Woodruff & Butterworth.

Draw Bridge.

No. 10527. Patented Feb. 14, 1854.

Fig. 1.

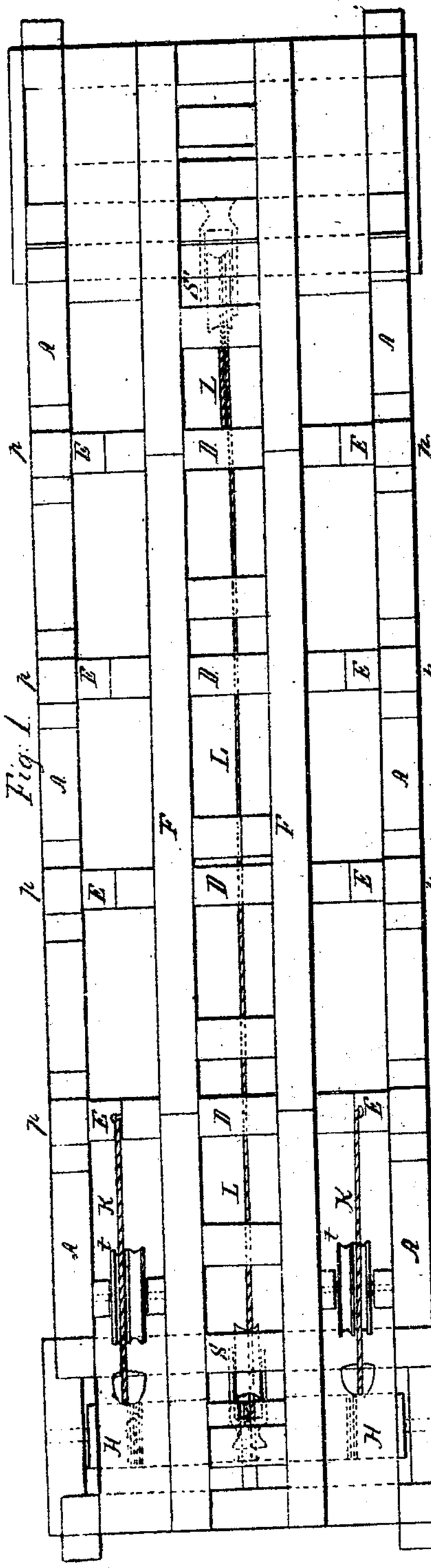


Fig. 3.

