With these *facts* for our guidance, is it unreasonable to expect that notwithstanding the Monongahela Company may be forced to resort to artificial aid, the slackwater on the Ohio will be well supplied without any such arrangement? Surely it cannot cost the Monongahela Company much to obtain the little additional water they may need merely for slackwater purposes, if, according to the calculations of Mr. Morris, and Mr. Ellet, it will cost so little to furnish a constant flow of *not less* than 5 feet depth for the broad current of the unobstructed Ohio, flowing freely over its bed on a declivity of one foot per mile; and requiring 864,000,000 cubic feet per day, nearly *eight times* the quantity we have assumed to be *abundant* for the Ohio slackwater!

To controvert successfully, the opinion that there will always be an ample supply of water on the Ohio slackwater, should it ever be constructed, something more than a bare assertion to the contrary, with a mere reference to an inapplicable example, is looked for.

In the present state of the discussion, the writer thinks he will be sustained by the judgment of every candid examiner, in the opinion that this *first objection*, namely, want of water for the lock and dam system, has no reliable foundation. The question of water supply is a very important one, and we have endeavored in this case to put it to a severe test.

(To be Continued.)

For the Journal of the Franklin Institute.

On the Timber Bridges upon the Providence, Hartford, and Fishkill Railroad. By A. F. WILDER, Assistant Engineer.

The timber bridges of long span upon the line of this railroad, are constructed upon Howe's plan, with all the improvements, of which the following extract from the specifications will give a general idea:

"Bridges of less than 60 feet span only, have low trusses. The trusses of *open* and *rafter* bridges are 14 feet apart in clear, and 21 feet high; and of *deck* bridges of a height and distance apart adapted to their locality.

"The following general specification for a bridge of 120 feet span may be deemed a standard: bridges of other spans having at least equal strength. Trusses 21 feet high, 28 inches thick, and 14 feet apart. Panels from 10 to 11 feet long. Bottom chord, two pieces of $5\frac{1}{2} \times 13$ inches, and two pieces of $6\frac{1}{2} \times 13$ inches. Top chord two pieces of 6×10 inches, and one piece of 12×10 inches. Main braces, one half 8×10 inches, and one half 7×10 inches. Counter braces 7×8 inches. Floor beams, 6×13 inches, four to a panel, with an extra one under joints of track-string. Track-stringers equal in size to 11×12 inches; either single or in two pieces.

BOLTS.—First set,	two of $1\frac{5}{8}$ inches, and one of $1\frac{1}{2}$ inches.
Second set, .	" $1\frac{1}{4}$ " " "
Third " .	" $1\frac{3}{8}$ " " "
Fourth and fifth set,	" $1\frac{1}{2}$ " " "
Middle, .	" $1\frac{3}{8}$ " " "

"The timber is of the best western white pine, except the wall plates and bolsters, which are of white oak."

In some bridges the floor beams rest upon a false chord, properly supported from beneath, or suspended from above, at a varying distance between the top and bottom chord, depending upon the requirements of the different localities.

The low truss bridges have the trusses covered separately with side boarding and a tin roof, the flooring being left open. Larger bridges have the sides covered with clap boards secured to upright scantling. The ends are cased up, and the side boarding returns into the bridges from 10 to 15 feet at each end as a protection against driving-storms. On *deck* and *half-deck* bridges, the decking is so arranged as to admit the ordinary cross-tie, and obviate the necessity of having the rail spike pass through the tin.

These bridges were built by Messrs. Stone & Harris, of Springfield, Mass., under the direction of the chief engineer.

For bridges of short span, a form of truss has been adopted in many cases like that shown in Plate I. At Riverpoint, the centre line of railroad passes within a few rods of Dr. Harris's large cotton mills, where an embankment of earth or a stone viaduct would have seriously obstructed the light from the factories. A light timber structure was therefore erected, combining these two forms of construction, the roadway and the sluiceways from the factories being spanned by eleven trusses of 35 feet each in length, and the river by a Howe truss of 75 feet span in clear, making in all 467 feet for total length of viaduct, of which 82 feet are of Howe's truss, and 385 feet of the short truss (35 feet).

