

Lawrence direct, goes off on a side issue; in one case from Chicago to the Gulf of Mexico; in the other, from Massena, as already stated, to the Grasse river at a distance of 3 miles or more from the St. Lawrence, while such action may also be fruitful of local complications by flooding the Illinois on the one hand and the Grasse river on the other.

But with this question we have not here to deal, and it is only introduced as a reminder to engineers that such river diversions, and be they only partial, may give rise to suits at law, when the engineer might be taken to task for not having foreseen the thing and advised his patrons thereof.

#### CURVED OR BOWED DAMS.

There is another class of dams where thickness is or may be partly compensated for by bending the dam up stream into a bow on the principle of a lock-gate of a canal. Such a dam occurs at Parsons, Kansas, where a masonry dam of 100 feet reach has been made convex up stream and to a radius of 200 feet. This dam is but 10 feet high, with a base of 6 feet; but as it is 2 feet thick at top, if a line be drawn through its vertical section from its outer edge at base to its inner edge at top, and the triangle thus cut off turned up-side down, and applied, thus increasing the base by 2 feet, the base will then be within 20 per cent. of being equal to the height, and the arched feature may be taken to make up in resisting strength for the want of sufficient base to conform to the writer's theory of "base of dam equal to height or depth of water, including overflow, if any."

As to this practice of arching a dam horizontally or in plan, Mr. Mansergh, President of the Institution of Civil Engineers, England, in his presidential address of November the 6th, says:—"In 1878 I built a small dam on the River Wyre . . . about 57 feet high above the river, across a narrow gorge, where I could give the wall a curve in plan of only 100 feet radius. In such a situation the structure could obviously be made much lighter than say the Rankin type section for a long straight wall," which corroborates what I have just said of thus adding strength and resistance to a dam wall by throwing it into a bend up stream, and thus saving thickness and weight of masonry.

Mr. Mansergh also strengthens the writer's position on the unadvisability of horizontally coursed masonry in a dam, and the necessity of binding the masonry vertically, when in the same address he says, alluding to the new Croton Dam, which is not erected as at first intended, at Quaker's Bridge, but two miles further up the valley: "I have just received some photographs of this work, which represent the wall as being built in horizontal courses of roughly