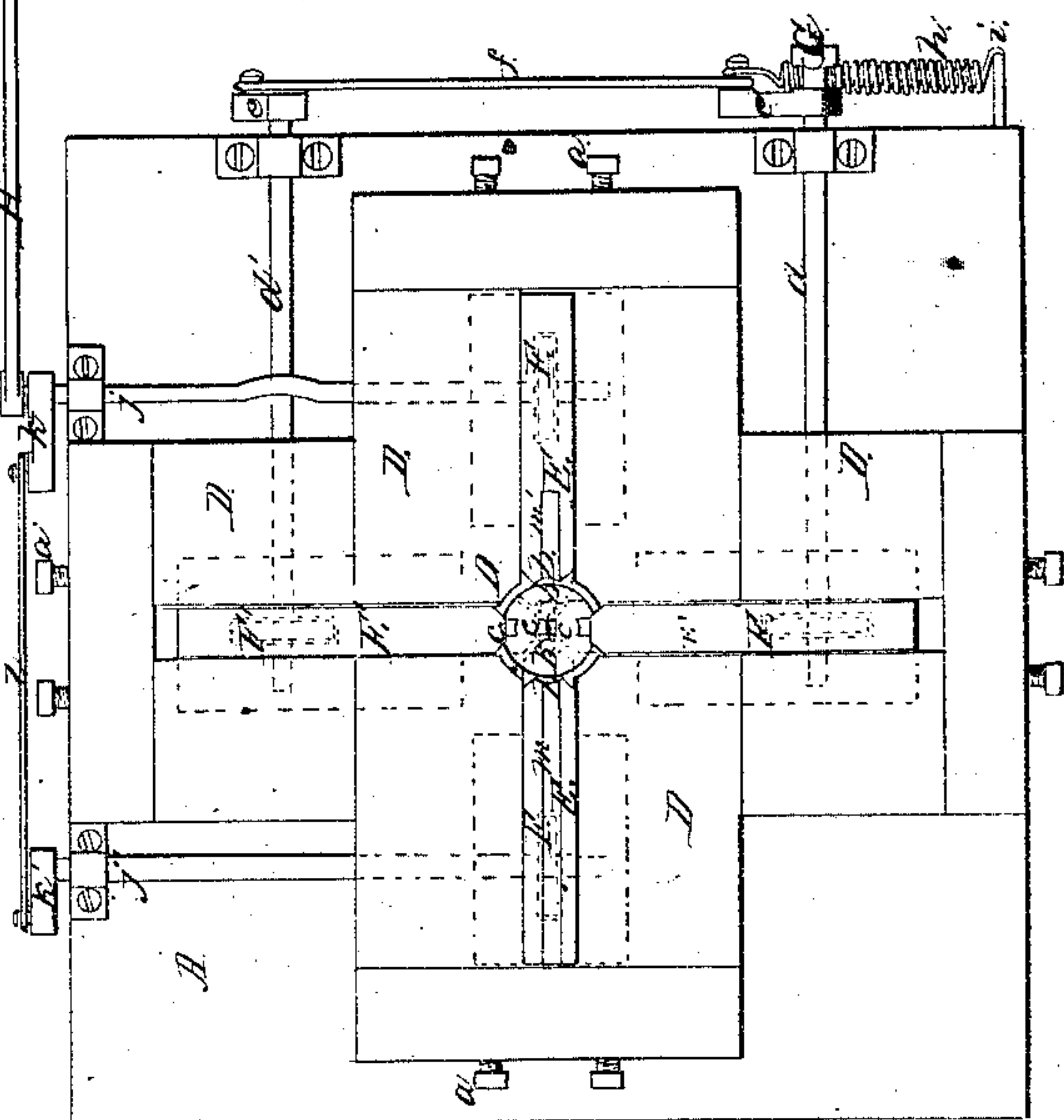
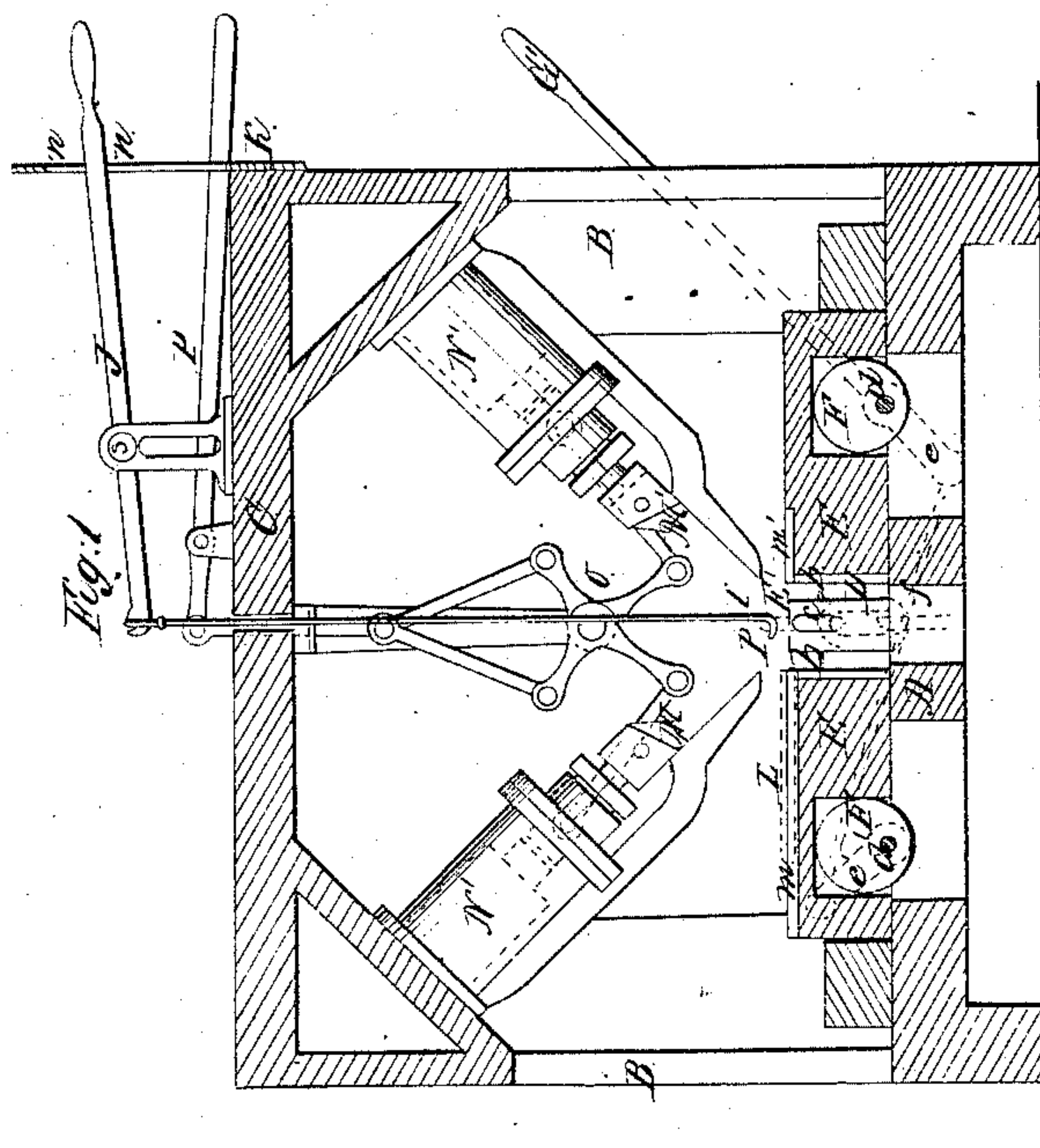
