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SOME EXPERIENCES WHILE A MEMBER OF THE WAR INDUSTRIES BOARD.

LECTURE BY

MR. L. L. SUMMERS.

May 27, 1926.

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ARMY INDUSTRIAL COLLEGE

Lecture of Mr. L.L. Summers

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Colonel Ferguson

Gentlemen

We have read a great deal about the War Industries Board, and heard a good deal of gossip about it. This morning we will hear Mr. Summers. He was the technical advisor to Mr. Baruch and perhaps no one man in all the organization in Washington had more different kinds of problems. We feel that we are very fortunate in that Mr. Summers has agreed to come down and talk to us. It is a great pleasure to introduce him.

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Mr. Summers.

Gentlemen

I am the garden variety of what is known as the "hardy perennial". I bring nothing but blossoms from year to year. The only reason I am here is the fact that I have always received such charming courtesy at the hands of the War Department. Perhaps they had no more astounding critic, not vitriolic, I would say. I feel I was justified. The days of knight errantry, the days of obscure candidates were over. Long before the war we had gradually laid aside the sword and armor and adopted the pen. That is history. We had clung to the maxim that the pen is mightier than the sword. This followed, I think, from that illustrious sentiment, the temptation to worship the pen and the inkpot. All you had to do was to sign a requisition and the materials flowed forth in abundant supply. It is not confined to our Army, it was evident throughout the Armies of the world. It is not confined alone to armies because it existed in Industry. You will find that as industry becomes over-fed, it reverts to that same condition. It assumes that supplies exist and all you have to do is to sign a requisition for all of the commodities and they will flow continuously. You have to go through an era almost of revolution to make it apparent to people what really lies beneath, how difficult it is actually to obtain those supplies. Obtaining supplies meant so much more than simply writing a long column of figures.

Besides, figures in war are stupendous. When you talk of billions of dollars, you lose comprehension of what they mean. I say that literally. The American Government entered the war after two years of riot purchasing by the Allies, so I was called in as special advisor and forced to inject some coordination and system in the purchasing of munitions and supplies for the allied governments.

It was rather astonishing to come from civil life to deal with the military specifications, for instance, of the British Army. As an example, the British specifications provided for acid open hearth steel. Most of the steel made in Britain was of acid open hearth because of the peculiarities of the British ore. The first thing we had to do was to change the British specifications and get acceptance of basic steel instead of acid steel, because 95% of American production was basic.

Owing to the declaration of war in 1914, a depression was put on all industry. But this did not last long. Allied orders soon poured into our country. The United States export prices of steel for 1915, as compared with 1914, was something over four dollars per ton more because at that time they shipped hundreds of thousands of tons of steel for military supplies in Europe. I subsidized all of the steel supplies used by the Government by giving a man a call on so many tons of steel. I bought all of these options of the various steel companies and various axle manufacturers, exercised the options, and so we bought here for Great Britain at a saving of millions of dollars.

It was necessary to turn to an industry that knew nothing about munitions and to avoid pyramiding your market by allowing them to option materials. We had the case of spelter. At that time there were two grades of spelter, Bertha and Horsehead. Brass made from that spelter is not brittle and consequently is suitable for drawing into cartridge cases. Going into cartridge cases corresponds, as a raw material, to the nitrate going into the explosives. There was a small percentage of rejections with this spelter. Because demands for ammunition were pouring in, prices soared. There were single orders coming in for ammunition of five million rounds, another of five million rounds, etc., to come from plants that had no ammunition workers. It was necessary to watch our prices and sources of raw materials. You can understand that a man who is going to bid on a million rounds, enters the market and gets options from the various producers. There was no producer that could produce them except in New Jersey. They quoted brass at 44 cents a pound.

You realize how impossible in these millions and millions of rounds this was, because we were holding orders and the effort was made to avoid having these options go pyramiding until the whole situation was artificial. It was necessary to do some thinking and it was decided to open notices and have everybody bid and we had bids for one hundred and fifty million rounds. We were holding off and not letting any contracts and everything got on a fictitious basis. We took the four leading bidders and got them in a secret session and secretly let the contract and gave out a statement that we had decided not to let the contract. Everybody was concerned and the result was we covered Bertha and Horsehead at thirteen and fourteen cents.

It was evident that there was a good deal of fiction about New Jersey Bertha and Horsehead, so we developed the electrolytic method of refining copper because you can avoid impurities in electrolytic refining. We developed two of the western plants which had never made a high grade spelter into electrolytic plants. We made some experimental cartridge cases. Then we shipped samples to the artillery at the front so they would have service in actual firing. The cases were supposed to stand fifteen loadings. This electrolytic brass went way up to 25 and 30, so the first thing New Jersey knew we had large orders placed with the electrolytic plant and we had control of Bertha and Horsehead the rest of the time.

