 o'clock, the zero hour, a red and green rocket, the signal for the attack burst in the air. A flash swept the sky, the earth trembled, and a mighty roar arose as thousands of pounds of cordite started the gas drums in flight. In a few seconds, 3700 gas drums exploded in the enemy lines, releasing 57 tons of lethal gas. The CG drums were filled with phosgene (carbonyl chloride) and the NC drums contained a mixture of 20% tin tetrachloride and 80% chlorpicrin. The gas cloud used in this attack was composed of 75% phosgene, 20% chlorpicrin and 5% stannic chloride gas. The mixture was a highly lethal lung irritant which penetrated the German gas mask, causing severe nausea, vomiting and asphyxiation. The discomfort necessitated the immediate removal of the mask and left the wearer unprotected.

"Very lights, sent up by the enemy, illuminated the sky so that the gas cloud that hung like a heavy mist was clearly visible. Red, green and golden rain enemy rocket signals spread the alarm and called for a defensive protective barrage, and German gunners answered with intensive 'curtain' fire, the shells falling immediately behind the projector positions. A slight pause in the firing while the German gunners adjusted their gas masks enabled the men to leave the position for the dug-outs in the Canadian trenches. At zero plus 10 minutes, Canadian machine guns opened fire, and at zero plus 20 minutes, all the British artillery from the 18-pounder guns to the 9.2-inch howitzers along a 12-mile front, chimed in for 10 minutes with 'drum fire' and continued with 'harassing fire' throughout the night.

"The 1550 projectors in front of Cite St. Auguste were discharged at 2:00 A.M., March 28th; and 700 projectors on the positions were reset and discharged again by M Special Company and the 3d Platoon of Company B at 3:00 A.M., April 1st. The companies to the south joined in simultaneous projector attacks on the same targets. Between March 21 and April 3, the men of the 1st Gas Regiment had assisted in the projection of approximately 175 tons of gas against the Germans."

SMOKE CLOUD PRODUCED BY 31 LIVENS PROJECTOR BOMBS



Upper Right - Protective devices enable decontamination workers to approach liquid vesical gas.

Center - Auxiliary fireman carries a sandbag to protect his face from molten magnesium. He will drop the bag on the bomb, which will burn through the burlap to release the sand.

Bottom - - Useful in battling incendiaries is the stirrup pump with adjustable nozzle.



PHOTOS BY O. E. M.



CIVILIAN PROTECTION

Chemical Warfare Instruction at Seven Regional Schools Established by O. C. D.

***Extracts from Remarks by General Porter,
Director Landis, and Colonel Fisher
at Maryland University Unit***



The job of civilian protection in the United States and its possessions has taken on a new significance since Pearl Harbor -- and Manila. For this is the first war in which the citizen is, theoretically, on the front line with the soldier.

This new situation in warfare prompts Maj. Gen. William N. Porter, Chief of the Chemical Warfare Service, to comment:

"It is an axiom that the better we are prepared to resist an attack, the less chance there is for us to get it. This is now equally true in the cities as on the battlefields. Modern aircraft has knitted the continents and otherwise bridged distances which formerly gave security to the people at home. Today populations and production centers far behind the lines are vulnerable to aerial bombing. I have no doubt that the Germans would have used gas on England long ago had they not known that the British civilian population was well protected from such an agent. By the same token, the civilians in our own country must be prepared for any emergency which may arise."

Thus far, our enemies seem to find explosive and incendiary bombs more effective than gas. The world is well aware of the early damage done to London by incendiaries dropped from the skies, and how an unafraid and prepared civilian population met and coped with this menace. Gas, which figured largely in World War I, has been used spasmodically against troops, according to news accounts, but at this writing had not been reported employed against civilians. However, gas may still be an ace-up-the-sleeve of Mars in the present conflict. The potential danger of employment of one or both forms of chemical attack is ever present. Hence, our civilian population must be ready for any emergency.

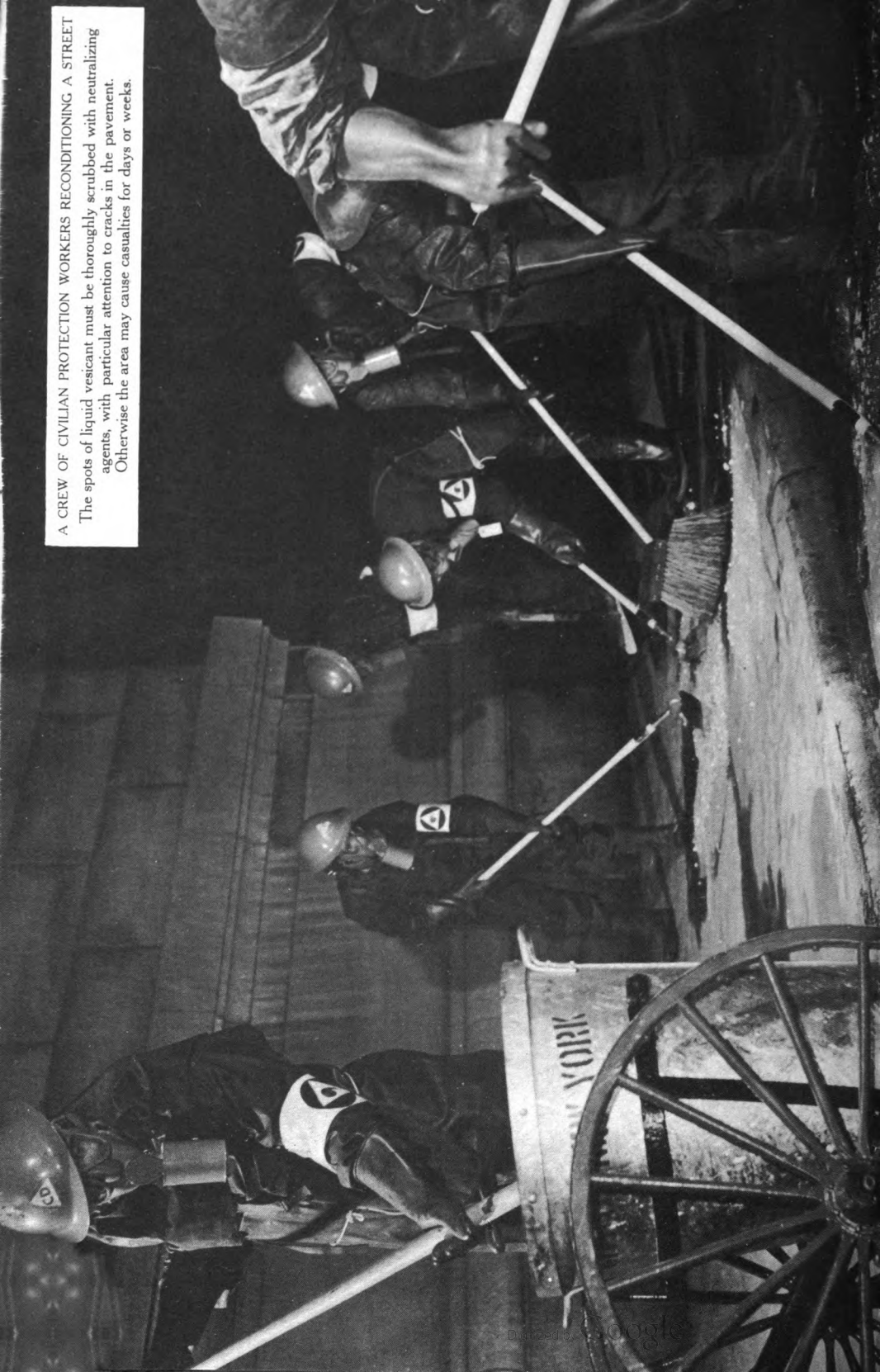
This is the reason for the Office of Civilian Defense and its activities, largely on a volunteer basis.

Responsibility for the protection of civilians during air raids rests with the Office of Civilian Defense. The Chemical Warfare Service, along with other War Department agencies, lends technical assistance to the Director of the Office of Civilian Defense in meeting this important obligation. The particular fields in which the Chemical Warfare Service cooperates with the Office of Civilian Defense concerns possible enemy use of incendiaries, gases, and smokes on our shores in such a way as to endanger noncombatants.

