

# THE ATLAS OF MODERN WAR

On the Shoulders of the Engineer Falls a Tremendous, Ever-Increasing Burden, Due to the Extraordinary Technical Demands of the Present Day

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NO art throughout history has been as progressive as the art of war. In the conflict now raging in Europe it has become, in large part, a technical occupation in which everything depends on the engineer. Until Frederick the Great developed the complicated evolutions of close order drill, from which the modern Prussians have not entirely freed themselves, practically nothing was required from the average soldier except a fair degree of proficiency in the use of his arms. The mediaeval archer, whose bow was his companion in time of peace as well as in war, was ready to step from his accustomed civil occupation into the military ranks at the call of his war lord. The knight's business was fighting all the time; at most war meant for him a change from a joust at a tournament to a battle with an organized foe.

In the last hundred years the evolution of war has been more marked than in any other period since the invention of gunpowder. Napoleon exemplified for the first time the dominating value of artillery when skillfully massed and the need of concentrating an overwhelming superiority of troops against the weak point of an enemy. The American civil war brought rapid-fire ordnance, the use of fixed cartridges as ammunition, and the development of open-order fighting, besides the armored warship, which revolutionized the world's navies. The Franco-Prussian war of 1870 produced the "needle gun" and taught the value of colossal organization in preparedness for war.

The familiar developments of the present conflict—the use of the submarine and the airship, trench warfare, the employment of artillery on an unprecedented scale, especially in forming the barrage, the greatly extended use of the machine gun, the substitution of motor traction for horses, and the effective marshaling of numbers of men so immense that it had been conceived hitherto to be impossible to keep such forces in the field as mobilized and effective combatants—are all based upon a background of engineering skill. The engineer has led the way in bringing about this transformation in warfare. Without his ever-present help the new appliances would be useless in affecting the results of battles and campaigns.

The American Army will be operated, in large part, as a sort of traveling machine shop. A direct view of its rapidly developing functions in this respect is afforded by a list of the new units, for which the chief of engineers of the army is calling for volunteers, and which must be provided without delay in order to assure America's participation in the land operations of the Allies on the scale that is urgently necessary. These units are:

- "Tank" service battalions.
- Gas and flame service units.
- Camouflage regiments.
- Searchlight regiments.
- Crane operating and maintenance regiments.
- Electrical and mechanical regiments.
- Forestry battalions for sawmill work.
- Forestry battalions for auxiliary, road, camp, and bridge work.
- General construction battalions.
- Quarry regiments.
- Railway construction battalions.
- Railway maintenance and equipment battalions.
- Railway maintenance of way battalions.
- Railway operating and shop battalions.
- Railway transportation battalions.
- Road building battalions.
- Supper regiments.
- Supply and shop battalions.
- Surveying, ranging, and map reproduction regiments.
- Truck and wagon companies.
- Water supply companies.

It is obvious that only technically

trained troops can operate the new "tanks," which depend entirely upon mechanics for their success. The American type of tank, which is already being produced in considerable numbers, is yet to be demonstrated on the field of battle. It is understood that constant improvements in the construction of these strange masses of machinery are being made, not only by the Americans, but also by the British, French, and Germans. The classes of men whom the Engineer Department considers most needed for this service are chauffeurs, machinists, mechanics, dredge and steam shovel operators, and gas and steam engineers.

To the new men who are being drafted for the gas and flame service will fall the task of bringing into play all that American scientists are able to develop



American Army Engineers Operating Trains Behind British Front.

for the prosecution of this terrible form of warfare, which Germany has resurrected from the days, centuries ago, when "Greek fire" was used in the defense of Constantinople against the Turks. The use of gas and flame to disconnect and shatter an enemy column depends largely upon accurate knowledge of atmospheric conditions and of the chemical operations involved. This branch of warfare requires a rare degree of initiative and decision in thought and action, as well as sufficient scientific knowledge. For enlistment in gas and flame battalions the Engineer Department is calling especially upon machinists, chemical workers, plumbers, steamfitters, electricians, boiler-makers, compressor men, pipe fitters, engine men, powder men, blacksmiths, carpenters, and tinsmiths.

American ingenuity is relied upon to produce some novelties in the camouflage service, which the Engineer Department considers so valuable that it is forming separate units for it. Successful concealment from the eyes of the enemy is, in the present war, often absolutely necessary. The camouflage companies will use their skill and original ideas in the concealment of the location of trenches, listening posts, gun emplacements, airplane sheds, and lines of communication. They will use all their artifices in the preparation of imitations of guns, roads, trenches, shell holes, and supply trains. For this work the army calls for the services of painters, architects, sculptors, motion picture men, photographers, scene painters, traction men, stage carpenters, sheet metal workers, riggers, derrick men, and property men.

