Floating a 300-Ft. Bridge Span Into Position

Span Built on Falsework Near River Bank Is Transferred to Barges and Moved to Piers by Steamers

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FLOOD conditions in the Atchafalaya River in the spring of 1928 necessitated special methods in placing the last span of a combined railway and highway bridge built for the Louisiana Railway & Navigation Company at Simmesport, La.

This bridge is 1,200 ft. long, consisting of two 150-ft. spans, two 300-ft. spans and a 300-ft. swing span. All except one of the 300-ft. fixed spans had been erected before the season of high water, which came in December, 1927, and would last until the following August or September. The depth of water under this span is about 85 ft., with stage of the river 32 ft. above low water. The swift current (about 7 m.p.h.), with silt bottom and great depth of water, made it impossible to construct ordinary falsework in the river. It was therefore determined to float the last span into position. This operation is shown in Fig. 1.

Ordinary pile falsework, parallel with the river and having one bent under each panel point, was constructed on the downstream side of the bridge below the first river pier, about 100 ft. from the west bank, as shown in Fig. 2. The water at this point was not deep, and the pier protected the falsework from driftwood, which was brought down in considerable amount by the swift current. Steel was delivered direct to the falsework from the track on the bridge at this pier. After the steel was raised and riveted, two bents of falsework on each side of the center were removed to provide room to float two large railroad barges or car-transfer boats into position under the span. These barges, used for ferrying cars down the Red River 10 miles and across the Mississippi to the east bank, were each 37 ft. in width. One was 250 ft. and the other 295 ft. long, both stiffened by high longitudinal steel trusses.

Footings for falsework about 32 ft. high were spread on the decks of the barges by means of bridge timbers,

