

ENGINEERING

Canals Retain Importance

Because they are inexpensive compared to other modes of transportation, they are still being used for freight that doesn't require faster transport.

By A. C. MONAHAN

➤ CANAL transportation is here to stay. Moving freight through canals may be slow but it is relatively cheap. A single mule can tow through water as heavy a load as a locomotive can pull on its steel track.

Most of the inland dug ditches will remain important routes for freight in spite of competition with railways, highways and airways. It is true that many early American canals were made obsolete by railroads relatively soon after railroading came into existence, but rails have not replaced many modern man-made waterways.

Shipping canals for ocean vessels are in another class. These permit ocean boats to travel far inland on rivers made navigable by dredging, or they are inter-ocean waterways such as the Panama and the Suez canals. These famous water routes may soon have competitors, but it will be friendly water competition made necessary by increased traffic and the possibilities of future wars. They are first objectives in any world war.

Rival Suez and Panama

Behind the reasons advanced for a rival Suez and rival Panama are increased transportation needs, political necessity and possible warfare. These greatest and most important of all shipping canals are located in regions foreign to the countries that use them most. This creates a special situation.

Another canal through the neck of land that connects the two Americas, either in Colombia or Nicaragua, is possible and feasible both from engineering and economic standpoints. A canal from the Mediterranean to the Red Sea by way of Palestine is reported proposed by British engineers. It is wanted before the Suez passes to the control of Egypt.

A canal from the Nile to the Red Sea would provide a second route to the Suez but it would be in Egypt. It could follow the route where a canal was built as early as 1380 B. C., according to ancient historians. There is not much evidence to support the claim, but it is known there were several canals from

the Nile to the Red Sea in early Christian centuries.

The Amr is the best known of these. Amr was the Arab conqueror of Egypt in the 7th century. The Amr canal was open at various times but closed for long periods in its history. Part of it is now used to carry fresh water from the Nile to the city of Suez on the Red Sea.

Use of Man-Made Canals

The use of man-made canals in other continents also dates back many centuries. The Grand Canal of China is one of those most important historically. It was constructed in the 13th century, for transportation and irrigation, and connects the Pei-Ho and Yangtse-Kiang rivers.

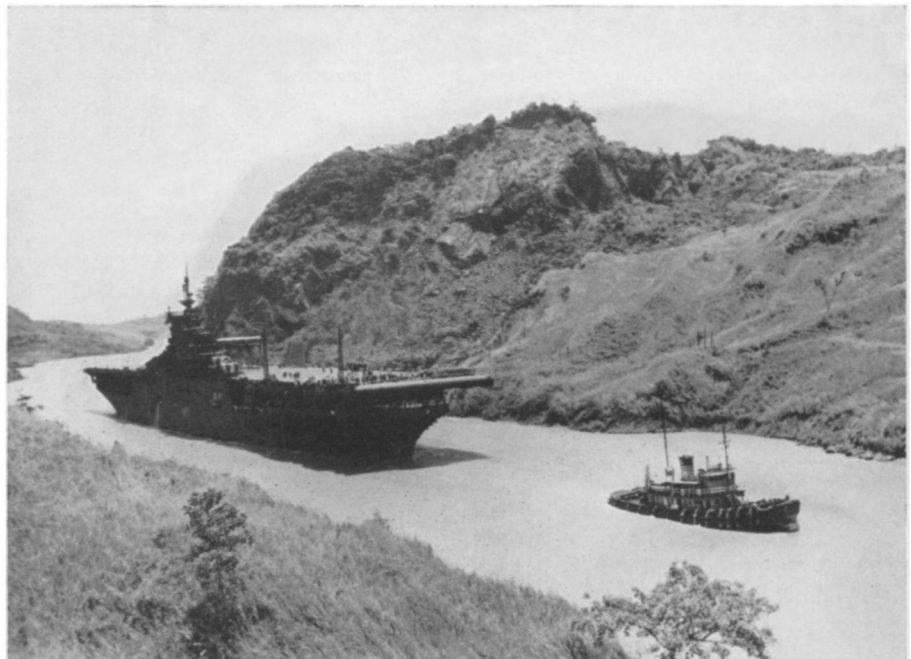
Charlemagne (742-814) is said to have proposed a canal to connect the Rhine with the Danube by way of the Main river and the now-American-occupied part of Germany. The present canal, which provides a waterway from the

North Sea to the Black Sea, was begun by Germany in 1921.