Another specialty developed in the present war is the widely extended use of searchlights for battle illumination and protection against aircraft. Formerly

one of the most familiar aspects of war, have been rendered well-nigh obsolete by the development of searchlight operations, made possible for the first time by the practical application of electricity to this form of illumination. For the searchlight regiments the types of men desired are searchlight mechanics, electricians, gas engine operators, blacksmiths, wheelwrights, saddlers, and wagoners.

The crane operating and maintenance regiments are required in unusual number and efficiency, owing to the bold decision of America to maintain armies of millions of men in an arena of operations 3,000 miles from home. These regiments will be stationed at the ports of debarkation which France has provided for our army, in order to facilitate the loading

Conditions require that the extensive forests of France shall supply this timber, but in order to make use of it in the quickest and best way, the Engineer Department is organizing forestry battalions. For these units it needs: wood bosses, sawyers, filers, logging teamsters, skidmen, stationary engineers, gasoline motormen, tractor drivers, stationary firemen, log scalers, tie cutters, pole and piling men, charcoal burners, sawmill foremen, millwrights, railroad track bosses and trackmen, locomotive engineers, firemen and brakemen, road construction foremen and workmen, tractor and roller road operators, concrete foremen, asphalt plant workmen, asphalt spreaders, rakers, and bridge carpenters.

Mining units, always needed in recent wars, are far more necessary now than ever before. Underground construction, particularly the driving of tunnels or mine galleries in trench operations for the purpose of demolishing the enemy's works, is constantly carried on.

The army also expects to reopen coal mines which have been closed or partly destroyed by the Germans and to make use of the coal for the army's needs and for the French people. Besides the coal mines, quarries will be operated under engineering supervision for obtaining stone to be used in the construction of roads, wharves, and buildings.

Never before have railroads played such an important part in the operations of war. A network of new railways must be constructed behind every large force of American troops in order to assure a constant food and ammunition supply in great quantities for the armies at the front. Every time an advance is made, even if it is only a fraction of a mile, the tracks must follow the troops at once, so that their fighting capacity shall not be impaired by lack of subsistence and war materials.

W. W. Atterbury, formerly a Vice President of the Pennsylvania Railroad, assisted by a number of "live wire" construction and operating men, who have offered their services to the Government, has already made wonderful progress with this vital work. Germany for years has been working out the problem of constructing and utilizing a system of strategic railways for war. It falls to the lot of General Atterbury and his associates to accomplish in a short time what Germany had reduced to a science through a long period of careful experimentation.

No country could supply, without a great deal of preliminary organization and preparation, the great number of engineers and technically trained men needed for the gigantic task which America has undertaken. The United States is prolific in engineering talent of the first order, but its engineers are not as numerous in proportion to the population as are those of Germany. That country, having foreseen for many years that a technical war would be waged, has been using its universities freely for developing the men needed.

A case that may be cited is that of the need for acetylene welders, who operate under the engineers in repairing guns and numerous other objects of metal which are part of the equipment of war. When the German Army entered Belgium, in August, 1914, it is said to have had 20,000 of these skilled workers with it ready to respond instantly to emergency calls. There were then only 6,000 acetylene welders in the United States, but the lack of them, as well as of many other types of men required by the army for its engineering operations, is being made up by co-operation with the Government on the part of the universities and training schools.

America, a nation of builders, must build in this war as never before, in order to prepare for the effective maintenance of its maximum forces in the field of operations. Lumber is urgently needed for warehouses, railroad ties, bridges, bombproof roofs, lining of mine galleries, erection of camps, hospitals, and the almost infinite variety of buildings needed for the men maintained in service.

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# Spirit of '76 Pervades France and England

Both of These Countries Are Full of Determination to Achieve Victory and Are Nowhere Near Being Starved—Nor Is France "Bled White"

By HERMAN WHITAKER.

Mr. Whitaker, before he went to live in California in 1895, had served three years in the British Army. He is the author of several novels and many articles on Mexico, where he was a war correspondent with Villa's forces in 1914. For months he has been in Europe. He bears letters from General Pershing and Vice Admiral Sims, recommending him to their subordinates as a correspondent especially worthy of trust.

IN New York some months ago two friends of mine expressed grave anxiety concerning the food situation in England and France; also the spirit of their peoples. They feared that the diabolical censor was sitting on the safety valve, suppressing truth that would presently generate a head of steam and blow our sanguine hopes to atoms. They had heard that England was starving, France bled white; their peoples so "fed up" with the war that they were ready for peace at any old price.

"Let us know the truth when you get over there, old man," one of them pleaded. "Send me only a line. Make it cryptic as you please. I'll understand."

I promised, and here goes—omitting the "cryptic" which my own dealings with the censor have proved unnecessary.