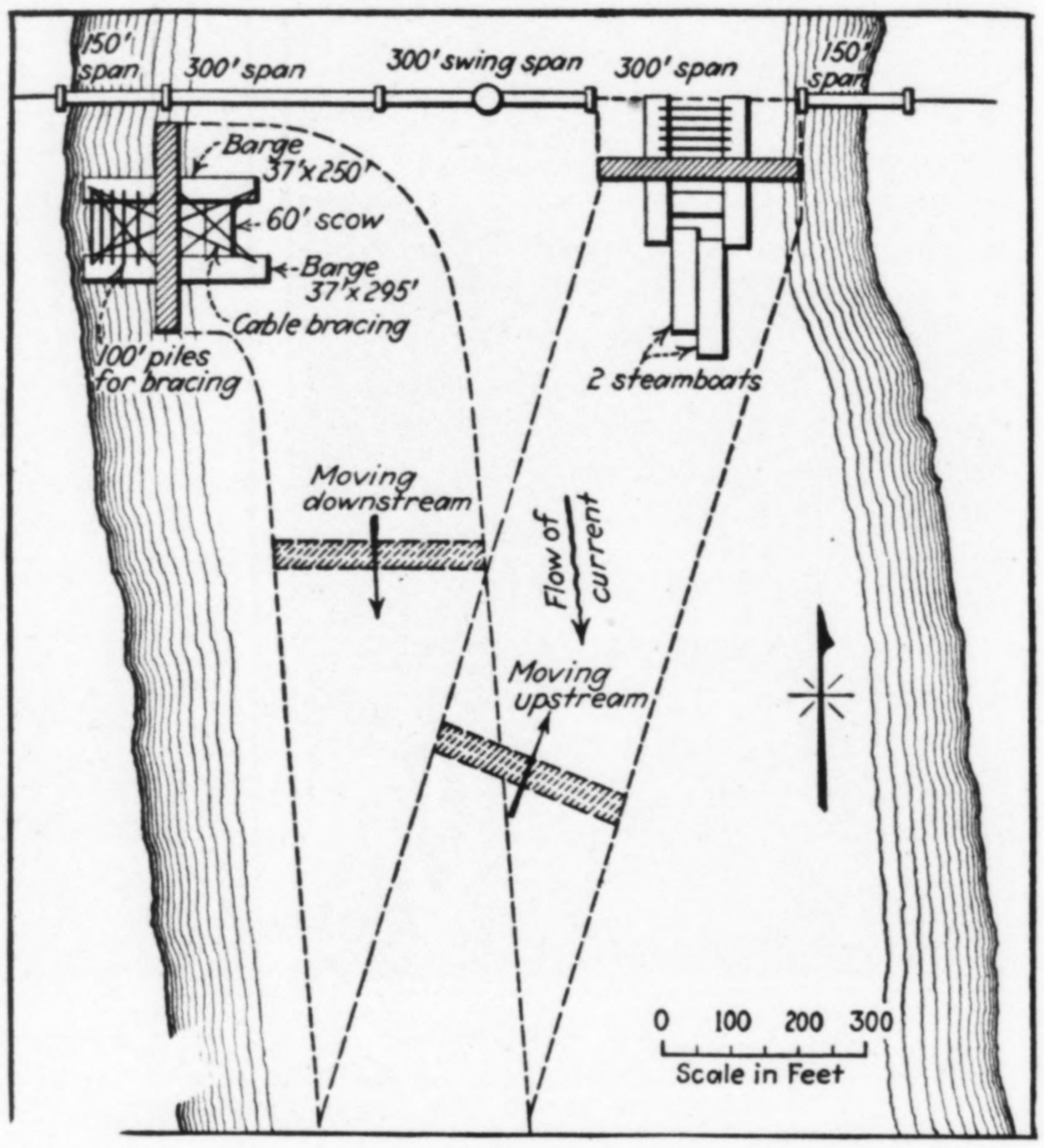


FIG. 2—METHOD OF HANDLING FLOATING SPAN

so as to distribute the load on the length of the barges as much as possible. The weight of span was 560 tons, and the falsework weighed about 200 tons. Some extra water ballast was put in the end compartments of the barges to help balance the heavy center load. This falsework was heavily braced, both laterally and longitudinally, and the central part of the pile falsework was removed so that struts and braces of 100-ft. piles could be placed between the barges to prevent any torsion on the falsework system while the bridge was being towed to position. A 60-ft. scow was also placed between the barges for bracing, as shown, and cables were placed diagonally to tie the structure together.

Preliminary work being finished by March 28, 1928, sufficient water was pumped out of barges to give buoyancy enough to lift the span from the falsework. Then the barges carrying the span were moved out toward the center of river and turned 90 deg., being controlled by long lines from the completed spans. Two large sternwheel steamers were hitched side by side to the down-

