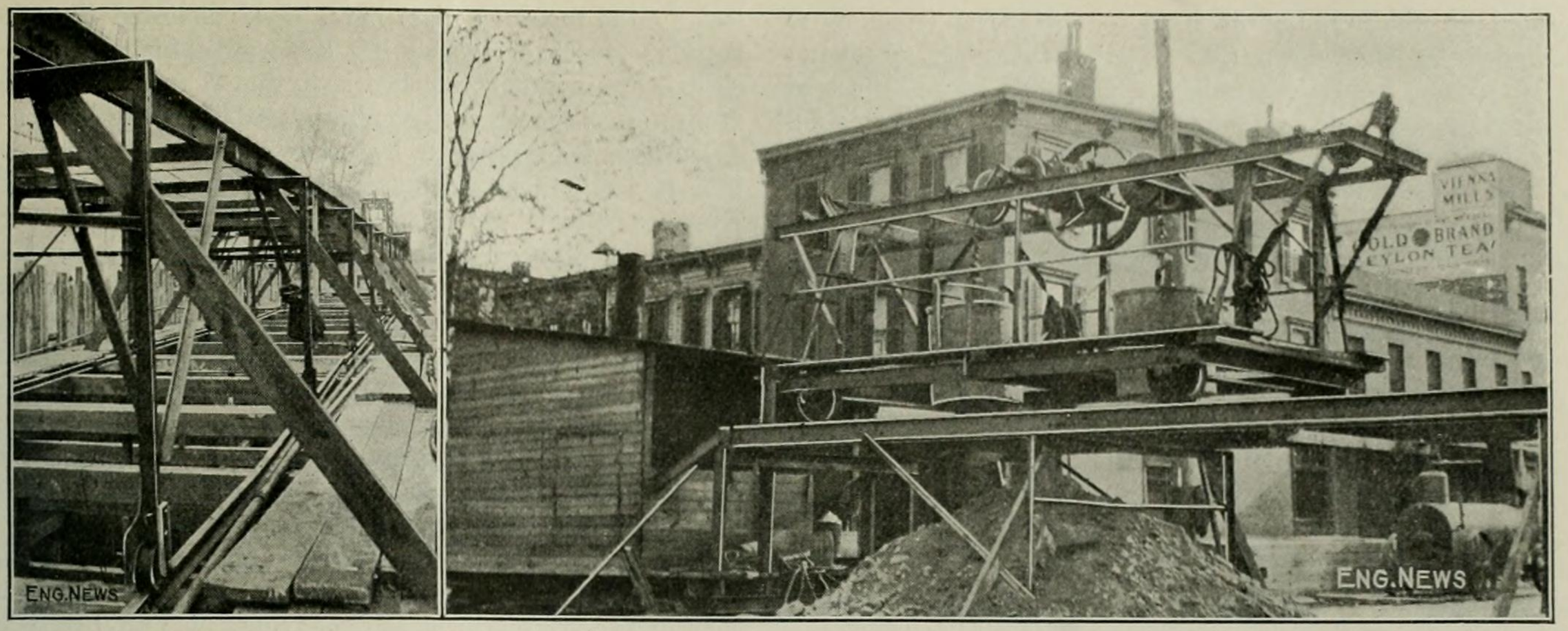



FIG. 2. TRAVELING STEEL TRESTLE FOR TRENCHING MACHINE

FIG. 3. POTTER SEWER-TRENCHING MACHINE, TOMPKINS AVE. SEWER, BROOKLYN, N. Y.

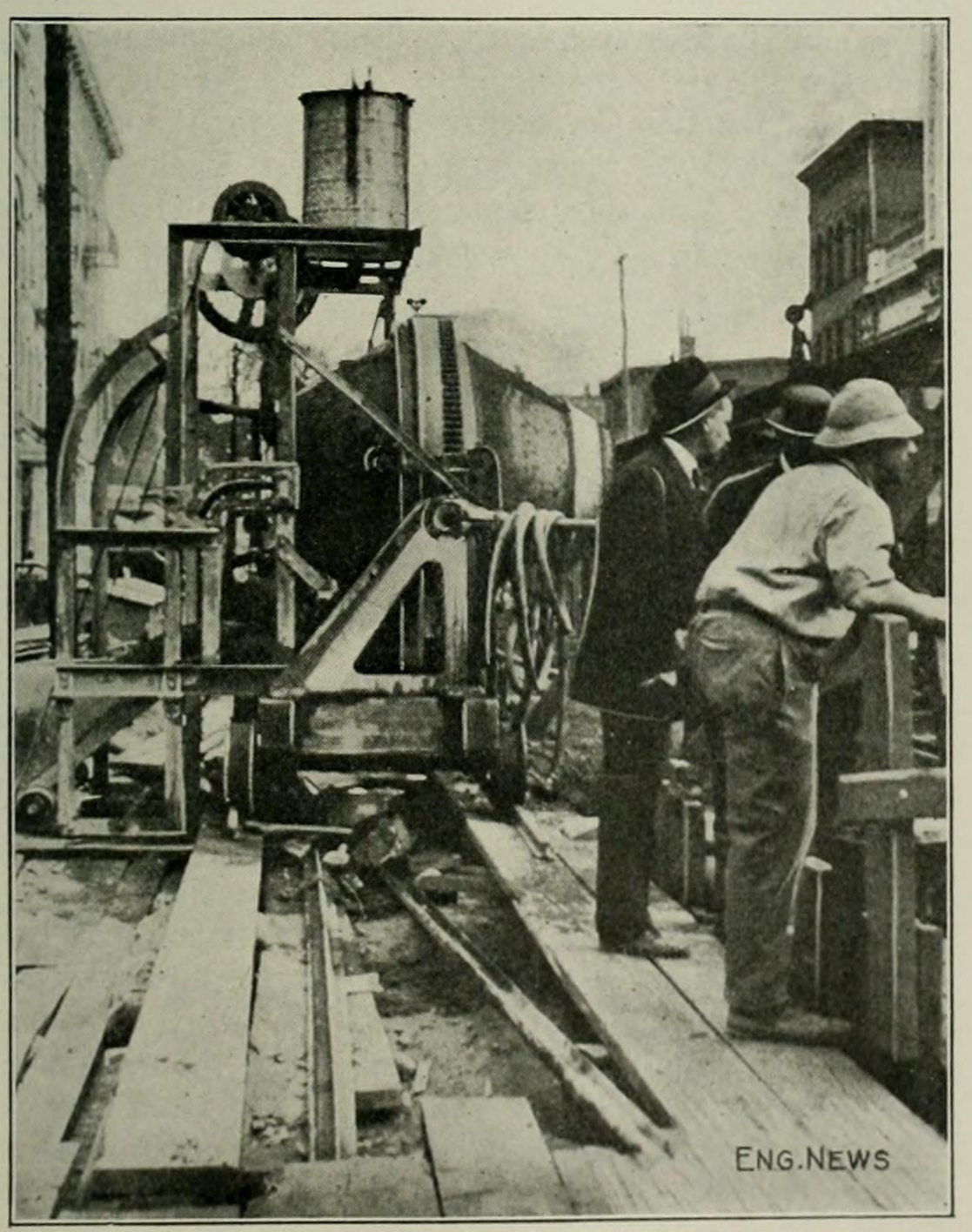



FIG. 4. TRAVELING CONCRETE MIXER, TOMPKINS AVE. SEWER

concrete work is, of course, so gaged as to keep pace with the excavation, and *vice versa.*

As soon as the concrete is sufficiently set, the backfill is continued over it. The bracing and sheeting remain in, and the street surface restored to use. About 100 men form the whole force engaged.

The contractor, John J. Creem Co., of Brooklyn, N. Y., has three such outfits on the same sewer contract, working independently on different sections of the work, which is under the supervision of E. J. Fort, Chief Engineer of the Bureau of Sewers, of Brooklyn.

## The Removal of the Old Jackson St. Bridge at Chicago

The superstructure of the old Jackson St. bridge over the Chicago River at Chicago was removed in very short time, in May last, by cutting it apart with blowpipes and swinging the several parts onto barges by means of a derrick boat with 60-ft. steel boom.

The old bridge (built in 1888) had a three-truss swing span (with through trusses) 280 ft. long and 58 ft. wide, the east arm of which spanned the navigable channel of the river. The west arm spanned team driveways and freight tracks, beneath which was a bypass to give the necessary flow capacity to the river. The removal of this bypass, to make room for the new bridge, was described in our issue of Aug. 28, 1913, this bridge being built to give a greater width of channel, as required by the U. S. Government.

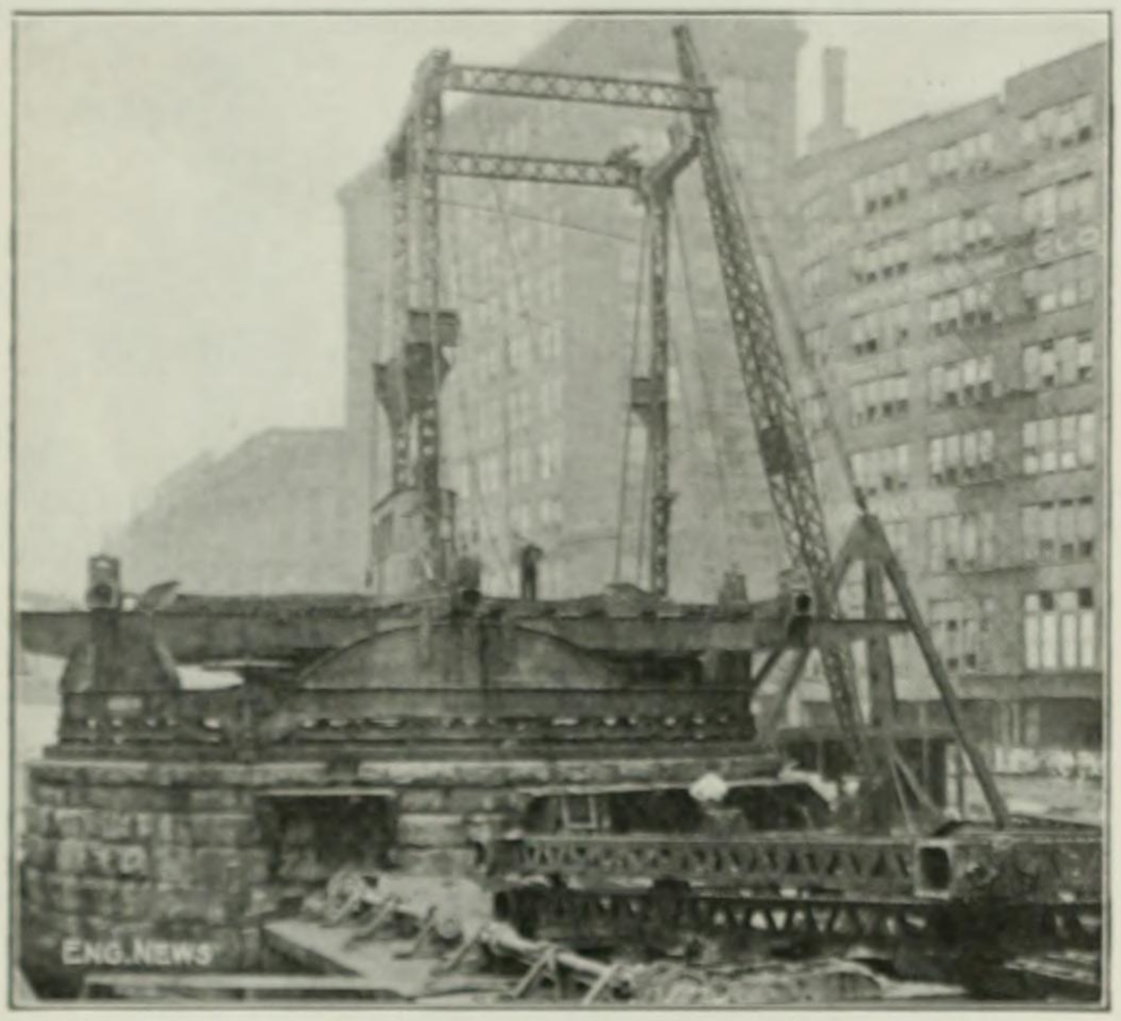
The new west abutment is close to the west side of the old center pier, and work has been commenced on the foundation for this. The coffer-dam has a single row of steel sheet piling, with heavy timber bracing. The weight of the adjacent pier and swing span, and that of the west retaining wall of the bypass, made it impossible to maintain this coffer-dam water-tight when excavating within it, particularly for the open wells which are to be sunk to rock for cylinder piers supporting the abutment. Therefore, it was considered better to remove the old bridge at once rather than to reinforce the coffer-dam at considerable expense.