The picture of England, drawn by my friends, showing her starving and about to bend the knee to the conquering Hun behind the censor's veil of silence, I found very far indeed from the reality when I landed there last October. Though prices were high, food was plentiful; people appeared to be observing their usual standard of living. Food regulation had, as yet, hardly begun. Even sugar was still to be bought in quantities. In fact, I had left a stricter economy in practice in San Francisco at the beginning of September than I found in London six weeks later. Not until after Christmas was a pinch really felt, and it was popularly attributed then to the withdrawal of supplies by the Food Controller preparatory to placing the nation on rations. This, no doubt, was partially true, for it is self-evident that there could be no rations without rations to ration.

During January the pinch became more severe. Queues formed in front of butchers' and provision shops. Meat was hard to get. In our household we had none for three weeks, but this was principally due to our housekeeper's pride, which would not brook her standing in queues. For it was to be had at the restaurants, hotels, clubs, and was served to me in several private families. Yet we did not suffer without it. Finnan haddie for breakfast, a sole for lunch, a rabbit, hare, or chicken for dinner, with bread, vegetables, and a dessert, can hardly be termed starvation as it existed in the imagination of my New York friends. Prices were high, of course, as before said. But so were wages. As a matter of fact, the British workman's family receives more money than ever before; is better able to buy food than the middle classes.

This was the situation, then, when I left England at the end of January. My observation, moreover, had not been restricted to the upper classes. Frequent visits to Whitechapel, Cheapside, Petticoat Lane, as well as good artisan neighborhoods like Pimlico, proved that London as a whole was getting enough to eat. Since then, the nation has been put on rations—with what results it is still too early to say. But taking into consideration the advantages gained in economy, equitable distribution, and better price control, they ought to be satisfactory. As the shortage of shipping is be-

ing remedied by the immense English and American mercantile programs, it is natural to suppose that the worst is past.

Now for France:

Paris exactly duplicated in the first of February the London situation during the last of October. Foodstuffs were plentiful, but dear. Everybody seemed, however, to be living as usual. First warnings of restriction had just been issued, to be put in force at the end of the month. On schedule they went into effect. Milk can be served in the cafes only with the breakfast coffee. Cream cheeses and cream, pastry and a few trifles of that order are prohibited. Neither butter nor sugar can be served at restaurants. They must be bought by card and taken with you.

Yet, even with these restrictions in force, a good square meal can still be obtained with a half bottle of wine at almost any middle-class restaurant for 90 cents. One restaurant I know of serves soup, salad, fish, an entrée, a vegetable

up," as my friends hinted, that they are ready to make peace at any price?

It would be foolish to propound such a question—say, to the British Commons, to the French Deputies, the newspapers of either country, to their leaders of thought or men of large affairs. They have already accepted President Wilson's statement of war aims—no peace till democracy is made safe in the world. But what of the common people—the dumb millions that, in Russia, recently brought the plans, first of an autocracy, then of a democratic administration, to naught? What have the dumb millions to say?

Let the little "slavery" who lit my first fire in London give answer. She was small, insignificant, almost dwarfish. She snivelled from the chronic cold one contracts in these Isles. Her snub nose and weak, watery eyes were not improved by a periphery of coal dust. Not by any stretch of imagination could she be considered a heroic figure; neither Lloyd

Then the Englishman awoke again and established the barrage fire of a thousand guns that roused me on my third night in London.

The week before a bomb had fallen within half a block of our house, killing eleven people and maiming many more. It had lit up every room in the house with its flash. The concussion had shaken things off the mantel. Yet there was no sign of trepidation in my hostess' gentle knock, or her quiet invitation to come down to the flat on the ground floor. Pajamas and blankets were quite au fait in the mixed company there assembled. Officers from the front, a few business men with their wives, mingled with the servants on equal terms, for air raids are great levelers. Quite indifferently, they singled the crashing, rattling roar of the Hun bombs from the thunder of the barrage, and their count of seven was confirmed by the official report next day. After each echo they would pick up the conversation where they had left it, probably concerning the shortcomings of "the little Welsh lawyer," Lloyd George, in the case of the men; the fashions among the women. But for the ghastly toll of maimed and killed men, women, and children we knew would be reported next day, it would have been quite an enjoyable occasion. Their spirit, indeed, reminded me of the cheerful courage of the San Franciscans during the trying days after the earthquake and fire.

This fortitude was by no means confined to the upper classes. Next day I went to see a house that had been bombed in one of the poorer districts—though "bombed" is too weak a word to describe the effects. Of the centre building in a solid brick street, nothing was left but the cellar. It had been blown clean away, and with it the side walls of the adjoining houses. From garret to cellar the rooms were exposed to view like in the "elevation" of their architect's plan. The entire neighborhood, too, had suffered heavily from the barrage fire—windows broken, brick fronts chipped, corners knocked off by the rain of shrapnel. Yet, in place of the fear one might have reasonably expected, the inhabitants displayed seething rage.

