

(No Model.)

2 Sheets—Sheet 1.

C. SYVERSON.
FORGING MACHINE.

No. 371,638.

Patented Oct. 18, 1887.

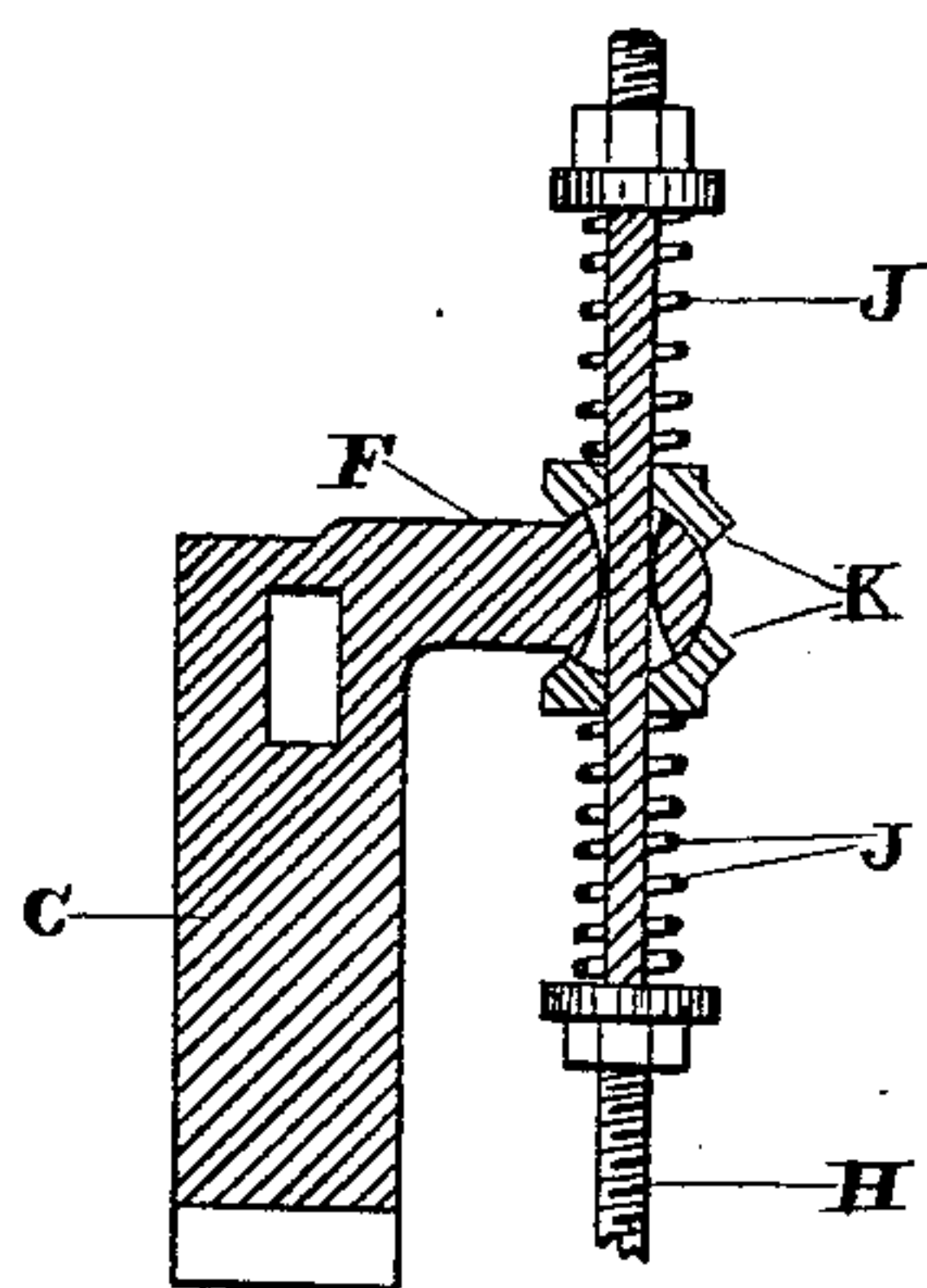


Fig. 3.