Coming here to Washington we found Bertha and Horsehead still in the Government specifications as the only permissible spelter. We had quite a conference with the Secretary of War and the Secretary of the Navy, and various officers, and we immediately - in the first week before war was declared - had those specifications entirely remodelled so no physical characteristics were specified. I just give you that as an indication of what took place.

The first and most important consideration that confronts you is the question of substitutes. It is astonishing how you are confronted with that problem from the very outset of war. You may not realize for instance that women's wear and men's wear affect your supplies for war. As a matter of fact, the tendency of both sexes to wear light underwear, shorten women's skirts, etc., has lessened the use of wool in this country. We use the imported article largely. While we raise wool here, it has to be mixed with foreign importations so you can see that when you come to actual purchasing of natural wool, it might greatly affect your sources of supply. There has

been another factor to affect wool and that is the development of rayon. There has been a stupendous development in the past five years. This has a great effect on all the textile industries. You may be confronted with the problem of substituting rayon for wool. To a certain extent you may have to amend your blanket and uniform specifications. You can see, therefore, why I am a blossom of the yester-year. These are all developments since my time and things I can not tell you intimately about.

You are gradually merging a definite program of authority so you will not suffer as we suffered from complete lack of authority and having to use diplomacy in a great many ways to get cooperation. It was only the extreme patriotism of American industry that made possible supplies to the Army. The Council of National Defense was an aimless body without authority, and it was the individuals who created the support of industry. The Secretary of War issued a number of commandeering orders where we had not been successful in getting the entire cooperation of industry.

One instance of commandeering was platinum. In conference, some three months before the war, I asked the Treasury Department to lay an embargo on platinum. We got quite a bit of platinum from scrap jewelry and some from plants, so without exciting industry at all we had accumulated three or four thousand ounces of platinum.

You will have to take steps of that kind when the clouds begin to thicken so see what essential things you can quietly accumulate without appearing to be preparing for war. You will develop reserves as I have stated here before the outbreak of a strategic war. Those of you who roam over the country pretty generally will recognize the enthusiasm of industry and there will be men of initiative in industry who will cooperate with you and assist you in working out these problems.

Even with your growing authority you must remember that you live under a democratic form of government. Although you will, within a few months after the outbreak of war, change over to an autocratic form of government, the interval of democratic government will subject you to criticism. Your Senator and Congressman will have a clientele in which he is interested and he will endeavor to impress his wishes upon you. My recommendation is that you handle that as we did and I learned that trick from an old

Army officer, a Captain Penny of the Civil War. He was called upon to placate the Indians. He was able to attain success because he knew the Indian. When you consult with men and listen to their suggestions and advice, the fact that you listen will enable you to go ahead and do as you please because you have the facts and there will be no criticisms when you have completed the work.

There is a tendency today toward an artificiality in industrial conditions. You realize in speaking to you when I use the personal pronoun I am a Victor Talking Machine because I am simply recording something someone else has said. But my records will be selective. I shall speak facts as I see them. We have entered a world since the war of artificial restrictions. Every kind of device has been unearthed and initiated for restricting economic laws. We are not in step in this country. We have raised tariff higher than before and have imposed a restriction on immigration. If we are to maintain large production as before, it is necessary that the works turn out an increased output per man. You can readily realize that some works can do that but the great mass of industry cannot do it. We have seen gradual pyramiding of our costs of living. The result is that we are more or less on stilts. We breathe an artificial atmosphere. It is a great deal easier to go up than to come down. That slump is impossible under the conditions of the Federal Reserve Bank and under the way industry is organized in this country. This condition has led to intensified effort in quantity production, machine substitution and standardization, until you do not find industry as flexible for general commodities and change as you might have in earlier days when there was more individuality about it. It is a thing your strategic board must consider and you gentlemen, as you go around the country and visit various plants, will recognize a tendency in that direction.

Quantity production has also made a huge demand upon the raw materials of the world. Many of those materials are not interchanged internationally in the free flow they were formerly. We ourselves have led the whole group in our methods of imposing barriers and are probably facing a certain measure of rebellion. Rubber is a glaring example. This is perfectly natural. The same thing takes place in pulp. Canada will not allow wool to be exported, the pulp must be made in Canada and the industry is increasing there. Therefore a migration of industry occurs. There is an ever increasing use of alloys and most of those alloys come from

foreign countries. We produce in limited quantities only some of these, and of some of them we produce none. You are therefore going to be confronted with the necessity of substitutes. If a man has been using vanadium and vanadium comes from Peru, you have to use some means of substitution. You cannot lower the grade of your steel material without tremendously interfering with production.