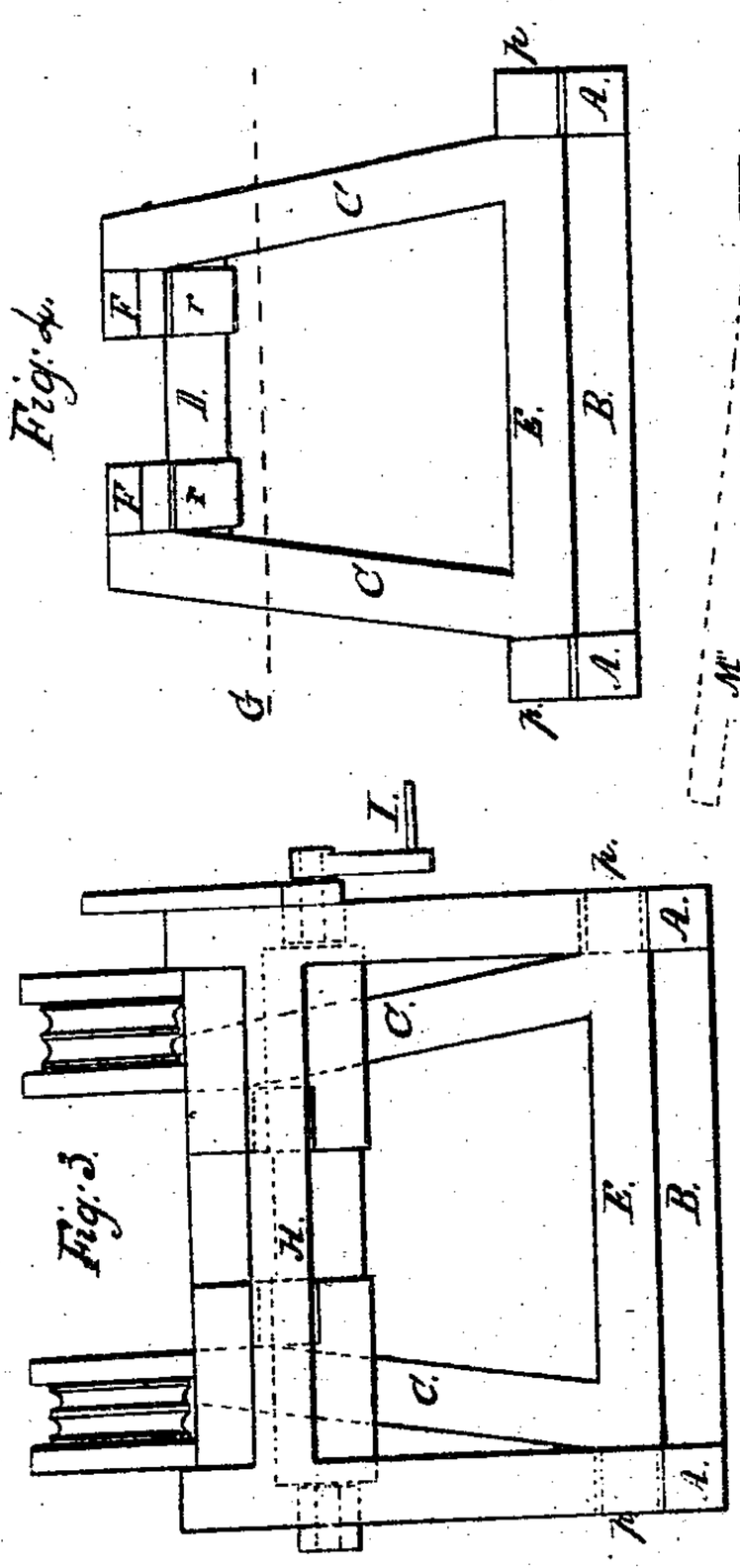
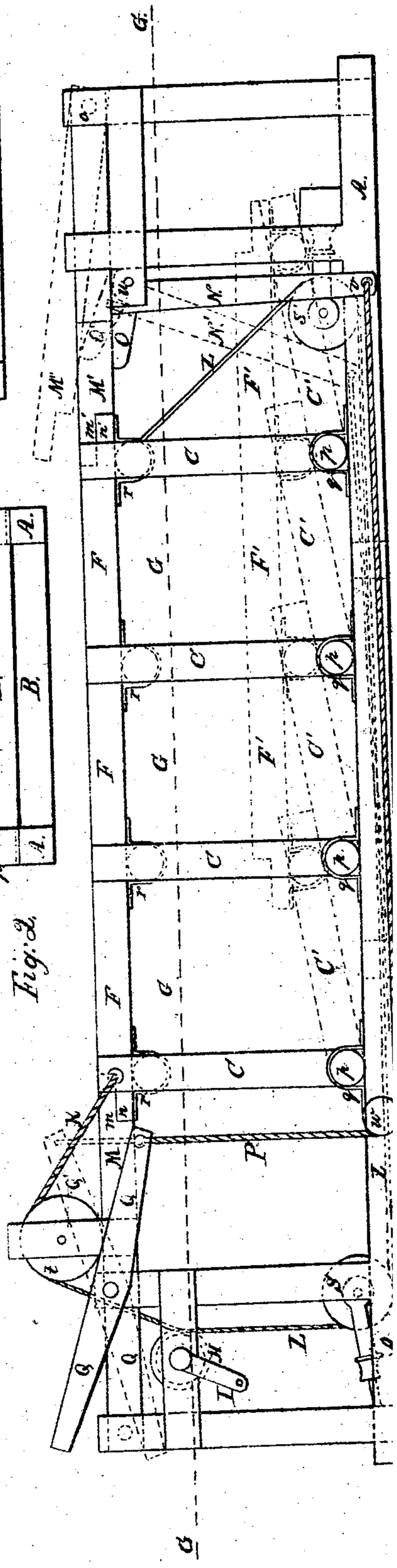


Fig. 2.



UNITED STATES PATENT OFFICE.

J. D. WOODRUFF, OF NEWARK, AND J. H. BUTTERWORTH, OF DOVER, NEW JERSEY.

DROP-BRIDGE.

Specification of Letters Patent No. 10,527, dated February 14, 1854.

