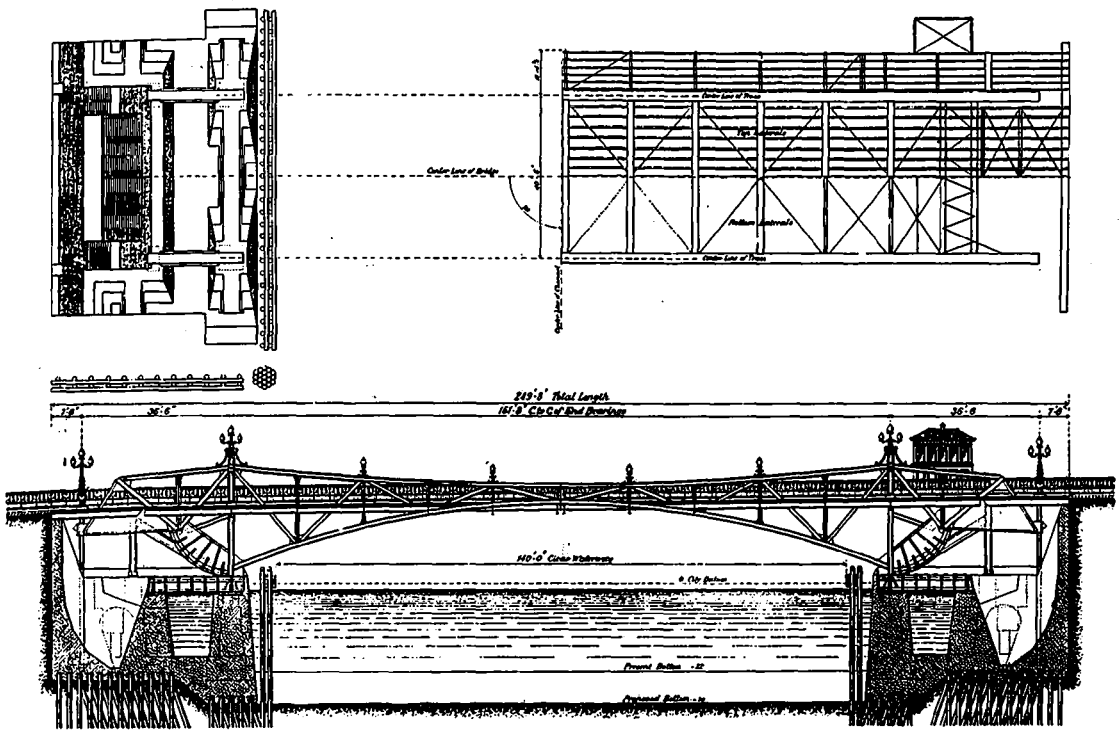

GENERAL PLAN OF BRIDGE ERECTED FOR THE SANITARY DISTRICT OF CHICAGO AT STATE STREET OF THAT CITY. NOTE THE DEEP (DRY) PIT INTO WHICH THE COUNTERWEIGHTS FALL WHEN THE BRIDGE IS RAISED, THE BY-PASS TO RELIEVE THE PRESSURE OF THE CURRENT ON THE MASONRY AND THE SYSTEM OF PILING THE RIVER BED SO AS TO CARRY THE WEIGHT OF THE STRUCTURE TO THE SOLID ROCK BELOW. *Fig.* 15.

twenty feet of water, and the recent erection and opening to traffic of a new and modern lift-bridge at this point which has supplanted a swing bridge.

The structure is the only example of its particular type in that city and is a two leaf, revolving, lift-bridge recently designed by the Cowing Engineering Company, under patents of Mr. John P. Cowing, of Cleveland. The bridge has two six-foot sidewalks, its trusses are forty feet from centre to centre and one hundred and fifty-two feet between front bearings, giving a clear waterway of one hundred and twenty feet at an angle of twelve degrees to the longitudinal axis of the bridge. The supporting end of the bridge is a semi-circular revolving segment having a bearing surface adapted to rest and roll on twenty-nine ten-inch anti-friction rollers sixteen and a half inches long, which rest and roll in a cradle transmitting all the moving load uniformly to the foundation.

The motive power for operating the bridge is two twenty-five horse power direct current electric motors for each leaf, one on each leaf being required for operating under ordinary conditions, while the other is held in reserve for emergencies. The power is transmitted to the main rack and pinion through a series of gears from a main equalizing gear on each leaf of the bridge. (See illustration, Figs. 4 and 6). This latter gear takes the first reduction from the motor, thereby transmitting the same amount of power and motion to each of the two rolling segments of the main trusses of each leaf. To prevent lateral displacements, the rollers are recessed and held in alignment by distance bars composed of two channels.

The centre of gravity of the moving leaf is at the centre of a circular segment, the counterweight being partly above the floor and partly below it, and consisting of pig iron set in Portland cement in a steel box with covering and riveted to each truss. There are some cast-iron blocks below the floor for adjusting and properly balancing the bridge. When the bridge is closed, the dead and live load reactions are taken by a front bearing on the cradle. The uplift from the load upon that portion of the lead which is between the centre and the front bearing is taken by an anchor bar in the rear foundation and that portion between the centre of the rolling segment and the abutment is taken by an electrically-operated tail lock. The total weight of steel in the bridge proper is estimated at 506 tons and in the counterweight 800 tons.

The bridge has the advantage, at all times, of keeping the dead load and the counterweight over the centre of the pier, all resting and rolling on anti-friction rollers revolving in a cradle. The cantilever arms are counterweighted to be in equilibrium at all positions and when lowered into position meet and lock at the centre of the span with an automatic lock. Both arms of the bridge are controlled from one side, can be operated together or separately, are automatic in stopping at the extreme positions and in locking at the centre, thus making it impossible for the operator, either by neglect or carelessness, to damage the bridge. The structure is designed to carry a street car track loaded with 80,000 pound cars.

Returning to the Rolling Lift bridges, from which type the greater number of our views and drawings are taken, it is peculiarly interesting to note the method of their construction. The movable parts are erected and completely equipped for operation on the piers at each side of the waterway, in the positions which they should occupy when the bridge is open for navigation, and it is not necessary to close the bridge until it is entirely completed and ready for use. Therefore no obstruction or interference is caused to navigation during erection. The economy of this method cannot fail to impress one. The bridge may be so counter-weighted that the centre of gravity falls in the centre of the rolling segment. In order to move the bridge sections it is then only necessary to overcome the resistance due to frictions. In