of which we were given a taste by their submarine warfare.

should be beaten. The United States would later be forced to accept German dictation; so we were of necessity obliged to join the allies. The problem for the world was whether the dream of German absolutism should be realized by the conquest of free peoples. It is mere deception to speak as if Germany had been deprived of the chance for unlimited industrial and commercial growth in times of peace, and that she had to go to war for the right to legitimate economic development.

Separating

a field for their activity beyond the borders of our country, and thereby gaining a direct influence over foreign territories that may be important to us as sources of supply and as markets. This can be done in an effectual way by acquiring over-sea colonial possessions; for, in such case, economic influence is secured and strengthened in the most effective manner possible by political domination. In so far, however, as this way is limited or barred up altogether — for when Germany, after the restoration of its political power, first cast its eyes over the seas, it found unfortunately that the colonial world was already for the most part occupied — our end must be reached by means of a far-sighted financial and economic activity" (p. 81).

The war has disclosed the true meaning of many innocent words in pre-war literature. The plan of a commercial organization over Middle Europe strengthened by strong political ties enforced by Germany lies behind such exposition as this:

3 German industrial penetration

"Their [German merchants in other countries] commercial, manufacturing, and agricultural undertakings, although rooted in a foreign soil, are an important support for Germanies position in the world's business. This is especially true of the works of civilization on the grandest scale which German enterprise and German capital have created in the course of the past few decades in non-European

Countries:- The great electrical undertakings, irrigation systems, and especially railways, which - like the Bagdad Railway and the Shantung Railway - open up areas under German direction extensive regions and develop them into sources of supply for our import trade and into markets for our exports." (ibid., p. 84).

The claim often made that Germany had need of new territories, because her increasing population had no room at home is belied by the facts. The rise of the new technique has caused a demand for agricultural industrial workers, and has stopped emigration; since, like England, a small area can retain a very large manufacturing population, if their imported food can be bought by finished products. It seems evident that ambitious expansion has not been due to lack of room for her people at home; but rather, because of great industrial gains, national conquests have been rendered possible.

Same.

In this period, ~~of about Thirty years (1870-1900)~~ undoubtedly the greatest application of power, working for a fuller production and so for an enlarged social consumption and development, for an opening of new resources, giving room not only for a larger population but for a higher standard of living; for the cheaper distribution of goods from the producer to the consumer; for the easier movement of coal and ore, and other materials such as cotton and metals, to the centres of industry; for the placing of the products of one climate at the disposal of the inhabitants of another; — the greatest factor has arisen from the remarkable progress in the means of transportation by land and sea. Not only has this expanding force steadily modified the material comfort of increasing millions of men, but it has introduced marked changes into political and international relations. Where in the beginning of this period life was narrow, provincial and remote, now a cosmopolitan newspaper is delivered over night to the farmers door. Great Britain, or New England, can devote itself entirely to machine-made industries, without giving any serious attention to its own production of food, because the fertile districts of Dacotah, Argentine, Australia and the Danube were brought near by quick and cheap transportation. Thereby also, the interdependence of trade has made nations much more dependent on each other, — a fact that makes modern war (which cuts off exports and imports on a colossal scale) more disastrous than wars of earlier decades.

cheapened cost of transportation

(3)

While there had been the application of the steam-engine to railway transportation, as well as the discovery of anthracite coal leading to the development of the iron industry, earlier in the nineteenth century, the really important phase of railway building and railway extension began in the seventies, and culminated through this period we have in mind. From 1880 to 1914 the total mileage of railroads in operation in the United States expanded by 282 per cent (from 93,267 to 263,547); while the charge for carrying a bushel of wheat from Chicago to New York by rail fell from 19.9 cents in 1880 to 9.6 cents in 1910. And what was true of the United States was, in the main, true of other countries. The railways of the world increased, from 1880 to 1910, 253 per cent. in miles of lines; while the miles of telegraphs grew by 300 per cent. In particular countries the rate of gain varied, Russia and Italy growing in mileage and tonnage faster than Germany; while Germany surpassed the United Kingdom, in which an earlier start allowed less relative gain.

Railway Extension

(2)

Note p. 5

Country	Miles of Line	Percent of Increase to 1910	Tons Carried	Percentage of Increase
France:				
1880	14 736		89.037 635	
1910	25 072	70	190,965,819	114
Germany:				
1880	21,052		176.799.144	
1910	38 092	81	597,140,439	239
Italy:				
1880	5,340		10,282,530	
1910	10,538	97	42,376,809	310
Russia:				
1880	14.824			
1890	18.164		75,480,187	
1910	41.818	182	262,494.980	250
United Kingdom:				
1880	17.933		263,542,304	
1910	23,389	30	576,160,263	119
	(9)	(6)	(6)	(6)

8/6/36 - miles of line

8/6/36 - Increase

Ans blank lines

8/6/36 - Tons carried

8/6/36 - Percentage of Increase

8/6/36 - Ans blank lines

8/6/36 - Ans blank lines

8/6/36 - Ans blank lines

Moreover, progress on ocean went on hand in hand with progress on land, transportation. In this period the reliance on the obsolete form of propulsion was largely given up, as shown by a decline of the world's sail tonnage by 1910 to one-third of its amount in 1880; while its steam tonnage had multiplied four-fold, coincident with a gain of commerce throughout the world of about 230 per cent. This phenomenal extension of sea-borne traffic was made possible by the development of the modern steamship. The introduction of the screw propeller, necessarily followed by iron and steel ships, the development of the steam engine for large vessels, the surprising increase in length and beam to allow many-fold the carrying capacity, the devices for quick loading and unloading, and the establishment of new lines of steamers and new routes to hitherto inaccessible parts of the world account for the increase of the world's commerce and a fall in ocean freights corresponding to that on railways. For instance, the cost of carrying a bushel of wheat from New York to Liverpool fell from 5 13/16 d. in 1880 to 1 1/2 d. in 1910, or to about one-fourth. Thus were the gains in transportation, permitting a vast increase in the world's population, accompanied by a reduction in the cost of subsistence. Such were the triumphs of peace.

