

# XIII.—MISCELLANEOUS.

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**Mining.**—The aggregate value of the product in 1880 of all branches of the mining industry, excluding petroleum, was \$223,505,018, as stated by the Census. This is only about one-tenth of the product of agriculture, and one-twenty-fourth of the gross product of manufactures. The following table presents the amount and value of each of the principal mineral productions, as returned by the Tenth Census:

MINERAL PRODUCTS.	AMOUNT.	VALUE.
Gold.....	....	\$33,609,663 <sup>a</sup>
Silver.....	....	41,170,957 <sup>a</sup>
Bituminous coal (net tons)...	42,776,624	53,520,173
Anthracite coal " ..	28,649,812	42,196,678
Petroleum (barrels).....	24,235,081	....
Iron ore (net tons).....	7,974,706	23,156,957
Copper (pounds).....	54,172,017	9,458,434
Lead " ..	162,938,105	7,935,140
Zinc " ..	62,681,459	4,240,006
Salt (bushels).....	29,805,298	4,829,566
Minor minerals.....	....	3,387,444
Total.....	....	\$223,505,018

<sup>a</sup>. Including estimated hoarded specimens, souvenirs, etc.

These figures are not, however, above criticism. Those of the production of lead are certainly far too low, inasmuch as none of the Western states or territories are credited with any production. During the census year it is estimated that Colorado produced not less than 35,674 net tons; Utah 15,000; and Nevada 16,659 tons, while the product of other Western states and territories cannot have been less than 10,000 tons additional. Altogether, fully 77,000 net tons, or 154,000,000 pounds, should be added to the lead product, thus nearly doubling the amount given in the table.

The value of minor minerals is certainly greatly understated. Several items here included exceeded individually the total value given. A close estimate of all minor minerals would place their value at not far from \$40,000,000.

**Gold and Silver.**—Inasmuch as these

two metals are generally found associated, they are here considered together.

The following tables present estimates, by different authorities, of the gold and silver production during the calendar year 1880, the fiscal year ending June 30, 1880, and the census year ending June 1, 1880:

PRODUCTION OF THE PRECIOUS METALS IN THE CALENDAR YEAR 1880, AS REPORTED BY J. J. VALENTINE, OF WELLS, FARGO & CO.

STATES.	TOTAL GOLD AND SILVER.
California.....	\$18,276,166
Nevada.....	15,031,621
Oregon.....	1,059,641
Washington .....	105,164
Idaho.....	1,894,647
Montana.....	3,822,379
Utah.....	6,450,953
Colorado.....	21,284,989
New Mexico.....	711,300
Arizona.....	4,472,471
Dakota.....	4,123,081
Total.....	\$77,232,512

These figures include lead to the value of \$5,742,390, and copper to the value of \$898,000. Deducting these amounts the value of gold and silver becomes, according to this estimate, \$70,592,122.

PRODUCTION OF THE PRECIOUS METALS DURING THE FISCAL YEAR ENDING JUNE 30, 1880, AS ESTIMATED BY THE DIRECTOR OF THE UNITED STATES MINT.

STATES.	GOLD.	SILVER.	TOTAL.
Alaska.....	\$6,000	....	\$6,000
Arizona.....	400,000	\$2,000,000	2,400,000
California.....	17,500,000	1,100,000	18,600,000
Colorado.....	3,200,000	17,000,000	20,200,000
Dakota.....	3,600,000	70,000	3,670,000
Georgia.....	120,000	....	120,000
Idaho.....	1,980,000	450,000	2,430,000
Montana.....	2,400,000	2,500,000	4,900,000
Nevada.....	4,800,000	10,900,000	15,700,000
New Mexico.....	130,000	425,000	555,000
North Carolina.....	95,000	....	95,000
Oregon.....	1,090,000	15,000	1,105,000
South Carolina.....	15,000	....	15,000
Utah.....	210,000	4,740,000	4,950,000
Virginia.....	10,000	....	10,000
Washington.....	410,000	....	410,000
Wyoming.....	20,000	....	20,000
Other states.....	14,000	....	14,000
Total.....	\$36,000,000	\$39,200,000	\$75,200,000

PRODUCTION OF THE PRECIOUS METALS DURING THE YEAR ENDING JUNE 30, 1880, AS REPORTED BY THE TENTH CENSUS.

STATES.	GOLD.	SILVER.	TOTAL.
Alabama.....	\$1,301	....	\$1,301
Alaska.....	5,951	\$51	6,002
Arizona.....	211,965	2,325,825	2,537,790
California.....	17,150,941	1,150,887	18,301,828
Colorado.....	2,699,898	16,549,274	19,249,172
Dakota.....	3,305,843	70,813	3,376,656
Georgia.....	81,029	332	81,361
Idaho.....	1,479,653	464,550	1,944,203
Maine.....	2,999	7,200	10,199
Michigan.....	....	25,858	25,858
Montana.....	1,805,767	2,905,068	4,710,835
Nevada.....	4,888,242	12,430,667	17,318,909
New Hampshire.....	10,999	16,000	26,999
New Mexico.....	49,354	392,337	441,691
North Carolina.....	118,953	140	119,093
Oregon.....	1,097,701	27,793	1,125,494
South Carolina.....	13,040	56	13,096
Tennessee.....	1,998	....	1,998
Utah.....	291,587	4,743,087	5,034,674
Virginia.....	9,321	....	9,321
Washington.....	135,800	1,019	136,819
Wyoming.....	17,321	....	17,321
Total.....	\$33,379,663	\$41,110,957	\$74,490,620

The discrepancies between the above tables of production can easily be explained. The estimate of Wells, Fargo & Co., contained in the circular of Mr. J. J. Valentine, was derived mainly from the record of shipments of gold, silver and bullion through this company, together with estimates of the amounts carried by other means of conveyance, and losses of various kinds. It is probable that these estimates were not sufficiently large.

The data for the estimate of the Director of the Mint were collected by agents scattered through the country, who visited the principal mines and smelting works, and supplemented the results thus obtained by estimates of the amounts produced in a small way.

The third estimate, that by the Census office, is the result of an attempt to get at the production by a canvass, either by personal visitation or by circular, of all the mines in the country. It could scarcely be expected that such an attempt would be crowned with complete success. Not only would there be, inevitably, a number of small mines and workings which would escape notice, the product of which, though individually small, would form in the aggregate a large amount, but since the information sought is that most sedulously concealed by mine-owners, the results could not be expected to possess the highest degree of reliability. In view of its difficulty, the considerable degree of success which attended this investigation attests its able management.

The maximum annual production of gold, in the interval between 1850 and 1880,\* was \$65,000,000, reached in 1853, at the height of the California excitement. A second maximum of \$53,500,000 in 1866, was produced by the out-put of the Comstock mines. Following this there was a general falling off in production until, in 1875, a minimum of \$33,500,000 was reached. The bonanza in the Comstock, a temporary rise, giving a third maximum of \$51,000,000 in 1878, was followed by a reduction, in 1880, to a less product than the former minimum of 1875.

The silver product first became important in 1861, when the Comstock lode began to produce. The amount has since steadily increased, the falling off in the product of Comstock between 1870 and 1880, having been more than made up by the discovery of the Leadville deposits.

Below is presented a *resume* of the production of the precious metals in the principal mining states and territories of the West:

**California.**—In annual out-put of gold California still leads, as also in respect to the total out-put since 1849, when this state became the chief gold-producing district of the world. The production has been mainly from the auriferous gravel beds, though a large amount is still obtained from quartz mines. Prior to the development of the Bodie mines in the eastern central part of the state, the placer mines furnished two-thirds of the total gold

product of the state, but the large yield of the Bodie district put the vein mines nearly on a par with placers. The principal yield is from the following counties: Amador, Calaveras, Mono, Nevada, Plumas, Shasta, Siskiyou and Tuolumne. The production of silver is comparatively small, and comes mainly from the two counties of Inyo and Mono.

The business of mining is in a somewhat more favorable position in California than in the other states and territories of the Cordilleran region, because of the relative cheapness of labor, fuel and transportation. These advantages enable lower grades of ore to be mined, smelted and shipped than elsewhere. Hence, with the exception of a few large companies, the mines are mainly in the hands of individual owners, a great many of whom are working them in a small way.

Of the total gold product in the United States, California furnishes 51.38 per cent., comprising 71.47 per cent. of the product from placer mines, and over 40 per cent. of that from vein mines. Of the total silver product California furnishes only a little over 2 per cent. In proportion to its area, this state ranks first in the production of gold; while in proportion to population, owing to the great development of agricultural and manufacturing interests in the state, it ranks fifth.

**Nevada.**—The mining interests of Nevada center in the Comstock lode, whose prosperity is the prosperity of the state. Latterly the production of the Comstock has greatly decreased, so that, from holding the first place from 1871 to 1879 as a producer of the precious metals, Nevada fell in 1880 to the third place. The product of the Comstock lode in 1876 was of gold, \$18,002,906; of silver, \$20,570,078; a total of \$38,572,984. In 1880 its total product declined to \$6,922,330, of which \$3,109,156 was gold and \$3,813,174 was silver, this being a reduction of more than 82 per cent.

In production per square mile of total area, Nevada holds the third rank. In proportion to population, however, owing to the fact that mining is still the prominent industry of the state, and owing to the smallness of its population, Nevada, notwithstanding its reduced out-put, retained the first place in 1880, having a product of \$278.14 for each inhabitant.

**Utah.**—Silver forms the principal part of the precious metals produced in Utah, the production of gold being comparatively small. The principal mines are located in the counties of Summit, Washington, Salt Lake, Beaver, Tooele and Juab. The ores of Utah are exceptionally rich, and the mines are generally in the hands of large companies. The bullion product

\* See Pl. 139, "Estimated Gold and Silver Product of the United States, 1845-1880," in which the figures are from Reports of the Director of the Mint, except as to 1880, for which year the Census figures are given.

is remarkably steady, varying little from year to year.

**Arizona.**—The product of precious metals in Arizona mainly consists of silver, the gold product being only about 8 per cent. of the total. The mines are mostly in the counties of Pima and Yavapai, although Maricopa and Mohave counties also produce a notable amount.

**Idaho.**—The production of precious metals in Idaho is nearly equally divided between gold and silver. The principal producing mines are located in the counties of Owyhee, Lemhi, Boise and Alturas. Of the gold product, considerably more than half is from the placers, many of which continue to be worked at a profit. Idaho furnishes 7.33 per cent. of the total placer out-put of the United States, and 4.43 of the total gold product. In the quantity of gold produced it ranks as sixth, and in that of silver as seventh among the mining states and territories. The yield of precious metals in 1880 averaged \$22.93 per square mile and \$59.62 per capita.

**Oregon.**—Oregon has at no time held a leading place in the production of the precious metals, although gold was discovered in the state shortly after its discovery in California. The principal deposits are in the counties of Baker and Grant, those in the former county being quartz veins yielding free gold. The product from the placer mines, discovered in various parts of the territory, has been trifling.