The Office of Civilian Defense is charged with organizing and instructing men and women to protect themselves against such a possibility. The Chemical Warfare Service provides technical assistance. Therefore, it is the Office of Civilian Defense, not the Chemical Warfare Service, which deals directly with the general public in matters relating to civilian protection.

A CREW OF CIVILIAN PROTECTION WORKERS RECONDITIONING A STREET

The spots of liquid vesicant must be thoroughly scrubbed with neutralizing agents, with particular attention to cracks in the pavement. Otherwise the area may cause casualties for days or weeks.



This applies alike to civilian training, equipment, and publications. Equipment for the protection of civilians from chemical agents is supplied through the Office of Civilian Defense. Certain items -- such as gas masks and training aids -- are procured by the Chemical Warfare Service for the Office of Civilian Defense, but the latter handles the distribution of such equipment.

Because of this centralized authority, the Chemical Warfare Service does not furnish publications to private groups or individuals concerning protection from air raids. The Office of Civilian Defense has compiled many booklets of instruction on this subject and disseminates such information as part of the public defense program. Among Office of Civilian Defense training pamphlets dealing with chemical warfare are "Protection Against Gas," "First Aid in Prevention and Treatment of Chemical Casualties," "A Training Course for Decontamination Squads," "Handbook for Decontamination Squads," "A Training Course for Bomb Squads," "Handbook for Bomb Squads," and "Blackouts."

CIVILIAN PROTECTION SCHOOLS

Likewise, the Office of Civilian Defense directs the training of the citizenry in the varied aspects of air raid protection. At the request of the Director of the Office of Civilian Defense, the War Department has established Civilian Protection Schools for the advanced training of civilians in this connection. Through the patriotic cooperation of universities in various sections of the country, seven such schools are in operation:

University of Maryland, College Park, Md.
Texas Agricultural and Mechanical College, College Station, Texas.
Stanford University, Palo Alto, Calif.
Amherst College, Amherst, Mass.
University of Florida, Gainesville, Fla.
University of Washington, Seattle, Wash.
Purdue University, Lafayette, Ind.

These seven schools are expected to graduate each month between 700 and 800 civilians, each fitted to play an important role under the program of the Office of Civilian Defense. Selection of citizens to attend these schools is made according to quotas established by the Office of Civilian Defense, which handles all applications. To these schools are invited, at the communities' expense, local experts in fire fighting, police, sanitation, health, and other public safety problems. Intensive courses are given in the application of these services to war-time civilian protection needs.

Since the schools are regionally located, it is the practice to choose keymen who, upon completion of the 10-day course, can return home and impart the knowledge thus gained to various home groups. Graduates organize volunteer auxiliaries to extend the work and train new volunteers. State and local defense councils, in collaboration with local authorities, provide training facilities and schedules.

Of late, outstanding women as well as men have been enrolled. The schools are conducted by Chemical Warfare Service commissioned officers who are graduates of the Chemical Warfare School at Edgewood Arsenal and are otherwise particularly fitted for such instruction.

The first Civilian Protection School was inaugurated at Edgewood Arsenal in June, 1941. Before this school was transferred to the University of Maryland, more than 900 picked civilians received training and have spread the knowledge gained to fellow citizens at home.



BUILDINGS OCCUPIED BY WAR DEPARTMENT CIVILIAN PROTECTION SCHOOLS

Top -- Staff in front of Headquarters Building of School at Amherst College, Mass.

Lower -- Remodeled inn where Gen. Lafayette once stopped; houses the School at Maryland Univ.



REMARKS BY CHEMICAL WARFARE SERVICE CHIEF

General Porter said at the dedication of the Maryland school on April 20th last:

"The opening of this school marks a 'coming of age' of the civilian training program. The War Department is now undertaking on a national scale the advanced training of selected civilians for key positions in protective aspects of the total war in which we are now engaged.

"The early classes at Edgewood were conducted while we were theoretically at peace with the world. The present schools find the United States in a desperate war. These courses have accordingly been modified and streamlined to meet the new situation.

"For example, we are no longer calling these schools, 'War Department Civilian Defense Schools'; they are now 'Civilian Protection Schools.' Defense won't win the war, yet prudence dictates that as we take the offensive, as we are now doing, we must also look to the protection of our civilian population and our vital industries.

"In our early pre-war courses, emphasis was placed on the special techniques of handling incendiaries, war gases, and unexploded bombs. You will still receive instruction in these particular features of civilian protection. But today you will receive much more. You will leave here with a better understanding of the duties of all the enrolled services which must work together as a team in meeting the situations that accompany aerial bombardment. You will learn not only more about your individual task under air attack, but you will learn how the team works as a whole.

"It is a peculiar fact that the better prepared we are to withstand aerial raids, the less incentive there is for our enemies to attack our cities. I have no doubt but that the opening of this school is known in Berlin and Tokyo. It is just another token of the fact that the United States is going all-out to win this war -- and as soon as our enemies are thoroughly convinced of this fact their defeat becomes inevitable."

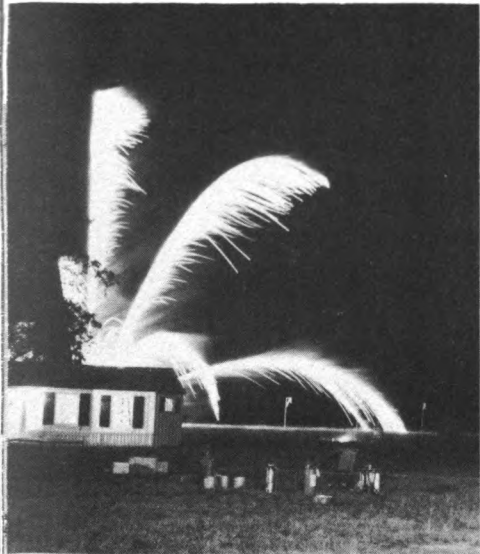
O.C.D. DIRECTOR LANDIS SPEAKS

The significance of the Army's contribution to civilian protection training was emphasized by James M. Landis, Director of the Office of Civilian Defense, in addressing a class at the Maryland school on May 4. The Army, he said, is making a great many contributions in other fields, but particularly in this one.

"Certainly, the toughest angle of civilian defense is that which is represented here -- the problem of training the millions of people who are necessary in order to create the type of civilian army that we need to deal effectively with the problems of hostile bombardment.

"I know that problem of training in the field quite well. I saw it begin when we (OCD) had no technical help. We thought that we ought to go into training and do something about starting the building of the civilian forces. We grabbed everybody who had the remotest idea of what the problems were in this field, put him on a platform, and tried to get him to impart his ideas to his neighbors. Some of those early experts were rather pathetic in the sense of competence of instruction that we could put together. But, on the other hand, you had a feeling that came as a result of that kind of an experiment when you saw hundreds of people perfectly willing to listen to poor instructors, knowing they were poor, but willing because of patriotic reasons to do what they could with what they could get.

"Fortunately, we are past that early stage today. Through the help, particularly of the Chemical Warfare Service, we have these schools. Now they are being



SCENES FROM CIVILIAN PROTECTION SCHOOL AT STANFORD UNIVERSITY

In the top picture Lt. Col. Albert C. Blicke, Director of the School, is explaining incendiaries to a class. The other views show a white phosphorus burst on the school demonstration field, and students working on a magnesium bomb with spray from a portable pump.

extended so that the program will call for about 350 persons to be graduated almost every two weeks. Three hundred and fifty persons by themselves is a very small number. But these people, as they go back to their communities, will multiply into battalions and into regiments of persons that they in turn have trained.

"I would like you, as you go back, not only to take up the duty of instruction, but also to carry out certain ideas to our civilian population that they need; that is, the essence of discipline and a sense of the seriousness of the responsibilities that they assume when they go into this work. I know that you can't put them under the Articles of War, but I do think that you and I can develop a code of discipline and loyalty for everybody that is involved in these forces, so that when the time comes for action they can respond and act as a unit along these lines -- and acting, have not only a loyalty to their community, a loyalty to their State, but also the same type of loyalty that the man in uniform has, and that is one to the United States of America."