Careful investigation showed that two high brick buildings on the east side of the river at Jackson St., built on pile foundations, must be placed on piers resting on the bedrock before it would be safe to put in the east abutment. The delay on the contract due to the construction of these piers under the buildings threw the removal of the old superstructure of the bridge into the season of navigation, while according to the contract and the arrangements originally planned, this span was to be removed in the winter time.

The cutting was to have been done with the Great Lakes Dredge & Dock Co.'s floating electric welding plant, which is provided with electric arcs for cutting as

well as welding, but at time the bridge superstructure had to be taken down (May, 1914), this plant could not be spared from its regular repair work on the fleet of dredges, tugs, etc., in the Chicago harbor. So it was decided to do the cutting with blowpipes, as it was important to avoid all possible delays to navigation at this season of the year in the busy Chicago River. The current at the bridge channel is about three miles per hour.

The bridge (weighing about 600 tons) was swung to the open position, and the flooring torn up. The stringers were first cut away with the blowpipes, after which the floorbeams were cut loose in the same way. As the floorbeams were removed, the chords and diagonals were cut near the panel points, and the severed sections swung onto barges by the derrick boat. Work was done from both ends so as to keep the remaining part of the structure in balance, as no falsework was used, and it was




REMOVAL OF THE JACKSON ST. BRIDGE, AT CHICAGO, BY CUTTING THE MEMBERS APART WITH BLOWPIPES

necessary to maintain a nice poise as the truss action of the remaining members was much impaired.

The accompanying cut shows one of the top-chord sections of the center panel of a side truss being held by the derrick boom while a man is cutting it loose at the farther end with a blowpipe. The view shows also the severed sections of the three bottom chords, with one of the plate-girder floor-beams resting on the turntable. The small cabin in line with the center truss is the operator's house, the bridge having been operated by electricity.

The girders and members were cut mainly to 16-ft. lengths for removal, and will be cut with blowpipes to 5-ft. lengths for charging to furnaces as scrap. The thickness of the members cut varied from ¾ in. to 3 in., and where parts overlapped the thickness was as much as 6 in. Different types of blowpipes were used (the Oxweld, the Davis-Bournonville, the Engineering Sales Co. and the American Boiler Welding Co., but most of the work was done with those of the Oxweld Acetylene Co. Not more than two operators were engaged in cutting with blowpipes at any one time. The entire work occupied 12 days, including the removal of the turntable, leaving the masonry piers bare. It is believed that the acetylene torch or burner has some advantages over the electric arc in cutting steelwork, in that it cuts a narrower groove and is more easily manipulated than the latter.

In regard to removal by other methods it is stated that it would have taken at least four weeks to cut off rivet heads, drive out rivets, and chip or cut the members into the necessary lengths. In this case also there would have been required a greater amount of equipment in the way of air compressors, air hammers and chisels, and other tools, and probably falsework, together with more laborers and operators, while there would have been a greater amount of work in handling the parts by the derrick boat. The method employed effected a great saving of time and the delays to navigation were reduced to a minimum, this being an important item.

The new bridge will be a double-leaf trunnion bascule structure of the Strauss type, with deck trusses, having a span of 202 ft. 3¼ in. c. to c. of trunnions and 182 ft. c. to c. of front bearings, while the clear width of channel will be 168 ft. The bridge will have a 37-ft. roadway and two 13-ft. sidewalks. The substructure will include two masonry abutments, each supported on four concrete piers sunk to rock at a depth of 90 ft. below datum. The contract for the superstructure was let to the Strobel Steel Construction Co., and the contract for the substructure was let to the Great Lakes Dredge & Dock Co., both of Chicago. The substructure contract included the removal of the old superstructure (as described above) and the old substructure.

## Some Neglected Points in the Theory and Adjustment of the Wye-Level

BY J. A. KITTS*

Although the wye-level was invented 174 years ago (by Jonathan Sissons, of London), the writer does not believe that this instrument is generally understood, particularly in the method of use, by young engineers.

Two general methods of setting up a wye-level are used, one consisting of bringing the bubble to the center of the tube, and the other of bringing the vertical axis into a vertical position. The writer believes this latter method to be the proper one, and adjustments to suit this method are outlined herein. The former method is the more common practice; there seems to have been little said or written about the latter method, and it is the first impulse of the novice with spirit-level instruments to center the bubble, little understanding why he does so.

This practice of keeping the bubble in the center of the tube leads to error, as in the best of instruments the grinding or calibration of the bubble tube is such that the bubble centers differently for different temperatures; and the relation between the line of sight and the bubble position is therefore not amenable to fine adjustment.

The levelman centering the bubble for every observation at a different angle has no way of detecting the change of the relation between the tangential axis of the bubble tube and the line of sight, until the instrument is very badly out of adjustment. Unless he has time to

*Balboa, Canal Zone, Panama.

# Substructure for the Jackson St. Bridge over the Chicago River

The Jackson St. bridge is at a narrow part of the Chicago River and the substructure design for the new bascule bridge had to provide an auxiliary channel to give the same flow capacity as at other parts of the river. In the construction work it was necessary to keep the old bridge in commission as long as possible. This old bridge consisted of a three-truss steel swing span 280 ft. long and 58 ft. wide, the east arm of which crossed the navigable channel. The work was started by dredging this narrow part of the river to a depth of 30 ft.

The west arm of the bridge spanned property of the Pennsylvania R.R. adjacent to the freight station, with a bypass 50x17 ft. beneath it to provide an auxiliary channel for the flow of water on the west side of the center pier and the west abutment of the elevated railway bridge to the south. The arrangement of the substructures of the old and new bridges is shown in Fig. 1.

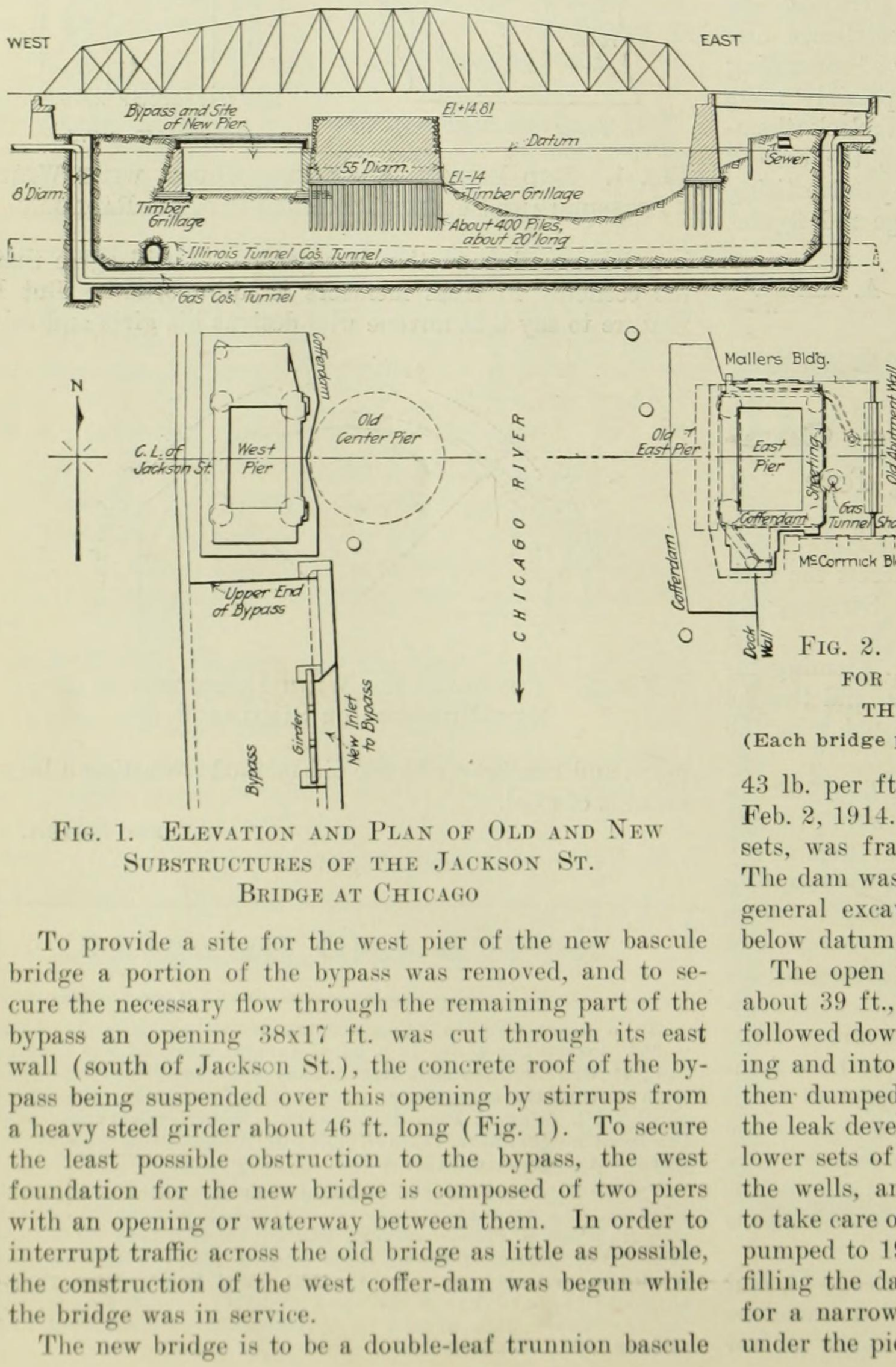



FIG. 1. ELEVATION AND PLAN OF OLD AND NEW SUBSTRUCTURES OF THE JACKSON ST. BRIDGE AT CHICAGO

To provide a site for the west pier of the new bascule bridge a portion of the bypass was removed, and to secure the necessary flow through the remaining part of the bypass an opening 38x17 ft. was cut through its east wall (south of Jackson St.), the concrete roof of the bypass being suspended over this opening by stirrups from a heavy steel girder about 46 ft. long (Fig. 1). To secure the least possible obstruction to the bypass, the west foundation for the new bridge is composed of two piers with an opening or waterway between them. In order to interrupt traffic across the old bridge as little as possible, the construction of the west coffer-dam was begun while the bridge was in service.

