

R. A. CUMMINGS.
ADJUSTABLE FALSE WORK.
APPLICATION FILED AUG. 3, 1914.

1,163,641.

Patented Dec. 14, 1915.

2 SHEETS—SHEET 1.

FIG. 1

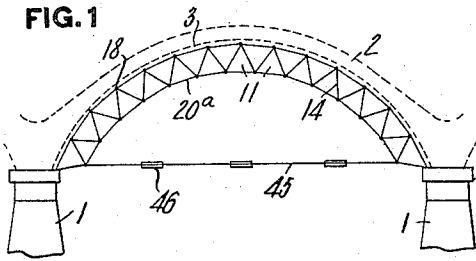


FIG. 8

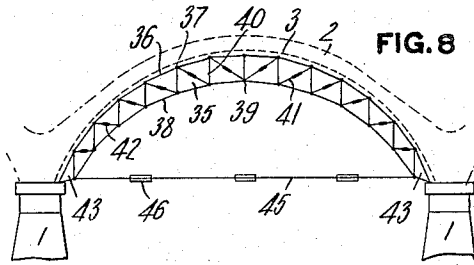


FIG. 9

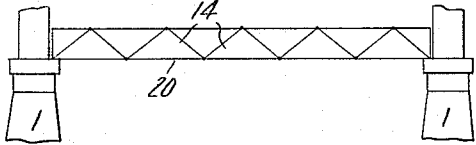
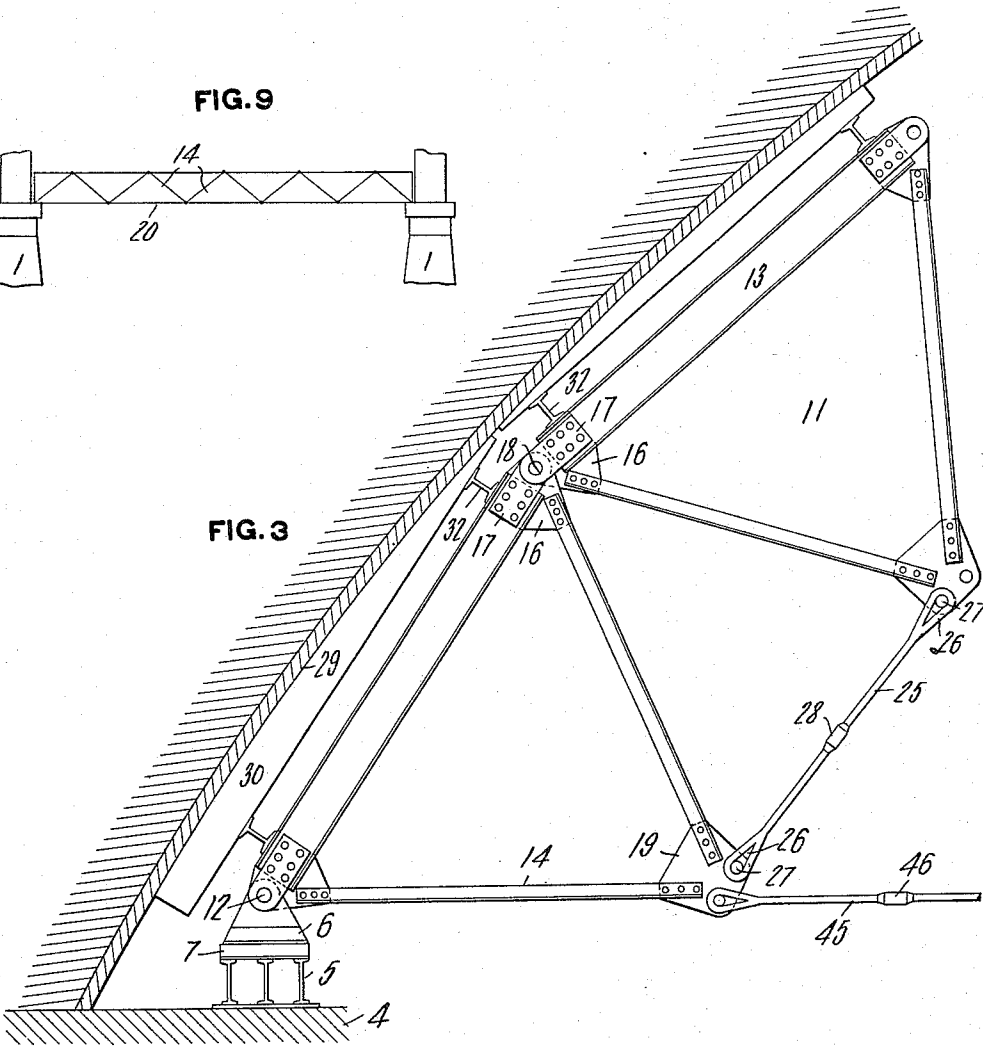


