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THE AUTOMOTIVE INDUSTRY
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THE AUTOMOTIVE INDUSTRY

I think this is the third or fourth time I have appeared before the College, and I hope you gentlemen who have heard me before will forgive me if I might seem to repeat myself. I am not strictly original. I can only recite facts as I know them

When I was here last, in 1937, just shortly before New Year's, I told you that the automobile business was on the skids, and it was. After a very large year in which the industry manufactured 5,000,000 automobiles, sales slid down inside of six weeks to less than fifty percent of what they were. You can imagine what that means when you are dealing with about a quarter of a million people, \$290,000,000 worth of inventory, and 17,000 dealers with an average of ten people in each establishment. It was a question of getting readjusted as fast as we could.

We couldn't go to the Government for help because it takes a great deal more than the Government can give us in peace time to keep a business like ours going. Nevertheless, I had to come to Washington to be somewhat panned for laying off people, which of course I couldn't help. We had all the automobiles that dealers could handle, we had all the automobiles that people wanted, and for us to keep on making more automobiles that were not needed would present a pretty high storage problem. Automobiles are like a load of hay - - - when put together they take up an awful lot of room. However, we were able to adjust our operations so that we reduced the number of people we had by 30,000, bringing it down to about 210,000, and we put these people on three days a week and carried them right through the selling season until the model change in October.

In the automobile business, we can't go along year after year and do the same thing. If we do, people won't buy. So, down through the years, we have had the custom of presenting what improvements we have been able to dig up in our laboratories in a new model which is presented at the automobile show. Last year it was November 15. This year it will be October 15. The public has come to expect the automobile industry to present something new, either in appearance, performance or economy every year. After we get one car out, our job is to begin work on the next one. Personally, I am now working on the one that comes after the next one.

It might interest you to know that whenever we do this, we have to spend a lot of money. The tool changes that we are

making this year will amount to \$25,000,000 for the corporation. You will wonder how we can spend that much money on tools. You think of tools as fixtures, either in machines or on prices, but in our case a set of tools for a body alone, since we have both made out of steel, costs \$5,000,000. So it is expensive to be progressive, but in the end it is cheap.

I go to Europe every other year, and I will tell you something about the trip a little later. In England and France they haven't gotten around to the yearly model. Consequently, sales do not progress. They stay on a somewhat level keel, and it is quite common, as we saw it in Paris, for a manufacturer to show the same car in three consecutive shows, and not even change the paint on it. That can't be done in the United States. People demand progress, and a man who has eight hundred dollars or a thousand dollars to spend demands something that is pleasant to look at, easy to ride in, and cheap to keep up. That is our problem and that is what we are working on all the time.

Our staff consists of six vice-presidents and myself. One is an engineer, one is a salesman, one is a manufacturing man, one is a labor relations man, one is a specialist in Diesel engines, and one is a body designer. These six vice-presidents have all come up from the ranks and have all worked on the bench. We naturally watch all the information we can get about sales in the United States because that is the most important part of our business, to be able to sell the goods.

In July, the used car business began to pick up a little bit, which meant that we were getting more employment in the country at large. When the used car business picks up we don't have to worry very much about the new car business. That will come along by itself. Today we have to center all our attention on the sale of the used car, knowing very well that we don't have to sell anybody on the idea of getting a new car. Everybody wants one. That is the greatest selling advantage the motor car business has.

So as the business picked up, we felt reasonably sure that with the new models we would get an upswing in the new car business. We did. We got a very decided improvement in the new car business, and we were able to give our men more work, we were able to give our dealers more cars, and the public was very, very nice in buying. So today, the upswing that we had during the last three months of 1938 made it possible for the year to show 2,700,000 sales for the industry. The sales in 1937 were 5,000,000.

