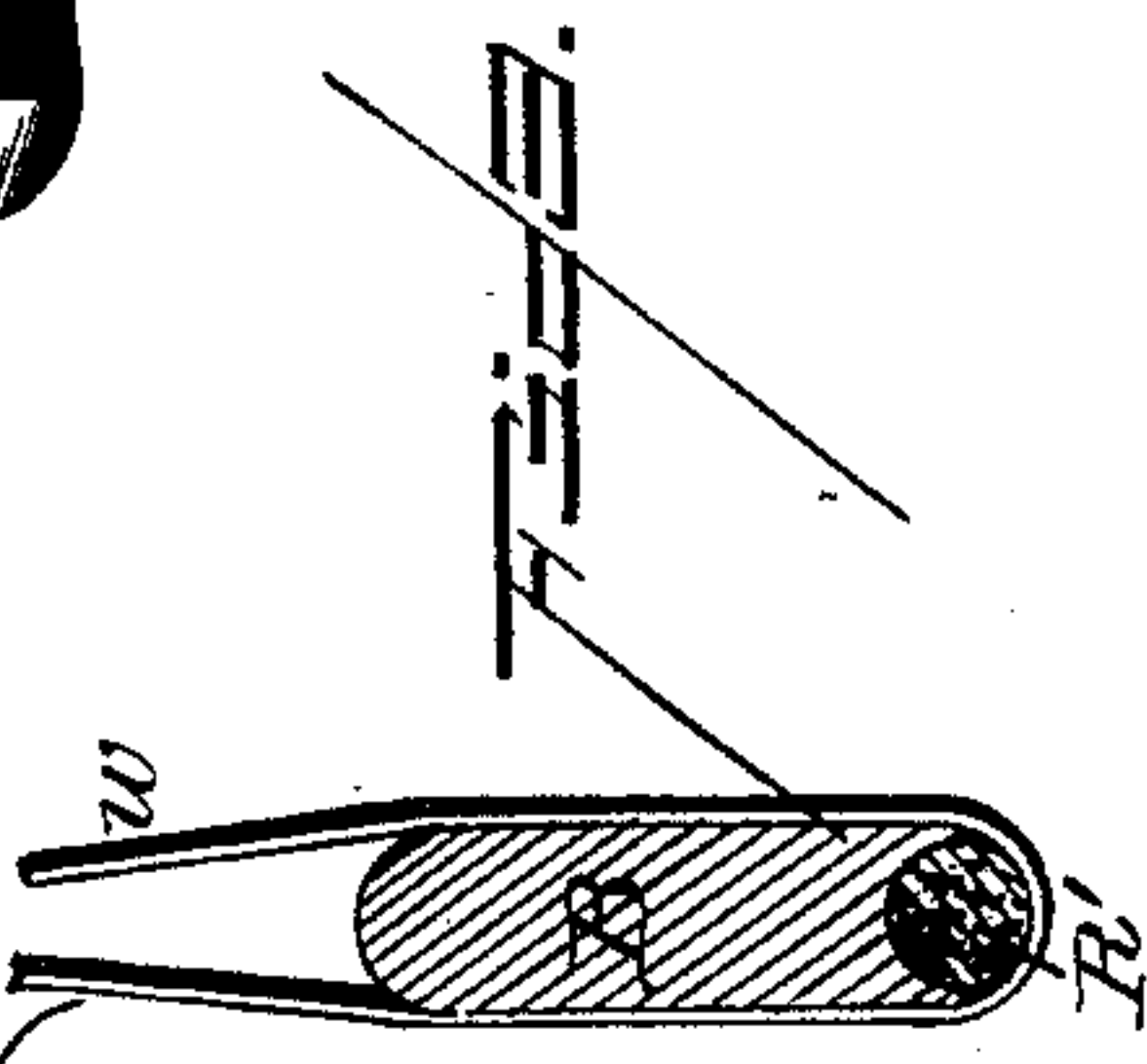
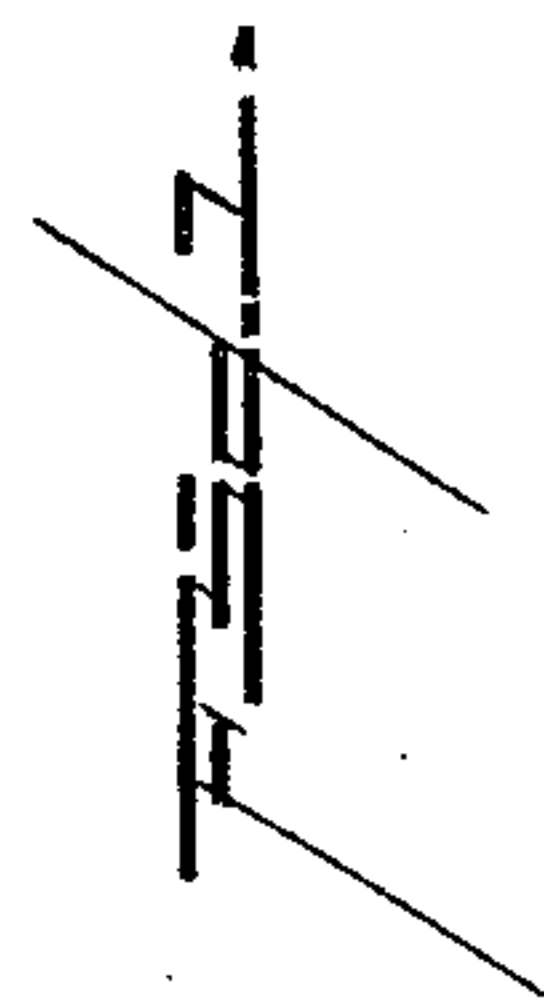