**Colorado.**—The mining history of this state has been one of singular interest, commencing with the "stampede" in 1859–1860, to the rich placers of South Park and California Gulch, followed by the discovery of the rebellious ores of Central City and Black Hawk and of the silver-lead ores about Georgetown. In 1877, the year after Colorado became a state, the discovery of rich lead carbonates in fabulous quantities in the neighborhood of Leadville, gave another and unprecedented impetus to its mining interests. Since the first discovery of gold in California there has been no period of so great and widespread mining excitement. The state leaped almost at once to the first rank as a producer of the precious metals.

The following counties are the principal producers: Lake, Gilpin, Clear Creek, Boulder, Park, Summit, Ouray and San Juan; while a number of other counties will probably rival these in the near future. The most promising of these newer mining districts is undoubtedly Gunnison county, from which the Indians have recently been removed, and in which a great number of extremely rich veins have been located.

The deposits of Colorado present the

greatest possible variety in character—from the typical fissure vein to blanket deposit, segregated deposits, "blow-outs," and almost every other variety known to the miner. The ores, too, are equally various in character. The characteristic ores of Boulder county are known as tellurides. Those in the neighborhood of Central City and Black Hawk are iron and copper sulphurets, containing gold; while those about Georgetown, and in many other sections of the state are largely galena ores, with some sulphuret of silver and free silver. The ores in the limited district about Leadville present great variety, ranging from pure sand carbonate to chlorides of silver and native silver. The production from placer mines in this state is trifling, being but little over \$100,000 annually.

In the production of the precious metals, in proportion to area, Colorado has taken the first rank; in proportion to population, however, it ranks only third, owing to its large agricultural, grazing and commercial interests.

**Dakota.**—The production of precious metals in Dakota is limited to the Black Hills and almost entirely to Lawrence county. The deposits are of immense size, consisting of low grade gold quartz, which can be worked at a profit only by reason of its abundance and the cheapness of mining and transportation.

**Montana.**—Owing mainly to want of transportation, the mining interests of Montana have not yet been developed largely, although it is well-known that the territory has abundant mineral resources. So far as developed, in 1880, the mines were contained in the following counties: Deer Lodge, Beaverhead, Madison, Jefferson, Lewis and Clark. Of these Deer Lodge county produced more than two-thirds the total product of the territory. It is estimated that about one-fourth of the total product was from placer mines.

**New Mexico.**—During the years 1879 and 1880 the mineral deposits of New Mexico first began to attract general attention, although many of them had long been worked by the Mexicans, in a crude, unsystematic way, with considerable profit. During the census year the principal production was from Grant county; small amounts, also, being produced in the counties of Santa Fé and Doña Ana. The large areas of rich placer land in New Mexico have been worked very little, owing to the scarcity of water.

**Eastern States.**—The production of the precious metals in the Eastern states is not of great importance. Gold and silver are found upon the Atlantic plain in Maryland, Virginia, North and South Carolina, Alabama and

Georgia, but in few localities in paying quantities. The deposits are mostly in veins, which at the surface consist of disintegrated quartz containing free gold, which at a slight depth are replaced by refractory sulphurets. Small amounts of silver have been found in Maine and in New Hampshire.

Of the gold product of the world in 1880 the United States furnished 33.65 per cent., of the silver product 44.77 per cent., and of the total out-put of precious metals 38.66 per cent. Other portions of North America contributed 13.92 per cent. of the total product. (See Plate 139.)

It is difficult to determine the extent to which the country has been enriched directly by its mines of gold and silver. It has been estimated, however, by Mr. Albert Williams, Jr., that out of a total production of nearly \$2,000,000,000, about 25 per cent., or \$500,000,000, has been net profit. The indirect benefit of the mining industry has moreover been incalculable in the impetus given to the settlement and agricultural development of a large part of the Cordilleran region, which would otherwise, in all probability, have remained long unimproved.

**Copper.**—The mining of copper is carried on to a greater or less extent in twenty-one of the states and territories, including Alaska. Of the total product of 56,920,266 pounds in 1880, four-fifths was mined in the upper peninsula of Michigan. The distribution of the total is shown on Plate 140.

The ore of the Lake Superior region is native copper. The first mines were opened in 1844 on well defined veins, containing copper in seams, shreds and masses. With few exceptions they were unsuccessful, and are not now in operation. The ore of nearly all the mines which are now producing heavily and profitably in this district, consists of a conglomerate rock, in which the copper is deposited in metallic grains, making from 2 to 5 per cent., by weight, of the rock. The ore is extremely abundant, is easily worked and, with the ample facilities for hoisting and transporting it, is handled in immense quantities. The manipulation consists simply of crushing, stamping, washing, melting and refining the product. One mine in this district known as the "Calumet and Hecla," produces nearly 30 per cent. of the whole copper out-put of the United States.

Deposits of copper ore are widely distributed through Arizona, but mining is carried on successfully only in two or three localities. The mine known as the "Copper Queen" has been producing heavily for several years. Copper is also produced in the Globe district, at Pinal, and in the neighborhood of Tucson.

The ores of Arizona are almost exclusively carbonates and oxides. They are easily worked, but are not of high grade.

The copper production of Montana is mainly from mines in the neighborhood of Butte, Deer Lodge county. The ores are sulphurets and are very rich in copper. They contain also small amounts of silver, sufficient to pay for its extraction.

**Coal.**—The supply of coal in the United States, as indicated by the area of its coal fields now known, constitutes about three-fourths of the world's supply. The following table, compiled mainly from "Mineral Resources of the United States," by Albert Williams, Jr., of the United States Geological Survey, shows the approximate area of the coal regions of the United States in comparison with those of other countries:

COUNTRIES.	Coal Area. (Square Miles.)	Product in 1880. (Gross Tons.)
Great Britain.....	11,900	146,818,612
United States.....	300,000	63,773,603
Germany.....	1,770	52,047,832
France.....	2,086	19,412,112
Belgium.....	510	16,866,698
Austria.....	1,800	16,500,000
India.....	2,004	4,000,000
Russia.....	30,000	3,218,661
Australia.....	24,840	1,571,736
Nova Scotia.....	18,000	1,032,710
Japan.....	5,000	850,000
Spain.....	3,501	800,000
Total.....	401,401	326,891,964

The countries are arranged in the above table in the order of their total product. While the coal area of the United States is over twenty-five times as large as that of Great Britain, its annual product is less than half as great, and its production per square mile of coal lands is less than that of any European country except Russia.

Of the various coal regions of the United States, that of the Appalachian mountains is the field now most largely worked, and probably the one which, for many years to come, will prove of the greatest value. It is known to cover an area of 875 miles in length, with a breadth ranging from 30 to 180 miles—the total area being 58,265 square miles. It comprises large parts of western Pennsylvania, eastern Ohio, the western end of Maryland, a small area in Virginia, a large portion of West Virginia, of eastern Kentucky and Tennessee, and the northeastern corner of Alabama. Much the larger part of this area produces only the bituminous coal. The comparatively small area of anthracite coal, which lies almost entirely within the state of Pennsylvania, is worked to a much greater proportional extent.

The second district comprises an area of 6,700 square miles in the central part of the lower peninsula of Michigan. The seams are thin and weak in some places, and the coal is not of the best quality.

The third district extends over an area second only to that of the Appalachian district, and comprising over 47,000 square miles. It includes nearly two-thirds of the state of Illinois, a large part of western Indiana, and the western portion of Kentucky.

The extent of the fourth district is very indefinite, its limits westward never having been defined, although it is estimated to contain in the neighborhood of 70,000 square miles. It includes the western part of Iowa and Missouri, and extends into Arkansas and the eastern portion of Kansas and Nebraska.

Besides these districts, great areas of Colorado, New Mexico, Wyoming, Utah, California, Oregon and Washington are known to contain coal, varying in quality, from the best bituminous variety to the poorest lignite. In limited areas, local volcanic action has produced from these deposits an excellent quality of anthracite.

The entire area underlaid by coal in the United States, exclusive of the Rocky mountain and Pacific coast areas, has been estimated at about 192,000 square miles. It is safe to estimate the latter at upward of 100,000 square miles, making the total coal area of the country approximately 300,000 square miles. This is about one-tenth the total area of the country, exclusive of Alaska.

The anthracite coal field of Pennsylvania, from which nearly the entire anthracite product is at present obtained, is situated mainly in the following counties: Lackawanna, Luzerne, Carbon, Schuylkill, Columbia, Northumberland, Dauphin, Lebanon and Sullivan. A small additional area in the counties of Susquehanna, Wayne and Lebanon, is now unproductive except in the first mentioned county. The amount of anthracite stored in the deposit in Pennsylvania is estimated by Mr. Albert Williams, Jr., at 25,000,000,000 tons. Of this there had been mined up to the close of 1880—that is, within a period of sixty years—a little over 400,000,000 tons, or about one-sixth of the whole deposit. As the mining of anthracite is going on at a rapidly increasing rate, the remaining five-sixths will be extracted in a proportionally shorter period.

The following table shows, by states and territories, the production of anthracite and bituminous coal in 1870 and 1880. The figures of this table represent only the amounts pro-

duced by establishments, as distinguished from that produced in a small and sporadic way:\*

STATES.	COAL PRODUCT. (Net Tons.)	
	1870.	1880.†
Alabama.....	11,000	323,972
Arkansas.....	.....	14,778
California.....	.....	236,950
Colorado.....	.....	462,747
Georgia.....	.....	154,644
Illinois.....	2,624,163	6,115,377
Indiana.....	437,870	1,454,327
Iowa.....	263,487	1,461,116
Kansas.....	150,582	771,142
Kentucky.....	32,938	946,288
Maryland.....	2,345,153	2,228,917
Michigan.....	28,150	100,800
Missouri.....	621,930	556,304
Montana.....	.....	224
Nebraska.....	1,425	200
North Carolina.....	.....	350
Ohio.....	2,527,285	6,008,595
Oregon.....	.....	43,205
Pennsylvania (anthracite)....	15,648,437	28,640,819
Pennsylvania (bituminous)....	7,800,386	18,425,163
Rhode Island (anthracite)....	14,000	6,176
Tennessee.....	133,418	495,131
Virginia (anthracite).....	.....	2,817
Virginia (bituminous).....	61,803	43,079
Washington.....	.....	145,015
West Virginia.....	608,878	1,839,845
Wyoming.....	.....	589,595
Total.....	33,310,905	71,067,576
Anthracite.....	15,662,437	28,649,812
Bituminous.....	17,648,468	42,417,764

† From returns of the Tenth Census.

