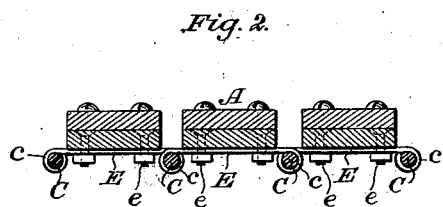
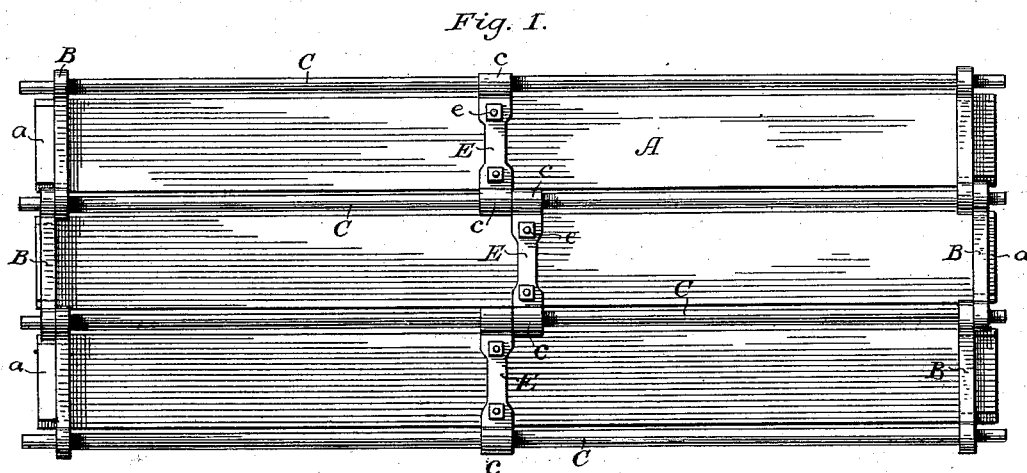


L. S. LAWYER.  
Three-Horse Endless-Chain.

No. 218,988.

Patented Aug. 26, 1879.



*Attest:*

Clarence Poole  
Warren Seely

*Inventor:*

Livingston S. Lawyer,  
by Ellis Spear  
Atty

# UNITED STATES PATENT OFFICE.

LIVINGSTON S. LAWYER, OF COBLESKILL, NEW YORK, ASSIGNOR TO MINARD HARDER, OF SAME PLACE.

## IMPROVEMENT IN THREE-HORSE ENDLESS CHAINS.

Specification forming part of Letters Patent No. **218,988**, dated August 26, 1879; application filed July 16, 1879.

*To all whom it may concern:*

Be it known that I, LIVINGSTON S. LAWYER, of Cobleskill, Schoharie county, New York, have invented an Improvement in Bridges for Endless Chain or Railway Horse-Powers, of which the following is a specification.

Heretofore, in the use of three-horse endless chain or railway powers, it has been found that as ordinarily constructed the bridge-planks were not of sufficient strength to stand the weight, being supported only at the ends.

When but two horses were used the weight was brought upon the bridge-plank near the ends, so that a sufficient support was given; but if a third horse was used its weight, coming in the middle of the planks, caused the planks to sag and bend, and finally destroyed the utility of the plank. This was remedied to some extent by placing a row of friction-rollers in the middle, which acted as a support; but other objections arose from the fact that it was very difficult to keep the bearings of the rollers clean, large quantities of manure and other matter falling between the planks and upon the rollers and bearings, while the difficulty of lubricating was very great.

No effectual way of remedying these various objections has been found, to my knowledge, until I devised the construction which is the subject of this application.

My invention consists in so coupling the planks together at the center by means of rods and links that the weight of the third horse will be distributed over the whole number of planks composing the bridge, without being concentrated at any one point, in the manner hereinafter described.

In the accompanying drawings, Figure 1 shows a plan view of the bottom of the bridge-planks, and Fig. 2 a separate view of the link.

Like letters refer to corresponding parts.

A represents the planks composing the bridge of a three-horse power, which are of proper length and thickness to give sufficient width and strength for supporting three horses. A slot is cut in each end of these planks, leaving a tenon, *a*, a little narrower than the plank itself, which tenon is inserted in a mortise in the metallic link B.

Each link B has an enlarged head, with an eye, and the heads of every two links overlap, so that an iron or steel rod, C, is passed through both eyes and fastens the adjoining links and planks together.

This construction is the same at both ends of the plank; and the ends of rods C have friction-rollers upon them, revolving on a suitable track, and arranged in any way that may be desired.

The planks are, of course, placed far enough apart to insure flexibility of the bridge.

E is a metallic link, made in one piece, and having its ends formed with an eye, *e*. This link is so much longer than the width of the plank that the eye *e* is brought opposite the space between the planks, and the rod C is passed through the eyes, which are brought in line by the overlapping of the ends of the adjoining links. One link is thus attached to and aids to support the adjoining links.

The links are bolted to the planks, as shown at *e*, or may be fastened with screws, pivots, or otherwise.

It is thus evident that the weight brought upon the center of the plank is distributed not only to the other planks, but to the full length of all the rods C, which combined support effectually prevents the sagging of the planks at the center, and greatly increases the durability and efficiency of the power.

Oil-holes *ff* are provided in the links, for the purpose of lubricating the bearings.

The advantages of this device are at once apparent. It is cheaper to manufacture than a row of wheels placed in the center. It avoids the friction caused by the rollers. It is easily lubricated—an operation very difficult where the rollers are used—and can be easily cleaned, which was exceedingly difficult under the old construction. The links, clamping the rods and being bolted or otherwise fastened to the planks, prevent the rods from becoming bent, which they are liable to be without my device. Other advantages will be apparent to those skilled in the art.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

The combination, with the planks forming the bridge of a horse-power, of the cross-rods C and links E, bolted or fastened in any manner to the under side of the planks forming a support for the middle of such bridge, as set forth.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

LIVINGSTON S. LAWYER.

Witnesses:

TIFFANY LAWYER,  
IRVING VAN VORIS.