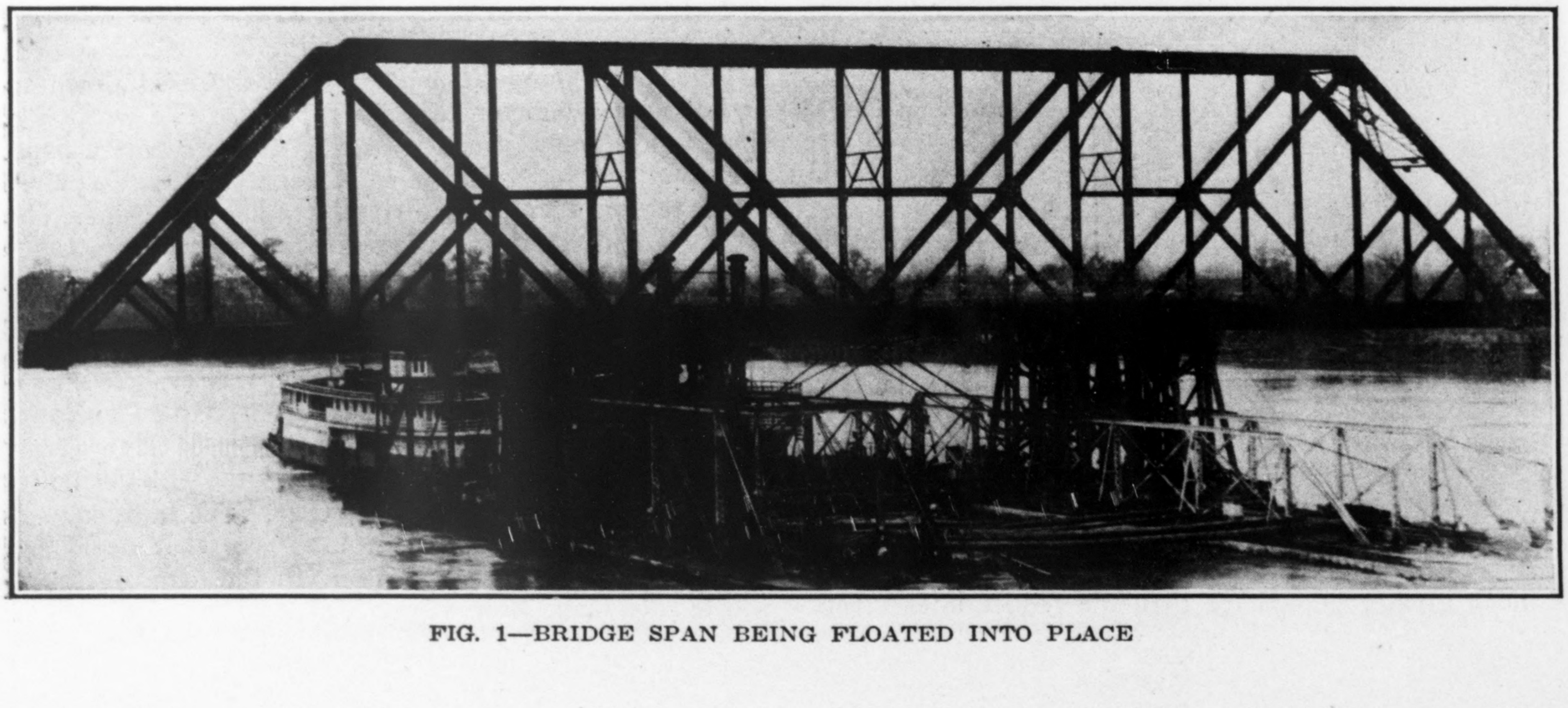


FIG. 1—BRIDGE SPAN BEING FLOATED INTO PLACE

stream end of the floating system, after which the lines were cast off and the whole assembly of steamers, barges and bridge dropped downstream diagonally about ¼ mile under control of the two steamers. Then the steamboats were speeded up and the span brought upstream slowly to position over piers, where by means of water ballasting the barges it was quickly lowered to position on bridge shoes which had been set in advance. The work of floating the span, moving it out and around, hitching steamboats, etc., required several hours, but the actual floating downstream and up again to a landing on the bridge piers required only half an hour. An interested spectator of the proceeding was the president of the railroad, Mrs. Sarah Edenborn.

The Wisconsin Bridge & Iron Company, Milwaukee, Wis., had the contract for this bridge, and D. K. Allinder, superintendent of erection, was in charge of the work. This writer, formerly vice-president of the company, suggested the general scheme of operations.