The new bridge is to be a double-leaf trunnion bascule bridge having a span of 202 ft. c. to c. of trunnions and 168 ft. clear channel opening. It will have one 37-ft. roadway and two 13-ft. sidewalks. The east abutment is to be supported by five reinforced-concrete cylinders 5 to 10 ft. diameter. The west leaf is to be carried by two piers parallel to the river channel and forming the additional waterway. The front pier is supported by two concrete cylinders 12 ft. diameter and one 5 ft. diameter, and the rear pier is supported by two concrete cylinders 9 ft. diameter and one 5 ft. diameter. All piers are carried down to solid bedrock at about 85 ft. below datum (water level in the river). The construction is shown clearly by the isometric drawing, Fig. 2.

WEST COFFER-DAM AND PIER—The west coffer-dam was constructed under the old bridge, just west of the center pier and in the space formerly occupied by the bypass. On account of the limited space available and difficulties of dredging around the piers, etc., the walls of this coffer-dam consisted originally of a single thickness of interlocking steel sheeting, inclosing a space 96x48 ft. The sheeting was 45 ft. long, and weighed

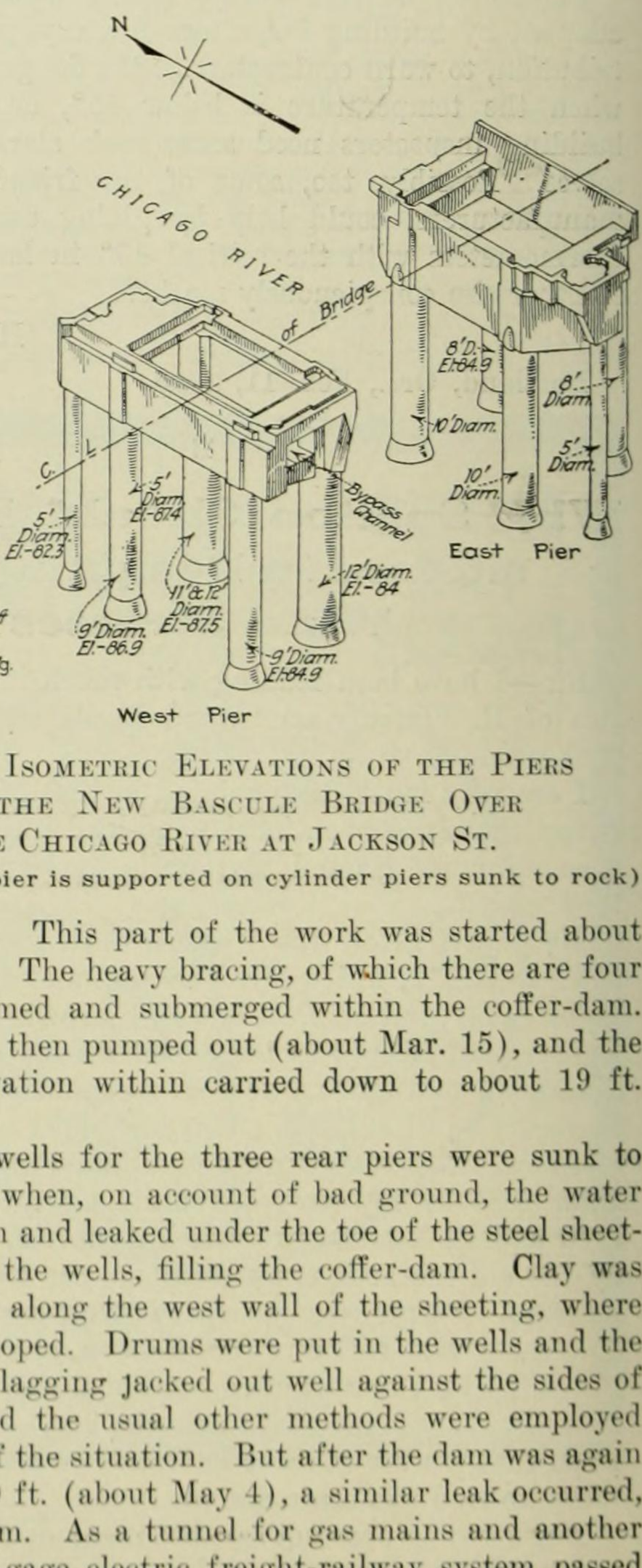



FIG. 2. ISOMETRIC ELEVATIONS OF THE PIERS FOR THE NEW BASCULE BRIDGE OVER THE CHICAGO RIVER AT JACKSON ST.

(Each bridge pier is supported on cylinder piers sunk to rock)

43 lb. per ft. This part of the work was started about Feb. 2, 1914. The heavy bracing, of which there are four sets, was framed and submerged within the coffer-dam. The dam was then pumped out (about Mar. 15), and the general excavation within carried down to about 19 ft. below datum.

The open wells for the three rear piers were sunk to about 39 ft., when, on account of bad ground, the water followed down and leaked under the toe of the steel sheeting and into the wells, filling the coffer-dam. Clay was then dumped along the west wall of the sheeting, where the leak developed. Drums were put in the wells and the lower sets of lagging jacked out well against the sides of the wells, and the usual other methods were employed to take care of the situation. But after the dam was again pumped to 19 ft. (about May 4), a similar leak occurred, filling the dam. As a tunnel for gas mains and another for a narrow-gage electric freight-railway system passed under the pier, special precautions were necessary.

A puddle-wall coffer-dam was decided on to take care of the situation, but the center pier of the old drawbridge was so close to the east wall of this coffer-dam that it was necessary to remove it before driving the outer line of sheeting. The wrecking of the old bridge superstructure was started therefore, and it was removed by cutting it apart with blowpipes, as described in ENGINEERING NEWS, July 9, 1914. The old masonry center pier, 53 ft. 9 in. diameter, and built on a timber grillage supported by pile foundation, was blasted and removed by a derrick boat and dipper dredge, this work being completed about the middle of July.

A second line of 45-ft. steel sheeting was then driven on the north and east sides of the coffer-dam, and puddle clay placed between the two lines. The remaining wall of the old bypass, a few feet west of the coffer-dam, served for the outer wall on this side. On account of the entrance of the bypass there was not room to drive another line of sheeting on the south side, and it was thought that a single line would serve here, the ground being a little better.

Before completely filling the puddle wall with clay and some lighter material, additional clay was deposited with a dipper dredge against the outside wall of the coffer-dam, on the north and east sides, to protect it against the considerable current acting on the coffer-dam where the channel had been dredged to 30 ft. The coffer-dam was pumped out about the middle of September. Work was then resumed on the sinking of the remaining wells, the work being done by miners and followed up closely with lagging and rings in the usual manner. As the wells were sunk to bedrock they were filled promptly with reinforced concrete, the front wells being filled to 24 ft. and the rear ones to 22½ ft. below datum; that is, to the level of the connecting struts of reinforced concrete.

The excavation for the bottom slab of concrete was then made and the concrete placed by a floating mixer plant, consisting of ¾-yd. mixer, 65-ft. tower, boom, discharge pipe, hoisting engine, etc., mounted on one end of a deck scow, and served with material by a revolving derrick with a 2-yd. bucket mounted on the other end of the scow. This plant is shown in Fig. 3.

EAST COFFER-DAM AND PIER—On the east side two 8-story brick buildings on the river front were underpinned, the light pile foundations being replaced by concrete piers under the parts adjacent to the bridge. The approach girder span and old masonry abutment were removed and the site of the coffer-dam was excavated to about 4 ft. above datum before any sheeting was driven. This coffer-dam is about 58x52 ft. inside, with an extension about 20x24 ft. on the southwest corner. The steel sheeting varies from 20 to 45 ft. in length. The river side is of the puddle-wall type, employing two lines of 45-ft. steel sheeting tied together by rods in the usual way.

