The handling of a vessel during its transit of the canal is like the handling of a railway train on its "run." The course is equipped with all requisite signals, facilities for mooring, like sidings, and a system of communication between points along the line, which includes a special telephone system connecting all the important points of control in series.

As soon as the vessel starts on its transit of the canal, the captain of the port at the point of entrance telephones its starting to the other stations along the course. As the vessel arrives and departs from each of these points, the fact is telephoned along the line, so that there is exact knowledge at each station all the time of the status of traffic, and complete co-operation from the several points of control.

The transit of the canal requires about 10 hours, of which approximately 3 hours are spent in the locks. In the sea-level channels and Gaillard (formerly "Culebra") Cut the speed of vessels is limited to 6 knots; through Gatun Lake they may make 10, 12 and 15 knots, according to the width of the channel. A vessel may clear from the canal port at which it enters and, after passing through the last of the locks, put direct to sea without further stop.

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 if the vessel shall enter the locks, and if so, on which side; or if it shall keep back or moor alongside the approach wall. If everything is ready for the transit of the locks, the vessel approaches the centre 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 of 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 centre 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 centre 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.

From Colon, on the Atlantic side of the Isthmus of Panama, to Balboa, on the Pacific side, the distance by water, around South America, is 10,500 nautical miles. Through the canal that distance is reduced to less than 44 miles.

The difference in length of these routes, 10,456 miles, represents the maximum distance that can be saved to a vessel by use of the canal. This maximum is more interesting geographically than commercially because vessels bound for the Pacific coast by way of the Strait of Magellan would not skirt the entire Atlantic coast of South America, but would strike across the Caribbean, if from the United States, or the central Atlantic, if from Europe, and proceed by the most direct route consistent with commercial advantage. But the saving is not purely hypothetical. The tug "Reliance," once employed in the Atlantic entrance of the canal, was transferred to the Pacific entrance by way of Magellan. The voyage required 126 days, and the "Reliance" has since several times made the transit from ocean to ocean in one day in passing back and forth between Colon and Balboa by way of the canal.

What counts in the commercial value of the canal is not the distance that could be saved but the distances that are saved by vessels substituting the canal route for the earlier 'round-the-continent route in regular trade.

Fundamentally, the saving to a vessel by the use of the canal in place of a longer route is the difference between the cost of the voyage over the longer route and the cost over the canal route, in which latter must be included the canal tolls. The actual cost per day at sea on any route is affected by various factors, chief among which are the cost of fuel and of supplies which must be taken aboard en route; these factors, as may be judged from the description of facilities for vessels at the canal, and the broader influences of weather, conditions at sea, and connections with secondary trade areas, are generally favorable to the canal in comparison with alternate routes. The advantage of quicker delivery of goods is in most cases an appreciable consideration.

For a specific voyage between two ports, by way of the canal or by an alternate route, the cost will vary in any number of vessels according to their individual expenses of operation. All cases can not be covered by exact formula. The following typical instances are, however, illustrative of general conditions:—

With reference to the trade from the Atlantic coast of the United States to the Far East, the voyage of the "Penrith Castle," which passed through the canal on October 22-23 en route from Galveston to Yokohama with a cargo of 3,270 tons of raw cotton, is typical.

By using the Panama Canal, this vessel saved at least 5,280 miles of travel between these ports. The distance via the canal, San Francisco, and the Great Circle is 9,294 miles; via the Suez Canal and the most direct sailing, about 14,575 miles. On a speed of 10 knots this means a saving of 22 days on the outward voyage alone.

The "Penrith Castle" is 361 feet long, 42.6 feet in the beam, 17.6 feet in mean draft, has a net registered tonnage of 2,337 by the rules of measurement of the British Board of Trade, and is propelled by a three-cylinder, triple-expansion engine, with 24, 40, and 67-inch cylinders and 45-inch stroke. The crew numbers 28, officers and men. Its operating expenses may be approximated at $230 per day on this route.

The saving of 22 days at sea amounts, accordingly, to a saving of $5,060. The tolls collected at the canal—$4,101.60 (at $1.20 per ton on 3,418 tons, including 111 tons of deck load)—should not be deducted from the saving, as an equivalent amount would have been collected at the Suez Canal.

If the vessel had elected to go by way of the Strait of Magellan, it would have had to travel approximately 15,071 miles, or 5,777 miles farther than by the canal route, and the cost, on the basis followed above, would have exceeded the cost by the canal, including tolls, by $1,533.40. The Cape of Good Hope route would have increased the voyage about 7,700 miles over the canal voyage and would have cost at least $3,258.40 more than the use of the canal route.