

of Aspinwall, on Limon or Navy Bay, the Atlantic terminus of the road, latitude $9^{\circ} 21' 23''$ N. and longitude $79^{\circ} 53' 52''$ W., the road skirted the western shore of the island of Manzanilla for about three quarters of a mile, then bent to the east, and crossed the channel which separates the island from the main land at a point nearly central of the breadth of the island, thence around the southern and eastern shore of Navy Bay until it reached the small river Mindee, cutting off a bend of this river about one thousand feet from its mouth; then it stretched across the peninsula formed by this bay and the River Chagres up to the mouth of the River Obispo, one of its branches, seldom, however, following the tortuous course of that stream, but cutting across its bends, and touching it only at intervals of two or three miles. The line continued upon the right or easterly bank of the Chagres as far as Barbacoas (twenty-five miles from Aspinwall), where it crossed that river by a wooden bridge six hundred and twenty-five feet in length; from thence it followed the left bank of the Chagres to the mouth of the Obispo River, thirty-one miles from the Atlantic terminus, leaving the native town of Gorgona on the left. After striking the Obispo, the line followed the valley of this stream to its head in the summit-ridge, which it reached $37\frac{3}{8}$ miles from the Atlantic and $10\frac{1}{2}$ miles from the Pacific terminus. The lower part of the valley of the Obispo, being crooked and bound in by precipitous hills, compelled the line to cross the stream twice within the first mile, when it passed the summit-ridge by a cut one fourth of a mile in length and twenty-four feet in depth, and then struck the head waters of the Rio Grande, which flows into the Pacific Ocean. Following the left bank of this stream, and descending by a grade of sixty feet to the mile for the first four miles, the line crossed the rivers Pedro Miguel, Caimitillo, and Cardenas, near their entrance into the Rio Grande; thence it stretched across the savannas of Corrisal and the

swamps of Correndeu, and cut through a spur of Mount Ancon, leaving the main elevation to the right, and reached the Pacific Ocean at Playa Prieta, the northern suburb of the city of Panama.

Four tracks were laid at the Atlantic and three at the Pacific terminus, and the line of the road was well supplied with sidings and machinery for reversing locomotives. A machine shop one hundred and fifty feet long by fifty wide, stocked with first class machinery, sufficient to do all the repairs required for the road, was in operation at Aspinwall; also a blacksmith's shop, containing six suitable forges, and a brass foundry, with a small cupola for iron castings. There was also a car-repair shop, one hundred feet long by eighty feet wide, a freight-house and passenger depôt at either terminus, and suitable buildings for the accommodation of the employes of the Company.

A pier of four hundred and fifty feet in length was constructed at the Panama terminus, which gave greatly increased facilities for embarking and landing passengers and freight, and a steam-tug was substituted for the lighters and small boats which had been previously used for transportation between ship and shore, a distance of two and a half miles. The Company owned, by purchase, fourteen acres of land, having a front of five hundred feet on the bay. The Company also obtained by purchase, in connection with the Pacific Mail Steam-ship Company, a group of four islands in the Bay of Panama, about two and a half miles from the city, affording good shelter and anchorage for vessels of the largest class, and well supplied with good springs of water.

But the road at this time, though in *working* order and performing a large and daily-increasing service, was by no means actually completed. Much of the work, especially on the Pacific division, was of a temporary character; streams were crossed on temporary trestles, many of them of timber procured from the adjoining woods, and which it

was known would not last more than six or eight months; deep ravines, requiring embankments from twenty to eighty feet in height (which it was found, from the nature of the adjoining soil, as well as from the amount of work involved in filling them, would delay the laying of the track for many months), were crossed on temporary trestle-work, in order to obtain the advantage of immediate communication between the two oceans by rail, thereby saving the thousands of men, women, and children, who were then crossing the Isthmus every month, the thirteen miles of mule-ride over a dangerous path, as well as the almost incredible hardships and perils to which they were subjected.

The difficulty and expense of keeping the road open in this state was very great; but, while this was safely accomplished, the work, under the energetic and skillful management of Messrs. Totten and Center, rapidly assumed a permanent character; firm and thoroughly secured embankments took the place of the trestle-work; for the temporary bridges were substituted heavy iron substantial structures, with abutments of stone.