In introducing Director Landis, Col. George J.B. Fisher, Chief of the Civilian Protection Division of the Chemical Warfare Service, remarked that the group of Civilian Protection Schools is concrete evidence of the War Department's cooperation with the Director of Civilian Defense.

THREE PRACTICAL SUGGESTIONS

by

***1st Lt. Charles R. Huntoon, B.W.S.,
Air Base Headquarters,
Howard Field,
Canal Zone***

SLURRY AGITATOR

Decontaminators: Have you mixed a slurry of lime in the proportions called for by the books?

Recently we received several drums of bleach that had been broken open in shipment and found most of the chlorine liberated. This provided an excellent opportunity to get in some training with the actual materials. We took advantage of the situation, and learned a lot.

This concentration of equal part by weight is very heavy slurry and is fast settling. It required quite a bit of time and effort to affect an even slurry with a paddle. Also as soon as we stopped paddling to dip out and fill an apparatus we found

that the slurry settled to such an extent that only about a 40-60 concentration reached the three-gallon decontamination apparatus.

My detachment here -- Chemical Company, Service Aviation -- suggested an agitator and with a spigot at the bottom. So we found a 55-gallon drum, borrowed a little reinforcing steel from a nearby construction job, and proceeded to the welding shop. It worked! In fact, it was just the thing, and so simple that we had no difficulties in having more fabricated. Now we have several placed around the base and at our auxiliary positions.

The accompanying photographs, thanks to the Base Photo Section, depict its construction and show it in operation.

Further, there's a hidden detail and an afterthought that improves its operation. The detail is to pivot the bottom of the agitator shaft in about an inch section of pipe welded to a small plate in turn welded to the bottom of the barrel. The pipe section holds the shaft in place and the plate reinforcing the bottom adds wearing qualities. In addition, weld a washer just large enough to slide over the shaft, to the shaft, right under the collar that guides the assembly at the top. This prevents the whole agitator assembly from jumping the pivot in the bottom.

M3 GAS MASK RACK

We weren't able to find any approved facepiece board specifications for the M3 diaphragm mask, so we had to use our ingenuity for our garrison storage racks. And it seems to be satisfactory, too.

As shown in the illustration below, the facepiece board is tilted back. The mask rests on its angle tube. The notches are square-cut 2-1/2-inches wide and 2-1/2-inches deep on a 5-3/4-inch (so-called 6-inch) board. The board is tilted at about 45 degrees with its top edge about 27 inches from the bottom shelf.



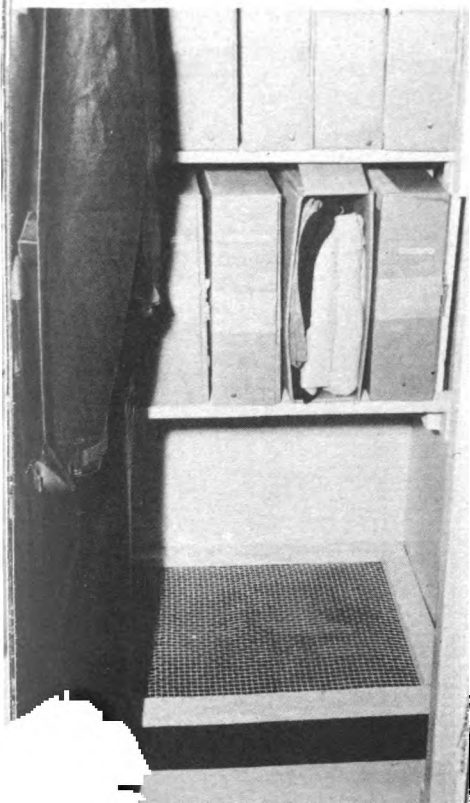
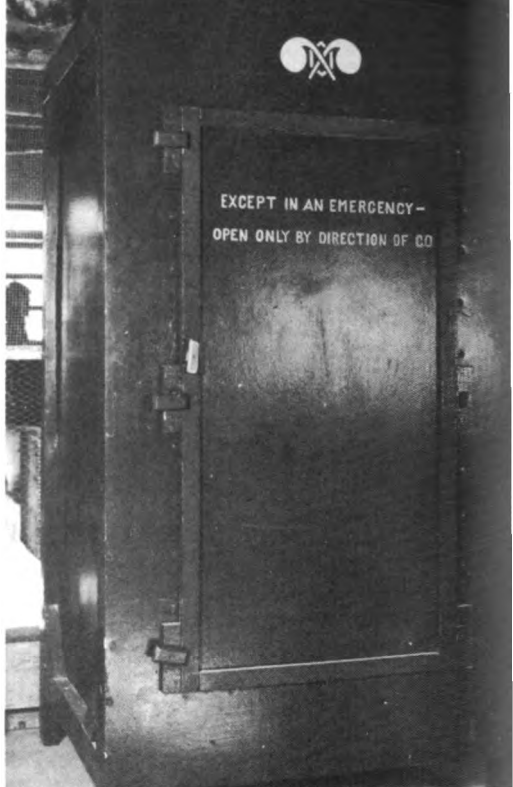
HANDY
PROTECTIVE
CLOTHING
CABINET



Here is an idea for storing protective clothing.

Construct a tight cabinet with a double tray in the bottom, one section to contain CaCl_2 to keep the air dry without raising the temperature, the other section to contain chloride of lime, to keep a concentration of Cl_2 in the cabinet.

The illustrations appearing on this page show such a cabinet and some of its details.



The container very conveniently holds two complete sets of protective clothing. It is fashioned out of an M3 diaphragm mask packing container. As will be noted in the lower photograph, the suits hang on a rod so that one complete outfit may be removed without disturbing the other one.

The CWS emblem emblazoned on the cabinet exterior is a fraternal touch added by the CW staff.

As will be noted from the suggestions offered, each of these devices is comparatively simple to construct and may be made of material that is usually available to any chemical warfare unit.



A "TAILOR MADE" KIT FOR GAS CASUALTIES

*Portable First Aid Box Developed
by Ingenious Chemical Officers
at Forts Monroe and Meade*



A "tailor-made" first aid kit for gas casualties has been devised by Maj. Alvin Caldwell, Chemical Officer of the Chesapeake Bay Sector, Fort Monroe, Va., and a number have been made up for the use of units in that area.

The contents of "Major Caldwell's Box," as it is now familiarly known, are based largely on a list of needed items compiled by Capt. Edward M. Hoshall, Post Chemical Officer at Fort George G. Meade, Md., with certain additions and refinements.

The powders and crystals used to make the neutralizing solutions are kept dry in bottles or other suitable containers until needed. The proper amount of pure water or other solvent may be added to a mark indicated on the container, or by other measurement. It is pointed out that, in general, solids keep better than solutions.

The original box was fashioned from boards salvaged from boxes in which gas masks were shipped to Fort Monroe. Any handy individual can make a suitable carrying case for the kit. The exterior and interior should be painted. The color is immaterial, but the paint preserves the wood. The box measures about 18 by 14 by 8 inches in size. In it is fitted a three-inch-deep removable tray. Compartments are made to accommodate the bottles, protective ointments, rubber gloves, and other medical supplies, including forceps and a knife. The box is equipped with lid, hasp, and padlock for convenience.

Thousands of persons engaged in civilian protection on the Virginia peninsula and throughout the Norfolk and Portsmouth areas have witnessed scores of chemical warfare demonstrations staged by Major Caldwell and his men. Many of these have been highly spectacular and have been reproduced pictorially in newspapers throughout the country.

Born in Groton, Vt., Major Caldwell is 35 years of age and bears the stamp of his New England background. His hobbies are woodworking and the collection of old firearms. He attended St. Johnsbury Academy and graduated from the University of Vermont in 1931, where he specialized in chemistry. Having taken ROTC training



through his school years, he was commissioned as second lieutenant in 1931. He became a captain in 1938.

In civilian life, Major Caldwell was employed in the plant research section of the New York State Department of Agriculture. In 1935, he joined the staff of the United States Department of Agriculture, where he specialized in plastics until called to active duty December 26, 1940, at Edgewood Arsenal. After eight weeks there, he was transferred to Fort Monroe.



