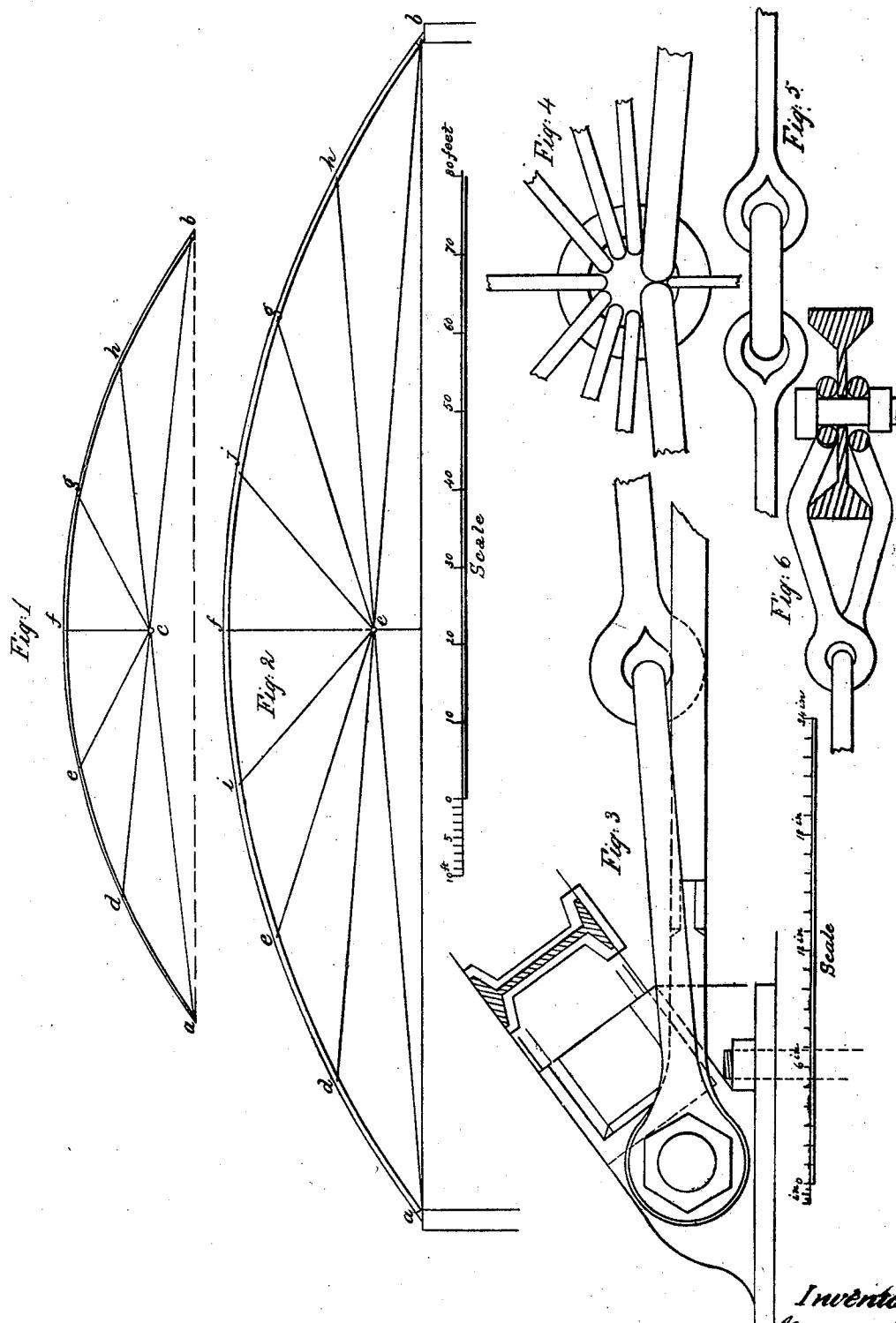


*M.C. Meigs & S.J. Reeves.*

*Bridge.*

*No 24,323.*

*Patented June 7-1859.*



*Inventor  
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# UNITED STATES PATENT OFFICE.

M. C. MEIGS, OF WASHINGTON, DISTRICT OF COLUMBIA, AND SAMUEL J. REEVES, OF PHILADELPHIA, PENNSYLVANIA.

## TRUSS FOR ROOFS, BRIDGES, &c.

Specification of Letters Patent No. 24,323, dated June 7, 1859.