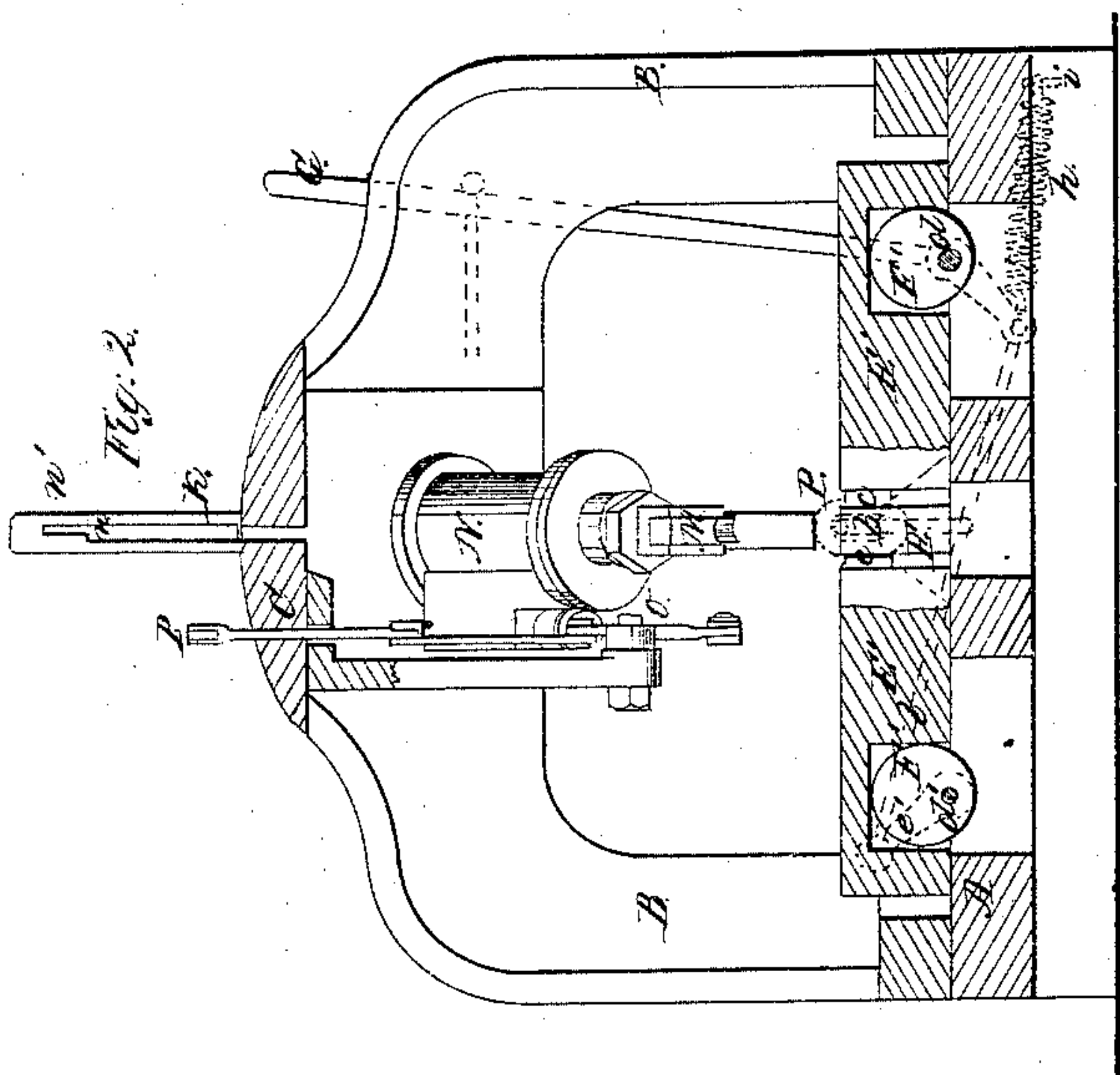