The location of the principal coal mining regions in the different states and territories, is shown in general on Plate 141. The following summary defines somewhat more closely the coal region of each state: *Rhode Island.*—Small tracts of anthracite in the northeastern corner, and on Aquidneck or Rhode Island. *Pennsylvania.*—An area estimated at 12,770 square miles, covering all of the state except twenty-four counties in the southeastern part and one county in the northwest corner. *Maryland.*—Alleghany county, near the western end of the state, the most important bituminous coal field of the country in proportion to its extent. *Virginia.*—A small area now productive, mainly in Tazewell and Russell counties. *North Carolina.*—Small tracts in the central part, principally in Chatham and Moore counties. *West Virginia.*—An area comprising three-fourths of the state; especially the region of the Kanawha river, containing the thickest bituminous coal beds of the Appalachian field, and a second important region about the heads of the Potomac (north branch) and Cheat rivers. *Ohio.*—The eastern and southeastern portions of the state, forming about one-third

\* This occasions a discrepancy between the total of bituminous coal given here and that given in the table at the commencement of this chapter, which includes the entire product.

of its area. *Illinois*.—An area of 18,864 square miles, including twenty-five coal mining counties. *Indiana*.—The western portion of the southern half of the state, forming about one-fifth of its area. *Iowa*.—One-third of the state, comprising the southeastern part. *Kentucky*.—The region of the Cumberland plateau, in the eastern part, containing the largest supply of cannel coal in the country, and the western central part of the state, adjoining the coal fields of Indiana and Illinois. *Tennessee*.—About 51,000 square miles in the eastern part, capable of large production. *Alabama*.—The northern central portion of the state, an area of 5,330 square miles. *Georgia*.—A small area in the northwest corner. *Missouri*.—About 23,000 square miles, in the western part of the state. *Arkansas*.—An area of 12,000 square miles, producing semi-bituminous coal. *Indian Territory*.—Mines at Levaune and Lehigh, supplying the railroads which traverse the territory. *Texas*.—About 30,000 square miles in the northern and western parts of the state. *Dakota*.—A large area of undeveloped beds of more or less lignitic coal. *Colorado*.—An area estimated variously at from 20,000 to 50,000 square miles, containing bituminous coal of all varieties, with small deposits of anthracite. *Arizona*.—Several mines along the Atlantic and Pacific railroad. *Utah*.—Considerable areas in the northern part, along the Union Pacific railroad, and in the southern part. *Idaho* and *Montana*.—Large areas as yet little developed. *Wyoming*.—About 4,000 square miles, with largely productive mines at Carbon, Rock Spring and other points along the Union Pacific railroad. *California*.—A small area, productive only near Monte Diablo. *Oregon*.—Small areas in various parts of the state, and productive mines only in the neighborhood of Coos Bay. *Washington*.—Considerable deposits worked at Bellingham Bay and near Seattle.

**Iron.**—The production of iron ore, pig iron and steel in the principal countries of the world, is shown in the following table:\*

COUNTRIES.	Year.	Iron Ore. (Tons.)	Year.	Pig Iron. (Tons.)	Year.	Steel. (Tons.)
Great Britain.....	1882	16,627,000	1882	8,493,287	1882	2,259,649
United States.....	1882	9,000,000	1882	4,623,323	1882	1,736,692
Germany.....	1882	8,150,162	1882	3,170,957	1882	1,050,000
France.....	1882	3,500,000	1882	2,033,104	1882	453,783
Belgium.....	1882	250,000	1882	717,000	1882	200,000
Austria-Hungary..	1881	1,050,000	1881	523,571	1882	225,000
Russia.....	1880	1,023,883	1880	448,514	1880	307,382
Sweden.....	1881	826,254	1881	435,489	1882	52,234
Spain.....	1882	5,000,000	1880	85,939	1873	216
Italy.....	1882	350,000	1882	25,000	1876	2,800
Other countries....	1882	1,000,000	1882	100,000	1882	20,000
Total.....		46,777,299		20,656,184		6,307,756

\* From "Mineral Resources of the United States."—Williams.

The product of the United States is second only to that of Great Britain, having doubled in amount within the five years from 1876 to 1880, while Great Britain required twenty years to increase its product in the same proportion.

Iron ore is found in nearly every state of the Union, and in twenty-two of them is mined to a greater or less extent. The distribution of the iron ore product of the United States in 1880 and 1870 was, according to the Census reports, as follows:

STATES.	1880.		1870.	
	TONS.	VALUE.	TONS.	VALUE.
Alabama.....	184,110	\$189,108	.....	.....
Connecticut.....	35,018	147,799	.....	.....
Delaware.....	2,726	6,553	3,600	\$10,800
Georgia.....	72,705	120,692	.....	.....
Indiana.....	.....	.....	665	2,660
Kentucky.....	33,522	88,930	17,500	53,000
Maine.....	6,000	9,000	.....	.....
Maryland.....	57,940	118,050	98,354	600,246
Massachusetts.....	62,637	226,130	30,061	130,874
Michigan.....	1,837,712	6,034,648	690,393	2,678,965
Missouri.....	386,197	1,674,875	178,842	491,496
New Jersey.....	754,872	2,900,442	362,636	2,025,497
New York.....	1,239,759	3,449,132	525,493	2,095,315
North Carolina.....	3,276	5,102	4,590	9,250
Ohio.....	198,835	448,000	316,529	960,984
Oregon.....	6,972	4,669	.....	.....
Pennsylvania.....	1,820,561	4,318,999	1,095,486	3,944,146
Tennessee.....	89,933	129,951	34,619	131,905
Vermont.....	560	2,750	5,000	25,000
Virginia.....	169,683	384,331	11,950	23,000
West Virginia.....	60,371	88,595	.....	.....
Wisconsin.....	41,440	73,000	20,000	22,000
Total.....	7,064,829	\$20,470,756	3,395,718	\$13,204,138

The distribution of the product for 1860 was not reported by the census; its total amount was 3,218,275 tons, with a value of \$7,723,860. The small product of Indiana in 1880 was not included in the census statistics, nor that of Alabama, Connecticut, Maine, Oregon and West Virginia in 1870.

The principal iron mines of the country are in the following localities: Northern Michigan and Wisconsin, in the neighborhood of Lake Superior; the vicinity of Lake Champlain, in New York; southeastern Missouri; northern New Jersey, and Lebanon county, Pennsylvania. The ore of the Lake Superior district consists of a very pure hematite, ranging from a granular to a slaty structure. It is very abundant, being obtained easily from open quarries, and is either smelted where mined or at Marquette, or other ports on the lakes. The ores of the Lake Champlain district are largely specular iron and hematite. Those of Pennsylvania are mainly limonite of a comparatively low grade, and it is possible to work them profitably only from the fact that the ore and the flux necessary for smelting are found in immediate juxtaposition to coal deposits. The ores of New Jersey are similar to those of Pennsylvania. Those of southeastern Missouri, located in the neighborhood of Iron mountain and Pilot Knob, consist mainly of a rich hematite.

For additional statistics of iron see MANUFACTURES, pages xcv-xcvi.

**Petroleum.**—The history of the petroleum industry in this country, as a branch of mining industry, dates from 1853.

The first flowing well, the "Fountain," was developed in 1861, yielding 300 barrels per day. Others equally profitable followed in quick succession, and the price of oil fell as low as ten cents per barrel. During the year 1862 the production amounted to over 3,000,000 barrels, and during that year and the years following the industry developed to an enormous extent. The total production for 1865 amounted to 22,000,000 barrels.

The free-flowing wells, however, soon declined in their production, owing to the great number of wells which were sunken over the limited area in which the oil was found. At the present time the producing localities are in the western part of the state of Pennsylvania, southwestern New York, northwestern West Virginia, southeastern Ohio, northeastern Kentucky, and a small area in California, which, although gaining in its production, is not as yet of great importance.

The oil region in Pennsylvania and New York continues to be the principal producer. It has a length in a northeast and southwest direction of about 160 miles, and is forty miles broad at the center. Within this area are scattered about the oil-producing localities in the following counties: Venango, Forest, Warren, McKean, Beaver and Butler counties, Pennsylvania, and Alleghany county, New York. Of these the largest producer at present is McKean county, Pennsylvania, after which follow Alleghany county, New York, and Warren and Forest counties, Pennsylvania, while the others are of much less importance.

Oil is now transported to the refining works and to market by means of pipe lines, nearly all of which are under the control of the Standard Oil Company, which practically monopolizes the business of refining the oil. The crude oil from the wells, after being measured, is run directly into the great tanks of the company, and certificates to the amount, known as "pipe line certificates," are issued to the owners. In 1878 the statement published by the Pipe Line Company showed that it had in active operation nearly 2,000 miles of pipe, with necessary appurtenances for repairing the lines. Since that time it has greatly increased its lines, and a moderate estimate would place the mileage at 4,000—connecting some 20,000 wells with the market. The charges for piping and storage amount to twenty cents per barrel. The company does not insure the oil in its hands, but all losses from accident or fire are divided up among the several owners of the oil.

**Lead.**—Prior to the opening of the last decade the principal lead-producing regions of the United States were two in number: First, the upper Mississippi region, comprising nearly 3,000 square miles, in northern Illinois, southwestern Wisconsin and eastern Iowa; and, second, a much smaller but more productive district in eastern Missouri, principally in Washington county, but extending into Jefferson and Franklin counties.

The deposits of both these districts are of galena, and consist of pockets and gash veins in lower silurian limestone. They were worked to a small extent even in the last century, but were not largely developed until 1826, at which time the production began to increase rapidly. Between 1840 and 1848 the out-put from these mines was so heavy that a large amount of lead was exported, but in 1850, in consequence of their comparative exhaustion, the importation of lead was resumed, and has continued to be large until a very recent date. These two regions produced jointly, during 1880, 27,690 net tons, of which only about one-eighth was from the upper Mississippi district.

In 1871 a third district in southwestern Missouri and southeastern Kansas began to be developed, and has gradually increased its product, which in 1879, amounted to 22,625 gross tons.

The following table gives the annual lead production in the United States from 1825 to the present date, in net tons:\*

YEAR.	NET TONS.	YEAR.	NET TONS.	YEAR.	NET TONS.
1825.....	1,500	1847...	28,000	1864....	15,300
1830.....	8,000	1848....	25,000	1865....	14,700
1831.....	7,500	1849....	23,500	1866....	16,100
1832.....	10,000	1850....	22,000	1867....	15,200
1833.....	11,000	1851....	18,500	1868....	16,400
1834.....	12,000	1852....	15,700	1869....	17,500
1835.....	13,000	1853....	16,800	1870....	17,830
1836.....	15,000	1854....	16,500	1871....	20,000
1837.....	13,500	1855....	15,800	1872....	25,880
1838.....	15,000	1856....	16,000	1873....	42,540
1839.....	17,500	1857....	15,800	1874....	52,080
1840.....	17,000	1858....	15,300	1875....	59,640
1841.....	20,500	1859....	16,400	1876....	64,070
1842.....	24,000	1860....	15,600	1877....	81,900
1843.....	25,000	1861....	14,100	1878....	91,060
1844.....	26,000	1862....	14,200	1879....	92,780
1845.....	30,000	1863....	14,800	1880....	97,825

As mentioned in the opening of this chapter, the Census statistics of the production of lead are only partial. States and territories not reported as producing, are estimated as follows: In Utah lead is mined and smelted in large amounts in connection with silver

\* For the years between 1825 and 1853, the figures are those given by Whitney; for the later years the authority is Edward A. Caswell.

mining. Its product in 1880 was 15,000 net tons, and that of Nevada 16,659 tons, the latter almost entirely from the Eureka silver-mining district. On the opening of the Leadville deposits, in 1877, Colorado became the largest producer of lead. In 1880 the product was 35,674 net tons, nearly all of which was from the Leadville district. In Montana and Idaho small quantities of lead have been produced in connection with silver mining. In the Appalachian region lead is produced in paying quantities only in Virginia and eastern Tennessee, the product, however, being small.

