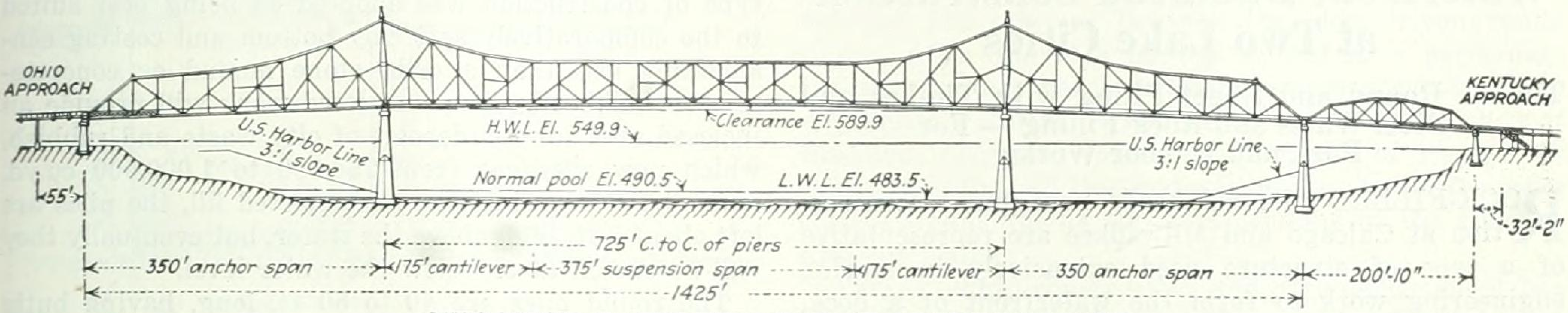
New Cantilever Bridge Begun on the Ohio River

A cantilever highway bridge now being built over the Ohio River from Ironton, Ohio, to Russell, Ky., will divide the present stretch of 240 miles of river between the bridges at Cincinnati and Parkersburg. The channel span will be 725 ft. c. to c. of piers, with a 375-ft. suspended span carried by 175-ft. cantilever arms, while the anchor arms will be 350 ft. long. A clear channel width of 705 ft. between piers will be provided and at the center of the span there will be a clearance of 40 ft. above high water or 99 ft. above normal pool level. This main part of the structure will consist of riveted through trusses spaced 29 ft. c. to c.



OHIO RIVER CANTILEVER BRIDGE AT IRONTON, OHIO

At Ironton, there will be an approach of plate girders on steel bents, ending with a curve and connecting with a timber trestle approximately at right angles to the bridge. At Russell, there will be a 200-ft. through truss shore span, followed by 500 ft. of steel trestle. The grades are 4 per cent and 5.36 per cent on the Ohio and Kentucky sides respectively, 4 per cent on the anchor arms, 3 per cent reducing to 1 per cent on the cantilevers, and thence 0.3 per cent to the center.

Three reinforced-concrete river piers carrying the cantilever and shore spans will have shallow foundations on sandstone rock. There will also be two piers on the banks. The structure will have a 20-ft. roadway with 6-ft. raised sidewalk. For the roadway, 3-in. shiplap oak planking will be laid diagonally on yellow pine sleepers, with concrete reinforcing and fireproofing over the railway tracks spanned by the Ironton approach. Live-load stresses were computed for the following loads on a 90-ft. length of roadway and sidewalk: two 45-ton electric cars on a 10-ft. width next the sidewalk; 30 tons on the remaining 16 ft. of width, or an 18-ton road roller anywhere.

Wind forces were figured at 350 lb. per lineal foot on the bottom laterals, and 150-lb. on the top laterals considered as a moving force. The sidewalk is inside the trusses and carries the same load as the balance of the roadway; the idea being that this roadway might be widened at some future date.

Most of the Ohio River bridges have piers built as solid rectangular blocks with either round or triangular ends. The Ironton piers have been designed similar to those for the bridge over the Mississippi River at Burlington, Iowa, built in 1917, using the I-beam cross-section (see *Engineering News*, March 8 and 22, 1917, pp. 382 and 466). The advantages are in economy of material, certain architectural effects, and placing of the mass of the concrete directly under the footings. This also gives considerable strength as against overturning.

This project originated with the Chamber of Commerce, at Ironton, Ohio, and funds were raised by public subscription under the direction of its secretary, E. B. Adams. The Ironton-Russell Bridge Co. was then incorporated in Ohio. The former town has a population of about 15,000, and Russell, Ky., with 1,500, has the shops of the Chesapeake & Ohio Ry. At present there is a ferry between the two towns. A bridge between Ironton and Ashland was commenced some years ago for an extension of the Cincinnati, Hamilton & Dayton R.R., but the project was abandoned after the substructure had been built and the river piers were afterward removed.

The bridge was designed by E. F. Barkow, assistant engineer of the Wisconsin Bridge & Iron Co., Milwaukee, Wis., under direction of Victoire Guillemin, chief engineer, and with some suggestions from J. F. Jackson as consulting engineer. The company also has the contract for both substructure and superstructure. The Dravo Constructing Co., which is building the substructure, commenced work on the foundations in July, 1921. The estimated cost is $250,000 for the substructure and $450,000 for the superstructure.

Reconstruction in France

In an article in *Engineering News-Record*, July 15, 1920, p. 101, a summary was given of French reconstruction work that had been done to April 1, 1920. Reconstruction work that has gone on in the intervening year has restored the devastated regions almost entirely. A few of the salient points in the work are reproduced herewith from statistics supplied by the Minister of Liberated Regions of France.

The population of the ten destroyed departments as of Nov. 1, 1918, was approximately 1,944,000, but by May 1, 1921, it had risen to 4,165,153, or 88 per cent of the 1914 population.

Since the armistice 2,172,167 persons have been housed in buildings either repaired or newly constructed. The distribution of these is as follows: In repaired houses, 1,573,080; in wooden huts, 253,603; in permanent structures, 82,717; in semi-permanent structures, 159,214; in temporary stone houses, 103,553.

The area of land over which the fighting took place amounted to 3,337,000 hectares. On May 1 the surface from which projectiles had been removed amounted to 2,934,128 hectares, a total of 21,370,800 tons of projectiles found in the devastated regions having been destroyed. The surface of the land from which projectiles and barbed wire nad been removed and on which all trenches had been filled was 2,787,120 hectares.

Earth used to fill trenches amounted to 239,666,481 cu.m. Of 2,164,727 hectares of land under cultivation in 1914, 1,851,039 hectares were made unfit for cultivation during the war. On the first of May, 1921, 1,754,693 hectares had been completely cleared and made fit for cultivation.

Of 52,734 km. of highway which were in a state of

Give Transportation Act a Fair Trial, Say Railroad Men

From many angles the railroad problem was discussed authoritatively at an all-day meeting of the Academy of Political Science held in New York April 28. The opinion prevailed that the Transportation Act of 1920, including the establishment of the Railroad Labor Board, has not yet had a fair chance to prove its worth and that it should not be fundamentally changed at the present time.