W. D. Grimshaw.

Making Chain.

N^o 67,751.

Patented Aug. 13, 1867.



*Witnesses:
M. W. Reed
Geo. Reed*

*Inventor:
W. D. Grimshaw*

United States Patent Office.

W. D. GRIMSHAW, OF NEWARK, NEW JERSEY.

Letters Patent No. 67,751, dated August 13, 1867.

IMPROVED MACHINE FOR MANUFACTURING CHAIN CABLE.

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, W. D. GRIMSHAW, of Newark, in the county of Essex, and State of New Jersey, have invented a new and useful improvement on Machinery for Manufacturing Chain or Chain Cable, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and in which—

Figures 1 and 2 represent sectional elevations of a machine constructed according to my improvement, and Figure 3 a plan of the lower portion of said machine.

Similar letters of reference indicate corresponding parts.

My invention consists in manufacturing chain or chain cable, link by link, by means of a quadrangular arrangement of sliding dies operating in pairs at intervals, first to hold a ready-made link whilst it is being threaded or crossed by a blank used to form the next link, and afterwards to constitute a mandrel within the partially-formed link, and to bend or prepare the same ready for closing; and said invention also consists in a combination of opposite obliquely operating hammers with dies working, as described, to close the blank or finish the link; and furthermore consists in a combination of eccentrics working in pairs for operating the dies at intervals, as hereinbefore referred to, and spring and drop-lever to the one pair of said dies for automatically establishing grip on the made link, and after projection of a mandrel to within the partially-formed new link, as hereinafter more fully explained.