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We are quite sure that the year 1939 will show between 3,400,000 and 3,600,000 for the industry. That is for the entire automobile industry and General Motors gets about 44 percent of it, so that we can expect somewhere between 1,400,000 and 1,500,000 if the trend of business continues. It is a funny thing about that. In the automobile business, there are certain months, three or four months of the year, that we sell half the year's output. In the other eight months we have to divide what is left. The four months are April, May, June and part of March. In that period we sell half the year's output. Why I don't know, but we have to adjust our manufacturing operations and keep our inventory so that we can keep as even a flow as possible.

I should probably tell you something about the labor situation. The last time I was here, I talked on it lightly. I told you what our difficulties had been up to that time, and now, at the moment two factions have sprung up within the automobile workers and you can't decide which one is the real one. I have a contract with one. I don't know which one. As a matter of fact, they have been so busy with their own dispute that they haven't said anything to us at all, and this is fine. We have no sweat shops in General Motors. We haven't any child labor in General Motors. Nobody ever talks wages to us, so if everybody is honestly satisfied we ought to be getting along fine.

One faction of workers had a convention March 4 and another one is going to hold one in Cleveland on March 27. When they are over, I don't know whether we will be dealing with one or two or three. But I don't feel so ravid on the subject. I feel that these are infantile diseases which the union movement has had to go through because they sprung up overnight in this country. They have a tremendous number of members and of course a number of Napoleons who always appear on the scene with the gift of gab and not so much knowledge of the trade itself. When we deal with a man who is a good mechanic, we seldom have any difficulty settling problems, but when we deal with other men who want to raise the world, we are generally in for a little trouble. He doesn't know where to begin. I feel as time goes on we won't have trouble as long as we pay men well and give them a good place to work. Now that the sit-down strike has gotten its proper label, I think it is going to help a great deal.

When I go to Europe I generally call on the French manufacturers. We don't make any automobiles in France, and we don't import very many on account of the duty. I called on one

manufacturer who had just been through this sit-down strike in France and he told me how he had been locked up in his own office. His name is Pinnerd. His firm is quite old. Finally he said, 'Look out! One of these days they are going to do this to you.' I said, "That can't happen in the United States. You couldn't possibly lock anybody up in his own office there." But inside of two months, they were doing it to me! And we had the same system. In came the cots and the musical instruments and the cafeteria. Everything was shipshape, organized exactly as it was on the other side, showing an organizer had come over from there. There was very little difference in the execution.

Of all the different questions that have been directed at the automobile industry, perhaps the most common is, 'Why don't you have a level production?' A couple of years ago a very celebrated labor man here in Washington asked me why we didn't find out how many cars we needed, divide it by twelve, and make so many a month. I told him that was the finest thing I had ever heard in my life, but the public wouldn't buy them on that basis, and what were you going to do with them in the meantime?

There has been criticism in that direction. We have had the shut-down period every year. In our case it means that about 45 percent of the men have to go on short time, ranging from three to five weeks, depending on whether it is a manufacturing or assembling plant. In order to meet that we have instituted this year what we call an Income Security Plan for the men. Any man who has been with us five years can draw up to 60 percent of his weekly standard wage. Say that his standard work week is 40 hours. During the time he is off, he can get 24 hours pay from us. I will advance that to him against the time he is coming back to work again. He doesn't have to pay any interest. He can only pay it back in work, he can't pay it back in money. If he dies, we will take the loss.

A good many years ago when I was in Chevrolet, this plan was tried on a smaller scale. At that time I had a Workmen's Committee, and I deducted ten cents a day from each man and added ten cents from the company. As this fund ran into two hundred thousand dollars it was turned over to a Committee of Workmen. The men could borrow money from that fund for food, rent and coal. In all the time I had experience with it, the losses never ran more than three or four percent. A man might quit, he might die, or something like that.

Out of that has come this plan of ours which now exists in the entire corporation. In other words, the workman will

not carry the inventory We will carry the inventory or take care of him with cash until he gets back to work again. That has been a point brought up against me quite often when I came to Washington. We have finally worked out a plan to dispense with that critical point.

