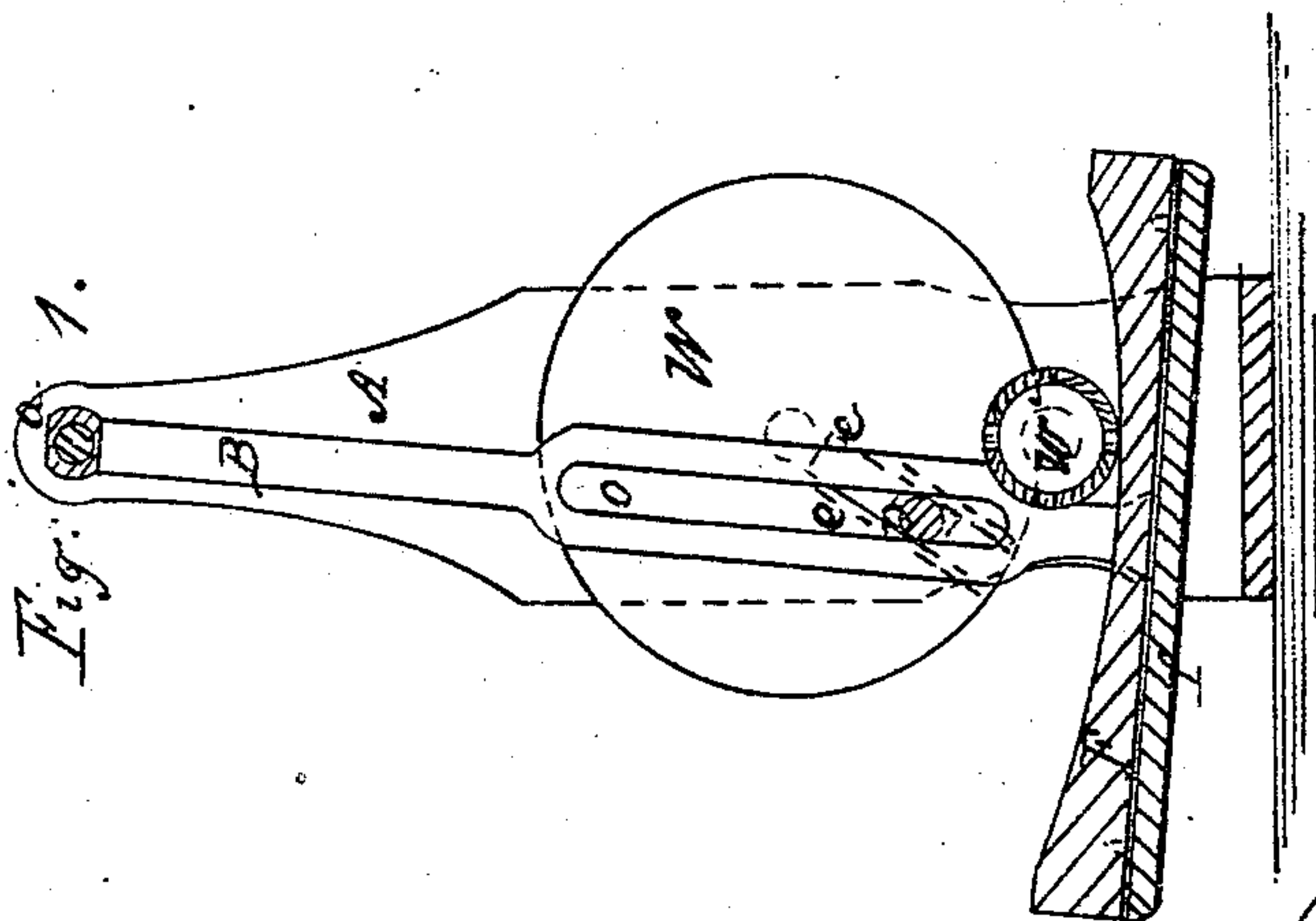
