J. BAIRD.

MACHINES FOR BENDING CHAIN-LINKS.

No. 169,333. Patented Nov. 2, 1875.

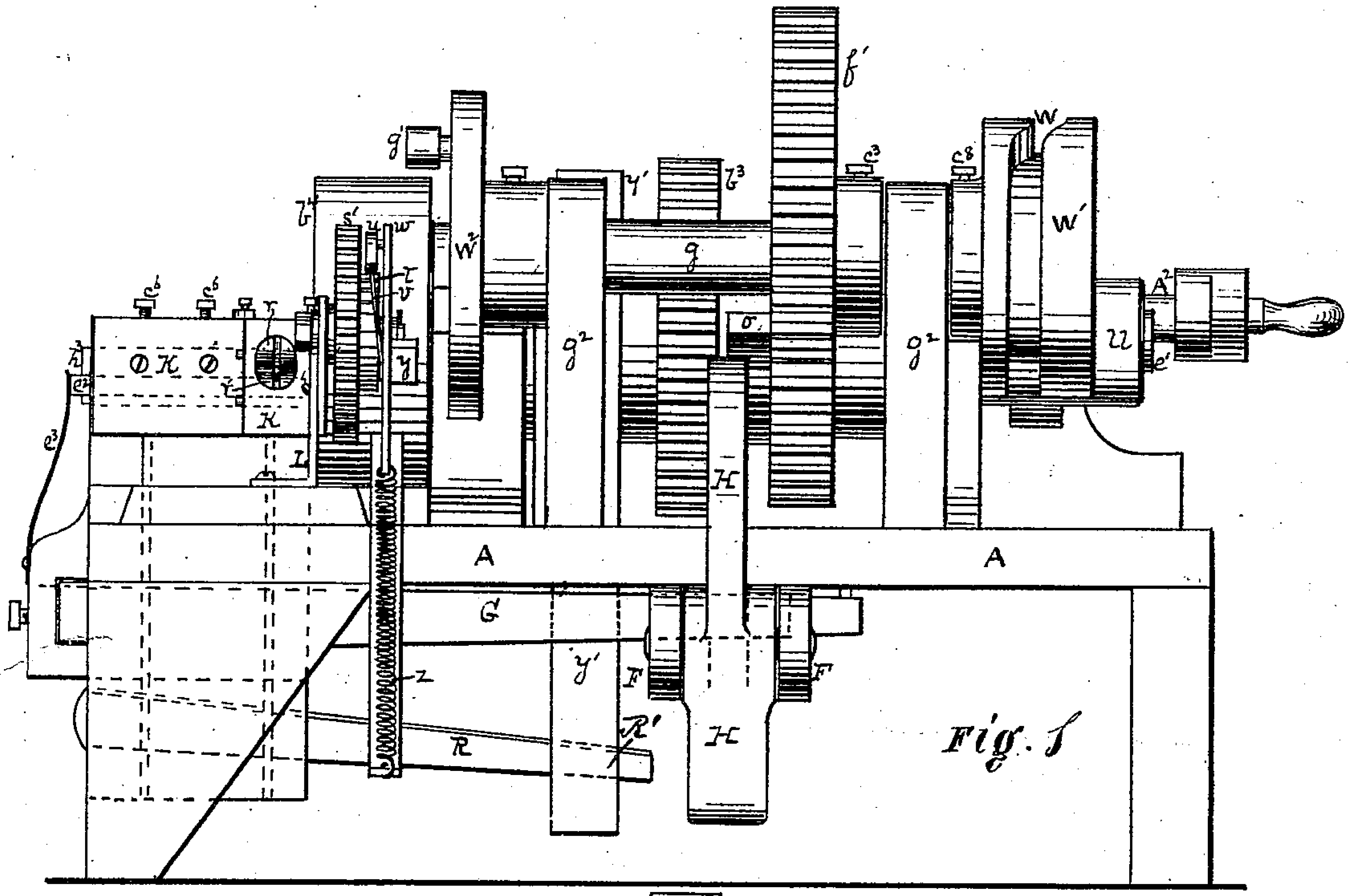

Fig. 1

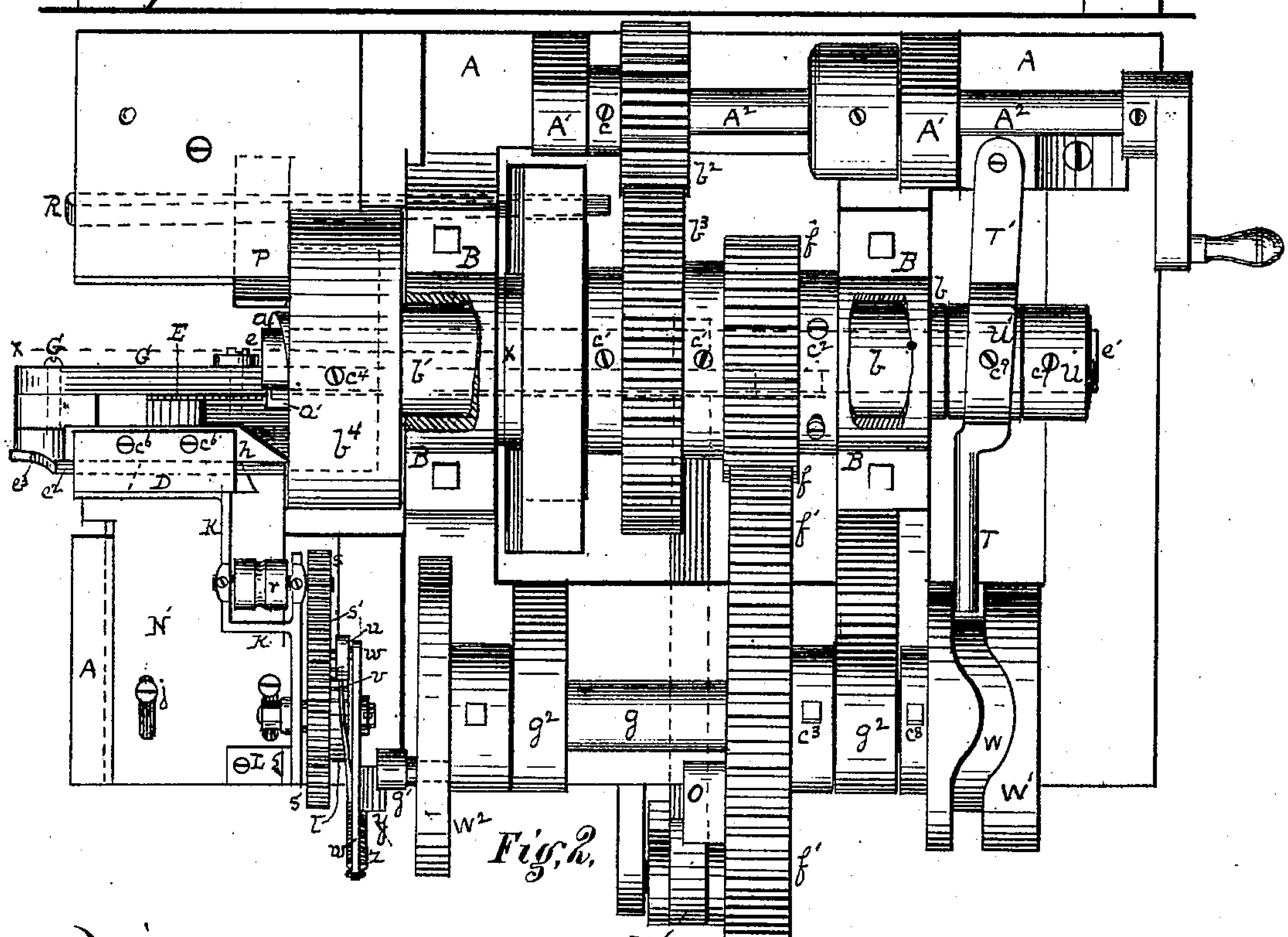

Fig. 2.