At the luncheon session attended by nearly 600, Henry C Wallace, Secretary of Agriculture, declared that unless freight rates come down the country will be confronted by profound readjustments in its agricultural and industrial activities. Daniel Willard, president of the Baltimore and Ohio R.R., urged a five-year trial of the Transportation Act in its present form. He favored that portion of the act which provides that the government shall take over one-half of net operating income above 6 per cent and questioned the wisdom of any legislation to prohibit strikes by railroad employees. Walker D. Hines, former Director General of Railroads, endorsed Mr. Willard's plea on behalf of the Transportation Act.

At the morning session Prof. Frank H. Dixon, of Princeton University, explained the functions and policies of the Railroad Labor Board and W. N. Doak, vice-president of the Brotherhood of Railroad Trainmen, discussed them from the viewpoint of the employee. C. B. Heiserman, general counsel, Pennsylvania R.R., and Henry T. Hunt, former member of the board, discussed them from the railroad and public angles with special reference to the current controversy between the Pennsylvania R.R. and the shop crafts. At the afternoon session Charles R. Hook, vice-president and general manager of the American Rolling Mill Co., explained the effect of freight rates on the cost of steel making, and J. D. A. Morrow, vice-president of the National Coal Association, showed how much of the retail price of coal goes to pay for transportation. Prof. Wm. J. Cunningham, of Harvard University, indicated what the railroads might do to render maximum service while R. H. Aishton, president of the American Railway Association, told what they are now doing to increase economy and efficiency.

Samuel McCune Lindsay, president of the board of trustees of the Academy, presided at the luncheon session. Prof. Henry R. Seager of Columbia University at the morning session, and Albert Shaw, editor of the *Review of Reviews*, at the afternoon session. Information as to the published proceedings and future meetings of the Academy may be obtained from the Secretary, Academy of Political Science, Kent Hall, Columbia University, New York City.

French Line Starts To Electrify

A large program for electrification of about 2,000 miles of line on the Paris & Orleans Ry. is to be commenced this year by the construction of three power plants and the line equipment of the Paris-Vierzon division. Orders for 200 electric locomotives have been divided between three French firms. At 1914 prices the cost for the 2,000 miles was estimated at $94,000,000.

Municipal Improvements Convention Date Changed

The convention committee has changed the date of the 1922 convention of the American Society for Municipal Improvements to Oct. 1-6, 1922. It is to be held in Cleveland.

New Ohio River Bridge Built in 274 Days

Dedication of the new Ohio River highway bridge at Ironton, Ohio, connecting with Russell, Ky., marked the completion of construction in 274 days. Work on the foundations was begun by the Dravo Contracting Co. last July, and erection of the superstructure steel was begun in the fall by the Wisconsin Bridge & Iron Works, designers of and contractors for the bridge. The bridge has a main span of 725 ft., this being the central span of a cantilever structure 1,425 ft. long between anchor piers. (See "Engineering News-Record," Oct. 13, 1921, p. 613, for span diagram.)

The governors of Ohio, West Virginia and Kentucky, as well as United States senators and a large number of railway officials attended the dedication, which centered about the state line, here located along the low-water line on the north side of the river, as fixed at the time when the Northwest Territory was set off from Virginia.

The cost of the bridge was about $700,000. Money was raised locally, and 2,424 persons hold stock in the company. The bridge will be operated on a toll basis.

Reclamation Act Amended

The Senate on April 2 passed a bill already approved by the House amending the U. S. Reclamation Service Act so as to permit the federal and the state governments to take bonds of irrigation districts as a substitute for the securities of the individual entrymen heretofore required. The Senate amendment permits federal land banks to make loans on irrigation projects. This, if agreed to by the House, will remove the inhibition of the Farm Loan Act against loans secured by irrigation projects.

Court of Appeals Decision on Flat-Slab Patent

Justice Alschuler sitting with Justices Baker and Evans, United States Circuit Court of Appeals for the Seventh District, in January affirmed the decision of the District Court for the Northern District of Illinois, Eastern Division, that U. S. patent No. 1,005,-756 on reinforced-concrete flat slab held by F. F. Sinks, was invalid in so far as it related to claims 2, 4, 6, and 7. This was in the case of the Condron Co. against the Corrugated Bar Co., and means in effect that the upper court has held that the so-called Akme system is not patentable. The lower court decision was noted in *Engineering News-Record*, issue of May 1, 1919, p. 889.

Urge Three-Year Federal-Aid Road Program

Effort Will Be Made in Senate to Secure Yearly Appropriation of $75,000,000

(*Washington Correspondence*)

An effort will be made in the Senate to provide for a three-year road building program rather than the two-year program prescribed in the bill which just has come to the upper chamber after having passed the House. Thirty-four of the state legislatures meet next January and will not meet again until January, 1925. It is held to be essential in the prevention of economic loss in organization and in securing maximum efficiency that the legislatures know just what the federal government will contribute during a three-year period. Since the states during the past three years have put under contract an average of $82,000,000 federal funds per year, there is very strong sentiment in favor of amending a bill in the Senate so as to make it provide $75,000,000 per year for three years.

Section 4 of the bill as it passed the House is not satisfactory to the state highway officials and W. C. Markham, their representative in Washington, has submitted the following substitute to the Senate committee:

Sec. 4. That if any State, for a period of one year from the date on which the Secretary of Agriculture approves, or heretofore has approved, a project statement for the construction of any road project, shall have failed to commence actual building construction on such project or if contract for the construction of such project shall not have been entered into, the Secretary of Agriculture shall require such State to submit a project statement, or statements, for one or more other projects to replace such project; and if said State, for a period of 60 days from receipt of notice from the Secretary of Agriculture to submit such other project statement, or statements, shall not have submitted the same, then, and in that event, the Secretary of Agriculture shall immediately cancel such project and reapportion the Federal funds allotted thereto among all the states in the same manner and on the same basis as provided by the Federal Highway Act and all acts amendatory thereof or supplemental thereto.

For $20,000 a Mile

An effort also will be made to convince the Senate committee that the bill passed by the House should be amended so as to continue the $20,000 per mile maximum which may be contributed by the federal government. The House reduced the maximum from $20,000 per mile to $12,500 during the first year and $10,000 per mile thereafter. The state highway officials believe that no abuse is resulting from the $20,000 maximum, with the type of construction left to the judgment of the Secretary of Agriculture. They point out that the average federal aid per mile has been but $7,415.

Representative Begg, of Ohio, made strenuous objection, during the consideration of the bill in the House, to a maximum as high as $20,000 for federal aid. He suggested that a $4,000 maximum would be better. He opposes the whole system of federal aid, however, and declares the states have already surrendered 90 per cent of their police powers so that the highways, the railroads, the education and the health may be nationalized. He presented, somewhat newly garbed, the argument that a few of the states pay most of the taxes and, as a result, are being taxed out of all equity for road construction.

Cantilever Highway Bridge Across the Ohio at Ironton

Main Span of New Toll Bridge Is 725 Ft. and Anchor Arms 350 Ft. Each—Was Locally Financed—Rapid Progress Made in Construction—Hydraulic Jacks Assist Erection

By J. F. Jackson
Consulting Engineer, Milwaukee, Wis.