FIG. 3



WITNESSES

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2 SHEETS—SHEET 2.

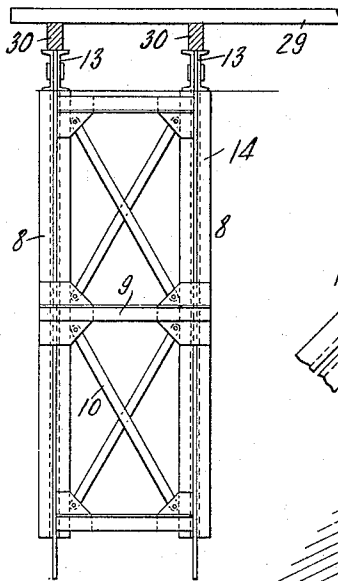


FIG. 5

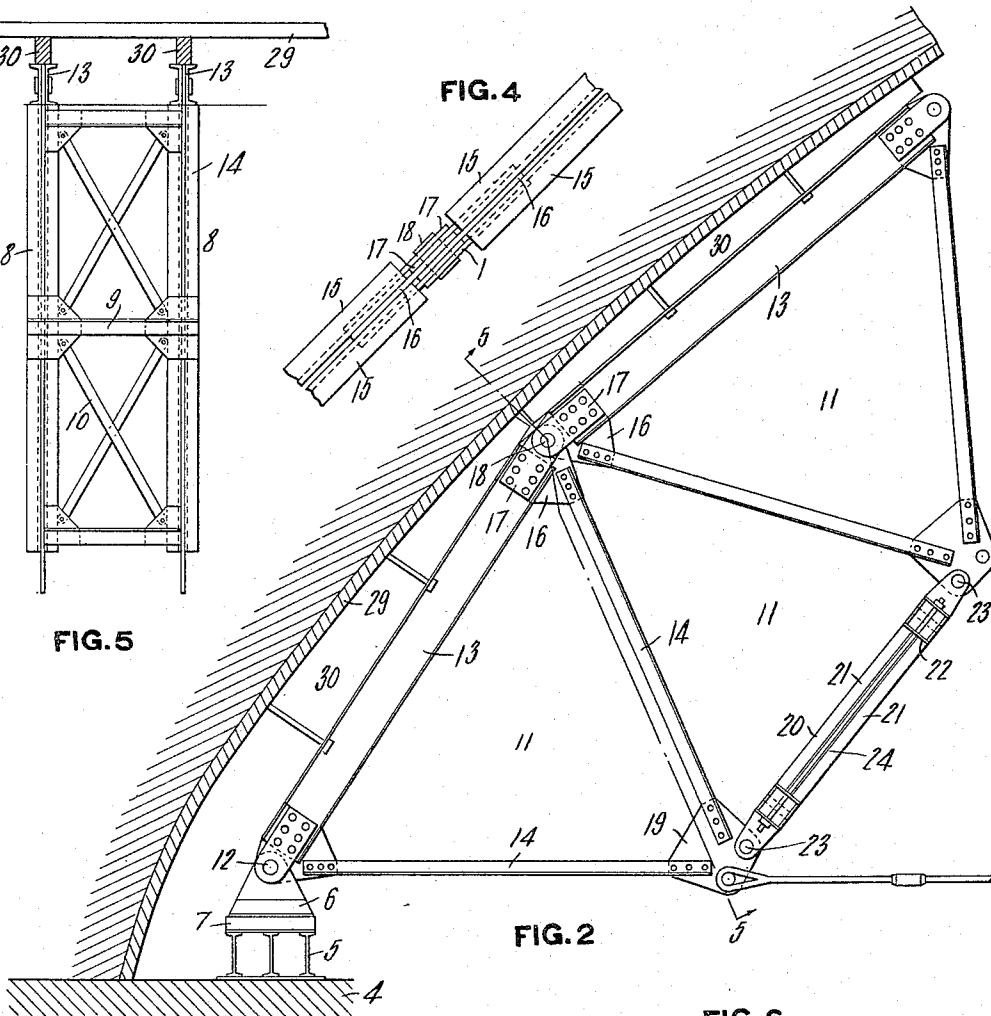


FIG. 2

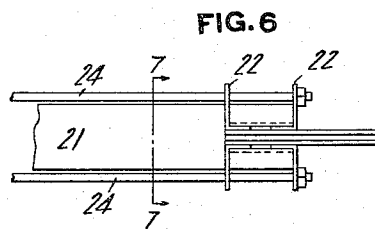


FIG. 6

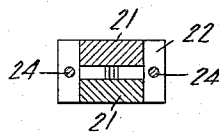


FIG. 7

WITNESSES

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ADJUSTABLE FALSE WORK.

1,163,641.

Specification of Letters Patent.

Patented Dec. 14, 1915.

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To all whom it may concern:

Be it known that I, ROBERT AUGUSTUS CUMMINGS, a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Adjustable False Work, of which the following is a specification.

This invention relates to false work, such as is used as a temporary support in various ways, for example, as centering for bridges, arches, aqueducts or the like, during the course of erection or repairs, or as a temporary support for retaining walls, or in any other manner as a temporary supporting structure.

The object of the invention is to provide improved false work of the character described which is made of units so that it can be readily assembled and disassembled, which can be used repeatedly, and which may be connected or adjusted in various ways and may be built up to any desired size or configuration so that a single set of false work is adapted for use in many different ways and in the construction of various forms of arch or other structure having spans of different lengths and curvature.

The invention comprises the construction and arrangement of parts hereinafter described and claimed.

In the drawings, Figure 1 is a diagrammatic view, showing the false work applied for use as centering for a concrete arch; Fig. 2 is a detail elevation thereof, showing two units of the false work or centering, and indicating the lines of the arch being formed; Fig. 3 is a similar view showing another arrangement for imposing the load upon the false work and also illustrating a modification; Fig. 4 is a detail plan view, showing one of the hinge connections between adjacent units of the centering; Fig. 5 is a cross section on the line 5—5, Fig. 2; Fig. 6 is a plan view of one of the members for connecting adjacent units; Fig. 7 is a cross section thereof on the line 7—7, Fig. 6; Fig. 8 is a diagrammatic view of another form of centering; and Fig. 9 is a similar view, illustrating a further modification.