Referring to the accompanying drawing, A represents the bed of the machine, and B B C the framework thereon. On the bed A are arranged two pairs of die-tables, D D', forming what may be termed a rectangular stock, and which may be set inward towards a common centre to meet the requirements of wear by means of set-screws, *a a'*. These die-tables carry dies E E', having a radially sliding movement towards or from said centre, said dies being operated by eccentrics F F'. The one set of these dies E is or may be of concave or grooved formation at their inner ends *b*, to hold and fashion the links, as hereinafter described, while the dies E', which operate at right angles to the first set of dies E, have mandrel formations *c* at their forward ends. The eccentrics F', that control the action of the dies E', are secured to shafts *d d'*, linked together so as to move in unison by means of cranks *e e'*, and connecting-rod *f*, the movement of said shafts being controlled by a hand or drop-lever, G, made fast to the one shaft *d*, and spring *h*, connecting the one crank *e* with the fixed point *i*. A similar arrangement of shafts *j j'* coupled by cranks *k k'* and rod *l*, and worked by a lever, H, serves to work the eccentrics F that operate the dies E. These last-named dies, on their upper surfaces, have, the one of them, a groove, *m*, which may be throughout its whole length, while the opposite one of said dies has a similar groove, *m'*, for a portion of its length in front. In the manufacture of chain or chain cable, a link or two of ready-made chain is introduced from above through the central aperture in the bed by hooking it on to a crane consisting, say, of a hook-end rod, I, pivoted to a lever, J, working on a fulcrum as at *s*, and having an up-and-down motion controlled by any suitable stops to adjust it to its work, say, for instance, by catch-slots *n n'* in an upright, K. The rod I of the crane being first raised, the ready-made link, or upper one, P, of a short series of such, is hooked on to the lower end of said rod, which is then lowered till the lever J strikes the upper extremity of the one slot *n*, which adjusts the link P to its proper position for the passage of a blank, L, through it. The dies E' E' are then made to grip the link P, as represented in fig. 2, by letting loose, from any suitable catch or stop, the lever G, which causes the spring *h*, by its tension and connection with the crank *e*, to establish said grip. The heated blank L, (see fig. 1,) of the length required to form a link, there being any number of such blanks in the course of being heated for similar after-treatment, being entered along the groove *m* of the one die E through the link P, and into, at its one end, the groove *m'* of the opposite die E', a downward pull, by any suitable application of force or mechanism, is made upon the ready-made link or links in lower connection with the link P, which causes the blank L to be partially turned or bent up on either side as it is drawn downwards through the grooved ends *b* of the dies E, till the link P is clear of the dies E', when the latter are moved forwards or inwards from the position shown for their front ends or mandrel formations *c c*, by black lines in figs. 2 and 3, to the position shown for said ends by red lines in the last-named figure, bringing the formations *c c* together so as to form a single mandrel. This forward movement of the dies E is or may be produced automatically by the dropping of the lever G, on said dies being released from their grip

on the link P, through the lowering of the latter, as described. The mandrel or mandrel formations *c c* thus brought in contact are securely held thereby, in the dropping of the lever G, the eccentrics F' being brought to assume the position of "dead-centres" relatively to the sliding motion of the dies. This gives a steadiness to the formations *c c*, when set to constitute a mandrel over or on which the new link is being or about to be formed. After this the lever H is shifted so as to turn the cams or eccentrics F F' to a similar "dead-centre" position relatively to the dies E E, which are by such action moved from the position represented for their forward ends *b* by black lines in figs. 1 and 3, to the position shown for them by red lines in the last-mentioned figure, said dies in thus moving finishing the turning up of the sides or legs of the link-blank L, which is shown by red lines in fig. 3, as so bent or turned. Said link-blank held by the dies E E, and with the mandrel *c c* within it, is then ready for closing at its upper or open end, which is done by stamps or hammers M M', having an oblique downward thrust or strike, and operating simultaneously on the upper or exposed ends of the link-blank to close them over the mandrel or formations *c c*, and by, if necessary, a rapid repetition of blows effecting a perfect welding of them, which finishes the link, that by moving back the several dies by their respective eccentrics and levers to their original positions, and adjusting by the crane said new link to its proper angle and position to be clamped by the dies E' E', serves, in its turn, as did the link P, to continue the process by the passage of another straight blank through it, to be operated upon as described in the treatment of the blank L. The hammers M M' may be worked by steam, air, or any other suitable power acting on pistons working in cylinders N N', controlled by any convenient valve motion O operated by a lever, P, to stop, start, and regulate the throw or stroke of the hammers. As such mechanism may be of the character usually applied to steam-hammers or stamps, it is unnecessary here to further refer to the same otherwise than to remark that as it is important the hammers should work in precise unison, the valves to either cylinder N N' should either directly or through their connections be capable of separate adjustment. Any suitable take-up motion may be used on or by which to wind or collect the chain or chain cable as it is made, and to give the requisite downward pull to the links gripped in succession by the dies E' E', to form the new link as described.

What is here claimed and desired to be secured by Letters Patent, is—

1. The combination of the dies E E and E' E', arranged for action together, or relatively to each other, as described, the one set of dies E' E' being provided with mandrel formations *c c*, and the other pair of dies E E with grooves *m m'* or other equivalent guides to the blank, substantially as specified.
2. The combination with the sliding-dies E E and E' E' of the obliquely operating hammers M M', for operation together in the manufacture of chain or chain cable, essentially as herein set forth.
3. In combination with the sliding dies E E and E' E' the eccentrics F F' and F' F', linked together in pairs, and either pair operated at intervals, as described, also the one set of eccentrics being controlled in their action by a spring, *h*, and drop-lever G, or the equivalents of such devices, substantially as specified.

W. D. GRIMSHAW

Witnesses:

J. W. COOMBS,
G. W. REED.