THE PANAMA CANAL AND COMMERCE

The Suez and Panama rules differ in relatively minor details. They could without great change be brought into harmony with each other; and, when harmonized, the Suez-Panama rules would constitute a natural basis upon which to build an international code of measurement rules. Probably the major portion of the vessels engaged in overseas international trade will use the Suez or the Panama Canal or both. The Panama and Suez measurement codes are based upon sound principles and could logically be made the model of an international code.

The most effective method of inaugurating a movement for the international unification of tonnage rules would be for Great Britain, or for Great Britain and the United States jointly, to call an international conference to formulate a code to be recommended for adoption by the commercial nations of the world. The recommendations of such a conference would carry much weight, and if the recommendations were carried out by Great Britain and the United States, they would probably be adopted in course of time by other countries engaged in international maritime commerce.
CHAPTER XIV

COMMERCIAL ADMINISTRATION OF THE CANAL

By the Act of August 24, 1912, "the President is authorized . . . to govern and operate the Panama Canal and govern the Canal Zone . . . through a governor of the Panama Canal and such other persons as he may deem competent to discharge the various duties." The act also gives the President power "to make and from time to time amend regulations governing the operation of the Panama Canal, and the passage and control of vessels through the same or any part thereof, including the locks and approaches thereof, and all rules and regulations affecting pilots and pilotage in the canal or the approaches thereto through the adjacent waters."

"The President is also authorized to establish, maintain, and operate, through the Panama Railroad Company or otherwise, dry docks, repair shops, yards, docks, wharves, warehouses, storehouses and other necessary facilities and appurtenances for the purpose of providing coal and other materials, labor, repairs, and supplies for vessels of the Government of the United States
and, incidentally, for supplying such at reasonable prices to passing vessels.’’

The administrative organization which the President, upon the recommendation of Major General George W. Goethals, has created for the operation of the canal provides for seven departments directly under the governor of the canal. The departments are the purchasing, accounting, executive, operation and maintenance, supply, health, and Panama Rail Road. The two departments having to do with the commercial administration of the canal are the ‘‘operation and maintenance’’ and the ‘‘supply’’ departments. One of the three parts of the department of operation and maintenance is the marine department headed by a marine superintendent who has direct supervision over the commercial administration of the canal.

As stated in the 1915 Annual Report of the Governor of the Panama Canal, the marine superintendent is ‘‘charged with the entry, conduct of vessels through The Panama Canal, and clearing them after transit, together with the supervision of the port captains, board of local inspectors, the pilots, the operation of lights and beacons, and the inspection and admeasuring of vessels.’’ There is a captain of the port at Cristobal and another at Balboa, and these are the officials most directly concerned with the details of
the commercial administration of the canal. The captain of the port assigns vessels to wharves, provides for the docking and berthing of ships, furnishes pilot service, supervises the admeasurement of vessels, and has "general supervision and enforcement of the canal and harbor regulations relating to shipping."

The shops and terminal facilities and the mechanical operation of the canal are briefly described in Chapters XIX and XX of Sibert and Stevens, *The Construction of the Panama Canal*. It is not necessary to repeat what is stated in that excellent volume, and the following brief description of the way in which vessels are operated through the canal will suffice:

The handling of a vessel all through the canal, except in the locks, is essentially the same as its handling through any charted channel where observance of signals, ranges, and turns is necessary. The canal channel throughout is very accurately charted, fully equipped with aids to navigation, and governed by explicit rules with which the pilots, of course, are thoroughly familiar.

In the locks, the vessel is under the control of the lock-operating force. As the vessel approaches the locks, the operator in charge at the control house indicates by an electrically operated signal at the outer end of the approach wall whether the vessel shall enter the locks, and, if so, on which side; or whether it shall keep back, or moor alongside the approach wall. If everything is

---

1 *Official Handbook of the Panama Canal* (1915), pp. 20, 21.

267
THE PANAMA CANAL AND COMMERCE

ready for the transit of the locks, the vessel approaches the center approach wall, which is a pier extending about a thousand feet from the locks proper, lines are thrown out, and connections are made with the electric towing locomotives on the approach wall.

The vessel then moves forward slowly until it is in the entrance chamber, when lines are thrown out on the other side and connections are made with towing locomotives on the side wall. Six locomotives are used for the larger vessels, three on each wall of the lock chamber. Two keep forward of the vessel, pulling and holding her head to the center of the chamber; two aft, holding the vessel in check; and two slightly forward of amidships, which do most of the towing of the vessel through the chamber. The locomotives are powerful affairs, secured against slipping by the engagement of cogs with a rack running along the center of the track, and equipped with a slip drum and towing windlass, which allow the prompt paying out and taking in of hawser as required. No trouble has been experienced in maintaining absolute control over the vessels.