Referring to the drawings, Fig. 1 illus-

trates the invention applied for use as centering for supporting the arch of a concrete bridge during the course of erection thereof. The bridge comprises the usual piers 1 and an arch 2, the intrados curve of which is marked 3. Suitable means is provided for supporting the centering, such as shown at 4, Fig. 2, which support carries a number of cross beams 5, upon which are superposed the shoes 6 for supporting the ends of the centering. Preferably, suitable anti-friction members, such as the rollers 7, are interposed between the shoes and the cross beams 5, in order that the centering may be adjusted laterally underneath different portions of the arch being formed.

The centering comprises two or more trusses 8 lying parallel with each other and extending across the span and connected together by suitable lattice work consisting of cross members 9 and diagonal members 10, so that when assembled they act as one member and may be handled together.

The false work comprises a suitable number of identical units 11, which may be of any shape, but preferably are triangular units, as shown in Figs. 1 and 2. The end units are pivotally connected, as at 12, to the shoes 6. Each unit comprises an outer or upper member 13, and two other members 14, which are connected at their ends in order to form substantially an equilateral triangle. Each outer member 13 is shown as formed of two channels 15 placed web to web and at their ends having gusset plates 16 interposed between their webs. Pin plates 17 are also placed on the outside of the channels at each end, the whole being riveted together in order to make a solid, rigid beam. The pin and gusset plates project from the ends of the beams and are pierced to receive the hinge pins 18 for pivotally connecting adjacent units of the false work along its extrados side to each other. The pin and gusset plates, of which there are three at the end of each beam, therefore form hinge leaves, lying in staggered relation to each other, so that the strain is distributed along the length of the hinge pin and decreases the liability of failure in

shear. The other two members 14 of each unit may be of any suitable section, such as angles, and are connected at one end to the gusset plates 16 and at their other ends to a third gusset plate 19.