**Zinc.**—The amount of zinc produced in the United States, prior to 1873, was very small. In that year the production was reported to be 7,343 net tons. In 1875, it was 15,833 net tons, and in 1880, the Census Report placed the product at 23,239 net tons. The imports of zinc amounted in 1872 to nearly 13,500 net tons; but with the increase of the product in this country, they fell off greatly. In 1875, the importation did not exceed one-third that of 1872, and in 1880, was but 4,454 net tons, while the exports of domestic zinc amounted to 744 tons.

The principal mines of zinc are in New Jersey, Pennsylvania, Virginia, Wisconsin, Illinois, Tennessee, Missouri and Kansas. Those of New Jersey are in the neighborhood of the town of Franklin, Sussex county. The ores are the red oxide, willamite and franklinite. The deposits fill a space between limestone walls, and are chimney-like in form. In Pennsylvania, the zinc deposits are in the Saucon valley, Lehigh county. Although at one time extensively worked, they now produce but little. In Wythe county, Virginia, zinc ore is found scattered over the surface of the ground, and has been collected and sold to the extent of several thousand tons.

The zinc-producing district of Illinois and Wisconsin is practically the same as the lead district, already described. In the earlier days of lead-mining in this district, the zinc ores, consisting here of zinc blende intimately associated with galena, were not recognized as valuable, but of late years they have been worked quite extensively. The deposits of zinc ores near Knoxville, Tennessee, have, for a number of years past, produced but little.

The zinc region of southwestern Missouri and eastern Kansas is coextensive with the lead region heretofore described in treating of that metal. It is found in the counties of Greene, Dade, Jasper, Lawrence, Newton and McDonald in Missouri, and Cherokee county, Kansas. The ore is zinc blende and calamine,

associated with galena and flint, and the deposit lies under a bed of limestone. The production of this district is now so large as to control the zinc market of the United States.

**Salt.**—Salt is made extensively in Michigan, New York, West Virginia and Ohio by evaporation, mainly by artificial heat, from subterranean brines. To a smaller extent it is produced by the same means in Pennsylvania, Utah (from the water of Great Salt Lake), Virginia, Nevada, Texas, Kentucky, Kansas and Wyoming, and is largely produced in California by the evaporation of sea water; and, during the census year, a small amount was made in Massachusetts in this way.

During the census year, the principal production of the country was derived from the salt wells in Michigan and New York, from solar evaporation in California, and from the mines of rock salt at Petite Anse, on the coast of Louisiana. The distribution of the total product among the different states is shown on Plate 142.

The earliest production of salt on a large scale, from subterranean brines, was in West Virginia, on the Kanawha river, and in southeastern Ohio, in the neighborhood of the Ohio river. The brine from the springs of this region is of low grade, and the product of the New York and Michigan wells has gradually superseded West Virginia salt in the market, except for merely local consumption.

The New York salt springs are mainly in the Onondaga district, in the western part of the state. The brine is obtained by means of pumping, from artesian wells. The property is owned by the state, by which it is leased to individuals. Deposits of rock salt, recently discovered in the neighborhood of the salt springs in New York, promise to be very valuable.

The salt production of Michigan is derived from the following counties: Bay, Saginaw, Huron, Iosco, Midland and Gratiot, situated on or near Saginaw bay. The brine from these springs is the strongest which has yet been discovered in large quantities. Owing to the cheapness of fuel employed in the manufacture, consisting of the refuse from the saw-mills in the immediate neighborhood, the salt of this district practically controls the market at present. The production of Michigan has risen from 4,000 barrels, in 1860, to nearly 2,750,000 in 1880.

The deposit of rock salt at Petite Anse, Louisiana, upon one of the small islands on the borders of the coast swamp, is of enormous extent and of excellent quality. An idea of

the magnitude of the deposit may be gained from the fact that, up to the present time, the workings have developed a rectangular mass 640 feet by 380 feet in horizontal dimensions, while a shaft has been sunken through 165 feet of solid salt, and no limits have been reached in either direction. Estimating on a basis of these dimensions, the property, as thus far developed, contains 40,000,000 cubic feet, or about 2,800,000 tons of salt. Further surface explorations by means of pits have established the fact that salt exists over an area of 144 acres, or more than ten times the area now explored by underground workings. The existence of this deposit has been known for many years, and mining operations have been carried on at various times, but with unprofitable results until recently. The company now controlling the property is rapidly increasing the out-put.

**Fisheries.**—During the census year there were employed in the fisheries of the United States, including in this term not only the fisheries proper, but the catching of seals and whales, and the dredging of oysters, a capital of \$37,955,349. By this industry, 131,426 persons earned a livelihood, while the products had a value of \$43,046,053. Of this, somewhat more than one-half, or \$22,405,018, was the product of fisheries proper, or, as they are designated by the Census, "General Fisheries." These are in the main distributed along the sea and lake coasts, the catch from interior river waters being of but little comparative value. The extensive cod and mackerel fisheries help to place Massachusetts and Maine in the lead in this industry, while, upon the Pacific coast, the great interest of salmon-canning places Oregon and California in the third and fifth ranks respectively, the fourth place being held by New York. The following table shows the product of general fisheries in each district of the sea and lake coasts:

GENERAL FISHERIES.	PRODUCT.
New England States.....	\$10,014,645
Middle States, exclusive of Great Lakes...	2,882,294
Southern Atlantic States.....	2,217,797
Gulf States.....	713,594
Pacific States and Territories.....	4,792,638
Great Lakes.....	1,784,050
Total.....	\$22,405,018

Of the total product, nearly one-half comes from the New England states, and much more than one-fifth from the Pacific coast.

Next to the general fisheries in importance is the oyster fishery, which in 1880 had a product valued at \$13,403,852. The greatest develop-

ment of this industry is in Chesapeake Bay, which in the census year produced more than half the oysters of the country. Second to this was the product of New York Bay and Long Island Sound, while smaller amounts were obtained at other points on the Atlantic and Gulf coasts.

The product of the seal fishery, which, in 1880, was valued at \$2,289,813, is confined almost entirely to the islands of St. Paul and St. George, of the Pribylov group, in Bering sea. Indeed, there are practically none of the fur-seal taken elsewhere within the limits of the United States. A monopoly of the fur-seal fishery upon these islands is enjoyed by the Alaska Fur Company, in consideration of a royalty paid to the Government and of the observance of certain restrictions in regard to the destruction of these animals. The principal of these restrictions are that none but full grown males shall be slaughtered, and of these a number not greater than 100,000 in each year. The catch of seals reported from other states and territories was almost entirely of the hair-seal species.

The menhaden fishery, which had a product in 1880 valued at \$2,116,787, is confined to that part of the Atlantic coast between Massachusetts and Virginia, and has its greatest development in New York, Virginia, Connecticut and Rhode Island.

The product of the whale fishery was, in 1880, \$2,323,943. This industry, once of paramount importance to the cities and towns on the coast of Massachusetts, Rhode Island and Connecticut has, during the past twenty-five years diminished astonishingly. Between 1840 and 1860, the tonnage employed in this pursuit ranged from 146,000 to nearly 200,000, being at a maximum in 1858, when it reached 198,594 tons. Since then it has declined until, in 1880, but 38,408 tons were employed, or less than one-fifth of the maximum. In 1860 the value of the products of the whale fishery was \$7,749,305, or more than three times that of 1880.

**Railways.**—In 1830 there were twenty-three miles of railroad in the United States. On June 1, 1880, there were, according to the report of the Census, 87,891 miles in operation, and at the close of the year, according to Poor's "Manual of the Railroads of the United States," not less than 93,671 miles—enough to encompass the globe three and one-half times on a great circle. This represents the progress of fifty years.

The construction of railroads began in this country about 1825, with the use of horse power

and gravity. The application of locomotive engines, with stationary engines to overcome heavy grades, immediately occasioned a great increase in railway building.

At the beginning of 1835, as estimated by Pitkin, who expressed grave apprehensions regarding this new element of material interest, the total cost of railroads completed, or near completion, was about \$30,000,000. He deplored the craze for railroads at some length, in the following strain: "In this, as in everything else which is new and connected with individual interest, fancied benefits outrun sober calculations." But, despite Pitkin and other conservatives, railroad building continued with only partial intermissions, and even now shows few signs of abatement. The diagrams upon Plate 147 illustrate far more forcibly than columns of figures, the wonderful progress of railroad construction in this country, which now has more miles of railway than all of Europe, and nearly two-fifths of the entire mileage of the world.

On June 1, 1880, in addition to 87,891 miles of completed railroad in the United States, there were 10,016 miles under construction, and about 41,000 miles of projected roads and extensions. The number of railroad companies was 1,482. The following is a general statement of the financial condition of these companies at that date:

STATEMENT, JUNE 1, 1880.	Amount.	Average per Mile.
<i>Assets.</i>		
Cost of construction of roads—total...	\$4,112,367,176	\$47,387
Cost of equipment—total.....	418,045,458	4,817
Value of lands and buildings.....	103,319,845	1,191
Value of telegraph lines, etc.....	204,913,196	2,361
Stock and bonds owned—issued by other companies.....	343,800,132	3,962
Cash and other assets.....	353,973,981	4,079
Total assets.....	\$5,536,419,788	\$63,797
<i>Liabilities.</i>		
Capital stock.....	\$2,613,606,264	\$30,117
Funded debt.....	2,390,915,402	27,551
Floating debt.....	421,200,894	4,854
Total capital and debt.....	\$5,425,722,560	\$62,522
Profit and loss, to credit.....	110,697,228	1,275
Total liabilities.....	\$5,536,419,788	\$63,797
<i>For the Year.</i>		
Gross transportation earnings.....	\$580,459,594	\$6,689
Total income.....	661,295,391	7,620
Transportation expenses.....	352,800,120	4,065
Total expenditures.....	541,950,795	6,245
Net transportation earnings.....	227,650,474	2,623
Net income, or profit.....	119,344,596	1,375
Dividends declared.....	70,550,342	813
Amount retained.....	48,794,254	562

Including all the railroads in the country, the dividends declared formed 2.7 per cent. of the capital stock, and the net income 4.57 per cent. Of the whole number of companies, however, only 623 reported a net income. These

companies represented 80 per cent. of the railroad capital of the country, or \$2,103,068,246, and the profit, either paid in dividends or available for such payment, amounted to \$132,989,336, showing an average profit of 6.32 per cent. upon their stock.