A corporation as large as we are is generally subject to criticism of different sorts, and the only thing we can do, if we can't just disprove it right away, is to try to do something about it. Naturally the resources are great, but after all, a big corporation is only a lot of small corporations put together. No one should think for a minute that the General Motors Corporation is one great big company. It is not. It consists of eighty--seven or eighty-eight smaller divisions, and each division is in charge of a general manager. True, he reports to me, but not very often. He doesn't have to. He knows how to run his own show, otherwise, he wouldn't be there

So when you think of General Motors, think of it not as one great corporation but as a whole lot of small corporations that are being coordinated, with the idea of getting the best results for the dollar out of the plant to have no old or obsolete plants As fast as machinery is obsolete or worn out it is disposed of on the spot. We try to keep our plants right up to the minute, because only in that way can we maintain our place in a market as hot as the automobile business

After we have talked about the men, the next thing is the material. We have, as you know, about 3500 pounds of material in a car, raw material which we manufacture into the finished article. In manufacture there are three stages. There is the primary stage that produces the raw material. By that I mean metal from the spout, steel from the ingot up to the bar, crude rubber, crude carbon, et cetera. That is the primary stage. We, in General Motors, don't engage in that at all. We don't make steel, we don't produce brass or copper, or anything like that. We buy that from existing sources because we feel if we were able to build blast furnaces and steel mills we would only obsolete present capacity and raise the cost. Sometimes, if you get so efficient that you can build a plant that is much better than anybody else's, you might be fooling yourself when you do. When there are industries from which you can buy materials on a fair basis, that is the thing to do.

The second stage is where you take these raw materials and make them into the finished products By that I mean castings, forgings and stamping.

The third stage is machining and finishing. Here we take the stamping, the castings, the forgings, the machines and finish them, and then assemble them in the unit of the car, as the case may be, and we send the car out.

Naturally, material is the greater part of the cost of the car. If, during the year, there are great fluctuations in the prices of material that makes our car pricing sometimes a little more difficult because we really like to set a price on our car at the beginning of the series and carry it through. The public generally reacts very badly to increases in price of motor cars during the season. In the field of material we have had a rather steady run in the last year. Crude rubber has fluctuated about $4\frac{1}{2}\phi$ a pound, and there are 223 pounds of rubber in an automobile. Cotton has fluctuated less than a cent a pound. The present price is 8.94. Copper has fluctuated $2\frac{1}{2}\phi$, present price $11\frac{1}{4}\phi$. Tin has fluctuated 10ϕ a pound. That, of course, is because we bring the tin a long ways, from the Straits Settlement. The last price was 46ϕ a pound. Zinc has fluctuated 1ϕ , lead 1ϕ , pig iron about \$3.00 a ton, and steel about \$5.00 a ton.

These figures that I have may be of interest to you. They're rough figures of what is in a motor car, 2800 pounds of steel, 400 pounds of grey iron, 152 pounds of malleable iron, 94 pounds of lead, 60 pounds of copper, 30 pounds of zinc, 10 pounds of aluminum, 5 pounds of tin, 5 pounds of nickel, 223 pounds of rubber, 68 pounds of cotton, 79 pounds of glass, 16 pounds of cloth, 13 pounds of hair, 2 pounds of mohair, 1 pound of leather and 33 pounds of paint and lacquer. That is the material listed in an average automobile weighing about 3300 or 3400 pounds. You can imagine that when we have steady material prices it makes our problem a good deal easier.

I can remember the early years. Then we didn't give a darn about the material because we got almost any price for our car after we got it finished. Furthermore, we didn't have to take very much responsibility after it got into the customer's hand because he was the proving ground. You remember the famous song, 'Get Out and Get Under.' I worked on that particular automobile at that time, and quietly, without the public generally knowing anything about it, except the jokes, we went to work and fixed the salient points of trouble in that automobile.