The general plan of construction for this bridge will be readily understood by reference to Plate I., in which a part only of the river span and three of the short spans are shown, each of which consists of four trusses, the two middle ones underneath the track-string—as will be seen by the specifications for timber—being somewhat heavier and stiffer than the outer ones. The trusses are supported by systems of three trestles resting on each pier, the middle trestle extending up to the track-stringer, and having four posts, the two outer ones being inclined. The outer trestles having two perpendicular posts only underneath the middle trusses, extending up to the lower chord. The track stringers rest immediately upon the thrust-pieces, and the rail lies upon the planking.

The piers are of peculiar form, built with economy of material for the purpose for which they were intended. The middle portion upon which all three trestles rest, is carried up of full thickness (5 feet,) from the foundation, while the ends, of 11 feet in length, are built with three offsets, leaving a width on top of only 22 inches, sufficient to receive the sill of the middle trestle.

This bridge was designed by S. Ashburner, Esq., Chief Engineer, and the details of construction were carried out under the direction of S. B. Cushing, Esq., Division Engineer. The scale of the full view is 20 feet to the inch or $\frac{1}{2} \frac{1}{4}$; that of the section of trusses and view of trestle is 10 feet to the inch or $\frac{1}{2} \frac{1}{8}$. The following bill of timber was used in

HARTFORD, PROVIDENCE AND FISHKILL

RAILROAD.

S. Ashmun, Chief Engineer.

View of Trusses.

the construction of the 385 feet of short truss, amounting to 91,235 feet board measure, together with 17,700 feet 4 inch plank.

Specification of Timber for Trestle Bridge at River Point.

Number of sticks	DESCRIPTION.	Length.	Size in inches.
22	Upright posts, middle trestle of each set,	22 ft.	14×14
22	Inclined " " "	23 ft.	14×14
40	Upright " outer " "	16 ft. 9 in.	12×12
22	Caps, middle " "	15 ft. 6 in.	7×14
20	" outer " "	7 ft. 6 in.	8×12
22	Upper girders, middle " "	17 ft. 3 in.	8×12
22	Lower " " "	22 ft.	6×12
11	Sills, " " "	29 ft. 6 in.	8×14
20	" outer " "	7 ft. 6 in.	8×12
22	Track stringers,	35 ft.	12×15
44	Outer " "	35 ft.	3½×15
44	Corbels,	7 ft. 6 in.	10×12
2	Wall plates,	14 ft. 9 in.	6×12
FOR TRUSSES.			
22	Inner thrust pieces,	16 ft. 3 in.	12×12
44	Outer " "	16 ft. 3 in.	3½×12
44	Inner braces,	10 ft. 6 in.	12×12
44	" " "	8 ft. 9 in.	8×12
88	Outer " "	10 ft. 6 in.	3½×12
88	" " "	8 ft. 9 in.	3½×8
22	Inner lower chords,	34 ft.	9×12
44	Outer " "	34 ft.	3½×9

4 in. plank in lengths of 15 feet 3 inches, each. Widths not less than 10, nor more than 12 inches.

Bolts for each Span.

Main truss.	Outside truss.
4 of 1½-inch.	4 of 1½-inch.
2 " 1½ "	2 " 1 "

Bolts for caps, girders, and corbels, ¾-inch.

For the Journal of the Franklin Institute.

On the Submarine Telegraph. By A. C. JONES, Engineer.

The connexion of Europe with America by means of the "Ocean Telegraph," will soon be attempted by the laying of the telegraph cable, and if it fails, it most probably will be from the great strain on the wires during the first few miles, when the cable is suspended between the two sterns of the frigates.

Up to the present time, (and I have waited until I believe all the details have been published,) there has been no other precaution against this great strain and consequent stretching of the cable, than the making of about five miles of the wire, of steel instead of iron. This may or may not be sufficient to prevent a rupture of the small copper conducting wires, but it seems to me that where so much is at stake,