The transportation earnings were distributed as follows:

PASSENGER TRAFFIC.	Amount.	Percentage of Total Passenger Traffic.
Local passenger traffic.....	\$98,321,340	68.23
Through passenger traffic....	44,514,393	30.89
All other passenger traffic....	1,265,976	0.88

FREIGHT TRAFFIC.	Amount.	Percentage of Total Freight Traffic.
Local freight.....	\$233,688,202	56.16
Through freight.....	176,909,131	42.51
All other freight.....	5,548,425	1.33

ALL TRAFFIC.	Amount.	Percentage of all Traffic.
Passenger traffic.....	\$144,101,709	24.83
Freight traffic.....	416,145,758	71.69
Mail.....	10,472,813	1.80
Express.....	8,828,259	1.52
Other earnings.....	902,055	0.16

Transportation expenses were divided as follows:

TRANSPORTATION EXPENSES.	Amount.	Percentage of Expenses.
Maintaining road and real estate...	\$102,583,043	29.08
Repairs of rolling stock.....	54,985,340	15.58
Operating and general expenses....	195,321,737	55.34

On 86,782 miles operated, the gross earnings per mile were \$6,688; the expenses per mile, \$4,065, and the net earnings, \$2,623 per mile. The expenses were 60.7% per cent., and the net earnings 39.2% per cent. of the gross earnings.

The statistics of transportation and traffic may be summarized as follows:

TRAINS.	Miles Run.	Gross Earnings. (Per Mile.)	Expenses. (Per Mile.)	Net Earnings. (Per Mile.)
Freight.....	251,022,710	\$1.65	\$0.98	\$0.67
Passenger.....	138,225,621	1.18	0.76	0.43

Freight tonnage:

Number of tons carried.....	290,897,395
Average distance carried, miles.....	111
Tons carried one mile.....	32,348,846,693
Revenue.....	\$416,145,758
Receipts per ton, per mile, cents.....	1.42
Cost per ton, per mile, cents.....	0.76
Profit per ton, per mile, cents.....	0.66

Passenger traffic:

Number of passengers carried.....	269,583,340
Average distance carried, miles.....	23
Passengers carried one mile.....	6,189,240,914
Revenue.....	\$144,101,709
Receipts per passenger, per mile, cents.....	2.38
Cost per passenger, per mile, cents.....	1.76
Profit per passenger, per mile, cents.....	0.62

The aggregate freight tonnage was divided as follows:

ARTICLES OF FREIGHT.	Per Cent. of Total.	ARTICLES OF FREIGHT.	Per Cent. of Total.
Coal.....	30.8	Stone, lime, cement, clay and sand.....	3.1
Merchandise and miscellaneous..	20.0	Petroleum.....	2.6
Grain.....	14.4	Flour.....	2.5
Lumber and other forest products..	8.8	Provisions.....	2.4
Manufactures.....	6.1	Cotton.....	1.4
Pig, bloom and railroad iron....	4.0	Unspecified.....	0.2
Live stock.....	3.7		

The equipment of the railroads of the country consisted of 17,412 locomotives, 12,330 passenger cars, 4,475 mail, express and baggage cars, 375,312 freight cars, and 80,138 cars of other kinds. Steel rails were in use upon 33,680 miles of track. The total number of employes was 418,957, and the annual payroll amounted to \$195,350,013.

The classification of employes was as follows:

EMPLOYÉS.	Number.	Percentage of Total.
General officers.....	3,375	0.9
General office clerks.....	8,655	2.1
Stationmen.....	63,380	15.1
Trainmen.....	79,650	19.0
Shopmen.....	89,714	21.4
Trackmen.....	122,489	29.2
All other employes.....	51,694	12.3

Of the 79,650 trainmen, 18,977 were engineers, 12,419 conductors, and the remaining 48,254 included baggagemen, brakemen, firemen and other regular train hands. Of the 89,714 shopmen, 22,766 were machinists and 23,202 carpenters. It will be observed that the shopmen and trackmen include more than one-half of all the employes, while those operating trains form about one-fifth.

It appears from the following table that more than one-half of all those injured by railway accidents in 1880 were employes of the companies, and only about one-twelfth were passengers, while nearly three-eighths were neither passengers nor employes, but were injured in crossing the tracks:

SUMMARY OF RAILWAY ACCIDENTS. 1880.	TOTAL.	THROUGH CARELESSNESS OF THE INJURED.		FATAL.	
		Number.	Per Cent. of Total.	Number.	Per Cent. of Total.
To passengers...	687	295	42.94	143	20.82
To employes....	4,540	3,276	72.16	923	20.33
To others.....	2,988	2,777	95.04	1,475	49.36
Aggregate....	8,215	6,348	77.89	2,541	30.93

From the above table it appears that the chances of injury in passenger travel by rail are but 1 to 9,000,000 for each mile traveled, while the chances of fatal injury are but one-fifth as great, or 1 to 45,000,000.

Out of the 269,583,340 passengers carried

during the year, only one in 392,406 was injured, and only one in 1,885,199 was killed by railway accidents. The relation between this immunity from accident and the large number of hands—trackmen and shopmen, as well as trainmen and stationmen—employed, should not escape notice. In estimating the number of employes who contribute to the passenger's safety, it is proper to include not only those operating trains, but all engaged in the care of the track and of the rolling-stock. Estimating the average number of passengers carried daily as  $\frac{1}{365}$  of the aggregate for the year, or 738,584 daily passengers, and that, on the basis of ten hours' work per day, at least ten-twenty-fourths of the whole force of these employes, or 148,115 men, are constantly on duty during the hours when passenger trains are running, there is one employe at work for every five passengers carried.

On an average, every inhabitant of the United States expended \$2.87 in railway travel during the year, or, estimating the average rate per mile at  $2\frac{33}{100}$  cents, each person traveled a distance of 123 miles.

**Land Grants.**—It has been estimated by the General Land Office that the total amount of land granted by the United States in aid of railroads, canals and wagon roads, has been in the neighborhood of 187,000,000 acres, or over 296,000 square miles—an area greater than that of the state of Texas, and nearly five times that of the New England states. With the assistance of these grants about 15,000 miles of railroad have been constructed. As the grants made were, in nearly all cases, of alternate sections of land, the others remaining the property of the Government, the latter were by the construction of the road greatly enhanced in value and made marketable, thereby increasing the national revenues. It may safely be said that, although in most cases the recipients of these grants have profited greatly by them, the Government, instead of being a loser, has also profited very largely, both directly in the gains to its treasury, and indirectly in the development of its waste territory. Nearly all of these grants have been made to railway companies, few having been made to canals, and none to wagon roads in recent years.

Besides the usual grant of alternate sections of land for a certain breadth upon each side of the road or proposed road, there has been added in many cases an indemnity strip of specified breadth, outside of the absolute grant. Within this indemnity strip the company has been allowed to select land to indemnify itself



for areas already occupied within the absolute limits at the time of making the grant. It is a common misapprehension that a railway grant includes the whole of the alternate sections to the outside limits of the indemnity strip. In many cases, notably those of the Union Pacific, Central Pacific, Kansas Pacific, and Sioux City and Pacific railroads, indemnity strips were not granted, except in certain states, but whatever land owned by other parties was found to be within the absolute grant was lost to the railroad company.

Further conditions were attached to the grants, which, if not fulfilled within a certain time, were to cause a forfeiture. It must be added that cases of actual forfeiture have been very few, although failures to comply with the conditions imposed have been numerous. Most of the grants have been made to states in trust for the railroad companies. To some of the largest railroad corporations building lines in the West, including those above enumerated, the grants were made directly.

The total area patented to railroads and wagon roads, under land grant acts, prior to June 30, 1880, is given by the Public Land Commission at 45,647,347 acres, or 71,324 square miles, an area but little larger than that of the state of Missouri.

The following is a list, as complete as possible, of the different land grants made to railroads, with a brief statement of the conditions under which they were given, the areas thus far actually patented to the companies, and an estimate of the absolute areas which by the grants have become or are to become the property of the companies. The limits, both of absolute and indemnity strips, are given as measured from the line of road, on either side—thus, 6 and 15, means that within a strip six miles in width on each side of the road, each alternate section is to be the property of the company, i. e., six sections on each linear mile of road; and, further, that within a strip fifteen miles in breadth on each side, i. e., extending nine miles outside the absolute grant, the company is at liberty to select land to repay itself for that already occupied or granted to other parties within the absolute grant.

The letters after the names of certain roads indicate that in cases so marked, grants were not made to the roads directly, but to states, in trust for the roads, as follows: *a.* Alabama, *b.* Michigan, *c.* Iowa, *d.* Wisconsin, *e.* Florida, *f.* Missouri, *g.* Arkansas, *h.* Louisiana, *i.* Mississippi, *j.* Illinois, *k.* Minnesota, and *l.* Kansas. In the other cases, the grants were made to the roads directly.

LAND GRANTS TO RAILROADS.