To all whom it may concern:

Be it known that we, JACOB D. WOODRUFF, of the city of Newark, in the county of Essex and State of New Jersey, and JOSHUA H. BUTTERWORTH, of Dover, in the county of Morris, in the same State, have invented a new and Improved Mode of Constructing Bridges and Draws; 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 leading idea of our invention consists in placing the bridge or draw under water, and raising it, at will, by means of movable posts or bents, above the surface when required for use. When not in use, vessels can pass over it without obstruction, and the bridge or draw itself may be rendered secure from the passage of ice, and from the ravages of fire.

To enable others skilled in the architecture and construction of bridges, to make and use our invention, we will proceed to describe its construction and operation. For this purpose, reference will be made to the accompanying drawings as above stated.

Figure 1, is a plan of the bridge or draw as the same would appear to a person elevated directly above the same. Fig. 2 is an elevation or side view, thereof. Fig. 3 is an end view; and Fig. 4 represents one of the movable bents on which the bridge is to rest.

The same letters in all the figures represent the same parts.

In the first place, sills, A, A, are to be embedded in the bottom of the stream, or framed upon piles, at the depth desired, and to extend across the stream or channel to be spanned. There must be at least two lines of sills, one on each side of the bridge. They should be properly strengthened by cross braces, or cross sills, as seen in B, B, Figs. 3 and 4, and also by piles or fenders if the rapidity of the current, or other circumstances should require it. The sills form the ground work of the bridge or draw.

Next in order come the posts which are to sustain the string pieces and the bridge formed thereon. The posts are designated in the drawings by the letters C, C. The posts are attached to the sills by pivots, *p*, *p*, so as to be capable of being lowered down to the level of the sills or nearly so; and are to be of sufficient height, when erect, to give the bridge a proper height above the surface. The posts are to be arranged in pairs, the two posts in each pair being attached, opposite to each other, one to one sill, and the other to the opposite sill. A cross-beam, D, D, Figs. 1 and 4, connects them, thus forming a bent. The bent thus formed by means of the pivots connecting the feet of the posts to the sills, may be lowered so as to rest on the sills, or may be raised to an upright position at pleasure.

The pivots connecting the feet of the posts with the sills are best formed by constructing a beam or shaft, (E, E, Figs. 1, 3 and 4) to extend from one sill to the other, with pivots *p*, *p*, formed on each end, to rest in sockets made in the sills themselves, or in caps placed on the top of the sills. Caps for this purpose are designated by the letters *q*, *q*, in Fig. 2. The posts being framed into this shaft, will revolve on the pivots, as the bent is lowered or raised.

A series of bents formed as above described, and placed at proper distances from each other for supporting the bridge, is erected along the ground-sills, A, A, from one extremity of the bridge or draw to the other. The bridge if of considerable length, must be formed in sections, each section to be supported by two or more bents. A draw will in general require but a single section.

Each section is formed as follows: The bents, (two in number for example) being brought to an upright position, string-pieces are laid across the bents, longitudinally with the bridge, inside of the posts. They are designated by the letters F, F, Figs. 1, 2 & 4. These string-pieces are attached to the bents by strong iron straps, *r*, *r*, firmly fastened to the underside of the string-piece, and passing around the cross-beam of the bent, which is rounded at that place for the purpose. The strap must not fit so tightly to the cross-beam, but that the latter may turn in the strap when the bent is in motion.

The string-pieces being thus attached to the bents, it is evident that the whole section will rise and fall with the bents. In this way each section of the bridge can, in a few seconds be placed at a sufficient depth below the surface of the water to allow vessels of any draft to pass over it; and may again at will be elevated to a sufficient height above the surface for the passage of passengers, carriages or railroad cars. The bents and string-pieces, when resting at the

bottom of the river, are represented by dotted or broken lines, and by the letters, C′, C′, and F′, F′, in Fig. 2; the broken line G, being intended to represent the surface of the water.

The mode of raising and lowering the different sections is by a windlass and chains, the windlass being constructed on the piers or permanent portions of the bridge. The windlass is designated in Figs. 1, 2 and 3 by the letter H, with a crank, letter I; and the chains are designated in Figs. 1 and 2 by the letters, K, K, L, L. The middle chain, L, passes from the windlass downward around the pulley S, thence, along the bottom of the river, around the pulley S′, and thence, upward to the cross-beam of the bent on the farther side of the draw; to which it is attached. This chain is for the purpose of pulling the drawn down, and winds around the windlass in an opposite direction to the chains K, K. The latter chains K, K, pass upward from the windlass around the pulleys, *t*, *t*, and from thence to the posts or cross-beam, of the bent nearest to the windlass, to which it is attached. These chains are for the purpose of raising the draw up, when it is under the water.