The water within the lock chamber proper, beyond the entrance chamber, is brought to the level of that in the approach, the gates toward the vessel are opened, the fender chain is lowered, and the locomotives maneuver the vessel into the chamber and bring it to rest. The gates are then closed, the water raised or lowered, as the case may be, to the level of that in the next chamber, the gates at the other end are opened, and the vessel is moved forward. Three such steps are made at Gatun, two at Miraflores, and one at Pedro Miguel.

When the vessel has passed into the approach chamber at the end of the locks, the lines from the towing locomotives on the side wall are first cast off, then those
from the locomotives on the approach wall, and the vessel clears under its own power.

Vessels require from 8 to 10 hours to make the transit through the canal, about 3 hours being spent in getting through the locks. In the sea-level channels and in Gaillard Cut, the speed of vessels is limited to 6 knots, but in Gatun Lake the speed may be 15 knots, except in portions of the lake where the channels are narrowed to 1,000 feet and less, and there the speed must be brought down to 12 and 10 knots.

The supply department is of great assistance to the owners and masters of vessels using the Panama Canal. The policy followed in the administration of the canal is to provide shipping, at reasonable prices, with all useful facilities and all needed supplies and repairs. The charges made for facilities and supplies have been fixed with a view to covering expenses, including overhead charges. The United States does not seek to make commercial profit in providing facilities and supplies.

As stated in Chapter XI, the Government has provided large coaling stations at Cristobal and at Balboa. The coaling plant of the Panama Canal at Cristobal has a stowage capacity of over 400,000 tons, while the plant at Balboa has a capacity of 200,000 tons. The coaling facilities are maintained by the Government to supply not only
the naval vessels of the United States but also merchant ships, American and foreign.

At the end of April 1916, the fuel oil stowage facilities at the Isthmus included the following tanks: At Cristobal are two tanks belonging to the Panama Canal, each having a capacity of 42,000 barrels. Private companies have six tanks each with 55,000 barrels’ capacity and three tanks holding 37,500 barrels each. At Balboa the Panama Canal has two oil tanks, each with 42,000 barrels’ capacity, while private concerns have two tanks each holding 55,000 barrels, four of 37,500 barrels, and one of 25,000 barrels’ capacity. It is stated that the International Petroleum Company is about to construct two tanks, one holding 65,000 barrels and another 20,000 barrels. Moreover, the Panama Canal had awarded contracts for the construction of two additional 55,000 barrel-tanks, one to be constructed at Mount Hope and the other at Balboa. The large number of fuel tanks that have been constructed and are in process of erection indicates the rapidly growing use of oil instead of coal as fuel for steamers.

Some private companies carry a stock of Diesel engine oil at the Isthmus, but up to the end of April 1916, the Panama Canal had not begun to handle oil for Diesel engines. Should there develop a large demand for Diesel oil, the Panama Canal will, presumably, keep it in stock.
The prices at which coal and oil are supplied at the Isthmus by the Panama Canal and the policy of the canal authorities in supplying fuel are indicated by the following announcement which appears from time to time in the Canal Record:

Coal is supplied to vessels at both Cristobal and Balboa at the rate of between 600 and 1,500 tons per day. Present prices are: At Cristobal, from lighters, trimmed in bunkers, or from cars alongside wharf, handled by ship's gear, per ton, $6.00; use of steam hoist and crane per hour, $1; at Balboa, the price is $1 more per ton, either form of delivery.

Fuel oil may be obtained at Balboa or Cristobal, from plants of the Panama Canal, or from private corporations. The present price from the Canal is $1.25 per barrel. Prices from the corporations may be obtained on application to them.

Diesel engine oil is for sale by several companies at approximately 50 shillings per ton of seven barrels.

The general supplies obtainable from the Panama Canal authorities at the Isthmus include practically everything that a vessel may need en route. “All standard lubricants, light and heavy hardware, cordage, and miscellaneous ship chandlery supplies are sold from the storehouses at Cristobal and Balboa.” From the commissary department of the Panama Canal, merchandise and all kinds of food may be purchased, including

---

1 *Canal Record*, April 19, 1916, p. 308.

271
fresh meats, vegetables, and fruit. Fresh water is sold at 25 cents per 1,000 gallons; and ice at 33 cents per 100 pounds. A vessel arriving at the canal may send its accumulated laundry by rail across the Isthmus and receive back the laundry on the same day, after the vessel has made the transit through the canal.

The large and fully equipped machine shops at Balboa enable the canal authorities to make repairs to vessels; and in the huge dry dock at Balboa, which was finished during the year 1916, it is possible to dock any vessel that can pass through the canal. Other services rendered vessels include towage at the terminals and, if necessary, through the canal. Pilotage into and out of the ports and through the canal is compulsory, but no charge is made for pilotage in the case of vessels that pass directly "through the canal without stopping at either terminal port to take on or to discharge cargo or passengers." This rule, however, does not prevent through passengers from landing. The cable and radio facilities at the canal are available for commercial uses at reasonable rates.

