sill area as possible. The necessity for this will be evident after a glance at the following figures. If, for example, the reaction of deck E be delivered over an area of 15 inches x 15 inches (the space immediately under its own bearing pieces) the resulting load on the oak is approximately 7,100 lbs. per square inch. This is evidently the worst case, namely, that in which the stem is not distri-

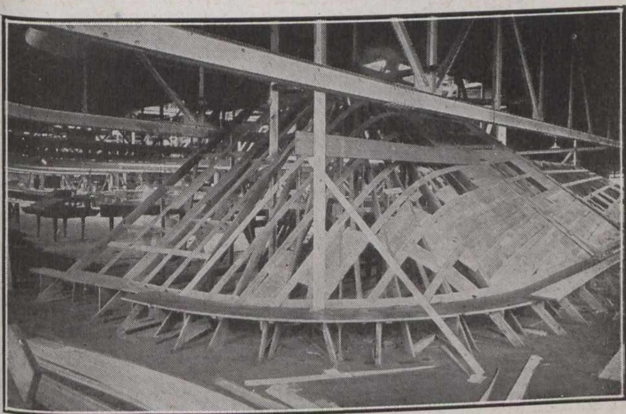

Fig. 4.

buting the reactions at all. On the other hand, suppose the stem distributes the load uniformly over 13.13 feet (equals ½ of 9 feet + ½ of 17.25) giving a load on the oak of 840 lbs. per square inch. It is apparent that even under these ideal conditions the load is very heavy and hence the importance of the stem is realized. In passing, it may be noted that the oak bearing pieces are enclosed by steel angles.

The keel was designed to be quite similar to the stems with, however, several changes due to the distinct differences in the duties of the two members. The function of the stem was to receive two highly concentrated loads and distribute them over as large an area as possible. The duty of the keel is, however, to receive and transmit directly to the sills a uniformly distributed load. Hence it is apparent that no bending moment will be developed within the keel, nor will there be any extremely heavy concentrations. It was, therefore, possible to reduce the flange material very markedly and also to dispense with the necessity of bearing between webs and flange plates. All stiffeners, both inner and outer, were accurately fitted by milling to bear against the flange angles, and these became excellent paths for the load distribution. Breast hooks were also supplied at every weak frame, *viz.*, at 1-foot 9-inch centres. These breast hooks are clearly seen in Fig. 2, taken during the yard assembly.

Additional stiffness for the tidal chamber portion is gained by the presence of the heavy diagonal fenders which are stiffened half-way up by 24-inch gussets.

These fenders, besides aiding in a very effective way the sway bracing system, are necessary to preserve the exposed portions of the deck against injury from falling bodies of any kind. They are shod throughout their whole length with 12-inch x 12-inch white oak, which serves as a buffer against contact with berth walls should any local disturbance cause violent rocking of the caisson when floating. Wooden strips are also inserted in the chords of decks E and D. These are 12 inches x 12 inches and, naturally, run completely around the caisson, and act as buffers against injury during those times that the gate is floating beside one of the dock walls.

The bearing strips of this caisson are all white oak. The thickness of these varies from point to point along the stem and keel, depending on the number of flange and splice plates inserted. In addition to these oak bearing strips there are buffer strips to absorb the shock as caisson is settling on to the bottom or oscillating against berth walls. Owing to the lay-out of the keel and stems, the axis of this caisson during contact with masonry may be quite oblique with no danger of steel touching masonry.

The structural design of the rest of the caisson followed along usual lines, and offers no field for any extended comment.

The layout, however, of the traffic bridge possesses certain points of interest that may with advantage be briefly described. As mentioned previously, the floor stands are situated on deck B, which is about 4 feet below the bridge. Consequently, over each floor stand a hatch had to be provided, and each hatchway is large enough to allow space for a checkered plate stairway from the steps of which the attendant may operate the floor stand mechanism. These hatches are well over to one side of the bridge.

In addition to the floor stand hatches there are five others—two main hatches, two ladderway hatches leading to the tidal chamber, and one motor box hatch. The main hatches lead directly into the machinery chambers and are large enough to admit the passage of any of the pieces of mechanical equipment. In order that a motor and pump might not have to be disturbed to give passage, for example, to a 42-inch valve being removed for repairs, the hatchway was offset from the centre line of the motor by about 4 feet 6 inches. It is through these main hatches, also, that the scuttling valves are operated. The ladderway hatches merely give direct access to the tidal chamber, and the remaining hatch to the watertight motor box and controller handles.

The fabrication of the steelwork of the floating caisson presented several problems only met with at very infrequent intervals by a bridge company. Especially was this the case in regard to the ends of the structure, which are similar to ships' bows.

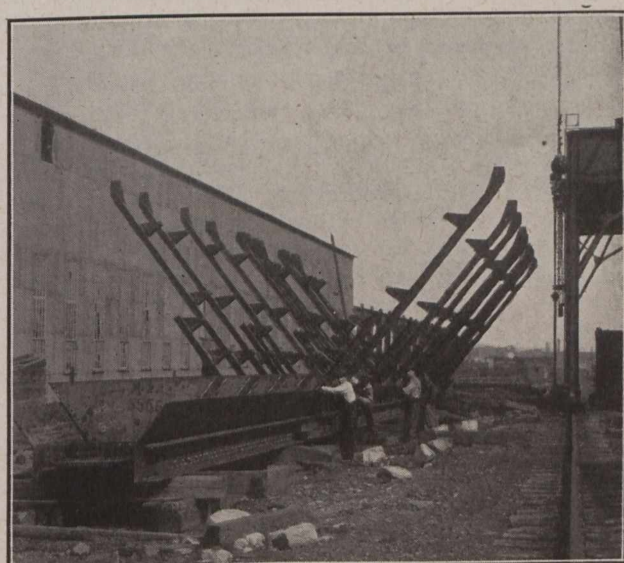

Fig. 5.

In order to simplify as much as possible the lay-out and detailing of these curved portions, an accurate wood and cardboard scale model of one-half of one end was constructed. This was made by the template shop shortly after the main design features were settled; and the scale selected was 1½ inches to the foot. Fig. 3 shows this model very distinctly. The name sheet is fastened to the