Some idea of the magnitude of the bridge and culvert work may be obtained when it is known that the waterways on the route were no less than one hundred and seventy in number, viz., one hundred and thirty-four culverts, drains, and bridges ten feet and under, the remaining bridges ranging from twelve to six hundred and twenty-five feet in breadth.

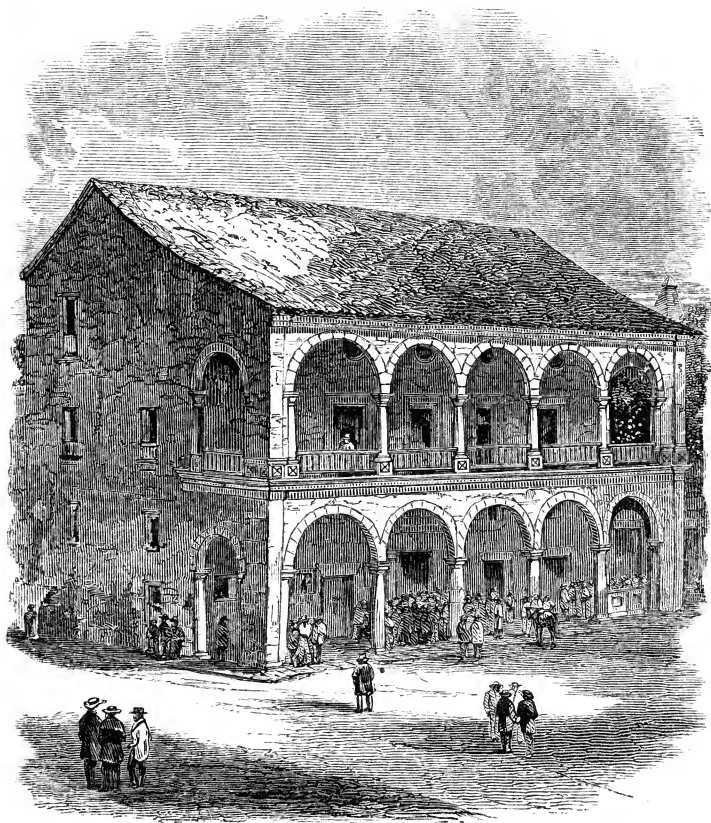
The iron bridge across the Chagres at Barbacoas may be taken, for its great strength and durability, as the type of all like structures on the line of the road. This bridge was composed of six spans of over a hundred feet each, built of boiler iron, with a top and bottom chord two feet in breadth and one inch in thickness, and joined together by a web of boiler iron nine feet in height at the centre and seven feet at the ends. The track was laid on iron floor-girders three feet apart, and the whole structure supported by five piers

and two abutments of hewn stone twenty-six feet wide and eight feet in thickness, increasing in the proportion of an inch to the foot down to their foundations, which were constructed of piles and concrete.

The ballasting, which was, however, previously well under way, was carried on and completed throughout the entire line of the road in the most substantial manner, and the rapidly decaying spruce, pine, and native wood ties were removed, and replaced with ties of lignum-vitæ, imported from the province of Carthagena. Additional buildings for the accommodation of freight and passengers were erected at the Pacific terminus, to meet the wants of a greatly increased business, and at the Atlantic terminus new and commodious wharves were built, besides a massive stone warehouse three hundred feet long by eighty wide, the stone taken from quarries along the line of the road. Large and commodious station-houses, for the use of the local superintendents, were erected at intervals of four miles along the entire line, and an electric telegraph was established between the termini for the use of the Company. These, besides many other improvements, in reducing grades* and straightening curves, were accomplished

* TABLE OF THE GRADES FROM ASPINWALL TO PANAMA.

Rate of grade per mile in feet.	Length of grade in feet.	Rate of grade per mile in feet.	Length of grade in feet.
Level.	123,539	24.82	418
2.64	1,000	26.40	13,600
5.28	1,900	30.00	8,868
7.92	1,500	30.25	1,936
8.45	2,500	31.68	1,100
9.24	3,100	34.15	1,400
10.56	13,313	36.00	2,200
12.14	2,600	36.96	2,396
12.41	4,300	37.49	1,916
13.20	6,500	38.54	1,707
15.10	2,100	46.20	3,430
15.84	3,700	47.30	3,250
17.42	200	52.80	6,300
19.01	1,400	58.87	3,355
20.60	4,900	60.00	20,107
21.12	4,595		71,983
23.25	2,052		179,199
	179,199		251,182



THE CABILDO AT PANAMA.



during the two years following the opening of the road in 1855, involving an additional expenditure of nearly two millions of dollars. This great expenditure was not, however, incurred without satisfactory proof that the enterprise would equal, in its pecuniary advantages, all the calculations which had been made in regard to its increase of revenue. Up to the opening of the road in 1855, that is to say, from the running of the first passenger train in 1852, the amount received for the transportation of passengers and freight was \$2,125,232 31. See Appendix B, p. 61, et seq.