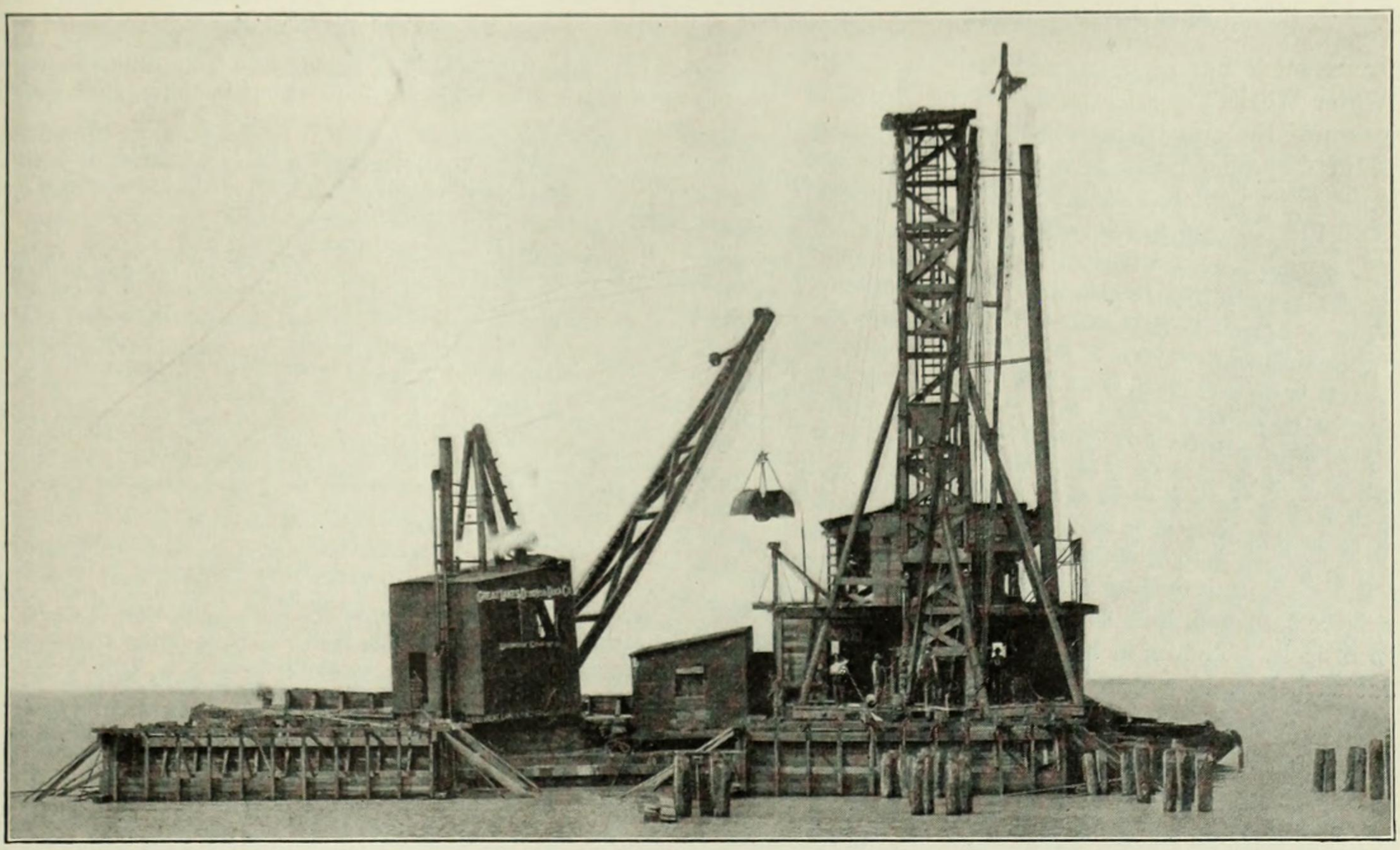


FIG. 3. FLOATING CONCRETING PLANT USED FOR THE SUBSTRUCTURE OF THE JACKSON ST. BRIDGE

(The scow has at one end the mixer and elevator tower with hopper and delivery spout. At the other end is a revolving crane with a clamshell bucket for handling the concrete material. The view shows the plant at work on the new Chicago municipal pier in Lake Michigan.)

Before doing any more excavation inside of this dam, and while the sheeting was being driven, the two 8-ft. wells in the rear of this pier were sunk to bedrock at about 85 ft. and filled with concrete to about 13 ft. below datum.

Three sets of bracing were used in this coffer-dam. The dam being pumped out, the various sets of bracing were placed as usual as the excavation proceeded within the dam. Before pumping out, a 36-in. sewer was diverted to a line about 20 ft. north and carried out to the river by a steel pipe placed in permanent position for the proposed concrete sewer. As the work proceeds the con-

crete will be run around this steel pipe. The two 10-ft. wells and the one 5-ft. well have been completed. The material was raised by the usual steam hoist to decks in towers about 30 ft. high and then carried by chutes to dump scows moored along the coffer-dam.

The bridge is being built for the Sanitary District of Chicago; Geo. M. Wisner, Chief Engineer, and C. R. Dart, Bridge Engineer. The work is subject to the approval of the city's Department of Public Works; John Ericson, City Engineer, and Thos. G. Pihlfeldt, Engineer of Bridges and Harbor. The contractor for the substructure is the Great Lakes Dredge & Dock Co., of Chicago.

## Birmingham Water-Rate Agreement

An agreement has been reached between the Birmingham Water Works Co. and the governing Board of Commissioners of the city of Birmingham, Ala., which is intended to dispose of the rate controversy in that city. While the agreement has been accepted by the water company and the city commissioners, yet there is still a question as to whether the offer and acceptance must be subject to a referendum election. If it is finally legally adopted all present litigation will be ended, except over a pending license tax.

The terms of this formal agreement apply on and after Apr. 1, 1915, and until Jan. 1, 1921, on which date the old rights and duties of both parties are reacquired, except that a right to purchase by appraisement continues in effect.

The water company is working under contracts made with the city and ten former suburban municipalities. This agreement modifies all the existing contracts to a uniform basis. The main provisions of the new plan are abstracted below.

### FLAT RATES

For a three-room dwelling, $1.50 per quarter plus 25c. per additional room up to 10 rooms, and 12½c. each above that number. Reception hall, butler's pantry, basement and attic rooms not counted as rooms under these rates unless used for living or sleeping. For a water-closet in a private three-room dwelling, $1 per quarter or $1.25 in a dwelling of more than three rooms; each additional water-closet, 62½c. per quarter. Private-family bathtubs, $1 per quarter.

For a store, shop, office or restaurant, $1.50 to $2 per quarter, according to size; water-closet in these, $1.25 each per quarter.

Faucets, etc., for sprinkling hose, 5c. per annum per front foot of property, with a minimum annual charge of $2.50.

### METER RATES

For a daily average of 4000 gal. or less, 20c. per 1000 gal.; 17½c. per 1000 gal. for a daily average of 4000 to 5000 gal. Rates for larger quantities as specified in the old contracts.

Meters are to be read and bills rendered approximately quarterly, except that for large consumers the readings and billing is to be monthly.

### INSTALLING METERS

Any consumer may require a company to place a meter on his service pipe at its expense, and the water company may place a meter on any customer's service at its expense, in both cases making charges according to the meter readings.

### MINIMUM CHARGES ON METERED SERVICE

Minimum quarterly charge, $2.25 for each dwelling, except that the charge is not to exceed three-fourths of the flat-rate charge for the same service. The consumer can draw without further change as many thousand gallons of water per quarter as 20c. is contained times in the minimum charge.

Where a meter is on a service pipe supplying more than one dwelling, the owner of which pays the bill for the entire premises, as in apartment houses, the minimum quarterly charge is to be $2.25 for eight rooms or less, and proportionately larger for over eight. The minimum charge is not to exceed three-fourths of the flat rate for such service.

Minimum charge for a single store, shop, office or restaurant, $2.25 (except that it is not to exceed three-fourths of the flat rate). Where the water bill for two or more establishments is paid by a single owner the minimum charge is to be $2.25 for three or less and proportionately larger for more than three.

The minimum quarterly charge on metered services is not to be affected by sprinkling use.

### VACANT PREMISES

Reductions in both flat rates and minimum charges are made where water is supplied from one service to more than one dwelling if a dwelling is vacant, provided the vacancy is continuous throughout a calendar month and notice is given the company (a fee of 15c. per notice allowed to cover additional bookkeeping and inspection).

Where only one dwelling is served, no reduction will be made for vacancy as long as pressure is kept on, but the reduction may be secured (though not for less than a calendar month) without cost by serving written notice on the water company to turn off the supply.

### METER RENTS

No meter rent charged for ⅝-in. or smaller meter, nor for a meter placed on a service supplying water to more than one dwelling or more than one place of business, nor for a meter on municipal service.

Meters larger than ⅝-in. on service pipes supplying a single commercial establishment to have, in place of the minimum charge, a rent varying from 25c. per month for a ¾-in. meter to $2.50 per month for a 4-in. meter.

### WATER USED BY CITY

All water used by the city, other than for fire protection, hydrant testing, etc., and other than for resale to consumers, will be metered and treated as passing through a single meter under the rates applicable to other large consumers. Services supplying water for municipal purposes will not be subject to minimum charge.

In consideration for treating water for resale in North Birmingham as water for municipal purposes, the license tax assessed each year is not to exceed 2% of the gross city receipts of the company for the previous calendar year.

### PUBLIC FIRE HYDRANTS

For public fire hydrants $35 per annum, payable in equal monthly installments. The city has the right to require the water company to lay 750 ft. of new water main (not smaller than 6-in.) for each new hydrant installed. If the extension required for one hydrant is less, a credit of the balance up to 750 ft. may be applied to longer extensions. The water company is not obliged to make extensions for additional hydrants while the city is more than one month in arrears for hydrant rental, and all deferred payments bear interest at 6%.

### PRIVATE FIRE PROTECTION

Automatic sprinkler heads, 5c. each per annum; opening for 2½-in. fire hose, $4 per annum; opening for 1½- or 2-in. fire hose, $3 per annum; opening for 1 or 1¼-in. fire hose, $2.50 per annum; private hydrants, $35 each per annum for the first three, and $25 per annum for those in excess. No charge less than $35 for water service for private fire protection.

No liability is attached to the water company for damage or injury resulting from inadequacy or failure of service in event of fire.

### MUNICIPAL OWNERSHIP

The city acquires the right, if it desires, to purchase the water-works in their entirety, but not in part, at a value to be fixed by a board of five appraisers in case the parties cannot themselves agree. The city agrees not to undertake to acquire any or all of the property in any other way. If the city attempts condemnation, this agreement terminates and the company can restore the previous contracts with the city of Birmingham and the various suburban municipalities since absorbed; or the company may allow the property to be acquired by condemnation and collect from the city, in addition to the award and to the compensation provided for in the agreement, a sum equal to the difference between such compensation after April 1, 1915, and the charge that would have existed for municipal water service prior to the agreement.

On receipt of four months notice the water company will furnish the city an accurate inventory and appoint an agent to arrange the transfer. In case of non-agreement, the board of appraisers is to be chosen, two by the city, two by the water company and a fifth by the other four. They are to be disinterested, non-partisan, non-resident persons.

The appraisers most consider "all lawful and proper elements of value including commercial value of the business

# News of the Engineering World

## Progress on the Jackson St. Bascule Bridge, Chicago

The erection of the superstructure of the Jackson St. bridge over the Chicago River has been delayed two months by the Chicago strike of steel workers. The condition of the work on July 2 on the west leaf of the bridge is shown in the accompanying view. This is a trunnion bascule bridge with a span of 202 ft. 3¼-in. c. to c. of trunnions, and will have 1310 tons of steel (exclusive of 105 tons for the machinery). About 500 tons are now erected, 350 tons of which are on the west side, as the completion of the foundation on the east side was delayed considerably.