UNUSUAL CONDITIONS OF PROMOTION and financing were necessary preliminaries to the construction of the new Ohio River cantilever bridge between Ironton, Ohio, and Russell, Ky., which was opened in April, 1922, and a view of which is shown in Fig. 1. The city of Ironton has a population of 14,000. Russell is very much smaller, but is an important division point on the Chesapeake & Ohio Ry., and many railway employees live in Ironton. Ferry traffic has been heavy for several years and there was need of a highway bridge to afford adequate transportation facilities. How to get the project financed was a problem in human engineering, a problem of a kind which is too seldom mentioned in articles on engineering work. Briefly, public interest was awakened, plans and estimates were secured, a local company with 2,600 stockholders was organized, passage of a bill by Congress was secured, a permit from the War Department was obtained, and a contract was let, all in nine months.

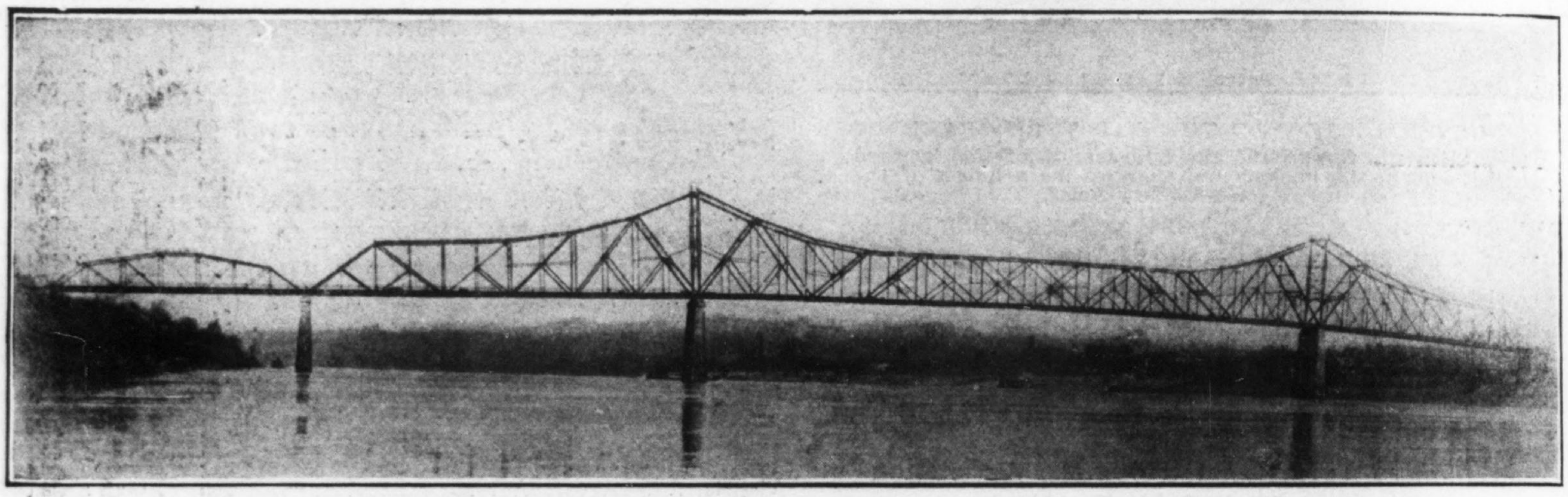


FIG. 1—HIGHWAY BRIDGE OVER OHIO RIVER AT IRONTON, OHIO; 725-FT. CANTILEVER SPAN

In September, 1920, when the Chamber of Commerce at Ironton decided to investigate the bridge problem, E. B. Adams, the secretary, wrote to twenty-three bridge companies and engineering firms explaining the situation and stating that local interests could finance a project of about $700,000. As an outcome of the negotiations, after eliminating unsatisfactory replies and negotiating with two or three prominent bridge companies, the bridge committee of the Chamber of Commerce finally authorized the Wisconsin Bridge & Iron Co., Milwaukee, Wis., to determine the best location and to prepare plans, specifications and estimates. At this point the writer was engaged by the company for consultation on the work. It must be remembered that before organizing a company or obtaining a charter the bridge committee wanted to know if the project was feasible and what would be the cost. Speedy work was necessary so that foundation work could be begun and completed during the approaching low-water season.

Upon the completion of general plans and estimates the cost was found to be higher than the amount the bridge committee thought could be raised. This matter was adjusted by changing several hundred feet of the more or less temporary approaches to timber construction and by minor changes in hand-railing. The Ohio approach viaduct extends to the anchor pier, but at the Kentucky end there is a 200-ft. through-truss span between the anchor pier and viaduct approach.

An estimate having been made, the bridge committee initiated a campaign to sell stock in a company to be organized to build a bridge on definite plans and for a definite sum of money subject, of course, to various contingencies. Through organizing ability and public spirit $778,000 were subscribed by 2,600 stockholders in about three weeks. The Ironton & Russell Bridge Co. was then organized, with E. J. Merrill as president and E. B. Adams as secretary. There remained an almost endless amount of red tape to be untangled before a contract could be entered into, but in the meantime the Wisconsin Bridge & Iron Co. was authorized to make the necessary surveys, maps and plans required by the U. S. Government and to do other engineering work in connection with the project. The authorization to construct the bridge was signed by the Secretary of War on June 29, 1921. A contract having been entered into with the Wisconsin Bridge & Iron Co., work on the bridge was started without delay.

Piers—The first step was the construction of the four river piers, the contract for which was let to the Dravo Construction Co., Pittsburgh, Pa., on July 25, 1921. There were some interruptions by sudden rises of the river, but the work was finished Oct. 26, 1921, just ahead of high water. Fig. 2 shows one of the main river piers, each of which contains about 2,500 cu.yd. of concrete. The use of two shafts connected by a reinforced web for the upper part of piers was a means of saving concrete, or rather placing the bulk of concrete where it would do the most good, as compared with the more usual rectangular plan of piers. The exact depth to solid sandstone was not known and could not be determined by the time estimates were demanded, but our assumed depths of 8 to 9 ft. below low-water proved to be fairly correct.

