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# PROBLEMS AND TRENDS IN THE IRON AND STEEL INDUSTRY

by

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Colonel Jordan and Gentlemen

Colonel Jordan has just indicated to you how difficult it is for one to live down his past. I have been trying diligently for a considerable number of years to pose as just an ordinary individual, but once you get a label like that of "Doctor" pinned on you it is just too bad, and you cannot get rid of it. In general, I got the impression that it is a liability rather than an asset the minute you get out of academic circles, therefore, if you will overlook that part of his introductory remarks I shall try to do justice to the rest of what he has said.

In giving me the subject of "Problems and Trends in the Steel Industry" I should like to take the liberty of turning the title around to the extent of calling it "Trends and Problems in the Steel Industry," because, to a considerable extent, the problems grow out of the trends rather than the trends out of the problems. That may be a minor distinction, in your estimation, but I want you to get the impression that I am going to talk more about trends than about problems. I am planning to talk to you for approximately 40 minutes, if my timing works out as I think it will, and then give you such opportunity as your calendar may permit to ask questions. As I said to Colonel Jordan, I shall undertake to answer any questions which you wish to ask. I do not, however, guarantee to give the right answer in every instance, nor shall I promise that I will not take refuge behind that convenient carry-all "I don't know." I can tell by looking at you that you have some questions ready to shoot, to which there are probably no answers.

Let us start out by looking at some of the general characteristics of the industry. I do not need to tell you that the steel industry is an important one, and a basic one. As a matter of fact I might almost go as far as to say that it is the basic industry, and the others are built on top of it. Others may not care to admit it, but it is true. You know perfectly well that in the activities to which the Army and Navy are committed, at least in times of war, steel is indispensable. In other words, after you have fed an army you can do nothing with it unless you have steel. You cannot transport it, equip it, or give it any of the essential matériel of warfare.

In the same way, in peace time, it seems to me that steel is no less indispensable and essential for all those things that make up the present-day order of our social and economic existence. We could not have the present order of things without steel. I want

particularly to impress that upon you because it has an important bearing on some other aspects of the consideration we may come to later. Steel is indispensable to the extent that there is no other material or competitive substance which can be substituted for steel in the uses to which it is customarily put.

When I say "steel" I use it only as a generic term for the products of iron. Iron and steel are referred to as "steel" for convenience, because they belong in the same category. I do not know how the steel industry compares with others in the actual amount of capital investment, but the capital investment in the steel industry is just about five billions of dollars. I do not know what five billions of dollars means, but at least the figure itself is worth thinking about because a profitable industry has to earn something on its capital. I doubt if the steel industry can be described as a "profitable" industry. Over a period of ten years, from 1925 to 1934, the average return on investment was about $2\frac{1}{2}$ per cent. You could do a little better than that if you had money in a savings bank at compound interest. During the best of those years the return for the whole industry was about 9 per cent. I do not believe that anybody would tell you that 9 per cent is an adequate return for capital invested in any manufacturing operation, when you consider the hazards and risks. I dwell on that because you are frequently told by critics of industry in general, and particularly critics of the steel industry, that industry is over-capitalized and something ought to be done about it.

You cannot have a steel industry and a small investment. In the first place it takes a lot of space to put up a steel mill. Land is expensive, but particularly expensive in the places in which it is appropriate to build a steel mill, because, oddly enough, one of the essential conditions is that you must have an adequate supply of water. You cannot operate a steel plant unless you have an abundant supply of water. All of the mills which are rolling hot metal must have constantly running streams of cool, clear water to keep the rolls from overheating and deteriorating, and millions of gallons of water a day go through ordinary steel mills, purely for the purpose of keeping the rolls from getting too hot to function. That means that the plant must be on the bank of a river or on the shore of a lake, and you know that in general such locations always tend to increase the price of industrial land. It is not at all an uncommon thing to find a steel plant which, from one end to another, is measured in miles. So, instead of acres, you will ordinarily be dealing with square miles of land in steel plant property. The mills themselves are tremendously expensive. Some of you have heard, or seen references to, the so-called continuous mills for rolling sheets or strip steel. The cost of one of them may run up to fifteen million dollars. A rail mill - a mill in order to roll rails for railroads - could not be built for less than five million dollars today.

Steel producers also have to protect themselves with respect to control of supplies of essential raw materials, especially ore and coal, involving large investments. There one item is piled on top of another to make a stupendous capital requirement for a fully integrated operation in the steel industry.

Coming back to the question of profitable operation of the industry - that large investment of capital is important only because it affects the cost of the product which is sold and the extent to which investors may be tempted to put money into the industry But recall that in a space of ten years, including some of the best and the worst, the industry averaged a return of only 2½ per cent. There is a real problem. Another point closely related is the value of the product the industry turns out. Last year the value of the product was more than $1,100,000,000. Figured in terms of turnover it would be less than one-fourth of the capital. I doubt if even in the best years the industry accomplished a turnover once. I know the biggest year the industry ever had the value of its products was not much more than $3,000,000,000, or three-fourths of the capital turned over in one year.

The industry employs about 425,000 people, and I want particularly to have that figure sink into your minds. There are certain figures which I think are worth carrying with you, and one of them is the figure of 425,000 employees at the present moment, which is about as many as the industry has ever employed at any time. The industry is not operating at capacity today. It has been going through five years of pretty tough times and is crawling back very slowly, but it still is employing today approximately as many as it did in 1929. I would like to have you keep that number in mind in connection with the comments frequently made as to the effects of mechanization in industry and displacement of employees by the introduction of mechanical processes. I do not suppose there is an industry in the country more highly mechanized than the steel industry, yet as far as mechanization has been carried, and it is generally carried as far as possible, it has not displaced from employment in the industry any of the number that has ever found employment there. This industry, great as it is, is carried on in about 450 plants. I believe there are 300-odd companies in existence and doing business today, and they are operating about 450 plants which are widely scattered in 28 states. As you know, there is a considerable concentration of these plants in certain states to which I shall refer later.

With this sketching of what the character of the industry is, in some of its broader aspects, I would like to turn to the question of the materials which the industry uses and the products which it produces - to develop certain of the significant trends in the industry which are helping to create some of the problems.

As you know, there are three fundamental materials required by the steel industry ore, the source of the metal; coal or oil, as the source of heat, and limestone, for the purpose of fluxing or purification. Fortunately we have in the United States not only adequate but ample supplies of these fundamental materials for the steel industry. We are better supplied with materials than is true of any other country on the face of the earth, not only in the amount of reserves but also in the quality of these reserves and their distribution in relation of one to another and with respect to the places where we would like to put them to use for the manufacturing processes. In the extent to which the natural endowment operates the United States is entitled to be, and could not avoid being, the greatest iron and steel-making country.

On the other hand, I do not want to leave you with the impression that we are absolutely self-sufficient as far as the steel industry is concerned with respect to raw materials. That would be erroneous. We can make steel conveniently or efficiently, as methods are now employed, only by the use of manganese in the process of melting, primarily as a de-oxidizer to help take oxygen out of the ores, leaving the pure metal. Some of you may have heard arguments about manganese and the domestic supplies as opposed to imports. So far as the facts are available, free from prejudice and self-interest, and so far as they may be made available by a disinterested organization like the Bureau of Mines which has nobody's axe to grind, there are not in the United States any adequate supplies of manganese. There are some small deposits of poor-grade ore, but none suitable for metallurgical purposes without going through a process of beneficiation. Our supplies have to come from abroad and, to the extent that we use manganese in this country, it is wise to bring it from abroad in order that, against the time when there might be some interference with the foreign supply, we could have recourse to the limited amounts available in this country.

As a matter of national defense in time of need, it seems to me there should be a prohibition on the use of domestic supplies of manganese in peace time, and preservation of the limited amounts we have for the remote contingency when we might have to rely on what we have. The Manganese Producers' Association however, would not agree with me on that point.

There are certain other materials that are going to be, if they are not already, quite as important as manganese in the steel industry, not in producing ordinary steel but for producing those special steels which are beginning to have a distinct and important place. The alloy steels, or the special steels, use a variety of products. Steel itself is an alloy, it is an alloy of iron and carbon, so that when you say "alloy steel" you are, in a way, redundant.

I suppose, if we were all purists, we would talk about alloys of iron, and steel would be a carbon alloy of iron, and then we would be in trouble because we would have to go into the process of inventing names for the rest, so it is not always good to be a purist. There are various alloy metals that are important in the steel industry - copper, silicon, chromium, nickel, vanadium, titanium, molybdenum, cobalt, tungsten, zirconium, and aluminum. Some of these are produced in ample quantities and are abundant in the United States. There is plenty of copper and plenty of silicon. We have enough molybdenum. Interestingly enough, during the World War, we were largely dependent upon Norway for molybdenum. Developments since then have proved the existence of adequate domestic supplies, also we are able to export it now. There is plenty of aluminum available. With these exceptions we have to depend largely on outside sources, and especially so for chromium, nickel, and vanadium.