Witnesses
Claudius L. Parker
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Inventor James Baird
By George H. Christy
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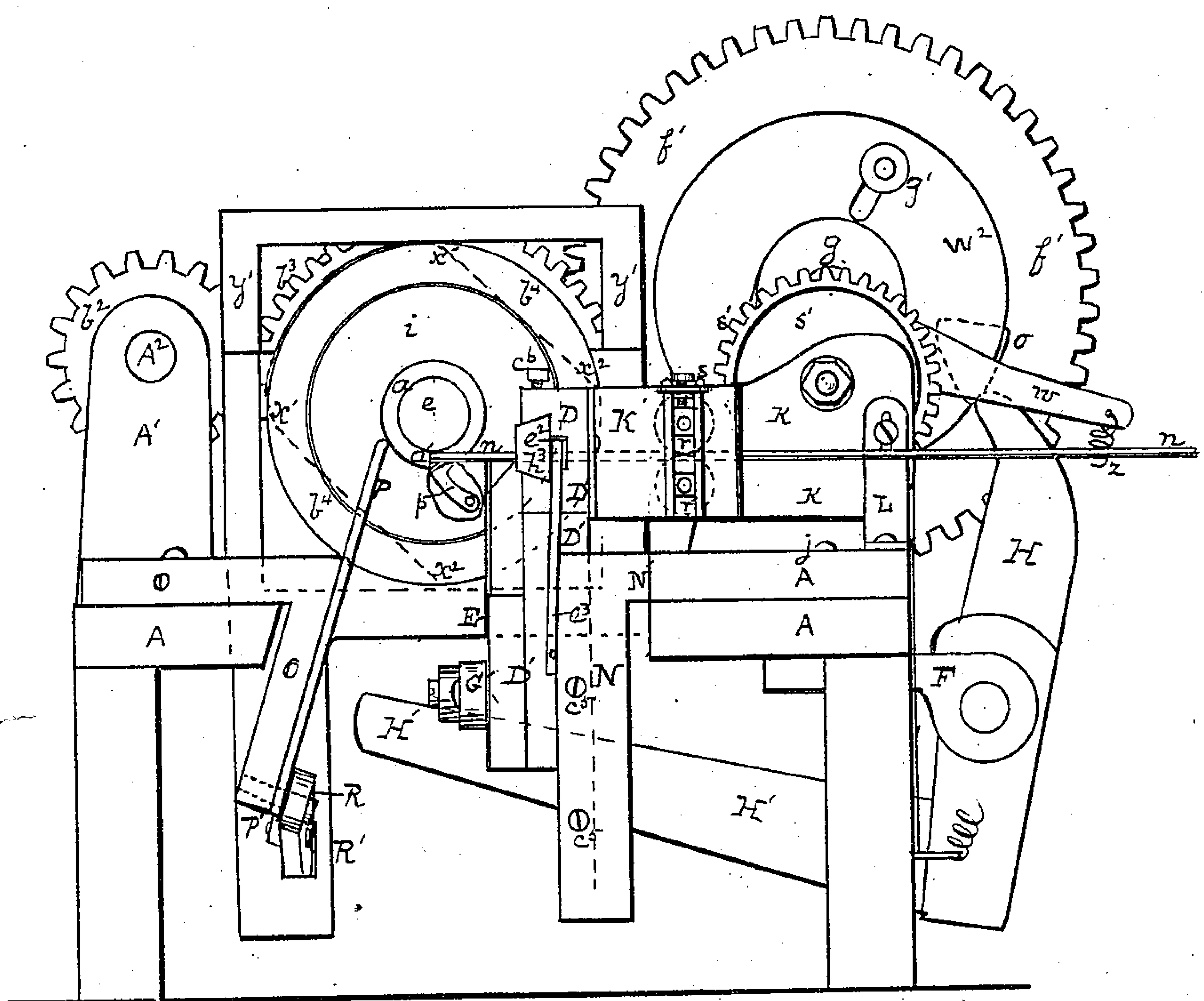

Fig. 3.