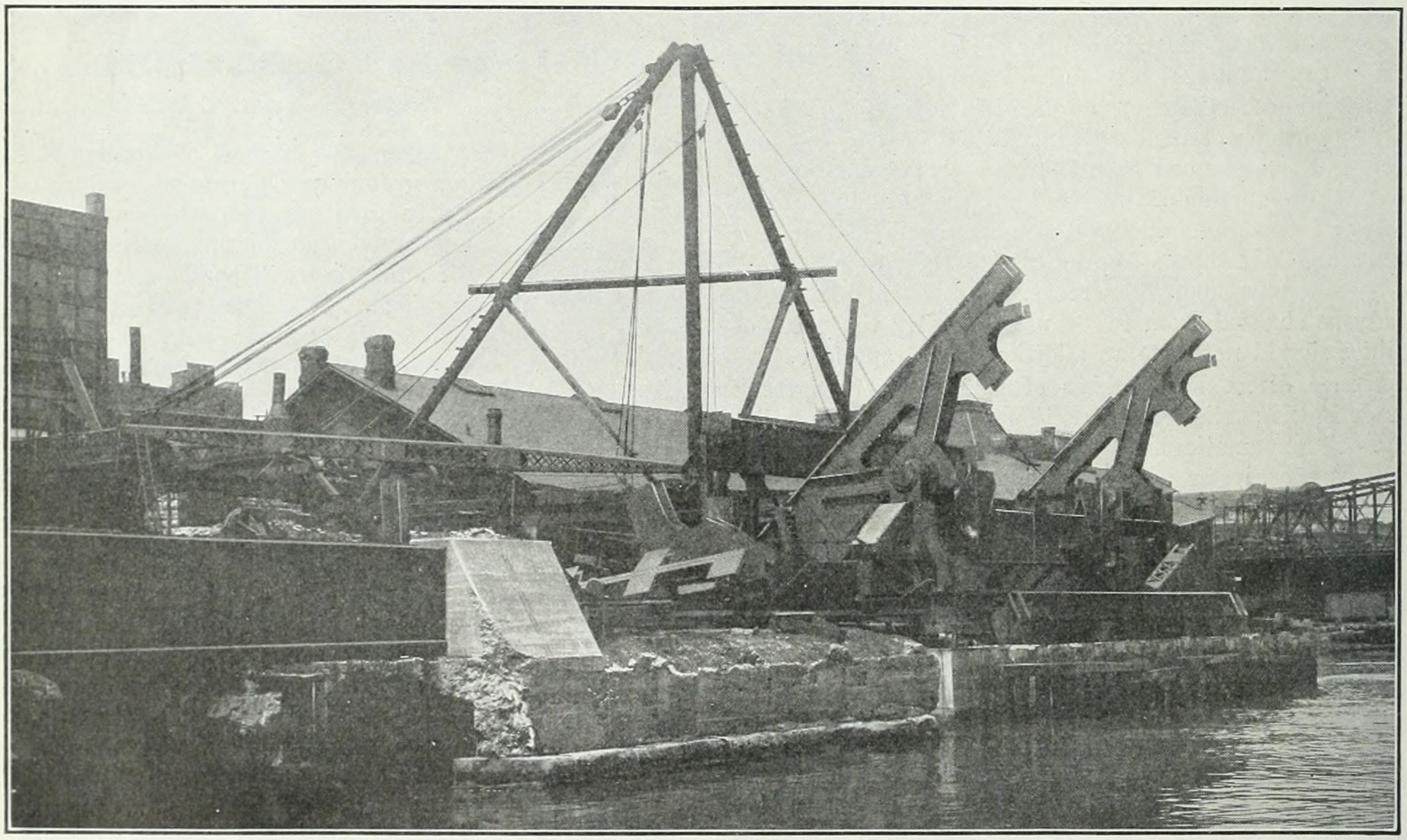
Erection was begun March 12. The strike occurred April 30, stopping all steel bridge and building work in the city until July 7, when a settlement was made and the strike ended.

The view shows the heels of the trusses erected and the trunnions in place. The erection is done by means of a stiff-leg derrick having a 50-ft. mast and a 70-ft. box-lattice boom, with a hoisting capacity of 40 tons. The heaviest loads handled are the 48-ton cross-girders. When the work has advanced farther, a boom 135 ft. long will be used, reducing the hoisting capacity to 20 tons.

The bridge is being built by the Sanitary District of Chicago, under George M. Wisner, Chief Engineer, the plans being approved also by John Ericson, City Engineer. The Strauss Bascule Bridge Co. acts as consulting engineer for both superstructure and substructure. The substructure was described in *Engineering News,* March 18, 1915, and was built by the Great Lakes Dredge & Dock Co. The steelwork is manufactured by the Mt. Vernon Steel Co., of Mt. Vernon, Ohio, and the erection is being done by the Strobel Steel & Construction Co., of Chicago.

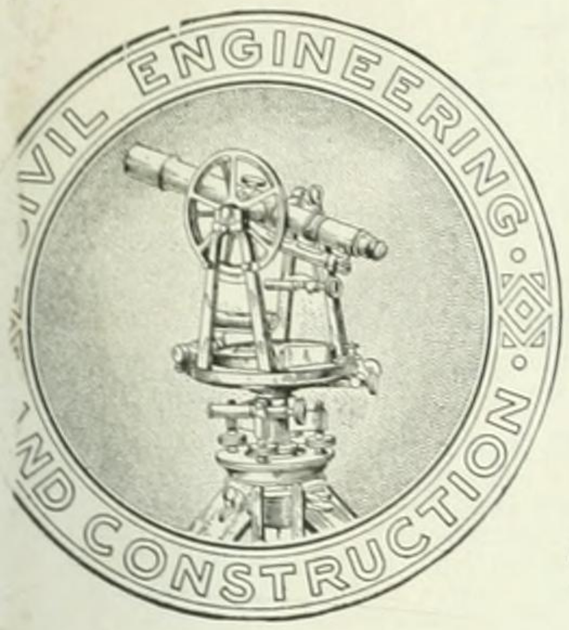
## First Shield Starts in East River Tunnels

On July 15 at Front St. and Old Slip, New York City, the first of the eight shields of the four new East River tunnels for subway lines started forward, and the first segments of cast-iron lining were erected. The southerly pair of tunnels will carry the Broadway-Church St. line (to be operated by the New York Municipal Ry. Corporation) across the river to a connection with the Fourth Ave. subway; these tunnels are located at South Ferry. The other pair, three blocks north, at Old Slip, will form the river crossing of the



ERECTION OF THE WEST LEAF OF THE JACKSON ST. BASCULE BRIDGE AT CHICAGO (DELAYED BY STEEL-WORKERS' STRIKE FROM APR. 30 TO JULY 7)

At the left is a truss span and deck span of the old approach (over the railway tracks). The girder at the left supports the outer side of a team driveway to the freight house, and spans the opening into the bypass which gives additional waterway for the flow of water in the river. At the right is the Adams St. swingbridge




# Engineering News

A JOURNAL OF CIVIL ENGINEERING AND CONSTRUCTION

ISSUED WEEKLY

VOLUME LXXIV

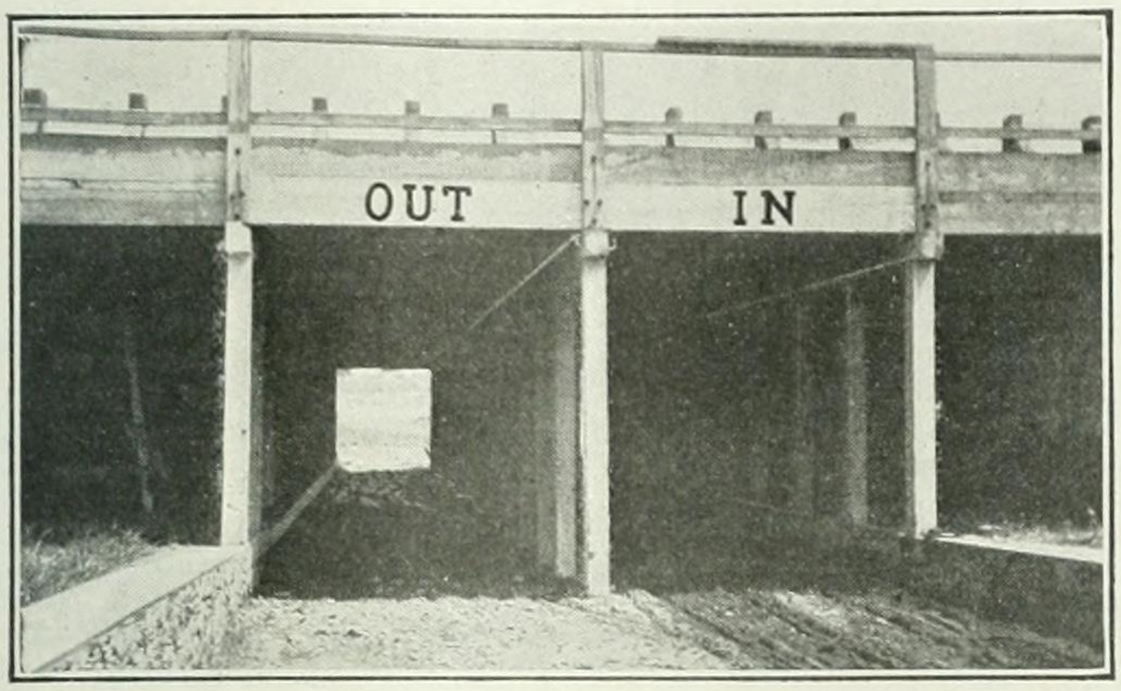
July 1 to December 31, 1915

HILL PUBLISHING CO.
HILL BUILDING
10TH AVENUE AT 36TH STREET
NEW YORK

ascertain the variation between ground and air temperature in various bore-holes of 2½ to 45 ft. depth. The curves require no explanation except perhaps to note that the ground temperature in the 45-ft. hole was the same throughout the year.

## NOTES

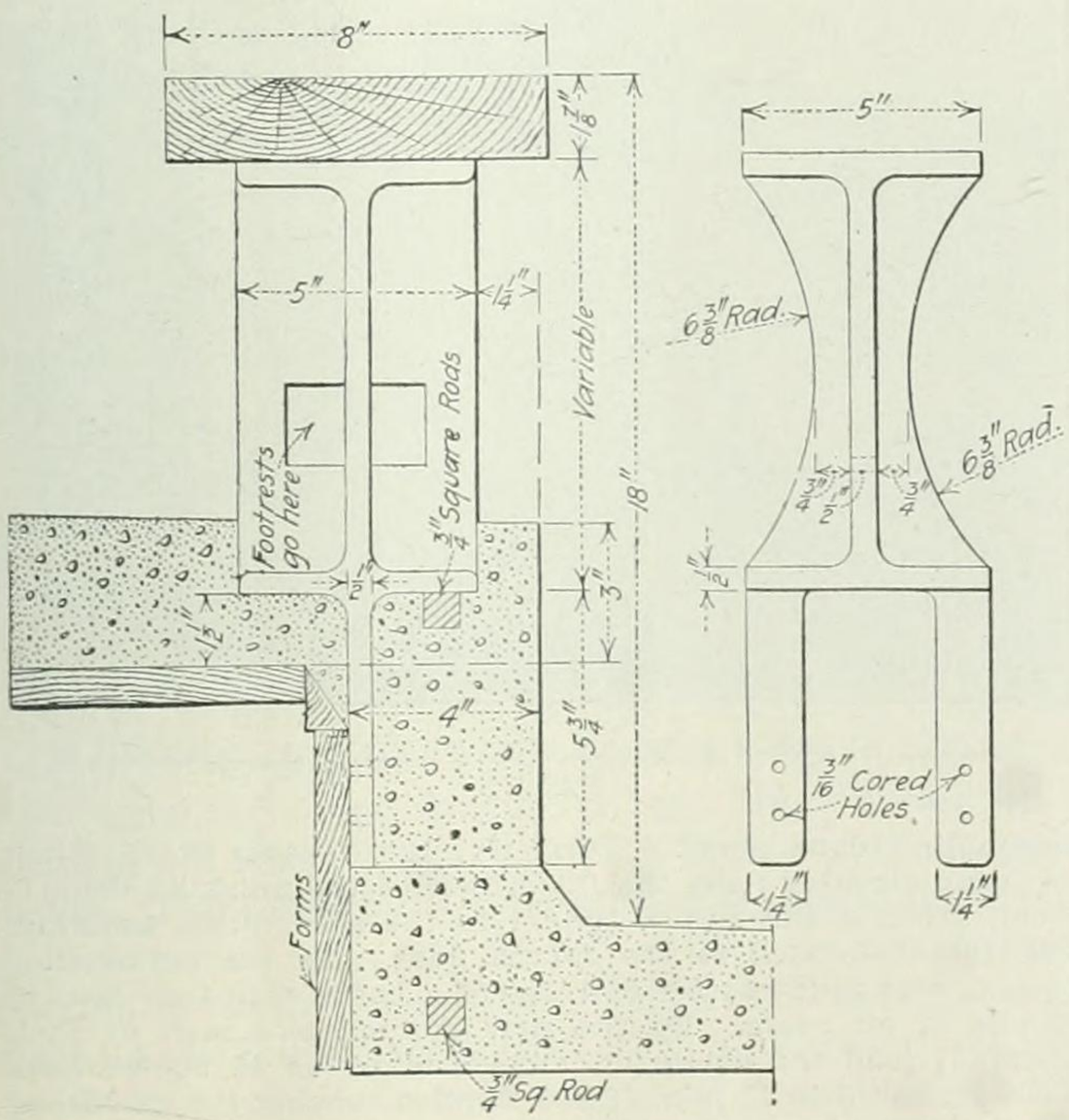
**A Durable Timber Bridge** is shown in the accompanying illustration. In spite of the fact that it carries an earth fill from 12 to 18 in. deep, it is sound and watertight. It was built in 1892 to form a subway under the Narragansett Park racetrack, near Providence, R. I. For many years this was a famous horse-racing track. It has been converted into an automobile speedway. The bridge is in 4 spans of about 8 ft. each.