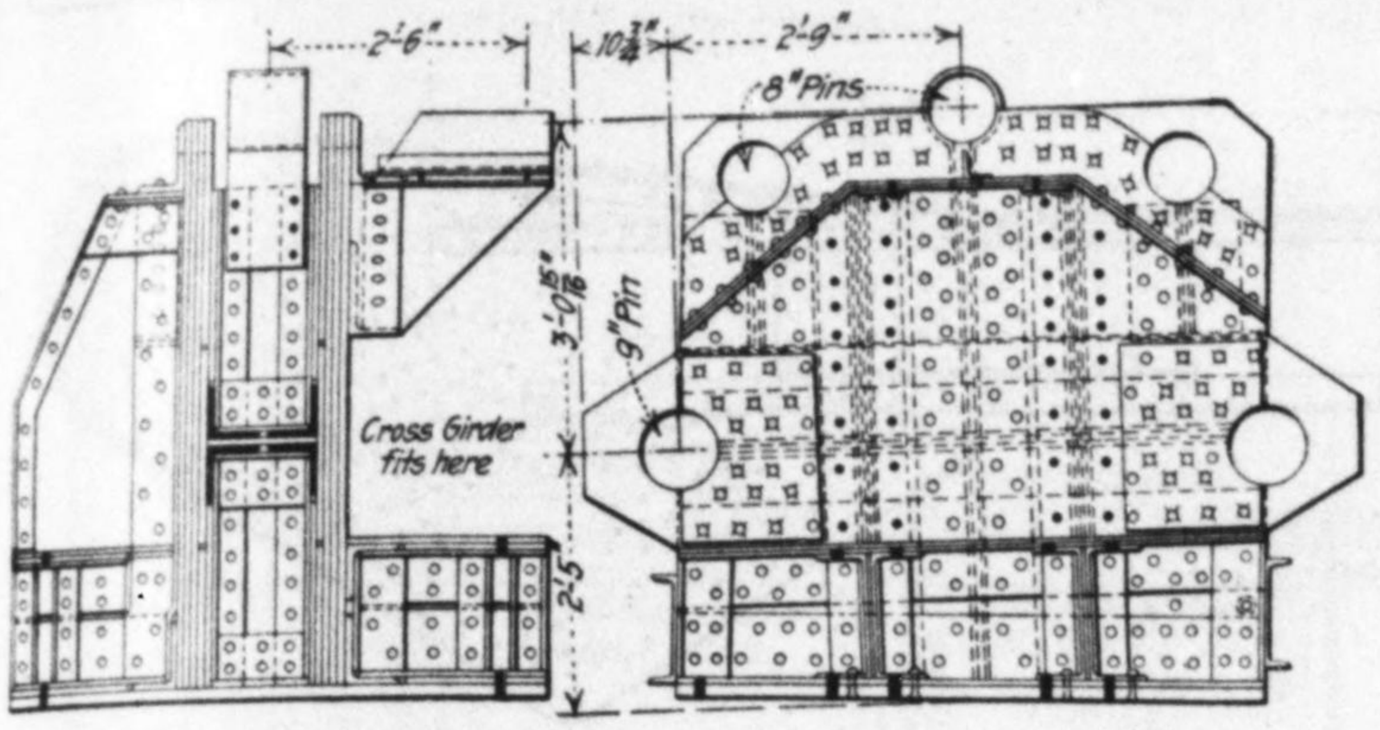


FIG. 3—BEARING SHOE WITH FIVE PIN CONNECTIONS

General Location and Layout—The Ohio River at this point is about 1,000 ft. wide at low water, with banks about 1,600 ft. apart at 50 to 55 ft. above low water. A clearance of 40 ft. above high water was required over the navigation channel. The stage of water is subject to great and sudden variation, and the floods of 1885 and 1913 rose 65 ft. above low water. A location crossing the river nearly at right angles was adopted, with grades of 4 per cent on the approaches and shore spans. Determination of the general character of the structure was the next step, giving span lengths and pier locations which would be approved by the government engineers and by river transportation companies. Other bridges on the river have spans of 500 to 775 ft. and the new dams have navigation passes 700 ft. in width.

For preliminary studies, contour maps of the river bottom were made and floats were sent downstream, their direction and speed being shown on the maps. The low-water navigation channel lies near to the north shore and this determined the location of the north pier within close limits. Since there is a fairly straight river channel from two miles above to half a mile below the bridge site, it was believed that we could get approval of a center span 700 ft. in the clear or 725 ft. c. to c. of piers. Further study showed that a good looking and economical layout could be obtained by a symmetrical cantilever of 1,425 ft. total length, with 4 per cent grades on the anchor arms and the adjacent 200-ft. shore spans (see *Engineering News-Record*, Oct. 13, 1921, p. 613).

Live-Loads for Design—Determination of live-load and design of the floor system was the next step, and it was considered advisable to provide for possible future electric railway traffic. Railway bridges are often kept in service long after their design loads are exceeded. A short highway span may sometimes have to carry the live-load for which it was designed. In fact since the advent of heavy trucks and road rollers, the suspenders, floorbeams and especially the floor stringers of old highway spans are apt to be exceedingly light and shaky. The use of short panels and light stringers, which are a source of vibration and injury to the floor itself, whether it be of wood or concrete, is a serious fault still committed in many recent structures, short and long. In the Ironton bridge the panels are 29 ft. 2 in. on the anchor span and cantilever arms, and 31 ft. 3 in. on the suspended span. This long panel design with deep stringers has resulted in a very rigid floor system of great local load capacity and a truss of more than adequate strength and absolutely without any skinny or shaky members.

The bridge was proportioned for the following loads, the live-load being assumed to move across the bridge in either direction for position of maximum stress in each member:

1. Full dead-load including all steelwork and wood floor-figuring lumber at 4½ lb. per foot board measure.
2. Live-loads for floor members and primary truss members based on a maximum combination of the following loads over a space the full width of the roadway and sidewalk for a length of 90 ft.: (A) A concentrated load of two 45-ton street cars on the 10-ft. space next to sidewalk; (B) a load of 30 tons uniformly distributed over the remaining 16 ft. of roadway and sidewalk to cover trucks, automobiles, wagons and foot passengers; (C) an 18-ton road roller placed anywhere on the roadway.
3. Live-load for main web members same as above, preceded or followed by a uniform load of 800 lb. per lineal foot.
4. Live-load for main chords; 1,400 lb. per lineal foot.
5. Wind forces were taken at 500 lb. per lineal foot moving, 350 lb. on bottom laterals and 150 lb. on top laterals.

