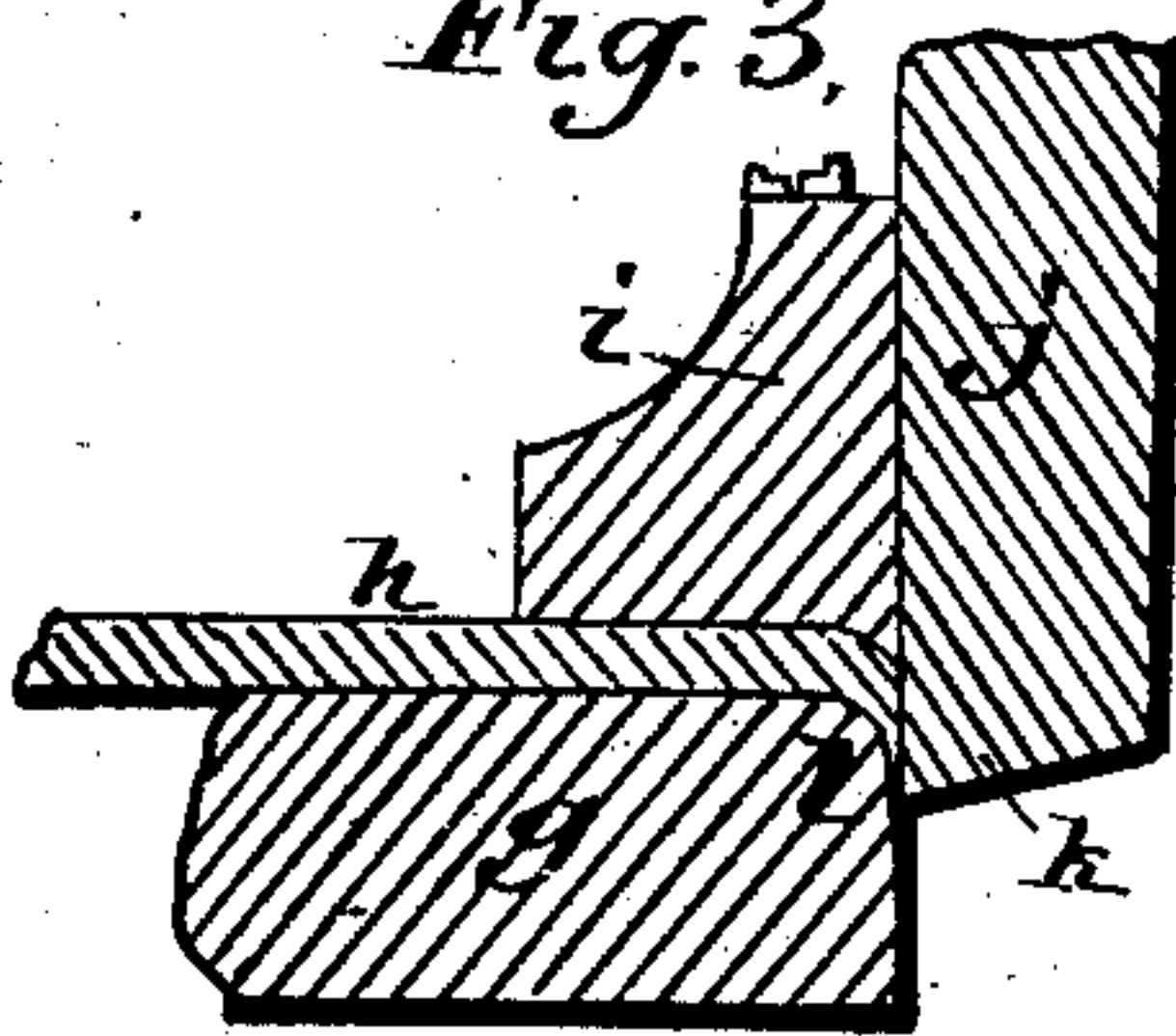
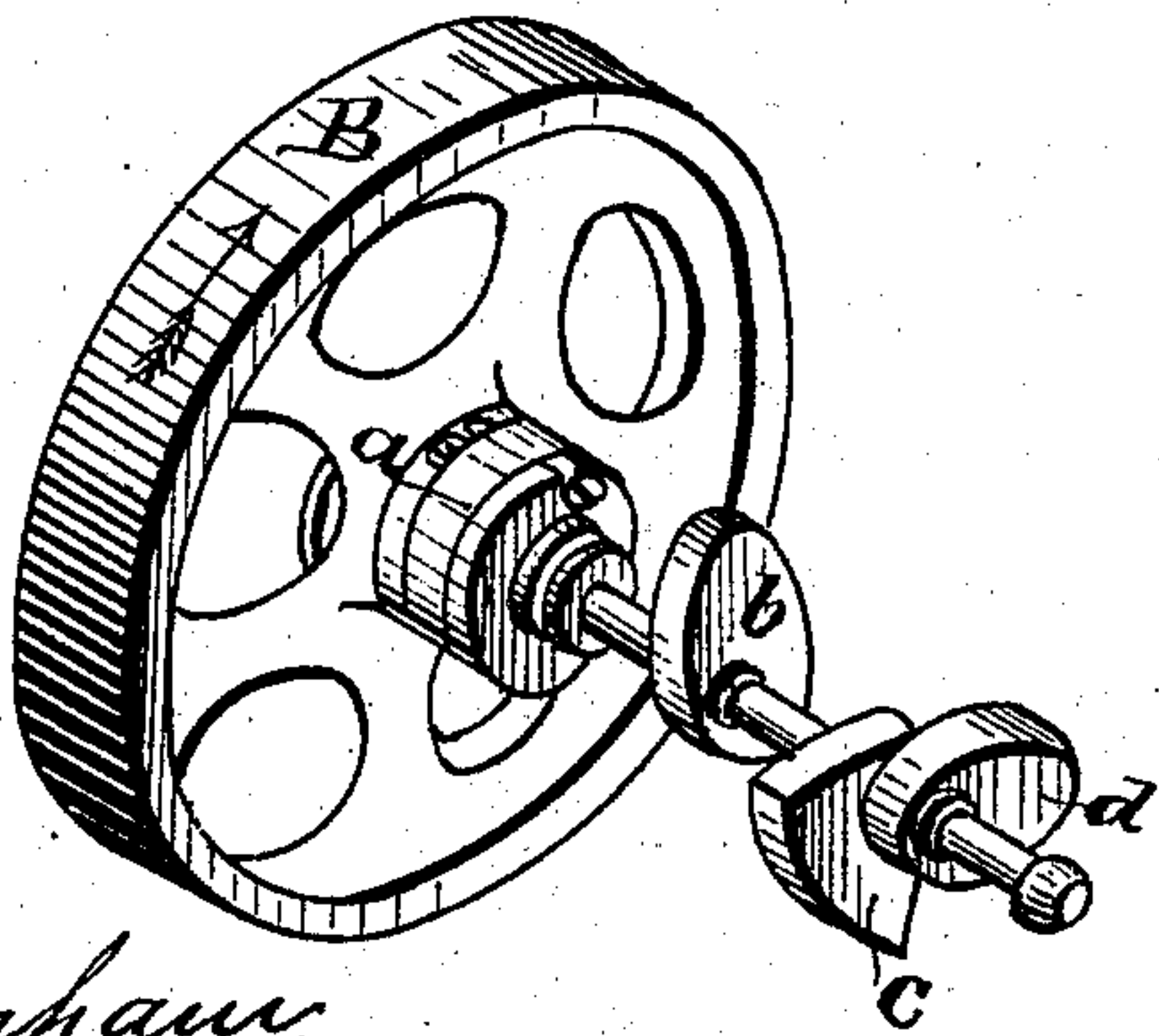