When we finally came around to where the average farm hand know how to make the cylinders hit, our service problem began to thin out. Today, of course, it has been organized to such an extent and on such a basis that you don't even have to change a tire any more on the road. There is a gasoline station

that will do it for you for a quarter. Almost within five minutes of wherever you are, there is some kind of a service station that will get you going again if you are not in running order. So the automobile has been developed to such a point that I don't want to appear to be a funny man - but just think of this. Say you have in your basement a stationary engine capable of developing 25 horsepower. You have got to have a licensed engineer to run that engine. But we will give anybody from sixteen up an eighty horsepower machine with a steering wheel and send him out on a road. And the license only costs a dollar and a half or two dollars.

I want you to understand that this improvement didn't just happen. It was really done by research laboratory work, by long hours trying to figure out how not to get in trouble. That is where the automobile is today, and it is still not good enough. We still have a long ways to go, because as the performance increases we have to take the fatigue out of the car. Checks show that most of the accidents happen at dusk on long rides, at high speed. The reason for that is fatigue, poor vision. You will see the automobiles in the next few years with better vision and more comfort, because when you are comfortable you don't get tired as quickly. And there is always economy.

Every time anybody increases the price of gas a couple of cents there is quite a protest going up. We have a foreign gasoline dealer in Detroit. He sells it a cent less than anybody else. It has become a very important point in the operation of the automobile. It is only fair to say that the Petroleum Institute has done a tremendous amount of work to improve the quality of gasoline. We helped the performance, but the gasoline had a lot to do with it. We give credit to the Petroleum Institute, especially for the work they have done in the last ten years. You gentlemen interested in airplanes know what higher octane ratings can do for planes.

Now coming back to the prices. I look for prices to be rather firm during 1939. I don't think there will be any great fluctuation. I don't think there will be any war either. That, of course, would have effect on the materials we get from the outside, such as rubber and tin. We would feel it immediately.

The advances in processing during the year haven't been such that I can point out anything special today. We have been developing welding and we have developed some better surface finishes. Some progress has been made in honing and there has been a great deal of progress made in the boring machine. You know the age-old problem in machine shop practice is to be able to drill a round hole straight. It has always been the problem and

always will be the problem, but I am very happy to say that we are making progress. You can get an awful lot of experience fussing with that. In honing, of course, you have to be careful that with the tool floating you don't start with a flat spot that will be there after you got done. You know about that as well as I do.

Welding is progressing very nicely. I tried to get Mr. Kettering to give me some data on the welding of duralumin before I left, but he said that he had nothing to tell me, that we haven't gone far enough to be able to demonstrate the strength that finally we expect to find in a process like that. That would materially increase the efficiency of a plane factory because you know of the millions of rivets that have to be put in one at a time. If you can find some way of welding that joint, it is going to save a lot of time and money.

I suppose I ought to report to you how far we have gone with Diesels. There are two schools of thought on the Diesel. One is the four cycle and the other is the two cycle. We have stuck to the two cycle. I think in the present two cycle Diesel we have managed to work out a fairly good rate of combustion with very little smoke. In fact, we like to say in the ads - 'smokeless.'

We have three series of engines. We run from 60 to 200 horsepower in a plant built specifically for that in Detroit. At Cleveland, we run from 200 to 600 horsepower, mostly marine work. In Chicago, we make locomotives, switchers and passenger trains, running from 600 to 1500 horsepower per unit. We make those in lots of three or four, as the case may be.

We have progressed rather slowly in order to be sure of our ground, but today the locomotive plant is pretty well sold out for the year. The only basis we have, of course, for advancing the Diesel engine is the economy. .37 pounds of fuel per horsepower hour in a Diesel engine would, of course, eventually save the cost of the engine over any other kind of moving power that you can get.