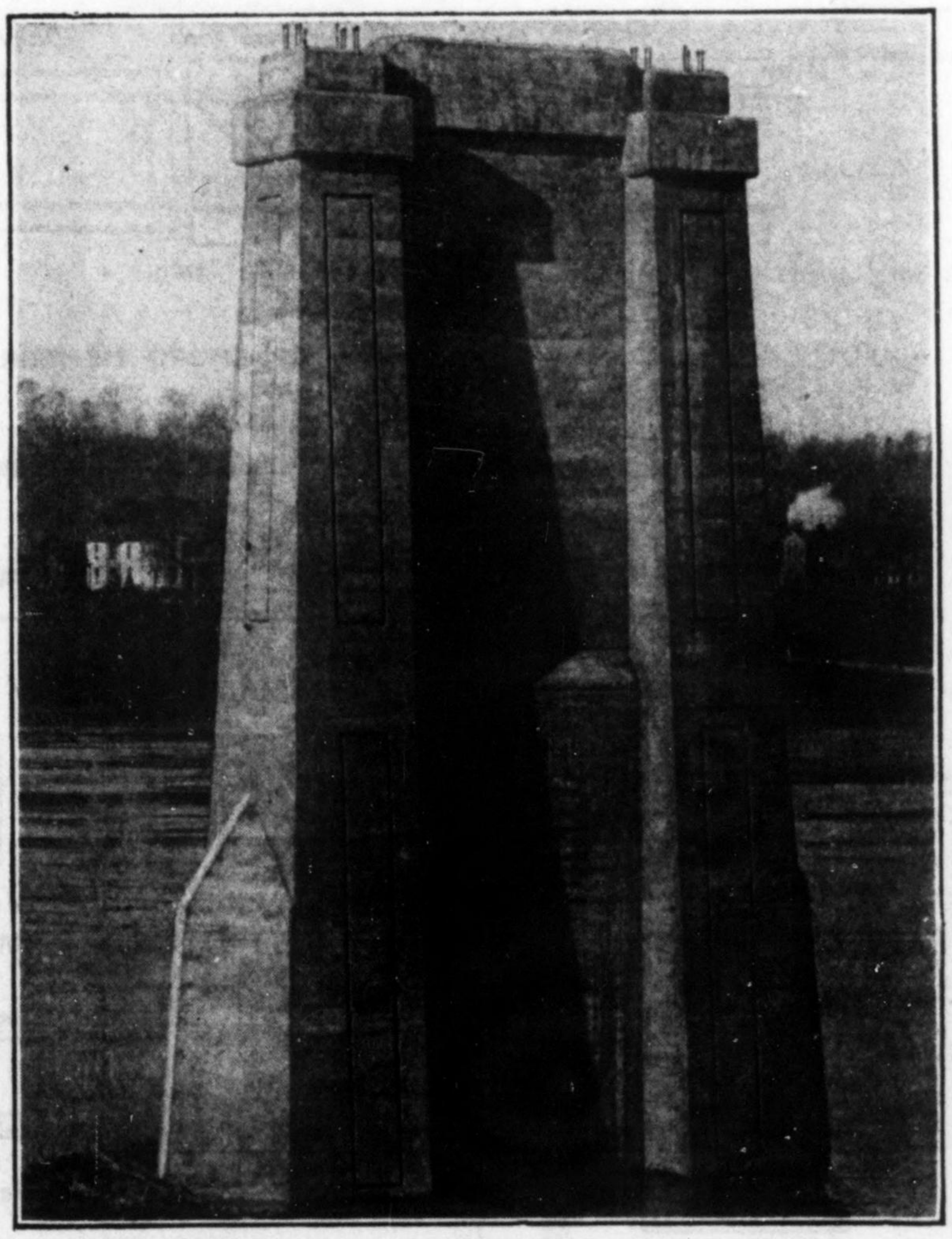


FIG. 2—DUMBBELL PIER OF OHIO RIVER BRIDGE
In the upper part the web is 36 in. thick and the shafts are about 8½ ft. square.

Design of Bridge—The cantilever trusses are spaced 29 ft. c. to c., giving room inside for a 20-ft. roadway and a 6-ft. walk. Anchor spans are 350 ft. each, cantilever arms 175 ft. each, and the suspended span 375 ft., making a total length of 1,425 ft. The truss depth is 100 ft. at the towers, 50 ft. in the suspended span and 45 ft. at the shore ends of the anchor arms. The total weight of steel in trusses and floor system is about 2,100 tons.

Some novel ideas and important matters of detail embodied in this bridge should be mentioned. In order to reduce the amount of field riveting, to facilitate erection and to avoid secondary stress, the vertical post, bottom chords and inclined end posts are connected to

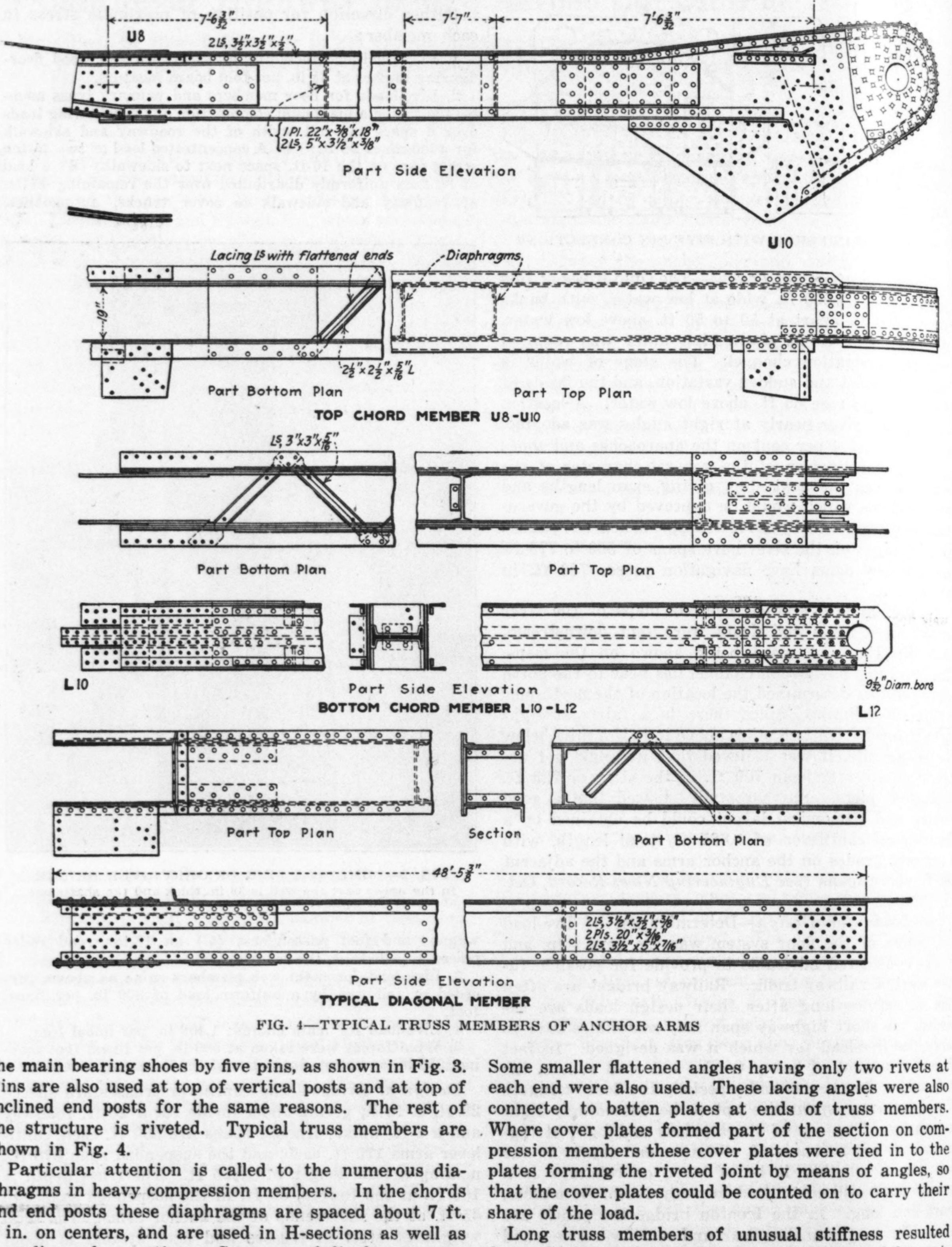


FIG. 4—TYPICAL TRUSS MEMBERS OF ANCHOR ARMS

the main bearing shoes by five pins, as shown in Fig. 3. Pins are also used at top of vertical posts and at top of inclined end posts for the same reasons. The rest of the structure is riveted. Typical truss members are shown in Fig. 4.

