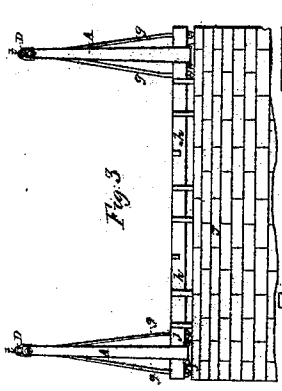
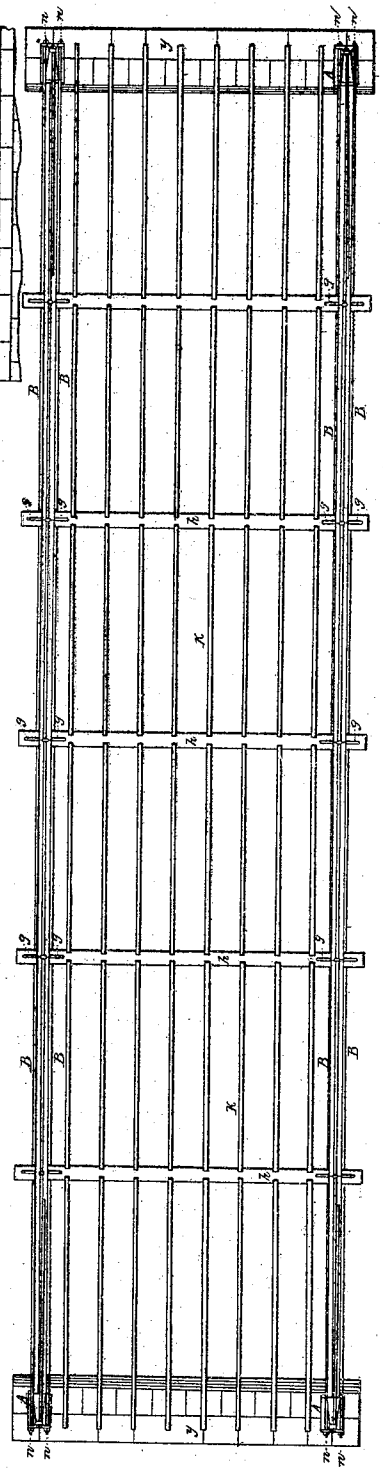
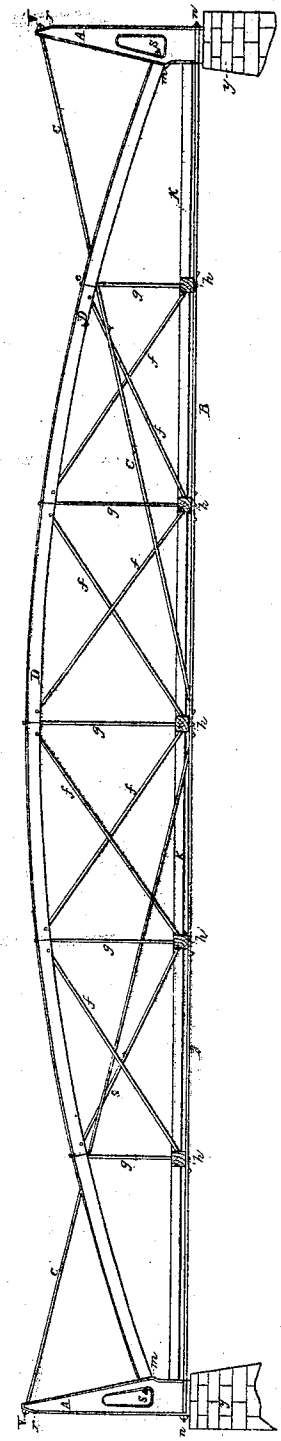
A. S. Swartz.

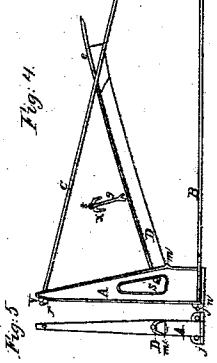
Truss Bridge.

No. 18,253. Patented Sept. 22, 1857.









Witnesses
Saml. Swartz
C. B. Forbush

Inventor.
Abram S. Swartz

UNITED STATES PATENT OFFICE.

ABRAM S. SWARTZ, OF BUFFALO, NEW YORK.

TRUSSED BRIDGE.

Specification of Letters Patent No. 18,253, dated September 22, 1857.

To all whom it may concern:

Be it known that I, ABRAM S. SWARTZ, of the city of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Iron Tower-Bridges; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and the letters of reference marked thereon.

The nature of my invention consists in making an iron tower to support the arch, the base of which is held against the thrust of the arch, by wrought iron, horizontal tension bars, and the top thereof, by a suspension rod. The tower, the horizontal tension bar, and the suspension rod, when taken together, make a figure in the form of a right angled triangle, the foot of the arch resting upon the tower within this triangle.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

Figure I is a longitudinal elevation of a bridge, of which my improvement forms a part. Fig. II, is a plan. Fig. III, is an end elevation. Fig. IV, is a side elevation showing the triangle formed by the tower, tension bar, and suspension rod. It also shows the foot of the arch as it rests on the tower within the triangle; Fig. V, elevation, showing the inside front of the tower.