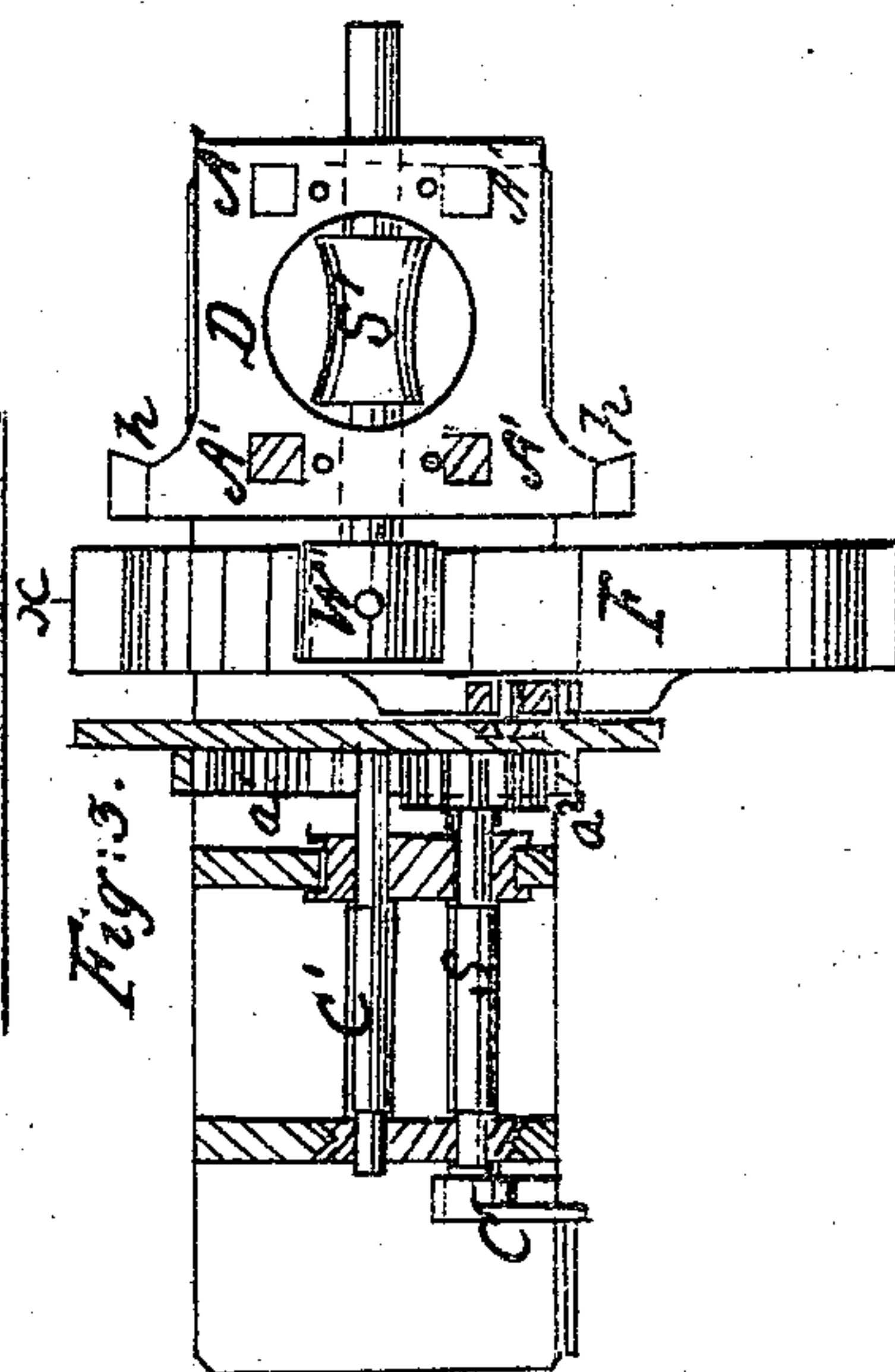
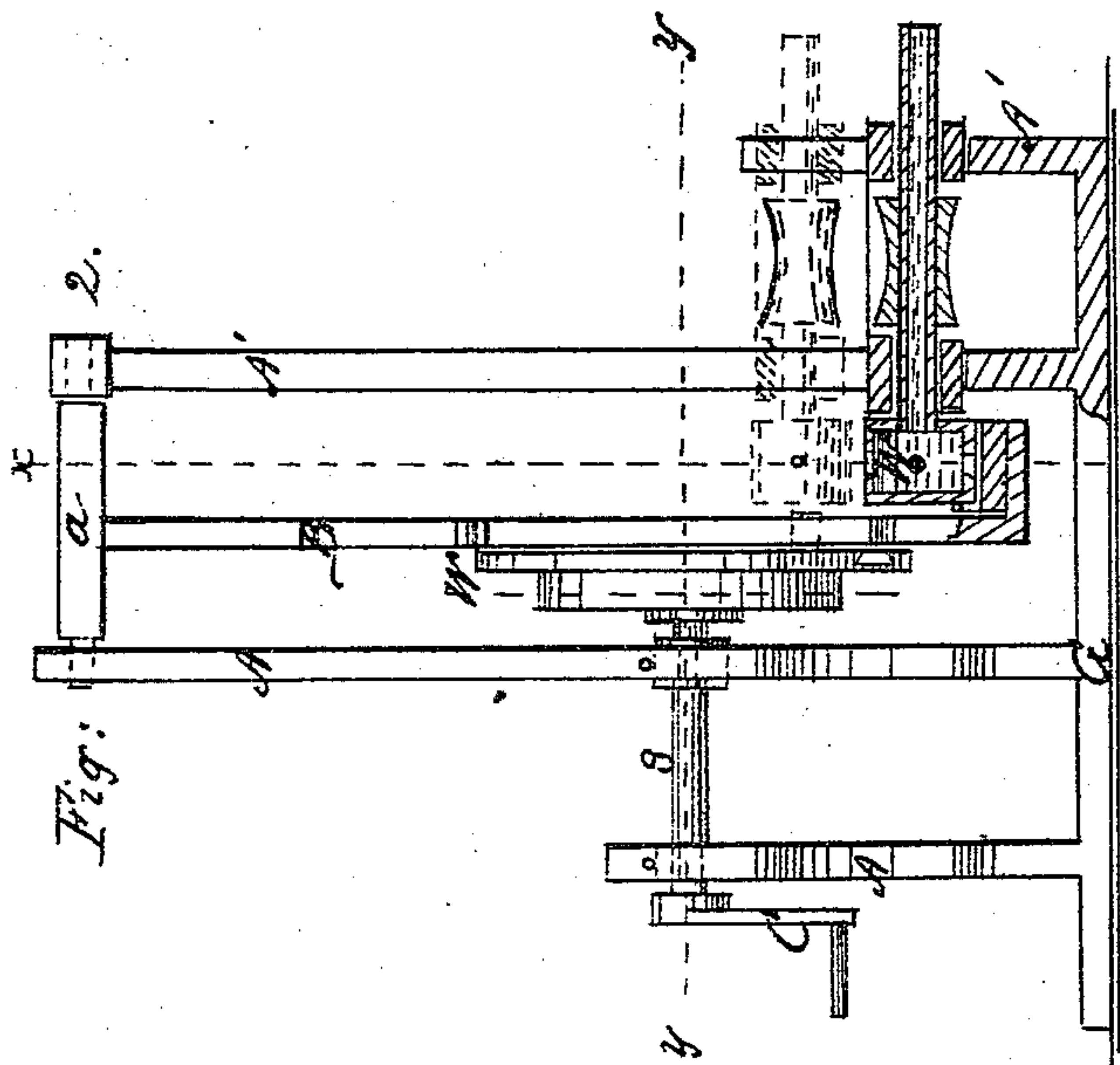