It is the policy of the canal authorities to provide shipowners with all useful information. From time to time "Notices to Mariners" are issued containing information regarding aids to the navigation of the canal; "Notices to Steamship
ADMINISTRATION OF THE CANAL

Companies” and “Sailing Directions” are published at intervals with a view to keeping shipowners fully informed as to the interpretations of the rules and as to other matters that may be of assistance to owners and masters of vessels operated through the Panama Canal.

The financial methods followed in the commercial administration of the canal are simple and impose minimum expenses and delays upon vessels using the waterway. As the Official Handbook of The Panama Canal states:

For a steamship owner or agent to send a vessel through the canal is one of the simplest matters in all his business. Practically all he has to do is to make a deposit with the Government to cover the vessel’s canal expenses. The Government will attend to everything else, and return his change as soon as the vessel has cleared from the canal.

Steamship companies and the owners of individual vessels may avoid carrying the cash required to pay tolls and to purchase supplies at the canal by making a deposit with an assistant treasurer of the United States at any of the larger ports of the country, and the assistant treasurer will cable to the Panama Canal giving notice of the amount thus placed on deposit. From the amount thus placed to the credit of the steamship company or shipowner, settlement may be made at the Isthmus for canal tolls and for whatever
supplies may be purchased. Shipowners in foreign countries may readily arrange through their banks for the deposit, with an assistant treasurer at an American port, of sums from which to make payments for tolls and to meet other expenses at the canal.

The Panama Canal authorities much prefer to have the shipowner deal directly with them instead of through the medium of a local agent. As the marine superintendent states in the 1915 Annual Report of the Governor of the Panama Canal:

Experience has fully demonstrated that the interests of vessels using the canal for transit and purchase of coal, supplies, provisions, and attendant services are much easier, better, and satisfactorily handled when placed in the hands of the canal authorities than when in the hands of local agents. In this respect, as well as in others, every effort has been made to eliminate any unnecessary or duplication of work and to make our business methods as simple as possible. To such an extent has this been accomplished that if owners or agents will follow our advice a vessel may automatically enter and pass through the canal without her master leaving his ship or signing a paper.

The admirable organization for the mechanical and commercial operation of the Panama Canal reflects the administrative skill and the exceptional foresight of Major General Goethals, the

1 p. 224.
builder and first governor of the canal. A great engineer, aided by an able corps of trained assistants, has successfully accomplished an executive task of the first magnitude, and has thereby rendered a most valuable service to the commerce of the United States and other countries. It is especially fortunate that the operation of the canal was inaugurated by the man who directed its construction.
CHAPTER XV

WHAT HAPPENED WHEN THE SLIDES CLOSED THE CANAL

After the Panama Canal had been in operation for more than a year and the trade of the United States and other countries had come to depend upon the services and facilities afforded by the waterway, it was suddenly closed to all shipping. It remained closed until April 15, 1916, a period of seven months. The inconvenience and losses that resulted from the closing of the canal indicate concretely its usefulness to the commerce and industries of the United States and of the world generally.

In spite of the fact that international trade was greatly reduced by the European War, the traffic through the canal had reached a relatively large volume before the waterway was closed by the slides that occurred September 18, 1915. During July of that year 170 vessels loaded with 705,000 tons of cargo were passed through the canal; and, although this was the largest traffic of any month preceding the closing of the canal, the volume for that month was not greatly above the
EFFECTS OF THE CULEBRA SLIDES

monthly average which the traffic had attained. During June, July, and August 1915, 474 vessels, carrying 1,884,000 tons of cargo, made use of the waterway. The sudden stopping of so large a current of traffic necessarily involved many expensive readjustments of industry and trade.

The readjustments could not be made immediately. During the three weeks following the date on which the slides occurred, more than 100 vessels, bearing 375,000 tons of cargo, arrived at the termini of the canal and were prevented from proceeding through the waterway to their destinations. Many more vessels would have reached the canal during these three weeks had not their sailings been canceled or their routes changed by the owners upon receiving notice of the closing of the canal.

The variety and value of the commerce interrupted by the closing of the canal are even more impressive than the volume of the trade affected. The traffic westbound between the Atlantic and Pacific ports of the United States is of much greater variety than that eastbound, but the manifests (some of which were published) of steamers that were held up at the canal en route from San Francisco to New York show that many kinds of articles were being shipped between the two seaboard and that some of these articles were of high value.

277
The *Ohioan*, of the American-Hawaiian Line, which sailed from San Francisco for New York, September 8, 1915, had in its cargo 49 different varieties of articles for New York and 38 different kinds of commodities for Boston. These were goods from San Francisco, and, in addition to them, there were large shipments of merchandise for New York and Boston from west coast ports north of San Francisco. The *Alaskan*, of the same line, which sailed from San Francisco for New York, September 16, 1915, had on board 62 different kinds of commodities for New York and 18 for Boston. This vessel also took out from San Francisco $385,000 worth of "bonded goods," which must have been imports being shipped to New York from foreign Pacific countries. The *Alaskan*’s manifest shows that the lading included copper with a value of $33,750, dry goods valued at $35,095, hops at $22,700, potash at $23,911, wool at $240,293, and wine at $35,042. These few selected commodities give some suggestion of the value of the commerce interrupted by the closing of the canal.