You have another factor to contend with - that is changes in design at the very outset. You probably recall that some crude designs, that were considered finished when the war broke out, were changed. It is astonishing to think how in a few months of war so many things should come. The high explosive shell was very largely unknown. We used in armor piercing shells as a shell filler a mixture of picric acid, but the English Government was using a modification of it. We had no use for T.N.T. Europe was using it for three years. Because of premature explosions of high explosive shells filled with T.N.T., we had been led to a conviction that it was necessary to take extreme precautions. In the British shrapnel shell a base cap was insisted upon to insure against premature explosion. The result was that the larger shells had bases of five and six inches solid metal, that is at the base of the shell before you come to the explosive chamber you had five inches of solid metal. You can think how that sacrificed the capacity of that shell for explosive and can imagine also the fact that it interfered with the ballistics very materially. The British developed an eight inch Howitzer. Many changes were necessary in this peace time ordnance in order to make it suitable for war.

Another factor to contend with is changes in design during mass production. When you are in mass production and some fellow makes up his mind it should be modified, you are raising the very dickens with your program. Except by causing unwarranted delay it is almost impossible to change anything through the process. When shall you make the change and how shall you make the change? Fortunately the British Government needed ammunition very badly so they gave me authority to exercise my own judgment. I never made the change in shell, for example, until we had used all the forgings we had on hand, but substituted new forgings as the old were consumed. Sometimes we paralleled those. In that way we avoided all that friction and litigation from change of design during process in the works. I speak very feelingly about those specifications and changes in design.

I do not care whether these changes relate to textiles, steel or what not. You face a very serious problem and great curtailment of your production when you endeavor to make a change in your product while in process. You make a great deal of contention in industry in making changes because they naturally feel they are entitled to heavy compensation in all the work that is done. So as an old-timer I would say be careful. Those of you who will have to do with production should endeavor to follow through that which is in course of production before you substitute anything new.

The most active development in intensifying industry is in the line of statistics and various graphical charts. The economist and statistician is a shadow boxer. He can deliver many knock-out blows with shadows, but when the antagonist is also boxing, he sometimes does not get a chance to put over his punches. I don't belittle the work of the statistician. There is no corporation worthy of the name today which does not devote time to the preparation of statistics. But the interpretation of statistics is the expert's game.

You must, as various men come before you here from various industries, start your training for industrial preparation by fixing a sliding discourt on them. You must realize that from industry comes enthusiasts, comes specialists who are apt to be optimistic. In industry they discount those men. But the Executive Officer would not be without their optimism and enthusiasm. It is astonishing the way industry develops means and methods of utilizing that optimism and enthusiasm. That is true in all industry. It is an astonishing thing how a fellow wants to take a piece of one thing and fit it in some place else and it may not be a component part at all. That is the way the statistician works and the way the economist works. I am a radical you know.

I supposed that I was only radical during the war. But I want to tell you the reason industry came to war in every nation is because the industrialist has a concrete and intimate knowledge of the law of supply and demand, and when he came into war with his law of supply and demand, he brought with him industry and that, of course, brought all the people of all the nations into the war. That happened first in Germany. They were the first to recognize it. That element of supply and demand I want to dwell on because of the fact that you are confronted with that continuously. You can do

some independent thinking and I am not announcing any exemptions. You can discount my statements as your experience justifies. They told me I had violated the law of supply and demand because it was the world's supply that made the price of wheat and therefore the 32,000,000 bushels of wheat that France produced was part of the world's supply. Liverpool was the world's market for wheat, not Chicago and Winnipeg, and I said Liverpool only reflects the price of the world. If there were billions of barrels in England, Liverpool would only reflect those quotations. Hence you have a picture that it is the time element that is making the world situation in wheat. It is the arrival of wheat, because it is the rate at which your supply meets your demand. You might have a huge supply of tungsten in China, but if you had only two hundred tons here in this country, your supply in China would not be much good here. Those two elements, supply and demand, are the things that control you in your ability to obtain those supplies. It is really astonishing how you must apply those two factors.

A number of statistics came out showing that supply and demand balance for the year. That is a favorite expression of the commodities for a certain year; that there is a balance of supply and demand. Hence your price is a factor all the time. It is an inability for some of the minds who study these things in detail and who worship their figures to agree with the fellow who wants to know something about these elements. The greatest element of all in everything you deal with is that of substitutes. For instance, the tariff on metallic oxalic acid was raised two cents. Two of the largest consumers were at Niagara Falls. They developed a substitute and as long as oxalic acid was at that price it was all right, but when two cents was added they threw it out; the works shut down, they had gone over the danger line of a substitute.