I want you particularly to note that chrome nickel steels involve the use of foreign material. We can produce at the best about one per cent of the chromium we require, the rest is imported. It comes largely from South Africa, Brazil, and New Caledonia. We can produce at best about 10 per cent of the nickel we require, the rest comes largely from Canada and New Caledonia. Chromium and nickel are the principal factors we have to look to to give us those qualities of steel known to you as the corrosion resisting and stainless steels. Without those alloying elements we are not able to produce those desirable qualities which hold so much promise for the spplication of steel to new uses. You may know also of another new development taking place in the steel industry - the so-called low-alloy, high-tensile steels, or the weight-saving steels which have, just within the last few years, opened a different horizon for part of the industry and which depend, to a considerable degree, on chromium and nickel as alloying metals with iron.

I doubt if you can over-emphasize the importance of the future of alloy and special steels, and if that is true then you can recognize along with it the disappearance of self-sufficiency with respect to the materials of the steel industry insofar as we know the facts concerning our resources of such metallic substances as chromium and nickel. I hope that when you hear people talking about how the United States can ignore the rest of the world because it could shut its doors and live to itself you will be tempted to ask them if they have thought it through.

There are four distinct classes, all products of the steel industry. There is pig iron which in itself is not of much use except for making iron castings of a somewhat low order. Pig iron is largely a material to be used in making steel. Steel ingots is

a term applied to steel in the raw form as it solidifies from the molten metal. We have to refer to the term "ingots" because it is the common denominator for measuring the rate of operations in the steel industry. You may have noticed that the daily press refers to the operating rate for the steel industry which is issued by the Iron and Steel Institute each Monday. It is in terms of ingots. Then there is semi-finished steel made from the ingot by putting it through the preliminary reducing process. And last of all, there are finished steel products of which there are a considerable number and variety. I suppose there are as many as 75 principal classes of steel products commonly recognized, and 20,000 varieties of these 75 classes. Biologically speaking, I guess I ought to say there are 75 genuses and 20,000 species, or 75 species and 20,000 varieties of those species, but some of you are probably better biologists than I.

Before going into a consideration of some of the points relating to these principal classes of products I want to point out to you two additional facts. I don't know that it is important that you know the metallurgical differences between them but there is an interesting difference in that the present magnitude of our steel industry is dependent on the open-hearth method which makes it possible to use qualities of ores that did not fit into the Bessemer process. Up to 1910 the Bessemer steel production in the United States was the dominant part of the industry. In 1895, only 40 years ago, about 80 per cent of the steel production was Bessemer and 20 per cent open-hearth. The conditions are more than reversed now because about 90 per cent is open-hearth and 10 per cent Bessemer. That is a reflection of the extent to which the introduction of the open-hearth process has made it possible to utilize ores which otherwise would not have been commercially satisfactory.

Another point along the same line and having an important consideration of the future is the use of scrap-iron and steel scrap. If you went back 25 or 30 years you would find most of the steel made from pig iron with relatively little use of scrap. As a matter of fact, if you went back to 1905 the ratio between steel and steel-making pig iron produced was about 10 8. In other words, the amount of steel-making iron that was produced annually was equal to about 80 per cent of the steel ingot tonnage. The metallic iron came 80 per cent from pig iron and 20 per cent from other sources. At the present time the ratio is just about 1 1, or about one-half of the metallic iron in steel now comes from pig iron and one-half from scrap, and there are a good many operations and operators for which the ratio of scrap runs higher.

That is an interesting and significant point because it bears on the rate of depletion of iron ore resources and has led some imaginative people to draw the conclusion that we may never find it necessary to mine the last of our reserves because there will be

so much scrap coming back to be melted. A comparatively superficial survey warrants the conclusion that over the next thirty or forty years there are 750,000,000 tons of steel now in use in one form or another which should come back as scrap to be remelted, or, say at least 25,000,000 tons of steel yearly coming back to be remelted. That eases to a very considerable extent the concern which was felt 20 years ago about the adequacy of our ore supplies.

The products that are made from steel in the finished form by the process of rolling hot, and when I say hot I mean a temperature of from 2300° to 2800° Fahrenheit - rolled hot from the ingot down to the finished product, present some interesting trends which are tending to create problems for the industry. Without boring you with figures (I shall leave a tabulation of the basic figures from which I am drawing this point) I want hurriedly to sketch to you the way in which there has been a shifting of the weight of importance of various classes of products in the last 30 years. 1905 is the first year I shall take, and 1934 is the l st. Thirty years ago 25 per cent of the entire output was in railway m terials, track materials, rails and accessories, in 1934 only 7 per cent. Consider what that means to a concern which has had a large part of its capacity in those heavy products. If you have ridden on a railroad recently you probably are conscious of the fact that they need to buy some materials for their tracks but they show no inclination to do it. In the heavy structural products - shapes and plates - that go into bridges, etc., the production dropped from 20 per cent of the total 30 years ago to 15 per cent last year, yet in that particular case there was no conspicuous change until 1930. As a matter of fact there was a gradual increase down to 1930. We are not safe, therefore, in drawing an unqualified conclusion as to the tendency in that direction. It may be that the pendulum will swing back again, and that a prominent part of the output will go into structural purposes.

You are probably especially interested in bar products because it is in the bar group that materials for forgings and projectiles come. In that group there has been a drop from 20 per cent to about 17 per cent. In contrast to those figures I want you to note that in the so-called flat rolled products, sheets and strip, 30 years ago there was less than 10 per cent of the total tonnage and today almost 30 per cent. In tin plate, which is closely related to sheets and strips in methods of manufacture, less than 6 per cent 30 years ago, almost 18 per cent today. The tinner has lost nothing during the depression. That is far enough to carry that consideration but it illustrates the point I want to bring out - the extent to which the industry has been shifting from heavy products, railway track material, heavy bars, etc., to the more highly fabricated products like sheets and strips and tin plate. It costs more for equipment to make the lighter products, requires more labor, other things being equal, to add the further processing operations.

That brings me back to one of the points I referred to previously - mechanization as illustrated in the continuous mill for the rolling of flat rolled products. One of those mills may require 125 men for its operation. To produce a like tonnage under old conditions of manufacture - hand mills - would have required 450 men. There is almost a 75 per cent saving in the number of men employed in that particular process which has been mechanized to high degree, but I would like to recall once more that the actual number of people employed in the industry is as great as it ever was. It takes a lot of money and that is one of the reasons why the capitalization is so large - it takes a lot to change equipment to keep pace with the trends in shifting production, the requirements of consumers, and the application of steel to the constantly increasing variety of uses. One of the biggest problems the steel producers have to consider is the problem of expenditures for modernization of equipment, and the addition of new equipment to keep pace with modern processes and changes in the basic operations of the industry. Often the question is whether to spend the money at all, and if it is to be spent, whether to spend it now, and if now, where to put the equipment when built. These are not easy questions to answer and they are having to be answered almost daily - perhaps I had better say monthly - by people in the steel industry.

I have told you a little about the labor requirements of the industry, I want to refer to some more aspects of that question. The steel industry is an industry of skilled workers, it is not an industry of the pick-and-shovel type of labor. You hear a good deal about the base rate for common labor in the steel industry - 40 cents an hour in the Pittsburgh district and 30 cents in the Birmingham district. It varies in different places. There are only about 27,000 workers, so far as I can get at the facts, who are to be labeled as unskilled out of the 425,000 in the industry. The steel worker is characteristically a skilled worker and his average rate of pay is about 65 cents an hour - high, as manufacturing operations go. There are few industries in which it runs higher. There are, however, wide differences in pay. The best paid operators in the industry, such as tin plate, sheet and strip materials, when business is good, may make as much as four to six thousand dollars a year. For wage earners that is doing pretty well. The number of skilled workers available for operations is probably not much greater than the total number now on the pay rolls. The industry is working at 52 per cent of capacity on the basis of a 40-hour week. With a 40-hour week the average worker will not get more than 35 hours of actual employment, taking all things into consideration. In order to get any more, the limit within which his hours are supposed to come would have to be raised because of the casualties over a period of a month or so. I refer to that for this reason if the industry were to find itself facing a higher rate of operations, and it is always hoping and praying for a higher rate, there would be a choice facing the industry - a choice between two possibilities, one simple and the other not. First, going out and finding more men, second,

increasing the number of hours that the men are allowed to work per week. I doubt, and so far as I have been able to get the facts the doubt is well founded, if skilled workers could be found to operate the industry at an operating rate even ten points higher than it is today without longer hours. If the operating rate were 60 per cent instead of 50 per cent, the probability is that a great many operations would be short of men for present schedules of hours. It takes two or three years to make a skilled worker out of an ordinary apprentice for most operations in the steel industry.