CORPORATION.	Date of Act.	Limit of Absolute Grant.	Limit of Indemnity Grant.	Acres Patented up to June 30, 1880.	Estimated Total Area of Grant. (Acres.)
Alabama and Chattanooga..... <i>a</i>	1856	6	15	553,581	460,000
Alabama and Florida..... <i>a</i>	1856	6	15	394,523	394,523
Atchison, Topeka and Santa Fé..... <i>d</i>	1863	10	20	2,474,686	2,995,200
*Atlantic & Pacific { in States....	1866	20	30	504,537	22,672,000
{ in Territories	1866	40	50		
Bay de Noquet and Marquette..... <i>b</i>	1865	200 sections.		128,000	128,000
Burlington and Missouri River (in Nebraska).....	1864	20 sections per mile.		2,374,091	2,441,600
Burlington and Missouri River (in Iowa)..... <i>c</i>	1864	20	....	388,818	389,124
Cedar Rapids & Missouri River..... <i>c</i>	1864	20	....	1,140,494	1,156,988
Central Branch, Union Pacific.....	1864	20	....	187,608	265,000
Central Pacific.....	1864	20	....	1,133,590	6,500,000
Chicago, Rock Island & Pacific..... <i>c</i>	1864	20	....	643,307	645,307
Chicago, Milwaukee & St. Paul..... <i>a</i>	1864	10	20	138,285	350,000
Chicago and Northwestern (in Michigan)..... <i>b</i>	1865	20	....	517,594	520,000
Chicago and Northwestern (in Wisconsin)..... <i>a</i>	1856	6	15	545,576	550,000
Chicago, St. Paul & Minneapolis..... <i>d</i>	1856	10	20	474,913	805,816
Coosa and Tennessee..... <i>a</i>	1856	6	15	67,785	68,000
Denver Pacific.....	1869	20	....	49,812	800,000
Des Moines Valley..... <i>c</i>	1846	5	....	369,002	369,002
Dubuque and Sioux City..... <i>c</i>	1856	6	15	550,467	552,000
Flint and Pere Marquette..... <i>b</i>	1856	6	15	512,337	513,000
Florida.....	1856	6	15	281,984	281,984
Florida and Alabama..... <i>c</i>	1856	6	15	165,688	165,688
Florida, Atlantic & Gulf Central..... <i>e</i>	1856	6	15	37,583	37,583
Grand Rapids and Indiana..... <i>b</i>	1856	6	15	952,960	.....
“ “ from Fort Wayne to Grand Rapids..... <i>b</i>	1865	6	20		
Hannibal and St. Joseph..... <i>f</i>	1852	6	15	603,506	603,506
Hastings and Dakota..... <i>k</i>	1866	10	20	225,179	350,000
Illinois Central..... <i>j</i>	1850	6	15	2,595,053	2,595,053
Iowa Falls and Sioux City..... <i>c</i>	1856	6	15	683,024	683,500
Jackson, Lansing & Saginaw..... <i>b</i>	1856	6	15	743,009	750,000
Kansas Pacific.....	1864	20	....	828,830	6,000,000
Lake Superior and Mississippi..... <i>k</i>	1864	10	20	860,564	862,000
Leavenworth, Lawrence and Galveston..... <i>l</i>	1863	10	20	256,282	260,000
Little Rock and Fort Smith..... <i>g</i>	1866	6	20	916,716	1,056,378
Marquette, Houghton and Ontonagon..... <i>b</i>	1865	20	....	437,385	552,515
Memphis and Little Rock..... <i>g</i>	1866	6	20	141,845	141,845
Minnesota Central..... <i>k</i>	1865	10	20	179,736	180,000
Missouri, Kansas and Texas..... <i>l</i>	1863	10	20	658,068	660,000
Missouri River, Fort Scott and Gulf..... <i>c</i>	1866	10	20	21,342	21,342
Mobile and Ohio..... <i>a, i</i>	1850	6	15	1,156,658	1,156,658
Mobile and Girard..... <i>a</i>	1856	6	15	504,146	505,000
New Orleans, Opelousas & Great Western..... <i>h</i>	1856	6	15	719,194	719,194
New Orleans, Baton Rouge and Vicksburg.....	1871	20	30	.....	903,218
*Northern Pacific { in States....	1864	20	30 & 40	746,510	42,000,000
{ in Territories	1864	40	50 & 60		
North Louisiana and Texas..... <i>h</i>	1856	6	15	353,212	353,212
Oregon Branch of Central Pacific	1866	20	30	1,338,039	2,127,000
Oregon and California.....	1866	20	30	323,149	2,500,000
Oregon Central.....	1870	20	25	.....	1,000,000
Pensacola and Georgia..... <i>e</i>	1856	6	15	1,275,218	1,275,212
Port Huron & Lake Michigan..... <i>b</i>	1856	6	15	37,427	37,427
St. Croix and Lake Superior..... <i>d</i>	1864	10	20	843,497	843,497
St. Joseph and Denver City..... <i>l</i>	1866	10	20	461,813	470,956
St. Louis & Iron Mountain..... <i>f, g</i>	1866	10	20	.....	100,000
St. Louis, Iron Mountain and Southern..... <i>f, g</i>	1866	6	20	1,386,303	1,483,948
St. Paul and Pacific..... <i>k</i>	1865	10	20	1,251,046	.....
“ “ St. Vincent Branch..... <i>k</i>	1871	10	20	789,292	1,500,000
St. Paul and Sioux City..... <i>k</i>	1864	10	20	1,200,358	1,205,000
Selma, Rome and Dalton..... <i>a</i>	1856	6	15	457,407	460,700
Sioux City and St. Paul..... <i>c</i>	1864	10	20	396,999	400,000
Sioux City and Pacific.....	1864	10	....	41,318	45,000
South and North Alabama..... <i>a</i>	1856	6	15	433,600	440,000
Southwest Branch of the Pacific Road..... <i>f</i>	1852	6	15	1,161,205	1,161,205
Southern Pacific.....	1866	20	30	952,597	7,760,000
Southern Minnesota..... <i>k</i>	1866	10	20	454,957	500,000
*Texas Pacific { in Territories	1874	20	30	.....	13,000,000
{ (Southern Pacific) in California.	1874	40	50		
Union Pacific.....	1864	20	....	1,859,475	9,050,000
Vicksburg and Meridian..... <i>i</i>	1856	6	15	198,028	200,000
Western R. R..... <i>k</i>	1865	10	20	659,345	815,000
Winona and St. Peter..... <i>k</i>	1865	10	20	1,326,444	1,670,000
Wisconsin Central..... <i>d</i>	1864	10	20	575,845	1,315,000

\*The indemnity grants here given agree with the statute limits, although not with the maps of the General Land Office from which the map on Plate 147 was prepared.

A number of these grants have been materially modified by legislation since they were first made. The date of act, and the limits given above, are those of the last legislation which affected the grants.

The grant to the Bay de Noquet and Marquette road was peculiar in being an absolute grant of 200 sections of land, and that to the Burlington and Missouri River road in Nebraska was even more peculiar, in that it did not fix the limits within which the twenty sections per linear mile of road were to be selected, in consequence of which it was decided that the road was at liberty to locate its land wherever it chose.

**Steam Craft.**—During the census year there were employed in United States waters, state waters and upon canals, 5,139 steamers, having a tonnage of 1,221,207, and a value of \$80,192,495. Of these vessels there were employed in United States waters, that is, waters having navigable outlets, and subject to customs and inspection laws, 4,778 steamers, measuring 1,194,889 tons, distributed as follows:

DISTRIBUTION OF STEAM CRAFT.	Number of Steamers.	Tonnage.
New England States.....	463	118,554
Middle States.....	1,459	432,803
South Atlantic Coast.....	266	30,833
Gulf of Mexico.....	126	41,611
Great Lakes.....	947	222,290
Upper Mississippi River.....	366	83,918
Ohio River.....	473	107,473
Upper Missouri River.....	44	12,099
Lower Mississippi River.....	315	48,303
Pacific Coast.....	319	97,005

In state waters, that is, waters having no navigable outlets, and not subject to customs laws, the number of steamers was 218, with a tonnage of 9,339. The steam craft on canals numbered 143, measuring 16,979 tons.

The gross earnings of all steam craft during the census year were \$85,091,067. The number of passengers carried was 168,463,001, and the number of tons of freight moved was 25,451,404.

The application of steam power to the propulsion of vessels was first effected on a practical scale by Robert Fulton, in the steamer Clermont, which was completed in 1807. The number of steamers built annually increased rapidly, until the Civil War partially checked the demand.

Up to 1870, the United States led all other nations in amount of steam tonnage, but since that year Great Britain has taken the lead, having in 1880 not less than 2,723,468 tons, or more than double the tonnage of the United States.

The following table gives the number and the tonnage of the steamers built during each decade from the time of their introduction:

CONSTRUCTION OF STEAM VESSELS.	Number.	Tonnage.	Increase in tonnage built. (Per cent.)
From 1807 to 1820.....	128	25,798	.....
From 1821 to 1830.....	385	65,212	153
From 1831 to 1840.....	1,015	175,698	169
From 1841 to 1850.....	1,662	371,035	111
From 1851 to 1860.....	2,521	730,355	97
From 1861 to 1870.....	3,082	900,686	23
From 1871 to 1880.....	3,343	766,294	-15

The minus sign indicates a decrease.

**Canals.**—Prior to the invention of the steam railway, canals were of great importance as highways for the commerce of the country. Even before the beginning of the present century, a project was agitated for a system of public improvements which should unite by a water-way the valley of the Mississippi with navigable waters upon the Atlantic coast, but nothing came of it until after the second war with Great Britain. In 1817 the state of New York passed an act providing for vast internal improvements, including its costly system of canals, and shortly afterward Pennsylvania took similar action, followed by several other states.

For many years thereafter a strong feeling in favor of internal improvements had possession of most of the states. Immense works were projected, and many of them, including the canal systems of New York, Pennsylvania and Ohio, were completed. State debts were increased to enormous amounts, in several cases to the verge of bankruptcy. The enthusiasm for these projects reached its greatest intensity in 1837, when it was suddenly checked by the financial crisis of that period.

It is estimated by Pitkin that on January 1, 1835, there had been completed, or nearly completed, in the United States not less than 2,867 miles of canals, at a cost of \$64,573,099. New York had 715 miles, costing \$15,125,511, and Pennsylvania 861 miles, costing \$23,000,000, these two states having considerably more than one-half of the total mileage.

In 1880, according to the Census, there were in the United States 4,468.<sup>5</sup>/<sub>10</sub> miles of canals, which had cost \$214,041,802. Of this, however, 1,953.<sup>5</sup>/<sub>10</sub> miles, costing \$44,013,166, had been abandoned, and a large part of the remainder were not paying expenses, a result mainly due, of course, to the competition of railways. All the canals of New England are reported as abandoned. Of the 964 miles in New York, 357, or much more than one-third, are no longer in use. In Pennsylvania there have been built 1,106 miles, of which 477 miles have

been abandoned. In Ohio 879 miles have been constructed, of which 674 are still in use. All the canals of Indiana, aggregating 453 miles, have been abandoned.

The canals now in use in the United States have a total length of 2,515.<sup>4</sup>/<sub>100</sub> miles, with slack water navigation in connection with them extending 411.<sup>4</sup>/<sub>100</sub> additional miles. The total cost of construction was \$170,028,636. The freight traffic on canals amounted in 1880 to 21,044,292 tons, yielding a gross income of \$4,538,620. The total expenditures for the year were \$2,954,156, leaving as a net income \$1,584,464, which is but nine-tenths of one per cent. of the cost of construction.

### Newspapers and Periodicals.—

Plates 148 and 149 treat of the newspaper and periodical press of the United States, the first relating to the number of newspapers and periodicals, and the second to the number of each issue, or the aggregate edition, in each state.

It must be understood that the second of these plates, although entitled "Circulation," does not refer strictly to distribution, but to publication, which may or may not conform to the distribution of the edition. It would be impossible to trace, without an exhaustive compilation of the subscription lists of all periodicals, the distribution of the editions over the country from the offices of publication, and this has not been attempted by the Census office.

On Plate 149 the issues are credited to the states in which they are published. This produces the effect of giving to those states which contain great newspaper centers, such as New York, Pennsylvania and Massachusetts, undue prominence, while other states which are largely dependent upon them for their supply of the news and periodical literature, such as New Jersey and Vermont, fall unduly low in the scale.

Of the 11,314 periodicals of all classes published in the country, 78 per cent., or nearly four-fifths, are devoted to news, politics and family reading. The remainder relate especially to the various branches of trade and industry, the professions, science, etc.

Again, the great majority, 76 per cent., are weekly publications, 10 per cent. are monthlies, while daily newspapers form less than 10 per cent. of all.

Of the total number of periodicals, 10,515, or 93 per cent., are published in the English language, 641, or nearly 6 per cent., in German, while the proportion in other languages reaches, in no case, 1 per cent. of the whole number.

Of all the elements of the progress of the United States, the growth of the periodical press is perhaps the most astonishing. In 1850, when the first census of the press was taken, the number of publications was 2,526. In 1860, it had increased to 4,051; in 1870, to 5,871, while ten years later it had nearly doubled, reaching the number of 11,314, or more than four times as great as in 1850. In respect to circulation, the progress has been even more rapid. From a circulation of 5,142,177 in 1850, it leaped to 13,663,409 in 1860; to 20,842,475 in 1870, and in 1880 it reached the enormous number, per issue, of 31,779,686. This was about six-tenths of a copy to each man, woman and child in the country, or very nearly one copy to each person able to read.