Maj. Alvin Caldwell Demonstrates His First Aid Kit for Gas Casualties.

LIST OF CONTENTS OF FIRST AID KIT

<u>AGENT</u>	<u>AMOUNT</u>	<u>COMPOSITION</u>	<u>FOR</u>
Kerosene	1 pint	Commercial coal oil	Solvent for removal of HS and M-1 from skin.
Copper Sulfate	1/2 pint	8% in water	WP burns on skin.
Sodium Bicarbonate	1/2 pint	2% Baking soda in water TM 8-285, page 46	FM, FS, on skin and in eyes. HS and M-1 in eyes. CN,CNS CNB, and CA in eyes.
Bleach Powder (Bleach bottle)	1/2 pint	3-oz. bleach in tight fitting wide mouth bottle.	DM, ED by inhalation of dilute Chlorine from "Bleach Bottle"
Aspirin	100 tablets	5-grain Aspirin tablets	DM relief of headache discomfort
G.I. Soap	1 cake	Regular issue-Brown G.I. Soap.	Decontamination of skin after handling any agent.
Protective Ointment	2-3-oz. tubes	C.W. issue	Removal of HS from skin.
Bleach Paste	1/2 pint water 1/2 pound bleach	1 part bleach to 2 parts water. (Make up as required.)	Removal of HS from skin.
Sodium Hydroxide	1/2 pint (Pyrex bottle)	10% Solution Sodium Hy- droxide in 30% Glycerine. TM 8-285, page 46	Removal of M-1, and ED from skin.
Sodium Sulfite	1/2 pint	4% solution sodium sulfite in 50% alcohol. TM 8-285, page 46	Skin irritation from CN, CNB, CNS, and PS.
Smelling Salts	2 oz.	Regular issue	Psychologicals.
Tincture of Iodine	4 oz.	Tincture of Iodine with applicator.	Cuts - incidental to handling chemicals and for wounds.
Antipruritic Ointment	1/2 pound	TM 8-285, page 46	Relief from pain and itching vesicant burns.
Butyn Solution	4 oz.	2% solution	Relief from pain-irritation of eyes all agents (after bicarbonate treatment)
Ferric Hydroxide Paste	1/2 pound	TM 8-285, page 46	Treatment of erythema and vesi- cles from M-1, also internally against, as in the case of Arsine.
Tannic Acid Jelly	8 oz. tube or jar	Commercial product.	Treatment of burns.

<u>SUPPLIES</u>	<u>AMOUNT</u>	<u>COMPOSITION</u>	<u>FOR</u>
Gauze Pads	50	8 thicknesses to 2-1/2" x 2-1/2"	Swabbing vesicants from skin either dry or soaked with kerosene.
Gauze Pads (Sterile)	25	Regular issue	Dressings
Forceps	1 pair	Curved ends 5"	Remove particles WP from skin.
Bandage Scissors	1 pair	3" blade	Bandage work.
Knife	1	4" blade	Rapid removal of clothing. Vesicant burns. General purpose.
Gloves, rubber	2 pairs	Special type rubber, resistant to HS and M-1.	Handling vesicant casualties.
Eye Syringe	2	10-cc rubber bulb	Washing eyes (field)
Nose Syringe	2	10-cc rubber bulb	Washing nose (field)
Basin, small	1	Regular issue 3" deep.	Washing skin with soap and water after handling CW agents.
Adhesive tape	1-rol 1/2" 1-roll 1" 1 roll 2"	Commercial Zinc Oxide	Bandage work, etc.
Bandages	2 boxes 2" wide or 1 box 4" wide		
Absorbent Cotton	8 oz.		
Sterile Gauze	1 - 1 yard square or 1 x 5.		
Cotton Tipped Swabs	18 - each		
Tongue Depressors	12 - each		
Paper Drinking Cups	12 - each		

"PRACTICE TEACHING" FOR GAS NONCOMS

by

*Maj. H. B. Merrill, CWS
Chemical Officer, Camp Grant, Ill.*



SIGNAL CORPS PHOTO

The duties of a Gas Noncommissioned Officer at a Replacement Center differ considerably from those of a Gas Noncommissioned Officer with a combat unit. For instance, the former is not as much concerned with combat intelligence as he is with basic individual training of recruits, particularly in the use and care of the gas mask. The Replacement Center noncom must not only be letter perfect in gas mask drill; he must be able to teach it, and prepare others to teach it, to large numbers of new soldiers, in a minimum of time.

For this reason, in schools recently conducted at Camp Grant for training Gas Noncommissioned Officers for the Medical Department Replacement Training Center, emphasis has been placed on the methods of teaching.

A time-honored procedure is to have students take turns in drilling one another (the so-called "coach-and-pupil" method). This practice has the obvious drawback in that the men being instructed usually know as much -- and often think they know more -- than their comrades. Such being the case, the instruction given by the student is likely to be perfunctory, and the benefits fall far short of what they should be.

In the schools conducted at Camp Grant, a different plan was put into effect.

This post includes a large Reception Center, in which several hundred newly inducted men are usually on hand, awaiting transfer to replacement centers or other assignments.

Through the cooperation of the Commanding Officer of the Corps Area Service Unit, the Camp Chemical Officer borrowed groups of these men, about one hundred in a group, for one hour (which was done without interference with the Reception Center program). Most of these men never had handled a gas mask before. They were issued masks, and divided into very small groups of four to six in each.

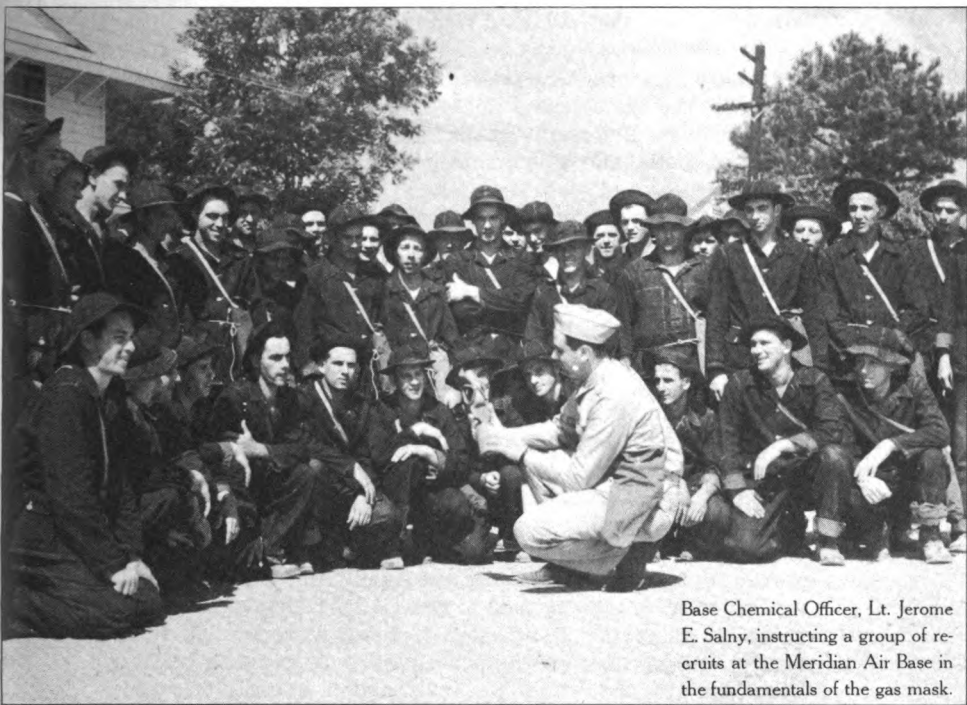
A student Gas Noncommissioned Officer was assigned to each group. He was told to instruct his group in the construction and care of the mask, and in the drill by the numbers. The senior instructor and his assistants, assisted by other officers attending the school as observers, circulated from group to group, observing the instructions being given, and noting faults. At the close of the hour, the men were assembled, and the senior instructor put them through the drill in a body, which served to evaluate the teaching they had received. Results were surprisingly good, although the performance of some men was much better than others, reflecting the efficiency of their particular instructors.