You can see, therefore, one of the problems from the standpoint of labor - adequacy of men if the rate of operations increases, and if men are not available employers must increase the number of hours of work per week. I might add that, as far as we hear, the majority of men would like to work more than 40 hours a week for, strange to say, men would like to find more money in the weekly pay envelope and if they could work more than 40 hours they would find more money.

You may be interested in the relation between labor and employers. It is a debated subject. I think I can say that the relation between the employees and the employers is as good as it is in any industry. There has not been a serious strike in the industry since an effort made in 1919, and that was a failure. The so-called employees' representation committees, which are commonly referred to as Company Unions, appear to have solved the problem from the standpoint of negotiating with the employees in respect to questions in which they are interested, and an overwhelming majority of the questions considered by joint representation of employees and management are decided in favor of the employees' side of the question. The percentage is about 75 per cent of the total number of questions considered. The relations are good between labor and management, whether they will remain so is not so clear. There are external factors which are impinging on the situation, the result of which you can guess as well as I.

I have referred to steel products as belonging in a multitude of classes and varieties. Largely they can be described as being producers' goods, not consumers' goods. They do not serve their ultimate use in the form in which they leave the mill. Some of them, like nails, piping, etc., are more nearly consumers' goods, but the producers' goods make up most of the tonnage. This fact bears to a very large extent on the question of the variability of demand and the elasticity of demand with fluctuating prices. I want to touch on that because of the frequency with which you see references to the fact that the depression was due to the failure of the steel tycoons to reduce prices. That may be a slight exaggeration but only a little variation of the thesis that some of our economic prognosticators would have you accept. You cannot find an adequate substitute for steel in most of the uses to which it is put. I will grant you

that in some instances which do not represent much in the way of the total tonnage consumed, there are substitute materials. Copper wire you all know, aluminum wire you know, brass pipe and copper pipe, copper sheets, monel metal in sheets; they are all used in applications where steel might fit, but they all combined do not represent a very large tonnage. There is not any adequate substitute for steel in most of the uses to which it is applied. That has an important bearing on this question of whether price - within reasonable limits - has any relationship to the elasticity of demand. If beefsteak goes to $1.25 a pound you can all eat pork chops. You have a variety of things you can turn to. If you don't like the price of suits you can continue to wear your old suit. If you are going to build a railroad track or a house or make cutting tools you are going to use steel for you can't use any substitute. You can go without to a degree, but that means suspending operations. You can go without eating but it is not advocated, and to the same degree we don't advocate, for the sake of industry, that you go without the processed production and rehabilitation that call for the use of steel.

You undoubtedly have had forced upon you the theory that elasticity of demand depends on fluctuating prices, put price up and the demand goes down, etc. If you offered to sell steel rails at $5.00 a ton the railroad probably would say that if you can sell them for $5.00 we don't want to take a chance on them.

Let me go now to the questions of certain of the problems in the industry. The first problem the industry faces, and some of you contribute to it, is the exacting demand of the users of steel. I don't know any buyer that is more exacting than the Army unless it is the Navy, and when I say the Army and Navy I am not leaving far behind the run-of-mine of industrial consumer. Technical schools are turning out highly trained men who have learned a great deal about materials and specifications and they have jobs and want to keep them, and they persuade their employers that they need a fraction less carbon, or more sulphur, and thereby is created an interesting and somewhat perplexing problem of practically every user of steel wanting to write his own specifications.

A hundred and fifty or two hundred years ago a bar was a bar, if the buyer was lucky enough to get an order in when the mill was rolling he got his material, and that condition prevailed more or less down to about 1920. Since 1920 the world has turned over and there is almost no such thing as commercial steel.

You may see a quotation of the price of merchant bars carrying the impression that here is a material that is produced by the mile and sold by the foot. I don't suppose, however, that 25 per cent of the total tonnage of bars produced today can be described as anything but special steel on which a specification has been written with scrupulous exactness. The commonest thing is to

specify the limits of carbon content and it is not unusual for a buyer to say he wants the carbon content covered by a range of not more than ten hundredths of 1 per cent or a carbon content of from 0.1 per cent to 0.2 per cent. What does that mean in terms of quantity of carbon in a ton of steel? It means that the maker is trying to control the carbon content within limits of two pounds out of two thousand pounds. That is a pretty good job even for a prescription druggist. Reduce that to the quantity of material the ordinary druggist deals with and it amounts to less than the proverbial mustard seed.

You will also find any number of consumers who insist they must have a sulphur content of not more than 0.04 per cent. That is less than 1 pound per ton of steel. These are merely illustrations. The same situation exists all through the industry; it applies in tolerances - the size must come within thousandths of an inch of a specified limit of accuracy, gauges, thickness must not vary more than thousandths of an inch between margin and middle of a sheet that may be 60" or 70" wide. Consider the problem involved when a roll long enough to have pass through it a sheet 60" or 70" wide must be so rigid that there is not going to be spring enough beyond what may be measured in thousandths of an inch and the whole thickness of the material rolled is only a small fraction of an inch. On a continuous mill the operations may start with a hunk of steel that weighs 8 or 10 tons in the ingot or bloom. As it comes out of the reheating pit it will go straight through without stopping for further heating until it comes out at the far end of the different sets of rolls with a thickness of perhaps five hundredths of an inch, and as it finishes it may be traveling at a rate of 700 to 1200 feet a minute. Precision and accuracy are still expected by the buyer under these conditions.

There is also the question of surface quality - finish - the kind of finish that will take the polish you insist on for your automobile. Those are problems - tremendous problems. How to do them, how to do them most efficiently and economically and at a price which the consumer thinks he should pay, is a constant problem for the steel maker.

The second of the problems of that order is the question of special steels, those made with the alloying metals to which I have referred. There is an infinite variety of combinations, especially in the stainless steels in which chrohium and nickel are the fundamentals. The two aspects of chemical analysis and physical qualities are to a large extent determined by two features of the process of manufacture. One of them is the heating of steel after the original melting - the so-called heat treatment. It is getting - I almost would say it has got - to the point where the steel maker well equipped with furnaces for reheating and heat treatment can almost make the steel do whatever he wants it to do in the process of getting it into the finished form. He can make it with long crystals or small crystals of the metal. He knows what temperatures are required and for what length of time, and he has to do it for one really important reason, and that is to make the steel perform in the way the user wants it to perform. The

has to do it for one really important reason, and that is to make the steel perform in the way the user wants it to perform. The drawing of steel is the best illustration. Look at the shell of a headlight, the fenders, the different bodies that are put on automobiles. All those represent flat pieces of steel that went to the manufacturer in a cold condition and were made to flow into the various shapes in which you see it. It is almost unbelievable that the steel is able to come through without tearing or cracking, or rumpling of the surface, or any other undesirable consequence as a result of being made to move cold.

That is the last of the great problems of the steel industry - how to make it perform in use - to make it meet all the requirements the ingenuity of the human mind is trying to find for this most basic of all materials.

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Q - What effect did the N.R.A. have on the labor end of the industry? From your remarks I gather they are continuing the policies directed by the N.R.A. Is there a likelihood of going back to the old labor status?

A - You ask about four questions, I shall take the last one first, the likelihood of going back to the old labor status. I would say no, because generally speaking the wheels of time turn forward and never reverse - once you have gone over a piece of ground you never really cover it again. I don't think there is the slightest danger that the forward movement, as a result of what has happened, is ever going to be lost. As a matter of fact I don't see that the N.R.A. situation brought up a great deal that was new in the relation between labor and management except to quicken what was going on. Spreading work in industry was well under way in 1930 and the factories showed a tendency to bring the hours down to a low level, they committee themselves under the code to rigidly prescribed hours which are still being adhered to. Whether they adhere indefinitely is tied up with what you can do with the labor you now have if the rate of operation rises to a higher point.

Q - Can you give any estimate on the number of tons of scrap exported last year?

A - 1,835,000 tons last year, 1,526,00 in the first eight months of this year. Those figures are not the result of a prodigious memory, I happened to put them in a letter yesterday. Last year the amount was more than double that for previous years, it was the biggest year we have had on scrap export.

Q - How is that going to affect the emergency needs of scrap?

A - So far as it has gone there is nothing to be worried about. The heavy movements of the last year and a half have been due to the low demand at home and the monetary exchange situation which made this a good place to buy it, also, the current industrial activities in Japan and Italy were factors. I don't think at the present time that the movement of scrap has got to a point where we need be concerned. If it increases steadily it might be embarrassing for domestic steel producers.