I don't know whether you have ridden on these Diesel powered trains. Mr. Budd in Philadelphia produced a train to go with these engines, and I rode in one of them going to Los Angeles about a month ago. It is certainly a comfort. They are a step forward over the old type train and the old type engine. I don't say that someone can't make a steam engine that is much better than the present one. I hope they do. There is nothing to keep you on your toes as a little healthy competition. I do think that the opportunity for progress in train

travelling is very great, that the cost can be brought down,
and the time materially shortened

On my previous coast trips, it generally took three nights and two days to go from Chicago to Los Angeles. This time it took two nights and one day. The difference in the comfort was outstanding. I want to give credit to Mr. Budd for building this train because he certainly did a fine job in using stainless steel and duralumin throughout. When you step from one of these trains and go into an ordinary one you wonder why it took so long. While I don't like to accept any ows from anybody, I think the fact that we have a Diesel engine light enough and strong enough is what started the thing off. So you can look for great development in it.

The marine end of the business is coming in faster all the time. There isn't a freighter built today that isn't built with Diesel power. Of course Europeans were quite a bit ahead of us in picking it up. They have all been making Diesel engines for several years. I went aboard a freighter a short time ago, 6,000 tons, run by twenty-four men. The 'black gang' is gone, and there is savings right there.

We have about four hundred Diesels in trucks and maybe a hundred in busses. In the truck and bus business, I am quite sure that the Diesel will develop rapidly, especially for long hauls. In busses, the same thing is true. On tests on long trips, the engines show very excellent economy. Of course as you get more experience you learn to make it still better and to make it cheaper because you never make a thing lower in cost until you learn how to make it better. That may sound silly to you, but that is a fact. You never get reduction in cost before you make a better part, for the simple reason you don't have to make it more than once.

Somebody will probably ask me about Diesel engines in passenger cars. There is no prospect of getting Diesel engines into passenger cars for quite a while. The reason is that the weight per horsepower is somewhere between $9\frac{1}{2}$ and 10 pounds. The fuel economy would be swallowed up with the extra weight you have to carry around. And, of course, it is not as elastic. So there are no prospects of having Diesel engines in passenger cars for a while.

We have better work on the aircraft. I suppose you know we make aviation engines. We have only one customer, and that is the Army. In Indianapolis, we have an experimental plant which was started about ten years ago. The object is the 12 cylinder

engine with about 1000 horsepower facility. This is accepted by the Army and we are getting about a pound and a quarter per horsepower. It is very expensive yet, but as more volume is available I suppose the cost will come down. The only thing we can say for it is that it has better streamlining qualities.

When I was in Germany in October, Mr. Udet, who runs the airplane industry, pushed a set of drawings down in front of me and asked if we could make this. It was their copy of the streamlined engine -- 12 cylinder supercharged, and they say you get 1250 horsepower. I don't think he has made many yet. But in aviation I am sure that we will strike the line one of these days where we will be practicable about it and be satisfied with a pound or a pound and a quarter per horsepower rather than strive for a half a pound and have the thing blow up. One of these days we are going to reach the deadline. On that, I am quite sure. The engines we have delivered have stood up pretty well. With 50,000 or 60,000 we can tell more about it.

I will tell you about this European trip. Since the war I have been to Europe every other year. That is my vacation, and I have two or three men with me. We go to Copenhagen, Stockholm and then down through Germany. We see the automobile show over there and then we go to London on the train, and home from Southampton. We have assembly plants in Denmark, Sweden and Belgium, and we have two manufacturing plants in Germany and two in England. So our holiday is to go around and look at more factories -- we haven't anything else to do.

In previous years, I have always had a car. In the first place, I like to ride in an automobile, and of course having been there every other year I know about the route we travel. It is possible to see what changes have taken place in the meantime

This year we got on the boat, and then they started this talk of a war. Some said that we had better get off at Southampton and return home. I said; "We will not do that. We will stay and look around," We finally found the fellow on the boat who knew all about it. He was a room steward but he was the political head of the boat. He was the fellow who had all the low-down on what was going to happen. He told us that we didn't need to worry, that there wasn't going to be any war.