On the next day, the procedure was repeated, with an entirely new group of selectees. In the interim, a conference had been held, at which the faults of presentation noted at the preceding exercise were discussed and corrected.

The students indicated considerable improvement in teaching technique in this second day, and the final test drill showed that much greater uniformity of instruction had been attained.

CONCLUSION

Student Gas Noncommissioned Officers, entirely untrained in the use of the gas mask, were given two hours of supervised practical instruction in its use. The results indicated that their future efficiency as instructors was greatly enhanced by this practice. Incidentally, about 200 selectees got an extra hour of basic training in defense against chemical attack.



Base Chemical Officer, Lt. Jerome E. Salny, instructing a group of recruits at the Meridian Air Base in the fundamentals of the gas mask.

WHY I AM AN AMERICAN

It would sound foolish to say you loved a country because Majors here call their Adjutants "Charlie," wouldn't it? But that is one of my reasons for loving America. Perhaps I really mean that I like America because it's so different from any other place. You couldn't take your dog into the Army with you in Austria where I was born, for instance. But when I joined the United States Army in 1917, I told the Major that I had a dog, and the Major said to his Adjutant, "Say, Charlie, he has a dog -- can we use a dog?" and Charlie hollered back, "It's all right with me," and the Major said, "All right son, bring your dog." The Adjutant had his legs on the Major's desk, and the Major told me how much he enjoyed a trip down the Rhine, and that's one of the reasons I love America.

-- Luc'wig Bemelmans, in "I Am An American."

A TREATMENT for WHITE PHOSPHORUS BURNS

by
**Lt. Comdr. Duncan D. Walton,
Medical Corps, U. S. Navy**



Great difficulty has been experienced in treating white phosphorus burns, owing to the fact that the phosphorus adhered to the flesh, where it continued to fume and occasionally burst into flame again. This necessitated the placing of such cases in a continuous bath, and immediately on removal from the bath the phosphorus would begin to fume and smolder again.

The following methods of treatment were considered:

1. To use a phosphorus solvent containing some neutralizing agent. This method at first glance appears to be the ideal one, but the only satisfactory solvent for phosphorus - carbon disulphide - is itself highly toxic. The same objections apply in less degree to the other solvents; also, they would be highly painful on a burned area. The possibility of the neutralizing agent not acting immediately on the dissolved phosphorus has also to be considered, as the burned area would rapidly absorb the dissolved phosphorus, and acute phosphorus poisoning would inevitably result.
2. To use oxidizing agents that would rapidly oxidize the phosphorus. This idea was abandoned, since either the reaction would proceed so slowly as to necessitate long applications of the chemicals, or, if stronger reagents were used, the reaction would proceed with such violence as to cause further tissue damage, and in addition any reagents capable of acting rapidly would be too irritant in themselves.
3. To use agents that would rapidly place an insoluble, inert, nontoxic coating on any particles of phosphorus present, such particles to be later removed by irrigation with some non-irritant such as physiologic sodium chloride solution.

A number of experiments were performed on phosphorus in vitro, using solutions of nontoxic chemicals, and it was found that copper sulfate acted the most rapidly. Copper sulfate has long been used as an antidote for phosphorus poisoning, coating the ingested phosphorus with a layer of insoluble and nontoxic copper phosphid and acting as an emetic. A lump of phosphorus dropped in a 1 percent solution of copper sulfate is immediately turned black, and no longer fumes when exposed to the air.

* Extract from The Journal of the American Medical Association, Vol. 84, No. 20 (p. 1569).

Copper sulfate is used in medicine for a number of purposes. Solid sticks are used in the treatment of trachoma, a disease of the eyes. Solutions of various strengths and also copper sulfate pastes have occasionally been used as local applications to stimulate indolent ulcers. Bevan has used copper sulfate successfully in actinomycosis. He gave from 1 to 3 grains (0.065 to 0.2 gm.) daily internally, and applied a 1 percent solution to the ulcerated area. Cushny states that a 1 percent solution is occasionally used as a lotion in wounds, and that it is much less dangerous to man than many other remedies used as parasiticides and disinfectants. Sollmann states that its toxicity to animals is low. Experiments on mice showed us that the toxicity of a 2 percent solution of copper sulfate for mice by subcutaneous injection was 625 milligrams per kilogram.

EXPERIMENTS ON ANIMALS

The following experiments on animals were then performed:

Areas were shaved on two guinea pigs; the pigs were then morphinized, and anesthetized with chloroform. Lumps of phosphorus were placed on their skin and ignited. The flames were then quenched with water, but the phosphorus continued to fume. "Milk of Magnesia" had no effect on the phosphorus, which continued to fume. A 1 percent solution of copper sulfate was then applied, and the fuming immediately ceased, the phosphate having a heavy black film of copper phosphid on its surface.

A small black dog with abdomen shaved was morphinized and then anesthetized with chloroform. Lumps of phosphorus the size of a pea were applied to the skin and ignited. Cotton pads soaked in water were applied, and the flames extinguished. The phosphorus remaining fumed markedly. A pad of 3 percent copper sulfate was applied for two minutes. Fuming ceased, and the phosphorus lumps were black.

The foregoing experiment was repeated with 1 percent copper sulfate with the same favorable results.

Gashes were then cut in the skin and phosphorus inserted to simulate the results of a wound from a white phosphorus hand grenade of shell. Both the 3 percent and 1 percent copper sulfate solutions at once stopped the fuming from the depths of the wounds.

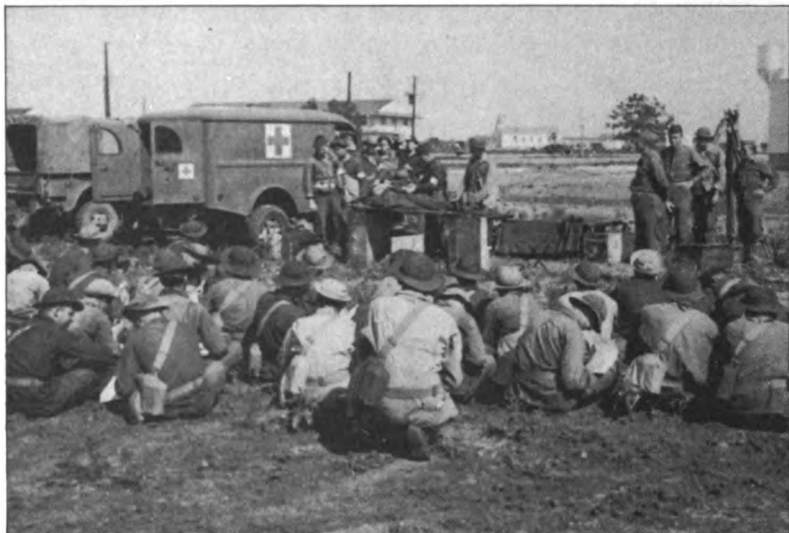
Large lumps of phosphorus were then placed in the wounds, ignited and permitted to burn, until the phosphorus was thoroughly heated and melted. Plain water pads when applied stopped the flames, but immediately on their removal the phosphorus burst into flame again. This experiment was repeated several times, pads being soaked with either a 3 percent or a 1 percent copper sulfate solution. The flames were at once quenched, the phosphorus did not reignite, and no fuming occurred. The phosphorus lumps were heavily copper plated and easily washed or lifted from the underlying tissues.

Several times during the course of the experiments, I accidentally let phosphorus come into contact with my hands. The result was a very disagreeable itching and burning sensation, and the area affected smelled strongly of phosphorus. A single brief application, one-half minute, of 1 percent copper sulfate solution at once relieved the burning sensation, and destroyed the odor of phosphorus.

