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COTTON GOODS IN RUSSIA

By

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CONTENTS.

LETTER OF TRANSMITTAL.

DEPARTMENT OF COMMERCE AND LABOR,
Washington, May 15, 1912.

SIR: I have the honor to transmit herewith, in accordance with the act making appropriations for the legislative, executive, and judicial expenses of the Government for the fiscal year ending June 30, 1912, approved March 4, 1911, a report by Commercial Agent Ralph M. Odell, of this department, containing the result of his investigations of the cotton-goods trade in Russia.

Respectfully,

BENJ. S. CABLE,
Acting Secretary.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

LETTER OF SUBMITTAL.

DEPARTMENT OF COMMERCE AND LABOR,
BUREAU OF MANUFACTURES,
Washington, March 16, 1912.

SIR: I have the honor to submit herewith a report by Commercial Agent Ralph M. Odell dealing with the various phases of the cotton industry and trade of Russia, which ranks fourth among the countries of the world both in cotton manufacturing and in the production of raw cotton. Because of the high customs duties imposed by that country on imports of cotton manufactures, it is not a good field for the exploitation of American products. However, Russia is developing an export trade in cotton goods, notably in Persia and China, and the report by Mr. Odell should prove of interest and value to American manufacturers engaged in foreign trade.

Respectfully,

A. H. BALDWIN,
Chief of Bureau.

To Hon. CHARLES NAGEL,
Secretary of Commerce and Labor.

COTTON GOODS IN RUSSIA.

COTTON MANUFACTURING.

CHARACTER AND DEVELOPMENT OF THE INDUSTRY.

Russia ranks fourth in importance among the cotton-manufacturing countries of the world, being exceeded in number of spindles by Great Britain, the United States, and Germany. The cotton industry is a very old one in Russia, hand-loom weaving and printing having been carried on in 1700; it was not until the middle of the nineteenth century, however, that the organization of the industry on modern lines was begun.

In the eighteenth century cotton goods of Asiatic production were brought to the annual fair at Nizhni Novgorod, at that time the chief commercial center in Russia. Later Turkey red dye was brought up the River Volga, and the art of dyeing and printing fabrics was acquired. The latter branch of the industry was largely developed in the early part of the nineteenth century by French prisoners left in Russia after the war of 1812, many of whom were Alsatians and were very skillful in the art. That this influence has persisted is indicated by the fact that the largest printing mill in Russia to-day is managed by Alsatians.

With the development of the art of printing there was an increased demand for cotton cloths, to supply which goods were brought in from Asia and later from Germany and England. Cottage weaving also became more important and some peasants operated 15 to 20 hand looms, yarns for which were bought from abroad on long terms of credit.

In 1840 the prohibition of the export of cotton machinery from England to Russia was removed, and that date marks the beginning of the modern Russian industry. The pioneer was Ludwig Knoop, a German, who came to Moscow in 1839 as the representative of English yarn merchants. His personality soon won him many friends, and he was requested by some business men to erect a cotton mill and equip it with English machinery. He undertook the task, and through his connections in England secured the machinery on favorable terms. Soon afterwards, through the aid of Knoop, many of the yarn dealers also became spinners. The firm of Platt Bros., English manufacturers of cotton-mill machinery, made him their exclusive agent in Russia. As he knew his customers well, he granted them liberal credit, discounted their drafts, brought over English managers and clerks, and later began to import cotton and supply the mills with raw material. In payment for machinery, supplies, cotton, etc., Knoop frequently accepted shares in the mills, and to-day his successors in the firm of L. Knoop have an interest in nearly all the important mills and are dominant factors in the industry.

Better banking facilities in Russia have made it possible for many of the mills to become more independent, but the fact that they can not use machinery and stock in process, but only land and buildings, as security for loans, has increased the importance of private money lenders.

FACTORS IN THE DEVELOPMENT OF THE INDUSTRY.

The policy adopted by Knoop, that of engaging Englishmen as managers and using English methods in the mills, is a striking feature of the industry to-day. In fact, with few exceptions, the most successful mills are those that have been under English management. In some instances attempts have been made to break away from this influence, but with Russian management the plant has often deteriorated and profits have decreased, and in the end English managers have been called in to conduct the business. Many of the mills I visited were like English mills transferred to Russian soil, and undoubtedly this fact is responsible, in large measure, for the prosperity the industry has enjoyed. Many of the managers have been trained in Lancashire mills, and they are efficient, progressive, and alert to the most modern methods of management. In the power plant they direct their efforts to securing the most efficient method of driving at a minimum cost; in buying raw material they select and mix the types of cotton best adapted to their needs; in the spinning and weave rooms they concentrate their efforts to obtain a maximum production at the lowest possible cost. The spirit of progressiveness, which is absent in some lines of Russian endeavor, is nowhere lacking in the cotton industry.

CUSTOMS DUTIES.

Another factor in the development of the industry is the high tariff, which practically eliminates foreign competition. The Russian tariff on manufactured goods is one of the highest in the world. The duties on yarn and various fabrics are shown in the following table:

Articles.	Duty per pound.
Yarn:	
Single—	
Below No. 38—	*Cents.*
Unbleached	11.69
Bleached, dyed, or mercerized	15.26
Dyed Turkey red	15.97
No. 38 to No. 60, inclusive—	
Unbleached	15.69
Bleached, dyed, or mercerized	19.25
No. 60 to No. 80, inclusive—	
Unbleached	22.82
Bleached, dyed, or mercerized	26.38
Above No. 80—	
Unbleached	31.37
Bleached, dyed, or mercerized	34.94
Twisted—	
On wooden spools, prepared from yarn of—	
Below No. 60	19.25
No. 60 to No. 80, inclusive	25.67
Above No. 80	34.94
All other kinds, prepared from yarn of—	
Below No. 60	23.53
No. 60 to No. 80, inclusive	32.09
Above No. 80	43.49
Fabrics:	
Unbleached or bleached—	
Biaz and mitkal (coarse calico) of up to 5.4 square yards per pound	32.80
Biaz and mitkal of from 5.4 to 8 square yards per pound, and all other fabrics of up to 8 square yards per pound	51.34
All fabrics over 8 square yards per pound	122.65
Dyed, printed, or mercerized—	
Biaz, mitkal, and chintz of up to 5.4 square yards per pound	55.90
Biaz, mitkal, and chintz of from 5.4 to 8 square yards per pound, and all other fabrics of up to 8 square yards per pound	76.96
All other fabrics over 8 square yards per pound	148.33
Cotton velvet, plush, and plush ribbon	62.70
Knit goods, all kinds	42.78

This tariff, which is equivalent to 40 to 50 per cent ad valorem, has enabled the manufacturers to operate their mills on a profitable basis for a number of years and accounts for the steady growth of the industry. The average increase in the number of spindles is about 250,000 yearly.

OTHER FACTORS IN INDUSTRY'S GROWTH.

An abundance of cheap labor, a supply of home-grown cotton that furnishes the mills with 50 per cent of the required raw material, and a large and increasing domestic demand for cotton goods are other factors that have contributed to the growth of the industry. Russia comprises a vast territory containing one-seventh of the total land surface of the globe, and the use of cotton goods among its population of more than 160,000,000 is constantly increasing. With the improved condition of the Russian peasants, the use of underwear, formerly almost unknown, is becoming more general, and this has an important bearing on the industry, for on account of their cheapness cotton goods are more widely worn than woolen fabrics.

In 1890 the per capita consumption of cotton cloth in Russia was only 2.31 pounds, while in 1910 it had increased to 4.56 pounds. The great railroad development during the past two decades has widened the markets and increased the demand for manufactured articles by bringing the people closer together. Russia is a country of great distances and before the development of railroads travel was difficult and expensive; villages far removed from industrial centers were practically isolated. By means of the railroad, however, the country merchant was enabled to travel to distant market centers; villagers made trips to the cities and came back with tales of the life there and with new styles of dress. In this way the immense market in Russia was first created and it has grown rapidly with the years.

STATISTICAL RECORD OF PROGRESS.

The following table, compiled from figures furnished by the Department of Commerce and Industry in St. Petersburg, shows the growth of the Russian cotton industry from 1850 to the present time:

Years.	Spindles.	Looms.	Cotton consumed.		
			Russian.	Foreign.	Total.
			Pounds.	*Pounds.*	*Pounds.*
1850	1,100,000	[1]	[1]	[1]	72,200,000
1860	1,600,000	[1]	[1]	[1]	90,250,000
1870	2,000,000	[1]	[1]	[1]	144,000,000
1880	2,300,000	[1]	[1]	[1]	180,500,000
1890	3,457,716	87,190	71,710,412	215,900,201	287,610,613
1895	4,576,930	108,174	127,014,240	302,473,308	429,487,548
1900	6,645,559	151,306	220,601,793	357,234,156	577,835,949
1905	7,350,683	178,506	246,585,310	355,659,438	602,244,748
1906	7,443,854	182,878	311,871,989	340,833,240	652,705,229
1907	7,562,478	188,021	365,784,766	337,950,800	703,735,566
1908	7,807,143	194,402	295,714,955	457,822,246	753,537,201
1909	8,064,707	200,510	388,613,395	379,367,175	767,980,570
1910	8,306,372	213,179	405,754,433	391,550,455	797,304,888
1911	8,448,818	220,000	[1]	[1]	[1]

[1] Statistics not available.

The foregoing table not only reveals the remarkable progress made by the Russian industry but also shows that Russia has obtained an increasing supply of raw cotton within its own borders. The foreign cotton consumed in 1890 formed 75.1 per cent of the whole, while in 1910 only 49.1 per cent of the raw material was purchased abroad. Finland, which has 222,846 spindles, is not included in the foregoing figures.

COTTON-MANUFACTURING DISTRICTS.

There are three well-defined centers of cotton manufacturing in Russia: (1) The central, or Moscow, district; the Baltic, or St. Petersburg, district, and (3) the western, or Polish, district. More than 99 per cent of the spindles are in these three districts.

The following table shows the number of spindles, looms, and operatives, the amount of cotton consumed, and the production of yarn and cloth in 1910 in the several districts and in the Governments (Provinces) of each district:

Districts and Governments.	Spindles.	Looms.	Operatives.	Cotton consumed.		Production.	
				Russian.	Foreign.	Yarn.	Cloth.
Central district:				*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Moscow	1,910,044	48,792	95,751	122,397,447	70,822,280	174,339,174	132,921,536
Vladimir	1,470,952	65,545	119,603	86,575,561	57,724,153	132,048,854	187,372,935
Kostroma	672,318	30,644	53,756	47,786,472	24,283,134	63,644,697	80,267,050
Tver	403,988	10,144	19,123	22,954,510	17,745,930	36,709,188	32,820,351
Yaroslav	375,224	1,848	9,860	33,456,660	10,472,321	39,082,041	5,389,694
Ryazan	202,676	3,750	9,890	14,404,622	6,374,718	19,063,110	11,084,000
Smolensk	136,785	1,637	5,253	11,946,888	1,191,625	11,497,200	5,263,921
Total	5,171,987	162,360	313,236	339,522,160	188,614,161	476,384,264	455,119,487
Baltic district:							
St. Petersburg	1,185,313	10,809	20,409	22,136,881	45,219,907	60,609,156	30,110,757
Esthonia	552,342	5,294	11,139	12,295,479	30,709,151	39,175,142	15,505,058
Livonia	55,956	491	2,293	1,429,199	7,319,347	7,615,259	2,054,415
Total	1,793,611	16,594	33,841	35,861,559	83,248,405	107,399,557	47,670,230
Western district:							
Piotrkow	1,193,421	30,823	46,923	27,420,188	110,326,834	135,515,212	104,892,846
Warsaw	62,572	480	1,329	444,788	4,032,478	3,851,364	921,633
Kalisz	19,090	885	1,367	831,022	2,052,249	2,354,659	2,653,711
Total	1,275,083	32,188	49,619	28,695,998	116,411,561	141,721,235	108,468,190
All other districts	65,691	2,037	3,223	1,674,716	3,276,328	4,302,687	4,318,354
Grand total	8,306,372	213,179	399,919	405,754,433	391,550,455	729,807,743	615,576,261

ADVANTAGES ENJOYED BY THE SEVERAL DISTRICTS.

As will be seen from the preceding table, the central district is first in importance. Moscow was formerly the political capital of Russia and has maintained its importance as the Empire's chief railroad and industrial center. It is advantageously located geographically, being a meeting place between the east and the west. Good railroad facilities, easy transportation on the River Volga for the naphtha brought up from the great oil-producing center of Baku, a good supply of wood and peat for fuel when oil is not used, and an abundance of cheap labor are factors that have made the district around Moscow the chief center of the cotton industry. The emancipation of the serfs in 1861, which greatly stimulated industrial progress in all lines, left a large

number of peasants in this region without land, and they were the first to turn to industrial pursuits as a means of earning a livelihood.

The Baltic district has an advantage in being on the sea, enabling American cotton and English machinery to be imported direct, and a further advantage in that the mill workers there are more industrious and efficient than the operatives in the central district.

The industry in Poland has made great progress, owing partly to the high efficiency of the labor and partly to the district's proximity to western Europe, through which machinery, cotton, and fuel can be transported to the mills at a lower cost than is possible in manufacturing centers to the north and east. German influence is also very strong in Poland, and many of the mills there are branches of German firms. This alliance has obtained for them the credit advantages and banking facilities enjoyed by German manufacturers, and a large share of the business is conducted through German banks.

In Poland, as in St. Petersburg, however, the labor, while more efficient, costs about 10 per cent more than in the central district, and although the mills from their geographic position have the advantages already mentioned, they are not so well situated as those of Moscow and the surrounding district as regards marketing their output.

SPINDLAGE AND COTTON CONSUMPTION.

In general, the yarn spun and cloth woven in Poland are coarse; the product of the Baltic district is fine; while the mills of the central district manufacture a wide range of yarn and cloth. The following table shows the increase in the number of spindles in the more important Governments from 1890 to 1910, the consumption of cotton per spindle, and the average number of yarn spun in each Government (Province) in 1910:

Governments.	Number of spindles.			Consumption of cotton per spindle.	Average number of yarn.
	1890	1900	1910		
				Pounds.	
Moscow	875,568	1,514,591	1,910,044	101.1	28.80
Vladimir	565,271	1,213,572	1,470,952	91.3	31.24
Piotrkow (Poland)	217,422	972,809	1,193,421	[1] 115.4	19.02
St. Petersburg	827,912	993,661	1,185,313	56.8	32.65
Kostroma	23,800	345,906	672,318	107.1	29.82
Esthonia	388,812	467,068	552,342	77.8	34.97
Tver	221,752	360,806	403,988	107.4	25.97
Yaroslav	250,299	361,626	375,224	116.7	28.56

[1] If foreign waste consumed is included, this figure would be 129.7.