When the Culebra slides suddenly closed the canal, an effort was made to substitute the Panama Rail Road for the canal as the agency for the transfer of freight from ocean to ocean, but it was at once realized that this single-track railroad was able to handle only a small part of the
traffic to be transported. By working seven train crews "in chain gangs, or rounds, first in, first out, on the through freight traffic, the railroad was able to handle between 4,000 and 5,000 tons of trans-isthmian freight daily." That, however, was barely equal to the average cargo of a single vessel. Most vessels were soon withdrawn from the coastwise trade between the two seaboard of the United States, but some lines engaged in foreign commerce via canal routes were continued in service; and the Panama Rail Road, while the canal was closed, transferred as much freight as possible in each direction between Cristobal and Balboa. The scarcity of vessels in ocean commerce and the irregularity of these sailings increased the difficulty of the Panama Rail Road and made the congestion more serious.

For a short time after the closing of the canal the Panama Rail Road transferred through traffic across the Isthmus at its regular classified schedule of rates for such traffic, but on the 6th of October, 1915, when it was realized that the canal would be closed for some considerable time, the Rail Road Company gave the steamship companies the option of a flat rate on through traffic of $3 per ton for all kinds of commodities. This flat rate, like the classified tariff, covered terminal services and the handling of freight out of and into vessels.
THE PANAMA CANAL AND COMMERCE

Only one company, the Luckenbach Steamship Company, which was engaged in the coastwise trade, availed itself of the $3 flat rate for all traffic. The vice-president of the Panama Rail Road Company, Mr. E. A. Drake, states that "in addition there were some individual instances of its use for single lots of cargo, but every other line engaged in transshipping through cargo elected to avail of the option that was publicly offered them to select the classified rates which have since applied to all cargo transshipped including cargo en route under bills of lading dated up to April 14th [1916]."

Mr. Drake also states that "with the reopening of the canal the transshipment of cargo, in which the railroad was temporarily engaged in discontinued." It should be explained that when the canal was opened in 1914, the Panama Rail Road ceased to transport through traffic, all such traffic being required to use the canal. The Panama Rail Road has, however, established, "applicable to any future interruption of canal traffic, a uniform classified tariff that will apply indiscriminately to all cargo transshipped whether domestic or foreign. The discrimination in past years in favor of coastwise traffic was maintained under the most adverse criticism from foreign interests and is now effectually done away with."

The closing of the canal imposed a large ex-
EFFECTS OF THE CULEBRA SLIDES

expense upon traffic across the Isthmus. The tolls charged for the use of the canal amount to about 90 cents per ton of cargo, on the average, and thus the closing of the canal added at least $2.10 per ton to the cost of getting cargo across the Isthmus. This, however, was only a small part of the expense that commerce had to bear. The most serious burden was due to the delay to traffic, to the uncertainty of the services that could be secured from the railroad, and to the inability to ship more than a small amount of freight, even at the higher costs of transportation, under the adverse conditions that prevailed.

The Culebra slides, with the consequent closing of the canal, could hardly have come at a more inopportune time. The industries and trade of the United States, after about three years of business depression, had entered upon a period of exceptional prosperity in August 1915. Transportation facilities within the United States proved inadequate to handle the tonnage offered to the railroads. Ocean shipping was entirely incapable of moving the exports and imports; and the congestion of freight at the terminals and in the yards of American railroads was made more serious by the closing of the canal route to coastwise carriers and to shipping engaged in the foreign trade of the United States. The closing of the canal made a bad situation worse and prolonged
the period of traffic congestion in the United States.

It is obvious that the closing of an interoceanic highway like the Panama Canal would have a world-wide effect upon commerce and industry. For example, sugar from Hawaii for the refineries at Philadelphia and New York, instead of moving over the short route via Panama, had to be sent around South America, or be transferred to the railroads at the Pacific seaboard of the United States for expensive transportation more than 3,000 miles by rail across the continent. The Bethlehem Steel Company, at South Bethlehem, Pa., was prevented from securing ore from Chile and had to obtain ore at higher cost from Michigan and Minnesota. Indeed, the company has been unable to secure ore in sufficient quantity and has been obliged to buy pig iron.