CONCLUSION

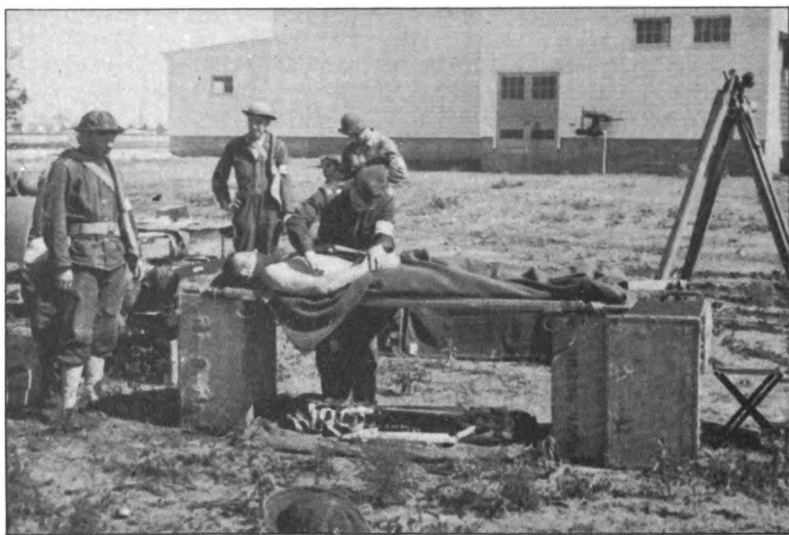
As the result of these experiments, a 1 percent copper sulfate solution is recommended as a treatment for white phosphorus burns, and a 1 percent solution of copper sulfate should be kept on hand at all shell and grenade filling stations, at

mortar batteries when white phosphorus shells are being used, and at first aid stations. Large pads of absorbent cotton should also be kept at hand. Whenever a phosphorus burn is received, a large sponge of absorbent cotton should be saturated with a 1 percent copper sulfate solution, and applied to the burning phosphorus. Within two or three minutes, it will be possible to remove the sponge. The copper-coated phosphorus should then be removed by forceps or by irrigation, and the case then treated like any other burn.



TRAINING IN FIRST AID

An Infantry Regiment, 31st Division, demonstrating their knowledge of first aid for gas "casualties" at Camp Bowie, Texas.



C.W.S. PARTICIPATION *in* **INSTRUCTORS SCHOOL**

Reservist Inaugurates State Course; II Corps Area Chemical Staff Assists in Curriculum

Being physically disqualified for active service does not prevent Maj. Frederick Kraissl, Jr., CWS-Res., from serving in the present emergency. Major Kraissl has been active in civilian protection activities in New Jersey as State Civil Defense Officer, and has conducted two regional schools which qualified 305 instructors detailed to take these courses by local defense councils.

In May, under the auspices of the New Jersey Defense Council, Major Kraissl directed a two-day instructor school at the Police and Fire Training Academy in Newark. The II Corps Area Chemical Officer and two enlisted men participated in the instructional program which, according to report, was "extremely well handled."

The school, the first of its kind, was known as the "Military Instructors School." Its purpose was to qualify inspectors to determine if the proficiency standards set for civilian protection instructors are maintained.

This pioneer course was streamlined as much as possible. There was no taking of notes, and the students reflected their absorption of the lectures by answering "Yes" or "No" to statements in a simple questionnaire covering each subject.

The curriculum was as follows:

Saturday

A.M.

8:00-8:30	Roll Call of Registrants Adjutant of School	Capt. Norman A. Skow, CWS-Res., Adjutant
8:30-9:00	Opening remarks and introduction of faculty and state officers Address by	Mr. W.R. Dorman, State Director of Training Col. T.S. Voelter, Chief of Staff, N.J. State Guard
9:00-9:30	Address by	Judge William O.H. McEnroe, Deputy Director, Newark District, New Jersey Defense Council
9:30-10:30	Purpose of School and Subsequent Duties	Maj. F. Kraissl, Jr., CWS-Res., School Director
10:30-10:45	Civilian Defense Organization and Communications	Lt.Col. E.B. Towns, Inf., Second Region, ODD.
10:45-11:45	Questionnaire on above Aerial Warfare and Incendiary Bombs	Major Kraissl
11:45-12:00	Questionnaire on above	

P.M.

12:00-1:00	Lunch	
1:00-1:45	Practical Blackout Methods	Maj. R.W. Kinsman, Inf-Res.
1:45-2:00	Questionnaire on above	
2:00-2:45	Demolitions and Rescue of Individuals	Chief J.P. Weeks, Newark Fire Department
2:45-3:00	Questionnaire on above	
3:30-3:45	Gas Weapons and Protective Equipment	Lt.Col. H.E. Miller, CWS, Chemical Officer, Second Corps Area
3:45-4:00	Questionnaire on above	
4:00-5:30	Gas Defense Training	Captain Skow, CWS-Res. Assisted by CWS detail from Hq. II Corps Area
6:00-7:00	Dinner	
7:00-7:45	Emergency Defense Against Chemicals	Major Kraissl
7:45-8:00	Questionnaire on above	
8:00-10:00	Demonstration of Handling Incendiaries	Chief Weeks

Sunday

A.M.

9:00-9:15	Instructions for Handling Bombs	Major Kraissl
9:15-9:45	Selection and Preparation of a Refuge Room in an Average Home and Industrial Plant	Major Kinsman
9:45-10:00	Questionnaire on above	
10:00-10:45	Duties of Air Raid Wardens, Fire Watchers and Training Methods. Film "THE WARNING."	Major Kraissl
10:45-11:00	Questionnaire on above	
11:00-12:00	Training of Auxiliary Fire Units	Chief Weeks

P.M.

12:00-1:00	Lunch	
1:00-2:00	Training of Auxiliary Police Units	Sgt. Paul V. Gaffrey, Newark Police Mr. Leo Welch, Director of Safety and Education, N.J. Motor Vehicle Dept.
3:00-4:00	The Emergency Medical Corp	Dr. Chas. H. Schlichter, Chief of State Emergency Medical Services; Dr. Leonid Snefireff, Asst. Director
4:00-5:00	Functioning of the Combined Defense Services. Practical exercise at Neward Center. Incidents were realistically reported through channels and were plotted on maps.	

Action required was analyzed
and directed by Control
Commander. General cri-
tique after adjournment.

During the course, mobile Red Cross units appeared at meal time and conducted cafeterias.

"In conducting this school," Major Kraissl explains, "the objective was set that all of the energies of the student would be required to assimilate the subject matter delivered in compressed capsule form. Consequently, no note-taking of lectures could be permitted to tire the students. Lecturers were required to submit their talks in advance so that they could be multigraphed. At the end of each lecture and questionnaire, the written talk was handed the student. The function of the questionnaire was not only to determine the capacity of the student, but also to evaluate his relative proficiency with various subjects and, most important, to determine whether the lecturer had 'gotten across' his subject. An analysis of the grades indicate that this occurred.

"The next step," says Major Kraissl, "will be the detail of these officers on a voluntary assignment basis to the Defense Districts in order that they can proceed with the plan. My function will then be that of administration and inspection of this program on a State level. My ultimate plans include the appointment of a District Civil Protection Officer and two assistants for each District. These officers would be those able to devote the most time and capable of performing the required duties. The organization and administration of the District schools and continuous inspection would fall heaviest on their shoulders. The remaining officers would be used as lecturers and inspectors in accordance with the plans decided as best applying in each District.