MILL CONSTRUCTION, EQUIPMENT, AND OPERATION.

The cotton industry in Russia is modeled after that of the United States, rather than that of England. Each firm generally carries on all the stages of manufacture and produces the finished cloth to be sold to the dealers or to the printers for converting purposes. Some of the larger mills have their own dyeing and print works. There are few mills without weaving departments, but some firms operate looms only, buying their yarn from the spinners.

Mills in Russia, almost without exception, are large. According to statistics of the Department of Commerce and Industry, the average

number of spindles per mill in 1890, 1900, and 1910 was 52,380, 56,800, and 52,241, respectively. The average number of spindles per mill is 77,981 in the Baltic district, 66,300 in the central district, and 23,611 in Poland. This average is considerably higher than that obtaining in the United States. Mills of 5,000, 10,000, and 15,000 spindles, which are not uncommon in the United States, particularly in the South, are seldom seen in Russia. A list of the spinning mills recently compiled by the Russian Cotton Manufacturers' Association shows that 1 mill has more than 400,000 spindles, 3 have more than 200,000, 10 have more than 150,000, and 26 have more than 100,000, while only about 25 have less than 25,000 spindles each.

One reason for such large establishments is that many of them are the outgrowth of smaller plants, founded many years ago, the profits from which have been used to increase the capacity of the mills. Another is the fact that a large amount of capital is required to build, equip, and operate a cotton mill in Russia and the fixed charges are so heavy that small mills are unprofitable.

Not only is the cost of machinery and supplies high, but the requirements for a complete cotton mill are greater than in other countries. There is no laboring class in Russia, as the term is understood in the United States, and many of the operatives are peasants who work in factories during the winter and return to their homes in summer to cultivate their small farms. It has thus been necessary for the cotton manufacturers to build villages around their mills; churches, schools, and hospitals are erected, often at considerable expense, and so-called "barracks," or tenements, are built in which to house the employees. At one mill I saw a new hospital being built at a cost of $250,000; at another a new park and field for sports was being laid out for the benefit of the workpeople. All of these activities, as will later be pointed out more in detail, have undoubtedly made the wages of the operatives lower, but the fact remains that all these undertakings require an outlay of considerable capital, and as a mill can not hope to compete successfully without such an equipment the building of large plants has been encouraged.

The president of the Cotton Manufacturers' Association stated that out of every 100 rubles spent in building and equipping a cotton mill 40 to 50 rubles is devoted to activities outside the mill proper. Moreover, considerably more working capital is required in Russia than in the United States. Cotton is bought in large quantities and stored, and it is not unusual for a mill to have six or eight months' supply of raw material on hand. In marketing goods long terms of credit are the rule, 6 and sometimes 12 months being given.

LOCATION OF MILLS—OWNERSHIP.

Although many of the Russian cotton mills are located in and around the cities of Moscow, St. Petersburg, and Lodz, the mill town as it exists in the United States is practically unknown. Some of the largest mills are in isolated places away from the railway, and to reach one of them I had to drive 15 miles after leaving the train. In this respect the cotton industry of Russia resembles somewhat that of Spain, where the "colonia" is the unit of cotton-factory life. One reason for this is that railroad development has been slow and many

parts of the Empire are still without modern transportation facilities. Secondly, many of the mills are the outgrowth of smaller enterprises established years ago in places where labor was cheap or fuel plentiful, and as the mill increased in size it was never considered practicable to change the location.

The result is that cotton, supplies, cloth, and sometimes fuel must be carted in wagons for distances of 5 to 20 miles. With bad roads and the severe Russian winters it would seem that mills located at points distant from the railroad would be at a great disadvantage. As a matter of fact it is maintained that on account of the low cost of labor and high freight rates drayage is cheaper than railroad transportation. One mill near Moscow has only recently begun to use the railroad, it being a question whether this is more economical than the means formerly employed.

In the central district, particularly in the Government of Vladimir, proximity to large forests or deposits of peat has also been a determining factor in the location of mills without regard to transportation facilities. In some cases the cotton mill owns vast peat bogs, from which a supply of fuel for power is obtained. While the use of peat is far less economical than coal or oil, the latter two classes of fuel had not been introduced at the time many of the mills were established, and the plants were located at points where wood or peat could be easily obtained.

Part of the Russian cotton mills are privately owned, while others are organized on the joint-stock company plan with a comparatively small number of shareholders. Frequently the stock is owned or controlled by one family which has inherited it from the founders. Consequently there are few exchanges of shares and the stocks are not quoted on the market. According to the president of the Cotton Manufacturers' Association the total capital invested in spinning mills alone is 350,000,000 rubles ($180,250,000). Most of the stock is in Russian hands, although English and German capital is also invested.

FACTORY BUILDINGS—INSURANCE—COST OF CONSTRUCTION.

The usual type of mill construction is brick, although new factories are being built of reenforced concrete. The mills are usually three to five stories high, although the modern tendency to build single-story weave sheds is noted among mills constructed in recent years. Floors are usually of cement and supports of iron or steel. Automatic sprinklers have been installed in many of the mills, over 1,000,000 now being in use. Humidifiers are also in general use, the vortex system being the most common. The mills are well lighted, heated, and ventilated, and the operatives work under as pleasant and healthy conditions as in England or the United States. While the buildings are perhaps not so roomy and spacious as Italian mills, the machinery is not crowded and is conveniently and economically arranged.

The mills are insured in a mutual fire insurance association which was organized in 1902. The average rates are 2.93 rubles per 1,000 on mills equipped with sprinklers and 6.80 rubles per 1,000 on mills not so equipped. The corresponding rates are 1.28 and 5.54 in England and 2.1 and 4.2 in Germany.

Taxes are rather high, but provision is made by the law for counting off 10 per cent of the value of the machinery each year before taxes are levied, with the result that many old companies are taxed on their land and buildings only, on which the deduction allowed is 5 per cent annually.

The cost of building a mill in Russia is considerably higher than in England, but about the same as in the United States, if we consider the mill proper. However, the number of other buildings that the manufacturer is practically compelled to erect makes the total much higher than in the United States. The cost varies with the location of the mill and with the kind of yarn or cloth manufactured, but if a spinning mill to make 30s to 40s single yarn is assumed the average cost is 25 rubles ($12.875) per spindle. This includes the building, steam plant, machinery, humidifiers, and automatic sprinklers. The cost is 40 rubles ($20.60) per spindle if there are included warehouses, tenements, schools, churches, hospitals, and other structures necessary for all mills. The cost of the building and machinery for an ordinary weave shed is 400 to 500 rubles ($206 to $257) per loom, depending, of course, on the kinds of goods to be woven, the amount of preparatory machinery, such as twisters, warpers, and slashers, and the amount of finishing machinery installed.

PRICES OF ENGLISH MACHINERY.

The prices of cotton-mill machinery are lower than they have been in many years, owing to the general depression in the cotton industry and the cessation of mill building in England. Following are the prices quoted for English cotton-mill machinery f. o. b. Moscow.

Machines.	Price.	Machines.	Price.
Crighton opener	$566.00	Weft spinning frame, 6 by 2¼ inches, 472 spindles	$1,468.00
Opener with automatic feeder	2,264.00	Per spindle	3.11
Scutcher, intermediate or finisher	1,080.00	Mule spinning frame, 1⅛-inch space, 1,020 spindles	2,160.00
Revolving flat-top card:		Per spindle	2.11
40-inch	643.00	Twister frame, 232 spindles	865.00
45-inch	746.00	Per spindle	3.73
Sliver lap machine	772.00	Winder or spooler, 200 spindles	855.00
Ribbon lap machine	824.00	Beam warper:	
Comber	1,957.00	45-inch	286.00
Drawing frame, price per delivery	77.00	62-inch	334.75
Slubber, 11 by 5½ inches, 100 spindles	1,286.00	Slasher, 7 and 5 foot cylinders, 52 inches wide	2,160.00
Per spindle	12.86	Plain two-harness loom:	
Intermediate, 10 by 4½ inches, 156 spindles	1,544.00	English	122.00
Per spindle	9.90	Russian	95.00
Fine roving frame, 7 by 3½ inches, 200 spindles	1,432.00	Northrop loom, 40-inch reed space, for plain weave	283.00
Per spindle	7.16	Electric motor, 100 horsepower, a. c., 3-phase, complete	1,030.00
Warp spinning frame, 5 to 6 inch lift, 2¼-inch gauge, 472 spindles	1,519.00		
Per spindle	3.21		

These prices were furnished by the manager of the oldest and most important cotton-mill machinery firm in Russia; they cover one of the leading makes of English machinery and are representative because practically all the mills are equipped with this make. The quotations include duty and transportation from the works in England to Moscow. Erection is at the expense of the mills.

CUSTOMS DUTIES ON MACHINERY.

The tariff on cotton-mill machinery amounts to about 45 per cent ad valorem at present prices. Duties are specific and are levied on the gross weight, which often makes the duty higher on cheaper machines than on more expensive ones. The tariff on cotton-mill machinery and supplies is shown in the following table:

Articles.	Rubles per pood.	Dollars per 100 pounds.
Spinning and weaving machinery	2.10	2.99
Machinery parts	4.20	5.99
Steam boilers	2.10	2.99
Steam and gas engines	3.20	4.56
Dynamo-electric machinery	8.50	12.12
Leather belting:		
Sewn	12.00	17.11
Unsewn	10.00	14.26
Loom strapping and roller skins	9.00	12.84
Paper bobbins and spools	6.00	8.56
Wooden bobbins, spools, and shuttles	3.00	4.28

Carding and spinning machinery is almost exclusively English, but some weaving, finishing, and power machinery comes from Germany and Switzerland. In more recent years looms have been made in Russia. Some of the largest mills manufacture their own looms in the well-equipped foundries and machine shops with which every up-to-date mill is provided.

SOURCE AND COST OF SUPPLIES.

The isolated location of many mills and their long distance from England have compelled them to furnish their own machinery supplies, gears, and spare parts, and nearly every mill I visited was also equipped with machinery for making harness and reeds. Other supplies, such as bobbins, spools, and belting, are usually handled by the machinery firms. Bobbins and belting are being made in Russia, but the home products are inferior in quality to those imported from England, and the manufacturers seem to prefer the latter, even at a considerably higher price. Some idea of the cost of bobbins, spools, and shuttles may be obtained from the following table, which gives prices per 100 f. o. b. Moscow, for both the English and the Russian product:

Articles.	English.	Russian.	Articles.	English.	Russian.
Roving bobbins, metal shields:			Weft pirns, 6-inch:		
10-inch	$7.08	$4.65	Painted tip and varnished—		
8-inch	5.18	3.56	With steel shield	$1.25	$0.83
7-inch	4.29	3.23	With brass shield	1.30	.95
6-inch	3.86	2.91	Enameled black—		
Skewers:			Without shield	1.68	1.06
10-inch	2.95	1.13	With brass shield	1.73	1.13
7-inch	2.06	1.00	Spools, varnished, painted ends, and with endless steel tires:		
Warp spinning bobbins, 6-inch:			Size 5 by 3½ inches	8.75	6.18
Painted tip and varnished—			Size 5 by 4 inches	9.21	6.75
With steel shield	1.95	1.13	Shuttles, 12½ inches long:		
With brass shield	2.00	1.28	Cornel wood	29.02	20.08
Enameled black, without shield	2.50	1.34	Persimmon	26.70	19.05

PRICES OF ENGLISH BELTING—AMERICAN TRADE.

Prices for different widths and thicknesses of English belting are given in the following table, the quotations being per foot f. o b. Moscow:

Widths.	No. 1.	No. 2.	No. 3.
	Cents.	*Cents.*	*Cents.*
Two inches	17.65	23.6	32.6
Two and one-half inches	24.2	30.8	40.6
Three inches	29.3	37.0	48.7
Three and one-half inches	33.9	43.2	56.9
Four inches	39.0	49.5	65.1

Efforts have been made to introduce American textile machinery, but they have not been very successful, owing to its high original cost, the high freight rates, the impossibility of making quick deliveries, and the preference of mill managers for English machinery. Pumps, sewing machines, and certain classes of dyeing and finishing machinery, such as driers and steamers, have been imported from the United States. Interest is also manifested in certain American labor-saving machinery, particularly warp tying-in machines. Cheapness of labor, however, has operated against the introduction of Northrop looms, and only about 1,000 of them are in use in Russia. An order has recently been placed for two American warp tying-in machines. The fact that the bulk of the cloth manufactured in Russia is plain gray goods creates an ideal situation for the adoption of these machines, provided they prove economical. American manufacturers of bobbins and spools might also secure trade in Russia, but great care should be exercised in producing goods according to sample.

MULE AND RING SPINNING.

Formerly the bulk of the yarn manufactured in Russian cotton mills was spun on mules, but in recent years ring spinning has been rapidly replacing mules because of the saving in cost of production. In 1890, for instance, 77.4 per cent of the spindles were mules, while in 1910 they constituted only 45.1 per cent of the total. In general, all the warp and about one-half the weft yarn is spun on ring frames, mules being used only for weft, for very high numbers, for yarns made from waste, and for special soft-twist yarns. Ring spinning frames usually have from 400 to 450 and even as many as 472 spindles, while mules have from 800 to 1,200.

The speed of both spinning and weaving machinery is high. Looms on ordinary print cloth 28 inches wide run at 210 to 225 picks per minute, and the average production is about 80 per cent of the theoretical. It is very difficult to ascertain production figures for spinning mills, as the percentage varies considerably in different factories and the wide range of yarns spun makes it difficult to secure accurate data. From information obtained in a number of mills the average production may be stated as approximately 77 per cent, although it is as low as 70 per cent in some of the mills and as high as 80 per cent in others.

USE OF HAND LOOMS—THE KUSTARI.

The use of hand looms in Russia, while considerably less than in former years, is still very extensive. The looms are scattered among the peasants throughout the country and the total number is unknown. Some idea of their importance is shown by the fact that the mill production of cloth in 1910 was 114,231,482 pounds, or 15 per cent, less than the production of yarn. As Russia's exports of yarn are considerably less than the imports, a large part of the yarn not woven on power looms, with the exception of that used for sewing thread, is ultimately sold to the peasants and utilized by them on hand looms.

Hand weaving is done by the "kustari" (household manufacturers), who occupy an important place in Russian life, in the making of not only textiles but many other lines, such as wooden articles and utensils, furniture, baskets, metal and clay products, hardware, tools, leather goods, shoes, jewelry, toys, as well as lace, embroideries, and carpets. All of these products are turned out in their homes by the peasants, who have attained great skill.