Of this immense circulation, that of the daily press forms but a little over 11 per cent., an unexpectedly small proportion.

The distribution of the publications and of their circulation, as shown by the maps on Plates 148 and 149, accords in its general features with the distribution of education, as shown by the maps of illiteracy. In the Northern states and the Western states and territories, there are, in proportion to population, the greatest numbers of publications and the largest circulation, while throughout the South, the proportion is generally low. Since, in considering groups of states, the circulation and its distribution are practically identical, the above sketch outlines the general distribution of the reading public. The disproportion between the North and South in this regard is, however, much less marked in respect to daily publications than in respect to weeklies and monthlies.

The average circulation per publication ranges among the several states through wide limits. Of all the states, Maryland has the largest circulation per publication, namely, 8,841, which is even larger than New York, which stands second in the list with 8,666. Following these are the District of Columbia, with 7,300; Massachusetts, 7,190, and Pennsylvania, 5,900. Most of the states adjoining these have a low average, Vermont having but 840 and New Hampshire 907. In the Southern states, the circulation ranges from a few hundred copies up to 3,045 in Kentucky. In the Northern Central group of states, the number has a somewhat higher average, falling below a thousand only in Dakota, and reaching in Ohio a circulation per publication of 3,863. In the Western states and territories it ranges through very wide limits, from 228 in Montana to 2,721 in California.

**A Comparative Study.**—The general summaries on Plates 150 and 151 serve to bring together, for comparative study, different classes of facts which have been treated individually in earlier chapters. They make apparent the relations of the leading industries to one another, to wealth and to population, and the relations subsisting between population, wealth, public debt, and taxation, and between illiteracy and education.

The names of the states and territories are arranged in the several columns, according to their rank in the feature therein presented; while lines carried from column to column aid the eye in tracing the varying rank of each state.

**Plate 150.**—In the first column of Plate 150, the states are arranged in the order of population. A comparison of the first column with each of the remaining columns, gives the following results by groups of states:

ANALYSIS OF GENERAL SUMMARY BY TOTALS.—PLATE 150.

STATES AND TERRITORIES.	RANK IN POPULATION.	VARIATIONS OF RANK IN PASSING FROM POPULATION TO								AVERAGE RANK.	
		OCCUPATIONS.	WEALTH.	MANUFACTURES.	AGRICULTURE.	LIVE STOCK.	NET DEBT.	TAXATION.	EDUCATION.		ILLITERACY.
<b>North Atlantic.</b>											
Maine.....	27	-1	5	12	-2	2	15	11	8	-6	22.6
New Hampshire...	31	0	4	13	-1	-2	6	6	5	-5	28.4
Vermont.....	32	0	0	9	4	8	0	-2	3	-3	30.1
Massachusetts.....	7	2	2	4	-20	-22	4	2	2	-12	10.8
Rhode Island.....	33	0	8	19	-6	-11	12	7	6	1	29.4
Connecticut.....	28	1	13	21	-3	-4	15	14	12	-2	21.3
New York.....	1	0	0	0	-1	-2	0	0	0	-11	2.4
New Jersey.....	19	0	11	13	-6	-8	14	9	7	-7	15.7
Pennsylvania.....	2	0	0	0	-3	-4	0	0	-2	-9	3.8
<b>South Atlantic.</b>											
Delaware.....	38	-1	2	10	3	-3	3	-1	-1	4	36.4
Maryland.....	23	0	9	10	-3	-3	-1	10	8	6	19.4
District Columbia.	36	-1	2	2	-10	-11	25	1	6	5	34.1
Virginia.....	14	1	-3	-6	-6	-3	5	-4	-6	10	15.2
West Virginia.....	29	0	0	3	-1	6	-8	-1	6	9	27.6
North Carolina....	15	0	-8	-14	-3	-6	-13	-16	-18	13	21.5
South Carolina....	21	1	-9	-9	-2	-10	1	-11	-14	14	24.9
Georgia.....	13	5	-8	-9	3	-5	-1	-9	-12	12	15.4
Florida.....	34	-1	-4	-4	0	-2	0	-4	-7	13	34.9
<b>Southern Central.</b>											
Kentucky.....	8	-4	-5	-9	-4	-3	-10	-7	-9	0	13.1
Tennessee.....	12	-4	-6	-9	-2	-1	2	-12	-9	7	15.4
Alabama.....	17	3	-9	-15	1	-3	-2	-12	-14	14	20.7
Mississippi.....	18	0	-10	-18	5	-1	-18	-9	-6	12	22.5
Louisiana.....	22	0	-2	-3	0	-8	14	2	-6	13	21.0
Texas.....	11	0	-5	-16	0	2	-12	-8	-11	1	15.9
Arkansas.....	25	0	-8	-12	4	3	-5	-8	-9	11	27.4
<b>Northern Central.</b>											
Ohio.....	3	-1	0	-2	0	-1	-3	0	1	-13	4.9
Indiana.....	6	-1	-1	-4	0	-1	-9	-1	0	-12	8.9
Illinois.....	4	1	0	0	3	3	-3	0	1	-11	4.6
Michigan.....	9	0	-2	0	1	-1	-17	-2	1	-13	12.3
Wisconsin.....	16	-1	4	5	7	4	-6	4	-5	-8	14.6
Minnesota.....	26	0	7	10	7	10	-1	5	12	3	21.3
Iowa.....	10	0	0	-9	6	8	-19	2	3	-17	12.6
Missouri.....	5	-1	-1	-3	-2	0	1	-4	-4	-8	7.2
Dakota.....	40	2	0	-1	4	5	1	-1	2	-2	39.0
Nebraska.....	30	0	-1	-3	6	15	-1	7	12	-7	27.2
Kansas.....	20	-4	0	-4	3	12	3	3	7	-8	18.8
<b>Western.</b>											
Montana.....	45	0	1	2	3	8	4	2	2	-1	42.9
Wyoming.....	47	0	1	1	0	8	2	2	0	0	45.6
Colorado.....	35	1	0	4	-2	1	2	7	3	-3	33.7
New Mexico.....	41	1	-2	-3	-2	3	-6	-6	-5	18	41.2
Arizona.....	44	0	-1	-3	-1	-2	2	0	0	3	44.2
Utah.....	39	-2	-2	0	-1	-4	-7	-3	-1	0	41.0
Nevada.....	43	1	4	1	2	1	5	6	6	0	40.4
Idaho.....	46	0	-1	1	2	1	2	0	1	1	45.3
Washington.....	42	-1	0	2	4	-2	-1	2	0	-2	41.4
Oregon.....	37	1	0	2	4	9	-3	1	1	-3	35.8
California.....	24	3	15	12	9	10	8	18	14	-1	12.2

The first and last columns show rank on a scale of 1 to 47; in other columns the figures indicate a gain of rank, except where the minus sign is prefixed, signifying a loss.

The summary on Plate 150 is devoted to total amounts, and the significance of its comparisons is therefore restricted by the wide fundamental differences of area and population existing between the various states.

Comparing the rank in population with that in wealth, it is seen that all of the North Atlantic states gain considerably, except Vermont, New York and Pennsylvania, which hold their own, the two last mentioned states ranking respectively as first and second in both columns. The gain for the entire group averages nearly five places. The sixteen states forming the South Atlantic and Southern Central groups, on the other hand, show an average loss of four places, only Maryland, Delaware and the District of Columbia making gains. In the Northern Central and Western groups there is little relative change of place, except that Wisconsin and Nevada each gain four, Minnesota seven, and California no less than fifteen places. These two groups show an average gain of one place.

The changes in passing from population to manufactures are similar to those above stated, but greater. The North Atlantic states show an average gain of over eleven places, the two Southern groups an average loss of five and one-half places, the Northern Central states a slight average loss, and the Western group a gain of a little over one place.

An inspection of the above table in connection with Plate 150, will enable the reader to measure at a glance the changes of rank as between population and all other features of the summary, in the case of any state. It will be observed that in the column of illiteracy, showing the number of persons ten years of age and over who are unable to write, the state having the greatest number of "illiterates" is ranked highest. Since this is a negative showing, it is virtually a reversal of the order followed in the preceding columns.

The changes shown in comparing, on Plate 150, the rank in manufactures with that in agriculture, are naturally very great, involving material changes in the rank of many of the states. The column relating to live stock shows a general agreement with that of agriculture. New York falls to the third rank, being exceeded by both Illinois and Iowa, while the great cattle states and territories of the West, such as Kansas, Nebraska, Montana and Wyoming, take high rank.

The column of state and local debt presents an agreement, in its general features, with those of population, wealth and manufactures, while, in comparison with agriculture, it shows marked differences. Agricultural states having, as a

rule, comparatively little urban population, have little local debt. Louisiana, Virginia, Tennessee, and other states having a large state debt, take a disproportionately high rank in this column.

A comparison of the column of occupations on the one hand, and those of wealth, manufactures and agriculture on the other, shows in a rude way the diversity in the productive power of labor in the different states. In most Southern states the rank in wealth is much lower than in the number of breadwinners, while the Northern and Western states and territories generally hold their rank, or stand higher in wealth than in number of persons occupied. This feature is still more apparent in contrasting rank in occupations with rank in the sum of the products of the two great industries, manufactures and agriculture.

**Plate 151.**—The summary on Plate 151 presents a much closer approximation to the true relative positions of the states and territories in the ten important features exhibited, than that on Plate 150, for the reason that it deals not with aggregates merely but with ratios, thereby placing the larger and smaller states on a common ground of comparison.

It is manifest, however, that the simple ranking by units from 1 to 47, does not serve to show the precise extent of the differences between states holding consecutive rank. Taking for example the first column of Plate 151, we may pass over as altogether exceptional the difference of 2,705.5 between the density of the District of Columbia, ranking first, and of Rhode Island, the second in rank. It will be seen, however, that the difference of 33.1 between the density of the latter and that of Massachusetts, the third in rank, is a trifle greater than that separating South Carolina, the eighteenth, from Wyoming, the forty-seventh in rank. In other words, the same actual difference is marked, in one case, by a variation of one place in rank, and in another by a variation of twenty-nine places. The difference, again, between the states occupying the third and the fourth rank is even greater than that between the second and third. A reference to the diagram on Plate 22, and similar diagrams on other plates, giving a graphic representation of these differences, will show many like irregularities.

For the purpose of more precise comparison the accompanying table has been prepared, presenting the rank of the states in the several columns by percentages. The state ranking highest in each column of Plate 151 is taken as 100, that ranking lowest as 0, and the rank of each state is expressed by the percentage which

its variation from the lowest forms of the total difference between the lowest and the highest.

In this table the columns of net debt, taxation and illiteracy reverse the order followed in the corresponding columns of Plate 151. While, in a popular sense, a state may be said to rank highest which has the least of debt, taxation and illiteracy per capita, a uniform order is adopted in the table, as better serving the purposes of comparison. The second part of the table presents in detail some of the more important of these comparisons, the number of which might, of course, be greatly extended.