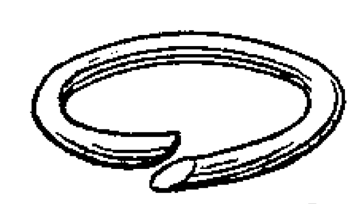

Fig. 6

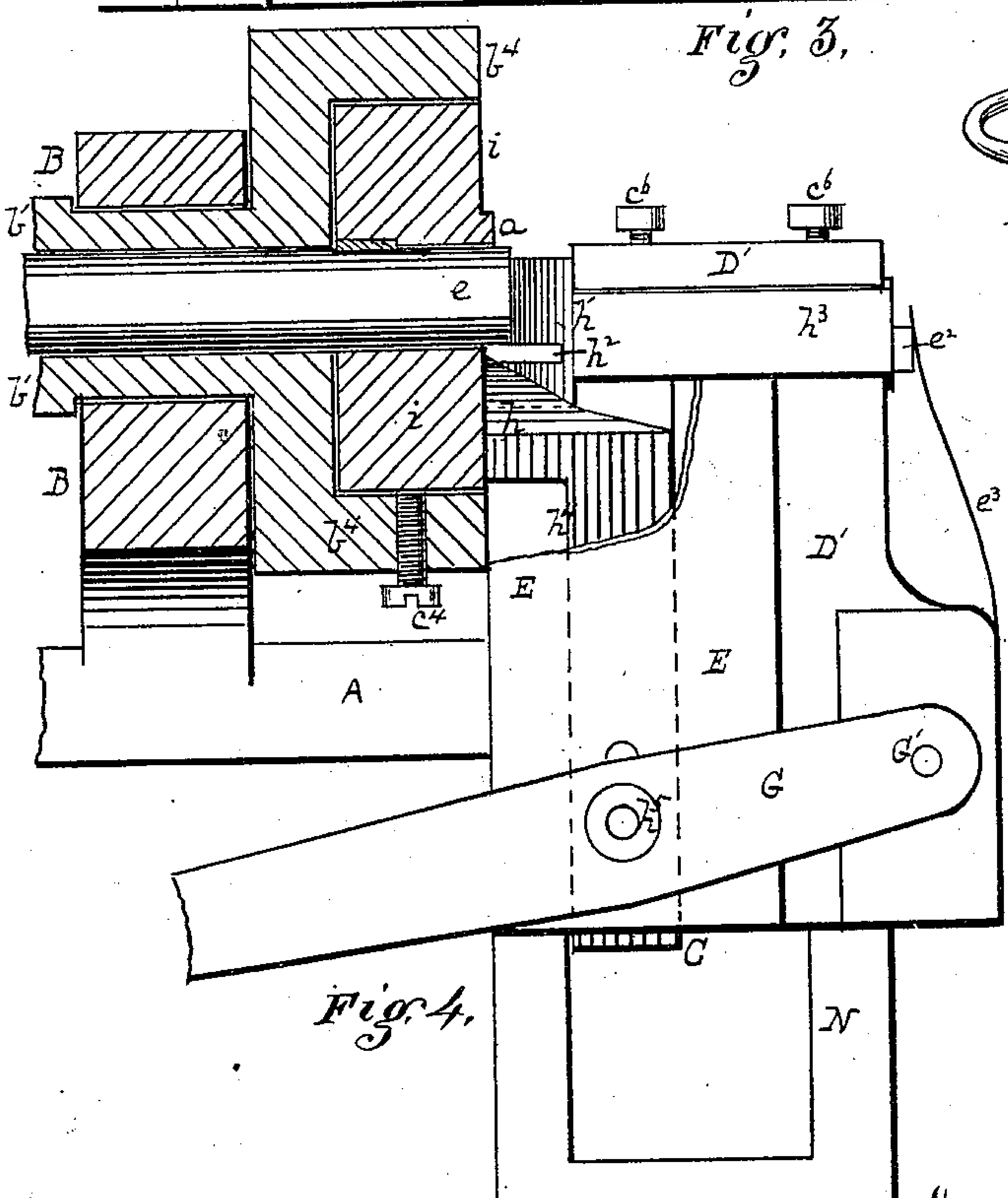

Fig. 4.