A 23-YR.-OLD TIMBER BRIDGE WITH AN EARTH FILL AND A WATERTIGHT FLOOR

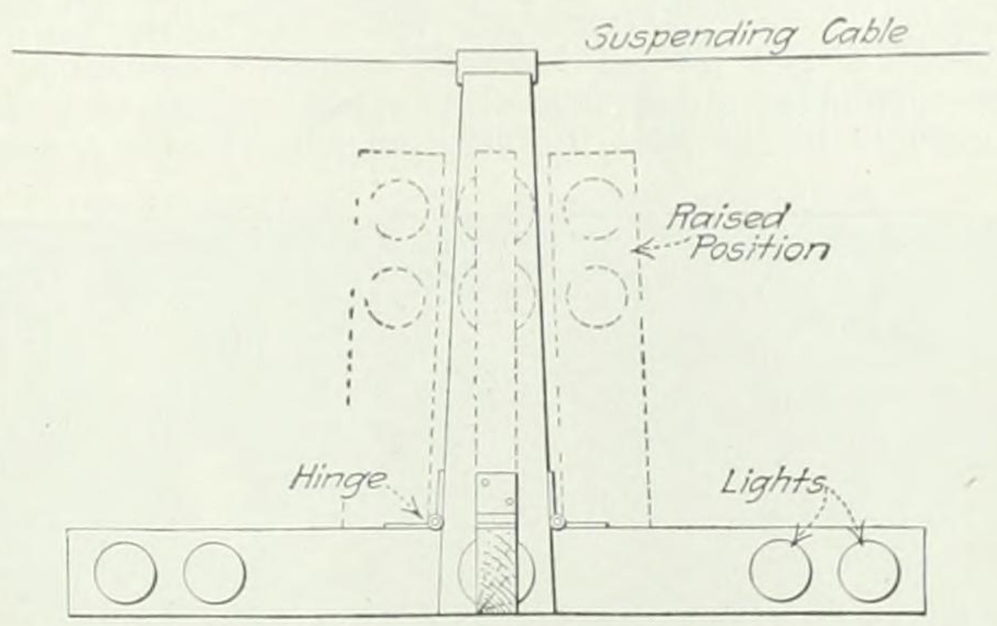
The 4x10-in. floor joists, spaced 2 ft. apart, are carried on 6x8-in. timber caps on rows of 6x8 in. posts. The floor is 3x10-in. planks, over which are four thicknesses of tar paper plastered on with hot tar. On top of this floor is the earth fill of the racetrack. The timbers are genuine long-leaf yellow pine and are as sound today as they were 23 yr. ago, and the floor is water-tight. Frederick E. Perkins in president of the Narragansett Park speedway.

**Cast-Iron Standards for Ball-Park Seats** are being installed in the open stands and the bleachers of the new National League park on Commonwealth Ave. in Boston, Mass. The stands in this park are of reinforced concrete, and in all of the open stands the seats are 2x8-in. plank screwed onto malleable cost-iron standards spaced every 3 ft. and embedded in the concrete of the steps during construction. About 12,000 of these standards are being used. The park structures were designed by the Osborn Engineering Co., of Cleveland, Ohio, and are being built by the James E. Gaffney Co., of Boston.



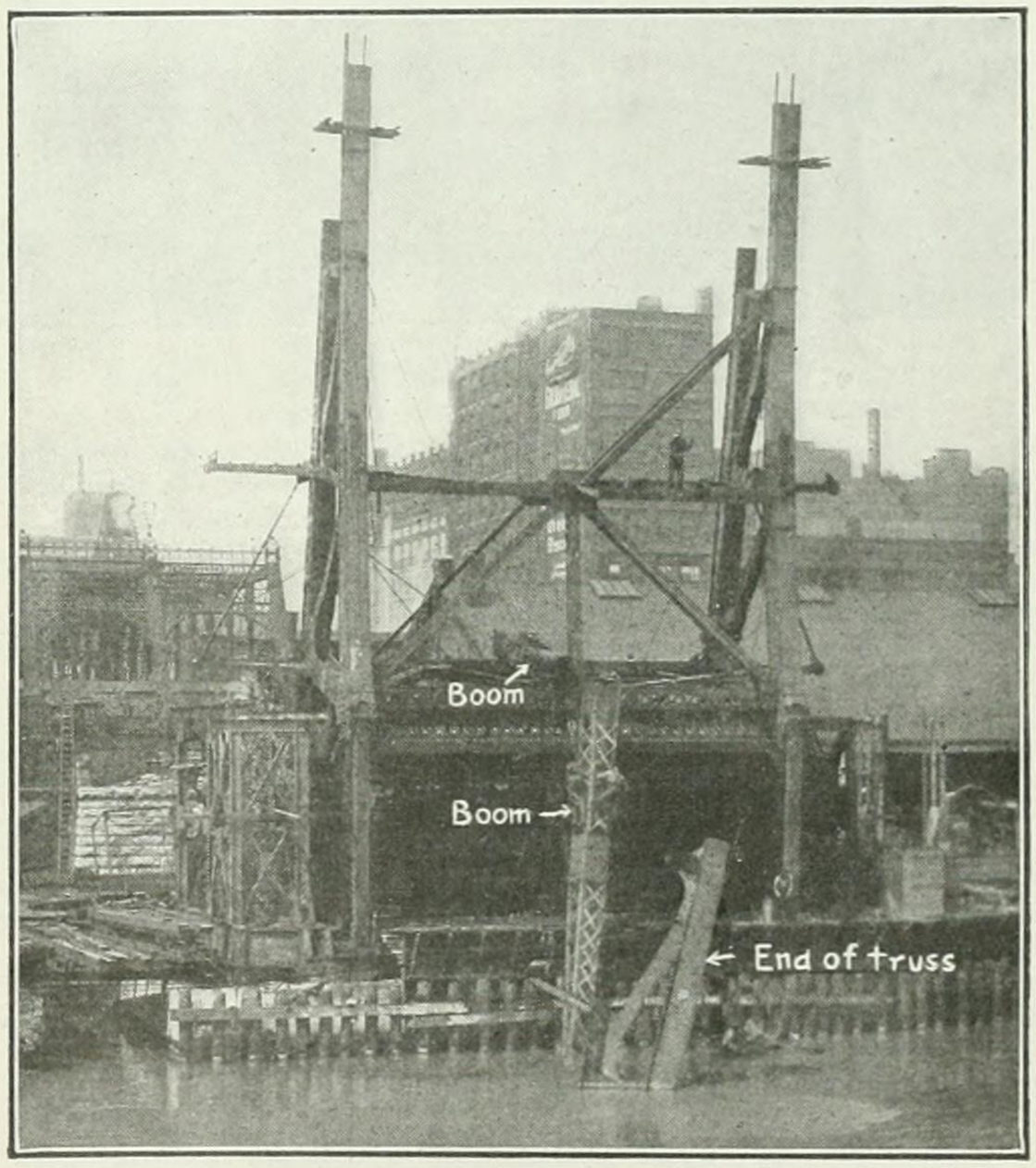

SEAT STANDARDS IN NEW BOSTON BALL PARK

**A Semaphore Type of Street Signal** invented by a Cleveland policeman named Ketchum is being tried out in that city at the intersection of Euclid Ave. and East 9th St. Two cables are stretched from poles in diagonally opposite corners of the sidewalks. Hung from the wire cables at their intersections is a post about 3 ft. long, with arms




about 2 ft. long hinged near the bottom of the mast, as shown in the accompanying sketch. The signal is manually controlled by a policeman in a sidewalk booth. From levers here wires run to the signal, one for each blade or arm. The arms may be operated separately for left-hand turns, or in pairs for traffic moving along one street across the other and for right-hand turns. In addition to the position indication, in each arm is a red and a white light.