The hinge connections between adjacent units all lie along the extrados side of the false work, but the several units are also connected along the intrados side of the false work, and preferably in such manner that the relations of the several units to each other may be varied in order to adapt the false work for any particular use, that is, as centering for different shapes of arch, or as a temporary supporting structure of any kind. In the form shown in Fig. 2 the adjacent units are connected by members 20, shown as formed of two parallel wooden members 21 of rectangular cross section and rigidly connected at their ends in any suitable manner, as by angles 22. Two plates extend endwise from said members and lie on opposite sides of the gusset plates 19, to which they are connected by hinge pintles 23. The connecting members 20 are also provided with longitudinal tie rods 24, which are provided with nuts for tightening them up. The connecting members 20 are preferably made of wood in order to enable them to resist compression strains, and are provided with tie rods in order that they may resist tension, as these members are subjected to both kinds of stresses during the course of erection of the false work and its final use as a temporary supporting structure.

Several sets of connecting bars 20 may be provided for use with each set of false work or said connecting bars may be made of various lengths upon the ground by inserting wooden bars 21 of the proper length. This is done in order that the relations of the units to each other may be varied. If the connecting bars 20 are of the same length as the upper and outer bars 13 the temporary false work is straight, that is, its extrados and intrados sides are straight lines, as shown in Fig. 9. If the false work is to be used as centering for supporting an arch, as in Fig. 1, the connecting bars 20 are made shorter than the outer members 13 of the extrados side of the false work, which gives the extrados side of the false work a curve whose amount of curvature may be varied by varying the lengths of different connecting members 20 on the intrados side of the false work. As the curvature increases the connecting members 20 are shortened, while if the arch to be formed has a flatter curve the connecting members 20 are lengthened.

The members for connecting the apices of adjacent units of the false work may also be made adjustable if desired, in order to save the necessity of providing sets of members

of different lengths. For example, Fig. 3 shows a connecting member 25 provided with eyes 26 at its opposite ends for receiving the hinge pintles 27, said member being also provided, intermediate its ends, with suitable means, such as an adjustable turn buckle 28, whereby its length may be varied. Such a member is useful in cases where substantially no compression strains are to be imposed upon the lower members of the false work, as they are effective only to resist tensile strains.

The centering or false work may be built up of any desired number of units, depending upon the characteristics of the structure with which it is to be used, such as the length of the span and the curvature of the intrados side of the arch. By placing the shoes 6 at the proper point, selecting the proper number of units, and choosing members of the proper length for connecting the units along the intrados side of the false work, the latter may be adjusted to conform fairly closely to almost any curvature of arch.

The load may be imposed upon the false work in any suitable manner, either concentrated upon the several pivots connecting adjacent units of the false work, or distributed along the outer and upper members thereof. In Fig. 2 the lagging 29 which forms the floor for receiving the concrete of the bridge rests upon longitudinal risers 30, which are supported directly upon the outer members 13, and consequently the load is distributed uniformly along said members. They therefore act not only in compression but also as beams and are subjected both to compression and bending strains. Fig. 3 shows an arrangement in which the risers are supported on cross beams 32, which are suitably arranged to transmit the load to the pivots 18, and are shown as resting upon the outer members 13 of the false work, but closely adjacent to their ends. In this case the load is practically concentrated at the pivots connecting adjacent members or units of the false work, and the outer members 13 of the false work consequently are subjected substantially only to compression.

The outer members 13 of the false work practically carry the entire weight of the arch during the course of erection, as little dependence is placed upon the angle members 14 and connecting members 20 for support. They merely hold the outer members 13 in the proper positions to give the arch being formed the proper curvature along its intrados side. In fact, the member which connects the two units on each side of the crown of the arch, and marked 20^a in Fig. 1, may be wholly omitted, if desired, although preferably none of the connecting members are omitted and there is a continuous chain

thereof along the intrados side of the false work.