For the Russian peasant, agriculture is the principal occupation. Formerly his family constituted an economic unit; food, garments, utensils, etc., were derived solely from work of the household. The new conditions following the emancipation of the serfs in 1861, the growth of population, the exhaustion of the soil which forced the peasant to look for new sources of income, the increase of taxes and the need for money resulting therefrom, and the development of ways of communication prompted the peasant to begin the production of articles for exchange and sale, first to neighbors and then to consumers farther away. Yet the industry, as a whole, is for the peasant agriculturist but a subsidiary occupation followed during the long winter months, when he can not work in the field. Herein lies the secret of the maintenance of the industry in spite of the competition of machine-made articles. The peasant is satisfied with small earnings, inasmuch as they are for him only an extra source of income in times when he is not engaged in his main occupation.

ASSISTANCE GIVEN TO KUSTARI.

In the past few years, however, there has been a tendency to bring the peasant workers together. Firms build special cottages for the kustari, employ them during the whole year, and market the products in trade centers, the quality of the handmade articles securing for them a good sale. The Central Government has assisted the industry by establishing schools for teaching new processes, by publishing for the use of the kustari popular pamphlets and collections of designs, by organizing museums to advertise the products of the peasants, and by selling them raw materials on special terms.

The zemstvos, or local governing bodies, have also appropriated money for the encouragement of the industry; they have developed the technical side of the work, have assisted the kustari in buying raw materials at low prices and on liberal terms of credit, and have established stores for the sale of the articles produced.

The weaving of cotton goods by hand is confined chiefly to coarse goods such as are worn by the peasants and which are sometimes

made of cotton and sometimes of a mixture of cotton and wool, and to carpets. The chief centers are in the Governments of Moscow, Ryazan, Vladimir, and Kostroma. Yarn is usually purchased from a dealer, who sometimes employs the peasant to work for him at a daily wage of about 50 kopecks ($0.2575). The weaving of carpets is carried on in the Governments of Poltava, Saratof, Bessarabia, and Kursk, in the south of Russia, and Tobolsk in Siberia.

KINDS AND COSTS OF POWER.

Steam power is used by most of the cotton mills in Russia. A few mills in the Baltic section are driven by the waters of the rivers along which they are built. In some cases steam is used to generate electric power, but direct drive from steam engines is very general, ropes being employed for driving main lines of shafting.

Most of the engines are supplied by domestic manufacturers, and the Diesel oil engine, made in Russia, is very popular. Oil engines are in general use, owing to the fact that gasoline, benzene, naphtha, and other oils are cheap and plentiful. The fields in the Baku district supply large quantities (about 8,000,000 tons annually) and the River Volga affords an easy means of transportation to the cotton mills in the central district.

In the Governments of Kharkof and Vladimir there are large deposits of peat, which forms about one-third of the fuel consumed in the latter district. Coal, too, is obtained in Russia and new mines are being opened up in many sections. The most important coal-producing center is the Donetz Basin, in southeastern European Russia. The annual yield from this section is 2,500,000 to 3,000,000 tons. As has been stated, many of the mills own forests and peat bogs from which they secure a supply of fuel at the actual cost of gathering and conveying it to the mill. Whether naphtha or coal is used depends on the prevailing price, as many of the steam plants are equipped to burn either coal or oil. When the price of coal is lower than that of oil, as at present, the former is more extensively used. Russian coal is now being sold in Moscow at 21 to 24 kopecks per pood ($6.75 to $7.60 per long ton) while naphtha is about 46 kopecks per pood ($1.75 per barrel of 42 gallons). Wood for fuel is quoted at 25 rubles per cubic fathom ($4.80 per cord), while peat is sold at 8 to 10 kopecks per pood ($2.55 to $3.20 per long ton).

The cost of steam power developed by an ordinary engine ranges from 80 to 100 rubles ($41.20 to $51.50) per horsepower per year, while the cost of power developed by a Diesel engine is as low as 50 rubles ($25.75). It should be noted, however, that these figures are based on an actual operating time of 4,500 hours per year, and are to be compared with a corresponding cost of $18 to $25 in the United States for a year of approximately 3,000 hours.

SOURCES AND COST OF RAW MATERIAL.

The Russian industry enjoys the advantage of a large range of cottons from which to make a selection. While American mills are practically confined to home growths and Egyptian, the Russian spinner has American, Russian, Indian, Egyptian, and Persian varieties from which he may choose the class best suited to his pur-

pose. Cotton is selected with expert care and often different varieties of approximately the same length of staple are mixed when an advantage in cost can be gained or when color, strength, or certain other characteristics are required in yarn for special uses.

Russian customs statistics of the imports of cotton are misleading as regards country of origin. Much of the cotton and other merchandise brought into Russia is transshipped from British, German, and Danish ports and is credited to those countries, rather than the country of origin. Although in the customs returns Germany appears as one of the chief suppliers of cotton, practically all that imported from Germany is American cotton transshipped at Bremen or Hamburg.

Probably the most reliable statistics of the various cottons used in Russia are those collected by the Department of Commerce and Industry from official returns from the mills. According to these figures the quantity of the several kinds used in 1890, 1895, 1900, 1905, and 1910 was as follows:

Varieties.	1890	1895	1900	1905	1910
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
American	179,033,979	188,268,648	266,956,070	281,590,613	285,052,892
Russian	71,710,412	127,014,240	220,601,793	246,585,310	405,754,433
Egyptian	23,332,405	84,532,951	64,621,527	38,032,108	46,701,018
Persian	7,709,443	19,118,163	19,068,489	26,648,695	44,038,029
East Indian	5,824,374	10,553,546	6,588,070	9,388,022	15,758,516
Total	287,610,613	429,487,548	577,835,949	602,244,748	797,304,888

These figures do not include the waste purchased abroad and used chiefly in Poland in the manufacture of coarse goods. Much of this consists of comber waste and card strippings and fly. The total amount imported in 1900, 1905, and 1910 was 11,697,302, 11,113,060, and 21,546,714 pounds, respectively. Of the 1910 imports, there was consumed by the mills in Poland 17,147,789 pounds, or about 80 per cent.

RUSSIAN COTTON GROWING—METHODS OF CULTIVATION.

Russia has supplied an increasing proportion of the total raw material. While the native cotton used in 1890 represented but one-fourth of the total consumption, in 1910 less than half of the total was purchased abroad. To-day Russia ranks fourth among the cotton-producing countries of the world. There are two districts with climatic conditions suitable for the production of cotton, namely, central Asia, or Turkestan, comprising the districts of Ferghana, Syr-Darya, Samarkand, Transcaspia, with the tributary States of Bokhara, and Khiva, and the Caucasus district.

Cotton has been grown in central Asia since ancient times, when the staple was used solely for domestic requirements and only the indigenous variety was planted. The district where the cotton plant flourishes is the vast plain bordered on the south and east by spurs of the Himalaya Mountains, on the west by the Caspian Sea, and on the north by the forty-third degree of latitude. The climate has a distinctive continental character, with an annual rainfall ranging from

194.8 millimeters (7.7 inches) in the Ferghana district to 421.8 millimeters (16.6 inches) in Samarkand. The climate is dry, with high summer temperatures and scarcely any rainfall during the crop-making months. The lack of moisture has necessitated irrigation, water being supplied by numerous rivers which have their sources in the surrounding mountains. The soil is very rich and its fertility is still further increased by the alluvial deposits during the rainy season. The planting season begins in March and ends in the middle or last of April.

The soil is prepared almost entirely by hand and only in recent years have modern methods of planting and cultivating been introduced. Generally, furrows are made and connected in a zigzag manner in order to facilitate irrigation. After the soil has been thus loosened the fields are watered and the seed planted, 20 to 30 being used in each hill. The planting of so many seed is due partly to the small germinating power (about 60 per cent) and partly to the fact that the soil becomes hard after irrigation and individual seed can not pierce the crust which is formed. The plants begin to appear in 9 to 10 days after sowing and later the weaker plants are pulled out. The fields are irrigated several times during the summer and the process requires careful attention, for, owing to the peculiar properties of the soil and to the warm climate, an excess of moisture causes hardening of the ground and consequent danger to the plant. The summer is short and it is of the greatest importance to have only quick-ripening cotton.

VARIETIES OF COTTON—PROFITS—GINNING AND BALING.

Two entirely different types are produced in central Asia, the cotton from American seed and the indigenous variety. The latter has a hard, rough staple up to 23 millimeters (0.9 inch) in length and is similar in many respects to East Indian cotton, to which it is closely related. The bolls of the indigenous variety do not open like American cotton and in gathering they are broken off entirely; the opening of the bolls and ginning of the cotton are done almost entirely by hand. The cotton famine created by the American Civil War gave the first impetus to experiments in acclimating foreign varieties. The first trials were made in 1870 with sea-island seed, but the efforts failed, owing to the fact that this variety required a damp climate. Some 10 years later experiments were started with American upland seed and from the beginning the results were very satisfactory. This variety soon became acclimated and was quickly adopted everywhere, owing to its superiority to the indigenous plant. At present the latter variety is cultivated only in districts where for some special reason the American seed can not thrive.

In central Asia, as in America, the cultivation of cotton is principally in the hands of small farmers, who either own the land or rent it. In the latter case the landlord furnishes all the tools and implements and advances money to the tenant, with the crop as security. The native seems to prefer the tenant system to hiring himself out as a laborer, and this accounts for the few large plantations and the limited use of agricultural machines. The average profit of the tenant farmer is 120 to 180 rubles per dessiatine ($23 to $34 per acre), depending on the character of the tenant, the yield, and the market price of cotton. The average cost of planting, cultivating, picking,

and marketing the crop is 2.50 to 3 rubles per pood (3.5 to 4.3 cents per pound).

The picking season begins early in September and is finished with the arrival of frost in October. The dangers which threaten the crop are pests such as locusts, caterpillars, and worms. The size and quality of the Ferghana crop are frequently affected by the hot west winds that throw dry leaves and sand into the cotton, which impurities can not be entirely removed in the ginning process. The damage was greater than usual in 1911, and it is estimated that the crop will be considerably smaller than last season. The crop is ginned and baled in very much the same way as in the United States, but the bales are well covered with a heavy quality of jute bagging held in place by four wires. This method of packing gives good protection to the cotton. The bales were formerly packed by means of screw presses, but hydraulic presses are now used. The bales usually weigh 300 pounds and have a density of 30 pounds per cubic foot.

CHARACTERISTICS OF VARIOUS COTTON-GROWING DISTRICTS.

The Ferghana district produces the best quality of cotton and more than one-half the entire Russian crop. The so-called first-class cotton has an excellent white color and ranges between the full middling and good middling American grade. Its staple is strong and silky, 29 to 30 millimeters (1.14 to 1.18 inches) long, and is very well adapted for warp yarns. Cotton is the favorite crop, and its trade forms the basis of the entire business life of the district. Numerous gins and cottonseed-oil mills have been established, and many of the cotton manufacturers of Moscow and Poland have their own buyers there.

Second in importance is the Syr-Darya district, in which the production has rapidly increased. American seed is used, but the quality of the cotton raised is inferior to that of Ferghana, and it is used principally in making weft yarn of low or medium numbers.

Samarkand ranks third, but the yield has remained stationary in recent years because the farmers have found it easier and more profitable to raise other crops. This is probably due to the availability of water for irrigation, which enables the farmers to inundate their fields when the locusts (which are a great pest in the country) threaten their crops. This practice is possible in the case of rice and other cereals, but can not, of course, be used in the cotton field. The cotton produced in this district is still lower in grade than those already mentioned. American and indigenous varieties have been planted side by side, hybridizing has taken place, and a cotton inferior to the American variety has resulted. The same is true of the Transcaspian district, with the single exception of the Imperial Estates, on which a fine quality of cotton is grown. More than 130,000 acres in Bokhara are planted to cotton, but because of special tax laws only the native variety is cultivated. The cotton grown in the Khiva district is of excellent quality and brings an even higher price than the Ferghana grade, but the yield is limited and is not rapidly increasing.

Russia possesses other cotton-producing country in the Caucasus district, lying between the Black and Caspian Seas. Soil and climatic conditions are similar to those in central Asia, and there are enormous stretches of land that can be cultivated as soon as irrigation is arranged. The practice of growing both native and American varie-

ties has had the same deteriorating effect on the quality of the fiber as was noted in the Samarkand and Transcaspian districts.

EXTENSION OF PRODUCTION—CUSTOMS DUTY ON COTTON—PRICES.

The figures in the foregoing table, showing the amount of Russian cotton consumed by the mills in specified years from 1890 to 1910, represent approximately the total crop, as the amount of cotton used by the peasants in the producing districts is not considerable. It will be noted that the mill consumption of Russian cotton was equivalent to 143,420 bales of 500 pounds each in 1900, while it exceeded 800,000 bales in 1910. The production in different districts varies from 270 to 325 pounds per acre. The crop for the 1911–12 season it is believed will fall short of last year's.

Extension of the cotton-growing area seems dependent entirely on the development of the irrigation system, and no important steps are being taken in this direction. However, the production is being gradually increased by improved methods of agriculture and intensive cultivation. It is undoubtedly true that the quality of the cotton is gradually deteriorating, owing partly to failure to exercise care in the selection of seed and partly to the mixing of the native and American varieties, as already explained.

Russia imposes a very high customs duty on raw cotton, the rate being 4 rubles per pood (5.7 cents per pound) on the gross weight, which makes the rate 4.25 rubles per pood (6.06 cents per pound) on the net weight of the cotton. This increases the cost of the raw material to the manufacturer, but since the tariff on cotton manufactures is correspondingly high the burden is not so keenly felt. Undoubtedly the high duty on cotton has stimulated the home production of the raw material. The entire amount of the duty is repaid to the manufacturer on all cotton yarn and cloth exported. This allowance, of course, is not made in the case of goods shipped to Finland and to certain parts of China, with which Russia has a special customs agreement.

The present (November, 1911) prices of American, Russian, Egyptian, Persian, and Indian cotton in Moscow are shown in the following table, and for comparison the prices of No. 38 weft and No. 32 warp and the average prices in 1910 of Nos. 30/32 warp and 38 weft yarns and of plain gray calico are given. The latter is 28 inches wide, is made of average 34s yarn, and weighs 6.16 yards per pound.

	Rubles per pood.	Cents per pound.
American cotton, December-March delivery	12.70	18.12
Russian cotton:		
Ferghana, first quality	12.40	17.69
Bokhara	11.00	15.69
Egyptian brown	17.45	24.89
Persian cotton:		
Machine ginned	11.00	15.69
Hand ginned	8.00	11.41
Indian cotton, Oomra No. 1	12.00	17.12
Nos. 32 warp and 38 weft yarn	23.25	33.15
No. 38 weft yarn (average price in 1910)	23.03	32.84
No. 30/32 warp yarn (average price in 1910)	23.26	33.16
Calico (average price in 1910)	.....	[1] 6.66

[1] Per yard.

AMERICAN COTTON IN RUSSIA.