Q - Has the American tariff been an important factor in the development of the industry?

A - Undoubtedly, historically, yes. Undoubtedly no, currently. If you go back to the McKinley tariff of 1892 or 1893 - that had a very important influence on stimulating the growth of the industry in this country, but over the last 10 or 15 years, since the war, the tariff has had nothing whatever to do with the forward progress of the industry in this country. There is no tariff protection on steel products today. The average duty is a matter of a few dollars a ton and it is possible for the foreign producer to undersell the domestic product by many times the amount of the duty.

Q - Is there anything approaching a monopoly control in raw materials used by the industry?

A - No. The Government once tried to prove that there was. You will find it very interesting reading - there are only 56 volumes of testimony in the so-called dissolution suit against the Steel Corporation. As I recall the story the case was getting to a point where it was heading up to that particular question Is there a monopoly control of the raw material? The hearings were in Pittsburgh and they put on as a witness an eminent mining engineer. He was asked much the same question, substantially, "Would it be possible to get another holding of properties equal to what they have?" His answer was "Yes." The Judge said, "Go ahead and tell me where the properties are and the tonnage of each." Exhibiting another prodigious feat of memory he went to work and recited the details of properties, one after another, this property and that, and precisely where it was located, what type of ore it produced, the estimated tonnage of available ores, and estimated tonnage of currently available ores. When he got through there was nothing more to be said. When asked later how he knew all this, the witness said he had just finished writing a report on it.

Q - How about chromium and nickel?

A - We don't control chromium and nickel. International Nickel has control of Canadian production of nickel and I believe a related company has control of the New Caledonia deposits. Of chromium deposits, those in South Africa are controlled by a British company. I believe there is a supply of chromium ore controlled by American interests in Brazil, but mostly it is in the hands of non-American controlled concerns.

Q - Has International Nickel been able to stabilize the price?

A - They have done a pretty good job.

Q - Has the tariff had any effect in stabilizing the price of alloy materials?

A - Frankly I don't know. I doubt if it has. We think it is the narrowness of the control of the producing interests that has been the stabilizing factor.

Q - I want to ask about the so-called metallizing processes and the extent to which they might eliminate somewhat the necessity for nickel and chromium for preventing corrosion. What is your opinion?

A - It is undoubtedly true in certain uses. I am not sure that the process has been adequate in those more trying applications to which corrosion resisting steels are applied, such as on board ships and at seacoast points. Marine conditions will probably be the real test of that process. I don't know that it has had an adequate demonstration yet.

Q - How has the 40-hour week effected the companies' operation?

A - They have worked it out generally on the basis of three shifts - eight hours a day for five days. It is not an easy thing to work out. As a matter of fact some of the producers have been considerably embarrassed in the last six months by keeping their average over a period of six months. One company I know of found it necessary to go out and import between a thousand and twelve hundred men to equalize the hours of work for its employees.

Q - What is the broad policy of industry concerning the use of manganese and nickel and chromium? Do they operate on current stocks or do they have a tendency to accumulate reserves?

A - There is, generally, a pretty good stock of manganese in this country. Most of it comes from the Georgian section of Russia, from British India or Brazil, and because of the indispensable nature of the manganese and the smelting operations I think probably you would find that a six months' supply is about the minimum. Nickel and chromium would be about the same. That is not a long supply when you are looking at it from the standpoint of an emergency situation.

Q - You spoke about the exportation of molybdenum. Can you tell us where the majority of that goes in order that we may have an indication of who is using such high-powered steel?

A - I confess I don't know who the buyers are. I think, however, that the Bureau of Foreign and Domestic Commerce could answer that in considerable detail.

Q - Are continual searches being made with a view to locating ores of vanadium and tin or do the steel companies feel certain there are no such ores in the country?

A - I don't believe they have ever ceased operations in looking for supplies. Those companies I know best have men constantly at work looking for deposits of not only iron ore but also alloying materials.

Q - You spoke of the high grade ore available in Brazil. What are the chances of their establishing a steel industry?

A - You ask me to indulge in prophetic vision. I would say the chances are slight. In the first place, Brazil does not have any metallurgical coal, so far as I know. Coal there is, according to my last information, of low grade and could not be adapted to metallurgical operations. That would mean bringing in coal from the United States or Wales, perhaps. In the second place, the market is very badly depressed. Brazil has no large demand for iron and steel products in any individual section and the district where the ores are located is perhaps as inconvenient as any could be from the standpoint of reaching the markets. Until Brazil gets to an entirely different scale of economic evolution it would not seem to me that there is a sound basis for building up a real steel industry.

Q - What chance has Japan of ever building up such an industry?

A - I am sorry you asked me that because I am not unbiased. Keeping as close as I can to facts and avoiding prejudice, I would say the chances are very slight. Japan can subsidize and support by the Government, but Japan does not have important resources of its own, either of ore or of fuel, and it does not seem to me that Japan has the kind of civilization either industrially or economically which calls for a great deal of iron and steel.

| | Ore Production | Pig Iron Production | % Pig Iron |
|---|---|---|---|
| 1905 | 42,526,133 | 22,640,499 | 53,24% |
| 1910 | 57,014,906 | 26,949,290 | 47.27 |
| 1915 | 55,526,490 | 29,524,789 | 53.17 |
| 1920 | 67,604,465 | 36,243,890 | 53.61 |
| 1925 | 61,907,997 | 36,116,311 | 58.34 |
| 1930 | 58,408,664 | 31,020,907 | 53.11 |
| 1934 | 24,587,616 | 15,676,809 | 63.76 |

| | Basic & Bessemer Pig Iron Production | Production of Ingots & Castings | % Pig Iron |
|---|---|---|---|
| 1905 | 16,512,295 | 20,023,947 | 82 46% |
| 1910 | 20,330,250 | 26,094,919 | 77.91 |
| 1915 | 23,616,520 | 32,151,036 | 73.45 |
| 1920 | 28,799,806 | 42,132,934 | 68.35 |
| 1925 | 29,086,841 | 45,393,524 | 64.08 |
| 1930 | 25,708,133 | 40,699,483 | 63.17 |
| 1934 | 13,533,033 (2) | 26,055 289 | 51.94 |

| | Production of Ingots & Castings | Production of Finished Rolled Steel | % of Finished Rolled Steel |
|---|---|---|---|
| 1905 | 20,023,947 | 16,840,015 | 84.10% |
| 1910 | 26,094,919 | 21,621,279 | 82 86 |
| 1915 | 32,151,036 | 24,392,924 | 75.87 |
| 1920 | 42,132,934 | 32,347,863 | 76.78 |
| 1925 | 45,393,524 | 33,386,960 | 73.55 |
| 1930 | (2) 40,699,483 | 29,513,007 | 72.51 |
| 1934 | 26,055,289 | 18,969,506 | 72.80 |

| | Production of Finished Rolled Steel | Production of Rails, Rail Joints and Tie Plates | % of Rails Rail Joints and Tie Plates |
|---|---|---|---|
| 1905 | 16,840,015 (1) | 4,084,874 | 24 26 |
| 1910 | 21,621,279 (1) | 4,399,598 | 20.35 |
| 1915 | 24,392,924 | 2,739,818 | 11.23 |
| 1920 | 32,347,863 | 3,179,346 | 9.83 |
| 1925 | 33,386,960 | 3,607,794 | 10.81 |
| 1930 | 29,513,007 | 2,479,623 | 8.40 |
| 1934 | 18,969,506 | 1,358,516 | 7.16 |

| | Production of Finished Rolled Steel | Production of Shapes & Plates | % of Shapes & Plates |
|---|---|---|---|
| 1905 | 16,840,015 | 3,701,[illegible]25 | 21.98 |
| 1910 | 21,[illegible]21,279 | 5,074,618 | 23.47 |
| 1915 | 24 [illegible]92 924 | 5,315,054 | 21.79 |
| 1920 | [illegible]2 47,863 | 8,061,881 | 24.9[illegible] |
| 1925 | [illegible]3,[illegible]86.960 | 7,357,581 | 22.04 |
| 1930 | 29,513 007 | 7,175,296 | 24.31 |
| 1934 | 18,969,506 | 2,862,819 | 15.09 |

| | Production of Finished Rolled Steel | Production of Bars | % Bars |
|---|---|---|---|
| 1905 | 16,[illegible]40,015 | 3 [illegible]93,[illegible]01 | 21.34 |
| 1910 | 21,[illegible] 1,279 | 4 026,540 | 18.62 |
| 1915 | 24,[illegible],924 | 4,484,650 | 18 39 |
| 1920 | 32,[illegible]47,863 | 6,702,685 | 20.72 |
| 1925 | 33,386 9[illegible]0 | 6,478,902 | 19.41 |
| 1930 | 29,513 [illegible]07 | 4,982,124 | 16 88 |
| 1934 | 18,969 506 | (3) 3,289,431 | 17.34 |