The effect of the closing of the canal upon the manufactures of the United States is illustrated by the difficulty that was experienced in shipping locomotives, boilers, and wheels to the Far East for delivery to the Manchurian and Siberian railroads. Long after these locomotives should have been on the way to their destination they were in the cars on the tracks of the Jersey Central Railroad, adding to the already serious congestion in the railroad yards. Munitions manufactured in Bridgeport, Connecticut, for delivery in the Far
EFFECTS OF THE CULEBRA SLIDES

East accumulated in the railroad yards at Bridgeport and increased the difficulties experienced by the New Haven Railroad in keeping its line and terminals from being completely choked up. Illustrations similar to these might be cited in great number.

An interruption to business such as was caused by the closing of the Panama Canal results in large direct and indirect losses to men engaged in many lines of business. Mention may be made of the fact that manufacturers of iron and steel in the eastern part of the United States had contracts to deliver their products to consignees on the Pacific coast of the United States and in foreign Pacific countries. These contracts were made upon the assumption that the goods could be shipped via the canal at much lower freight rates than were obtainable after the canal was closed. Numerous business men on both the Atlantic and Pacific seaboards of the United States found that the business which they had built up by making use of the services through the canal had to be abandoned when the canal services were discontinued. What they had spent in building up the business was lost wholly or in part.

With the reopening of the canal, the trade that was interrupted by the closing of the waterway is being resumed, as far as possible; but when shippers lose trade to competitors it usually takes
time to regain the business. Moreover, the opening of the canal will not immediately restore the conditions that prevailed prior to September 1915. The vessels that were being operated through the canal have been put upon other routes and employed in other services, and the facilities for transportation between the two seaboard of the United States via Panama will be less in 1916 and 1917 than they were during the first eight months of 1915.

This will be the most serious consequence of the closing of the canal. The slow return of vessels to Panama routes will keep the revenues, obtained by the Government from canal tolls, small in comparison with what they would have been had the traffic continued uninterruptedly to develop at the rate it was increasing during the first eight months of 1915. The slides have not only added many millions of dollars to the cost of constructing the canal, but have cut down the returns which the people of the United States will receive from their large investment. During July and August 1915, the last two full months that the canal was operated before being closed by the slides, the tolls earned by the canal amounted to $1,070,157.

The losses sustained by the Government, however, are of much less importance than those incurred by the manufacturers and traders of the United States whose business depends upon the
EFFECTS OF THE CULEBRA SLIDES

transportation facilities afforded by the canal. The losses sustained by individuals cannot be so definitely measured as can the losses in tolls, but they must have been larger and of more serious consequence.

The tonnage of shipping engaged in the international trade by way of the canal will be much less during 1916 and during the continuance of the European War than it was at the time the slides temporarily put the canal out of service. In April 1916, Mr. H. E. D. Jackson, vice-president of the American-Hawaiian Steamship Company, in testifying before the Interstate Commerce Commission, stated that the company had been compelled to discontinue its intercoastal services not only because of the closing of the canal by the slides, but also because the prevailing rates by rail between the two seabords of the United States made it necessary for vessels in the coastwise trade to charge lower rates than could be obtained by placing their vessels in the foreign trade. Under existing conditions the company finds it more profitable to operate or charter their vessels in the foreign trade. Concerning the disposition made of the vessels early in 1916, Mr. Jackson testified:

We chartered three of our vessels the other day to the United States Steel Corporation for a year, at much higher figures than we had ever obtained by operating
THE PANAMA CANAL AND COMMERCE

them. Four of our vessels are under charter till December 1917, three are chartered for a year, and the others are chartered for from three to six months each, with ample opportunity for renewing the charters as they may expire.

Although vessels are now being built for the American-Hawaiian Steamship Company, these vessels will not go immediately into the canal trade, because of the greater revenues to be obtained in foreign commerce. Special reference is here made to the American-Hawaiian Steamship Company because it is by far the largest steamship line that has been engaged in the intercoastal trade. During the twelve months ending with the first of July 1915, this company carried 55.57 per cent. of the trade from the Atlantic ports of the United States through the canal to California terminals. At the present time the company has a fleet of 26 vessels, the number of which will be increased with the vessels now under construction.

The second largest steamship line that has been in the intercoastal service is the Luckenbach Steamship Company which regularly has a fleet of 10 vessels, and which operates an additional number of vessels under charter as its business may require. Mr. H. P. Hamilton, general manager of the Luckenbach Steamship Company, in testifying at the hearings above referred to, stated that the Luckenbach Company will probably not resume the
EFFECTS OF THE CULEBRA SLIDES

cost-to-coast service during the next two years. This company, during the year ending July 1, 1915, carried 29.64 per cent. of the traffic from Atlantic ports through the canal to California terminals. The testimony of these officials of two steamship lines that were developed with reference to the intercoastal trade, and which before the closing of the canal carried the larger part of the commerce coastwise between the two seaboard of the United States, is rather discouraging as to the early resumption of the intercoastal business via the canal.

With the restoration of peace and the return of commerce to its usual volume and to its customary routes, and with the decline of freight rates to a fairly normal level, the traffic of the Panama Canal may be expected to overcome the setback it has suffered because of the war and in consequence of the closing of the waterway for a long period while the war was in progress. The present unhappy state of the world must be temporary, and, when commerce is again permitted to expand, the use of the canal will increase with the growth of international trade.