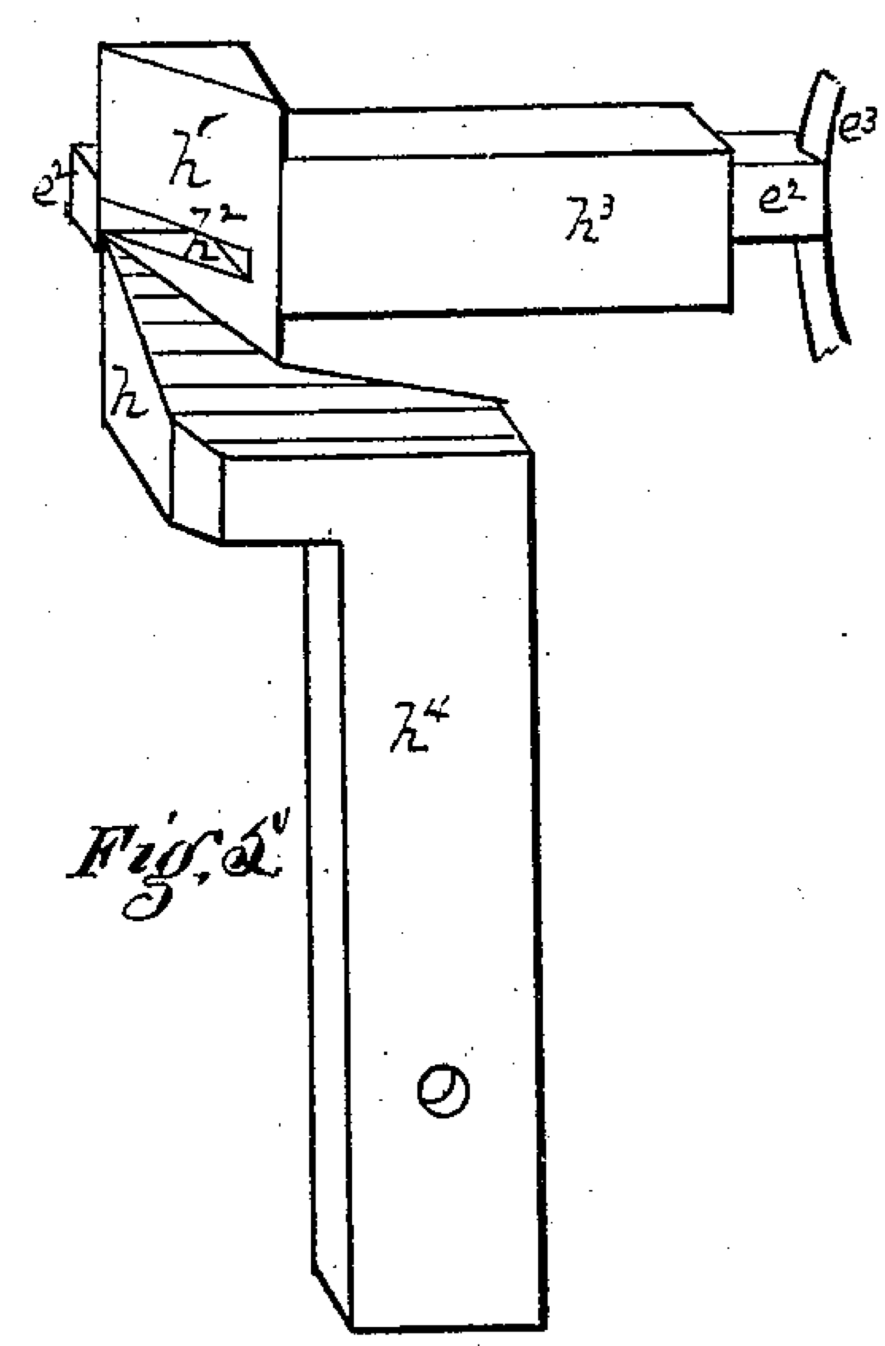

Fig. 5.

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UNITED STATES PATENT OFFICE.

JAMES BAIRD, OF ALLEGHENY, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR BENDING CHAIN-LINKS.

Specification forming part of Letters Patent No. **169,333**, dated November 2, 1875; application filed September 30, 1875.

To all whom it may concern:

Be it known that I, JAMES BAIRD, of Allegheny, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Link Cutting and Bending Machines; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings making a part of this specification, in which like letters indicate like parts.

Figure 1 represents a side view of my improved machine. Fig. 2 represents a top or plan view of the same. Fig. 3 shows an end view of the left-hand end, Figs. 1, 2. Fig. 4 shows a vertical section through the line x x, as seen from the opposite side of Fig. 2. Fig. 5 is a detached view of the shear or cutting device, with attachment for keeping the rod or wire in position; and Fig. 6 represents a ring as cut and bent by my improved machine.

My improved machine is designed for cutting and bending ring and link blanks, by feeding in the rod or wire to be bent, cutting the same into proper length for the size of blank required, and also in such manner that the ends of the blank, when bent, shall be prepared ready for welding without further manipulation, and bending and discharging the same, all these operations being performed automatically by the machine alone.