Explanation of Fig. I.—A, represents the tower, which is made of cast iron. It may be made two and one half feet wide at its base for a span of from sixty to eighty feet—the width extending parallel up the tower two and one half feet to the step (*m*) upon which the arch rests. From thence it rises seven and a half feet—tapering to eight inches, where the suspension rod passes through. The metal should be one inch thick and flanges should be cast on each side of both edges. These flanges should be twelve inches wide at the base, and taper to eight inches at top, and one and one fourth of an inch thick. About twelve inches of the top of the tower is made beveling, from the back, forward, the bevel angle forming a right angle to the suspension rod *c*, (as represented at *r*.) An opening is made through the tower, opposite and above the step, in order to lessen the quantity of metal and also to admit a tie rod which passes over the arch to be fastened to the tower by means of a screw nut within the opening as represented at *s*. The tension bars pass through the flanges at the base of the tower, and are secured thereto by means of heavy screw nuts as represented at *n*. A cast iron tower of the dimensions herein described will weigh about two thousand pounds. The drawings are made on a scale of one fourth of an inch to one foot. The size, form and proportions of the tower as well as all other parts of the bridge, may easily be estimated by applying the scale to the drawings. The towers sustain the whole weight and thrust of the arch.

B, wrought iron tension bar. There are two of these bars to each tower. They extend from tower to tower, and securely hold the base of the towers against the thrust of the arch. They should be made of the best quality of wrought iron about two inches in diameter, or of sufficient strength to resist the strain, which they may be subjected to. Heavy hexagonal screw nuts secure these tension bars to the base of the towers, as represented at *n*, *n*. These bars should be connected to the needle beams by stirrups, bolts or otherwise for the purpose of preventing a vibration of the same.

C, wrought iron suspension rod. This is secured to the top of the tower by a heavy hexagonal screw nut, as represented at V. It passes through the arch (a slot being made in the arch segment for that purpose) and under the needle beam at or near the center of the arch, and connects with the top of the other tower.

If the frame work of the flooring will not allow of a needle beam at the center of the arch, then the suspension rod may pass under the two, nearest to the center. The needle beams, under which the suspension rods pass, should rest upon the suspension rod. The suspension rods hold the top of the tower against the thrust of the arch. The strength of this rod must be proportioned to the strength of the tension bars, allowing for its advantage in leverage.

D, arch. This is made of circular segments of uniform cross section, weighing not less than forty pounds to the lineal foot, and joined together at the ends like a socket joint having one piece extending into the other, and secured by a flange which is cast on, to guard against the side thrust. In case the tie rods herein described, should

not be used, then the ends of arch castings should be so shaped as to form vertical holes for the uprights to pass through—cast flat on top, to afford horizontal bearings for the nuts—the holes being so placed, that the plane of the arch joint may cut the center of the upright, at the upper side of the casting. The number of arch segments to each arch must be determined by the length of the span, and should not be less than ten nor more than fourteen feet each. The shape or form, of a cross-section of the arch segment, is semicylindrical on top, with the sides extending down on a tangent, each in width, one half times the diameter of the circle—and the whole length or girth of the cross section to be about one fourth of an inch to each foot of span. The metal to be not less than half an inch thick in any part, and to be one inch in thickness within two inches of the joints.

When the tie rods (*e*) are used, then the arch segments should be cast with a groove in the crown thereof, so that the tie rods will lie in the groove, and serve to prevent the arch from swaying. The foot of the arch is stepped on to the tower at about two and one half feet, above the base, so that the tower is made to sustain the whole weight and thrust of the arch.

f, diagonal rods, which connect the arch to the needle beams; *g*, vertical rods, connecting needle beams to arch; *h*, needle beams; *k*, longitudinal joists, with their ends shouldered down and resting upon the needle beams; *m*, step, on which the foot of the arch rests; Y, abutment, upon which the tower stands; *e*, tie rod, lying in the groove in the crown of the arch; *s*, screw nut, which secures the tie rod to the tower; *n* heavy hexagonal screw nut which holds or secures the tension bar to the base of the tower; V, screw nut, which fastens the suspension rod to the top of the tower; *v*, bevel angle.

Explanation of Fig. II.—Letters of the same name and kind, refer to like parts, as in Fig. I.

Explanation of Fig. III.—Letters of the same name and kind refer to like parts as in each of the other figures.

Explanation of Fig. IV.—A, tower; B, tension bar; C, suspension rod. These three parts taken together form a triangle. This triangle embodies the principle of my invention whatever may be the height of the tower, or the length of the span. X, represents a cross section of the arch; *g* vertical rod which passes through the arch, and is held by a screw nut, on the crown of the arch, in case the tie rod is not used. *t*, is an eye in the vertical rod which conforms to the groove in the arch. The tie rod *e*, which lies in the groove in the crown of the arch, passes through this eye. D, arch, the foot of which rests upon the step, *m*, and thrusts against the tower.

Explanation of Fig. V.—This figure is an elevation showing the inside front or flange projection of the tower *j*, *j*. The tension bars B, B, pass through the flange at *j*, *j*. *m*, step upon which the arch rests; D, arch, or foot of the arch as it rests against the tower.

The size and proportions herein given may be varied and adapted to circumstances without departing from the principle of my invention.

I claim—

The arrangement of the parts herein described, so that the tower A, the tension bars B, and the suspension rod C, when taken together will present the distinctive feature of a triangle, with the foot of the arch D, resting upon the tower within the triangle substantially as herein set forth.

ABRAM S. SWARTZ.

Witnesses:
E. B. FORBUSH,
SAML. SWARTZ.