Particular attention is called to the numerous diaphragms in heavy compression members. In the chords and end posts these diaphragms are spaced about 7 ft. 3 in. on centers, and are used in H-sections as well as in ordinary box sections. Some use of diaphragms was also made in long tension members made of two 12-in. or 15-in. channels. Note may be made of the use of 3 x 3 x $\frac{5}{16}$-in. single-intersection angle lacing on heavy members. The ends of the angles are flattened out and connected with three rivets, as shown. A more effective use of material for column lacing would be hard to find. Some smaller flattened angles having only two rivets at each end were also used. These lacing angles were also connected to batten plates at ends of truss members. Where cover plates formed part of the section on compression members these cover plates were tied in to the plates forming the riveted joint by means of angles, so that the cover plates could be counted on to carry their share of the load.

Long truss members of unusual stiffness resulted from the consistent application of the principles outlined above. There was no need to handle them "tenderly" in shop or field. This fact inspired confidence and pride on the part of shop and field workmen and speaks for itself in the completed structure. Some excess of metal was used at various points, such as cover plates on end posts and top chords of anchor arms, pri-

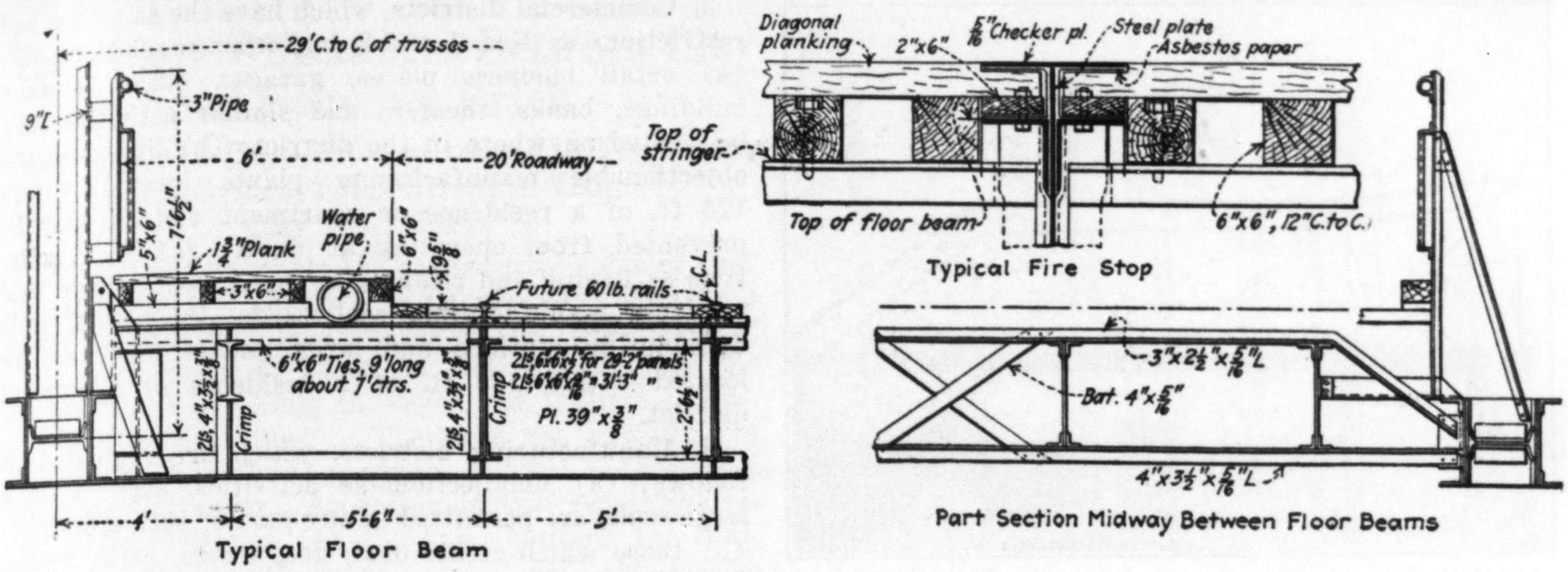


FIG. 5—FLOOR FRAMING AND TIMBER DECK

marily for the sake of appearance, but on the whole the metal is placed where it will do the most good, keeping in mind great load-carrying capacity, stiffness, ease of maintenance, and long life of the bridge.

Floor—In the floor construction, shown in Fig. 5, the 10 x 3-in. oak plank were sized, shiplapped ½ in. and laid diagonally on 6 x 6-in. yellow pine cross-ties spaced 6 in. apart. These ties were painted with creosote and the tops covered with strips of tar felt. This construction provides for future installation of an interurban track and makes a floor of great strength. It will dry out readily after rains and so prevent rot. The sidewalk floor is of 2-in. pine.

Cross-ties are supported on the four deep stringers and one 15-in. I-beam under the walk, as shown. The five stringers are tied together at their centers and to the bottom chords by a cross strut. The long bottom laterals are also connected to the bottom flanges of stringers. No vibration can get a start in construction such as this, which is designed to carry heavy street cars and road rollers. Fire stops of steel extending entirely through the floor are spaced 175 ft. apart.

Erection—Some special points may be noted in connection with the erection of the steelwork. Materials were delivered by rail on each side of the river, as required. It will be seen from Fig. 7 that the anchor arms, 350 ft. long, were each supported by three heavy steel bents on small concrete piers. These falsework bents, as well as the truss members, were raised by means of stiffleg derricks of 12 tons capacity with booms 95 ft. long. Booms were provided with a 20-ft. extension of about 3 tons capacity. These derricks traveled inside the trusses and were fastened to each successive floor beam as the work progressed. The boom could be turned backward between stifflegs in order to put in top lateral bracing.

After the completion of the anchor arms and cantilever arms, each half of the 375-ft. suspended span was built out in the usual way from the suspension points to a junction at the center. The projection over the main piers was 362½ ft. The work was done in March and some rather high winds were experienced, but the cantilever was so stiff and steady that no anxiety was felt by the erection men. For the first time in cantilever erection hydraulic jacks instead of wedges were used to control the position of bottom chords at suspension points, as shown in Fig. 6. Each jack was of 500 tons capacity. Each forward movement of the jack was followed up by shins. These jacks worked like a charm and were not expensive. The toggle joints in the top chord were operated by 125-ton hydraulic jacks arranged to produce a pull downward.

To further facilitate the connection of bottom chords at the center of the suspended span, links formed of pin plates about 6 ft. long and having slotted holes with the slot 2½ in. longer than the diameter of the pins were used. The pins and links were of sufficient size to take the dead load. After the suspended span was swung the pin plates were reamed and riveted to take up the live-load tension.