A A, Figs. 1, 2, and 3, represent the main frame of my machine, which may be supported in any suitable way. Secured to and extending up from the main frame are the plumber-blocks A^1 A^1, Fig. 2, which carry the driving-shaft A^2. Parallel to the driving-shaft A^2, and secured to cross-pieces of the main frame A A by means of plumber-blocks or bearings B B, Fig. 2, is a hollow shaft, b b^1, which is geared to the driving-shaft A^2 by means of the gear-wheels b^2 b^3, which are adjustably secured to their respective shafts by means of the set-screws c c^1 passing through sleeves which project laterally from the wheels. The pinion f is also adjustably secured to the hollow shaft b b^1 by means of set-screws and like sleeves c, and, gearing with the wheel f', drives the shaft g. This wheel f' is also adjustably secured to its shaft g by the binding-screw c^3. The shaft g is supported upon and above the main frame by the brackets g^2 g^2. W^1 and W^2 are also wheels carried upon the shaft g, the purpose of which will be presently described. The hollow shaft b b^1 has at its end b^1 an enlarged hollow cylindrical head, b^4, Figs. 2 and 4, inside the cavity of which is a head-block, i, which is bound to the cylindrical head b^4 by means of a binding-screw, c^4. Through the center of this head-block, and extending through the entire length of the hollow shaft b b^1, is a bending-mandrel, e e^1. That part of the mandrel e e^1 which is within the head-block i is keyed to said head-block, so that the mandrel is free to move endwise within the head-block i and hollow shaft b b^1, and the mandrel e e^1, head-block i, and cylindrical head b^4 of the hollow shaft b b^1, being thus connected, will rotate together. A spirally-ended sleeve, a, Fig. 2, projects from the head-block i out upon the end e of the mandrel e e^1, making, by its abrupt ending, a stop, a', Fig. 3, for the rod or wire n as it is fed forward to the mandrel, and also, as the ring or link is bending on the mandrel, the spiral sleeve a guides the wire laterally to one side, so that the ends of the blank, when bent, shall lap and be side by side, as shown in Fig. 6. The angular plate N N' is adjustably secured to the main frame A A, and supports the feeding and cutting devices, as presently described. To the vertical part N is fitted the plate D', in a dovetail or other suitable groove, which plate is adjusted in any desired position by the binding-screws c^5. To the upper end of the plate D', at D, Fig. 2, is attached one end of the irregularly-shaped frame K, which carries the feeding-rolls r r', the other end of the frame K being supported by the post L, which rests upon the horizontal part N' of the plate N N'.

A bar, e^2, Figs. 3, 4, sliding horizontally in a mortise in the upper part of the plate D', is pressed by the spring e^3 against the wire n, Fig. 3, and holds the wire against the face of the head-block i, so that the end of the wire shall strike against the stop a' as it is fed forward by the rolls r r', and so that, as the wire is carried to one side away from the head-block

i by the spiral sleeve a, as already described, and after the wire n is cut between the mandrel e and bar e^2, the bar e^2 will force the uncut part or end of the wire back against the face of the head-block i, as before. On the plate D′, Fig. 4, is also arranged the shear h h^1, Figs. 2, 4, and 5, for cutting the rod or wire. The horizontal section or blade h^1, Figs. 4, 5, is, by its stem h^3, fixed in a dovetail slot and bound by set-screws c^6. Through the cutting-face of this blade h^1 is a slot, h^2, Fig. 5, through which the wire n passes as it is fed to the mandrel e, Fig. 3. The stem h^4 of the vertical blade h of the shear works in a groove, C, in the plate D′, and is held to its place by the plate E, which is fastened upon the plate D′. The cutting-faces of the blades h h^1 are so beveled and arranged as to give the desired bevel to the ends of the blanks when cut. The vertical blade h is worked in its groove C from below by means of the lever G G′, Fig. 4, which has its fulcrum at G′ upon the plate D′, and is pivoted to the blade h at h^5 in any suitable manner. The lever G G′ passes back under the main frame A A, and the end G rests upon or is suitably connected with one arm, H′, of the bell-crank lever H H′, Figs. 1, 3. The bell-crank lever H H′ is pivoted to the main frame by means of the bifurcated arm F, Figs. 1, 3. The arm H of the bell-crank extends up by the side of the large gear-wheel f', to which is fixed an adjustable tappet, o, which, as the wheel revolves, is made to strike against the arm H of the bell-crank, and thus, by its adjustment, give any desired amount of motion, through the bell-crank H H′ and lever G G′, to the shear h; and the wheel f' being adjustable on the shaft g, it may be so set relatively to the feeding device as to cause the shear to cut the wire at any point of its forward feed desired, thus determining the length of the wire which forms the blank. This result is secured partly by the adjustment of the wheel f' in a rotary direction on its shaft, by which I determine the point of the feed at which the cut shall be made, and partly by the adjustment of the tappet g^1 to or from the axial line of motion, by which latter means I determine the length of feed, at the termination of which the shearing action commences. When the tappet g^1 is set nearer to the shaft g it engages the inclined face of the projection y so much the sooner, and remains in engagement therewith so much the longer, with the result of a greater length of feeding motion, and reversely with an adjustment outward.