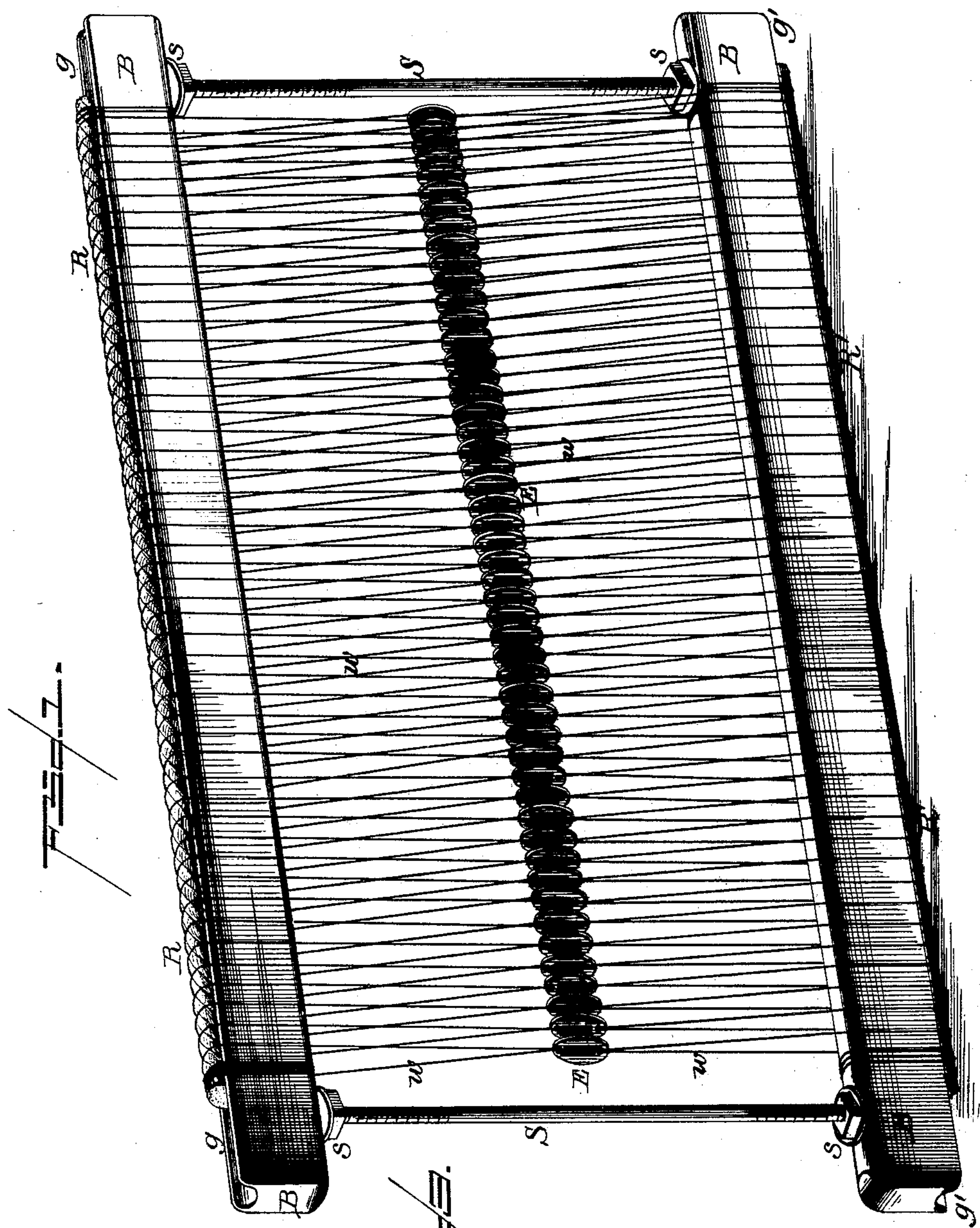