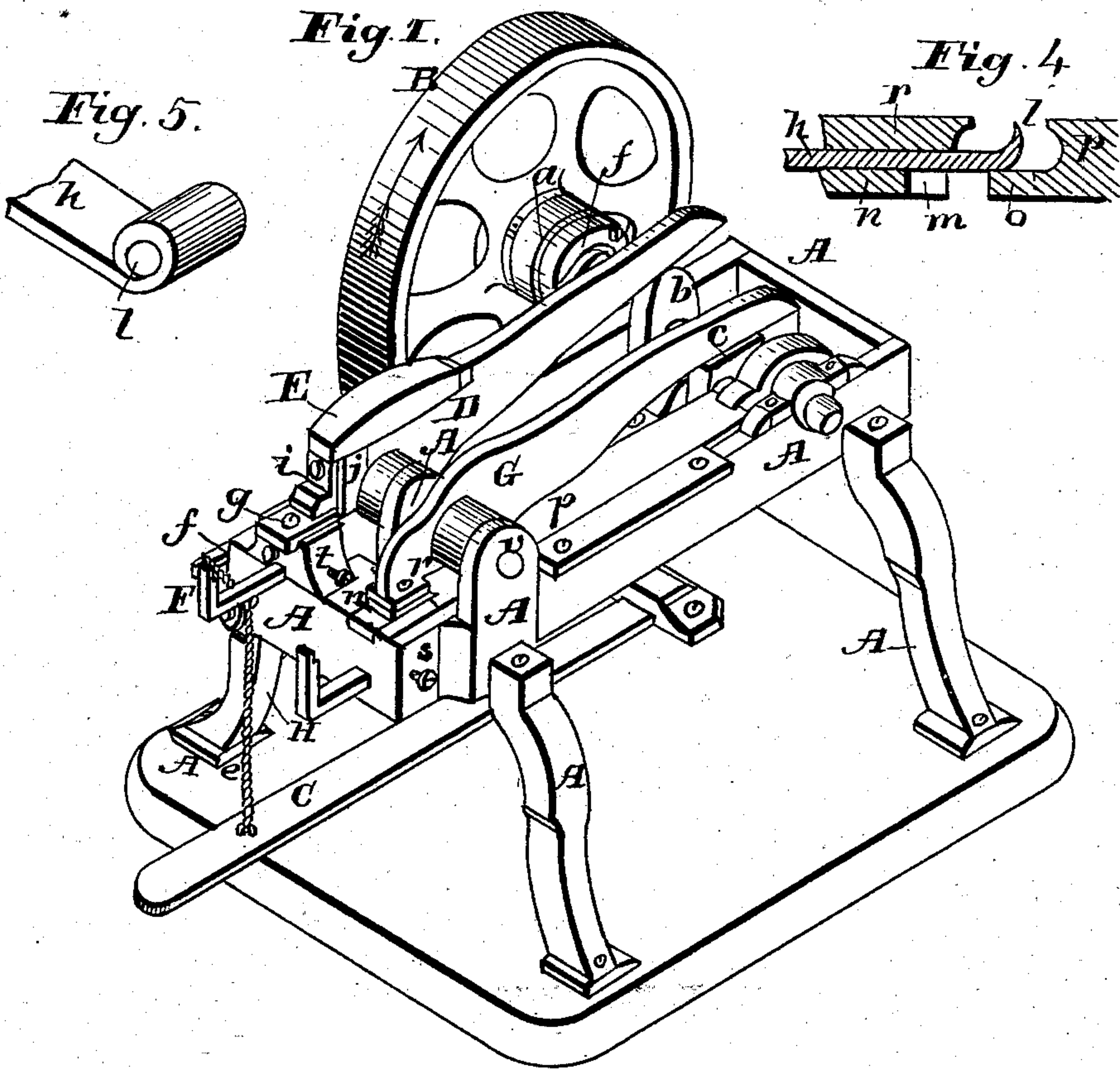