As a safety measure, so they wouldn't close the border and hold us up for a few days, we rented an airplane in Berlin. We had it fly over to Copenhagen and pick us up, take us to Berlin and from Berlin to Copenhagen again, and finally from Frankfurt to Paris, on the theory that if they cleared us out of one place

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we were bound to come down in another and they couldn't send a traffic cop after us. It was quite an efficiently run outfit. It was a Junkers plane with three motors, and we made scheduled time. Whenever we wanted the plane, we called up on the telephone and had it meet us at such and such a time. Only took two hours and a half to go from Frankfort to Paris. That is why they are so scared over there. Of course everybody was more or less worried about the situation. It is all history now, and so I propose to go over it very briefly.

In Scandinavia, they were of course worried about whether Germany would want the Swedish ore. The reason for that is that the ore in Sweden is very low in sulphur and phosphorus. It is about one-fourth of the ordinary rate of sulphur phosphorus content in the virgin ore. Consequently, it makes better steel. The Germans take one ton of this and mix with it about three tons of their ore and produce a fair grade of steel. In Norway, they haven't anything but fish and in Denmark butter and food, and the Swedish people were worried more than the other two.

When the thing blew over, we got back to Germany. As I have told you before, I have friends of years standing who are quite high in the Army and in the air service. They were very anxious to show me a lot of things. They had taken the exact opposite attack from what had existed in Germany before. Previously if we wanted to get into German factories we had to get a crowbar. Now the attitude is, "Come in and look at everything." I was shown this motor--that couldn't have happened before. The funny part of it was that they also said, "We could have told you before you went away there wasn't going to be any war." This man told me frankly they were not ready at that time for any war. He offered to take me to a fortification. I told him I didn't want to see it, and that most of the Germans had told me this warfare was going to be done with a swiftly moving corps, highly trained and with airplanes. In other words, we were coming right back to the middle ages, trained sections of troops, highly experienced, going around doing the fighting. It would all be done in such a hurry that the rest of the people would be taken care of by being scared to death.

We have 28,000 people working in Germany. We found over there that the staff was very anxious to produce a truck for which parts could be made all over Germany and assembled in a certain place. We got the assembling job to do on one of them, and the usual thing happened. When the parts came together they didn't fit! Technically, there is the danger. Of course, theoretically it is perfectly possible. In practice it doesn't work

out because it is hard to find a boss of the job. It is better to settle on existing models that can be adapted in a simple way than to try to make one thing and make it a cooperative effort.

I don't know whether or not you heard about the stir-up they had in England about airplanes. Over there, they had the idea they were going to make motors in one place and radiators, propellers and wings in others, and all that was coming together in a certain place to be assembled. Old Mr. Morris, who is now at Oxford, makes the Morris car. He and three others were called in to pass on this scheme. Morris pointed out right away that all the Germans had to do was dump a bomb in one of these places and the whole thing would be on the blink. He wouldn't have anything to do with the other two. He would build a plant and make the whole plane himself and nobody else would have anything to do with it. If they put him out of business the other two would still be running. I think he was rather practical. In the first place, he was reasonably sure of getting his finished product out the way it was designed. In the second place, he would not be entirely out of business at any time, even if he had bad luck with air raids.

In Germany a friend showed me 300 planes on one place, to impress me I suppose. There were 300 all right but they were not all planes. They were in such stages of obsolescence that I don't suppose more than a hundred of them would be of any real use in a battle. The trouble with the plane business is that there has been so much progress in the last few years you are liable to over-estimate what the inventory is worth. This man told me frankly that they were going to have 10,000 planes in the first line. But he ought to have told me he didn't have them yet, and I know he didn't have them. The trouble today is getting motors, good motors, and enough of them. The plane part has made more progress in that it is much lighter work.

France is still trying to recover from what I talked to you about the last time I was here. They had a premier by the name of Blum, and he had settled the big strike by giving the minimum of 48 hours' pay and 40 hour weeks, and two weeks' vacation with pay. That was the way he fixed the strike. It stands to reason that a Frenchman, however good he is, cannot produce as much in 40 hours as an Englishman, Belgian, a German or an Italian in 48. What Mr. Blum really did was raise the cost 13 per cent and the franc began to slide. And the franc was still sliding in October when I was there. It was the lowest it has ever been.