American cotton is sometimes bought through Bremen, Hamburg, or Liverpool firms and sometimes direct from America on c. i. f. terms, 6 per cent, with 1 per cent weight allowance. Payments are usually made in drafts dated 90 days from day of shipment. As one and one-half to two months is required for delivery, and as Russian manufacturers buy raw material to cover their needs several months in advance, the cotton is ordinarily paid for before it is used.

The various expenses incident to bringing American cotton into Russia and shipping it to Moscow from a Baltic port or from the border are, according to figures furnished by a prominent cotton dealer, as follows: Net duty per pood, 4.25 rubles; forwarding agent's expenses, reweighing, etc., 0.08 ruble per pood; banker's commission, 0.03 ruble; railroad freight, 0.25 ruble; interest and miscellaneous expenses, 0.04 ruble; total, 4.65 rubles per pood. This is equivalent to 6.63 cents per pound. The freight charge for bringing cotton to Russia, which varies from 45 to 55 cents per hundredweight, is not included in the above. The cost of transporting cotton from central Asia to Moscow, including freight, interest, insurance, and difference between buying gross weight and selling net weight, is 2.25 rubles per pood (3.21 cents per pound).

Strictly speaking, Russian cotton is bought for cash, but the purchaser may give bills of exchange for six to nine months at 6 per cent annual interest, and this is usually done. The present (November, 1911) low price of American cotton has brought the cost of the best grade of Russian cotton almost on a parity with the former, and the demand for the American variety will probably be greater this season than it has been for several years. In 1910 the average price of American cotton was 23.94 cents per pound, while that of the best grade of Russian was 22.25 cents. Of the home-grown cotton 83.4 per cent is used in the central district, a little over 8 per cent in the Baltic district, and the remainder in Poland and other sections.

The Persian cotton used in Russia is of many varieties, the staple being similar in character to Indian cotton, short but strong. It compares in some respects with the Russian cotton grown from home seed, but in consequence of mixing grades and of careless cleaning and sorting it is rather inferior. The Poland district utilizes it very largely in making waste products, 60,505 of the 88,076 bales imported in 1910 being consumed in this district. Indian cotton is not extensively used; only 31,000 bales, of which Poland used 70 per cent, were imported in 1910.

LABOR CONDITIONS.

The total number of operatives employed in the spinning and weaving mills in 1910 was 399,919, as compared with 279,766 in 1900. Women form 53.6 per cent of the total, while children under 15 years (half-timers) constitute only 10 per cent. The abundant supply of labor in Russia has led the cotton mills to adopt the two-shift system of work. The first shift usually works from 4 a. m. to 10 a. m. and from 4 p. m. to 10 p. m., and the second shift from 10 a. m. to 4 p. m. They alternate so that the shift that works during the first and last periods on the first day works during only one period

on the day following. Thus the working hours are alternately 12 and 6 hours, or an average of 9. Owing to the large number of church holidays that are observed, the average number of working days per month is only 22.8; the number of hours worked per year averaged 4,233 in 1900 and 4,173 in 1910. The schedule given above obtains in most of the cotton mills, and in practically all those of the central district. In the Baltic district and in Poland, however, where the supply of labor is not so large, the majority of the mills employ only one shift, which works from 10 to 11 hours per day.

AVERAGE ANNUAL WAGES OF OPERATIVES.

The earnings of cotton-mill operatives are considerably lower than in the United States, and even less than in other European countries. According to the report of the Inspector of Labor for 1910, the average annual earnings of operatives in the chief cotton-manufacturing districts were as follows:

Districts.	Average annual earnings.	Districts.	Average annual earnings.
Central district:		Baltic district:	
Moscow	$118.96	St. Petersburg	$147.29
Vladimir	98.80	Esthonia	140.59
Yaroslav	100.45		
Kostroma	98.80	Average	143.94
Average	104.22	Western district	150.38

The average is considerably higher in Poland and in the Baltic district than in the central section, but the difference is more apparent than real, and is due partly to the fact already mentioned that the working hours are longer in the former districts, and partly to the fact that the operatives in Poland, St. Petersburg, and Esthonia, as a whole, are more efficient.

Operatives are generally paid by piece, and in mills working two shifts the production of the spindle or loom is awarded equally to each of the two operatives tending the machine. It would appear that this system would cause complaint among the workers, but apparently it does not, and the managers of several mills stated that it actually tended to increase production. The more efficient weaver, for example, "gets behind" the operative on the same set of looms who is inclined to neglect his work, in order that the total amount of cloth woven may be larger, thus increasing the earnings of both weavers. Moreover, wherever possible, two members of the same family operate a set of looms or the same spinning frames, etc. The arrangement is particularly satisfactory in the case of a family with small children; the husband takes one shift and his wife the other, and the children in the home are never left alone.

RANGE OF DAILY WAGES.

Wages necessarily vary in different mills according to local conditions and to the class of yarn or cloth manufactured. The following table, which has been compiled from figures obtained at different

mills and from cotton manufacturers, gives an idea of the daily wages of the operatives in the various departments:

Operatives.	Daily wages.	Operatives.	Daily wages.
Lapper tenders (men)	$0.46–$0.64	Ring spinners, one operative to 500 spindles (women and girls)	$0.33–$0.46
Card grinders (men)	.36– .64	Mule spinners, overseers (men)	1.03– 1.30
Card strippers and lap carriers (men)	.41– .52	Big piecers, one to 1,000 spindles	.41– .51
Can tenders (mostly girls)	.26– .31	Little piecers (boys)	.36– .41
Drawing frames, 12 deliveries (women)	.36– .46	Scavengers (waste boys)	.21– .26
Combers (women)	.31– .51	Spooler and winder hands (women)	.31– .41
Slubber operatives (men and women)	.36– .46	Beam warper operatives (women)	.46– .56
Intermediate operatives (men and women)	.36– .50	Slasher tenders (men)	.52– .67
Fine roving operatives (men and women)	.36– .50	Draw-in hands (women and girls)	.46– .56
Back tenders or creelers, one to every 4 or 6 frames (boys)	.26– .31	Weavers	.41– .60
		Weave-room overseer, one to 48 looms	1.03– 1.23

Operatives in the lapper room usually tend 2 machines; card grinders, strippers, and lap carriers, who tend the backs of the cards, look after 40 to 60 cards; can tenders are paid at the rate of 3 kopecks (1.54 cents) per card, and usually tend 15 to 20. One woman looks after 12 deliveries of drawings, or 2 combers of 8 deliveries each. Slubber hands tend 1 frame, while on intermediates, fine roving, and jacks 2 frames to each operative is the rule, with a back tender or creeler to every 4 or 6 frames. Ring spinning frames usually have from 400 to 500 spindles each, and one operative tends 2 and sometimes 3 sides.

INFLUENCE OF WELFARE WORK ON WAGE SCALE.

The wages in the foregoing table are very low apparently, but attention is drawn to the fact that the Russian operative is better cared for by the employer than those in many other countries. Many mills house their operatives rent free, while others charge only a nominal sum. The manager of one mill in the Moscow district stated that operatives not housed by the mill were paid 2 rubles ($1.03) extra per month. Free schools, churches, hospitals with free medical attendance, theaters, parks, and playgrounds are provided and maintained by the manufacturers, often at great expense. Nearly every mill has its own bakery, from which bread is furnished to employees, sometimes free and sometimes at about one-half the market price. It is also not unusual for the mill to sell other provisions at cost prices.

In their welfare work the manufacturers have been actuated partly by altruistic motives, but largely by necessity. In the United States and other countries efforts to ameliorate the condition of employees have been due largely to the keen competition for labor and the desire to provide pleasant surroundings for the employees, and thus secure a steady, well-contented class who will remain at the mill. In Russia the same purpose is in view, but the employers are actuated not so much by the scarcity of labor as by the fact that the operatives come from the peasant class, who regard the mill village not as their home, but as a temporary residence. To the peasant home is the little farm, often many miles from the mill, to which he expects some day to return. Undoubtedly the manufacturers by their welfare

work have been able to retain many people at the mills and for their trouble and expense have secured some return in the low scale of wages.

The foreigner who goes among the cotton mills with preconceived notions as to the laboring classes will be forcibly impressed by the good appearance and general condition of the operatives.

I inspected several of the mill tenements, hospitals, and schools and found the tenements clean and sanitary, provided with electric light, hot and cold water, and neat and attractive in appearance. Hospitals are built at considerable expense and are equipped with every modern convenience; capable physicians and surgeons are always in attendance. The operatives of the mill when sick may go to the hospital and receive the very best of care without cost. At one mill a new hospital was being built at a cost of $250,000; at another an amusement park and theater for the use of the operatives was just being finished at an expense of $75,000. The object of these amusement features is to provide recreation for the mill workers when they are idle in order to combat the tendency to drink vodka to excess. The activity of the cotton manufacturers is but one phase of the temperance movement in Russia to-day, which has for its object the provision of clean and wholesome forms of amusement for the working people in their idle hours. The presence of many Englishmen as managers, foremen, or clerks has led to the organization of football teams, and the popularity of this sport is evidence of the wisdom of the employers.

It has been recently estimated that the Russian cotton-mill operative spends 14.5 kopecks (7.47 cents) per day for food. In the Russian Church calendar there are 180 fast days on which no meat, eggs, or butter can be eaten. Owing to this fact the food of the Russian laborer consists chiefly of bread, tea, and vegetables. Bread, as has been stated, is furnished by the mills either free or at a very low price, and tea is also sometimes provided.

LAWS IN REGARD TO LABOR.

The laws in Russia in respect to labor in cotton mills are essentially as stringent as those in other industries. The principal provisions of these laws are as follows:

For the purposes of the law night work is reckoned as from 9 p. m. to 5 a. m. for mills operating with one shift and from 10 p. m. to 4 a. m. for those with two shifts.

Where one shift is employed, the hours of labor must not exceed 11½ in each 24, and on Saturdays and the eves of holidays the hours must not exceed 10, and in all cases there must be an interval of rest of not less than 1 hour.

When work is carried on for 18 hours a day with two shifts of operatives the working hours in each 24 may be increased to 12, provided that in a fortnight the average work time for each operative does not exceed 9 hours.

The operatives must be allowed time for meals at least once in 6 hours. When the work time between two intervals of rest exceeds 6 hours, and any other distribution of time is impossible, the workmen must be allowed to take their meals during work time, and a place for meals must be fixed by shop regulations.

Children under 12 can not be employed. Minors from 12 to 15 can not be engaged for more than 8 hours per day exclusive of the period assigned for meals, school, and rest; work must not occupy more than 4 successive hours, and is prohibited from 9 p. m. to 5 a. m. Where two shifts are used during 18 hours they can be employed 9 hours, but work must not occupy more than 4½ consecutive hours. Minors from 15 to 17 and women can not be employed at night.

The conditions of the agreement made between employer and employee are stated in a book, a copy of which is given to each worker, and must be delivered to him seven days after his employment. In this book are noted all payments to be made by the employer and all fines imposed for idleness, neglect, etc. When the length of engagement is indefinite, either party may break the agreement by giving a fortnight's notice. The laborers must be paid not less frequently than once a month if the engagement is for a longer time, and at least twice a month if the contract is for an indefinite time.

The agreement can be annulled (1) if the workman is absent from work three days consecutively, or six days in one month, without just cause; (2) if the workman is absent from his work during two weeks running for any cause whatever; (3) for rudeness or misconduct, if such menace the interests of the employer or the personal security of anyone connected with the factory; (4) if the laborer for any act be sentenced to imprisonment; (5) in case of the laborer contracting a contagious disease. A discharged laborer may appeal, in the case last mentioned, to the factory inspector or to the court of justice, which fixes the compensation to which he is entitled if his complaint is sustained.

The administration may fix a list of fines to be imposed on the employee for (1) negligence, (2) idleness, (3) infringement of rules. Each act subject to a fine must be stated in special tables, with the amount of said fine, and no fine may exceed one-third the laborer's wage. This list must be approved by the factory inspector, and all fines collected under it must go to a fund for the benefit of the operatives.

These laws have been in effect since 1898, and factory inspectors are employed to see that they are observed, and, in general, to act as an intermediary between employers and workmen.

COMPENSATION FOR INJURIES—LABOR ORGANIZATION.

Compensation to laborers in case of injury is regulated by the law of June 2, 1903, under which the employer is obliged to compensate the laborer and the members of his family; but the employer is relieved of this obligation when he can prove that the accident was the fault of the laborer. Compensation is in the form of an aid, or pension, paid from the date of injury until the employee's full restoration to health. For complete disability a pension is allotted amounting to two-thirds of the annual wage, and for partial disability according to degree. In case death results from an accident a pension is paid to the deceased's family, one-third going to the widow, one-third to the children, and one-third to the brothers and sisters.

Medical and funeral expenses are paid by the employer, and in cases of factories employing 1,000 workpeople or more, infirmaries or hos-

pitals must be provided, the size of which is determined by the number of employees.

All the laws appear to be strictly observed by the cotton mills, and there is a notable absence of small children in the factories.

There is no organization among the cotton-mill operatives; in fact, such organizations are contrary to the laws of the country, which provide heavy penalties of imprisonment for originators of or participants in a strike. Nevertheless there have been frequent strikes, although the number is considerably less than formerly. During the disturbances throughout Russia in 1905 and 1906 the manufacturers suffered heavily and the damage to their property was considerable. Conditions have greatly improved since then, but at many of the mills a force of police is employed, often supplemented by a detachment of Government troops. By intervening between employer and employees in cases of dispute the labor inspectors have had an influence in preventing strikes.

The improved condition of the operatives has not been brought about by strikes, however, and wages have not had more than a normal increase in the past 10 years. Strikes have had more of a political nature than a well-formulated and fixed determination to secure higher wages, or a protest to the manufacturer, as in the United States.

Time will doubtless bring a better feeling between the employer and the workers, because the cotton industry in Russia has undoubtedly done much toward improving the condition of the laboring class and developing the people along educational, moral, and industrial lines.

NATURE OF OUTPUT AND COST OF PRODUCTION.

One of the chief classes of goods made in Russian mills is plain sheeting, which is called mitkal or biaz. The former is the cheaper grade, although it is made in a variety of constructions, from ordinary 48 by 44 cheese cloth to a cloth similar to the regular 36-inch, 56 by 60, 4-yard sheeting. It is sold both in the gray and bleached, and is usually narrow (25 to 27 inches) like the bulk of the cloth woven in Russia. Biaz is of the same width and in the cheaper qualities is identical with mitkal. Three samples of each of these fabrics are furnished (see list, p. 48), and they will give an idea of the quality and construction of the goods. The yarn is usually 32s warp and 34s filling.