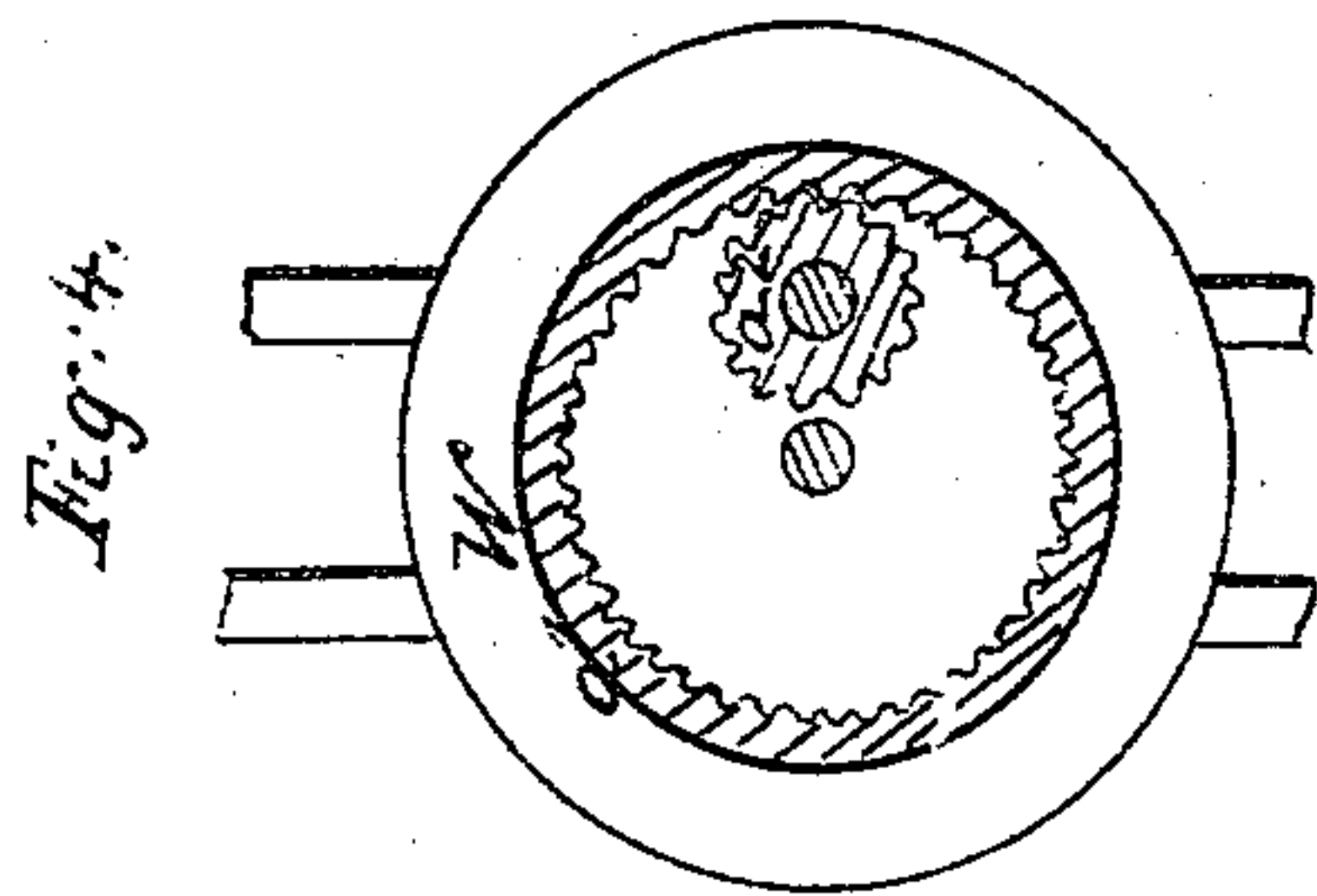