It is to be expected, however, that the demand for ships will be greater than the supply and that ocean freight rates will be high for some time after the close of the European War. If these conditions prevail, vessels will not quickly return
to the intercoastal trade of the United States where carriers by water must make rates in competition with railroad rates that are subject to government control; but, at most, the restoration of the interrupted coastwise trade through the canal can only be delayed. Indeed, the turn of the tide from ebb to flood may come sooner than present conditions would indicate. It is to be hoped that this may come to pass.
# INDEX

| Administrative organization of canal, 266 | Canada, effect of canal upon trade of, 157 |
| American-Hawaiian Line, abandons Magellan route, 13 | Cargo ton, two classes of, 212 why tolls should not be based upon, 242 |
| beginning of, 13 | Casimir-Perier, C., investigation of effect of Panama Canal on Suez Canal traffic, 174 |
| fleet of, in 1915, 55 | Central America, commerce of, with United States through the canal, 124 increase of trade with, by canal, 156 |
| makes use of Tehuantepec route, 31, 71, 74 | See also South America Chartered vessels, deviation in routes by, 181 |
| opening of service via Straits of Magellan, 25 | China, characteristics of United States trade with, 128 See also Far East and Orient |
| services of, through the canal, 54 | Clayton-Bulwer Treaty, 159 neutrality clause in, 161 |
| traffic of, via canal, 286 | Closing of canal causes increase in transportation costs, 281 effect of, upon coastwise shipping, 284 upon commerce and industry, 282 financial loss by, 284 |
| American marine, the canal and the, 133-148 | Coal, comparison of prices of, along different routes, 197 |
| Australia, advantages of United States ports over European ports in commerce with, 44 commerce of United States with, 16 competition of Europe with United States for trade of, 126 distances to, via canal, 153, 157 effect of canal upon United States trade with, 130 movement of commerce to, from United States and Europe, 152 shortening in distances to, from United States via canal, 42 |

1 Unless used with a qualifying word, "Canal" in this index refers to the Panama Canal.
## INDEX

| Coal, how price of, is regulated, 192 |
| Construction of Panama canal, beginning of, 3 |
| illustration of actual cost for, via Panama and alternative routes, 203 |
| geographical reasons for, 10 |
| less in price at Panama than at Suez, 190 |
| most potent influences for, 11 |
| price of, at canal, 196, 271 |
| purposes of, 112 |
| relative steaming values of, 199 |
| reasons for, 7, 18, 69 |
| supply stations for, on various routes, 202 |
| Cost of canal, 218 |
| wide differences in price of, 183 |
| Crew accommodations, deductions for, 251 |
| Coaling stations, at canal, capacity of, 195, 270 |
| Culebra, slides at, in 1915, 53 |
| of the world, by whom maintained, 191 |
| effect of, 279-288 |
| map of, facing 192 |
| Danube rule, for propelling power deductions, 247 |
| Coastwise carriers, competition of transcontinental railroads with, 74, 82 |
| Deck cargo, how treated in tonnage rules, 253 |
| Coastwise commerce, restricted to American vessels, 134 |
| Deductions for determining net tonnage of vessels, 246 |
| Coastwise lines, comparison of rates charged by, 89 |
| De Lesseps, canal concession obtained in interest of, 11 |
| rate policy followed by, 89 |
| Diesel marine engine, use of, 187 |
| Coastwise shipping, effect of free tolls on, 232 |
| Displacement tonnage, defined, 210 |
| Coastwise trade, continuance of present policy towards, advocated, 140 |
| Distances, not the only determinant of ocean routes, 172 |
| increase in vessel tonnage for, 139 |
| points equally distant from New York and Liverpool, 40 |
| Commerce, dependent upon effective merchandising methods, 119 |
| Domestic trade and industries of the United States, effect of the canal upon, 94-111 |
| percentage of, over six general routes via canal, 47, 53 |
| Europe, benefit to, from canal, 154 |
| Commercial administration of the canal, 265-275 |
| changed conditions of competition between United States and, 151 |
| Competition of the Suez and Panama routes, 168-182 |
INDEX

Europe, commerce through canal between United States and, 100
commerce of, between South and Central America through canal, 100
interest of, in canal, 150-166
services from, to North and South America via canal, 63
European Commission of the Danube, 250
European ports, saving in distances from, via canal, 36
European War, abnormal demand for supplies created by, 52
diversion of vessels on account of, 60, 67
effect of, on traffic via canal, 50, 51, 52, 176, 229, 230, 285, 286
increases tonnage of American deep-sea fleet, 134

Far East, commerce of United States with, via canal, 179
distances to, 152
route of commerce to, 167
services to, via canal from United States, 65
trade of eastern United States with, chiefly via canal, 177
See also Orient