The coarsest quality of mitkal is 26/27 inches wide, 48 by 48 picks, and retails for 10 kopecks per arshine (6.6 cents per yard). The better qualities are 25/26 inches, 60 by 56 picks, and 26/27 inches, 60 by 56 picks. The former is bleached, and sells for 14 kopecks per arshine (9.3 cents per yard), while the price of the latter, in the gray, is 12 kopecks per arshine (7.9 cents per yard).

The three grades of biaz are as follows: Coarse, 27/28 inches wide, 56 by 56 picks, unbleached, retailing at 17 kopecks per arshine (11.3 cents per yard); medium, 24/25 inches wide, 60 by 44 picks, bleached, retailing at 16 kopecks per arshine (10.6 cents per yard); fine, 27/28 inches wide, 56 by 48 picks, bleached, retailing at 18 kopecks per arshine (11.9 cents per yard).

DYED AND PRINTED GOODS.

In dyed and printed fabrics the article most widely sold is the so-called koomach. If one enters a store and asks for this he will ordinarily be given a cloth that is dyed in a bright solid-red color, although in recent years it has been made in other colors, such as indigo, dark blue, and green. Among the Russian peasants red is a favorite color, and it was among the first colors used, the people from Asia Minor and Turkey having brought the Turkey red dye up the River Volga and sold it to the natives early in the eighteenth century. The red koomach is extensively used throughout Russia to-day, not only by peasants but by the working classes in the cities. The blouses which one often sees on the porters in the hotels are made of this material, and it is also used by the women for dresses. The cloth is made 24 inches wide (finished), 96 by 72 picks, and generally of 32s warp and 38s weft or 34s warp and 36s weft yarn. Samples of the red, blue, and indigo styles are furnished.

Chintz is another printed cloth that is in good demand. The word chintz is derived from a Hindu word meaning variegated. It is a cloth usually printed in many and various colored designs with a Persian effect, and is used for curtains, upholstery, and other household purposes. In Russia, however, the term has a much broader application, and the cloth is printed in simple designs, stripes, checks, flower effects, and the like, and takes the place of a cheap gingham, which is not made in that country. The three samples furnished will give a good idea of the fabric. No. 10 is a Persian design printed in seven colors, is 25 inches wide, 80 by 56 picks, and retails for 20 kopecks per arshine (13.24 cents per yard). It has a rather stiff finish. The other two (Nos. 11 and 12) are finished soft for dresses, and are 25 inches wide, 80 by 56 picks, and 24 inches wide, 56 by 56 picks; they sell for 18 and 12 kopecks per arshine (11.9 cents and 7.9 cents per yard), respectively.

Another fabric that may be considered characteristic of the Russian cotton industry is boomazey. It is printed both in elaborate Persian designs and in plain figures and always has a slight nap or flannel finish on the side that is not printed. These goods are usually of twill construction and are used for shirts, dresses, etc., in winter, taking the place of wool because they are cheaper. Three grades are represented in the samples furnished. The first (No. 13) is 23/24 inches wide, 72 by 44 picks, three-up-and-one-down weave, and retails at 14 kopecks per arshine (9.3 cents per yard); the second (No. 14) is 22 inches wide, 72 by 44 picks, two-up-and-one-down construction, and sells at 17 kopecks per arshine (11.3 cents per yard); the third (No. 15) is 24 inches wide, 64 by 56 picks, two-up-and-two-down, or regular flannelet, construction and retails for 24 kopecks per arshine (15.9 cents per yard). The price of the goods seems to depend more on the printing design than on the construction.

OTHER PRODUCTS.

The goods described are those deserving particular mention because they are typical of the industry. Because of the high tariff and the duty on raw cotton prices are undoubtedly higher than for similar

fabrics in the United States. Other fabrics manufactured are print goods, which are usually 28 inches wide, 74 by 70 picks, made of 34s warp and 38s filling, and weighing a little over 7 yards to the pound; sateens; muslin; percale; piqué, which is usually napped on the under side; imitation woolen goods; cheviots; reps; cretonne; curtain and upholstery goods; head shawls and handkerchiefs; corduroy and velvet, which are dyed in the piece and generally cut by hand; and also such finer goods as lawns, batiste, fine bleached muslin, madapollam, damask, and leno fabrics, napkins and tablecloths, and mercerized goods. Most of the mills are engaged in making the cheap and coarser grades, because they are in the greatest demand.

COST OF PRODUCTION.

The cost of production in Russia varies, of course, in different mills. For example, I found that 32/34s warp yarn costs from 4.40 to 5 rubles per pood (6.27 to 7.13 cents per pound). These figures include loss from waste and all expenses of production. In other words, the manufacturer must add these amounts to the cost of cotton at the mill in order to come out even. In one of the best-managed mills I found that the cost of producing 32s warp was 6.27 cents per pound, divided as follows:

	Rubles per pood.	Cents per pound.
Cost of raw cotton at the mill	12.50	17.83
Loss of waste less recovery from reworked waste (12 per cent)	1.50	2.14
Average cost of fuel	.50	.71
Running expenses:		
Supplies, taxes, insurance, interest, packing, and freight	1.50	2.14
Labor	.80	1.14
Salaries	.10	.14
Total	16.90	24.10
Cost of cotton	12.50	17.83
Cost of producing yarn	4.40	6.27

The labor cost is very low, but the item of interest is high, it being the chief item under the head of supplies, etc. While the labor cost is therefore much lower than in the United States, the total cost of production is perhaps not more than 1½ to 2 cents per pound less. The total weaving cost of regular print cloth was given to me as 90 kopecks per piece of 45½ yards, weighing 8 funts. This is equal to 6.4 cents per pound. However, this cost is probably higher than the average, because at the present time the weaving mills are charging only 80 kopecks per piece, weighing 8 funts (5.7 cents per pound). A weaver working on 28-inch, 74 by 70 pick goods, weighing 7.25 yards per pound, is paid 35.6 kopecks (18.3 cents) per piece of 45½ yards, and he usually weaves one piece per day on each loom, running at a speed of 220 picks per minute. The present market is making it more profitable to spin than to weave, as the price of yarn is about 4 or 5 cents per pound above the cost of production.

METHODS OF SELLING—PROFITS IN THE INDUSTRY.

The larger mills sell their products through their own stores and warehouses in the large cities. Others sell through brokers, who charge a commission of one-half of 1 per cent. There are no special rules among the manufacturers governing prices or conditions of sale. Contracts are usually made for 8 months, and the terms are sometimes 6 and sometimes 12 months, with interest at the rate of 6 per cent per annum.

The cotton industry has enjoyed great prosperity in Russia, and five or ten years ago profits of 30, 40, and 50 per cent were not unusual. In 1905 and 1906, however, the mills suffered considerably from the prevailing disturbances, and in 1907 and since that year the increased cost of cotton has diminished the earnings. The president of the Cotton Manufacturers' Association stated that the average earnings in the past 10 years had been a little over 7½ per cent. This, however, is the amount distributed to shareholders; the actual profits have been more. The depression in the industry in all parts of the world has certainly not embarrassed the Russian manufacturers to the same extent as those in either the United States or England, and no appreciable curtailment of production has taken place. The failure of the crops in 1911 is expected to affect the industry, and the recent fall in the price of cotton will hurt those manufacturers who have on hand a large supply of cotton bought at high prices. However, the Russian industry seems to be on a sound basis and in all of the mills I visited I heard no complaint as to conditions. Under the ample protection afforded by the tariff, cotton manufacturing will probably continue to grow in Russia to keep pace with the constantly increasing demand for cotton goods.

USE OF WASTE.

In Russia practically all the cotton mills work up their waste, while in some districts there are mills devoted exclusively to the manufacture of waste products. It is not always advisable or profitable for a small mill to attempt to work up the waste produced; the larger the mill the more economical it becomes. Russian mills are nearly all large and, moreover, are generally equipped to manufacture a wide range of yarn and cloth; it is easy, therefore, to use the waste in the coarser counts and cheap fabrics. Furthermore, nearly all the mills operate mule spinning, and it is on the mule frame that waste can be most advantageously spun, because the material consists of short and varying lengths of fiber and can not be spun on the ring frame without excessive twist.

In the Lodz district of Poland the manufacture of waste products is an important branch of the cotton industry. Not only is the waste from Russian mills utilized, but large quantities of strippings, fly, and comber waste are imported, chiefly from England. The total quantity of imported waste consumed in Poland in 1910 was 475,008 poods (17,153,869 pounds); the consumption in the central district was 106,094 poods (3,831,351 pounds), and in the Baltic district only 15,710 poods (567,332 pounds).

The system of machinery usually employed is the condenser, as opposed to the coiler system, and a number of the mills have all the equipment necessary for spinning yarn of low numbers from such waste as sweepings, motes, fly, strippings, scavenger, and hard waste. The combined opener and picker used is about 12 feet long and 30 inches wide, and is made in England. It is very similar in operation to a regular cotton-mill picker, except that the beaters, of which there are usually three, consist of cylinders about 18 inches in diameter fitted with a number of short projecting spikes. All sorts of waste are fed into the machine and the action of the beaters and the strong draft of air separate the fiber from the dirt in the case of motes, sweeps, fly, and similar waste, and take out the twist in hard waste and tear it up so that it can be reworked. Often the various kinds of waste are not separated but are run in together in order to obtain a better mixing.

In some cases the waste after being thus prepared is put in a general mixing of low-grade cotton in the proportion of about 1 to 10 and is made into coarse yarns, ranging in number from 6s to 14s, through the ordinary processes of spinning. In several of the mills visited, however, there was a complete special equipment for spinning waste. The cards used, which are simply modifications of the woolen card system, consist of a breaker and a finisher working together. The stock from the picker is sometimes fed on an apron or through a hopper and sometimes from laps. The slivers as they come from the cards, wound on spools, are carried direct to the mule without going through any intermediate processes and are there spun into yarn. The mules are without draft rollers and the sliver passes through only one set of self-weighted rolls and is delivered direct to the spindle.

In Poland a large quantity of vigogne yarn is produced for weaving imitation woolen cloth. Strictly speaking, this class of yarn is made from cotton with a small proportion of wool, the word "vigogne" being derived from the name of the South American animal from which the wool is obtained. But in Poland, as in Germany and Italy, it is made entirely of cotton and is so worked on the woolen card system that it is an excellent imitation of the real article; in fact, it is sometimes difficult to discover without very close examination that no wool has been used. Besides imitation woolen goods, waste is used for making cleaning cloths, cheap towels and blankets, etc., and the coarse grades of gray goods, which are sometimes sold as woven but which more frequently are dyed and printed.

EMIL ZÜNDEL CO.

The great demand for printed and piece-dyed goods has given an impetus to the dyeing and printing industry, and it has been brought to its present position very largely by Alsatians, a number of whom, as already mentioned, were left in Russia as prisoners after the retreat of Napoleon in 1812, and who were the first to introduce the art of printing in a modern sense. Some of the mills operate their own printing plants, in which either Frenchmen or Germans are largely employed, but the most important print works in Russia is that of Emil Zündel, of Moscow.

The Zündel plant was founded in 1825 by an Alsatian, and in its early days printing was done by means of wooden boards. It was

not until 1840 that printing machines were adopted. The present owners of the plant purchased it in 1874 and started with a capital of 1,500,000 rubles ($772,500). To-day the firm has a capital of 6,000,000 rubles ($3,090,000), with a reserve fund of more than 1,000,000 rubles ($515,000), and owns property valued at more than 14,000,000 rubles ($7,210,000). The company's land comprises more than 400 acres; 2,500 operatives are employed in the print works, and 5,000 in a cotton mill which was acquired in 1907.

Thirty printing machines, with a capacity up to 16 colors, are operated, and in 1910 the total production was 2,500,000 pieces of 58 arshines (45.1 yards) each. Besides printing, the firm bleaches, mercerizes, and naps. Very fine work is done in silk-finished goods, for which a Schreiner machine is used. Another specialty is "blotched" work, in which the colors are developed by steaming after the cloth has been printed. In 1910 more than 36,000 tons of crude naphtha (ton of crude petroleum = about 7.1 barrels) were consumed in producing the 4,000 horsepower used in the two establishments and for furnishing heat, light, and steam.

CAPACITY AND OUTPUT OF MILL—MARKETING SYSTEM.

The cotton mill, which is located in the Moscow Government, has 112,816 spindles and 3,188 looms, consumes 12,000 bales of American, Egyptian, and Russian cotton annually, and produces 362,000 pieces of print cloth, batiste, sateen, muslin, and percale, all of which is dyed, printed, or bleached at the finishing works. In the latter the most expert laboratory chemists, skilled designers, and engravers are employed, and they constantly seek to develop new coloring processes and improved methods of dyeing and finishing. The managers are Alsatians, and the chemists are German, French, and Alsatian.

In its welfare work the firm has done much to improve the condition of the operatives and the manager stated that more than $1,000,000 had been spent in providing hospitals, churches, schools, etc. A fund of more than 500,000 rubles ($257,500) is maintained from which pensions are paid to the workers on leaving the service after a certain age. In the savings bank which has been established the deposits of the operatives amount to nearly $400,000. A cooperative store is conducted where provisions are sold practically at cost.

In marketing its goods the Zündel company exercises the same care and employs the modern systematic methods that characterize its manufacturing and printing plants. At first the goods were sold through wholesale houses, but in recent years they have been marketed direct. Warehouses and stores have been erected all over the Russian Empire, in the cities of Moscow, St. Petersburg, Warsaw, Riga, Helsingfors (Finland), Odessa, Omsk (one of the largest mercantile centers of western Siberia), and others. Branch houses have also been established beyond the Russian border, notably at Harbin, an important trading center with respect to the Chinese trade. More recently a branch has been opened at Sofia, Bulgaria, while there are agents in Paris and Hamburg and in the Near Eastern markets of Turkey and Persia.

The Siberian Railway has been a strong factor in developing the trade of this firm and others. The establishment of better means of

communication has brought the people nearer together and has made it possible for the customers to get quicker deliveries than in former times. The Zündel company usually sells on terms of 6 months' credit, whereas in other days 12 to 18 months was necessary because of the great distances goods had to be conveyed by means of poor transportation facilities.

KRENHOLM MANUFACTURING CO.

The most important mill in Russia and one of the largest in the world is that of the Krenholm Manufacturing Co., situated at Narva, about 75 miles from St. Petersburg. Some of the figures in regard to this plant are interesting. The company owns 32,000 acres of land and employs 12,000 people; 74,660 bales of cotton were used in 1910, from which there were produced 34,861,796 pounds of yarn and 159,994 pieces of cloth (average 45 yards each). The wages paid in 1910 amounted to $1,370,000. For developing power for driving, 11 water turbines with a combined horsepower of 8,550 and supplementary steam engines of 700 horsepower are employed. The growth of the plant is shown in the following table:

Years.	Spindles.	Looms.	Production of yarn.
			Pounds.
1859	10,440	.....	1,372,766
1860	34,431	516	2,116,831
1866	104,211	960	3,976,415
1871	177,185	1,578	7,965,609
1881	289,131	2,177	16,167,746
1891	389,152	2,136	21,262,900
1901	458,380	2,500	22,343,914
1910	472,500	3,672	34,861,796

MILL CONSTRUCTION AND EQUIPMENT.