**W. T. RICHARDS,**  
**Making Elliptic Spring Eyes.**

No. 68,113.

Patented Aug. 27, 1867.



Witnesses:

Saml Gorham.  
W. Fitzgerald.

*Inventor:*

W. F. Richards



# United States Patent Office.

WILLIAM T. RICHARDS, OF BRIDGEPORT, CONNECTICUT.

*Letters Patent No. 68,113, dated August 27, 1867.*

## IMPROVEMENT IN MAKING THE EYE OF ELLIPTIC SPRINGS.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, WILLIAM T. RICHARDS, of the city of Bridgeport, in the county of Fairfield, and State of Connecticut, have invented a new and useful Improvement in Machinery for Making the Knuckle or Eye-Part of the Joint of Elliptic Springs for carriages; and I do hereby declare that the following is a full, clear, and exact description of the construction, character, and operation of the same, reference being had to the accompanying drawings, which make part of this specification, in which—

Figure 1 is a perspective view of the whole machine, showing the locations of the dies, levers, and cams.

Figure 2 is a perspective view of the cam-shaft, showing the shape and relative positions of the cams.

Figure 3 is an enlarged section of the pair of dies in which the end of the bar is cut or scarfed, and partially formed, and of the bar of steel, as in the operation.

Figure 4 is an enlarged view of the other pair of dies which finishes the eye or knuckle, with the partially-formed bar in its relative position for finishing.

Figure 5 is a perspective view of one of the eyes or knuckles, perfectly formed, as it comes from the second pair of dies.

My improvement consists in fitting one pair of dies, into which I can pass the heated end of the bar of steel, when, by the operation of the cam on the lever, the end of the bar will be bent and cut off at such an incline or bevel as to leave the scarfed point or edge in a suitable condition to be inserted into the other pair of dies to be finished; and in so fitting the second pair of dies that I can pass the before-mentioned partially-formed article into them, when, by the operation of one cam, the article or bar will be held as in a vise, and by that of another cam the ram will be brought forward so as to completely form or finish the eye or knuckle ready for use.

I make the frame of cast iron, or any other suitable material, substantially in the form shown at A A, &c., in fig. 1.

I make the cam-shaft with the fly-wheel B, clutch *a*, and cams *b*, *c*, and *d*, substantially of the shape, and locate them substantially in the relative positions shown in figs. 1 and 2, making the whole of cast iron or any other suitable material, and I work the clutch, to throw the machine into and out of gear, by the treadle C, chain *e*, and lever *ff*, all as shown in fig. 1, or by any other convenient means.