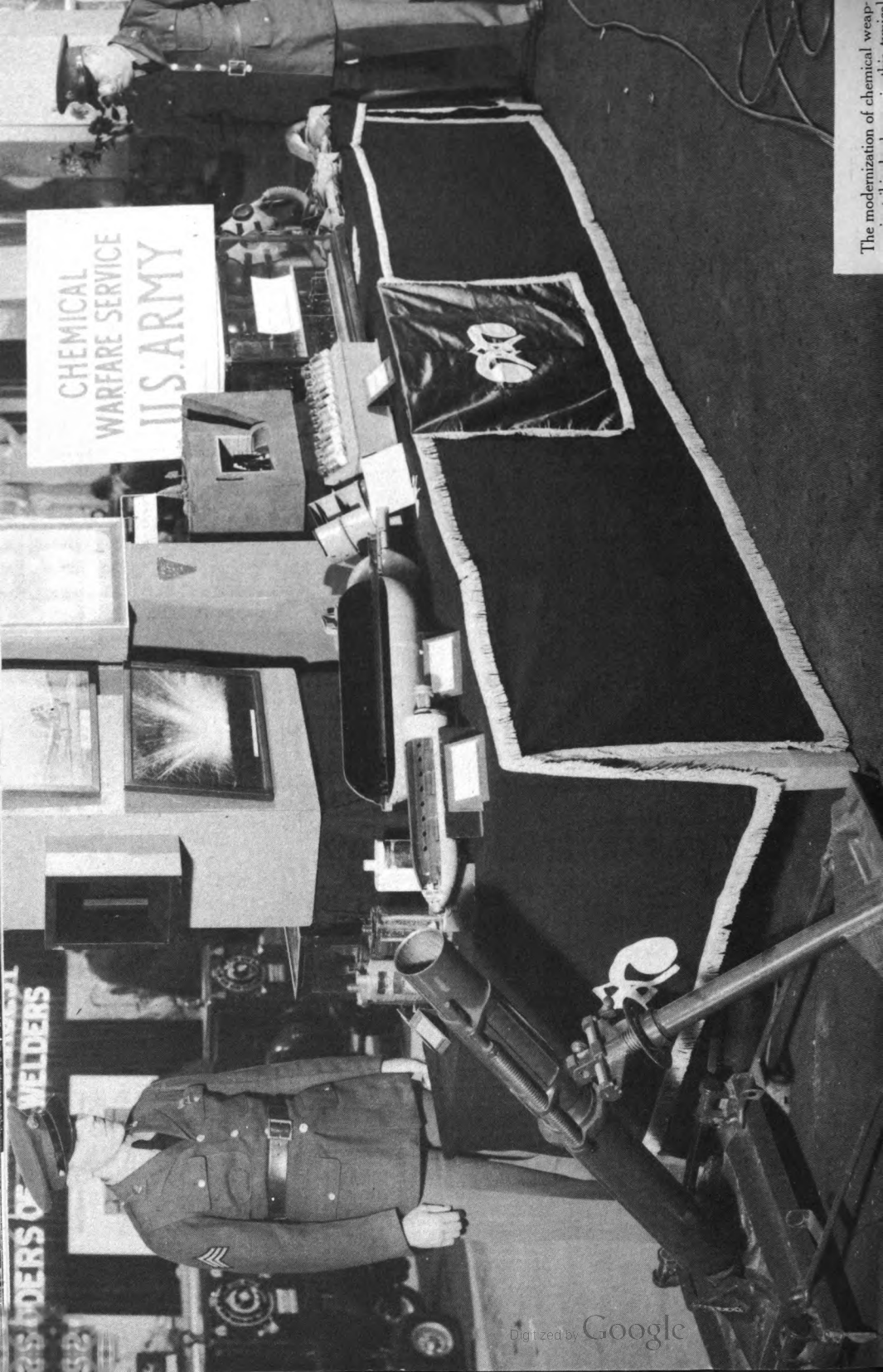
"If this plan works out successfully it can be greatly credited to the assistance given by the other members of the faculty of this school."



A TRIBUTE TO THE ARMY

We Americans these days realize as never before how much we owe to our Army. All that we have now, and all that we hope to have in the future, depends in the last analysis upon the courage and devotion of the individual soldier and upon the skill and efficiency of the Army as a whole.

-- Donald M. Nelson, Chairman of the War Production Board.



CHEMICAL
WARFARE SERVICE
U.S. ARMY

WELDERS

CHEMICAL WARFARE THROUGH THE AGES

Incendiaries and Poisonous Fumes Used Since Biblical Times; Flame Throwers Known to Ancients

A Chronicle of Past Precedents Compiled from Varied Sources

Man's earliest weapon was his fist. Then some sly fellow started to throw rocks. Eventually an artful person fashioned a crude knife. Staves, swords, and lances made their appearance without criticism. Such things were accepted so long as man engaged in individual combat.

"But," as once pointed out by Comdr. H.A. Flanigan, U.S.N., in U. S. Naval Institute Proceedings, "the genius who invented the bow, and the knave who from a safe hiding place first discharged an arrow at a distant foe, found few admirers. The knights and gentlemen grudgingly included the bow and arrow as a weapon of war but disdainfully placed it in the hands of serfs and yeomen while they proudly held to their swords and lances. Not until after the feats of the British long bowmen at the Battle of Cressy was the archer given a place of honor in the armies of the world."

"Contempt and indignation met the soldier who advocated a cowardly lying-in-safety while discharging a deadly piece of metal at a far distant foe. What chance had a man against this invisible thing which struck him unawares, tore great holes in him, and neither gave him an opportunity to defend himself nor his comrades an opportunity to rescue him? But all to no avail, musketry had come to stay."

THE HAGUE CONVENTION

Likewise, at The Hague in 1889, and again in 1907, effort were made to prohibit gas as a weapon of war. But they, too, came to naught. To quote Commander Flanigan: "A few practical delegates to these conventions, among them our Admiral Mahan, recalled the history of previous weapons and refused to pledge their countries not to use this newly talked of one." As the world knows, Germany, who was a party to a pact not to use gas, treated it as another "scrap of paper" when she introduced chlorine against British and Canadian troops before Ypres on April 22, 1915. Germany's early successes with this weapon lay in its surprise and psychological effect. But she showed her hand early in the war, and the Allies later proved to be more than a match for her.

FLAME THROWERS OF 424 B.C.

Contrary to a popular idea, use of chemical agents in battle is by no means new. Incendiaries were employed with marked success as far back as Biblical times; poisonous fumes were resorted to in the wars between the Athenians and

Spartans, and flame throwers were tried out in 424 B.C. Capt. George O. Gillingham, C.W.S., relates some historical background in *The Saturday Evening Post*:

Earlier -- some histories say 429 B.C. -- the Spartans utilized chemical agents against the cities of Delium and Plataea. It seemed to be a favorite practice to melt pitch, charcoal, and sulfur and allow the resultant fumes to be carried downwind to the enemy, in some instances aiding dispersion of the fumes with bellows.

About 360 B.C., it is recorded, blazing material was thrown in pots from besieged towns. This led to the introduction of incendiary arrows. The Greeks and Romans were familiar with chemical weapons. Though the famous "Greek Fire" is to have been invented about 660 A.D., it was probably known earlier. A similar substance was used by the Byzantine Greeks against the Saracens in 672 A.D., and was later employed against the Christians in the Crusades.

No weapon which has proved successful in war is abandoned until something better comes along. Invention of every new weapon invariably inspires outcry that that it is "cruel" and "inhuman." Yet for each development some counter article or method is found. For example, invention of the ironclad, while it spelled the doom of unarmored vessels, did not have the invincibility that it was first hailed as possessing.

THROES OF WEAPON EVOLUTION

Chemical warfare has gone through the same throes of dispute and misconception that other weapons weathered. When the crossbow made its debut during the 12th century people were horrified. "Too fatal and too cruel," they cried. Pope Innocent III prohibited its use in battle between Christians but sanctioned its use against non-Christians.

Gunpowder was characterized as "contrary to humanity and calculated to extinguish military bravery." In the days of "Good Queen Bess" there was popular aversion to the improved artillery. When the English first employed small arms to advantage in their wars with France the latter condemned the former as "cowardly and base knaves who would never have dared to meet true soldiers face to face."

In our own country Gatling's invention of the gun that bears his name evoked so much opposition that he took his idea to foreign nations, who quickly adopted it.

In 1855, during the Crimean War, Lord Dundonald, an admiral in the British Navy, suggested the use of sulfur and other materials to drive the Russians from Sevastopol. He planned to vaporize the sulfur with great fires of coke. But certain superiors, though admitting the plan was feasible, rejected it as being "too horrible" and even ordered the papers detailing the scheme destroyed.

CHEMICAL WARFARE IN WAR BETWEEN THE STATES

Several forms of chemical warfare were introduced in our own War Between the States. During the siege of Charleston wood saturated with sulfur was burned under the parapets in the hope that favorable winds would carry the fumes and drive out the defenders. On another occasion, 36 incendiary shells were dropped into that town under cover of darkness, causing General Beauregard to write the Federal commander, General Gilmore, as follows:

"Your firing a number of the most destructive missiles ever used in war into the midst of a city taken unawares and filled with sleeping women and children will give you a bad eminence in history."

But history repeats, as evinced by Germany's intital use of incendiaries from the air in World War No. 1, and her aerial bombing of London in the current war.

