series parallel controller and the three wedge motors are operated from one special controller, all three being started at the same time and running until automatically stopped by the rupture of the circuit and the application of the solenoid brakes at the end of the motion of their respective appliances. Electric indication is provided for the motion of the draw span and wedge mechanism, and of each of the 16-rail connections. Electric interlocking also, as before described, is employed throughout. This interlocking extends even to each individual rail lock connection on both decks. Through the use of a contact device at the end of the span, it is made impossible for the wedges to be driven until the span is exactly lined up.

No electric power from outside sources being available, it was decided to install a special generating plant for the sole purpose of operating the draw span. To erect a building on the shore for this purpose would have meant additional operating expense on account of requiring an attendant in the power plant in addition to those on the bridge. The

motor is required. The swing motors are operated through a first story directly underneath the operator's room. The storage battery, consisting of 264 cells, 160-ampere-hour capacity, is in the portion of the building extending under the deck of the bridge when opened. The convenience of this scheme will readily be recognized, especially when it is seen that when the bridge is opened the operator can step from his house on to the deck of the bridge or has easy access to the end wedge mechanism from the roof of the battery room.

Owing to the fact that the operator is not on the swing span, it is not possible to employ the usual mechanical brake. At the same time it is extremely necessary that the span be under control, especially when a strong wind is blowing. This is accomplished by equipping each of the two swing motors with a solenoid brake of sufficient power to retard the motion of the bridge without checking it too abruptly. An additional brake of greater power is installed on each machinery set. This is applied normally by a powerful spring, and each brake is connected with a motor-operated mechanism designed to partially or totally release the same. This



One End of Swing Span; St. Louis River Bridge.

bridge, however, being a double deck structure, there was no place either on or above the bridge where generators or storage batteries could be installed. It was even found impracticable to locate the operator anywhere on the draw span where he could see the river traffic and the approaching traffic on both decks of the bridge. A novel solution was found, however, in building a combined power house and operator's house at the extreme end of the protection pier. The operator's room is located in the top story of the building and at sufficient height so the operator can see approaching boats through the structure of the bridge in one direction, and have a clear vision down stream in the opposite direction, and at the same time have an unobstructed view of approaching traffic on both decks of the bridge. The first photograph shows the general view of the draw span and approach spans, with the former swung into a nearly open position. The next shows one-half of the draw span and a nearer view of the operator's house, which can also be seen through the structure in the general view. The operator's house is of brick and fireproof construction. The generating plant, consisting of two 15-k.w. 500-700-volt generators each directconnected to a 30-h.p. two-cylinder gasoline engine, is in the

motor is connected with a controller in the operator's house, and by its use the operator can apply or release or partially release the brakes at will.

All wiring on the bridge and in the operator's house is entirely enclosed in conduit, there being no open loops even at the motors or controllers. The upper and lower decks of the bridge, all parts of the operator's house, and the government signal lanterns are lighted by current from the storage battery.

## Other Recent Bridges.

There are probably about 15 drawbridges in this country at present operated from storage batteries. There is no question that the number will be greatly increased as the merits of this type of installation become better known.

One of the most important and interesting recent installations operated by current from outside sources is the eighttrack bridge over the Chicago drainage canal near Campbell Avenue, one view of which is shown herewith. This consists of four independently operated bascule spans, located side by side, two being on the north bank and two on the south bank of the channel. The four spans are controlled from two operators' houses, one on each side of the channel, the con-