Fall in ocean freights

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1. Morrison, ibid, p.5

"The power generated in a modern steam-ship in a single voyage across the Atlantic is more than enough to raise from the Nile and set in place every stone of the great Egyptian pyramid."[1]

The improvement of the marine engine so that the coal consumption was reduced to less than a pound and a half per indicated horse-power made possible the speed of the Atlantic liner and the extremely cheap carriage of the tramp freight steamer.

This period is further memorable for the opening of new resources throughout the world, made possible by the extension of cheap transportation, and thereby holding back the tendency to diminishing returns on a scale never before known in economic history. In this country there was witnessed the occupation and cultivation of the wide territory west of Iowa, Minnesota and Missouri and Arkansas which added vast stores of wheat, corn, cotton, cattle, coal and metals to our use, and gave an undreamed-of stimulus to our home markets for all kinds of manufactures. But the United States was enjoying only its share of a world-wide movement. The same forces were at work wherever on the globe civilization and enterprise were carrying the results of invention and industrial progress. It might truthfully be said that this period was one characterized by industrial colonization, an inevitable consequence of improved transportation. It saw the opening of new ports and the development of great territories hitherto inaccessible in Africa, Australasia, China, Japan, and South America, and British North America. With the multiplication many times over of the products for general consumption, there was besides an increase in still greater proportion of the supply of gold. The movement of more goods led to greater activity in the mechanism and organization of credit and banking, not in one country, but in all countries.

Industrial Colonization

As we proceed, there is unrolled before us additional
Conquests of intelligence and science over nature, par-
ticularly in the field of mechanics and chemistry.
It would be folly to attempt even a catalogue of the
more characteristic inventions which have abridged
costs in the work of the world's industries. Improved
locomotives have brought greater speed and hauled longer trains;
standardization and interchangeability of parts made
cheaper and better watches, fire-arms, and agricultural
implements; special tools and machinery changed rods
into screws and metal into pages of type; new devices
have made possible irrigation schemes and even the Panama Canal.
Everywhere, notably in the electrical field, have new inven-
tions revolutionized the processes of industry. Steel, in-
stead of iron, has become the order of the day.

The economics of chemistry disclose a wide ramifi-
cation of applications of principles to practical industry.
Science aids industry
For instance: Vegetable dyes have given way to newer commercial prod-
ucts which revolutionized the whole dye industry; and
in this progress Germany had taken the lead. In the
recovery of by-products of coal and oil hundreds of new
commodities have appeared. In the steel industry, the
Bessemer process (1864) cheapened the making of steel; and the
removal of phosphorus from the ores by Sidney Gilchrist
Thomas allowed poorer ores to be used; and the open-
hearth Siemens furnace followed. All these are character-
istic of the modern industrial revolution. Nor are they
confined to any one country, since scientific gains become
universal property.

Emphasis

(633)

"Only twenty years ago" says Morrison, "the tin-
gineer," nothing typified the strain of human labor
more than the row of furnaces in which the
puddlers, by muscular effort and in glaring heat,
slowly drew together the particles of soft metal
into the spongy puddle-ball from which wrought
iron was forged and rolled. Today the Bessemer con-
verter and the open-hearth furnace have stricken the
doom of wrought iron, which is disappearing before
the less costly steel, and there is nothing more striking
about a great steel plant than the absence of
men".

Moreover, while events had been preparing in previous decades for later results, the culmination of many contributing causes in producing a wholly unprecedented era of industrial change is the mark of this period. These changes in economic methods moreover led inevitably to a new development in business organization. The corporation early arose to meet the need of large capital supplied by many small contributors, thus distributing the risks of enterprise; but the significant use of corporate forms in large combinations of industrial operations did not come until late in this period. When several hundred thousand dollars are paid for a single steam hammer, or a single train of tools in a modern plant, the whole establishment requires vast capital, with the result that production on a large scale, by the use of inanimate power, lessens the amount of human labor relative to the power developed; but it enables the laborers to receive the highest wages at the same time that their goods undersell in Asiatic markets those of laborers (unaided by these mechanical marvels) who receive only one-tenth the wages. For this obvious reason, the period may be described, also, as an era of corporations. In our country underlying economic conditions have brought us the "Trust" problem; while in Germany the Kartel has arisen from the same evolution. In every country the inevitable presence of large production has created its special problem, no matter how differently it has been met.

changed business organization

Not less significant in its influence, and because it has been an inevitable consequence of the new conditions of industry and science, has been the upheaval in the conservative ways of education. The new forces of the world call for men trained in new ways. The education for the old so-called "learned professions" is not adapted for training the men who must invent, design and manage the mechanism called forth by the use of newly developed force. A premium of material success is now set on an entirely new type of industrial leader and entrepreneur. An accurate and disciplined mind, the ability to direct men, taught how to think, how to investigate and construct with mathematical exactness and with precise knowledge of the laws of matter, or of the chemical composition of substances, — the need for men of such quality demanded a new type of education. In addition, nine-tenths of the public questions and of the problems of the entrepreneur became economic; and education had to provide place not only for science and its applications in new ways but also for economics and public administration. The man trained in the law no longer was the best legislator.

The new training

Apart from the education of men for the highest posts of industry, the mechanical and vocational training which made a skilled artisan became recognized as a source of superiority. In the new era stupidity became a crime; efficiency, a necessary virtue. The country which surpassed others in recognizing the needs of the new era and best trained its artisan class gained most in the keen industrial competition which has arisen in this period.

As we shall soon see, Germany was one of the quickest to see the value of thorough and exact training for its workmen classes. In this respect, Great Britain and the United States have been slow to follow.

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As a consequence of the multiplication of products suited to men's use, came the new problems of their quick and easy exchange in all markets. Apart from the price-making of products in terms of a standard money, the devices for exchanging them were not confined to forms of money. In the evolution of various media of exchange, induced by the desire to avoid the risk of using the valuable standard metals, like silver and gold, came not only credit devices such as bank notes and bills of exchange, but most phenomenal of all, the use of bank checks drawn on deposits, or the deposit-currency. To the man of today in Anglo-Saxon countries the general use of checks for all but a fraction of our daily transactions is so familiar as to attract no attention; and yet its development through clearing houses, is of recent date, in the United States. The New York clearing House was established only in 1853; and in many other large cities only in later decades. Banking and checks, however, are but practical applications of the general principles of credit. The significant movement, of which the rise of the deposit-currency is but a part, is the rise and extension of credit. Nothing else is more characteristic of this period.