I make the lower or stationary part of the first pair of dies of cast steel, (and the other dies of the same,) substantially of the form indicated in section at *g*, fig. 3, and partially shown in perspective at *g*, fig. 1, on which I lay the heated end of the bar of steel *h* while being bent and cut or scarfed to fit it for rolling up.

I make the upper or movable part of the die in two parts, as represented at *i* and *j*, figs. 1 and 3, and secure them together by a binding-screw, as shown near *i*, fig. 1, which screw passes through a slot in the part *i*, by which I can adjust that part to the thickness of the steel, as *h*, figs. 1 and 3; and the other part *j*, I make with a cutting edge or shear, as indicated at *k*, fig. 3, which will bend down and then cut or scarf the end of the bar to the shape indicated at *l* in figs. 3 and 4. I secure these two parts *i* and *j* to the end of a cast-iron lever, D, the projecting cap E of which rests upon the upper ends of the parts *i* and *j*, and I fit a gauge, as F, to determine the exact length or point at which the steel is to be cut by the cutting-die *j*, which I secure by a binding-screw, *t*, and I work the lever D by the cam *b*, figs. 1 and 2, as indicated in fig. 1.

I make the lower or stationary part of the second or finishing-dies, as shown at *n*, figs. 1 and 4, with a slot or space cut in the centre of the inner end, as indicated at *m*, fig. 4, to receive the projection or tongue *o* on the head of the ram *p*, figs. 1 and 4.

I make the upper or moving part of this second die substantially in the form shown at *r*, figs. 1 and 4, with a concave segment of a circle at its inner end, to assist in forming the eye, and I secure it to the under side of the end of the cast-iron lever G, as shown in fig. 1, which lever is worked by the cam *c*, figs. 1 and 2.

I make the head of the ram of cast steel, and with a concave semicircle at its front end, as shown near *p*, fig. 4, to receive the cut and partially-formed end *l* of the spring *h*, and with a projecting piece or tongue, as indicated at *o*, fig. 4, to serve as a bridge to pass under the spring *h* and into the slot *m*, to prevent the spring being crippled down while the eye is being formed by the parts *p* and *r*. And I make a guide or gauge, as shown at H, fig. 1, to designate the exact extent to which the eye must be rolled, and which I secure in place



by a set-screw, as *s*. This ram is forced forward by the cam *d*, figs. 2 and 1, and thrown back by a spring, (not seen,) or by any other convenient means.

Having made the several parts as before described, I place the cam-shaft and cams in their proper positions, key the lower or stationary dies *g* and *n* in their proper dove-tails in the frame, and put the ram *p* in its place, and put the two levers *D* and *G* in their places, on their proper fulcrum-pin *v*, when the whole will appear as represented in fig. 1, and the machine will be ready for use.

To use my machine, (having cut the bars of steel to the desired length.) I pass one end of the bar *h* on to the die *g* and under the point of the cutter *j*, when, by revolving the cam-shaft in the direction indicated by the dart on the fly-wheel, the cam *b* will raise the rear end of the lever *D* and force down the dies *i* and *j*, and, when the point *k* of the cutting-die *j* strikes the bar *h*, it will first bend it over the rounded corner of the die *g*, as indicated at *l*, and, when the bar is bent down to a firm resting place, the point *k* will cut or scarf off the end of the bar, and the die *i* will flatten down or straighten the bar, so that the whole will be as represented in fig. 3. I then take the bar *h* out, turn it over, and place it on the die *n*, when the cam *c* will raise the rear end of the lever *G* and bring down the die *r* on to the bar *h*, as represented in fig. 4, so as to hold it firmly like a vise, and the cam *d* will force the ram *p* forward, so that the tongue *o* will pass under the bar *h*, as shown in fig. 4, and pass into the slot *m*, while the upper point of the concave head of the ram *p* will strike the point *l* of the partially-formed eye and turn it over so far that the point will pass into the recess in the die *r*, and, by continuing the force on the ram, the two segmental curves or recesses will roll up the scarfed end of the bar *h* to the position shown in fig. 5, when the eye will be complete; thus dispensing entirely with the hammer and rolling-mill in forming a complete and finished eye.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the dies *g*, *i*, and *j* with the lever *D*, or its equivalent, when they are constructed, arranged, and fitted to scarf the end and partially form the eye, substantially as herein described.
2. I claim the combination of the dies *n* and *r* with the head of the ram *p*, when the head is provided with a tongue, *o*, and the die *n* has a slot or recess, *m*, to receive the tongue, and the whole is fitted to produce the result of finishing the eye, substantially as herein described.

WM. T. RICHARDS.

Witnesses:

SAMUEL GORHAM,  
R. FITZGERALD.