From 1857 the Company were actively engaged in establishing every needful arrangement and improvement which was found necessary to facilitate the perfect working of the road. Side tracks at either terminus were added to meet its increased requirements; the wharves at Aspinwall were improved and covered, and substantial bulk-heads were erected over a considerable portion of the frontage of the port. Much of the low ground on the island was filled in and laid out into streets, and many buildings erected. In addition to this, an immense reservoir was in process of construction on the site of a natural basin some two miles distant, from which water was to be conveyed in iron pipes to Aspinwall for the use of the town and shipping; and a substantial iron light-house, sixty feet in height, and furnished with a Fresnel light, was substituted for the wooden structure at the western side of the entrance to the port. At Panama the wooden pier was replaced by one of iron four hundred and fifty feet in length, and steam-tugs for towage, and several iron launches, each of one hundred tons burthen, were added to the facilities for the transshipment of goods between ship and shore. These were the principal works and improvements up to January, 1859, when the construction account of the road was closed, showing its entire cost up to that date to have been eight millions of dollars.

The *gross earnings* of the road up to that time amounted

to eight millions one hundred and forty-six thousand six hundred and five dollars.

The running expenses, together with depreciation in iron, ties, buildings, etc., amounted to \$2,174,876 51, leaving a balance of \$5,971,728 66 as the legitimate returns for the money invested in the road in a period of seven years, during the first of which but twelve miles were in operation, the second twenty-three, the third thirty-one: only for the last four years was the road in use throughout its entire extent.

Out of these receipts, the directors of the Company, having paid the regular interest on all mortgage and other bonds, a ten per cent. dividend to stockholders in 1852, one of seven per cent. in each of the years 1853 and '54, and one of twelve per cent. for every succeeding year, showed a balance of \$529,041 50, besides a sinking fund of \$153,395 83, and no floating debt.

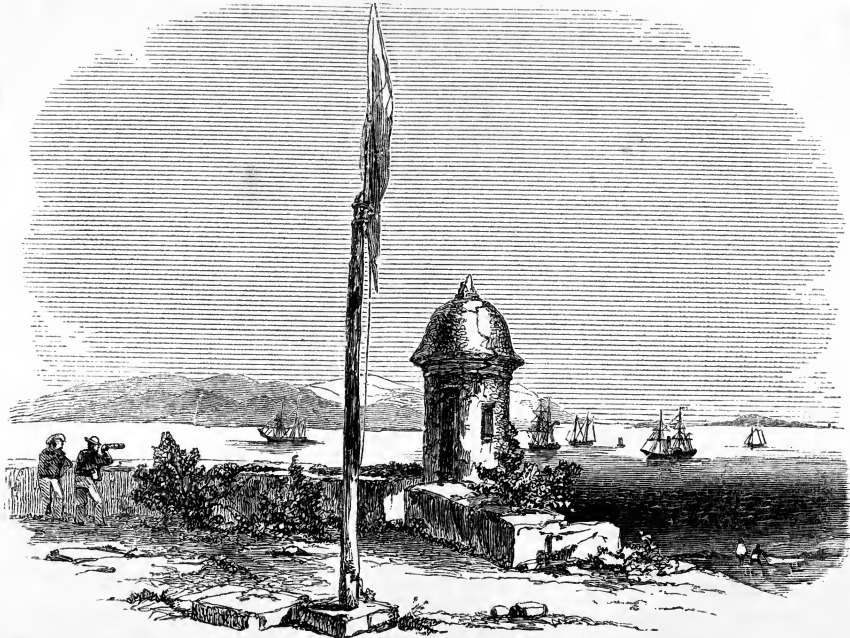
The increase in the receipts from the commencement of the road was as follows:

From December, 1852, 12 miles open, }	} \$73,266 32.
To " 1853, 23 " " }	
From 1853 to 1854, 31 miles open, \$131,143 91.	
From 1854 to 1855, opening of the entire road, \$645,497 29.	
From 1855 to 1858 showed an increase of \$416,006 84; and	
From 1858 to 1859, an increase above that of \$419,477 93.	