"Afraid?" A middle-aged woman whose roof had been smashed in by one of our own "duds" scornfully repeated my question. "No, I wasn't; only cowed mad. All I arsk, Mister, is to get me 'ands on one of them bloody devils. It 'ud be the last bom 'ed drop." A policeman who stood near gave me a wink. "An' that's no lie," he said, after she had gone back into her house. "The women round 'ere was that mad they'd 'ave tore 'im to bits if they could 'ave collared 'im. I never see nothink like it. 'E was flying low along 'ere. Seemed to drop out of the sky and come booming over the 'ouse tops. The three that was killed was standing outside watching 'im, and after 'ed dropped the bomb one woman chased him along the street 'owling for 'im to come back and fight it out like a man." He concluded with scorn that equaled the woman's. "But not 'im, the baby killer! 'E likes 'is easy."

The policeman had been knocked down by the concussion. But his eye was clear, his nerve unshaken. Nevertheless, for sheer coolness the palm goes to another policeman whom I met at the close of another raid.

The loches had caught me this time out in the street, and I stayed there watching the flash of the guns, the searchlights weaving and interweaving long white fingers up in the sky, the brilliant star shells bursting on high while the guns roared and the shells shrieked. One caught above all the rend-

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## WOE! AND WHOA!

By BOOTH TARKINGTON

IF those Liberty Bonds are bought, they stand behind the army that stands between you and the Kaiser's army. You know what the Kaiser's army has done in Belgium and France and Russia. But neither the Atlantic Ocean nor the British Fleet can protect us if we do not support our Government by buying these bonds.

The Kaiser said: "I am God's voice and God's sword! Woe unto them that oppose my will! Woe! Woe! Woe!" When he says these things he means them, and also he means Us! He means Washington and New York and Indianapolis and Milwaukee and Kankakee and Council Bluffs. He means President Wilson and Governor Whitman and you and me and the children. The Kaiser has 5,000,000 soldiers, a great navy, new submarines, liquid fire, poison gas, 100-mile guns, and a nation of people devoted to his orders.

He means Deadly Harm to us and Annihilation to our Freedom. And you have got to defend yourself or he'll do you the deadly harm he purposes.

The Kaiser says "Woe!" to you, and he isn't "just talking." He means agony, blood, and slavery for you if he can get at you.

Let's get out the old rawhide whip and send him the answer to his strafing and woe-ing and gott-swording. When he says "Woe to America!" buy a Liberty Bond. A Liberty Bond says "Whoa, Bill!" to the Kaiser with a crack of the whip that shows him we mean it.

dessert, and a half bottle of wine, all good, well-cooked food, for 45 cents. By eating like the French, coffee and buttered bread for breakfast, a light lunch, and a square meal at night, it is still possible to eat in Paris for a dollar a day. People who do their own cooking can, of course, live much cheaper.

In the small country towns food is far more plentiful and still almost ridiculously cheap. A hotel in Brittany served a full quarter pound of fresh butter with my breakfast rolls. A dinner of seven courses, with a bottle of wine, cost only 60 cents, and I have never tasted better food.

So in France the boggy of starvation again proves a chimera. France is eating well—and will till the end of the war. She has Spain, Italy, Switzerland to draw from by rail, and the remainder of the world by shipping. More than twelve hundred ships a week enter her ports. Two thousand five hundred more arrive in British harbors. Contrast their condition with that of Germany, debarred for three years and a half from the eighteen hundred ships that used to enter her ports every week, and it is easy to form a conclusion as to which nation will be starved out first.

If England and France are not to be starved out, then what of their spirit? Are they really so war weary, so "fed

George himself, nor President Poincaré, could have answered more to the point.

"Yes, Sir, we are tired of the war. But we can't stop now. It's too terrible a thing to ever 'ave 'appen again. We 'ave got to fight it out to a proper finish. That's 'ow we working folks feel."

All over England, to cabmen, bus drivers, shopkeepers, porters; to tinkers, soldiers, sailors, I put the same question, always getting the same answer; they stood in a solid phalanx behind Nellie, the little "slavery."

But it took an air raid to show the spirit that dictated it at its best. Your Englishman is rather slow to "catch on." When the Germans invaded Belgium he viewed the situation through his monocle and remarked, "Seems to be trouble over there. Send a few men over." But he soon woke up, and when he did begin to think—it was in millions of men and munitions. In the same way he was quite unable to imagine the Germans bombing London. His London? It was quite impracticable, you know! Or if they tried it, the Royal Flying Corps would soon make hash of them! So it went on until, one very fine day when the birds were chirping in the gladness of their hearts in the London parks, a fleet of thirty Gothas sailed at midday right over Westminster Abbey and knocked chips off several cherished institutions.

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