Evolution of media of exchange

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1 The London Clearing House, although dating back to 1773, kept no records prior to 1840, and became active only after the creation of the one in New York. Others were established in Boston (1856), Philadelphia (1858), Chicago (1865), St. Louis (1868), Osaka, Japan (1879), Tokio (1887). On the Continent, the forms of credit do not warrant much development of checks and clearing houses; although they have shown some growth in Germany and France. In the United States alone there are 170.

The extension of credit — that is, the transfer of goods under obligation to return an equivalent in the future — quite apart from from the forms (such as bills, checks, notes) arising from these transfers is a special characteristic of this period.

Rise of Credit

Early in the nineteenth century, the purchasing power of a business man was largely confined to the amount of money he could command; but the rise of credit enormously increased the available purchasing power by the enormous mass of goods bought and sold, which became the real possible basis of bank assets. Bank credit became synonymous with all articles having a liquid, saleable quality. In the time of Ricardo, credit had little place in the economic world. Today, it is of first importance, not only in all private transactions, but in the fiscal operations of all governments; while its influence upon prices and the principle of money has been revolutionary. Ricardo expressed a belief that prices of goods depended on the quantity of money in circulation; but today an unmeasured volume of goods are exchanged by forms of credit practically without the intervention of any money. For instance, in the United States alone goods to the amount of $173,000,000,000 were exchanged by the use of checks in one year (1913). In international trade the bill of exchange serves as a medium of exchange, and only balances are paid in coin or bullion. The discovery that goods (after being priced in some standard) could be safely bought and sold by credit devices, amounts being offset against each other in opposing currents of domestic and foreign trade, without passing money from hand to hand, has produced a mechanism of flexibility and power, rising to almost incredible achievements, which was unknown in earlier decades. As we proceed in our study of the European War, we shall begin to realize the full wonder and working ways of credit.

Moreover, the growth of capital directed to banking for the purpose of providing credit to those engaged in producing and distributing goods has gone on pari passu with the demands of an enormously increased output of goods. But the increase of banking power, which is synonymous with the operations of credit, is not to be measured by the amount of banking capital (and surplus), but by the work performed by that capital, that is, by the growth (in Anglo-Saxon lands) of Deposits; because and result directly in Deposits, and the close relationship between Loans and Deposits. In the last thirty years the Deposits item of our national banks, which may be taken as fairly representative of banking and credit development, increased from $833,701,034 in 1880 to $5,897,216,209 in 1910 (by 534 per cent.); or if all banks, state and private savings banks, be taken, the gain has been 754 per cent.

U.S. Statistical Abstract, 1914, p. 632.

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§3. Into a world pulsing with the life of these new forces, the Bismarkian German Empire issued from its Prussian Crysalis after the Franco-Prussian War of 1870-71. [illegible] It took its part in a world-wide movement. It is not unnatural that an exaggerated and egoistic nationalism may have ascribed the extent and speed of its progress largely to its own internal virtues, and have given little heed to the world-wide surge of new forces on which it, as well as other countries, was carried to unexpected triumphs. Certain it is, however, that its characteristic virtues and discipline helped to propel its craft at a greater speed on the swift-moving current. The exact nature and trend of that progress throughout this remarkable period just before the European War is necessary to our understanding of the various problems before us.

Germany in a world-wide movement

"The German people × × × have broadened all the conditions of their life from a contracted narrowness to an unheard-of expansion; and, all things considered, they have achieved an advancement such as, compressed within so brief a time, the history of nations can hardly parallel", says Karl Helfferich, in "Germany's Economic Progress and National Wealth, 1888-1913" (1913), p. 6.

Before the Empire the German race was scattered in relatively small states from the North Sea to the Danube. It was a community of simple ways, chiefly rural, and its manufactures were largely hand-made. In Prussia, in 1804, 73 per cent. of the population were engaged in rural occupations such as agriculture, and only 27 per cent. were classed as urban; while more than one-half of this 27 per cent. were connected with agriculture. At that time Prussia had but 17 cities with inhabitants numbering over 10,000. A people with little adaptability, the Germans retained these rural and slow-changing characteristics well into the present period. The significant mark of her industry was the prevalence of handicraft; machinery, not only in agriculture but in her limited sphere of manufactures was undeveloped. They exported foodstuffs and raw materials, and imported manufactured products. Germany was an inland country, with little or no transportation by canals or railways between the various, disunited German states.

Early Germany given to handicraft

Her development of credit and banking was backward.

Long before the Empire, England had developed and put fully extended the many uses of steam and machinery. Long before Germany, and first of all the nations, England had passed from an age of handicraft to an age of machinery. The new era had its birth on British soil. To this fact is to be attributed the prodigious growth of British manufactures, industry and commerce in the nineteenth century. Before other peoples, she had begun to supplement her labor

Great Britain first in the mechanical stage

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cf. Earl D. Howard, Recent Industrial Progress of Germany, (1907).

with the manifold productiveness also of new mechanical forces. Of other countries later turned from handicraft to mechanical methods, in imitation of and stimulated by British example, they were sure to make startling progress in their transitional period, gaining relatively on Great Britain, even though not outstripping her. . . British progress, in later Saxaries, while continuous could not possibly keep up the comparative rate of her own early transition to the mechanical stage. The story of German industrial growth is that of an energetic, industrious, thrifty people able to take up mechanical devices already perfected in other countries; ready to their hand, and able to in the amazing conquests of this era of new forces. The rate of her early progress was sure to be spectacular, because she started from a position so far in the rear. She has not inaugurated a new era; she became a part of the new industrial movement started before her birth. But today she has fully changed from the former handicraft, agricultural people to a manufacturing, exporting and commercial nation. For the present we are concerned not with her political and militaristic policy, but with the facts of her industrial development. Germany followed England in this period

In Chart I, we have a ready means of measuring the economic progress of Germany, not only absolutely, but in comparison with Great Britain, Russia, France, Austria-Hungary and the United States. The growth of population alone is, of course, no measure of industrial gain; but the contrast of numbers with what numbers can do is striking and significant. The increase of population is, as was to be expected, greatest in Russia, followed by that of

The United States, both having had extensive areas of agricultural, forest, and mineral resources to be exploited, and serving as a stimulus to numbers. In Great Britain, Austria-Hungary and France, population has remained nearly stationary; while that of Germany has gained since 1880 about 57 per cent.