(For a particular statement of items of expenditure and income, see Appendix B, page 61, et seq.)

HEALTH OF THE ISTHMUS.

It may interest the general reader to know that more than 196,000 passengers have been transported over the road during the five years ending in December, 1859, and it is not known that a single case of sickness has occurred during or in consequence of the transit since the entire opening of the road in 1855. The diseases contracted by persons in transit previous to that time were of a purely ma-



VIEW FROM THE RAMPARTS, LOOKING TOWARD THE SITE OF THE ANCIENT CITY.



larious character, and identical with the intermittent (fever and ague) and bilious fevers of the Western States, always found resulting from great exposure and fatigue, so often unavoidable while the transit was performed upon mules and in open boats, occupying from two to five days, the traveler frequently obliged to live upon the vilest food, and sleep upon the wet ground or in the but little less comfortless huts of the natives; the comfortable railway carriage, and the passage from ocean to ocean reduced to *three hours*, having fully demonstrated a *perfect* immunity to the traveler from all those varieties of sickness long popularly recognized under the head of *Panama Fever*. The sanitary condition not only of Aspinwall, but of the country along the entire line of the road, has also been improved by the filling in and draining of the swamp and low land to such a degree that the congestive forms of fever among the laborers and residents which, during the earlier days of the road, were the chief causes of mortality, are now rarely met with, and the whole line of the transit will, in point of healthiness, compare favorably with many of the equally recent settlements in the Western States.

SAFETY TO PROPERTY.

The amount of specie conveyed over the road from 1855 to 1860 was over three hundred millions of dollars, *without the loss of a single dollar*; and during the same period there were sent over the road nearly 100,000 bags of mail matter (the greater part of which consisted of mails between the Atlantic States and California), not one of which was lost. And of the many thousands of tons of freight which have been transported over the Panama Railroad since it was first opened, the losses by damage and otherwise do not exceed five thousand dollars.

SOURCES OF BUSINESS.

Erroneous impressions in regard to the sources from whence the business of the Panama Railroad is derived prevail extensively even among intelligent business men and members of our national councils, many regarding it as entirely dependent upon our trade with California. The fact seems to be overlooked that while California has a population estimated at only 500,000, the population of Central America is over 2,000,000; and that that portion of South America, whose only means of communicating with the Atlantic is either by the Isthmus of Panama or around Cape Horn, contains nearly 8,000,000, and that regular and direct steam marine communication exists between those countries and the Panama Railroad.

The fact that up to the establishment of the Isthmus Railroad the trade of South and Central America had been carried on almost exclusively with Europe (that between the United States and those countries being estimated at less than ten per cent. of the whole) has prevented its magnitude and importance from being fully appreciated by the American people.

Careful estimates, however, show that the value of the trade of these countries to and from the Atlantic exceeds \$60,000,000 per annum. The managers of the Panama Railroad Company, from its earliest existence, were aware of that important circumstance, and looked confidently to the business of those regions already existing, and that which would undoubtedly be developed by the facilities afforded by the railroad, as one of the surest elements in its ultimate and permanent success.

It was not lost sight of that the European trade (as far as European influence extended) would cling tenaciously to its circuitous track around Cape Horn, fully aware that, when the business was turned into the direct route across

the Isthmus, a large portion of the trade would be inevitably directed to the nearer markets of the United States; notwithstanding this, the Company rested in the conviction that the shortening of the distance from three thousand to more than four thousand miles for the South American markets, and more than five thousand for the Pacific Central American, besides the avoidance of the well-known perils of Cape Horn, must bring much of the most valuable merchandise across their road so soon as those countries were able to avail themselves of its advantages. The South American states, Chili, Peru, Bolivia, and Ecuador, were put in immediate connection with the road by a British line of steam-ships, which was organized some time previous to the opening of the road, and which, up to that time, had been mainly dependent upon the coastwise trade. The business resulting fully justified the expectations of the Company (see Appendix A, page 57, et seq.); but the Central American states had at that time no means of connection with the road. Their Pacific ports had been so long shut out from remunerative commercial relations that they could not at once realize the advantages the Isthmus railroad offered over the tedious and expensive land-route to the Atlantic; they required to be lifted from the ruts along which they had been creeping and groaning for ages, and placed upon this great commercial highway.