**Failure of a Derrick on Bridge Erection**—The fracture of a derrick iron caused the fall of a derrick, Aug. 25, while erecting the west leaf of the bascule bridge over the Chicago River at Jackson St., Chicago, Ill. The erection was illustrated

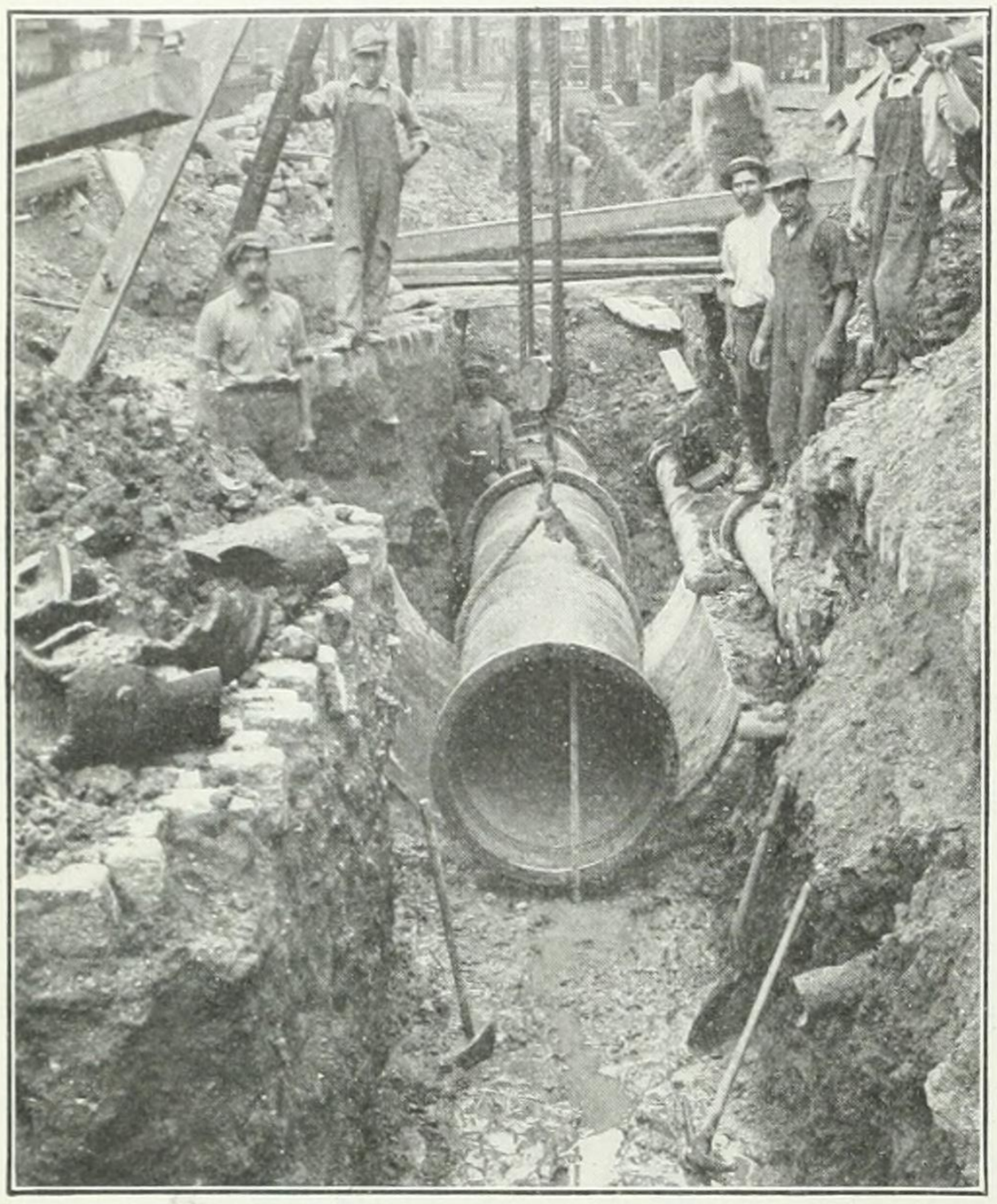



FALL OF A DERRICK WHILE ERECTING THE JACKSON ST. BRIDGE AT CHICAGO

in "Engineering News," July 22, 1915, but since that view was taken the leaf had been raised to a more nearly vertical position to keep its end clear of the channel. The derrick was placing a 22-ton section comprising the end panel of one truss

and a heavy transverse plate girder. The derrick iron holding the head of the mast to the stiff-legs broke, allowing the weight to pull the mast over. The steel boom fell across the completed work and doubled up, its main portion standing vertically with its head in the river. This is shown in the accompanying view, taken after the boom had been cut apart. The end of the truss panel is projecting above the water. The plate-girder was badly bent when recovered, being hauled up by means of tackle attached to the bridge.

**Laying a Water Main Through a Storm Sewer**—In the construction of an extension to the high-service fire-protection system of Boston, Mass., it was necessary to lay a 30-in. cast-iron pipe at right angles to a storm-water sewer having an internal diameter of 8 ft. As the top of this sewer was only 4 ft. from the surface of the street, which would allow insufficient cover for the water main, the sewer top was broken into and the main carried through the top of the sewer. To make a neat job and to create as little resistance as possible to the flow through the storm-water sewer, a



LAYING WATER MAIN THROUGH TOP OF SEWER

cast-iron cradle was designed to fit the diameter of the water main. This cradle rested upon the arch ring of the sewer where the latter was broken into. The accompanying view shows the main resting in the cradle. By the means described 28 in. of cover were secured over the water main. The bottom of the cast-iron saddle reached into the storm-water sewer a distance of 15 in. below the highest point of the crown of the arch.—F. I. Winslow, Engineer of Extension, Boston Water-Works.

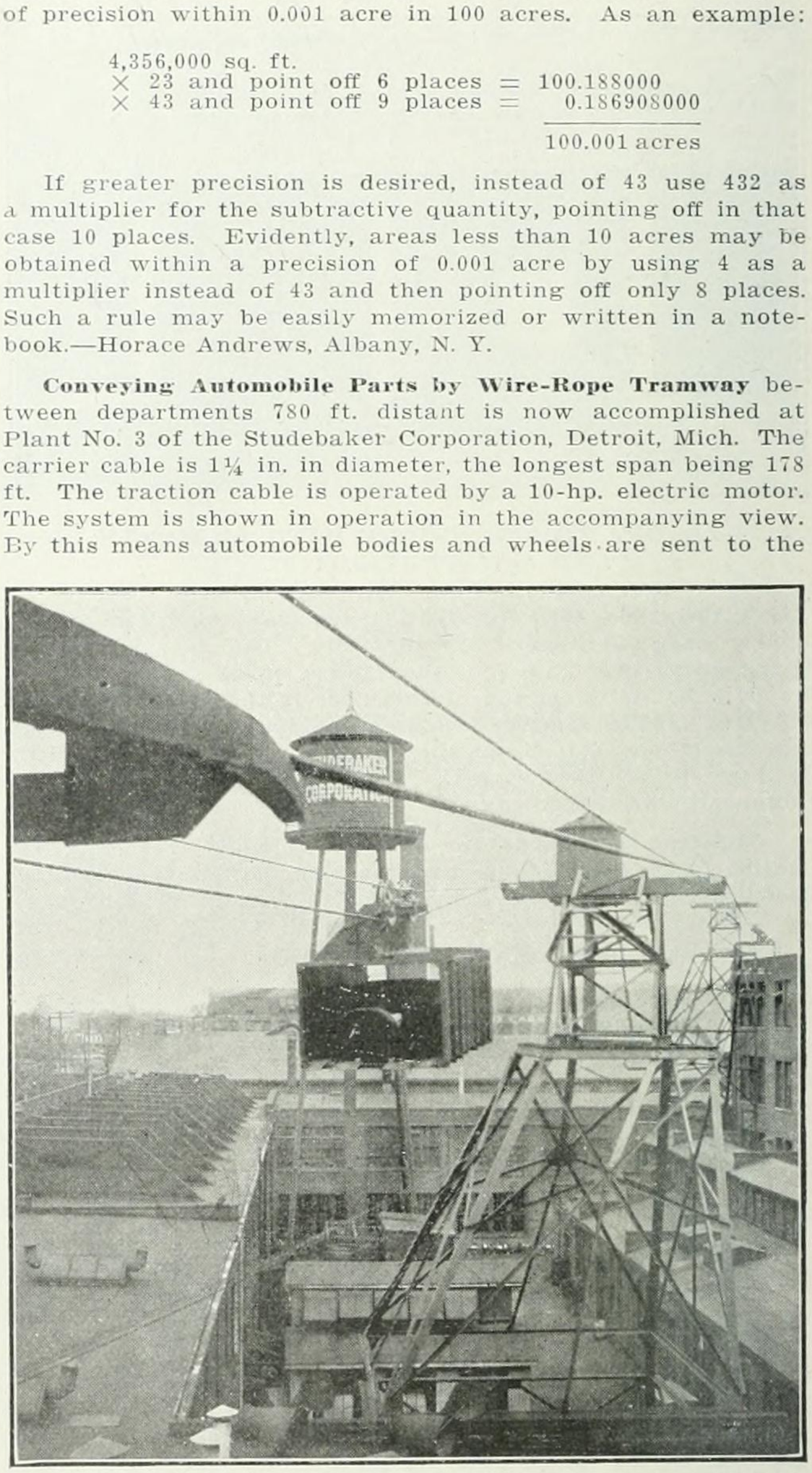
**The Great Northern Ry. Tunnel**, 1733 ft. long, near Paola, Mont., with the exception of 500 ft. at the west end, was driven by the use of pneumatic-hammer drills of the "Jackhamer" type. The tunnel is 36 ft. wide and 32 ft. high, having a cross-section of 38 cu.yd. per lin.ft. The material is a sedimentary rock similar to soapstone in texture, but considerably harder. This rock is in strata inclined at 20 deg. to the horizontal and is very seamy and full of mud pockets. Water was frequently encountered. In the wall-plate drifts two 5-ft. rounds per 10-hr. shift could be driven, 14 holes 6 ft. deep to the round. This was possible because drilling could be resumed immediately after shooting, without loss of time in setting up bars and "mucking back." The rock remaining in the heading above the drifts was shot down upon traps erected in the drifts. A round here consisted of from 18 to 22 holes 10 ft. deep, which were drilled in from 3 to 4 hr. with two "Jackhamers." Ordinarily, drilling and mucking were completed in a half-shift. The most remarkable performance of the drills was shooting the bench ahead of the shovel. The "old timers" laughed at the idea and prophesied that tripod drills would have to be used. The bench contained 30 cu.yd. per lin.ft., and was excavated and timbered at an average rate of 20 lin.ft. per day. In order to break up this material, 60 to 70 holes 11 ft. deep were necessary. These were drilled with three or four "Jackhamers" regularly in 7 hr. An 11-ft. hole was frequently drilled in 10 min. The bench holes were drilled from the face because of insufficient overhead room to drill down holes. This prevented the drilling and the shovel excavation being carried on simultaneously.—H. King, of the Guthrie, McDougall Co., Paola, Mont.

**Short Cuts in Surveying Computations**—In examining the table on p. 363 of "Engineering News" of Aug. 19, 1915, I have been impressed with the conviction that a division by 43,560 can more easily be effected by the use of its reciprocal as a multiplier. If a given number of square feet is multiplied by 0.0000229568 the result will give acres and decimals. More conveniently this rule can be applied: Multiply square feet by 23 and point off 6 places, and multiply square feet by 43 and point off 9 places. Subtract the second product from the first and the result will give area in acres to a degree of precision within 0.001 acre in 100 acres. As an example:

| | |
|---|---|
| 4,356,000 sq. ft. | |
| × 23 and point off 6 places = | 100.188000 |
| × 43 and point off 9 places = | 0.186908000 |
| | 100.001 acres |

If greater precision is desired, instead of 43 use 432 as a multiplier for the subtractive quantity, pointing off in that case 10 places. Evidently, areas less than 10 acres may be obtained within a precision of 0.001 acre by using 4 as a multiplier instead of 43 and then pointing off only 8 places. Such a rule may be easily memorized or written in a notebook.—Horace Andrews, Albany, N. Y.