But, taking up the imports and exports of goods as an indication of industrial and commercial progress, the contrasts are illuminating. With numbers as great as those of Great Britain, Austria-Hungary has made little commercial gain. Russia with the greatest growth in numbers has not used the units of human labor to commercial advantage and her foreign trade has been sluggish; even France has gained more than either Austria-Hungary or Russia. In comparing Germany with Great Britain, we find both have greatly extended their foreign commerce, with the latter still in the lead; but, with a smaller population than Germany, Great Britain's superior control of machine-made processes has so increased the power of her labor in this era of new forces that her commerce is still absolutely larger than Germany's. The case of the United States is suggestive, if only for the reason that a rapid increase in numbers goes hand in hand with a marked gain

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↓ The advantage to Great Britain in imports is not so great as the line in the Chart would indicate, because this not possible to obtain figures throughout the period for "special" imports (for home consumption). Hence The British line of imports gives the "general" imports, while for all the other lines the figures are "special". For instance, in 1910, British "special" imports are # 2872 against # 3391 millions of "general" imports.

in foreign trade; That is, The agricultural régime is no longer the main source of commerce. Although our excess of exports is due largely to agricultural products, yet in these industries labor is aided by machine processes and the new forces are probably to a greater than in any other country.

Obviously, foreign commerce is not the only measure of industrial growth, even though the movement of exports and imports is indicative of internal productivity. Of course there could be no foreign trade without relative low costs and efficiency of production at home. Germany's internal development is therefore of interest not only because of its fundamental relation to her foreign trade, but because the specific industries in which she has most excelled throw light upon the causes of her remarkable progress.

Germany after 1870

Immediately after the Franco-Prussian War, there was a "boom" period, which had little foundation beyond the elation of victory and the receipt of the French indemnity. It was collapse, lasting for about fifteen years, or until about 1890. The recovery due to general causes happened to coincide with the beginning (1888) of the reign of the present Kaiser, and allowed good courtiers to ascribe the change to his personal leadership. (, of course,

The internal industrial development of Germany has been much more marked even than her foreign commerce. While remaining an agricultural country, nearly able to supply her own consumption in normal years, the marked characteristic of her industrial progress has

been a relative decline in agriculture and a relative rise in manufactures. Nevertheless, it must be kept in mind that the ruling classes, like the conservative landowners of the East, have provided a highly protective tariff for agricultural products, the advantages of which to this particular interest have been estimated at about 50,000,000 a year.[1] Moreover, bureaucratic control and scientific aids to soil and to methods of cultivation have made the productivity of her land greater per acre than ever before; although the area available for agriculture and forestry is practically incapable of increase. In spite of the gains due to greater intensity of cultivation, and the added efficiency of labor through the increased use of agricultural machinery, the manufacturing interests have gained far more. While in 1882, the persons engaged in agriculture and forestry made up 42 per cent. of the total population, in 1907 the percentage was only 28.5 (although the absolute number was 17,681,200). As with us, the tendency to move from the land to the towns was an inevitable consequence of the urban demand for factory labor, in connection with the new mechanical era. In 1885, only 18.4

German gains in both agriculture and manufactures

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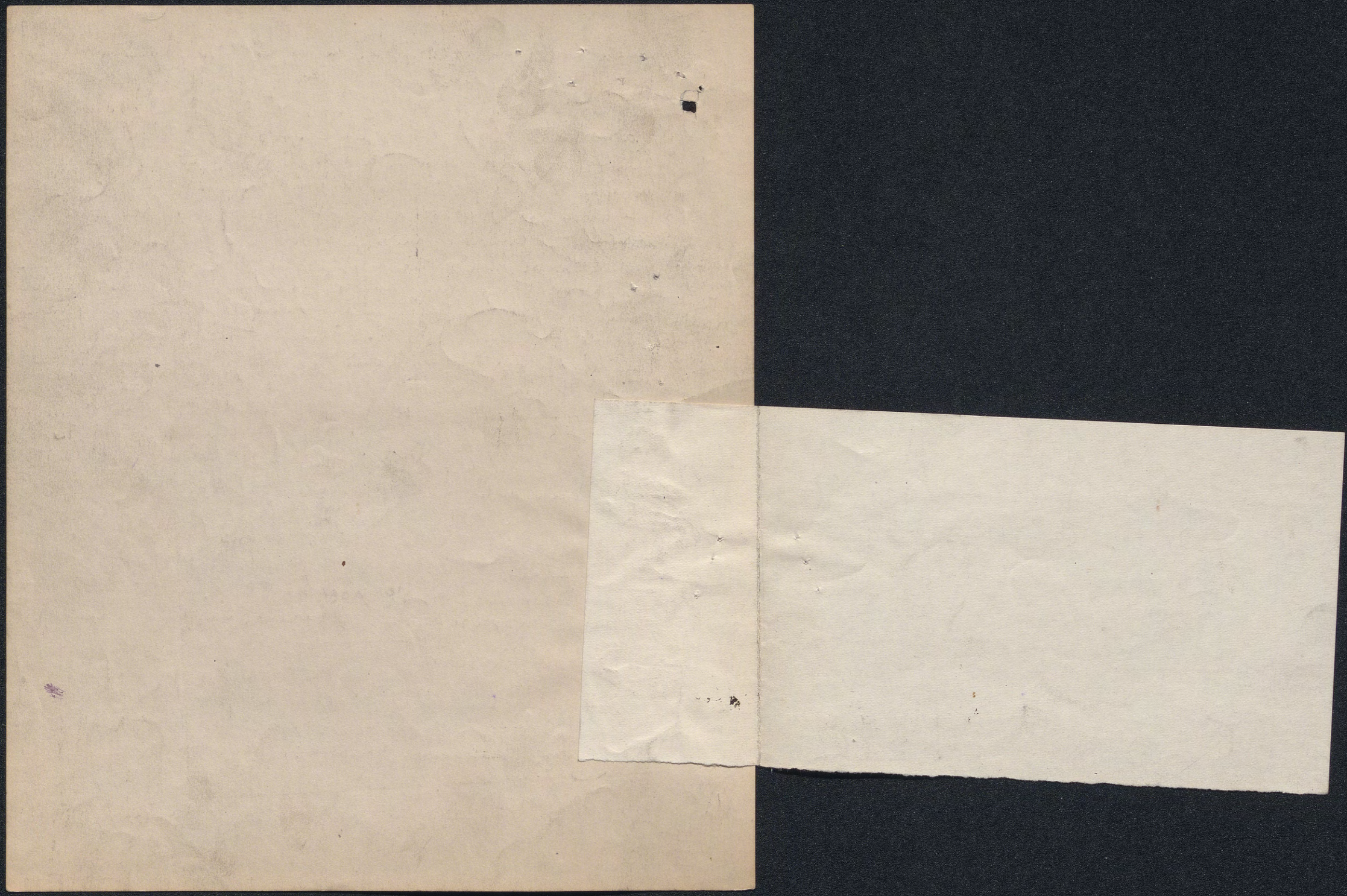
2. Karl Helfferich, (Germany's Economic Progress and National Wealth, 1888-1913, Ge. Stilke, Berlin, 1913. 8°. pp. 124) makes the following comparison, pp 53-4:—