This was accomplished in 1856 by the Panama Railroad Company, who at that time organized a line of steam communication with all their ports from Panama to San Jose de Guatemala.

This departure from the legitimate business of the road was not made until the directors had vainly exhausted every available means in their power for the establishment of an independent company. But the development of the Central American trade was so manifestly for the interest of the Isthmus transit, and so certain to follow the establish-

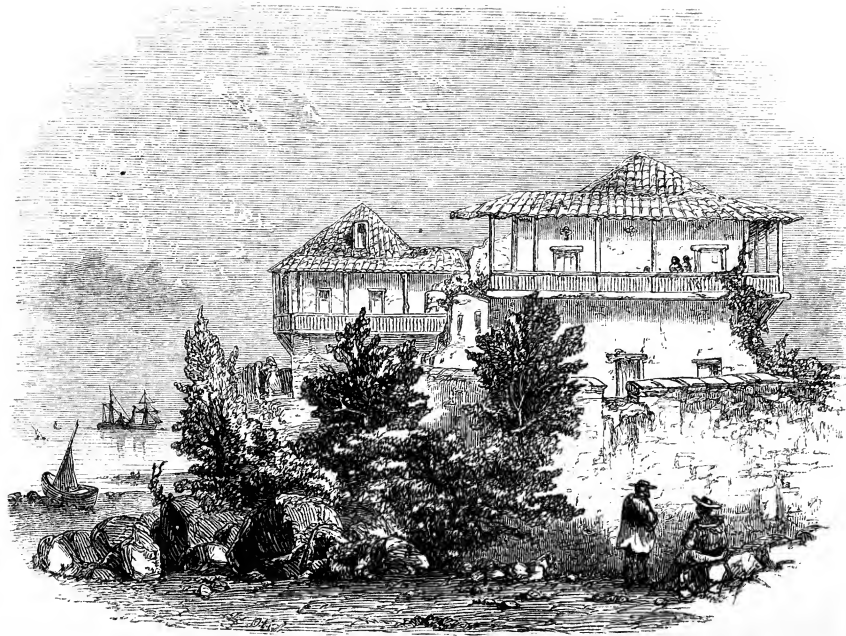
ment of such a line, that they finally decided to identify its interests with those of the road. In the latter part of 1856 the first vessel was dispatched under the command of Capt. J. M. Dow. The returns from the monthly voyages of the "Columbus" soon proved the wisdom of the measure, for in less than two years the cargoes of merchandise brought from those states for transportation over the road often exceeded half a million of dollars, while a large amount of foreign merchandise found its way to those countries by the same channel.

In 1858, the business over the road from the South and Central American states exceeded in value *nine times* the freighting business of California *via* the Isthmus, and by 1860 less than *one fifteenth* of the freighting business of the road was due to the California trade, the remaining fourteen fifteenths consisting mainly of shipments from the United States, British manufactures and other goods shipped direct from England for South and Central America, and the produce of those countries in return, such as indigo, cochineal, India-rubber, coffee, cocoa, deer-skins and goat-skins, besides orchilla, pearl-shells, tobacco, balsams, Peruvian bark, ores, straw hats, etc., etc.

When it comes to be considered that in the California trade large amounts of goods and merchandise for Oregon and Washington Territory and the British Possessions are included, likewise occasional shipments from China and the Sandwich Islands, and that it is still in its infancy, the importance of the South and Central American trade to the Panama Railroad may be in a measure appreciated. The conveyances by which the business of the Pacific coast finds its way to and from the road are,

1st. By the Pacific Mail Steam-ship Company, plying tri-monthly between California, Mexico, and Panama, with a fleet of twelve large steam-ships.

2d. The Oregon and California Steam-ship Company.



RAMPARTS ON THE NORTHEASTERN BEACH OF PANAMA.



running between California, Oregon, and Washington Territory, with a branch line to the Mexican coast, and connecting with the Pacific Mail Steam-ship Company tri-monthly, with a fleet of five steam-ships.

3d. The Pacific Steam Navigation Company, plying semi-monthly between Chili, Bolivia, Peru, Ecuador, New Granada, and Panama, with a fleet of nine large steamers for the main service, and three smaller steam-ships performing a coasting service, and connecting with the main line.