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When Daladier was called in to head the government, he immediately committed himself to a plan whereby France would be on a competitive basis with the surrounding countries. It is very dangerous to set your standard of hours without any reference to the competition you have around you, and he found that out. Mr. Renault is also a quite celebrated manufacturer in France. He made motor cars, trucks, tanks, airplane engines, and trains all in one place. I asked him about the labor situation. He said he thought now that he had an understanding with the French government that the hours would be more elastic so that he could be on a competitive basis with people in surrounding countries, otherwise they were certainly going to lose business. I believe France is going to put enough flexibility into the hours.

We have a margin over here to go along for a while--but one of those days! I only mentioned this to show that fiat measures in dealing with people are sometimes a little dangerous. Everybody thought it was a great thing to fix that labor trouble over there, that it was the grandest thing ever done, until the chickens began to come home to roost.

At the automobile show there wasn't a thing worth looking at. They had one American car and all the Frenchmen were looking at that new gear shift--it costs about three dollars. There was no progress particularly.

When we got to England we had a new experience. We found people terribly disturbed. I have never seen anything like it. This was right after the crisis, and maybe it was done in order to get the people to realize what a fix they were in over there at the time. I have never seen such hysteria, and I thought it was silly. There were gas masks being manufactured by the millions. We brought one home with us for the fun of it. They shipped about a half a million people out into the country, and when they arrived there was no particular place to go, not even a tag showing where they came from. It was very, very bad. They were digging trenches in Hyde Park. There didn't seem to be any drainage. You might as well die from a bomb as pneumonia. It was all done in such a hurry. Eventually it will be straightened out.

We have three plants, one in London and two which are thirty miles out of London, and we were ordered to dig trenches in the hillside sufficient to house the entire personnel in case of an air raid. Business was at a standstill for six weeks. It must have cost them hundreds of pounds sterling merely for that.

Contracts were given right and left to contractors who had experience in motor manufacture. They were ordered to build a plant, get a plant, and get going, and 'no question of what the cost is, settle that afterwards.' So they are going after it over there. We sold them some of North American Aviation with the consent of the State Department, and they are getting every plane they can handle. It seems to me that about the only way to meet an air raid is stop it before they get there. If they get there, what can you do about it? There is no way of protecting a town with these concrete huts and basements and all that sort of thing. The best thing is to get them before they get there. I imagine that will be the policy. You gentlemen know that more than I do, but that is my policy.

Now to come to what might be more interesting to you than my reminiscences. The capacity that we in General Motors figure as our standard volume, we might call it, along the lines that I talked to you about here, primary, second, and third schemes of manufacture. We can melt 4000 tons of iron a day, we can forge 1500 tons of forging a day, and we can stamp 7500 tons of sheets a day. This is, forging cars up to 4 inch or 4½ inch, starting with round corrugated square billet and moulds running up to 400 pounds at the spout, standbys, sheet 18 gauge 96 by 96. That is our capacity, anything within those ranges in the line of machining or finishing we can do.

We can handle, as you know, electrical equipment up to 3 horsepower. The equipment we have for the starters and generators is adaptable to that kind of stuff. We can wind armatures, etc. We have maintained the contact with the government for the last seven or eight years and you have in your file records what our so-called allotment is in case of war, what we are supposed to do, and what we are perfectly willing to do. There have been conferences, and I attended one on one of my visits here. I have always found that any information that is wanted can be had through the Detroit office, which is in touch with our man, Mr. Johnson. They keep a running file of the machinery, new machinery that we acquire, and of new processes that we perfect. I won't go into detail on that. You will probably ask me questions afterwards and as far as I am able, I will be glad to answer.

When you deal with the corporation you have 1,628 acres of shop space of all kinds, 220,000 men, and the shops can be manned up to 260,000 without any expansion of the buildings.

Thank you very much.