(Model.)

C. P. LADD & W. MUIR.
HEDDLE FRAME FOR LOOMS.

No. 407,078.

Patented July 16, 1889.



WITNESSES
Philip F. Larner.
Howell Battle.

INVENTOR
Calvin P. Ladd
William Muir
By Johnson & Johnson Attorneys.

UNITED STATES PATENT OFFICE.

CALVIN P. LADD, OF CAMBRIDGE, MASSACHUSETTS, AND WILLIAM MUIR, OF NEW YORK, N. Y., ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE NATIONAL LOOM HARNESS COMPANY, OF MAINE.

HEDDLE-FRAME FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 407,078, dated July 16, 1889.

Application filed November 4, 1887. Serial No. 254,335. (Model.) Patented in England November 23, 1887, No. 16,132; in France November 25, 1887, No. 187,208; in Belgium November 26, 1887, No. 79,690; in Italy July 24, 1888, No. 23,613, and in Austria-Hungary October 21, 1888, No. 22,719 and No. 39,114.

To all whom it may concern:

Be it known that we, CALVIN P. LADD and WILLIAM MUIR, citizens of the United States, one being a resident of Cambridge, Middlesex county, in the State of Massachusetts, and the other of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Heddle-Frames for Looms, (for which we have obtained patents in Great Britain, No. 16,132, bearing date November 23, 1887; in France, No. 187,208, November 25, 1887; in Belgium, No. 79,690, November 26, 1887; in Italy, No. 23,613/357, July 24, 1888; in Austria, No. 22,719, October 21, 1888, and in Hungary, No. 39,114, October 21, 1888,) of which the following is a specification.

We have produced an improved heddle-frame for looms in which the leashes are made of fine annealed wire, and the article rendered durable, cheap, and better and more satisfactory than the textile leash heddle-frames now in use.

As an improved article of manufacture, our heddle-frame has the leashes formed continuously with a free bearing upon each bar for each eye and passed through such eye. It has each bar formed with a continuous groove on its outer edge to receive a cushion, preferably of fibrous material, over and upon which the wires are wound with such free bearing, and it has provision for maintaining the leashes taut and for supporting and bracing the heddle or leash bars. In the co-operation of these parts the leash-wires can be drawn taut as a continuous strand from end to end over a free cushion-bearing of each bar, whereby the leashes are made uniformly taut throughout the length of the bar—that is to say, in adjusting the rods S S at each end of the bars the strand which forms the leashes of each bar is made uniformly taut throughout its length, being free to have a movement over its bearing on the bar to distribute the tautness from each end to the middle of the length of the bar, so that all the strands of

the leashes may be maintained at the same tautness. This important result cannot be obtained with a continuous leash-forming wire made fast at its bearings on the bar by means of cement, nor can this advantage be obtained by leashes tied over a cushion-bearing of the bar, there being a separate leash-strand for each eye; but by having a continuous wire secured at its ends only at the ends of the bar a stretching tension put upon the wire at one or both ends must extend equally throughout the length of the wire and thereby give equal strain upon the bars throughout their length and to the length of each leash. This construction also gives the advantage of keeping the eyes in perfect alignment, by reason of the provision for adjusting the tension of continuous wires, which advantage cannot be obtained by adjusting the bars with leashes formed of separate strands for each eye, or of a continuous wire in which the strands for each eye are fixed to the bars, so that there can be no uniform tension of the leashes. This is the distinguishing feature of our improved heddle-frame, and which gives the advantage of greater durability and perfect working conditions than can be obtained by the heddle-frames now in use, or by any of the heddle-frames which are known by us to be old in the present state of the art.