| | Production of Finished Rolled Steel | Production of Sheets & Strip | % Sheets & Strip |
|---|---|---|---|
| 1905 | 16,840 015 | (4) 1,191,024 | 8 85% |
| 1910 | 21,021,279 | (4) 2,147,75[illegible] | 0 93 |
| 1915 | 24 392,924 | (4) 1,836,78[illegible] | 7 5[illegible] |
| 1920 | 32,[illegible]47,863 | 3,472,92[illegible] | 10.74 |
| 1925 | 33,[illegible]86,960 | 5,345,467 | 16.01 |
| 1930 | 29 [illegible]13 007 | 5,453,419 | 18 48 |
| 1934 | 18,[illegible]69,506 | 5,399,445 | 28.46 |

| | Production of Finished Rolled Steel | Production of Tin & Black Plate | % Tin and Black Plate |
|---|---|---|---|
| 1905 | 16 840,015 | (5) 1,001,067 | 5 94% |
| 1[illegible] | 21 021,279 | 1,359,825 | 6.29 |
| 1915 | 24, [illegible],924 | 2,[illegible]45,813 | 9.62 |
| 1920 | [illegible]2,[illegible]47,863 | 3,071,125 | 9.49 |
| 1925 | [illegible]3,[illegible]86,960 | 3,501,385 | 10.49 |
| 1930 | [illegible] 007 | 3,[illegible],31[illegible] | 12.04 |
| 1934 | 18,[illegible],506 | 3,[illegible]38,349 | 17.07 |

| | PRODUCTION OF FINISHED ROLLED STEEL | PRODUCTION OF WIRE RODS | % WIRE RODS |
|---|---|---|---|
| 1905 | 16,840,015 | 1,808,688 | 10.74% |
| 1910 | 21,621,279 | 2,241,830 | 10.37 |
| 1915 | 24,392,924 | 3,095,907 | 12.69 |
| 1920 | 32,347,863 | 3,136,907 | 9.70 |
| 1925 | 33,386,960 | 2,844,656 | 8.52 |
| 1930 | 29,513,007 | 2,348,600 | 7.95 |
| 1934 | 18,969,506 | 1,723,765 | 9.09 |

| | Production of Finished Rolled Steel | | Production of Tubular Products | % Tubular Products |
|---|---|---|---|---|
| 1905 | 16,840,015 | (6) | 1,435,995 | 8.53% |
| 1910 | 21,621,279 | (6) | 1,828,194 | 8.46 |
| 1915 | 24,392,924 | (6) | 2,299,464 | 9.43 |
| 1920 | 32,347,863 | | 3,220,289 | 9.96 |
| 1925 | 33,386,960 | | 3,229,768 | 9.67 |
| 1930 | 29,513,007 | (7) | 3,930,202 | 13.32 |
| 1934 | 18,969,506 | (7) | 1,944,759 | 10.25 |

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(1) Fictitious figure based on a 21% production of Rail Joints and Tie Plates against the production of rails such 21% being based on the production figures for the 5 years 1912 to 1916 inclusive.

(2) Figure for 1934 includes only that portion of the capacity and production of steel for castings used by foundries operated by companies producing steel ingots.

(3) Includes Alloy.

(4) Sheets only, figures on Strip not available prior to 1920

(5) Includes Terne Plate.

(6) Includes Skelp, Flue and Pipe, Iron or Steel.

(7) Includes Blanks or Pierced Billets for Seamless Tubes, such figure not being available prior to 1926.

CAPACITIES

| | PIG IRON | INGOTS | TOTAL ROLLED | SHAPES | PLATES | BARS | SHEETS | HOT STRIP | TIN PLATE | WIRE |
|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL U.S.. | 52,715,100 | 71,431,089. | 54,225,446. | 5,487,140. | 5,664,320. | 11,798,833. | 7,303,162. | 4,210,078. | 2,664,300. | 4,017,070 |
| PENN. | 17,924,040 | 23,421,004 | 18,737,618 | 2,963,100 | 2,490,570 | 3,710,300 | 1,260,560 | 687,068 | 915,700 | 1,130,000 |
| OHIO | 11,504,400 | 15,772,800 | 10,471,933 | 226,000 | 548,000 | 2,108,135 | 2,687,800 | 1,307,500 | 473,900 | 613,300 |
| IND | 5,057,700 | 8,496,200 | 6,861,300 | 317,940 | 617,000 | 1,474,200 | 975,100 | 675,560 | 555,200 | 240,000 |
| ILL. | 5,611,000 | 7,357,800 | 5,286,650 | 829,600 | 1,033,000 | 1,326,300 | 340,500 | 637,550 | 163,000 | 756,400 |
| N Y. | 3,714,100 | 3,244,700 | 2,412,695 | 660,200 | 48,350 | 904,650 | 131,600 | 4,700 | ---- | 146,100 |
| ALA. | 3,314,360 | 2,212,500 | 1,748,400 | 84,000 | 156,000 | 319,800 | 207,800 | ------ | ---- | 225,000 |
| MICH | 1,022,900 | 2,111,475 | 1,669,900 | ---- | ---- | 553,600 | 414,000 | 492,700 | ---- | 55,000 |
| MD | 1,663,200 | 2,490,000 | 1,594,000 | ---- | 410,000 | 72,000 | 204,000 | ---- | 240,000 | 95,000 |
| W.VA. | 802,600 | 1,652,000 | 1,405,550 | 100,000 | 100,000 | 76,[illegible]50 | 252,300 | 203,000 | 385,100 | ----- |
| TOTAL OF ABOVE STATES | 50,614,300 | 66,758,479 | 50,491,046 | 5,180,840 | 5,404,920 | 10,523,733 | 6,533,650 | 4,008,078 | 2,632,900 | 3,260,800 |
| % of U.S. TOTAL | 96% | 93% | 93% | 95% | 95% | 89% | 91% | 95% | 99% | 81% |
| TOTAL PA. OHIO & W. VA. | 30,231,040 | 40,845,804 | 30,615,151 | 3,289,100 | 3,140,570 | 5,893,183 | 4,200,660 | 2,197,[illegible]68 | 1,674,700 | 1,743,300 |
| Pa.-OHIO & W.VA. ONLY --% U.S. TOTAL | 57% | 57% | 56% | 60% | 55% | 50% | 58% | 52% | 63% | 43% |

MEMORANDUM TO MR. TOWER.

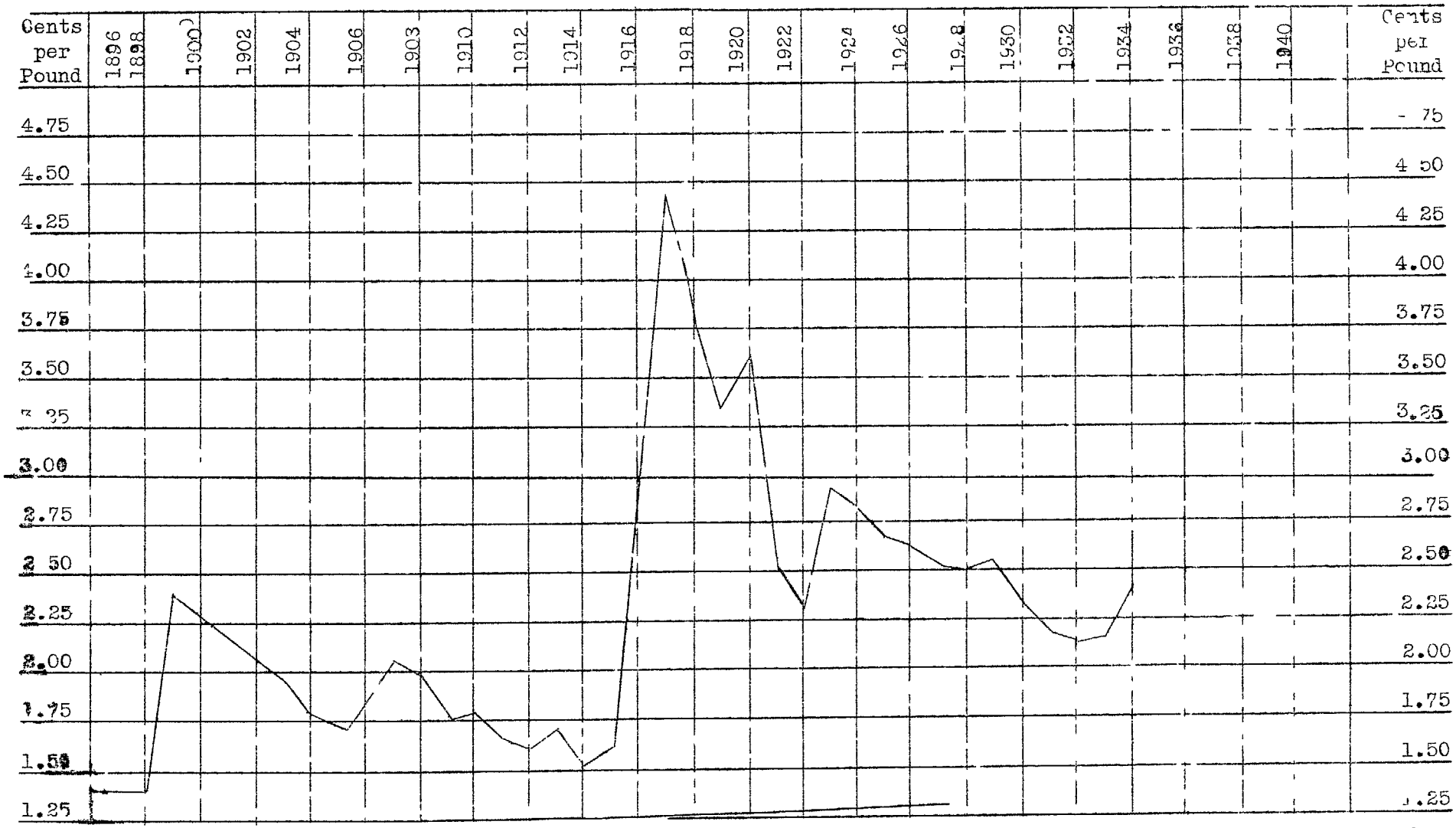
The capacities of the other finished hot rolled products are as follows:

| | |
|---|---|
| Rails | 3,492,600 |
| Splice bars and tie plates | 1,346,500 |
| Sheet piling | 260,000 |
| Hoops, cotton ties, baling bands | 241,000 |
| Skelp | 3,525,400 |
| Tube blanks and billets | 2,310,000 |
| heels (rolled) | 311,150 |
| Blooms and billets (for forging purposes) | 906,100 |
| All other finished hot rolled | 427,000 |
| Total | 12,819,750 |

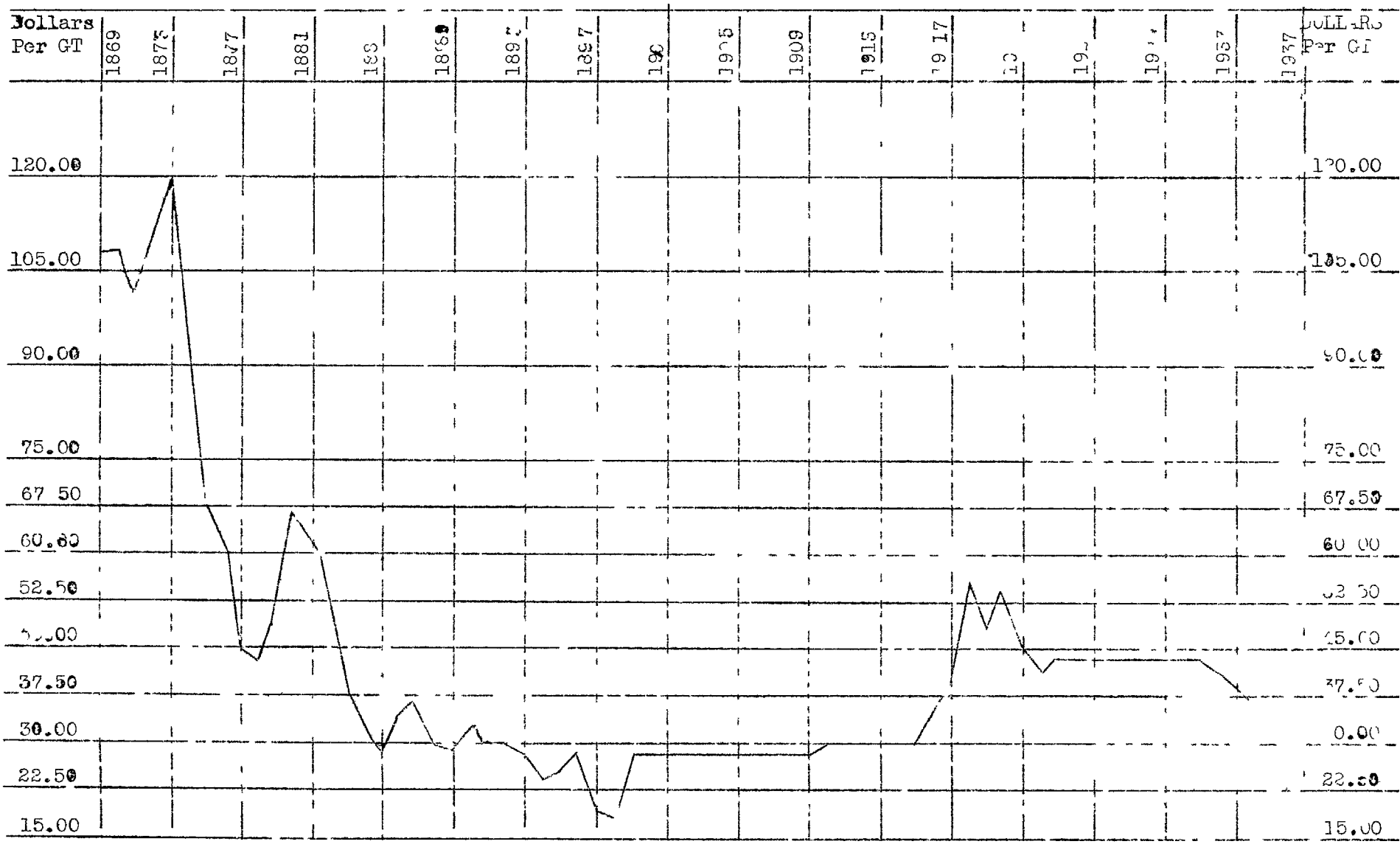
# INGOT PRODUCTION

| Year | Bessemer | % of Total | Open Hearth | % of Total | Total |
|---|---|---|---|---|---|
| 1895 | 4,909,128 | 80 | 1,137,182 | 19 | 6,114,834 |
| 1900 | 6,678,303 | 67 | 3,220,634 | 32 | 9,995,526 |
| 1905 | 10,919,272 | 56 | 8,444,856 | 43 | 19,463,180 |
| 1910 | 9,354,437 | 37 | 15,641,158 | 62 | 25,154,087 |
| 1915 | 8,194,737 | 26 | 22,945,770 | 73 | 31,284,212 |
| 1920 | 8,[illegible] | 22 | 31,685,495 | 78 | 40,881,392 |
| 1925 | 6,670,128 | 15 | 37,[illegible],903 | 84 | 44,140,738 |
| 1929 | 7,091,680 | 13 | 47,[illegible],599 | 86 | 54,850,433 |
| 1934 | 2,162,367 | 8 | 23,436,761 | 90 | 25,948,744 |

ANNUAL AVERAGE COMPOSITE SELLING PRICE PER POUND IN THE UNITED STATES OF FINISHED STEEL PRODUCTS
WEIGHTED ACCORDING TO THEIR TONNAGE IMPORTANCE, EXCLUDING RAILS
(From American Metal Market)



AVERAGE SELLING PRICE OF STEEL RAILS F.O B. MILL, UNITED STATES




From 1910 prices shown are on O.H. Steel Rails (Bessemer rails $2.00 less) - prior to 1910 on Bessemer Steel Rails. $2.00 differential between O.H. and Bessemer Rails was discontinued in 1931



29

137

THE STEEL PLAN

by

Major H. C. Hanton, O.D.

Oct 29, 1935

As you gentlemen proceed with the individual and committee problems that make up the course of instruction at the Army Industrial College, the thought will frequently occur to you - Is Industry interested in our plans for industrial preparedness? Does Industry cooperate with us in the preparation of these plans? Now, speaking personally, I have had a very, very limited experience in procurement planning work. I have, however, in the past few months come into contact with the Steel Industry principally through the Trade Association of the Industry, the American Iron and Steel Institute. Steel is, roughly, a five billion dollar industry. It is probably the best organized and strongest of our basic industries. Its Trade Association is the most representative of what such an association should be of all the Trade Associations in the entire country. I should like to say that we have had the utmost in cooperation from the American Iron and Steel Institute. We have had valuable suggestions, data in the form of capacity and production statistics, and we have had, and are now having, some of our own data checked by the Institute.