The bridge was built in 274 days counting from the time ground was broken for piers until the bridge was opened for traffic, April 23, 1922. Great credit is due the organization of the Wisconsin Bridge & Iron Co. for the high-grade work of its engineering, shop and erection departments. The Dravo Construction Co. did

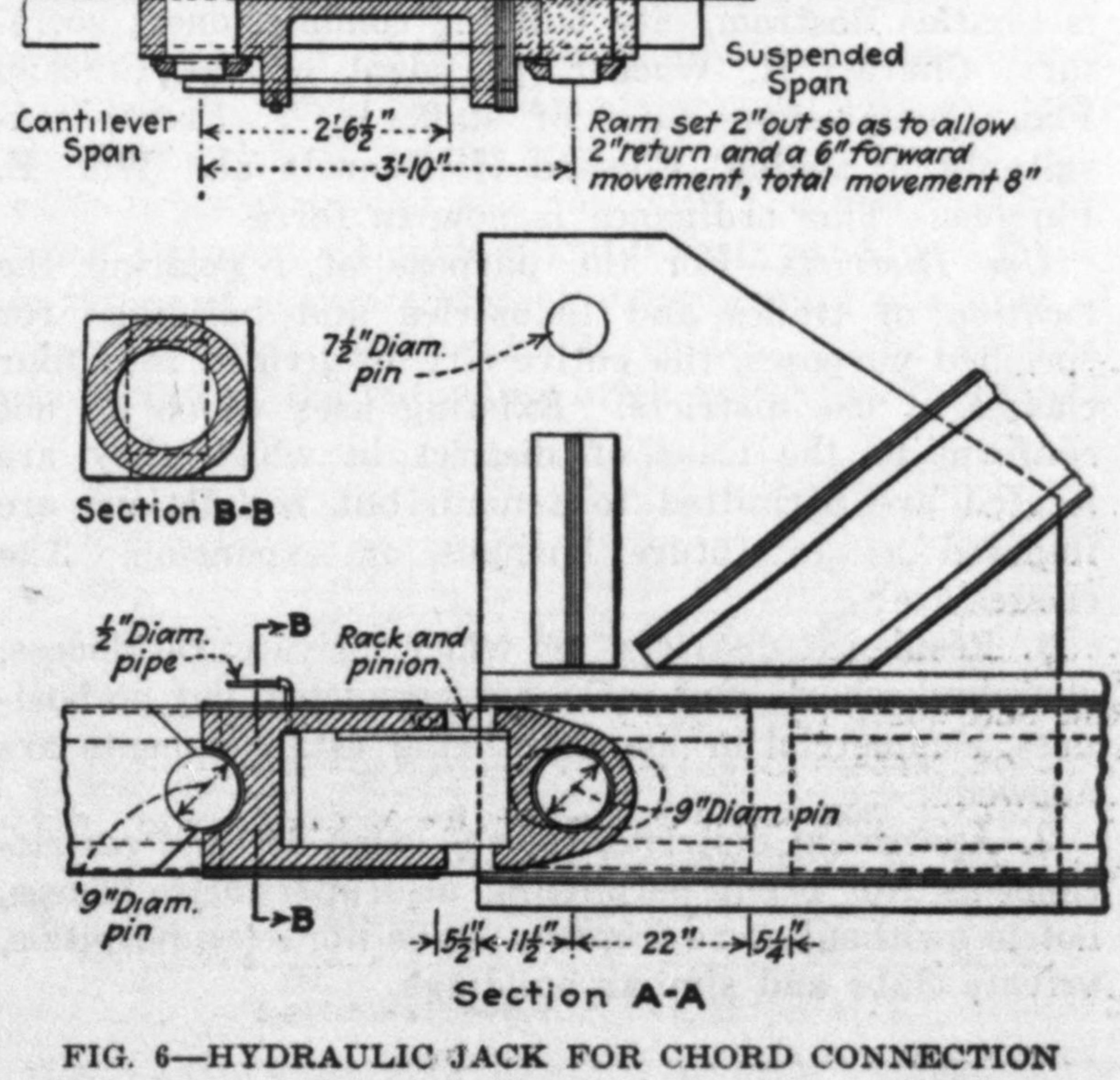


FIG. 6—HYDRAULIC JACK FOR CHORD CONNECTION

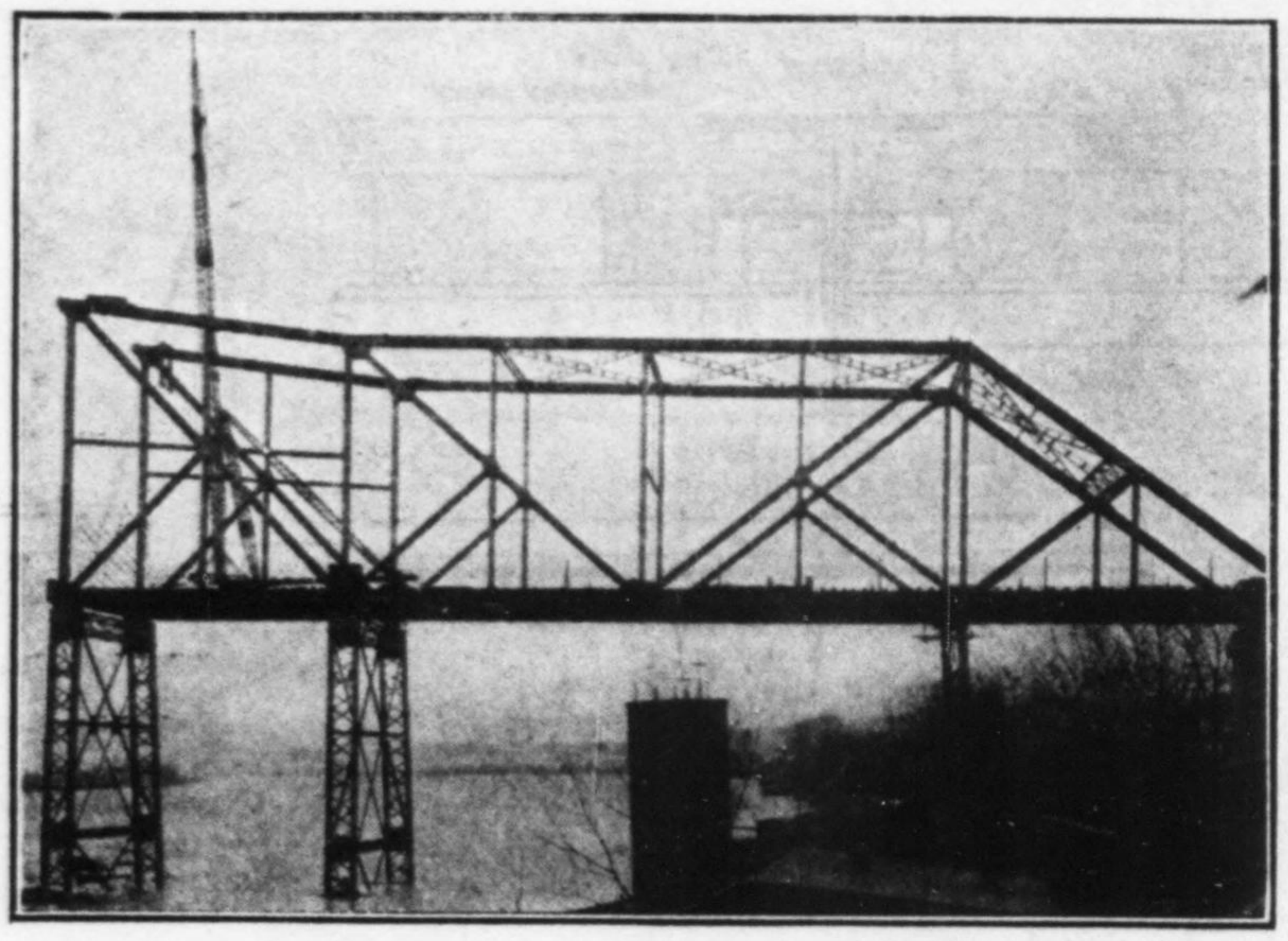


FIG. 7—ERECTING ANCHOR ARM ON STEEL FALSEWORK

rapid and splendid work on the substructure, as noted above. The engineers chiefly responsible for the design of general plans and details of this cantilever believe that it shows some rational advance in the art of assembling materials into a large-span highway bridge to meet all possible or probable needs of the future as far as they may be foreseen.

Chicago Adopts Zoning Ordinance for Entire City

Four Classes of Use and Five of Volume Districts—Control by Building Commissioner and Board of Appeals

A ZONING commission for the city of Chicago was appointed by the mayor in July, 1921, in accordance with a law passed by the Illinois legislature in June of that year. After numerous public hearings and conferences with civic and other organizations the commission drafted an ordinance which, with some amendments, was adopted by unanimous vote of the city council on April 5, 1923. This commission of twenty-two members is composed of municipal officials, business men, engineers and architects; its chairman is Charles Bostrom, city building commissioner; secretary, Charles H. Wacker, president of the Chicago Plan Commission; chief of staff, H. T. Frost; consultants in zoning, Edward H. Bennett and Wm. E. Parsons. This ordinance is now in force.

Use Districts—For the purpose of regulating the location of trades and industries and buildings for specified purposes, the entire city is divided into four classes of use districts. Existing uses which do not conform to the class of district in which they are located are permitted to remain but restrictions are imposed as to future changes or expansion. The classes are:

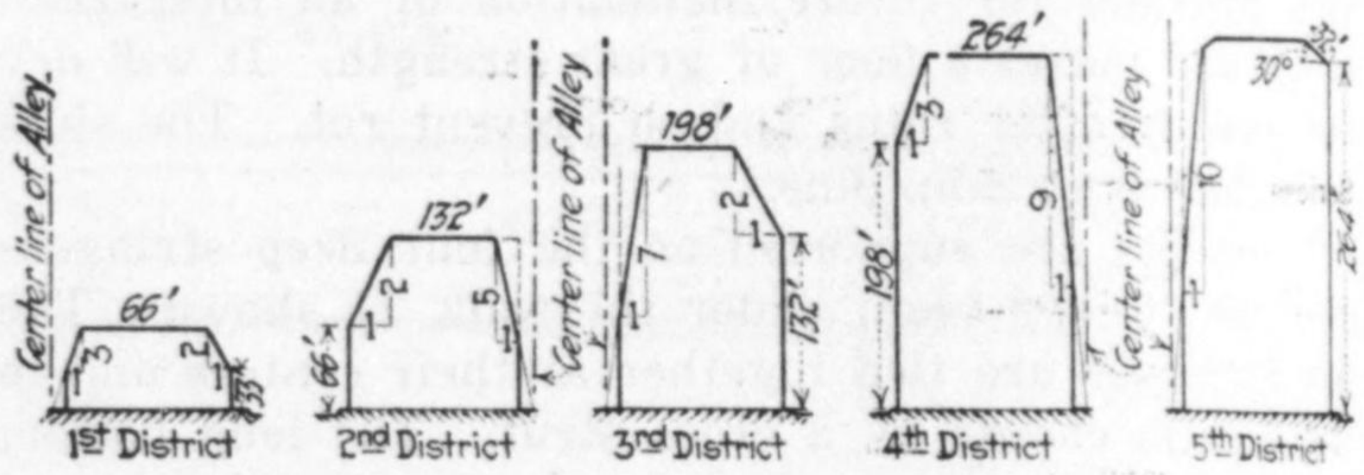
1. Residence districts, in which private residences, churches, schools and parks are permitted, but no business, commercial or manufacturing establishments are allowed.

2. Apartment districts, for the same use and restrictions as No. 1 but permitting also apartment houses, hotels (without store fronts), public libraries, hospitals, private clubs and similar buildings.