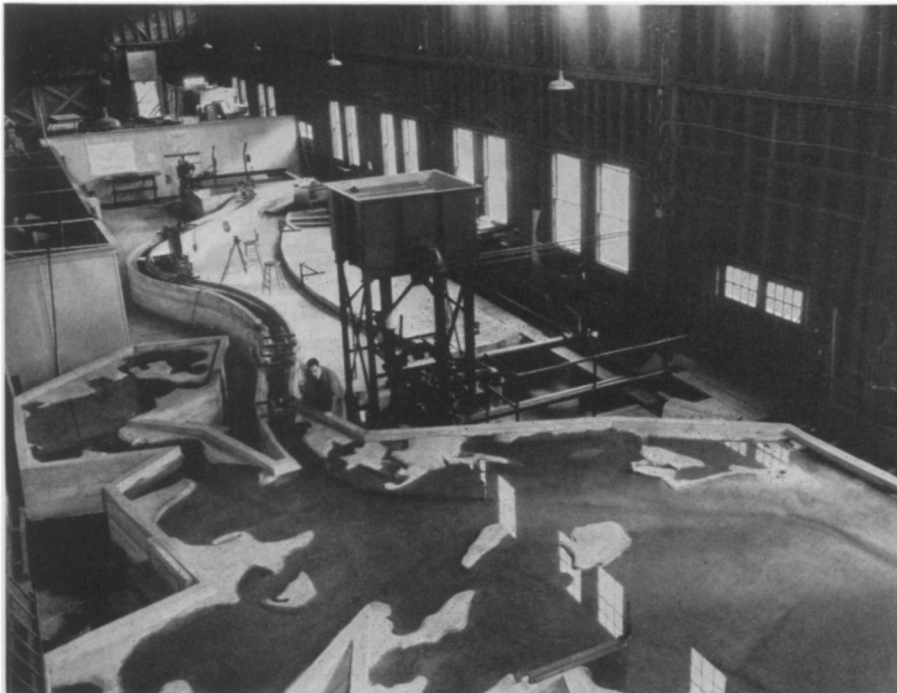
Western Europe for many years has been criss-crossed with thousands of miles of barge canals, and probably half the freight in Germany and France in prewar days moved by water. European canals felt the competition of railroads far less than those in early America. About one-half the former 5,000 miles of inland canals in this country are now closed because of railways. Included among the closed water routes is the first canal constructed in this country. It was at South Hadley, Mass., and was dug in 1792-96.

America's great interest in internal waterways has been in making rivers navigable, even for long distances inland from the ocean. Some 24,000 miles of United States rivers have already been canalized by straightening, deepening and providing with locks. There will be more later.

The Panama and the Suez are unique among the world's shipping canals because of their positions and their strategical value in war times. They provide the former missing links in the short round-the-world water route. Their greatest value since construction has



INTEROCEAN TRAVEL—Man-made waterways permit ocean vessels such as the U. S. S. Boxer, shown here, to be towed through the Panama Canal for interocean transportation.



CANAL MODEL—Modern technology requires laboratory studies with models such as the relief of the Cape Cod Canal, shown in this picture, which Massachusetts Institute of Technology engineers built to observe the effects of rising and falling tides.

been commercial, but their war value has been recently emphasized.

How important they are is evidenced by the part the Suez played in both world wars. It will be remembered that during World War II, when Russia was desperately in need of American supplies to stem the Nazi invasion of the Soviet Union, American vessels were forced to round the coast of South Africa to reach the Persian Gulf. It will be remembered also that the Panama Canal was an important objective of the Japs, which fortunately they never reached.

Suez Internationally Managed

The Suez, formally opened to traffic in 1869, is under international management of a board composed of French, English and Dutch representatives. In theory, it is always "open, in time of war as in time of peace, to every vessel of commerce or of war, without distinction of flag." The concession granted by Egypt for the canal expires in 1968. Certain British statesmen now feel that a new canal, not crossing Egypt, should be built and ready for use before that date.

One proposal, that has been made public in London, is a canal across Palestine near its southern border. It would extend from Gaza on the Mediterranean to the upper end of the Gulf of

Aqaba (Akaba), an arm of the Red Sea with a northern extremity touching both Palestine and Trans-Jordan. It would be 40% to 50% longer than the 100-mile Suez, and probably would have locks where it would cross highlands in eastern Palestine.

The war value of two separated canals to connect the Mediterranean and the Red Sea is self-evident. For peace-time purposes, the value is not as evident, but it must be remembered that the greatest oil fields yet discovered are in Asia Minor in the general area adjoining the Gulf of Persia. The development of these fields means greatly increased Mediterranean traffic. The oil mined can be piped to Mediterranean ports, but the supplies and equipment needed in the oil fields and by their thousands of employees must reach them by boat to ports on the Persian gulf.

Panama Canal Is Vulnerable

The Panama canal has served its purpose well since opened in 1914, but it will soon be unable to meet growing commercial demands. It is not wide enough for some of the new vessels, and it is vulnerable to enemy destruction, particularly from airborne bombs. When built, aerial bombing was practically unknown, and the atomic bomb was un-

dreamed of, except perhaps in the minds of a few advanced scientists.

One proposal is to widen, deepen and straighten the present canal, building new locks with greater width. A second is to replace it with a sealevel canal, following in part only the present route. A third is to open an entirely new canal, neither in the Canal Zone nor in Panama, to provide a waterway for the largest ships and to lessen danger from enemy attack.

The present canal, which cost in the neighborhood of \$500,000,000, has triple locks near each end to raise or lower vessels some 85 feet to or from the main section of the route across the high land of the isthmus. It is these locks that are vulnerable to enemy bombs; one well-placed bomb could put the canal out of use for three to five years.

The proposed sealevel canal would be lockless except for one low construction to handle the approximately one-foot different tide elevations of the two oceans. The canal would be from 200 to 750 feet wide, and its bottom would be 65 feet below sealevel. Its cost would be perhaps five times that of the present canal, but it would probably cost less to maintain. Without locks travel through it would require much less time.

Several sites outside of Panama have been suggested for the building of a new canal. One is in northern Colombia not far from the Panama border. Another is the Nicaraguan route, where it was first planned to build the original inter-oceanic waterway. It is still available. An America option, acquired in 1916 for \$3,000,000, is still in force.

Nicaraguan officials have recently offered America full cooperation in building a shipping canal through their country. They promise also the necessary bases to defend it.

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