To all whom it may concern:

Be it known that we, MONTGOMERY C. MEIGS, of Washington, District of Columbia, and SAMUEL J. REEVES, of Philadelphia, in the 5 county of Philadelphia and State of Pennsylvania, have invented a new and Improved Truss or Frame for Roofs and Bridges; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

The nature of our invention consists in the use of tension rods or ties of metal wood 15 or other suitable material attached to various points of an arched or curved beam of metal or wood and converging to and connected together at a common point within the space included between the arched or curved beam 20 and the greatest chord of the arc, the straight line joining its two extremities.

To enable others skilled in the art to make and use our invention we will proceed to describe its construction and operation as 25 shown upon the accompanying drawing, which represents two trusses or roof frames designed the one for a span of one hundred and fifty and the other for a span of one hundred feet.

Figure 1 represents a truss of a span of one hundred feet.  $a, d, e, f, g, h, b$  represents the curved or arched beam of wood or metal of suitable dimensions to which at the 35 points  $a, d, e, f, g$ , and  $h$ , are attached tension rods or ties  $a^c, d^c, e^c, f^c, g^c, h^c$ , and  $b^c$ , of metal, wood or other suitable material which converge to the central point  $c$ , between the arched or curved beam and the straight line,  $a^b$ , where they are strongly connected together either immediately or by 40 the use of a connecting ring or plates or other suitable means.

Fig. 2 represents a truss of a span of one hundred and fifty feet.  $a, d, e, i, f, g, h, b, i^c$  represents the arched or curved beam of wood or metal.  $a^c, d^c, e^c, i^c, f^c, g^c, h^c$ , and  $b^c$ , are the tension rods or ties of metal, wood or other suitable material which are all 50 strongly attached to the curved or arched beam at their outer ends and converging to the point,  $c$ , between the arched or curved beam or rafter and the straight line  $a, b$ , joining its extremities are there strongly connected to each other. In this design a 55 chord or tie reaching from one end of the

curved beam or rafter to the other is represented. This is not essential to our construction or invention which may be used in combination with this principal tie or without it as may be more convenient and 60 economical in the particular roof to be constructed. When this principal tie is omitted the arched or curved beam and some of the ties  $a^c, b^c$ , &c. must be made stronger than when it is used.

By experimenting upon the model which accompanies this design and specification or by a mathematical investigation it will be seen that any irregular load or load applied to and tending to force inward toward the 70 center, or to depress any point as  $g$  of the arched or curved beam will tend to cause some other part as,  $e$ , to rise or recede from the center and this tendency is resisted by the tension of the tie as,  $e^c$ , which corresponds to this part  $e$ . By the tension of the tie  $e^c$  and of those adjoining the force or strain is transmitted to the point,  $c$ , which being by the lower ties  $a^c, b^c$  firmly connected with the fixed ends of the arched or curved beam 80 or rafter. When they rest upon the walls the tie  $e^c$ , and those adjoining can not yield to the strain produced by the irregular load without stretching or breaking themselves or stretching or breaking one or both of the ties  $a^c, b^c$ , or lifting or removing the ends of the curved or arched beam or rafter from their positions. But as the tendency of the 85 whole weight of the roof and of all loads equally or unequally distributed upon it is to more firmly fix the ends of the beams upon the walls, it is evident that these points may be regarded as fixed and immovable by any strains arising from loads not able to break some part of the truss thus constructed.

The same reasoning applies to any other points of the curved beam than  $g$ , and,  $e$ , and therefore the truss will be a stiff and safe one if its parts are made of due proportions and strength. The other figures 90 represent modes of making the joints of the different parts of the truss. But any other suitable mode of connection may be adopted.

Fig. 3, represents a simple mode of connecting the ties with the ends of the beam 105 by means of bolts and shoes resting upon the wall.

Fig. 4, represents one mode of connecting the ends of the radiating ties where they meet at the point,  $c$ , by a ring passing 110

through rings formed on the inner ends of the ties.

Fig. 5 represents a mode of connecting the outer ends of the ties or tension rods 5 with the curved beam.

Having calculated the dimensions of the parts of trusses designed upon this principle for various spans from 80 to 200 feet we are able to say that the invention will be 10 an important contribution to the science of engineering and construction and that it is applicable with great economy to roofs of spans even exceeding 200 feet.

What we claim as our invention and desire to secure by Letters Patent is—

15 The mode of trussing or stiffening a curved or arched beam or rafter for bridges

or roofs by means of tension rods or ties of metal, wood or other suitable material connected at their outer ends with the arched or curved beams or rafters at various points and converging toward and connected together at their inner ends at a point within the space contained between the arc or arched or curved beam or rafter and the 20 straight line joining its extremities substantially as above described and as represented in the drawing and model herewith.

M. C. MEIGS.  
SAM J. REEVES.

Witnesses:

PAUL T. JONES, Jr.,  
JNO. B. KENNEY.