1. Cf. E. Crammond, Journal of the Royal Statistical Society, July, 1914.

	Average yields per hectare (2.47 acres) in tons	
	1883-87	1908-12
Rye	1.00	1.78
Wheat	1.34	2.07
Summer Barley	1.28	2.01
Potatoes	8.74	13.37
Oats	1.13	1.90
Hay	2.85	4.21



per cent. of the inhabitants lived in towns of over 20,000, but in 1910 the proportion was 34.5 per cent. As in the United States, and for the same reason, the increasing urban population brought about a rising demand for foodstuffs. Instead of exporting foodstuffs and raw materials and importing manufactures, as formerly, Germany now felt the need of expanding her mechanical industries and stimulating her exports of manufactured goods in order to pay for the steadily increasing imports of food, which had risen from $241,375,000 in 1887 to $800,150,000 in 1912. As to food, in spite of her intensive cultivation, she was no longer self-sufficing.

Germany exports manufactures.

Great Britain long before had accepted the inevitable result of the manufacturing regime and had comparatively neglected agricultural pursuits, so that in 1912 she produced but one-half of her consumption of food. Hence a necessary reliance on her navy in case of war.

The basis of her industrial development, as well as that of Great Britain and of the United States, lay in coal and iron, although Germany mines also salts, lead, zinc and copper, in the production of

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1. The aggregate yields of typical crops in other countries than Great Britain are as follows (in millions of tons):

Harvest Year	Countries	Wheat and Rye	Potatoes
1912	Russia	42.6	36.9
1912	United States	20.8	11.4
1912	Germany	15.9	50.2
1912	Austria-Hungary	11.2	18.5
1911	France	10.4	11.5
1911-12	British India	8.4	—
1912-13	Argentine	6.4	—
1912	Canada	5.4	2.2

K. Helfferich, ibid., p. 55

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Coal

Coal Germany now holds third place, and yields about one-fifth of the total coal production of the world. Taking mining as a whole, there has been an increase in the value of her products from #175.000.000 to over $400.000.000 in twenty five years, in which perhaps one-fifth of her population is engaged.

Iron and steel

German iron ores contain considerable phosphorus, and little use could be made of them until the Gilchrist Thomas process was applied in 1868; but from 1887 to 1911 the production of iron ore increased three-fold. Moreover, foreign ores were also imported, and in the same period the production of pig-iron was quadrupled, so that now Germany ranks next to the United States and above Great Britain (since 1903) in this industry. She holds the same

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The hard coal to be found in Rhenish Westphalia, Upper and Lower Silesia, and at Saarbrücken, is practically inexhaustible.

1. The relative growth of the leading countries of coal may be seen as follows (in millions of tons):

Countries	1886	1911	Percentage of Increase
United States	102.1	450.2	336.6
Great Britain	160.0	276.2	72.6
Germany	73.7	234.5	218.1
Austria-Hungary	20.8	49.2	136.5
France	19.9	39.3	97.5
Belgium	17.3	23.1	33.5

ranks in the production of steel; her percentage of increase since 1886 being 1335 against 910.3 per cent. of gain by the United States.

For the manufacture of machinery, and out of the extraordinary development of the electrical industry, arose a great increase in the demand for iron and steel for steel rails, bridges, building materials, mining machinery, and railway equipment. Locomotives were sold to Russia; while it is estimated that 91 per cent. of the electrical railways in Europe were built by Germans. It is to be noted, however, that in this field the Germans, in the main, were not inventors, but adapters of the instruments originated by others. England still held a superiority in textile machinery, and the United States in agricultural implements.

In the applications of science to the chemical and beet sugar industries rather characteristic German qualities came into play. Bayer, in 1897 discovering the process of making artificial indigo, or alizarine, from a coal tar product; and German chemists supplied organic dyes with dye-stuffs from coal tar, the by-products of gas and coke, which had formerly gone to waste. When the war broke out Germany was found to have furnished the main supplies of these dyes. For this industry benzol had been imported from England, Belgium and Austria-Hungary. Inasmuch as these processes were closely related to the production of explosives there was a reason for the invasion of Belgium, apart from its furnishing an easier in obtaining control of its coal and gas

From 1882 to 1907, the persons employed in producing machinery increased by 229.1 per cent., and the steam power by 557 per cent.

road to Paris than through the French frontier.

Sugar

The chemical triumphs in developing the processes of extracting sugar from beets are primarily German, and she leads the world in this industry. In 1911, Germany produced 2,701,000 tons of beet sugar, far surpassing Russia, Austria-Hungary and France. In this period the area (plantings) to sugar-beets was nearly quintupled, the total quantity of sugar increasing over seven-fold, and the weight of beets to make one kilogram of sugar being reduced from 11.62 (kilo.) to 6.08.