The Krenholm mill was founded in 1857 by the pioneer of the Russian cotton industry, Ludwig Knoop, and is located on an island and along the banks of the River Narova. The sea is only about 10 miles distant, and in the harbor at the mouth of the river large cotton warehouses have been erected where cotton, imported direct from America or Liverpool, is stored and brought up the river to the mill as needed. The Narova, just before it runs into the sea, has a fall of about 27 feet with a flow of 1,770 cubic feet per second and this provides a splendid source of power. The machinery is distributed through three separate buildings, which are of brick and stone construction, two of them being five stories and one four. It is interesting to note that the last mill, devoted entirely to spinning, is of American construction, the floors and supports being of wood. The manager stated that he is well pleased with it, that there is very little vibration and that he considers it as fireproof as the regular Russian type of building in which no wood is used.

The managers and assistant managers of the mills are English, and this was everywhere apparent, inside and outside the plant. In fact, it is practically an English mill on Russian soil with Russian operatives. The carding and spinning machinery is from the firm of Platt Bros., in England. Part of the looms are English, but most of them were made by the firm in its up-to-date foundry and machine works, which are an important adjunct of the mill. Northrop looms are not in use, except a few for trial purposes; the manager stated that

the low cost of labor had not made it advantageous to install them, and this opinion was confirmed at other mills. However, this firm quite recently placed an order for two American warp tying-in machines. Old machinery is constantly being replaced by new, although its life at an effective production is longer than that of the average American machine. For example, I saw a few spinning frames in this mill that had been running 18 hours per day for about 30 years, while some machinery installed in 1860 and 1865 was just being replaced. The remarkable fact is that the production is hardly less than from new frames. I timed the front roll on one of the spinning frames mentioned and found that it was running at 130 revolutions per minute on 34s weft, which is only slightly under the standard speed as set down in the catalogue by the makers.

In the opening and mixing room the conveyer belt and blower systems are used. Cotton from a number of different bales is fed into a hopper, where it is thoroughly mixed, and is then carried on an endless apron to the various bins, from which it is conveyed to the pickers through blower pipes.

WAGES—WORKING HOURS—PRODUCTION.

In the card room two card grinders were employed on 44 cards and earned 60 cents per day, while the lap carriers and can men were paid 41 cents for tending 15 cards. Roving-frame operatives received 54 cents per day on an average, and one man ran one slubber of 80 spindles, one intermediate of 124 spindles, or two fine frames of 160 spindles each, but on the last two machines one creeler at 31 cents per day was employed as assistant. Ring spinners were tending 632 spindles at a daily wage of 38 cents; on mules the overseer received $1.17 per day for looking after 1,250 spindles, big piecers 38 cents, and little piecers 26 cents. Daily wages on spoolers were 48 cents (36 ends per operative) and on twisters 40 cents (404 spindles per operative). A hand who was running one beam warper earned 61 cents, and slasher tenders were paid $1.51, and one man and an assistant at 71 cents looked after one machine. Weavers were earning from 40 to 60 cents per day, dependent on the production. Practically all work is done by the piece and the foregoing figures are the average earnings as stated by the manager.

The laborers are partly Russian and partly Esthonian; the latter are the more efficient and this mill's production is higher than that of the average mill in the central district; wages, however, are correspondingly higher. The company is very active in looking after the welfare of the workpeople. Both a Russian church (built at a cost of $250,000) and a Lutheran church for the Esthonians are provided. Schools, in which there are 1,200 children, are maintained and a new hospital is being erected at a cost of nearly $250,000. The mill also houses the employees at a nominal rental and 500,000 pounds of bread are baked each month and sold to the people at $1\frac{1}{4}$ kopecks (0.64 cent) per pound, which is one-half the market price, while other commodities are furnished at very low prices.

In one of the mills the working hours are $10\frac{1}{2}$ per day, with one shift, the schedule being from 6 a. m. to 12 noon and from 1.30 to 6 p. m. In the other mills two shifts working 9 hours each are employed, one from 4 a. m. to 1 p. m. and the other from 1 to 10 p. m.; the two shifts alternate each day on the morning and evening

period. On Saturdays and days preceding holidays, however, the hours are from 4 a. m. to 12 noon and from noon to 8 p. m.

Seventy per cent of the spindles are engaged in making yarns for sale principally among weavers in the St. Petersburg and Moscow districts. A specialty of the mill is 90s ply yarn, made from Egyptian yarn, for the rubber-tire manufacturers. The range of yarns produced is very wide, running from 3s to 90s, and about 330,000 of the spindles are mules. In shipping yarn I noticed that they used beams made entirely of wood instead of the beam with iron heads and a wooden barrel employed in the United States. The spinner in Russia usually pays the freight on the yarn and the returned beams, and it is claimed that the lightness of the wood beams effects a saving in freight, while they are sufficiently strong and do not injure the yarn. The cloth woven consists mainly of print cloths of various constructions and sateens, both woven from 34s warp and 38s weft. Practically all the goods are shipped to a printing works in Moscow, in which the firm has a large interest.

VIKUL MOROZOFF & SONS MANUFACTURING CO.

In the central district one of the most important mills is that of the Vikul Morozoff & Sons Manufacturing Co., situated at Zuevo, Vladimir Government, about 50 miles from Moscow. This is only one of the several mills founded by the firm of Morozoff, which is second in importance only to that of Knoop in the development of the Russian cotton industry. "Morozoff cloth" is a brand of cheap calico that is known all over Russia and enjoys a large sale. This mill operates 155,456 spindles and 2,503 looms, and employs 15,000 workpeople, part of whom are engaged in digging peat in the extensive bogs which the company owns and from which fuel is obtained. As at the Krenholm mill, an English manager is in charge, and all of the machinery is English except the looms, which are largely of Russian make. Ten thousand horsepower is developed at a cost of 80 rubles ($41.20) per horsepower per year of 4,620 hours. Steam power is now used to generate electricity, and motors are being installed on the individual drive system.

WAGES—BONUS SYSTEM.

Operatives are paid by the piece, as in the majority of mills, and the average daily earnings are as follows:

Operatives.	Average daily wages.	Operatives.	Average daily wages.
Scutcher room, one man to 2 machines	$0.58	Spinning room—Continued.	
Card room:		Mule frames, one operative to 1 mule (1,200 spindles)	$0.77
Overseer, one to 65 cards	.85	Big piecers on mule frames, one to 1 mule	.64
Card grinder, one to 65 cards	.64	Little piecers on mule frames, one to 1 mule	.51
Lap carrier, one to 32 cards	.46	Spoolers, one operative to 30 spindles	.43
Can tender, one to 32 cards	.38	Twisters, one operative to 550 spindles	.51
Combers, one woman to 24 heads	.53	Warpers, one operative to 1 machine	.51
Drawing frames, one woman to 24 deliveries	.37	Slasher tenders, two operatives to 1 machine	.63
Slubbers, one hand to 1 machine (90 spindles)	.46	Draw-in hands	.43
Intermediates, one hand to 1 machine (140 spindles)	.46	Weavers (men), on 2 looms	.51
Fine frames, one hand to 2 machines	.46	Weavers (women), on 2 looms	.43
Creelers, one boy to 6 frames	.36	Operatives in bleaching, dyeing, and finishing department, average	46
Spinning room:			
Ring spinners, one operative to 1 frame (500 spindles)	.43		
Doffers, one to 6 frames	.31		

The manager stated that wages were about 25 per cent higher in this mill than in the average factory of the district, owing largely to its being situated in a village in which there are several mills, making the demand for labor greater. The mill, however, was in very fine shape, and the production was high. The bonus system is used; that is, the operative is paid a premium in addition to his regular earnings if the production exceeds a stated amount. I found this system in vogue in numerous mills, and it seemed to be working satisfactorily. At one place a somewhat different method was employed. There was a graduated scale of premiums dependent on the annual production of the mill, and at the close of the year the sum awarded was divided among the operatives in proportion to their earnings. This system has the advantage of encouraging the whole body of employees to increase production, but, on the other hand, to the average cotton-mill operative, the promise of a reward at some distant date may lack effectiveness as an incentive to increased effort. The bonus system seems at its best when the rewards are made at sufficiently frequent intervals to impress upon the laborer the value of closer attention to work.

WORKING HOURS—WELFARE WORK—PRODUCTION.

Two shifts of operatives are employed at this mill, the first going on from 4 a. m. to 8 a. m. and returning to the mill at noon and working to 5 p. m.; the other shift works from 8 a. m. to 12 noon and from 5 p. m. to 10 p. m. Each set thus works 9 hours each day, but has an intervening rest. On Monday morning work does not start until 6 a. m. and on Saturday the mill stops at 6 p. m.

Welfare work is carried on here to a marked degree. Tenements with heat, light, and hot and cold water are furnished, rent free. In the splendid day school I found 35 teachers and nearly 1,800 children, while in a night school 800 men were enrolled. In the hospital 7 doctors are employed, and attendance and medicines are, of course, free. The mill store furnishes provisions at cost prices. A splendid park and a theater are just being completed at a cost of $75,000. All sorts of sports are encouraged, and a football team, which arouses great enthusiasm among the mill people, is given financial support by the firm. One of the managers of the mill with whom I talked on the subject of welfare work expressed a desire for changed conditions which would not necessitate the mill maintaining so many outside activities and would permit a greater concentration of forces on the purely manufacturing side of the business. It was his opinion that it would perhaps be better to pay the operatives higher wages and provide them with good living quarters, but not furnish them with so many other things.

About 36,000 bales of cotton are used annually by the mill, of which about 40 per cent is American and Russian and 60 per cent Egyptian. The latter is combed and made into fine yarns up to 120s and 140s, while a good trade has been built up in sewing thread. Very low counts of yarn, into which all the waste of the mill is worked up, are also spun and later woven into moleskins, cleaning cloths, and other coarse fabrics. A variety of goods is manufactured, including cambric, fine lawns, sateens and satinettes, imitation woolen goods, print cloth, mercerized goods, velvets, and corduroys. All of these goods are finished in the firm's own dyeing and printing plant.

OTHER PROMINENT MILLS.

The Koonshin Manufacturing Co., at Serpukhov, Moscow Government, is one of the most up-to-date mills I visited. There are 115,000 spindles in the mill, of which 44,000 are mules, and 4,100 looms. About 25,000 bales of cotton are consumed annually, consisting of 20 per cent Egyptian, 25 per cent American, and the remainder Russian. The output is mainly fine sheetings, sateens, lawns, and a high quality of etamines. Wages are, on the whole, somewhat lower than in the mill previously described, being as follows: Scutcher tenders, 46 cents; card grinders, 42 cents; lap carriers, 37 cents; can tenders, 26 cents; comber operatives, 37 cents; drawing-frame hands, 38 cents; slubber, intermediate, and fine frame operatives, 47, 39, and 38 cents, respectively; ring spinners, 39 cents; mule spinners, 65 cents; spooler and winder hands, 36 cents; warper tenders, 46 cents; slasher tenders, 72 cents; weavers, 41 to 51 cents. In this mill the wages are lower than in the Morozoff mill, but the operatives in the latter appeared to be a better class of laborers, and the difference is more apparent than real.

The Voznesensky Manufacturing Co., at Pushkino, Moscow Government, is another first-class mill. It is managed by a young Englishman, who is an expert in all things pertaining to cotton manufacturing. There are 86,388 spindles and 1,510 looms, and 3,000 operatives are employed. The yarns spun are mainly 34s warp and 38s weft, and the production is exclusively print cloth. Power is produced by steam generated by wood fuel and by a gas engine. The latter is said to be one of the few gas engines successfully operated in Russian cotton mills. Undoubtedly it is one of the cheapest classes of power that can be employed, particularly in a country where coke is cheap and plentiful. The manager showed me the comparative costs, from actual tests, of the two kinds of power used. The figures were 58.95 rubles ($30.36) per horsepower for the steam engine and only 21.91 rubles ($11.28) per horsepower for the gas plant, for a year of approximately 4,500 hours.

Wages in this mill are at least 10 per cent lower than in the Koonshin Manufacturing Co.'s plant, which is doubtless due to the isolated location of the mill (it is 15 miles from the railroad) and the consequent lack of demand for labor outside the mill. In the weave room weavers were being paid 35.6 kopecks (18.3 cents) per piece (45½ yards) on 28-inch 74/70 print cloth made with 34s warp and 38s weft, with a loom speed of 225, and each weaver was tending two looms.

A list of the cotton mills in Russia, with number of spinning and twisting spindles and looms, which was prepared by the Moscow consulate general, will be found on pages 44–47.

COTTON-GOODS TRADE.

In 1909 Russia imported cotton yarn and cloth to the value of $10,941,704, while the exports for the same year amounted to $12,442,000. The detailed figures for 1910 (except those covering the trade by the European frontier) are not yet available. The course of the trade during the 20 years ended in 1909 is shown in the table following. The effect of the disturbances throughout Russia in 1905 and 1906 is revealed by the figures for those years.

Years.	Imports.				Exports.			
	Yarn.		Cloth.		Yarn.		Cloth.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1891....	5,909,570	$2,506,000	2,133,510	$678,000	(1)	(1)	(1)	$3,347,000
1899....	10,649,500	3,348,000	7,148,000	2,965,000	86,640	$28,840	9,819,000	5,313,000
1905....	4,554,700	2,036,000	8,953,000	4,055,000	198,550	67,980	20,332,000	10,567,000
1906....	7,906,000	3,700,000	16,425,500	10,882,000	285,190	95,300	26,176,110	12,784,000
1907....	12,543,000	4,648,000	9,422,000	6,451,000	201,000	81,724	22,120,000	11,062,000
1908....	10,072,000	4,337,000	12,271,000	8,692,000	432,000	141,000	18,736,000	10,546,000
1909....	9,260,000	4,837,000	8,683,000	6,105,000	1,086,000	390,000	21,470,000	12,052,000

[1] Not available.

Imports and exports are both small in comparison with those of other leading European countries. The chief explanation for the almost insignificant imports, for they are insignificant in proportion to the size and population of the country, will be found in the customs duties (p. 8). The protection these rates afford to an industry which, as we have seen, is in a very high state of development is a strong check to the importation of cotton goods and has effectively secured the home market to the native manufacturers. The imports are limited to special kinds of yarn and cloth that are not used in sufficient quantities to make it advisable or profitable for the Russian mills to produce them. The market for what may be termed staple goods, those used by the masses of the people, is absolutely in the hands of the home industry, and the cotton manufactures imported are only special lines and those demanded by certain of the upper classes to whom the question of price is not very important.