In fact, we have had such complete cooperation that I am almost ashamed to look Mr. Tower in the face when I think of the trouble we have caused him and are even now causing him. So when the thought occurs to you, as it will many times before next June - "Does Industry cooperate?", I should like to say, from my brief experience, you can rest assured that Industry does and will cooperate in our industrial preparedness activities.

Colonel Jordan has asked me to tell you about the Steel Plan and I have divided the subject into - First, Why is a Steel Plan considered necessary by the Office Assistant Secretary of War?, Second, What does the Steel Plan consist of?, and Third, What should the Steel Plan accomplish?

Let us take up, First, Why is a Steel Plan considered necessary by the OASW? Just consider steel for an instant. The first and usually the principal raw material required by the munitions fabricating plant is steel in the proper shape and of the correct grade. The finished product of the steel mill is thus perhaps the most important raw material for the munitions manufacturer.

You will find it customary in this College to examine our current procurement planning in the light of our World War experience. During the war, more attention was probably paid to the supply of steel than to any other commodity. As a result of this close attention there was little, if any, shortage of steel. World War conditions were special, however, in that our allies were between us and the enemy, and immediate and rapid production of munitions was not as essential as it will be in the next war.

The idea of a Steel Plan was conceived in 1923-1924. General Ferguson was then Director of the Planning Branch. Major R. R. Nix was Chief of the Commodities Division. Mr. James Bonner was present in the City of Washington as the representative of the Steel Corporation. Mr. Bonner, during the War, represented the American Iron and Steel Institute on the War Service Committee for Steel. Requirements for steel were routed from the Steel Division of the War Industries Board to Mr. Bonner. Mr. Bonner and his assistants then allocated requirements to producers. The idea of a Steel Plan originated among these three gentlemen, General Ferguson, Major Nix, and Mr. Bonner. A Steel Plan was actually prepared by Major R.R.Nix, with Mr. Bonner's advice. This Plan was known as the 1927 Steel Plan. In the revision of the Plan now under way, we have not changed the fundamental concepts as drawn up by these gentlemen. Both Mr. Bonner and Major Nix are now dead, and after a rather close study of the work accomplished by them, I would like to pay tribute to their painstaking thought and effective work in drawing up the original Steel Plan.

It is well known that the United States excels in the technique of making steel, in the capacity for producing steel, and also in the production of steel. Let us now examine the requirements for steel, comparing these requirements, or as we speak of them, the War Load, with capacity and production. I have attempted to show on this chart, in general terms, the conditions that existed in 1918 and then the corresponding conditions in 1934. Looking at the left side of this chart, one would say that there is little to worry about, because the total War Load is relatively small as compared to the country's capacity to produce.

Looking now at the right side of the chart, we can obtain an idea of the proportionate share of the War Load required by the Army, Navy, and Emergency Fleet. There still appears little to worry about in the supply of steel and one would say that if our plans went far enough to prevent cross hauls and distributional difficulties, the requirements of the Steel Plan would be met.

There is, however, another side and a very serious side to the problem. It has been stated at least one thousand times from this platform that modern warfare is essentially a war of machines. Not only is it a war of machines, but the machines must be light, they must be strong, and they must be highly mobile. These requirements have led to the widespread use of alloy and stainless steels. The American Iron and Steel Institute defines alloy steel in general terms as steel where the minimum of the range specified in any of the elements named exceeds the following percent

| | | |
|---|---|---|
| Nickel | Over | .40% |
| Chromium | " | .30% |
| Copper | " | .50% |
| Manganese | " | 1.65% |
| Silicon | | .50% |
| Molybdenum | | .10% |
| Vanadium ) | | |
| Tungsten ) | | |
| Cobalt ) | Any percent | |
| Titanium ) | | |
| Zirconium) | | |

The Institute defines stainless steel as all steels other than tool steels containing 9% or more of chromium with or without alloys, or a combined content of 18% or more of chromium and other alloys.

Let us now consider the requirements for these special steels. I apologize for the number of figures on this chart, but it is intended to show you the actual situation that exists. Now we can not say that the capacity of the Steel Industry to produce alloy and stainless steels is a definite figure, because the equipment used in the manufacture of these steels is identical in most cases with the equipment used for the production of tonnage steels. The production in peace time depends then upon the demand for these steels and we might say that the production in war time will depend upon the supply and availability of ferro-alloys. This chart shows you then, the comparison between the recently computed requirements and 1934 production and it can readily be seen that a really serious situation exists.

I think, then, that you will agree, and that we can conclude, that we need a Steel Plan to prevent cross hauls and distributional difficulties for the plain carbon or tonnage steels, to insure the supply of the necessary alloy and stainless steels, to prevent competition among the Supply Services of the War and Navy Departments, and to secure an equitable distribution of the War Load.

Let us now consider what the Steel Plan consists of. There are three parts to the Plan - First, Requirements, Second, Capacities, and Third, Capacity Credits. In connection with the preparation of the Steel Plan we have classified iron and steel products as shown on this chart. There are nine classes which we recognize and, then, of course, the grades or compositions within the classes. The grades follow the SAE classification system as far as it goes. I should now like to discuss requirements very briefly.

Requirements, in terms of guns, battleships, tanks, automobiles, or what not, would give us little idea of how to distribute these requirements to the Steel Industry. Our first step in computing requirements was to show on appropriate work sheets the steel going into the various items of munitions in terms of the nine classes of steel and also in terms of the grades within each class. The data from the work sheets was then segregated into classes and grades of steel, and by Supply Arms and Services of the Army and also by Bureaus of the Navy. These segregations also show the distribution of the steel requirements to the Branch Procurement Districts in the case of the Army, and to the Naval Districts in the case of the Navy. These aggregations were then summarized by Supply Services and by Districts, and finally, the total requirements making up the War Load, were completed.

Now, knowing requirements in commercial terms and by Districts, we next want to know the capacity of the industry to produce the nine classes of steel by company and plant, and also by Districts. Fortunately, the American Iron and Steel Institute brought out its 1935 Iron and Steel Works Directory in June of this year, and from this Directory we have worked up the capacity of the industry to produce the nine classes of steel by company and plant, and also by Districts.

With requirements known and capacities known, the third part of the Plan, which we term "Capacity Credits," can be prepared. The capacity credits sheets show for each Supply Arm and Service of the War Department and Bureau of the Navy, the requirements by Districts and by class and grade of steel, and also the companies and plants which are to supply these requirements.

With capacity credits set up, a final set of sheets will show the distribution of the War Load to the steel industry. On these sheets will be shown for each corporation, company, and plant, its share of War Load and the percent of this War Load to its capacity

Let us now summarize the Steel Plan. We can see that the Steel Plan consists of, first, Requirements by class and grade of steel and by Districts, second, Capacity of the Industry by company, plant, and by class of steel, and by Districts, third, Capacity Credits set up in favor of the Supply Services on the various companies and plants making up the Industry, fourth, The distribution of the War Load to the corporations, companies, and plants making up the Industry.

As to the present status of the Plan, requirements have been completed, Capacities have been worked up and are now being reviewed by the Statistics Division of the American Iron and Steel Institute, Capacity Credits have been started but are temporarily suspended until we obtain data on the 1934 production of alloy and stainless steels.

The next step in the Plan after Capacity Credits have been set up, will be to submit the Capacity Credits to the Supply Arms and Services and to the Navy for criticism. When these criticisms have been adjusted as far as possible, the Plan as a whole will be submitted to the Army and Navy Munitions Board for adjustment of any inequalities that can not be smoothed out by the personnel preparing the Plan. Finally, the Plan as a whole will be submitted to the American Iron and Steel Institute for its approval. With the approval of the Institute, the Plan will be considered complete.

In conclusion, let us consider what the Assistant Secretary's Office hopes the Steel Plan will accomplish. The Plan should tell the War Department Supply Arms and Services and the Navy Bureaus where their war supply of steel is to come from. This should facilitate their procurement planning activities.

The Plan should eliminate competition between Supply Services, it should tell the Director of the Planning Branch what steel is required, where it is coming from, and also how the steel load is distributed to the Industry.

The Plan should eliminate to a very considerable extent the cross hauls and distributional difficulties that almost stagnated transportation during the World War.

The Plan should provide the Army and Navy Munitions Board with a well defined scheme for carrying on, in so far as steel is concerned, during the critical and chaotic transition period when the proposed War Industrial Administration is being organized.

Finally, it should furnish the War Industries Administration with a definite guide as to Army and Navy requirements for steel; where these requirements have been placed, and what productive capacity will be available for the essential civilian activities of the nation.