The windlass may be operated by steam-power, horse or other power, or by hand according to convenience, and the measure of power required.

The draw locks into the permanent part of the bridge in the manner shown by reference to the letters, *m*, *n*, and *m′*, *n′*, Fig. 2. The end of each string-piece of the draw is cut away on the upper side, so that the lower half thereof projects beyond the upper half; and when the draw is raised to its place a corresponding projection on the upper side of the string-piece of the stationary pier or bridge laps and fits into the notch or shoulder thus formed. The string-piece of the pier at the opposite end of the draw from the windlass, marked M′, is movable, so that the end next to the draw can be raised in the position shown by the broken lines at M″, being kept in its place by a pivot, or large bolt, *o*, which serves as a pivot for that purpose. As the draw is raised up out of the water, the end *n′*, of the string-piece F, when it comes in contact with the string-piece M′, raises it up, unless it has been previously raised by a lever or machinery arranged for that purpose, until the draw comes to its place in a perpendicular position, when the spring-piece M′, falls into the notch, making the joint as seen at *m′*, *n′*, and keeping the draw fixed firmly in its position.

When it is desired to lower the draw again, the string-piece M′, is raised to the position seen at M″, by means of a lever N, having an arm O, and turning on a pivot *n*. This lever N, being drawn forward to the position, N′, the arm, O, is raised upward to the position, O′, and thereby raises the string-piece, M′, under and against which the arm, O, rests. The lever, N, is drawn forward by means of the chain, or rope P; which is attached to the lever Q, passed downward therefrom, around the pulley, *w*, and is attached to the lever, N, at the point *v*. By forcing down the opposite end of the lever Q, the end thereof to which the chain is attached, is forced upward (as seen in Q′) and the chain P draws the lever, N, forward to the position N′, as required. This arrangement enables one operator, standing on the side of the draw next to the windlass, to raise and lower the draw.

A similar apparatus is, of course, required for each string-piece of the draw, unless the string-piece, M′, and its fellow are framed together by means of cross-timbers so that the raising of one necessarily raises the other.

A railing can be formed by producing the posts three or four feet above the string-pieces, and stretching thereon a chain or iron rod through rings attached by staples to the edge of the posts which lies upward when resting at the bottom of the river.

When the bridge or draw is formed of two or more sections, instead of one, each succeeding section follows and fits into the one that precedes it in the same manner that a draw of one section fits into the pier or stationary part of the bridge. Again, if it is desired that the draw should be formed of two sections, so that one section shall fall outward one way and the other fall outward the other, leaving a greater depth in the center or channel, this object can easily be attained, by a double set of fixtures as above described. In that case the string-pieces of the pier on both sides of the draw should be movable, so as to be capable of being raised up, to let the sections of the draw on each side respectively drop back under the pier.

It may be observed that the string-pieces M, and M′, are supported, when the draw is up and in use, by the posts of the draw, and that they project beyond the posts of the stationary part of the bridge sufficiently far, to give the draw in its upward and downward motion, abundant room for that purpose, without being obstructed by the stationary posts of the bridge.

It is also seen that the different bents of the draw may be placed at such distances from each other as that they will respectively rest, when let down to the bottom of the river, either upon the framing of the ground-sills, or upon the pivot shaft E, of the next forward bent, as seen in Fig. 2, at the option of the engineer.

It will be observed by the drawings that we propose that the sills be farther apart

than the width of the bridge or draw, so that the posts of each bent may lean toward each other when the bents are raised to a perpendicular position. This arrangement, we think, will add strength to the work. It is not necessary for any other purpose.

Of course the size of the timbers, and the height of the posts will entirely depend upon the particular circumstances of every case—to be decided by the good sense of the engineer.

Where the water is stationary, the posts need to be no longer than may be necessary to raise the bridge or draw sufficiently above the surface of the water for convenient travel, and to lower it to a sufficient distance below the surface for convenient passage of vessels. Thus, suppose the grade of a road requires that the bridge or draw, when used, should be ten feet above the surface of the water; and the greatest draft of vessels using that particular stream or water is five feet. It is evident that the posts must be at least fifteen feet in height; and if the water is subject to rise and fall, such rise and fall must be added to the length of the posts.

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

The construction of a bridge or draw which may be dropped below the surface of the water, so as to admit the passage of vessels over the same, substantially as above described.

JACOB D. WOODRUFF.
JOSHUA H. BUTTERWORTH.

Witnesses:
JOSIAH MEEKER,
A. S. BURTT.