NATURE OF THE IMPORTS.

The following detailed statement of the imports in 1909 gives an idea of the kind of goods purchased abroad:

Articles.	Quantity.	Value.
Yarn:		
Single—		
Below No. 38—	*Pounds.*	
Unbleached	1,107,728	$218,984
Bleached, dyed, or mercerized	610,306	277,084
No. 38 to No. 60, inclusive—		
Unbleached	669,474	321,698
Bleached, dyed, or mercerized	50,142	24,950
No. 60 to No. 80, inclusive—		
Unbleached	291,038	143,194
Bleached, dyed, or mercerized	6,931	5,223
Above No. 80—		
Unbleached	130,898	119,738
Bleached, dyed, or mercerized	13,959	13,158
Twisted—		
On spools—		
Below No. 60	1,189,459	578,736
No. 60 to No. 80	1,138,641	654,746
Above No. 80	56,100	44,139
All other—		
Below No. 60	2,599,705	1,490,197
No. 60 to No. 80	875,930	451,632
Above No. 80	511,212	491,456
All other, including ropes and cords	9,169	1,950
Total	9,260,692	4,836,885
Fabrics:		
Unbleached or bleached—		
Biaz and mitkal (coarse calico) weighing up to 5.4 square yards per pound	2,718,005	635,511
Biaz and mitkal weighing from 5.4 to 8 square yards per pound and all other goods weighing up to 8 square yards per pound	2,079,901	1,444,016
Other fabrics weighing up to 8 square yards per pound	63,922	122,534
Dyed, printed, or mercerized—		
Biaz, mitkal, and chintz, weighing up to 5.4 square yards per pound	820,300	247,636
Biaz, mitkal, and chintz weighing from 5.4 to 8 square yards per pound and all other goods weighing up to 8 square yards per pound	1,929,111	1,512,436
Other fabrics weighing up to 8 square yards per pound	173,207	510,845
Felts and felted fabrics	15,739	8,880
Cotton fabrics mixed with silk or tinsel	21,443	50,561
Handkerchiefs, tablecloths, counterpanes, napkins, and curtains	172,341	361,617
Plush, velvet, and velvet ribbons	689,907	1,210,780
Total	8,683,876	6,104,816
Knit goods	894,402	1,263,685
Tulle	31,768	205,032
Laces and embroideries	226,744	2,069,246
Total	1,152,914	3,537,963
Grand total	19,097,482	14,479,664

FEATURES OF IMPORT TRADE.

These figures were compiled from customhouse statistics, and the classification is the same as that of the tariff. The items of knit goods, tulle, and laces and embroideries are misleading, because they represent all kinds except silk. Considering yarn and cloth only, the former constituted 44.2 per cent of the total imports. The chief yarns imported are special fancy and twist yarns, and ply yarn below No. 60 is the largest item in the list, followed by ply yarn on spools, which includes sewing thread. The native mills are gradually coming to supply all the requirements of the trade in the lower numbers and plain yarns and to restrict imports to the limits mentioned.

As showing the particular kinds of cotton cloth imported, the table is not very satisfactory. The goods are classed according to construction and weight, and each item includes a wide variety of both plain and fancy fabrics. Colored goods and plush and velvets constitute more than one-half the total cloth imports. Russian mills do not engage very extensively in the manufacture of fabrics made from dyed cotton or yarns and the chambrays, ginghams, zephyrs, etc., found in the shops are nearly always from Germany, England, or France. Only fine velvets and plushes are imported, and more than 90 per cent of these come from Germany. In fact, Germany is the chief supplier of Russian needs, not only in cotton goods but in other lines.

According to Russian statistics the total imports into Russia in 1910 were valued at about $490,000,000, of which Germany furnished $227,000,000. These figures are to some extent misleading, however, because most of the goods imported into Russia from the United States and England, France, and other European countries go through Germany or are transshipped from German ports, in which case many of them are credited to that country rather than the country of origin. For example, the statistics show that imports from the United States amounted to only $38,000,000 in 1910, whereas the American cotton used by the mills alone amounted to approximately $50,000,000.

Nevertheless Germany's trade in Russia far exceeds that of any other country. Undoubtedly this is largely due to her nearness and the advantage of being able to keep in close touch with the trade and make quick deliveries. But German business methods, which have secured her an enormous trade in all parts of the world, have also contributed to success in Russia. Commercial travelers are sent to Russia in large numbers, small orders are accepted, and long credits are extended. In the cities of Moscow and St. Petersburg German is very generally spoken by the business men, and the buyers of the most important firms make frequent trips to Berlin.

SOURCE OF IMPORTS.

The share of the various nations in the imports of yarn and cloth in 1909 was as follows:

Countries.	Yarn.		Cloth.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Germany	2,827,171	$1,892,717	1,861,757	$3,322,429	4,688,928	$5,215,146
England	4,648,813	2,397,826	295,117	486,429	4,943,930	2,884,255
China	7,581	1,618	3,808,517	952,278	3,816,098	953,896
Finland	898,601	183,354	1,625,655	637,992	2,524,256	821,346
Austria-Hungary	253,205	113,229	97,073	159,730	350,278	272,959
Japan	31,804	7,367	709,220	241,829	741,024	249,196
France	218,838	76,771	80,936	147,483	299,774	224,254
Switzerland	14,909	12,713	31,840	73,130	46,749	85,843
All other countries	359,770	151,290	173,761	83,516	533,531	234,806
Total	9,260,692	4,836,885	8,683,876	6,104,816	17,944,568	10,941,701

The comparatively large imports from Finland are due to the fact that low rates of duty are paid on cotton goods from that country.

Goods from China are admitted free along certain parts of the frontier, and large quantities of cheap fabrics are brought across the border and sold to people in Asiatic Russia. These are mostly cheap hand-woven products and include some goods from other countries sold through Chinese dealers.

DESTINATION OF EXPORTS.

Exports of cotton goods from Russia are also inconsiderable, and although they have more than doubled in the past 20 years the increase in recent times has not been important. In fact, Russian manufactures have found the demands of the home market so strong and profitable that they have not concerned themselves greatly about export trade. Only in the last year or two has much interest been manifested. This interest was aroused partly by the rather widespread crisis in the industry, which diminished the profits of the mills, and partly by the failure of the crops in 1911, which has curtailed the demand at home and prompted the manufacturers to seek foreign markets. An association has been recently organized among the manufacturers for the purpose of encouraging export trade in cotton goods.

The exports in 1909 are given in the following table:

Countries.	Yarn.		Cloth.		Total exports.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Persia	210,000	$81,000	10,433,000	$6,398,000	10,643,000	$6,479,000
China	196,000	94,000	5,307,000	2,835,000	5,503,000	2,929,000
Afghanistan	25,600	13,000	2,527,000	1,584,000	2,552,600	1,597,000
Finland	3,000	500	1,805,000	525,000	1,808,000	525,500
Turkey	92,000	47,300	1,119,000	614,000	1,211,000	661,300
Roumania	1,000	600	87,000	43,000	88,000	43,600
Germany	556,000	153,000	31,000	15,000	587,000	168,000
All other countries	2,400	600	161,000	38,000	163,400	38,600
Total	1,086,000	390,000	21,470,000	12,052,000	22,556,000	12,442,000

RUSSO-PERSIAN TRADE—NATURE OF EXPORTS.

The exports of yarn are comparatively unimportant. Persia is Russia's best customer in cotton goods. Indeed, this is true in many lines. The total value of the imports into Persia in 1909 was approximately $40,000,000, of which more than one-half came from Russia. Cotton goods constitute Persia's leading import, their value in 1909 being $11,000,000, of which Russia furnished over 50 per cent. The Russian influence in Persia is very strong, particularly in the northern part of the country, where practically all business is in the hands of Russians, and this has secured to the Empire the bulk of the country's trade. Russian manufacturers are well informed as to the class of cotton goods in greatest demand, and they endeavor to cater to this demand and to the ever-changing styles. The goods shipped to Persia are gray and bleached sheetings, chiefly mitkal and biaz, and a great variety of cheap printed goods, including many grades of koomach and calico. Colored goods are in greatest demand in Persia, and they constitute 80 per cent of the total exports

thereto. The latter statement is also true with regard to Russia's two other principal markets, China and Afghanistan.

Russian statistics do not give in detail the classes of goods exported, but the following table shows the preponderance of colored goods in the total amount exported:

Classification.	Yarn.		Cloth.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Without drawback	402,000	$119,500	3,941,000	$1,274,500	4,342,000	$1,394,000
With drawback:						
Bleached and unbleached	544,000	191,000	3,336,000	1,762,500	3,880,000	1,953,000
Dyed or printed	118,000	67,500	9,266,000	5,735,000	9,385,000	5,803,000
Dyed Turkey red	22,000	12,000	4,927,000	3,280,000	4,949,000	3,292,000
Total	1,086,000	390,000	21,470,000	12,052,000	22,556,000	12,442,000

The goods exported without drawback include all those shipped to Finland and about one-third of the shipments to China, with which country Russia has a special tariff agreement. It may be safely assumed that most of these goods are printed, since such goods constitute the greater part of the manufactures. Exports to Persia and China have nearly doubled in the past 10 years. In Turkey, too, the manufacturers are obtaining an increasing amount of trade, and the shipments of cloth to that country amounted to 1,119,000 pounds in 1909, as compared with only 108,300 pounds in 1901. Recently agents have been sent into the Balkans, and in Roumania and Bulgaria a serious attempt is being made to capture a share of the cotton-goods trade.

It is evident that Russian cotton manufacturers will continue to concern themselves chiefly with their well-protected home market, but the growth of the industry is likely to be too rapid for the demands of the native population, and it is only natural that they should seek an outlet in the markets at their own door and in the countries in which they have already secured a foothold. But the Empire of the Czar is the most extensive on the globe, with the sole exception of Great Britain and its possessions, and it is practically a world within itself—a world, too, that is only beginning to develop its enormous resources. The improved condition of the people that must necessarily follow this development will increase the buying power of the peasants and create a larger demand at home for the products of the cotton manufacturing and other industries, and the protective principle, which appears to be a settled economic policy, will doubtless secure to the cotton industry the monopoly of the home market which it has hitherto enjoyed.

LIST OF RUSSIAN COTTON MILLS.

[In stating the locations of the mills the abbreviations "Gov." for Government and "Dist." for district are used. The Government is an administrative subdivision of the country corresponding to the State in this country. The Governments are divided into districts. The district as given under the heading "Location of mill," should not be confused with that in the first column, where the word is used in a general sense to indicate the different sections of Russia in which cotton manufacturing is carried on.]

Firm names and districts.	Location of mill.	Spinning spindles.	Twisting spindles.	Looms.
CENTRAL DISTRICT.				
Balashinsky Manufacturing Co. of Cotton Products.	Balashicha, Moscow Gov	172,856	17,184	.....
A. J. Balin Manufacturing Co	Jucha, Viaznikov Dist., Vladimir Gov.	128,748	6,380	1,790
Baranov Manufacturing Co	Karabanovo, Alexandrovsk Dist., Vladimir Gov.	71,724	484	2,100
Bogorodsko-Glukhovo Manufacturing Co.	Glukhovo, near Bogorodsk, Moscow Gov.	126,328	26,180	3,358
Voznesensky Manufacturing Co., S. Lepeshkin's Sons.	Pushkino, Dmitrovsky Dist., Moscow Gov.	86,388	.....	1,510
Volga Spinning Manufacturing Co.	Near St. Volga, Mishkinsky Dist., Yaroslav Gov.	20,700	.....	.....
Voskresensky Manufacturing Co., of Emil Zündel Co.	Nara-Thominskoe, Ver. Dist., Moscow Gov.	112,816	.....	3,188
Visokovsky Manufacturing Co	Nekrasino, Klinsky Dist., Moscow Gov.	60,660	3,624	1,992
Nikon Garelin & Sons Co	Ivanovo-Voznesensk, Vladimir Gov.	35,612	.....	859
Cotton Manufacturing Co., G. & A. Gorbunovs.	(1) Sereda, Nerechta Dist., Kostroma Gov.; (2) Ladigino near Kolobovo, Kovrov Dist., Vladimir Gov.	125,390	380	1,152
Staro-Gorkinsky Manufacturing Co.	Mikhnevo, Bronnitsky Dist., Moscow Gov.	21,000	100	728
Danilovsky Manufacturing Co	Moscow City	59,248	920	1,160
Nikanor Derbenef's Sons Manufacturing Co.	(1) Novki (Nizhegor Ry.); (2) Ivanovo-Voznesensk, Vladimir Gov.	84,000	.....	2,123
Dneprovosky Manufacturing Co. (Ltd.)	Dubrovno, Mohilev Gov	.....	1,200	360
Egorievsky Cotton Manufacturing Co., A. & G. Khludov.	Egorievsk, Ryazan Gov	177,816	7,488	1,740
Ermolaev Bros. Manufacturing Co.	Near Serpukhov, Moscow Gov	4,000	.....	92
Zuev Manufacturing Co., I. N. Zimin.	St. Drezna, Moscow Gov	98,072	1,600	2,299
Ivanovo-Voznesensk Weaving Co.	Ivanovo-Voznesensk, Vladimir Gov.	69,608	.....	2,206
Izmailov Cotton Manufacturing Co.	Izmailovo, Moscow Gov	27,000	.....	620
Alexander Karetnikov's Sons' Manufacturing Co.	Teikovo, Vladimir Gov	68,026	.....	1,902
Ivan Konovalov & Son Manufacturing Co.	Boniatchki, Kineshma Dist., Kostroma Gov.	72,796	5,312	2,237
Annensky Manufacturing Co., Ivan Kapitonovitsch Konovalov.	Near Kineshama, Kostroma Gov	34,030	.....	572
N. N. Konshin Manufacturing Co	Serpukhov, Moscow Gov	115,000	2,184	4,100
Gratry, Gerard & Michin, Société Anonyme.	Kostroma	50,000	10,624	.....
Anna Krasilshikova & Sons Manufacturing Co.	Rodniki, Kostroma Gov	84,652	2,784	3,009
Krestovnikov Bros	Polano, Moscow Gov	76,612	3,924	.....
Lejnevsky Manufacturing Co	Lejnevo, Vladimir Gov	28,000	.....	800
Commercial and Industrial Co., P. Malutin & Sons.	Near Ramenskoe (Moscow-Kazan Ry.), Moscow Gov.	158,034	5,936	1,770
Vasili Morgunov's Sons Manufacturing Co.	Ozeri, Moscow Gov	27,400	.....	1,017
Vikul Morozoff & Sons Manufacturing Co.	Zuevo, Vladimir Gov	155,456	17,970	2,503
A. F. Morokin	Nova Galchicha (Northern Ry.), Kostroma Gov.	16,112	900	814
J. S. Netchaev-Maltzev	Goos-Khrustalni, Vladimir Gov	104,668	.....	1,636
Nikolsky Manufacturing Co., Savva Morozoff's Son & Co.	Nikolskoe, near Orekhovo, Vladimir Gov.	176,488	.....	3,875
Nikolsko-Bogojavlensky Manufacturing Co., D. Morokin, I. Tichomirov & Co.	St. New Vitschuga, Kostroma Gov., New Goltchicha, Morokina and Tichomirova.	25,000	300	1,045
Nora Manufacturing Co	Norski Posad, Yaroslav Gov	100,000	.....	.....
Pereslavl Manufacturing Co	Pereslavl Zalesski, Vladimir Gov	115,518	9,184	.....