**In Conclusion.**—Of the total population of 50,155,783 in the United States, in 1880, 17,392,099 persons, or 34.68 per cent., were engaged in gainful and reputable occupations. During that year the sum of \$79,339,814 was devoted to public primary education, making \$5.27 for every child of school age, an average tax of 1 $\frac{8}{10}$  mills on every dollar of total wealth of the country.

The gross product of manufactures in 1880, was \$5,369,579,191, and the net product, after deducting the value of materials consumed, was \$1,972,755,642, or \$39.33 per capita. The value of farm products was \$2,213,402,564, or \$44.13 per capita; and of live stock, \$1,500,464,609 in the aggregate, and \$29.92 per capita.

The wealth of the country in 1880, estimated at \$43,642,000,000, was, on an average, \$870.13 for each man, woman and child. Deducting the public debt (national, state and local), amounting to \$3,162,534,517, or \$63.04 per capita, the balance of unencumbered wealth was over \$40,000,000,000, or \$807.09 for every inhabitant. The amount raised by direct taxation was \$302,200,694, or \$6.03 per capita, which was but 6 $\frac{2}{3}$  mills on each dollar of true valuation.

The capital of the country, or that part of its wealth employed in further production, was in 1880 approximately \$30,000,000,000, and its gross income \$10,000,000,000, or about 33 per cent. of the capital. As estimated by Mr. Edward Atkinson (Special Agent, Tenth Census), the annual consumption per capita is

stand first among the nations. In wealth the country now surpasses even Great Britain, and in manufactures and mining, as in the total product of all the industries, it also holds the leading place, which it is not likely ever to lose. Its agricultural products still keep it greatly in advance of all other countries in

controlling the food markets of the world. Its railways have a mileage greater than those of all Europe, while its carrying trade at sea, despite the great decline in this industry, is exceeded only by that of Great Britain.

The advance of the United States to the present position of leadership has been made in a single century from the time when peace with England enabled the new nation to turn its energies to industrial development. It is a mere truism to say that history shows no record of growth in material prosperity at all approaching this; our very familiarity with its results makes it difficult for us fully to comprehend its extraordinary character.

If the conditions of the future could be compared with those of the past, the next hundred years would justify a forecast the figures of which would be almost bewildering. This comparison is of course impossible. Every decade draws this nation more completely within the rule of the ordinary economic laws that govern others,—laws from which its vast unused resources have hitherto exempted it. But

Analysis of General Summary by Ratios.—Plate 151.

STATES AND TERRITORIES.	RANK. In percentages of the total variation from lowest to highest.										SELECTED COMPARISONS OF RANK. The figures indicate a gain of rank—except where the minus sign is prefixed, signifying a loss—in passing from									
	POPULATION. Density per Square Mile.		OCCUPATIONS. Ratio to Total Population.		WEALTH. True Valuation per Capita.		MANUFACTURES. Value of Product per Capita.		AGRICULTURE. Farm Product per Capita.		LIVE STOCK. Value per Capita.		NET DEBT. State and Local, per Capita.		TAXATION. State and Local, per Capita.		EDUCATION. Expenditure per Capita for Primary Schools.		ILLITERACY. Percentage of White Male Adults unable to Write.	
	254.9 Highest. 0.2 Lowest.	56.83 Highest. 27.82 Lowest.	\$1,633.76 Highest. 250.91 Lowest.	\$376.68 Highest. 6.64 Lowest.	\$83.76 Highest. 2.90 Lowest.	\$240.85 Highest. 0.69 Lowest.	\$127.66 Highest. 6.71 Lowest.	\$14.68 Highest. 1.08 Lowest.	\$8.90 Highest. 0.81 Lowest.	48.1 Highest. 1.7 Lowest.	POPULATION TO WEALTH.	OCCUPATIONS TO WEALTH.	WEALTH TO MANUFACTURES.	WEALTH TO AGRICULTURE.	MANUFACTURES TO AGRICULTURE.	WEALTH TO TAXATION.	WEALTH TO EDUCATION.	NET DEBT TO TAXATION.	TAXATION TO EDUCATION.	EDUCATION TO ILLITERACY.
<b>North Atlantic.</b>																				
Maine.....	8	27	37	31	38	10	26	51	29	6	29	10	-6	1	7	14	-8	25	-22	-23
New Hampshire.....	15	46	49	56	42	11	23	50	36	7	34	3	7	-7	-14	1	-13	27	-14	-29
Vermont.....	14	27	44	24	79	21	10	31	25	22	30	17	-20	35	55	-13	-19	21	-6	-3
Massachusetts.....	87	43	94	94	13	3	39	93	60	10	7	51	0	-81	-81	-1	-34	54	-33	-50
Rhode Island.....	100	50	90	100	13	3	37	64	39	17	-10	40	-10	-77	-87	-26	-51	27	-25	-22
Connecticut.....	50	38	80	79	32	7	26	56	43	8	30	42	-1	-48	-47	-24	-37	30	-13	-35
New York.....	42	32	89	56	40	9	32	74	37	8	47	57	-33	-49	-16	-15	-42	40	-37	-29
New Jersey.....	59	25	72	59	29	6	33	51	32	8	13	47	-13	-43	-30	-21	-40	18	-19	-24
Pennsylvania.....	37	21	72	45	34	8	20	42	28	10	35	51	-27	-38	-11	-30	-44	22	-14	-18
<b>South Atlantic.</b>																				
Delaware.....	29	32	49	36	50	9	13	23	18	17	20	17	-13	1	14	-26	-31	10	-5	-1
Maryland.....	37	24	48	29	35	7	9	35	23	14	11	24	-19	-13	6	-13	-25	26	-12	-9
District of Columbia.....	*	33	72	16	0	0	100	53	47	5	*	39	-56	-72	-16	-19	-25	-47	-6	-42
Virginia.....	15	17	15	8	34	7	21	15	6	30	0	-2	-7	19	26	0	-9	-6	-9	24
West Virginia.....	9	2	18	8	35	11	2	17	15	27	9	15	-10	17	27	-1	-3	15	-2	12
North Carolina.....	11	22	5	2	42	6	5	2	1	47	-6	-17	-3	37	40	-3	-4	-3	-1	46
South Carolina.....	13	40	4	3	48	5	11	6	2	30	-9	-36	-1	44	45	2	-2	-5	-4	28
Georgia.....	10	38	8	5	50	6	10	8	3	31	-2	-30	-3	42	45	0	-5	-2	-5	28
Florida.....	2	21	8	4	31	8	8	9	3	26	6	-13	-4	23	27	1	-5	1	-6	23
<b>Southern Central.</b>																				
Kentucky.....	16	12	20	10	44	12	7	15	7	34	4	8	-10	24	34	-5	-13	8	-8	27
Tennessee.....	14	4	13	5	46	11	18	6	4	37	-1	9	-8	33	41	-7	-9	-12	-2	33
Alabama.....	9	39	4	1	52	7	9	34	1	34	-5	-35	-3	48	51	30	-3	25	-33	33
Mississippi.....	9	31	3	0	66	9	8	5	21	5	-6	28	-3	63	66	5	2	7	-3	16
Louisiana.....	8	37	14	5	53	5	35	27	4	29	6	23	-9	39	48	13	-10	-8	-23	25
Texas.....	2	17	15	2	47	15	6	13	4	20	13	-2	-13	32	45	-2	-11	7	-9	16
Arkansas.....	6	16	4	0	64	10	8	9	4	30	-2	-12	-4	60	64	5	0	1	-5	26
<b>Northern Central.</b>																				
Ohio.....	31	11	56	28	57	13	22	52	41	7	25	45	-28	1	29	-4	-15	30	-11	-34
Indiana.....	22	15	36	19	68	15	7	38	36	11	14	21	-17	32	49	2	0	31	-2	-25
Illinois.....	22	16	54	35	78	17	12	51	40	9	32	38	-19	24	43	-3	-14	39	-11	-31
Michigan.....	11	24	42	23	65	14	4	31	33	9	31	18	-19	23	42	-11	9	27	2	-24
Wisconsin.....	9	13	34	25	65	14	7	35	25	10	25	21	-9	31	40	1	-9	28	-10	-15
Minnesota.....	4	17	40	25	75	16	9	33	34	9	36	23	-15	35	50	-7	-6	24	1	-25
Iowa.....	11	16	44	10	100	32	4	42	43	5	33	28	-34	56	90	-2	-1	38	1	-38
Missouri.....	12	15	32	19	51	18	20	27	20	13	20	17	-13	19	32	-5	-12	7	-7	-7
Dakota.....	1	52	18	3	48	20	6	18	27	3	17	-34	-15	30	45	0	9	12	9	-24
Nebraska.....	2	20	29	6	83	30	13	38	40	3	27	9	-23	54	77	9	11	25	2	-37
Kansas.....	5	16	23	7	61	25	13	29	28	3	18	7	-16	38	54	6	5	16	-1	-25
<b>Western.</b>																				
Montana.....	1	100	35	11	60	54	14	65	52	1	34	-65	-24	25	49	30	17	51	-13	-51
Wyoming.....	0	52	51	10	23	100	8	74	38	0	51	-1	-41	-28	13	23	-13	66	-36	-38
Colorado.....	1	84	36	18	29	18	13	74	60	5	35	-48	-18	-7	11	38	24	61	-14	-55
New Mexico.....	1	22	0	1	21	17	0	0	0	100	-1	-22	1	21	20	0	0	0	0	100
Arizona.....	1	94	23	2	15	11	7	46	39	22	22	-71	-21	-8	13	23	16	39	-7	-17
Utah.....	1	0	15	6	25	9	0	14	15	11	14	15	-9	10	19	-1	0	14	1	-4
Nevada.....	1	83	61	8	53	22	13	96	100	6	60	-22	-53	-8	45	35	39	83	4	-94
Idaho.....	1	69	8	9	54	28	6	37	24	2	7	-61	1	46	45	29	16	31	-13	-22
Washington.....	1	42	29	10	66	27	3	42	26	2	28	-13	-19	37	56	13	-3	39	-16	-24
Oregon.....	1	37	34	15	90	33	4	39	31	3	33	-3	-19	56	75	5	-3	35	-8	-28
California.....	2	54	100	35	82	16	14	100	72	7	98	46	-65	-18	47	0	-28	86	-28	-65

\* The density of population in the District of Columbia is properly comparable only with that of cities.

about \$150; in other words, three-fourths of the annual product is consumed in food and raiment, leaving \$2,500,000,000 to be added yearly to the permanent wealth of the country.

Using the estimates of Mr. Mulhall ("Balance Sheet of the World") in regard to other countries, it appears that in nearly all the factors of material prosperity, the United States

with all this the promise of the future is still such as has never been presented to any people; such as not only to justify hopes of continually increasing material prosperity, but also to insure the success of that great political experiment, "whose further history," as an English writer has said, "is of unbounded importance to the future welfare of mankind."