Financial methods followed in canal administration, 273
Foreign trade, concrete effects of canal upon, 132
need for international banking facilities in, 120
of the United States, the canal and, 112-132

Foreign trade, relation of canal to, 122
removal of handicap on, 136
tonnage of American merchant marine in, 135
Fortifications, 19, 219
Freight rates, the canal and, 69-93
on intercoastal traffic, 222
See also Rates
French Canal Company, reasons for failure of, 3, 11
Fuel oil supply at canal, 270
Fuel supplies and costs via the Panama Canal and alternative routes, 183-207

Gaillard Cut, slides in, 28, 279-288
Goethals, Major General, administrative skill of, 266, 274
Gold, discovery of, in California, 1, 24
Gorgas, General, sanitation work of, 4, 6
Grace, W. R. and Co., services of, via canal, 58, 65
Gross tonnage, how determined, 211
problems concerned with determination of, 245
why tolls are not based upon, 241

Hay-Pauncefote Treaty, 158
neutrality clause in, 163

"Industrial line," services of, 48
Industries, American, relation of canal route to development of, 105
service of canal to, 107

291
INDEX

Industries and domestic trade of the United States, effect of the canal upon, 94-111

Intercoastal traffic, rapid growth of, 13
a typical vessel cargo, 278
volume of, to September, 1915, 96
See also Traffic

International Tonnage Commission, 250

International trade, requisites for, 114, 115, 116, 120
subject to worldwide competition, 114
transportation a controlling factor in, 115

Isthmus of Panama, map of, showing canal, 22

Japan, difficult for American producers to increase exports to, 128
See also Far East and Orient

Japanese steamship line, service by, through canal to New York, 178

Line traffic, services of, 51, 66

Luckenbach Company, services of, through canal, 58, 286

Lumber shipments, 110
special type of vessel for transportation of, 60

Marine engines, two types of oil consuming, 187
Measurement rules, when promulgated, 235
Measurement tonnage defined, 213

Merchant marine, decline in, after Civil War, 136
legislation for, imperative, 147
proposed measures for development of, 143
tonnage of, in foreign trade, 135
Morgan Line, establishment of, 79

National City Bank, establishment of foreign branch banks by, 121

Navy, American, canal of much benefit to, 160
merchant marine, the foundation of, 141
strengthened by canal, 20, 21

Net tonnage, how determined, 211
the basis for tolls, 237
Neutrality of canal assured, 20, 113, 159, 163, 164
New York, distances from, via canal, to Australia, 43
to Orient, 39
New Zealand, situation of, with reference to canal routes, 45
See also Australia
Nicaragua Canal, beginning of a, 2

Ocean routes, around South America, 7
distance not only determinant of, 26
economy of shortening, 29
interlacing of, in the Orient, 173
saving in, via canal between United States and Europe, 33
INDEX

Ocean routes, shortening in, between United States and Australia, 42
three main considerations influencing choice of, 169
traffic, a chief factor affecting, 27
Ocean voyages, the canal and the length and time of, 24-47
Oil, use of, in marine engines, 184, 187
Oregon, long voyage of, in 1898, 21
Orient, commerce of United States with, 16
competition of Europe with United States for trade of, 126
concrete illustration of saving in voyages to, via canal, 38
major share of United States commerce to, via New York, 39
nature of exports from, to United States, 181
saving in distances to, from United States, 37
See also Far East

Pacific countries, competition for trade of, 153
importance and possibility of trade with, 17, 18
Pacific railroad, the first, 73
Panama and Suez routes, competition of the, 168-182
Panama and Suez tonnage rules, comparison of, 252
Panama Canal, and the length and time of ocean voyages, 24-47

Panama Canal, annual operation and maintenance cost of, 227
blockaded by slides September 1915, 28
closing of, readjustments in shipping made necessary by, 277
commercial administration of, 265-275
comparatively near coal and oil fields of United States, 188
cost of, 218
domestic trade and industries of the United States and the, 94-111
effects saving in fuel costs for vessels, 186
Europe’s interest in the, 150-166
facilities for fuel at, 196
first vessel of commerce through, 94
foreign trade of the United States and the, 133-148
freight rates and, 69-93
fuel supplies and costs via, and alternative routes, 183-207
services through the, 48-67
tolls, 208-234
tonnage rules, 235-264
what happened when slides closed the, 279-288
why it was built, 7-23
Panama Canal Act, enacted, 142
interpretation by Attorney General of section regarding tolls and result thereof, 259
Panama Canal Company, organization of, 149
INDEX

Panama-Pacific Line, canal service of, 59
Panama Rail Road, opening of, 2, 25
traffic via, when canal was closed, 278
Panama, Republic of, treaty with, 164
Panama tonnage rules, the, 235-264
Penrith Castle, advantages obtained by, in using
canal for trip to Orient from United States, 38
Percentage rule, for propelling power deductions, 246
Petroleum oil, tank vessels for transportation of, 61
Philippine Islands, effect of canal upon United States
trade with, 131
Pilotage, 272
"Prairie schooners," 24
Propelling power deductions, two rules for, 246

Rate groups, map of, 78
Rate zones, map of, 76
Rates, freight, the canal and, 69-93
blanketing of, 77, 80
cites from which back haul rates may be calculated, 87
comparison of, charged by coastwise lines, 89

San Francisco, distances from, via canal, 32
Sanitary work, at Isthmus of Panama, 3
in Cuba, 4.