List of Russian cotton mills—Continued.

Firm names and districts.	Location of mill.	Spinning spindles.	Twisting spindles.	Looms.
CENTRAL DISTRICT—continued.				
Pokrovsky Cotton & Weaving Manufacturing Co.	Jacroma Station, Dmitrov Dist., Moscow Gov.	110,218	2,016	2,150
N. M. Polushin Heirs Manufacturing Co.	Ivanovo-Voznesensk, Vladimir Gov.	12,000	600	1,200
Kosma Prochorov & Sons Manufacturing Co.	(1) Vishny Volotchek, Tver Gov.; (2) St. Podsolnetchnaia, Moscow Gov.	93,000	.....	1,537
		.....	.....	763
Prochorov Trechgorni Manufacturing Co.	Moscow City	41,188	644	1,527
Ludwig Rabeneck Manufacturing Co	Near Tschelkovo Station (Northern Ry.).	38,000	2,080	832
Franz Rabeneck Manufacturing Co.	Bolshevo (Northern Ry.), Moscow Gov.	34,440	12,300	.....
Vitchugsky Manufacturing Co., F. & A. Razorenov.	Vitchuga (Northern Ry.), Kostroma Gov.	67,144	.....	1,760
Gerasim Razorenov & Ivan Kokorev Manufacturing Co.	Tezino, Kostroma Gov	100,296	.....	2,501
Grand Kineshma Manufacturing Co.	Kineshma, Kostroma Gov	59,628	712	1,175
Reutovo Manufacturing Co	Reutovo, Moscow Gov	76,728	16,954	.....
Rozhdestvensky Manufacturing Co., Berg Bros.	Tver City	90,520	.....	2,412
Russian-French Cotton Manufacturing Co., Société Anonyme.	Pavlovsky Posad, Moscow Gov	65,700	.....	1,632
Riabov Cotton Manufacturing Co	Serpukhov, Moscow Gov	48,892	496	1,718
P. M. Riabushinsky & Sons Manufacturing Co.	Zavorovo, Vishnevolotzky Dist., Tver Gov.	69,024	11,936	1,233
Savvinsky Manufacturing Co	Obiralovka, Moscow Gov	29,000	.....	418
Sadkov Manufacturing Co., Ivan Demin.	Sadki, Kolomna Dist., Moscow Gov.	30,524	.....	1,002
P. F. Sevrugov Heirs	Kineshma, Kostroma Gov	67,312	366	1,575
Serpukhov Cotton Weaving Co. (Ltd.)	Serpukhov, Moscow Gov	42,432	.....	.....
Manufacturing Co. founded by I. I. Skvortzov.	Sereda Station, Kostroma Gov	70,324	.....	3,466
A. & K. Slutchaev	Kellerovo, Vladimir Gov	10,000	.....	.....
A. V. Smirnov	Likino, Vladimir Gov	48,500	.....	1,332
Sobinsky Manufacturing Co	St. Undol, Vladimir Gov	132,000	2,800	204
Asaf Baranov's Sokolovsky Manufacturing Co.	St. Strunino, Alexandrovsk Dist., Vladimir Gov.	50,000	600	1,400
Tver Manufacturing Co. of Cotton Products.	Tver City	154,700	.....	3,970
Moscow Textile Manufacturing Co	Serpukhov, Moscow Gov	64,576	4,308	695
I. A. Treumov Heirs	Kovrov, Vladimir Gov	36,000	.....	2,002
Société Anonyme of Zurich for Russian Cotton Industry.	Zaraisk, Ryazan Gov	57,140	3,376	.....
Pelageia Tchernishova's Sons Broadcloth Manufacturing Co.	Pirogovo, Moscow Gov	17,560	984	70
Istominsky Manufacturing Co., E. K. Shibaev Heirs.	Istomkino, near Bogorodsk, Moscow Gov.	55,024	380	1,250
E. E. Shlichterman	(1) Moscow City; (2) Isupovo, Podolsk Dist., Moscow Gov.	41,230	.....	.....
Shuia Manufacturing Co	Shuia, Vladimir Gov	53,300	.....	1,232
Shuia-Tezino Manufacturing Co	do	27,984	.....	379
Theodore Scherbakov & Sons Manufacturing Co.	Ozeri, Kolomna Dist., Moscow Gov	66,750	520	1,748
Great Yaroslav Manufacturing Co	Yaroslav	261,866	11,266	1,912
Yartzev Manufacturing Co	Yartzevo, Smolensk Gov	138,218	5,528	1,645
V. E. & A. Jasuninski Manufacturing Co.	Kochma, Yaroslav Gov	60,056	1,408	1,232
BALTIC DISTRICT.				
Baltic Cotton & Weaving Manufacturing Co. (Ltd.).	Reval	66,744	.....	1,775
James Back Cotton Manufacturing Co. (Ltd.).	St. Petersburg	105,576	21,390	.....
I. A. Voronin, Lutsch & Tschesher Manufacturing Co. (Ltd.).	do	66,652	1,416	1,790
William Hartley	do	.....	7,000	40
K. V. Gerardi Cotton Manufactur- Co. (Ltd.).	do	23,500	3,000	.....
Ekaterinhof Cotton Manufacturing Co.	do	140,130	.....	.....
Sassenhof Cotton & Weaving Manufacturing Co.	Sassenhof, near Riga	26,064	4,228	465
Krenholm Manufacturing Co	Narva, St. Petersburg Gov	472,500	13,800	3,672
Malo-Okhta Weaving Manufacturing Co.	St. Petersburg	.....	2,744	320
Neva Cotton Manufacturing Co	do	132,000	100,000	.....

List of Russian cotton mills—Continued.

Firm names and districts.	Location of mill.	Spinning spindles.	Twisting spindles.	Looms.
BALTIC DISTRICT—continued.				
Neva Cotton Weaving Manufacturing Co.	St. Petersburg	221,460	51,212	.....
"New Cotton Weaving Mill" Co.	do	100,000	.....	.....
Okhta Cotton Weaving Co.	do	73,262	2,008	.....
Alexandro-Nevsky Manufacturing Co., K. J. Pal.	do	22,000	.....	1,354
Petrovsky Cotton & Weaving Co.	Smolenskoe, St. Petersburg Gov.	48,816	1,200	1,500
Riga Cotton & Ribbon Manufacturing Co.	Riga	15,332	6,122	250
Riga Cotton Manufacturing Co. in Strazdenhof.	Strazdenhof, near Riga	14,600	22,236	.....
Russian Cotton Weaving Manufacturing Co.	St. Petersburg	121,500	.....	.....
Henry Small	do	16,000	.....	.....
Spassky Cotton Weaving Manufacturing Co.	Smolenskoe, St. Petersburg Gov.	44,122	.....	1,258
Sampson Cotton & Weaving Manufacturing Co.	St. Petersburg	62,412	1,256	1,477
Northern Weaving Manufacturing Co. (Ltd.).	do	.....	5,064	367
Triumphal Weaving & Cotton Manufacturing Co.	do	30,856	816	.....
WESTERN DISTRICT.				
Henry F. Berndt	Zavertse (Warsaw-Vienna Ry.)	8,000	.....	.....
R. Biderman	Lodz	35,000	7,700	440
Cotton Manufacturing Co. "Volia," E. Heiman & M. Kernbaum.	Volia, near Warsaw	29,372	9,576	200
Cotton Manufacturing Co., Gampe & Albrecht.	Lodz	11,000	.....	545
Cotton & Rubber Manufacturing Co., Ferdinand Geldner (Ltd.).	do	8,500	.....	.....
Louis Heyer Cotton Manufacturing Co.	do	46,514	848	1,578
Heintzel & Kuntzer Cotton Manufacturing Co. (Ltd.).	do	56,920	1,394	2,713
J. Hirshberg & Wiltchinsky	do	3,400	.....	.....
Karl Hoffrichter	do	6,720	.....	392
G. Groman	do	30,000	10,000	.....
L. Groman Manufacturing Co. (Ltd.).	do	5,176	.....	1,136
Gille & Dietrich Girardov Manufacturing Co. (Ltd.).	Girardov (Warsaw-Vienna Ry.)	35,000	.....	2,000
Zavertse Co. (Ltd.)	Zavertse, Bendij Dist., Piotrkow Gov.	79,276	3,350	2,602
M. Silberstein Co. (Ltd.)	Lodz	23,600	2,680	.....
Zgerge Cotton Manufacturing Co. (Ltd.).	Zgerge, Piotrkow Gov	25,156	6,846	.....
J. Kistenberg	Lodz	22,200	1,100	290
R. Kindler Half-wool Manufacturing Co. (Ltd.).	Pabianitzi, Piotrkow Gov	12,300	.....	1,043
K. Krening	Lodz-Karolev	14,184	2,800	120
Krushe & Ender Pabianitzi Cotton Manufacturing Co.	Pabianitzi, Piotrkow Gov	47,602	3,386	1,848
Kuester Bros	Zgerge, Piotrkow Gov	5,000	300	.....
Lodz Cotton Manufacturing Co. (Ltd.).	Lodz	41,896	18,096	.....
Lorentz & Krushe Cotton Manufacturing Co. (Ltd.).	Zgerge, Piotrkow Gov	3,500	.....	155
Lorentz & Krushe Cotton Manufacturing Co. (Ltd.).	do	15,000	4,132	.....
M. Lubinsky	Lodz	4,000	.....	60
Adam Osser	do	30,092	11,236	.....
I. K. Poznansky Cotton Manufacturing Co. (Ltd.).	do	136,466	672	4,353
F. Ramish	do	10,000	.....	342
E. Ramish	do	13,000	2,500	.....
Sh. Rosenblatt Cotton Manufacturing Co. (Ltd.).	do	58,096	6,840	719
Russian Commercial & Industrial Co., Emile Hebler.	Lodz and Dombrova	20,378	5,304	.....
V. V. Stolarov	Lodz	11,000	5,400	465
Tchenstokhov Weaving Co. (Ltd.)	Tchenstochov, Piotrkow Gov	50,100	6,400	485
Karl Sheibler Cotton Manufacturing Co. (Ltd.).	Lodz	222,574	12,250	4,848
K. G. Shoen	Sosnovitze, Piotrkow Gov	19,500	.....	.....
Schloesser Cotton & Weaving Co.	Ozerkov, Kalisz Gov	19,090	.....	693
August Schmeltzer Cotton Manufacturing Co.	Mishkov, Bendinsky Dist., Piotrkow Gov.	25,000	.....	.....

List of Russian cotton mills—Continued.

Firm names and districts.	Location of mill.	Spinning spindles.	Twisting spindles.	Looms.
WESTERN DISTRICT—continued.				
Gustave Schroer	Lodz	.....	8,200	.....
Steigert Bros	.....do	6,000	1,400	.....
F. Steigert	.....do	20,000	4,000	.....
Karl Steinert	.....do	17,168	400	500
F. Ender	Moshennitza, near Baba Station (Warsaw-Vienna Ry.), Piotrkow Gov.	13,096	.....	620
OTHER DISTRICTS.				
Caspian Manufacturing Co	Near Petrovsk, Daghestan	17,728	320	573
Saratov Manufacturing Co	Khmelevka, Saratov Gov	38,240	10,440	.....
Hadgi Zeinal Abdin Tagiev, Caucasian Co. for Cultivating Fibre Products.	Baku	36,876	588	1,215
FINLAND.				
John Barker & Co	Abo	21,252	2,952	650
Bierneborgs Bomullsmanufacture Aktiebolag.	Bierneborg	20,000	5,000	500
Vaza Bomullsmanufacture Aktiebolag.	Vaza	28,290	12,514	652
Tampereen, Puuvillateollisuus, Osakeitie.	Tammerforce	23,104	6,604	470
Finleison & Co., Aktiebolag	.....do	90,000	13,500	1,820
Forssa Aktiebolag	Forssa	40,200	7,336	1,049

LIST OF SAMPLES.

Sample 1.—Mitkal, or coarse sheeting; 26/27 inches wide; 48 by 48 picks; retail price, 10 kopecks per arshine (6.6 cents per yard).

Sample 2.—Mitkal, better quality; 26/27 inches wide; 60 by 56 picks; retail price, 12 kopecks per arshine (7.9 cents per yard).

Sample 3.—Mitkal, bleached; 25/26 inches wide; 60 by 56 picks; retail price, 14 kopecks per arshine (9.3 cents per yard).

Sample 4.—Biaz, a little better grade of sheeting than the above; 27/28 inches wide; 56 by 56 picks; retail price, 17 kopecks per arshine (11.3 cents per yard).

Sample 5.—Biaz, bleached; 24/25 inches wide; 60 by 44 picks; retail price, 16 kopecks per arshine (10.6 cents per yard).

Sample 6.—Biaz, bleached; 27/28 inches wide; 56 by 48 picks; retail price, 18 kopecks per arshine (11.9 cents per yard).

Sample 7.—Koomach, red; 24 inches wide; 96 by 72 picks; retail price, 20 kopecks per arshine (13.24 cents per yard).

Sample 8.—Koomach, blue; 24 inches wide; 96 by 72 picks; retail price, 18 kopecks per arshine (11.9 cents per yard).

Sample 9.—Koomach, indigo; 24 inches wide; 96 by 72 picks; retail price, 17 kopecks per arshine (11.3 cents per yard).

Sample 10.—Chintz; 25 inches wide; 80 by 56 picks; retail price, 20 kopecks per arshine (13.24 cents per yard).

Sample 11.—Chintz; 25 inches wide; 80 by 56 picks; retail price, 18 kopecks per arshine (11.9 cents per yard).

Sample 12.—Chintz; 24 inches wide; 56 by 56 picks; retail price, 12 kopecks per arshine (7.9 cents per yard).

Sample 13.—Boomazey; 23/24 inches wide; 72 by 44 picks; retail price, 14 kopecks per arshine (9.3 cents per yard).

Sample 14.—Boomazey; 22 inches wide; 72 by 44 picks; retail price, 17 kopecks per arshine (11.3 cents per yard).

Sample 15.—Boomazey; 24 inches wide; 64 by 56 picks; retail price, 24 kopecks per arshine (15.9 cents per yard).