PROLOGUE !



Top - Anti-gas clothing was tried out by Russian cavalrymen.
Below - The moors battled in masks for Madrid.



London "Bobbies" prepared themselves with gas mask drill. (above.)



German motorcycle troops maneuvered in gas masks. (lower.)



The record of incendiary agents is an interesting chapter on chemical warfare in itself. Col. Augustin M. Prentiss, now Commanding Officer of Pine Bluff Arsenal, published the following facts on this particular subject in *The Military Engineer*:

"The early use of incendiaries in combat is easily understood when it is remembered that, from the earliest times, fire has been the most ruthless enemy of mankind, and its application to war is but further evidence of the universal dread of 'The Great Destroyer' which has come down through the ages.

"The idea of using incendiaries in battle dates back to early Biblical times when armies attacking and defending fortified cities threw upon each other burning oils and flaming fire balls consisting of resin and straw. The first flame projector on record was used at Delium in 424 B.C. It consisted of a hollow tree trunk to the lower end of which was attached a basin filled with glowing coals, sulfur and pitch. A bellows blew the flame from the tree trunk in the form of a jet, setting fire to the enemy fortifications and aiding the besiegers in the capture of the city.

"The next recorded use of incendiaries was by the Trojan king, Aeneas, about 360 B.C. He made use of fire compositions consisting of pitch, sulfur, tow, resinous wood, and other highly inflammable substances which were easily ignited and hard to extinguish. The incendiary composition was poured burning into pots, which were fired from the walls of besieged cities upon the attacking troops below.

"Somewhat later the Romans hurled from catapults crude iron latticework bombs, about two feet in diameter, filled with highly inflammable materials. These were ignited and thrown as flaming projectiles upon the enemy fortifications. Later, incendiary arrows were subsequently enlarged and shot from catapults. Behind the arrowhead, they carried a perforated tube containing tow, resin, sulfur and petroleum, and were ignited just before being shot.

"GREEK FIRE"

"The greatest impetus to the use of incendiaries in war came with the introduction of "Greek Fire," which was said to have been invented by the Syrian, Callinicus, about the year 660 A.D., although there is evidence of the use of similar materials as early as the time of Constantine the Great, in the fourth century, A.D. The exact formula for Greek Fire has never been definitely established. The process for making it was kept a secret for several centuries and no detailed information as to its composition seems to have survived. It is certainly known to have contained readily inflammable substances such as pitch, resin, and petroleum, as well as quick-lime and sulfur. The quick-lime, on contact with water, generated sufficient heat to ignite the petroleum, the burning of which ignited the other combustible materials. The light vapors from the petroleum caused explosions and these spread the flames.

"It was difficult to extinguish Greek Fire because water increased the reaction of the quick-lime and spread the petroleum. The troops of the Byzantine Empire made such effective use of Greek Fire against the Saracens that it is frequently said to have saved the empire from Mohammedan domination for nearly a thousand years. At any event, Greek Fire was extensively employed in the wars of the Middle Ages, and its use survived until the introduction of gunpowder in the Fifteenth Century.

INCENDIARIES REAPPEAR IN WORLD WAR I

"From the beginning of modern times down to the World War, incendiaries

were not extensively employed, as the introduction of firearms caused armies to engage in battle at such distances that they could not effectively be reached by incendiaries. Moreover, the defensive use of armor, and later of earthworks, left little of combustible material on the field of battle. So formidable were the technical difficulties created by these new conditions that the successful use of incendiaries in war remained an unsolved problem until the advent of the World War, when the vast resources of modern science were utilized to effect a solution. So, while fire has been considered of military value, from antiquity, means for scientifically using it in warfare were not developed until the World War.

"The effectiveness of incendiaries in war is dependent upon the character of the materials employed and upon the devices used for carrying them to the target and setting them in action there. Because of the generally adverse conditions which exist in modern warfare the development of successful incendiary armament involves chemical and mechanical problems of great complexity, as will be appreciated from the consideration of the many rigid technical and tactical requirements which must be met. At the same time, the introduction of the military airplane has greatly increased the field of application of incendiaries, as it is now possible by such means to reach large and vulnerable incendiary targets at practically any point in the theater of war. This was exemplified in the German air raids on Paris and London in 1915, in which incendiary bombs were frequently employed.

"Although the French and Germans both had developed incendiary artillery shell before the World War, one French model dating back to 1878, such shell were not used to any extent in the early days of the war, probably because they were largely ineffective. The earliest incendiary munitions used in the war appear to be incendiary bullets and antiaircraft artillery shell, directed against observation balloons.

GERMANS INTRODUCED FLAME PROJECTORS

"The first incendiary attacks against ground troops were by means of flame-projectors. General Foulkes says that the Germans used their flame projectors on the French front on June 25, 1915, but it is probable that their first use was several months earlier, for it is known that the Germans had an organized detachment of flammenwerfer troops as early as January, 1915, and the French made a formal protest against the use of these devices under date of April 29, 1915.

INCENDIARIES DROPPED FROM AIRCRAFT IN 1915

"The initial use of incendiaries from aircraft occurred during the first German Zeppelin raid over London on May 31, 1915, during which one airship dropped 90 incendiary bombs.

"By the end of 1915, improved types of incendiary artillery shell were in use by both sides. These were soon followed by the introduction of incendiary grenades, trench-mortar shell, and projector bombs. Throughout the war, all the principal belligerents engaged in the energetic development of incendiary armament and much progress was made in improving all types of incendiary munitions, particularly aviation drop bombs."

BOOK CORNER



THE CONDENSED CHEMICAL DICTIONARY, edited by Editorial Staff of Chem. Eng. Cat., 690 pp., 6" x 9", + app. 66 pp. (Reinhold Pub. Corp., New York, 1942, \$12) -- The third edition of this popular compendium includes thousands of new items. The inclusion of commercial names for various chemicals makes the book particularly useful, while the cooperation of a long list of commercial firms in the compilation of the book insures accuracy for these items. The definitions are complete and give all essential information for each material. A guide to pronunciation, a table of price ranges for chemicals and a valuable appendix of readily accessible useful data are features. The book is well-printed and serviceably bound with a thumb index.

THIS CHEMICAL AGE, by William Haynes (Alfred A. Knopf, \$3.50) -- Stories of the new materials that are remaking our world -- how they were discovered and developed -- as related by the recent publisher of "Chemical Industries" magazine. Not only does he tell of what is being accomplished today, but he presents what he thinks may be expected in the near future.

THE MEN WHO MAKE THE FUTURE, by Bruce Bliven (Duell, Sloan & Pearce, Inc., \$3) -- The editor of "The New Republic" magazine presents a review of American pioneering and achievement on all scientific fronts. He visited the great laboratories and research centers and interviewed leading scientists. He finds American science in the vanguard, devising the most potent weapons ever known, making the country safer at home, discovering new ways of producing vital materials.

CIVILIAN DEFENSE OF THE UNITED STATES, by Col. R. Ernest Dupuy, G.S.C., and Lt. Hodding Carter, F.A. (Farrar & Rinehart, \$2.50) -- In connection with the general subject, they tell the layman what he can do in fighting incendiary bombs. Outlines organization for the "Air raid set-up" from home precautions to operations of the Interceptor Command. Devotes chapters to bomb shelters and fire-fighting. Colonel Dupuy, incidentally, is in the Bureau of Public Relations of the War Department.

AERIAL BOMBARDMENT PROTECTION, by Professors Harold Everett Wessman and William Allen Rose (John Wiley & Sons, Inc., \$4) -- Courses conducted at New York University under the auspices of the Engineering Defense Training program of the U.S. Office of Education inspired this volume. Effect of aerial bombs in England is detailed from the viewpoint of being helpful particularly to engineers and architects.

WINGS OF DEFENSE, by Capt. Burr W. Leyson (E.P. Dutton & Co., Inc., \$2.50) -- "Air gas attack is largely a myth for the very good reason that it is not to any degree as effective or as inexpensive as bombing attacks," declares the author. However, Captain Leyson devotes a chapter to possible gassing by planes. He regards the incendiary bomb as the lightest and most destructive of all aerial bombs, and reviews the three major types of these incendiaries.