In the operation of looms having the ordinary thread leashes the wear is upon the leashes and the eyes, and the leashes are liable to get out of position and tangle the warp-threads, and also to become slack. It is found that the greatest wear is upon the leashes where they are wound upon the bars, due to the riding of the bars upon each other, and their unequal tautness at the sides of the bars. It is under this riding action that the leashes are liable to be cut, and the cutting of a single leash, if a continuous fibrous thread were used, would disarrange the working of the whole heddle. In the use of the fine annealed wires the leashes of adjacent bars are not so liable to ride upon each other,

while the tautness of the wires embeds them in the cushion and maintains their perfect alignment.

Our heddle-frame is designed with special regard to its manufacture by machinery—an advantage not hitherto obtained—and as a result of such object our heddle containing sixteen hundred leashes (more or less) can be produced in about thirty minutes, as compared with days with hand-labor. It is due to this advantage that we are able to supply the trade with good, durable, and desirable heddles at a comparatively small cost—say at a saving of more than half on the cost of one heddle.

The accompanying drawings illustrate our improved heddle complete in Figure 1. Fig. 2 is a view of one of the eyes, and Fig. 3 is a cross-section of one of the heddle-bars.

B B are the heddle bars or staves, and S S are screw-rods fitted in openings at each end thereof, and provided with nuts s s, upon which the said bars are supported at their inner edges, and by which they are adjusted in parallel relation and at the proper distances apart. The rods may not pass entirely through the bars, so that the latter rest upon the nuts, and their grooves are unobstructed. The outer edges of these bars are formed with grooves *g g'* throughout their length to receive ropes R R', loosely placed therein.

The leashes *w*, for supporting the eyes E which carry the weft-threads, are of fine annealed wire continuously wound over the rope cushions of the bars and passing through the holes *r* in the ends of the eyes, so that the leashes are formed of an upper continuous length of wire and of a lower continuous length of wire, each of said wires being alternately threaded through the holes and over the cushions of the bars. In this operation the ends of the wires are first wrapped around the bars and fastened, so that the continuous threading and winding are done by the other end, which at the end of the operation is also fastened to the other end of the bar. In this operation the bars and the eyes are supported in their proper relation, so as to preserve the alignment thereof and of the slots *o*, in which the warp threads or yarns are threaded. The leashes having been completed, any slack in the wires can be taken up by turning the nuts on the rods against the heddle-bars, and by reason of the continuous length of the wires and

their free bearings upon a loosely-seated rope the strain upon the wire will be uniform from end to end, and will thus give a very desirable firmness to the leashes and to the heddle-frame.

We prefer to make the cushions of rope, because it is cheap and has the required firmness to support the wires under their tautness and allow them to be embedded within the surface without being liable to cut through. It also permits the free movement of the leash-loops upon them in drawing the wires to their proper tautness. It gives a uniform bearing at all points, and is effective in its action in keeping the wires to their exact bearings and perfect spacing; but rubber cushions may be used.

Referring to the grooves in the outer edges of the heddle-bars, it will be noticed that they extend the entire length of the bar, and this is to allow the rope to be held therein while the wire is being wrapped around it by machinery, the rope being subsequently cut off at the ends of the wrapping.

We claim—

1. The combination, with the eyes E, the bars B, grooved in their outer edges, yielding cushions placed in the grooves of the said bars, and the continuous wires W, fastened at the ends thereof to the bars, and each passing alternately around a bar and its cushion and through one of the eyes, as described, of means for straining the bars apart from each other, whereby a tension may be applied to the wires, all substantially as set forth.

2. In a heddle-frame for looms, the combination of the heddle-bars B, having grooves *g g'* in their outer edges, their adjusting screw-rods S S, their nuts s s, the rope cushions R R', loosely seated in said grooves, the eyes E, and the two continuous wires threaded through said eyes and looped over and upon the rope cushions of the bars to form the leashes of each bar, and secured at their ends to the bars, whereby the wires of each bar may be drawn uniformly taut from end to end over a free bearing, as shown and described.

Signed at the city of Boston, in the county of Suffolk and State of Massachusetts, this 3d day of October, A. D. 1887.

CALVIN P. LADD.
WILLIAM MUIR.

Witnesses:

GEORGE V. MOREY,
JAMES P. MCLEAN.