G. S. Long.

Forming & Tempering Elliptic Springs.
N^o 72055 *Patented Dec. 10, 1867.*



Witnesses
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United States Patent Office.

GEORGE S. LONG, OF BRIDGEPORT, CONNECTICUT.

Letters Patent No. 72,055, dated December 10, 1867.

IMPROVEMENT IN MACHINE FOR FORMING AND TEMPERING 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, GEORGE S. LONG, of Bridgeport, in the county of Fairfield, in the State of Connecticut, have invented a new and improved Spring-Former; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying plate of drawings, forming part of this specification.

This invention relates to a new and improved method of constructing machines for bending or forming steel springs for carriages and other purposes, whereby they are more easily and uniformly tempered, and whereby the same are more economically made. It consists of a vibrating anvil or former, upon which the steel to be worked is placed, said former vibrating under a roller; said roller being hollow, and provided with holes or orifices through which water received in the shaft of said roller is distributed upon the heated steel. In the accompanying drawings—

Figure 1 represents a central vertical section of my invention, taken in the line $x x$ in fig. 2.

Figure 2 represents a side view of the same.

Figure 3 represents a central horizontal section of the same, taken in the line $y y$ in fig. 2.

Figure 4 is a detail view of the pinion and wheel, by means of which the former or anvil is made to vibrate. Similar letters of reference indicate corresponding parts.

G is a base or foundation; A are uprights; A' are other uprights; a is a rotating or vibrating cross-bar, extending across from one of the uprights A to one of the uprights A', and supported in journal on the same. B is a vibrating rod attached to cross-bar a ; F is the former or anvil attached to a shoe, f ; f is a shoe or former bed-plate attached to rod B, upon which is former F; W is a gear-wheel, by which rod B is vibrated; a^1 is the gear of wheel W; a^2 is a spur-gear pinion working in gear a^1 of wheel W, by means of which said wheel W is driven; C' is the shaft of wheel W; S is the shaft of pinion a^2 ; C is the crank; e is a slot in wheel W; p is a crank-pin in same; W' is a roller; S' is the shaft of the same; D is a movable binder, by means of which the roller W' is kept down upon the heated metal upon the former F; O is a slot in rod B.

