FOREIGN EXPERIENCE AND TECHNIQUES

RADIAL GATE WITH VALVE AND HYDRAULIC HOIST

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In 1973 the Kiskőros hydraulic development (Fig. 1), which includes a five-bay spillway, a 12 x 85-m navigation lock, and a 24-MW hydroelectric plant was placed in operation on the Tisza River, in the Hungarian plains. The main purpose of this hydraulic development is to store $400 \times 10^6$ m$^3$ of water and to ensure its supply to an irrigation system being constructed.

The spillway bays have gates equipped with valves (Fig. 2) for close control of the prescribed water levels. Radial gates are used for closing off large openings. For their fabrication, 15% less steel is required in comparison with other types of gates. Also, they are noted for their operating reliability and relatively small values of the lifting force. The spillway gates at the Kiskőros hydraulic development are among the most modern and largest of their type. These gates cover spillway bays 24 m wide and 11.3 m high and transmit a water pressure of 1500 tons. The spillway bays are separated by 3.6-m-wide piers (instead of the 6-7-m-wide piers which would have

Fig. 1. General view of hydraulic development.
been required in the spillway for other types of gates). The hydraulic hoists are installed on the piers and the oil pumping plant, the control units, and other equipment are installed in compartments located in the upper part of the piers (Fig. 3).

The lateral faces of the piers are smooth (with the exception of the grooves for the upstream stoplogs); this is permitted by the construction of the radial gate and of the bridge-type downstream stoplogs. This type of equipment provides a means for increasing the discharge capacity of the spillway by 8% and for simplifying its construction. At the closure place, on the floor, there is a 3.2-m-high streamlined sill, which made it possible to reduce the gate height to 11.3 m (instead of 14.5 m). The local narrowing of the streamlined elements causes the water level to rise only 2-3 cm.

The gate span is built in the form of a rigid trapezoidal beam resting on the segment legs. The design value of the span is 23 m. The center of the arc of the gate skin plate, which is 14 m in radius, is located at a distance of 1.0 m above the point of rotation; this reduces the required lifting force considerably. However, the lateral seals of the segment, as well as the embedded parts, are fabricated with the radius described from the gate rotation center. The segment legs are A-shaped with closed sections, and have Vierendeel-type tapered bearings.

The bearing (Fig. 4) is made from cast steel and has a cantilevered-projecting cylindrical shaft. The casting is secured to an embedded welded tube which serves to redistribute the load from the shaft to the pier or abutment. The shaft has a bronze hub with a spherical surface. Self-adjusting bushings permit the bearing to rotate in the plane of the radial gate portal.