Now the most conspicuous thing in the world is petroleum. The methods of producing petroleum you probably know. We developed, in 1923, twice as much petroleum as we did in 1918. There was thrown on the market a two hundred percent increase. The peace time demand doubled in five years over the requirements of war for ourselves and the Allies. Strange enough the demand accompanied supply. How? We changed locomotive boilers, went into houses and put in petroleum heaters, and did everything we could but give petroleum away. The astonishing thing is that a nation can double its peace time consumption of a product such as petroleum. You forced

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petroleum in as a substitute for something else and your game will be to force these things back again to get petroleum. Supply has been gradually supplemented by conditions and developments that did not exist when we were at war. By the cracking process you can convert a large percentage of your crudes into your motor fuel. You could without stressing anything easily make seventy-five per cent of the crudes into motor fuel so that you will have to go back to coal for many uses now demanding petroleum and take your crude for motor fuels because motor fuel is necessary for transportation, airplanes, tanks, etc.

I think you face a very, very complicated situation in securing your foreign supplies and I differ radically from a great many of the engineers and a great many of the recommendations made in connection with those foreign supplies. I was talking with a tin expert the other day and he said that Bolivia might close exportation. The United States had thrown open to exploitation and foreign ownership, and I suggested the British Government exploit for tin in America while we exploited in the Malay Peninsula. Before we entered the war we got the Brazilian Government to send soldiers to the manganese mines and we guarded every port and town. The United States Steel Company paid the soldiers which was included in export price of manganese. They kept their line of railroad, between four and five thousand miles, guarded and it was all included in the price of manganese, including export tax. You are going to find that other nations are recognizing the value of these natural deposits that are so important in the world's commerce and erect various types of barriers to maintain them. One expert told me that what the American Government should do was to prohibit the importation of tin and make duty free the importation of tin ores so that any fellow who wanted to get a market in the United States would have to ship and smelt it. But suppose Bolivia put a prohibitive tax on the exportation of tin ores? You may think that is simple. That is the identical kind of recommendation you will have and you will be declared a radical moron if you don't agree. Or, to cite another example.

We had a crew from the American Society of Mining Engineers who declared that the way to produce steel on domestic manganese ore was to prohibit the importation of manganese ore. You cannot put in a substitute for manganese ore. That is not practical. You must be careful that the substitute accomplishes the same thing as the thing you have displaced.

When the bugle blows you will have available the best type of opinions and it is only building your organization to get the best, foreseeing what is coming.

Statistics are a cemetery and they deal with the past. The grain expert got his statistics two years after the grain was consumed and he did not realize that his data was gotten two years after the wheat was gone. There are a lot of fellows like that everywhere and it is your Strategic Board that must analyze these points.

Now, the first move in view of a strained international situation and it was tremendously important in the war, was the censorship of cables. You must have a censorship of cables and I was at my desk every morning at seven-thirty. The cables would tell me, from the Pacific and the Atlantic, of materials that dealt in any way with munitions. We started accumulating those dealing with stocks. You have no idea how much you learn from these pictures, and so your first fighting line is that Naval intelligence that will enable you to initiate that cable censorship. The agents start reporting to the owners and you get an immediate picture of what and where accumulated stocks are. This is your first picture of the world's supply. It is astonishing what a vivid picture you would get by not delivering your cables for forty-eight hours.

You too face the subject of disarmament. You have seen certain regulations attempted in connection with gas warfare. It is the prevailing feeling that such regulations would not hold in case of war. So you will have the recurring phases of changes in chemical warfare because as you know they are certain to come in war. Aside from those restrictions you will have another phase which some of us recognized in the war and is now becoming a matter of conference in disarmament, that is the potential strength of the nation. The potential strength of the nation is not the armies you have but the potential capacity to wage war. Consequently you can never reduce this strength because you would have to go out of existence. Your industry is your potential strength so whatever happens to disarmament, you gentlemen take a more prominent position as disarmament is brought about because you are the ones that must calculate that potential strength and turn it into war.

Then again there were a great many of the developments that were surprising, some of which came about by accident, and changed your program. I was in Germany last summer and had entre to some of the works. In talking to some of the experts, they were appalled at the quickness with which America became autocratic and at the ease with which we took college professors and made them boon companions of military experts. They were astonished at the transportation of troops, but were appalled at the flow of supplies that went to Europe ⁱⁿ such increasing quantity. They gave us two years to get where we were in sixty days. They realized that we did in two months what they thought it would take two years. They had no idea we could do it so quickly. One of the developments in Germany that interested me was the development of a metal like magnesium. We paid a price of about six dollars while they produced magnesium for twenty-five cents a pound. It was more or less by accident that this soft metal was used as a cap over the hard nose of an armor piercing shell. You must be constantly on the alert for those possible substitutes. A very material development came from that magnesium cap. They were put in over the hard pointed noses of the naval shells and it was astonishing to see how that shell clung to the armor plate. From that development came the Hatfield shell which you are now using. The astonishing thing is that when you add a soft cap to the hard pointed nose, you can penetrate a plate that a hard shell goes off of. There was much that interested me in Germany as to their methods of procuring supplies and turning to substitutes. Germans are artists at substitution.