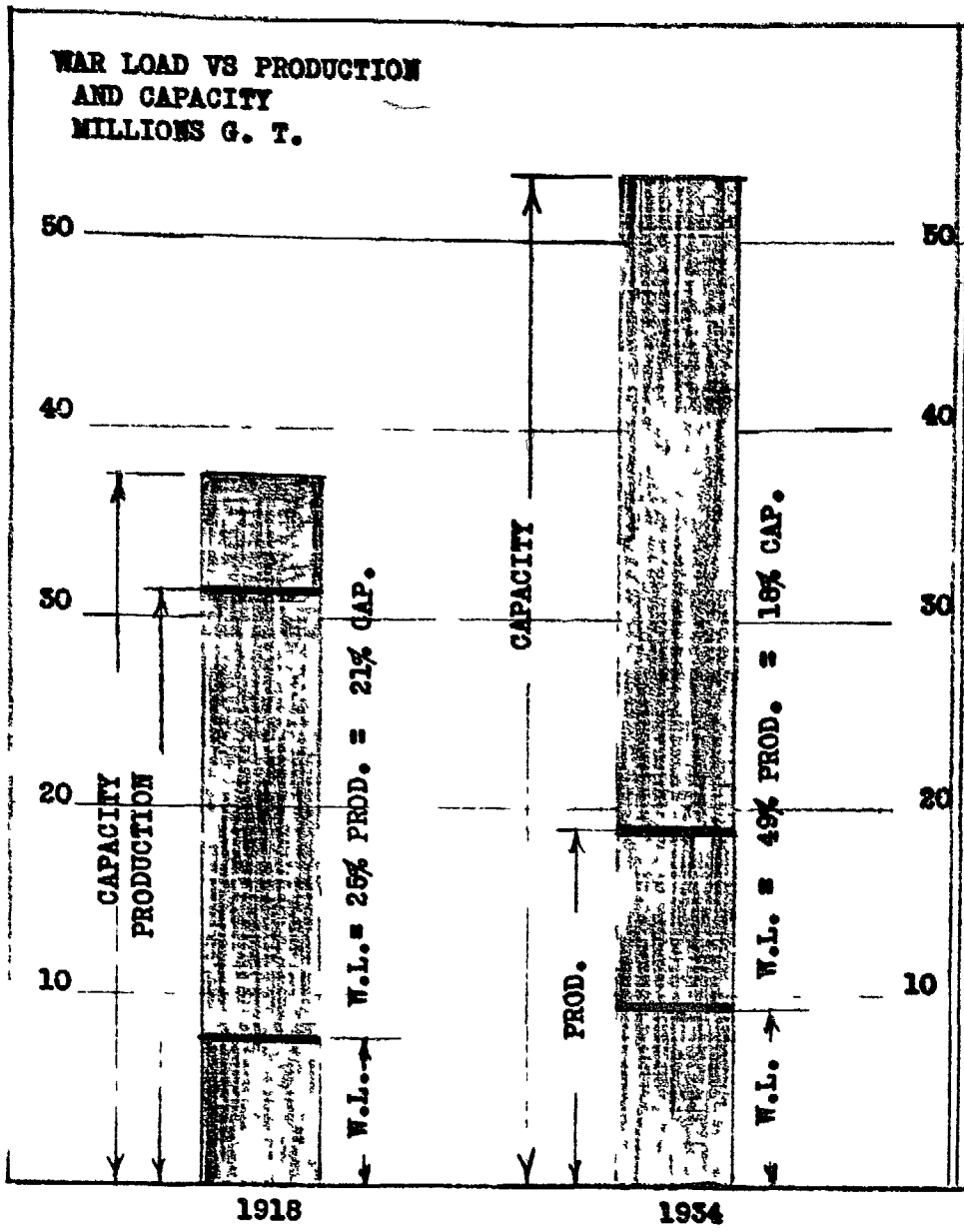
## THE STEEL PLAN

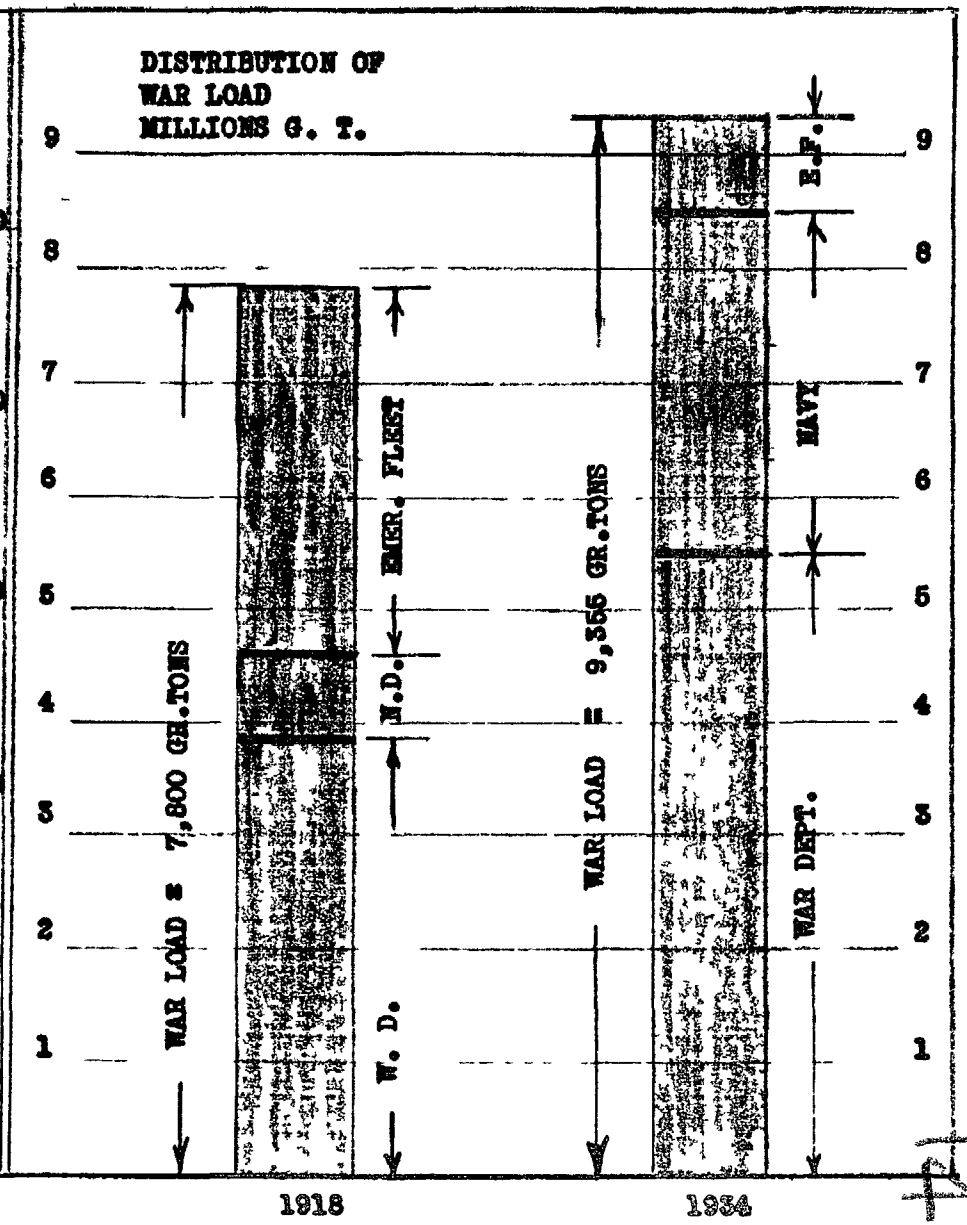
THE THREE PARTS - I. REQUIREMENTS, II. CAPACITIES, III CAPACITY CREDITS

### CLASSIFICATION OF IRON AND STEEL PRODUCTS

| CLASSES | | GRADES | |
|---|---|---|---|
| I | BLOOMS, BILLETS & FORGINGS | 1 | PLAIN CARBON |
| II | ROUNDS, SQUARES & FLATS | 2 | NICKEL |
| III. | STRUCTURAL SHAPES | 3. | NICKEL CHROME |
| IV | SHEARED AND U.M. PLATE | 4 | MOLYBDENUM |
| V. | SHEET AND TIN PLATE | 5 | CHROMIUM |
| VI. | TUBULAR PRODUCTS | 6 | CHROME VANADIUM |
| VII | WIRE AND WIRE PRODUCTS | 7 | TUNGSTEN |
| VIII | RAIL | 9 | SILICO-MANGANESE |
| IX. | CASTINGS AND INGOTS | SI | STAINLESS IRON |
| | | SS | STAINLESS STEEL |
| | | 18 & 8 | NON CORROSIVE |
| | | SP | SPECIAL |

140




ROLLED PRODUCTS.