3. Commercial districts, which have the same use and restrictions as Nos. 1 and 2, but other regulations are: (a) retail business places, garages, offices, storage buildings, banks, theaters and similar activities may be located anywhere in the district; (b) light and unobjectionable manufacturing plants located within 125 ft. of a residence or apartment district may be prevented from operating at night; (c) such activities as dyeing and cleaning establishments, large food products manufactures, coal yards, ice plants, milk distributing stations and large stables must not be located within 125 ft. of a residence or apartment district.

4. Manufacturing districts, which are regulated as follows: (a) unobjectionable activities, even if on a large scale, are permitted in any part of such a district; (b) those which create dust, gas, smoke, noise, fumes, or odors must be at least 400 ft. from a residence or apartment district; (c) nuisance types of activities such as fertilizer, glue, cement and starch manufacturing, petroleum refining and tanning must be at least 2,000 ft. distant from a residence or apartment district.

Volume Districts — For regulating the heights of buildings and the percentage of lot area that may be occupied by a building, five classes of volume districts have been adopted, with restrictions as shown in the accompanying table. These districts are classified as follows: (1) areas devoted to private residences, two-flat buildings and similar uses where existing buildings have ample yard space and do not cover a large proportion of the yard area; (2) where the tendency is towards three-story apartment buildings; (3) where the tendency is toward tall apartment buildings and apartment hotels; also business and manufacturing sections outside of the central district; (4) warehouse and office buildings in sections close to the central district; (5) downtown district.



NEW BUILDING HEIGHT LIMITS FOR CITY OF CHICAGO

Diagrams for the five volume districts. Dotted lines indicate the alley building line for 55 ft. nearest to street intersection.

Height of Buildings—The limits of height for different classes of buildings are shown by the table and graphically in the accompanying diagram. Buildings are required to set back from the street lines and alley lines above certain heights, so as to provide for adequate light in the streets and for adequate light and air along the rear and sides of high buildings. Church spires are not included in these regulations, nor does the ordinance prevent the erection of grain elevators, gas holders or similar structures in excess of the prescribed limits of height and volume. When a building in a volume district No. 2, 3, or 4 fronts on a park or other open space or upon a street more than 120 ft. wide, the height of street front may be increased 33⅓ per cent of the height specified for such building in the ordinance.