The rod or wire n is fed to the mandrel e by means of the rolls r r', and, to give an intermittent motion to the rolls r r', so as to feed in the wire at the time desired, I gear to the roll r the wheels s s', Figs. 2, 3. To the shaft of the wheel s' is fixed a ratchet-wheel, t, Figs. 1, 2, and a pawl, u, held to the ratchet-wheel t by the spring v, and attached to a lever, w, which works in the ratchet-teeth. As the wheel W² on the shaft g revolves, a tappet, g^1, adjustably fixed to the wheel W², strikes a projection or pin, y, on the lever w, and raises the lever, and the pawl u, engaging a tooth of the ratchet-wheel t, causes it to rotate, and with it the gear-wheels s s' and rolls r r'. As the tappet g^1 leaves the projection or pin y the spring z draws the lever w down, and the attached pawl u slides back over the ratchet-wheel t, and rests until, by another revolution of the wheel W², the tappet g^1 again strikes the projection y, elevates the lever, and, through the ratchet-wheel, imparts motion to the feeding-rolls, as before. The plate N N′ being fastened to the main frame A A by bolts j j passing through slots in the plate, the plate, with the cutting and feeding devices which it supports, may be set at any desired distance from the center of the mandrel e, and said feeding and cutting devices being also vertically adjustable by means of the dovetail groove and slide at n and the slotted fastening at L, they may, through these adjustments, be readily adapted to mandrels of different size.

The rod or wire n, on being fed forward by the feeding-rolls r r', as described, and against the stop a' on the under side of the mandrel e, as shown in Fig. 3, passes between the griping-dog p and mandrel e. The griping-dog p is pivoted so as to swing with a free motion in a recess in the head-block i, as shown in Fig. 3, and is placed in such relation to the mandrel e that it will, by its eccentric-shaped end or head, gripe or bind a rod fed between it and the mandrel tight against the mandrel, if force be applied to draw the rod out, and the rod or wire, being thus bound, will be drawn along with the mandrel and head-block as they rotate.

The plate E, Figs. 3 and 4, may be extended up against the wire n, as shown in Fig. 3, to form a bridge or stay for holding or guiding the wire against the mandrel as the blank is being bent; but in bending elliptical links I prefer to make use of the following device: In the plate O O, Figs. 2 and 3, which is adjustably secured to the main frame A A, is placed a slide, P P′, in a dovetail or other suitable groove, which slide extends up to within the desired distance of the mandrel e, to keep the wire to its place. This slide is raised or lowered, to follow the elliptically-shaped mandrel then employed, by the lever R R′, Figs. 1 and 3, the attachment of the slide P P′ to the lever R R′ being such as will allow the slide to be set for different-sized mandrels. A cam or segment of a wheel (shown by dotted lines x^1 x^2, Fig. 3) is carried by the hollow shaft b b^1, and inclosed by the yoke y' y'. This yoke extends down on the under side of the frame, and makes connection with the lever R R′ at R′, Fig. 1. As the cam x^1 x^2 rotates, the yoke y' will take a vertical motion, and a corresponding vertical motion be given, through the lever R R′, to the slide P P′, which, by suitable adjustment of the several parts, may be made to follow the shape of an elliptical mandrel, keeping at a fixed distance from it, and forming an automatically-operating bridge, against which the blank is bent to and held in its place upon the mandrel. This sliding bridge may also be fixed in position in any suitable way, and serve as a bridge when bending round rings, thus dispensing with the necessity of extending up the plate E, as described.

In order to discharge the ring or link blank when bent, I fit at the end e^1 of the mandrel e e^1 a lever, T T′, Fig. 2, the lever encircling, by a yoke or collar, u', a sleeve, U, which sleeve is bound to the mandrel by the set-screw c^7. The end T of the lever T T′ extends into and follows the eccentric groove W in the cam-wheel W^1, which wheel is adjustably fixed to the shaft g by the set-screw c^8. By properly adjusting this wheel W^1 the lever T T′ will, at the desired time, be moved by the deflection shown in the groove W, and the mandrel e e^1 will be drawn by the lever endwise within the head-block i at e, Fig. 2, and the bent blank formed upon the mandrel will be discharged, after which the mandrel will be returned to its former position by the redeflection of the eccentric groove W.

By releasing the binding-screw c^7 the sleeve U may be removed from the end e^1 of the mandrel, and by also releasing the binding-screw c^4 in the cylindrical head b^4, Fig. 4, which binds the head-block i, the head-block i and inclosed mandrel e e^1 may be removed from the hollow shaft b b^1, and another head-block, with a mandrel of any desired form or size at its working end e, may be inserted, and secured as before.