Services through the canal, 48-67
Shelter deck spaces, treatment of, in determination
of gross and net tonnages, 252
Ship Registry Act, 136
Shipbuilding, contrasted in United States and United
Kingdom, 137
Shipping board, suggested duties of the proposed, 145
Shipping business, governed by complex body of naviga-
tion laws, 145
Slides, what happened when they closed the canal, 279-288
South America, commerce of, through canal between
Europe and, 100
commerce of, with United States through canal, 100, 124
exports and imports of, 14, 15
geographical relation of, with North America, 8, 123
high cost of coal on east coast of, 206
ports, saving in distances to, via canal, 34
services to, from Europe via canal, 64
from United States, 65
trade of, mainly with Europe, 122
Southern States, products of, through canal, 108
"Steam schooner," for transportation of lumber, 60
Suez Canal, effect of opening of, 94
INDEX

Suez Canal, investigation regarding effect of Panama Canal upon traffic of, 174
neutrality of, 20
opening of, 10
rate of tolls at, 231
Suez route, supply of coal along, 193
Suez and Panama routes, competition of the, 168-182
Suez and Panama tonnage rules, comparison of, 252
Suez tonnage rules, when formulated, 263
Supply department at canal, 269

Taft, President, statement by, regarding financial management of canal, 217
tolls proclamation by, 209
Tehuantepec, Isthmus of, cost of transferring traffic at, 71
Tehuantepec route, American-Hawaiian Line, changes to, 31
opening of, 25
Tolls, Panama Canal, 208-234
amount of, during first 13 months of operation of canal, 230
based upon net tonnage, 213
effect upon, of ruling of Attorney General, 259
fixing of, an instance of transportation rate making, 219
law repealed regarding exemption of, on coastwise vessels, 142
methods of levying, 210

Tolls, policy followed in fixing schedule of, 217, 232, 236, 239
proclamation regarding, by President Taft, 209
rate of, 208, 231, 236
relation of, to freight rates, 222
vessel charges in relation to, 223
why not based upon size or weight of vessels, 240
Tolls, Suez Canal, rate of, 231

Tonnage, cargo, 212
dead-weight, 211
displacement, 210
gross, 211
measurement, 213
net, 211
Tonnage measurement rules, need for uniform system of, 262
when promulgated, 235
Tonnage ratios under Panama and Suez rules, 214, 256

Traffic, amount of, through canal, for first 13 months, 230
distribution of, over main canal routes to September, 1915, 99
how handled by vessels, 48
interfered with, by European War and Culebra slides, 229
major share carried by regular carriers’ lines, 50
tonnage of sixteen principal commodities shipped through canal to September 1915, 103
two special types of vessels used in, 60

295
See also Intercoastal Traffic

Transcontinental railroads, competition of, with coastwise carriers, 74, 82

Transcontinental rate policy, determination of, by Interstate Commerce Commission, 91

Transcontinental rates, as adjusted by Interstate Commerce Commission, 84-88

special characteristics of, at opening of Panama Canal, 74

Transisthmian routes, early surveys of, 2

Transpacific countries, commerce of the United States with, through canal, 101

Transportation, a controlling factor in international trade, 115

cost of, between two sea-boards of United States lowered by canal, 93

effect of canal on costs of, 68, 70, 72

Treaty, Clayton-Bulwer, 159

Hay-Pauncefote, 158

with Republic of Panama, 164

Vessels, actual cost of coal for, via Panama and alternative routes, 203

admission of foreign built, to United States registry, 133, 136

Vessels, cargo space in, affected by fuel used, 185
diversion of, to other routes on account of European War, 60, 67

engine room in, 249
gross tonnage of, in coastwise trade and on Great Lakes, 134

method of handling, through canal, 267

of many types, 216

provision for repairing, at canal, 272

supply of coal to, along various routes, 201

time of transit for, through canal, 269

tonnage, kinds of, 210

traffic conditions controlling routes of, 173

transfer of, to other routes by closing of canal, 284

two large items of cost of operating, 170

types of, used in canal traffic, 60

Warships, designation of tonnage of, 217
tolls for, using Suez Canal, 236, 257

Whaling fleet, first voyage of, to Pacific coast, 1

West Coast States, large use of canal made by, 110

Wool, economical shipment of, through canal, 107

Yellow fever, control of, at Panama, 5