**Conveying Automobile Parts by Wire-Rope Tramway** between departments 780 ft. distant is now accomplished at Plant No. 3 of the Studebaker Corporation, Detroit, Mich. The carrier cable is 1¼ in. in diameter, the longest span being 178 ft. The traction cable is operated by a 10-hp. electric motor. The system is shown in operation in the accompanying view. By this means automobile bodies and wheels are sent to the



CABLE SYSTEM FOR TRANSPORTING AUTOMOBILE PARTS

assembling department. Formerly, these parts were taken down an elevator from the third floor of the finishing department, trucked through a tunnel to the assembling building, and there elevated to the fourth floor. By the old method 12 min. was required for delivery of a body, with four men to handle it en route. By the new method two men at each terminal tend the conveyor, and as many as 41 bodies have been delivered in 42 min. Steel trestles support the cables; at the buildings it was found necessary to erect steelwork from the ground to the proper height, to take the pull.

the La Salle Hotel, Chicago, Dec. 10 and 11. All engineers are invited and the engineering societies and clubs of the United States are urged to be represented by engineering delegates. Further information may be obtained by addressing Arthur Kneisel, secretary, 29 S. La Salle Street, Chicago, Ill.

## May Lease Chicago Garbage Plant to Private Firm

A plan to lease part of the Chicago municipal garbage reduction plant to a private firm is being fostered by Dr. John D. Robertson, Chicago's new health commissioner. The city purchased the old plant of the Chicago Reduction Company Feb. 1, 1914. For it and its reconstruction the city has paid to date $742,922 and it contemplates a further expenditure of $371,000. The plant has been operated for a year at a loss, but in a sanitary manner. Instead of taking the grease out of the garbage —the valuable product—it has sold the tankage at $5.77 per ton. To extract the grease it would be necessary to use the millhouse and naphtha plant, both of which have remained idle. For the tankage the best price obtainable for the ensuing year is $3.27 per ton.

Dr. Robertson proposes to rent the old millhouse and degreaser to a contractor, who shall pay a certain price for the tankage that will be turned out by the remainder of the plant. He recommends that scheme to the finance committee for a period of ten months.

"From the information I have collected," he said, "I believe that, from each 4 tons of garbage, a ton of tankage can be had. With grease at 3 cents a pound and fertilizer at $4.50 or $5 a ton, a ton of tankage will bring in about $10. I understand that it costs about $3 a ton to get the grease out." Last year the city's garbage, hauled by municipal teams, totaled 129,211 tons. That would mean about 32,000 tons of tankage. At $10 a ton the income is $320,000 a year.

Dr. Robertson's plan was described by Oscar E. Hewitt in the *Chicago Herald* for Aug. 16. In Mr. Hewitt's words it is as follows: "The city will operate the end of the plant where most of the jobs are. The contractor will operate the money-making end of the plant."

## Professorship Established as a Memorial to Joseph A. Holmes

As a memorial to the late Dr. Joseph A. Holmes, director of the Bureau of Mines, of the Department of the Interior, the Colorado School of Mines has established the Joseph A. Holmes Professorship of Safety and Efficiency Engineering.

## Total Asphalt Production in 1914 Shows Increase

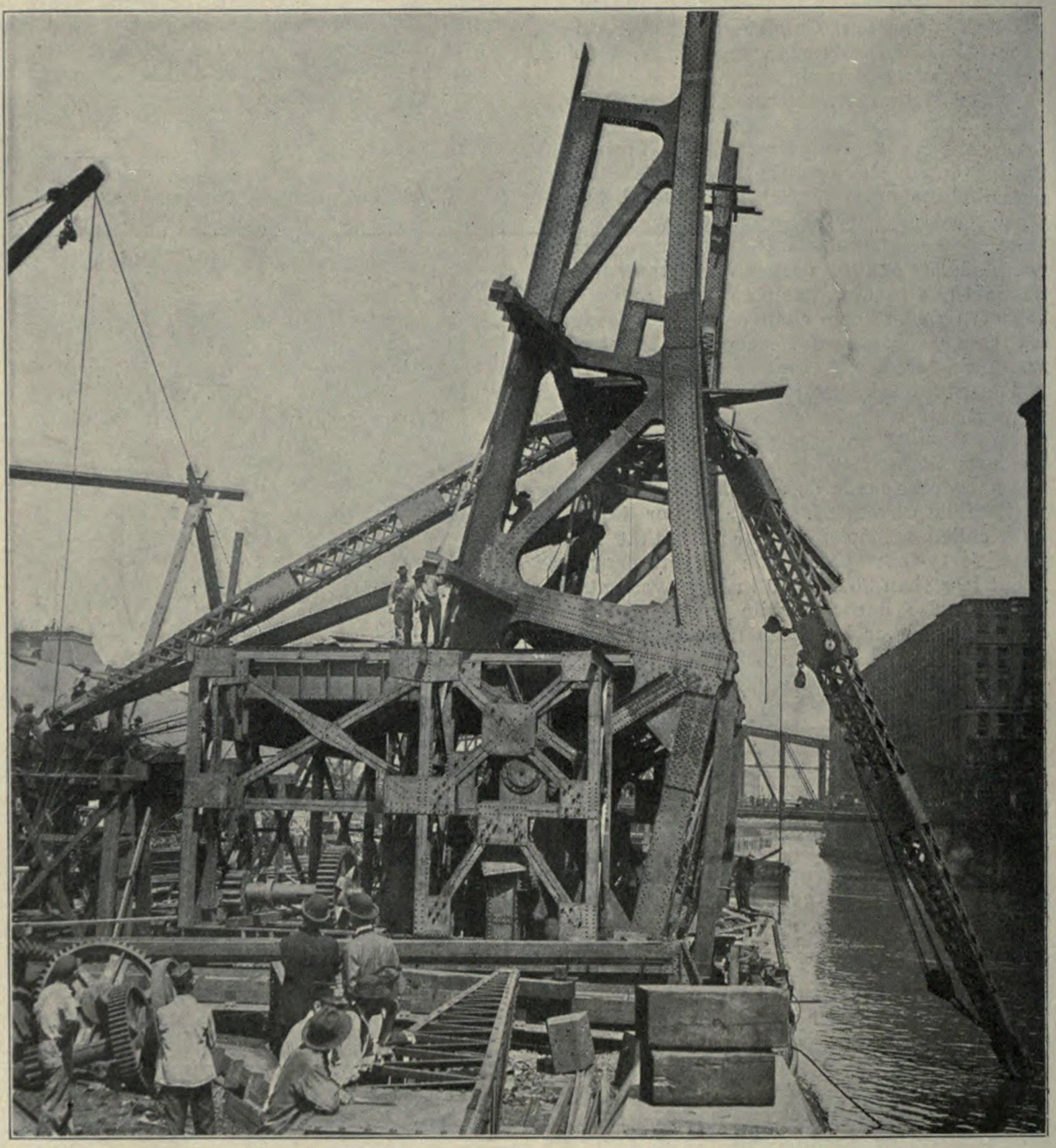
Although there was a decrease in the market production of natural asphalt and of manufactured or oil asphalt derived from domestic sources in the United States in 1914, the decrease was more than offset by the greatly increased output from American refineries, of oil asphalt derived from crude petroleum imported from Mexico.

The decline in asphalt production from domestic sources is attributed by J. G. Northrop of the U. S. Geological Survey to the increasing use of the product manufactured from Mexican oils. The production of oil asphalts from domestic petroleum amounted to 360,683 tons, valued at $3,016,969, and the output from the American refineries of oil asphalt from Mexican petroleum amounted to 313,787 tons, valued at $4,131,153. Compared with 1913, the output of natural asphalt in 1914 declined 16 per cent and that of domestic oil asphalt 17 per cent, but the output of Mexican oil asphalt increased 174 per cent. In California there was a notable increase in the output of oil asphalt derived solely from domestic petroleum, which resulted largely from an increase in the use of asphalt in highway and pavement construction in that State. In Texas and Utah the output of certain varieties of naturally occurring asphalt required for special purposes showed an increase. Asphaltic material and products to the value of $186,142 were imported for consumption during the calendar year. Exports during the same period amounted in value to $1,247,020, leaving a balance of $1,060,878 to be credited to the domestic asphalt industry.

## Gooseneck on Derrick That Lifted 37 Tons Breaks Under 21½-Ton Load

Mystery surrounds the breaking on Aug. 19 of a 2½ x 12-in. steel gooseneck, which held the 16 x 16-in. 50-ft. Oregon Fir mast of a derrick used in the construction of the west end of Chicago's new Jackson Street lift bridge. The gooseneck broke at the joint as the 4-ft. square laced steel boom, 118 ft. long, was lifting a 21½-ton top section chord. The back stiff leg of the derrick is made of 12 x 14-in. timber and is uninjured. The boom, in falling, hit the partly erected leaf and was crushed near the center. Four sheave blocks were used, two at the top of the mast and two at the bottom. A ⅞-in. cable was used at the drum and a ⅝-in. cable for the lift.

Engineers for the contractor, the Strobel Steel Construction Company, Chicago, have as yet been unable to determine the cause of the failure. The gooseneck has been examined by the Pittsburgh Testing Laboratories and found to be made of best quality steel. To add to the mystification of the engineers, the derrick, which is designed to lift many more than 21½ tons, had lifted 37 tons the day previous without apparent distress to the gooseneck.



*Courtesy Chicago Daily News*

LIFTING A 21½-TON TOP SECTION CHORD CAUSED THIS DERRICK FAILURE

## Loss in Galveston Probably from Three to Four Million Dollars

Later advices, received from John B. Hawley, consulting engineer, of Fort Worth, Tex., in regard to the damage done by the hurricane of Aug. 16-17 at Galveston, which was described in this journal last week, indicate that the property loss, public and private, will probably be from $3,000,000 to $4,000,000.

The 30-in. water main from Alta Loma lost several hundred feet at different points through erosion of the bay bottom. A temporary 8-in. main connects the island with the mainland, but its capacity is too small to give an adequate supply and water is being doled out in small quantities. The total loss of life on the island may reach 100. A careful examination of the sea wall showed it to be wholly uninjured and, according to Mr. Hawley, "indicated that its designers provided for every necessary element of strength."

The arch portions and bascule of the causeway are practically intact, but that part which is of retaining-wall and earth-fill type is largely destroyed. A temporary trestle is being built to serve traffic needs until the arch construction can be extended to both shores.

Lieut.-Col. Charles S. Riche, Corps of Engineers, U. S. A., in charge of the Galveston district, is authority for the statement that the great jetties, which made Galveston's deep water channel, are practically unharmed and that soundings show that the channel itself suffered no filling or accumulation of sand bars.

The city, aided by the U. S. Army, is cleaning up the streets and alleys. The citizens are working on their own premises.