4th. The Central American Steam-ship Company, running semi-monthly between Guatemala, Salvador, Costa Rica, Nicaragua, and Panama, with two large steam-ships and one steam-tug.

Besides these are numerous sailing vessels with freight from different ports for transportation over the road.

On the Atlantic side are,

1st. The Atlantic and Pacific Steam-ship Company, plying tri-monthly between New York and Aspinwall.

2d. The Royal Mail Steam Packet Company, running semi-monthly between England, the West Indies, the eastern coast of South and Central America, and Aspinwall, with a fleet of twenty-three large steam-ships.

3d. Holt's line of screw steamers between Liverpool and Aspinwall, monthly—two steamers.

Besides the steam lines are,

1st. The Bremen and Aspinwall line of sailing vessels, monthly.

2d. The Bordeaux and Aspinwall line of sailing vessels, quarterly.

3d. The Panama Railroad Company's line of sailing vessels between Liverpool and Aspinwall, monthly.

4th. The Panama Railroad Company's line of sailing vessels from New York to Aspinwall—seven vessels: three barks and four brigs.

5th. Five ships a year from Boston to Aspinwall. For

particular information in regard to these lines, see Appendix D, p. 147, et seq.

CHARACTER OF THE SERVICE PERFORMED ON THE ROAD.

As early as the year 1855 daily trains were established each way over the road, requiring in its then imperfect state from five to six hours for the transit. As the character of the road improved, a corresponding improvement took place in the time-table, and for the past three years the passage has been uniformly and safely accomplished in three hours, or even less, when the exigency of the case required it. The rolling stock of the road has always been most ample. Fifteen hundred passengers, with the United States mails, and the freight of three steam-ships, have not unfrequently been transported over the road during a single half day. The engines, some eleven in number, are of the first class, averaging twenty tons burden; the passenger-cars are large and commodious, and built for convenience and comfort, especially with reference to the climate; the cars for the transportation of the mails and treasure are entirely of iron. The usual freight-cars are built to carry not only the ordinary freight, but the heaviest and coarsest materials—large quantities of gold and silver ore, timber, anchors, and chains of the largest size, cannon shot and shells, iron-work in pieces of twenty-five tons, heavy machinery, guano, whale-oil, etc., more or less of which are daily passing over the road. The arrangements for the loading and unloading of cargoes are unusually perfect; double tracks run from the main road down the different wharves to the very ship's side, and the lading process is so effectively managed that frequently less than two hours pass between the *arrival of the largest ships*, laden with from two to three hundred tons of merchandise, besides the baggage of from four to eight hundred passengers, and the *departure of the trains* for Panama bearing the entire freight.

APPENDIX A.

Statement of Merchandise, destined for San Francisco, transported over the Panama Railroad during the two Years ending respectively July 31st, 1859 and 1860.

Years.	Tons measurement.	Tons weight.	No. of packages.	Total tons.
1859	5626 $\frac{33}{40}$	3817 $\frac{54}{2000}$	24,482	5665 $\frac{3}{5}$
1860	6911 $\frac{36}{40}$	755 $\frac{542}{2000}$	46,061	7667 $\frac{1}{6}$

Statement of Merchandise from San Francisco transported over the Panama Railroad for the two Years above named.

Years.	No. of packages.	Tons measurement.	Tons weight.	Total tons.
1859	259	321 $\frac{18}{40}$		321 $\frac{18}{40}$
1860	525	611 $\frac{2}{40}$	1210 $\frac{52}{2000}$	733 $\frac{3}{4}$

Statement of Treasure from San Francisco transported over the Panama Railroad for the two Years above named.

Years.	Number of packages.	Amount.
1859	2399	\$37,173,187 25
1860	2476	38,247,613 62

Statement of Merchandise, destined for Central American Ports, transported over the Panama Railroad for the Years 1859 and 1860.

Years.	No. of packages.	Tons measurement.	Tons weight.	Total tons.
1859	11,319	1644 $\frac{31}{40}$	1112 $\frac{17}{2000}$	1655 $\frac{3}{8}$
1860	23,257	3064 $\frac{32}{40}$	2197 $\frac{29}{2000}$	3284 $\frac{1}{6}$

Statement of Merchandise from Central American Ports transported over the Panama Railroad for the two Years ending respectively July 31, 1859 and 1860.