Textiles

In the textile industries, the characteristic lessons of this period appear in striking forms. Long ago, before the Thirty Years War, the Germans had produced and exported woolen and linen goods, but, dependent mainly on agricultural occupations, such as the growing of flax and the raising of sheep, her relations, as we have seen, was to handicraft; weaving was done at home. The invention of the steam engine, the spinning jenny and the power loom in England in the eighteenth century so lowered the cost of producing textiles that Germany could not compete with the English, whose labor has been enormously multiplied by the use of new power. In Germany low wages and what was known as domestic production could still hold its own against the factory system. Yet she was late in changing from the household to factory methods. It was 1860, before the automatic cotton spindle was introduced into Saxony, where cotton goods had been manufactured by machinery since 1795. From 1882 to 1907, the persons employed in textiles (now over 1,000,000) have increased only 20.3 per cent., and the steam power by 71.7. Nevertheless there has been a distinct

(or thirty years later than in England)

growth in the exports of these goods in twenty five years. As contrasted with 55.6 million spindles in Great Britain in 1909, Germany had only 10.1; and while Germany exported £131.4 millions of cotton goods in 1912, Great Britain exported £611.1 millions. Similarly British exports of woolen goods in 1912 were £188.8 millions, but German were only £84.4. Taking German manufacturing industries as a whole, Helfferich estimates that in the past twenty five years their producing capacity has increased three-fold. In this fact we find the raison d'être for the remarkable gain in German commerce and shipping. For permanently international trade goods in the main must be exported to pay for imports. As Germany now grows little wool, and no cotton, the important items Germany in her foreign trade are wool, woolens, cotton, cotton imports goods, as well as iron and steel and machinery. She raw materials imports chiefly from Russia, Great Britain, Austria-

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1. ([£ in millions] cable centre)

. Cottons	from	£ 16.8	To	£ 105.4
. Woolens	"	44.4	"	63.5
. Silks	"	4.0	"	47.7
. Woolen yarns	"	8.5	"	21.0
. Cotton	"	"	4.4	" 16.0

8/8/36 mailed

Hungary; France, India, Argentine, and the United States (taking our cotton, copper, wheat, petroleum, corn, lard, turpentine, oil cake, etc.); and exported chiefly to Russia, Great Britain, Austria-Hungary, France, Belgium, Netherlands, Switzerland, and the United States (selling to us cotton goods, hosiery, silks, porcelains, dyes, toys, gloves, etc.). From 1887 to 1912, her imports gained by 243.8 per cent., and her exports by 185.4 per cent. As against a total gain in foreign trade for Germany of 214.7 per cent. That of Great Britain was 112; of the United States, 173.3, and of France, 98.1.

As a consequence, it became possible to expand the German mercantile marine, two and a half times, since 1888, to about 4,400,000 tons at the end of 1912. In 1911, [illegible] Germany and Great Britain together did 39 per cent. of the world's international trade (the former 12.5, and the latter 26.9); and between them they owned 53 per cent. of the world's shipping. In 1880, 39.1 per cent. of German

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2. Mercantile marine of leading countries:
[(in millions of tons)]

	1885	1911
Great Britain	7.4	11.6
United States	4.2	4.6
Germany	1.2	3.0
Norway	1.7	1.5
France	1.3	1.4

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for Germany

1. In 1913, of a total of #2,675,000,000 in imports, food products, animals, industrial raw materials, and semi-manufactured goods amounted to #2,275,000,000, and finished goods to #400,000,000. While of #2,225,000,000 exports, finished goods amounted to #1,450,000,000.- Helffrich, op. cit., p. 38.

Jobbins
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German and English Shipping

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sea-borne trade was carried in German bottoms, and in 1911, 50.4 per cent. In the same years British figures dropped from 72.2 per cent. to 59 per cent. It is significant to note, also, that in the tonnage passing through the Suez canal, what was under English control, in 1892 that owned by Great Britain was 74.5 per cent., and that of Germany was 7.4 per cent.; but in 1912, the per cents were respectively 62.9 and 15.1. That is, German, had gained at the expense of English tonnage.

§4. Having before us the unmistakable facts as to the very remarkable economic progress of Germany in the period immediately preceding the European War, we are the better able, by virtue of the direction and characteristics of that progress, to reach a conclusion as to the causes underlying it. Indeed, it does not seem possible to go far wrong. As in most studies of this sort, the resultant seems to be the outcome of a combination of more than one set of forces.

Causes of Germany's progress

The ruling influence in this case is undoubtedly the general industrial revolution which has fired every modern nation. The transition from handicraft to machinery, the discovery and application of new mechanical forces, would alone account for much of what has happened. It is the conspicuous merit of Helfferich's analysis of this period that he has emphasized the influence of the new technique. In giving the increase of steam power in twenty five years as four-fold, he makes this statement[1]:

"The effective capacity of one mechanical horse-power can be placed at about the equivalent of the physical labor-capacity of ten men. Upon this basis the actual work done by German

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1. Loc. cit., p. 23. The capacity of steam-engines in Prussia increased from 1,222,000 horse-power in 1882 to 2,358,000 in 1895, and to 5,190,000 in 1907.

steam-engines in the year 1907 was equivalent to the work done by 52,000,000 men; and the increase of actually effective steam horse-power from 1895 to 1907 was equivalent to an increase of the working population by about 28,000,000 men".

The new technique 2

Here is the pivotal matter: The growth of mere numbers is not the chief thing, but the union of workers with new forces which enormously increased the production of goods and so the consumption of the people. This is the fundamental reason why labor depends upon capital which alone can provide the new technique.

in the use of water-power to create energy; 3

On the use of gas, released in coking, or by blast furnaces, for generating power by gas engines; in reducing peat, lignite &c into gas, by which extensive moors were converted into a source of new power; in saving ammonia as a by-product; in transforming the gas into electric energy so that it could be conveyed to industrial centres, and not used only at the place of origin; and in the perfection of other combustion-motors; and in the advantages of cheap land and water transportation for her goods, Germany was sharing in the general industrial revolution going on in all countries. Indeed she was unable to use her phosphorous ores until an American, Thomas Gilchrist, discovered his process. For gains due to forces which are the common property of mankind no special credit is due to any one country beyond that for intelligence

by power transmission 3

Gains Common To all Countries 3

and readiness in their application to its own problems.