The gear-wheels f f' are so related as to give the shaft b b^1 two revolutions to one revolution of the shaft g, and the cutting and feeding devices will receive but one impulse or movement for each two revolutions of the mandrel e e^1, inclosed in the shaft b b^1. Thus a little more than one revolution of the mandrel e e^1 may be employed in bending a blank, thereby lapping the ends sufficiently for welding, as shown in Fig. 6, and during the remainder of the second revolution the blank formed on the mandrel will be discharged, and the mandrel replaced in position for forming another blank.

The parts of my machine being each and severally adjustable, the separate devices of which it is composed—namely, the feeding, cutting, bending, and discharging devices, and the device for causing the bridge or brake P P′ to follow the shape of the bending-mandrel—all may be made to operate in such relation to each other as to perform the functions for which they were intended at the desired time and in the desired manner automatically, and without the intervention of manual labor or skill. Thus the feeding-rolls r r', Fig. 3, taking the wire n from a continuous coil, feed it, in the manner described, through the slot in the shear-blade h^1, Fig. 4, direct to the under side of the mandrel e, Fig. 3, against the stop a', and between the griping-dog p and mandrel e, when the dog p will gripe or bind the wire tight against the mandrel e, and, as it rotates, the wire will be drawn along with it. By the proper adjustment of the wheel f' and tappet o, Fig. 2, which operate the cutting device, as described, the shear-blade h, Fig. 4, will be carried across the face of the blade h^1, cutting the wire at such time that the piece bound to the mandrel e, Fig. 3, will be of proper length for the blank designed, and also cutting the wire in such manner that the ends of the blank shall be prepared for welding, as in Fig. 6. The slide P P′, Fig. 3, being made to follow the shape of the mandrel, in the manner described, and keeping at a fixed distance from it, the wire forming the blank will be held by it tight against the mandrel until it is bent to the form of the mandrel. By properly adjusting the wheel W^1, Fig. 2, the mandrel e e^1 will be drawn within the head-block i by the lever T T′, and the blank formed on the mandrel will be discharged, when the mandrel will be returned to its former position, and the several devices of the machine will be ready to co-operate in forming another blank, in the manner described.

Instead of the wheel W^2 and tappet g^1 for raising intermittingly the lever w, there may be substituted two or more eccentric elliptical gear-wheels, placed in such relation as to give a rapid rate of rotation to the one bearing a tappet at such time as the tappet may be in position to engage the projection y, and raise the lever w, thus giving a very quick forward feed to the wire n at the time desired.

I claim as my invention—

1. In a link cutting and bending machine, the combination of a bending-mandrel, e e^1, adjustable bridge P P′, griping-dog p, head-block i, with spiral sleeve a, shear h h^1, and feeding-rolls r r', operated substantially in the manner and for the purposes set forth.

2. In combination with the bending-mandrel of a link cutting and bending machine, the griping-dog p, guide-bar e^2, feeding-rolls r r', and spiral sleeve a, operated and arranged substantially as set forth.

3. In combination with the bending-mandrel of a link cutting and bending machine, the automatically-adjustable bridge P P′, lever R R′, yoke y', and cam or segment x^1 x^2, arranged and operated substantially as set forth, whereby the bridge P P′, by an upward and downward motion, follows the elliptical form of the bending-mandrel.

4. In a link cutting and bending machine, the horizontally-adjustable angular plate N N′ and vertically-adjustable plate D′, carrying thereon the cutting and feeding devices, and in combination therewith, whereby the cutting and feeding devices are adjustable to mandrels of different sizes, substantially as set forth.

5. In combination with the shears h h^1, the

adjustable tappet *o*, with a lever connection to the shears, for effecting the cut at the end of a variable feed, and the adjustable tappet g^1, and inclined-faced projection *y*, with pawl-and-ratchet connection to the feed-rollers, for imparting to the rod a feed variable in length at pleasure, substantially as set forth.

6. In a link cutting and bending machine, the combination of a bending-mandrel, $e\ e^1$, with the spiral sleeve *a*, stop *a'*, and griping-dog *p*, substantially as set forth.

7. In a link cutting and bending machine, the combination of a bending-mandrel, $e\ e^1$, head-block *i*, and hollow shaft $b\ b^1$, having an enlarged hollow cylindrical head, b^4, operated and arranged substantially as set forth.

In testimony whereof I have hereunto set my hand.

JAMES BAIRD.

Witnesses:
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JAMES M. CHRISTY.