Arch Dam of Unusual Design

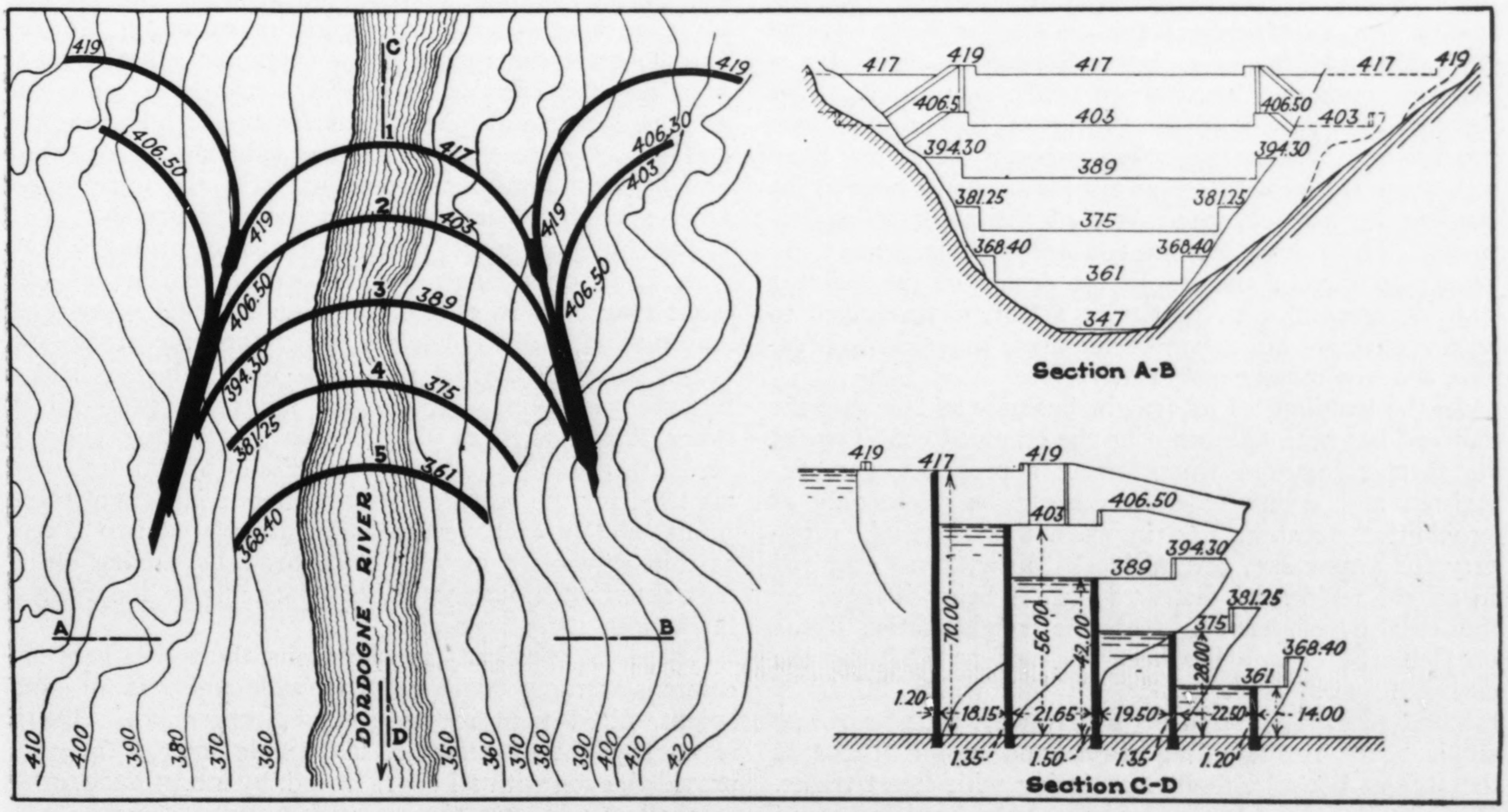
Many Advantages Are Claimed for This New Type of Structure—Test Models Show Ample Factor of Safety

A NOVEL type of arch dam, for which several important advantages are claimed, has been developed by two Frenchmen, MM. Mesnager and Veyrier. The merits of the new design have appeared sufficient to justify the granting of a government subsidy of 200.-000 francs to the inventors for further experimentation. Although no structure of this type has yet been erected, plans have been prepared for a dam on the Upper Dordogne River, and extensive tests have been made upon models at the laboratory of l'Ecole des Ponts et Chausées.

The principle used is that, since the cost of a dam increases rapidly with the height, it is cheaper to build a series of low dams than one high one. As seen by the plan, the first arch is built to the full height desired, but is of unusually light construction. Immediately below this is a second light arch, of lesser height, below this a third, still lower, and so on for as many steps as are necessary. The light construction is made possible by the intermediate pools, which provide a balanced load on the lower downstream section of each arch and which materially lower the effective water pressure against each dam. Not only does this reduce the amount of material in the structure but it also prevents scour below the dam at times of overflow. Floodwaters passed by the crest will descend in a series of short drops rather than in one sheer fall. This feature eliminates the necessity for the diversion canals or tunnels which are often necessary to protect the foundations. Still another advantage is that after construction is completed the new type dam can be thoroughly tested by subjecting it to double, triple or even greater multiples of the usual working pressure, simply by emptying one or more of the intermediate pools. This test can be repeated at any time fears for the safety of the dam are expressed. Failure of any wall would not be followed by complete loss of the structure, but would simply double the pressure on the adjacent wall.

The tests at the Ecole des Ponts et Chaussées were made on plaster models of the contemplated dam on the Upper Dordogne reduced to a scale of 1:100. Mercury was used in place of water. As this has 13.6 times the density of water and the plaster used had a strength of 1 : 7.3 as regards concrete, it was considered that the tests on these models (1 : 100 scale) would be comparable to actual results on the contemplated structure. By repeated tests under unbalanced conditions secured by emptying one or more pockets it was found that the factor of safety of the design was between four and five.

The tests were made possible by a subsidy of 200.-000 francs granted by the French Minister of Public Works. The Department of War loaned a 15-ton stock of mercury valued at 1,250,000 francs to the experimenters for the duration of the tests.



PLAN AND SECTIONS OF PROPOSED DAM IN FRANCE
Increased safety and lower cost claimed for design involving a series of light arches.