But besides making great strides due to the new age of progress, how much did Germany accelerate this movement by her own efforts? Only in such respects has she a basis for national self-complacency. Characteristic are the precision and thoroughness, the economy and thrift, of the people in general. As a consequence there is little waste, a low level of expenditure, and in the human element the basis for a low cost of production. Her resources in coal and iron are made available chiefly by the low costs due to the general technical gains of the age, but the existence of these deposits at home furnishes an individual advantage over countries without them. ¶ In the scientific development of the principles of chemistry and their application to other industries, Germany has a special claim to credit. These gains, however, have extended to physics and electrical theory. ¶ Liebig's work in vegetable physiology and agricultural chemistry have been distinctly German; but only more recently have the processes for using phosphoric acid, potash and nitrogen to increase the fertility of the soil been of importance. These processes, however, are of common knowledge and freely used by other countries. Germany has no monopoly of these advantages. Her special progress in this direction is due to her political and internal organization and to her ability to enforce good methods of cultivation upon all growers of foodstuffs. Still, in her large deposits of potash, she has a special advantage

Special triumphs in Chemistry

Fertilizers

It is claimed for a German, Werner von Siemens, that his invention of the dynamo-machine and the dependence of power transmission upon it was the basis for the applications of electricity in strong-current dynamics; and that in 1891 the first successful transmission of power took place from Lauffen on the Neckar to Frankfort on the Main.

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over other nations. ~~The recovery of calcium nitrate~~ In obtaining nitrogen through from the air, she is gaining from her individual progress in using electrical power; but while earlier in this field, these methods, too, are common property, as well as the access to Chilean nitrate. Here, again, the advantage is due to the energetic application of general knowledge rather than to her own inventiveness. The same is also true of the recovery of phosphorous slag from iron (by the Thomas Gilchrist method) and its use in the form of phosphate flour as an artificial fertilizer.

Again, it has been supposed that Germany's marked industrial progress has been founded on a singularly effective system of training and education. In reality, it will be found that her commercial schools have been a result, and not a cause, of her commercial Industrial and Education success. At the present time there is no question as to the superiority of German technical and commercial schools; and the commercial success which led to the creation of the schools has undoubtedly been accelerated by their work. ¶ Since 1887, the gains of German foreign trade and the development of her special technical and commercial schools have gone on hand in hand. It seems clear that, as her commercial ambitions expanded, the aid of education for material and commercial purposes was sought for, as a part of the desire to penetrate into the trade and industry of other nations. The first German commercial high school, that of Leipsic, was not established until 1898.

Without doubt, accuracy, precision and exact knowledge

and efforts

The technical high schools are intended for the training of managers in the fields of architecture, structural engineering, mechanical engineering, electro-technics, industrial and administrative engineering, surveying and forestry; preparation for which is supplied by the lower technical schools, or the gymnasiums. These institutions are the response to the new world-wide industrial revolution. For artisans, there are the middle and lower grade and special schools in which are taught wood-carving, potting, glass-making, drawing, spinning, brewing, lace-making, milling, &c.

have been stamped upon profile; but there is a question whether the system has not produced a mechanical and narrow mind, lacking in flexibility. Indeed the German mind has a tendency to heaviness, and the methods enforced from above lead to a reliance on cut-and-dried rules for all operations which do not put a premium on initiative. Outside of his special field, the German student does not know how to think in an unexpected emergency, as does an American student. To teach what ought to be believed, and the methods by which certain policies, dictated from above, can be furthered, does not result in a true scientific mind. The inability of German diplomacy to understand the springs to action of other peoples seems to be an inevitable result of the too mechanical nature of German education, and the belief that energy and industry, if persisted in long enough, can produce spiritual results.

Mechanical nature of German education

We see, therefore, that to the necessary conclusion in studying the causes to which her amazing industrial progress is due, that the special contribution to her success which is essentially German is her genius for efficient organization. Most countries, not realizing the full meaning of the industrial revolution and the need of enormous capital investments to provide the new technique, which would magnify the productive power of labor, were slow to accept the new regime, being influenced by the rising tide of agitation which claimed for labor the gains in production due to this new technique. The necessity of large production, of consolidation and

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centralization of business, in the new era was quickly recognized by Germany. From 1882 to 1907, the number of persons engaged in small concerns increased only one-fourth, while in the largest concerns four- and one-half fold. Moreover, the various processes of production were centralized under one head not only in industry, but in agriculture (where dairies, breweries, sugar factories have become a part of large establishments). The banks, Iron Trade combinations, have taken in coal-mines and iron-works. In Germany, instead of ignorant anti-combines as with us, intelligent supervision and coöperation by the Government has facilitated industrial organization adapted to the new technique. Under the name of Syndicates, "Kartels" &c, there have been developed organizations of a wide range, including similar or related establishments[1] — which with us are regarded as criminal. In Germany, however, the

Germany facilitated centralization of industry

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1. The Krupp establishment combines coal mines, coking plants, iron mines, smelting works, steel-working, (machines, cannon, munitions of war, armor-plate), electrical works, river transports for coal and ore, and ocean-going vessels.

constituent companies maintain a nominal independence, but enforce agreements as to production, prices, and competition. The State approves such organizations to the end that there may be more and cheaper products for the consumption of the people.

More than this, the German government has consciously and with great energy and skill become the ally of trade, both domestic and foreign, with an assiduity and support not known in any other country. It initiates and supports new German enterprises; owning the railways, it grants special traffic rates for exports; it builds canals with public funds in order that industry may obtain low rates on heavy materials; it stimulates and subsidizes international steamship lines; it forces the development of colonies; its bullies other states to gain commercial privileges; it uses its diplomatic body, the prestige of its military power, all the pressure of the government, to contract ports, obtain concessions for opening mines and building railways, and to expand its commercial influence in other lands. How well Germany has succeeded in this policy has only been revealed by the events of the European war.

Germany's remarkable progress from 1880 to 1910, we must conclude, has been in very large measure due to the general industrial revolution for which she did not originate, but which she shares with all other modern nations. The rapidity of her progress must be explained by the relatively backward position from which she started.

'it has used its political power to good effect in gaining control of the trade in Southeastern Europe and Turkey;

'it has helped in establishing banks for foreign operations, and put her banking resources at the service of foreign trade;

the opportunity came to her after the establishment of the Empire, there were no handicaps put upon her to prevent her catching up with her competitors. But to opportunity she added exceptional qualities of energy, perseverance, training, docility under bureaucratic rule, thrift, industry, and a genius for organization. To this extent she deserves no little credit for conscious effort; but in the main she was only one of the legatees of the general intellectual renaissance. The man standing on an escalator rises from no effort of his own; but if he adds his own force by also walking upward on the moving steps, he moves faster relatively to stationary objects. Such seems to have been the canvas of her progress.