Years.	No of Hides.	Number of packages of											Total.				
		Coffee.	Skins.	Indigo.	Cochineal.	India - rubber.	Bark.	Balsam.	Cocoa.	Ores.	Copper.	Cigars.		Amalgams.	Sundries.	Tobacco.	Dye-wood.
1859	26,892	5717	468	6910	3633	63	1	327	2	16	16	—	—	48	14	1408	45,575
1860	65,899	8270	745	5420	6239	777	4	286	5	359	—	7	8	124	—	—	88,143

Statement of Merchandise, destined for the West Coast of South America, transported over the Panama Railroad for the two Years above named.

Years.	Number of packages.	Jewelry, etc. Value of.	Tons measurement.	Tons weight.	Total tons.
1859	1063	\$90,342	199 $\frac{31}{40}$	1139 $\frac{39}{2000}$	198 $\frac{1}{5}$
1860	8413	1,809,000	1099 $\frac{37}{40}$	3072 $\frac{25}{2000}$	1130 $\frac{1}{4}$

Statement of Merchandise from the West Coast of South America transported over the Panama Railroad for the two Years ending respectively July 31st, 1859 and 1860.

Years.	No. of Hides.	Number of packages of								Total.	
		Skins.	India-rubber.	Bark.	Jocoa.	Tobacco.	Orchilla.	Sundries.	Copper.		
1859	147		2			25				174	
1860	2017	979	188	571	1706	93	32	20	6243	11,850	
			Treasure\$								

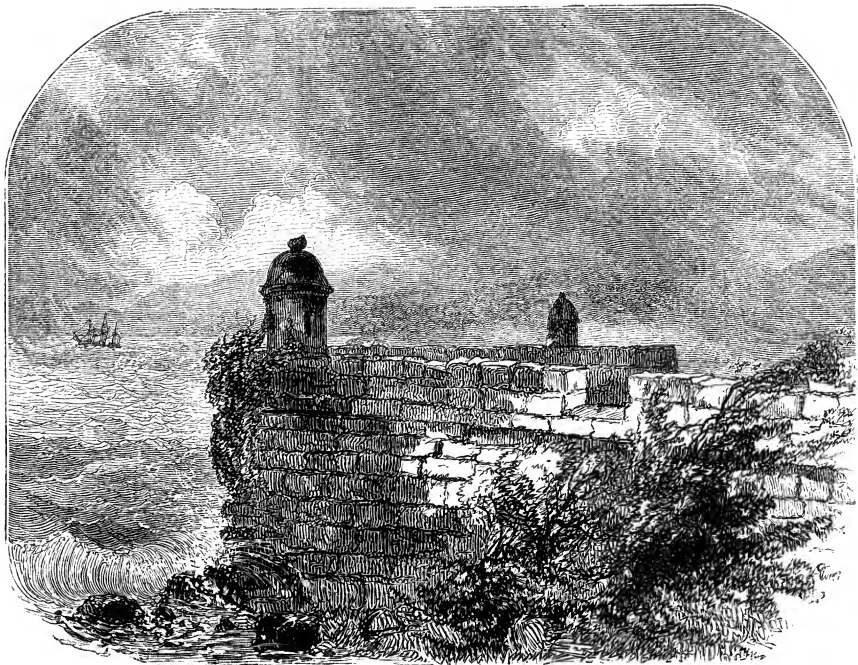
The above comprises only the merchandise brought under *through bills of lading*; all other is included in the following table.

Statement of Merchandise from Panama, N. G., transported over the Panama Railroad for the two Years ending respectively July 31st, 1859 and 1860, not under through Bills of Lading.

Years.	No. of Hides.	Number of packages of														Total.		
		Skins.	Bark.	Indigo.	India-rubber.	Cocoa.	Orchilla.	Dye-wood.	Coffee.	Copper.	Sundries.	Pearl-shells.	Sarsaparilla.	Hats.	Cigars.		Tobacco.	Sperm oil.
1859	35,721	166	6628	42	2	1572	25	14	152	46	851	93		1	78		45,292	
1860	29,869	220	5453	95	45	2413	164	1000	220	38	35	525	19	8	5	25	98	40,832

SPECIE.

Year.	Number of packages.	Amount.
1860	28	\$100,342 00



SOUTHEASTERN RAMPART.