Upon any suitable base or foundation, G, are erected the uprights A and A', as shown in the drawing, fig. 2, the two centre uprights being higher, so as that the vibrating rod B may be suspended thereon. Extending from one to the other of the centre uprights A and A' is a rotary shaft, a , turning in suitable bearings in said uprights. To the centre of said shaft a is rigidly attached the vibrating rod B. Said rod B is of sufficient length to give the proper curve to the motion of the former F, which is attached to the same. In said rod B, which is made of sufficient size and of proper width for the purpose, and near the lower end of said rod B, is a slot, O, in which the crank-pin p moves up and down while revolving about the centre of the wheel W. Through the higher of the uprights A, which is made of proper shape to receive the same, is a square opening, as shown in the drawing, to receive the boxes or bearings of one end of the shafts or axles S and C'. Upon the shorter of the uprights A, as shown in the drawing, are suitable bearings to support the other end of the shafts or axles S and C'. To one end of the axle S is attached the crank C, as shown in the drawing. To the other end of the same, and properly keyed thereto, is the spur-gear pinion a^2 . Upon the same end of the shaft C', and so as to fit into the teeth of the spur-gear pinion a^2 , and properly keyed thereto, is the wheel W; upon one face of which, towards the shaft C', is a flange, on the inside of which is the spur-gear a^1 , as shown in the drawing, fig. 4, so as to fit into and be driven by the spur-pinion a^2 . In the opposite face of said wheel W is a dove-tail-shaped slot e , extending from a point near to the centre of said wheel W to a point near the circumference of said wheel W in the direction of a radius of the same. In said slot e is fitted a dove-tail-shaped block, so as to move in the slot e , to which said block is rigidly secured, the crank-pin p passing through the slot e in rod B in such a way that, when the wheel W rotates, the rod B will be made to vibrate by the crank-pin p moving in the slot e in the wheel W, and moving also in the slot e , so as to give only a vibratory motion to the rod B. Upon the higher of the uprights A', and upon the lower of said uprights A', as shown, are suitable boxes or bearings in which the shaft s' of roller W rotates; said boxes not being fixed, but are permitted a slight upward and downward motion within the parts of the uprights A', which are made of posts a little distance from each other, as shown in the drawing, fig. 3, for that purpose. The roller W' is rigidly secured to the shaft S', and is of any convenient size. Said roller W' and shaft S' are hollow, so as to contain water supplied by

any pipe to the same in the usual way. The roller *W'* is provided with any convenient number of orifices communicating with the hollow shaft, by means of which water is supplied to the steel being operated upon. To the lower end of the rod *B*, and being part of the same, or rigidly secured thereto, is a shoe or former bed-plate, *f*. Upon said shoe *f* is the former *F*, made of any form, as shown in the drawing, so as, by being brought under the roller *W'*, any heated steel bar or bars may be formed into the shape of a carriage or other spring. The former *F* is made of steel, or iron faced with steel, having its upper face of the shape of the spring required. Across the upright *A'*, and so as to move upward and downward in the same, and over the boxes or bearings of the shaft *S'*, and so as to form the caps of the same, and bolted to the same in the ordinary way, is a binder or presser, *D*, and fitting loosely on said uprights *A'*, so as to be allowed a slight rocking motion; the object of which said binder is to press the roller *W'* firmly upon the steel or other metal on the former *F*, and so as that such former *D* will yield and permit the roller *W'* to accommodate itself to the uneven surface of the said steel or other metal. At the points *h* or on the binder *D*, or at other convenient points on the same, heavy weights may be suspended to increase the pressure of the roller *W'* upon the metal upon the former *F*. The former *F* is secured to the shoe *f* by bolts or pins, or in any other way, so that the former *F* may be removed and another former, of different shape, may be substituted therefor.

The operation is such that by the operator moving the former *F* to the extent of its motion towards himself, and placing the heated metal, of which a spring is to be made, upon said former *F*, by turning the crank *e*, the former *F* and heated metal upon the same will be forced under the roller *W'*, and made, by the pressure of said roller *W'* upon the same, to conform in shape to the form of the former used, and by admitting water into the inside of shaft *S'* and roller *W'*, said metal will be chilled or tempered by the water issuing from the orifices in said roller. This operation may be repeated as often as required, the former *F* stopping at each end of every vibration by the crank-pin *p* sliding, as above described, sufficiently long to admit of the spring being removed and another piece of heated metal being placed upon said former *F*, of which to form another spring as before.

Constructed as above described, it constitutes a simple and powerful steel-spring former, the advantages of which are that springs may thereby be made much quicker and better, and may be at once and uniformly tempered for use.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent—

1. A steel-spring former, substantially as shown and described, and for the purposes set forth.
2. The vibrating rod *B* and shoe *f'* and any former *F*, in combination with the slotted wheel *W* and roller *W'*, substantially as shown and described, and for the purpose set forth.
3. The hollow shaft *s'* and roller *W'*, in combination with the binder or presser *D*, substantially as shown and described, and for the purposes set forth.
4. The sliding crank-pin *p*, in combination with the slotted wheel *W* and slotted vibrating rod *B*, substantially as shown and described, and for the purposes set forth.

The above specification of my invention signed by me, this 21st day of October, 1867.

G. S. LONG.

Witnesses:

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ALEX. F. ROBERTS.