Special German qualities for success

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§ 5. The outcome of her industrial development has directly affected Germany's foreign policy. The trading-world growth of her productive forces at home has made her dependent on the importation of raw materials to be worked up into finished goods; and, in turn, made it necessary to maintain foreign markets for her finished goods. Therefore, she has come to regard it as a natural duty to "guarantee" a supply of raw products through the possession of colonies. ¶ It has been assumed — not necessarily on economic, but largely on political, grounds — that Germany must own the territories from which she draws her materials, and to which she may export. Here is an assumption which cannot be accepted; for proof is not to be had from usual experience in German trade. Trade does not follow guns and warships, nor arbitrary governmental decrees. From all time, nations have carried on trade without owning the ports or territories to which their ships go. Indeed, the old time-honored colonial policy of Europe, by which colonies were used as a means of aggrandizing the mother country, has long ago been outlawed and declared obsolete, because it was crippling the normal movement of goods. Goods move in international trade on the economic basis of a difference in comparative costs. We send the goods in which we have a relative advantage, and with them buy the goods in which we have a relative disadvantage. It is an economic commonplace to say that this is the reason for the very existence of

Foreign markets

Ownership of markets not necessary to trade

Classical examples of the success of the carrying trade by unwarlike nations are to found in the development of shipping in Holland, Norway and Italy.

foreign trade.

"Moreover, Germany's silent commercial conquests in the trade with Russia, England, Southeastern Europe, ~~and~~ South America, and the United States have gone on victoriously in Territory owned by her rivals, in some cases even. Her commercial penetration of Russia has been due to industrial efficiency and low costs. Before the war, both English and Germans had built factories in Russia in rivalry, and sometimes in collaboration.

German and British trade reciprocal

3 In regard to German trade with England himself, it is common knowledge that English markets were flooded with German goods, so that "made in Germany" became a commercial shibboleth. In short, British companies freely carried on operations in Germany, and German companies and banks were established in Great Britain. Trade is reciprocal and these rivals were necessary to each other. In 1911, exports from Germany to the British Empire amounted to £360,725,000, and the goods sent by the latter to the former were valued at £442,475,000. There were evidently no restrictions on trade beyond those set by protective tariffs and relative advantages. The British took from Germany sugar, electrical and mining machinery, and mechanical products of the new technique. In return, they sent to Germany products of the older technique in which the British retained their superiority such as agricultural and textile machinery; also, in addition raw materials to be used in the chemical industries, together with yarn, wool, hides, as well as articles of luxury and fashion, like leather

goods, laces, cloths, plate glass, porcelain, china, best grades of paper, etc. Gradually, it resulted that Germany, as she gained industrially, was buying less from England and England was buying more from Germany. Again, French and German bankers were freely competing in Russia and Turkey, and in the Balkan States; while the British were aiding the Turkish navy, Germany was reorganizing the Turkish army. How, then, could it be said that Germany's trade was hindered in these countries?

Clearly enough, something more than the gains of peace entered into the national aspirations of Germany. If the conditions before the war brought to her the greatest progress obtained by any other country in the last thirty years, then the retention of those conditions was the thing most to be desired. Her phenomenal commercial gains were in themselves proof that she had the freedom of the seas. How else could her foreign trade and her shipping have grown so amazingly? The facts show only too clearly that she had the "freedom the seas", and the entry of her goods on equal terms in all ports of the world where her costs allowed her to undersell. Equally clear is it that her cry for the "freedom of the seas" was born of a plan to control the seas that, when war came, she would be dominant on the ocean as well as on land. She already had freedom of the seas for peaceful commerce; but an exaggerated ambition looked to dominance on the seas in time of war. Such seems to be the only possible explanation of her foreign and colonial policy.

Freedom of the Seas

herself

37

1. "Germany – which is compelled by its geographical position and its experiences in history to maintain a land-army equal to all contingencies – had also to decide to protect its ever-growing and expanding economic relations over the seas by building a navy strong enough to ward off in the best way any temptation on the part of any enemy to curtail our economic competition by force. Our navy, the creation of our Emperor, is, in this sense, the keystone in the mighty system to which is due the extraordinary development of wealth in Germany, and which today constitutes the basis for the existence of the German people." – Helfferich, p. 85. The power to develope a navy has been a consequence, not a cause, of the industrial development, and is a means of gaining these gains for national ambition.

AMERICAN INSTITUTE OF GRAPHIC ARTS

ART CENTER · NEW YORK · April · 1923

WITH this eighth item in the series of keepsakes sent to members by the Committee on Publishing is presented a portrait of Frederic W. Goudy, Honorary President the American Institute of Graphic Arts. Accompanying the portrait is a biographical sketch, set in type by Bertha M. Goudy and printed at the Village Press. In rendering the portrait, Clarence H. White's photography has been ably supported by Harry M. Phillips's gravure reproduction, done by the Manhattan Photogravure Company. At the request of the committee, Mr. Goudy has autographed the portraits. Thomas Nast Fairbanks and George A. Nelson furnished the paper for the keepsake.

Committee on Publishing

Edmund G. Gress, Chairman

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Obviously, her colonial and foreign policy seems to have a result of an industrial success which gave her the strength to expect extensive conquests of territory. This affords an explanation of her unwarranted Theory that possession of territory is necessary to the expansion of trade. But, inasmuch as her development came late, other countries had (especially England) been before her in colonial expansion. A naïve egotism, swollen by unexpected commercial success for a country relatively poor in wealth, seems to drive her to anger against the one country (England) which had led the way in the change from handicraft to machinery, and which was now found to have been established on the most productive colonies throughout the world. The German hatred of England is born of commercial rivalry. It is the childish naïveté which believes it has a right to something possessed by another simply because it wants it. In furtherance of this desire was a concept of the State which had no code of morals, and to which everything was permitted provided it achieved success.

German foreign ambitions a consequence of success in industry

Perhaps, the German point of view can in no way be more clearly or authoritatively stated than in the following words of Helfferich:

"Our dependence upon foreign countries, the counterpart to the great advantages derived by us from having taken our place in world-economy, calls for stronger counterpoises. Such a counterpoise can be created by German enterprise and German capital establishing