Fig. 8 shows a modified form of the invention in which the false work consists of a number of four-sided units 35. The outer members 36 of said units which carry the lagging for supporting the arch to be formed are pivotally connected to each other at the points 37. The intrados side of the false work consists of a number of members 38 pivotally connected to each other at the points 39. The intrados and extrados sides of the centering are also connected by two sets of cross members, marked respectively 40 and 41, and which members are connected at their ends 37 and 39. The members 36, 40 and 38 are all of uniform length. The members 41 extend diagonally across the several units, being inclined upwardly and away from the center of the arch in order to take tension strains. This false work is adjusted to conform to any desired curvature by lengthening or shortening the diagonal members 41, which are provided with suitable adjusting means, such as the turn buckles 42, for that purpose. By varying the length of the diagonal members 41 the several units are made more or less diamond-shaped, which varies the relations of the adjacent outer members 36 to each other. In this case, also, the two end units, marked 43, are rigid and triangular in shape, so that the complete false work is substantially crescent shaped.

With all forms of false work or centering described the several units are made of a size depending upon the size of the structure to be produced. Preferably, a large number of units is used, so that if one side of the false work is to be curved, as when the false work is used as centering for an arch, the extrados curve of the false work consists of a large number of short, straight lines, and the more units that are used the nearer does the false work conform to the actual curvature of the arch. Preferably, the units at opposite ends of the false work are connected by a tie bar 45, the opposite ends of which are connected to the pivots or gusset plates at the apices of the end units. This tie bar is preferably provided with suitable means for adjusting its length, such as the turn buckles 46. In striking the centering the wedges are withdrawn from between the false work and the arch which has been formed, and at the same time the turn buckles 46 in the bars 45 are tightened up. These bars consequently relieve the centering from strain and form supports therefor while striking centers. They also form supports for the centering when the latter is moved laterally across the bridge to a position for forming the next rib thereof.

The false work described is simple and is

readily manufactured from ordinary structural steel shapes, although any suitable materials may be used therefor. In practice it is found that one or two sets of such false work will serve for almost all forms of temporary supporting structures. It may be used for temporary foot bridges, for temporary supports for vertical retaining walls, or for the erection of arches of any design and size, such as the arches of sewers, aqueducts, bridges and the like.

What I claim is:—

1. A temporary supporting structure, comprising two rows of longitudinal members, and a series of transverse members connecting the ends of the longitudinal members of said rows and thereby forming a series of successively disposed triangles, and hinge connections between successive longitudinal members, some of the members of said triangles being variable in length to thereby permit the relations between successive longitudinal members to be varied to thereby vary the curvature of the structure.

2. A temporary supporting structure, comprising a plurality of like triangular units hinged together at their corners with a side of each unit lying on one side of the structure and its other two sides forming diagonal transverse members, and a set of members connecting the corners of said triangular units where the diagonals of each unit converge, said connecting members being variable in length, whereby the relations of the units to each other may be varied and bending strains on the transverse members are avoided.

3. A temporary supporting structure, comprising a plurality of like units, each unit comprising a plurality of members lying in parallel planes, cross and diagonal braces connecting said members, hinge connections between said units along one side of the structure, and adjustable connections between the units along the other side of the structure.

4. A temporary supporting structure, comprising a plurality of like units hinged together at their corners with a side of each unit lying on a side of the structure and the other two sides forming diagonal transverse members, a set of members connecting the corners of said triangular members where the diagonals of each unit converge along the other side of the structure, said connecting members being variable in length, each of said units comprising a plurality of members lying in parallel planes, and cross and diagonal braces connecting the members of each unit.

5. A temporary supporting structure, comprising a plurality of like triangular units, each unit comprising rolled steel members, gusset plates connecting said members

at the corners of the triangles, said members being hinged together along one side of the structure, and each unit having a corner on the other side of the structure, and adjustable members connecting the gusset plates at the corners of adjacent units on the other side of the structure.

In testimony whereof, I have hereunto set my hand.

ROBERT AUGUSTUS CUMMINGS.

Witnesses:

GLENN H. LERESCHE,
ELBERT L. HYDE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."