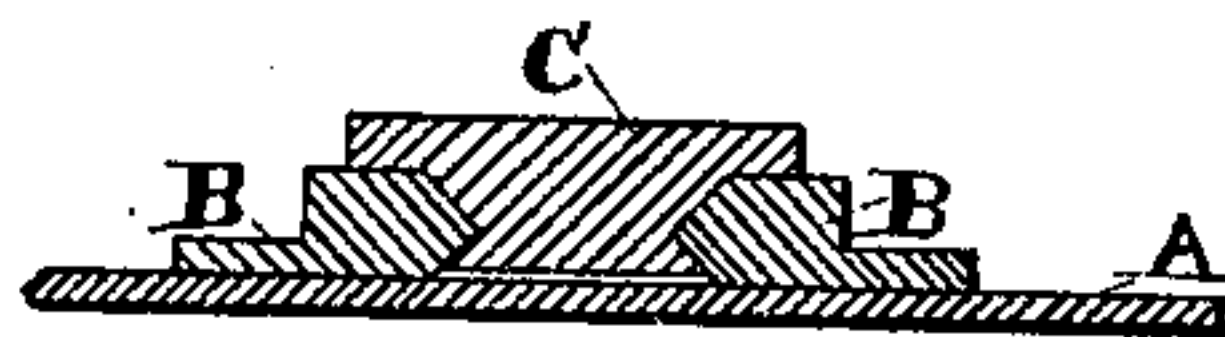


Fig. 5.

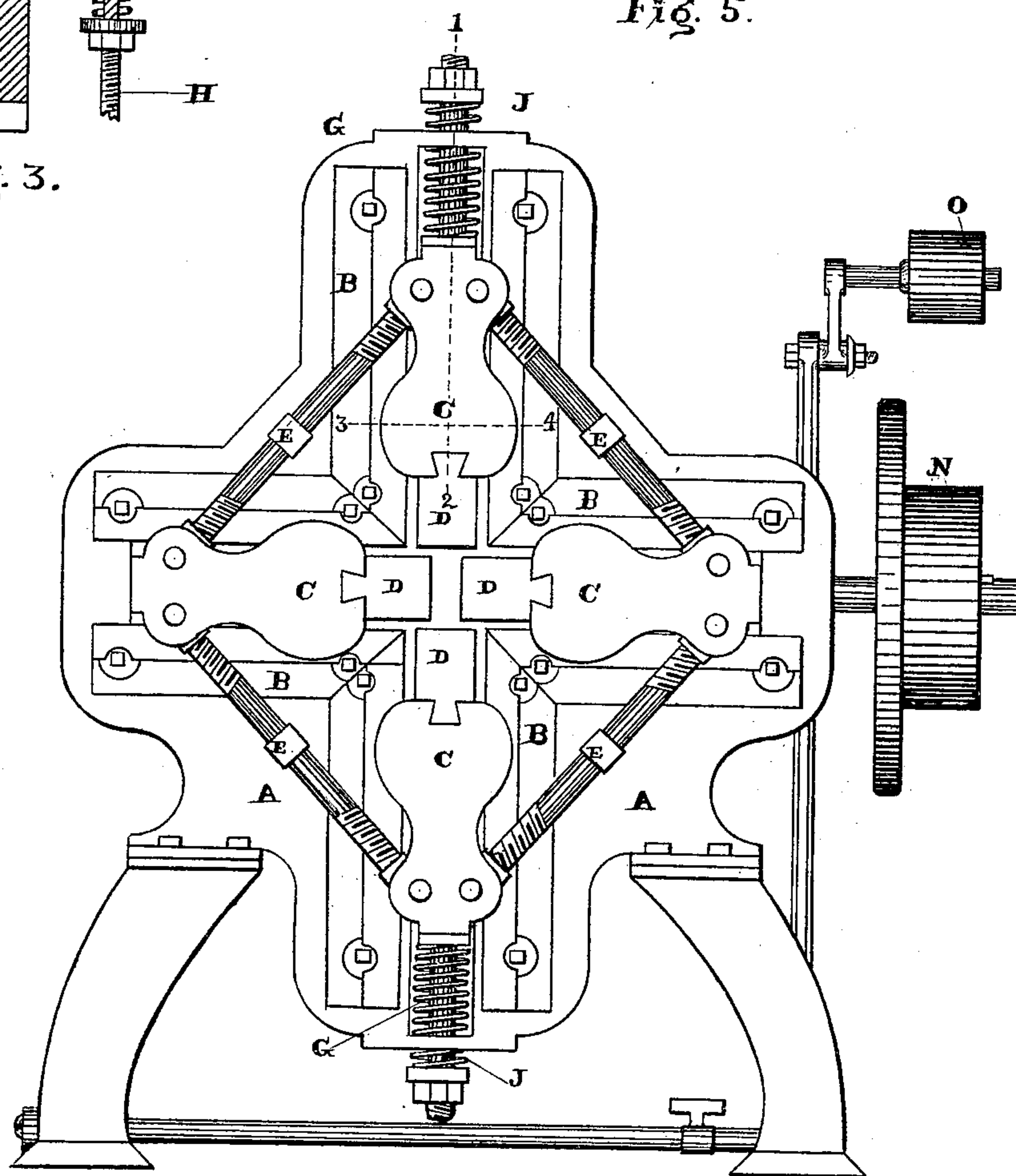


Fig. 1

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Louis W. Claude

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Carl Syverson

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ATTORNEY

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Fig. 4.

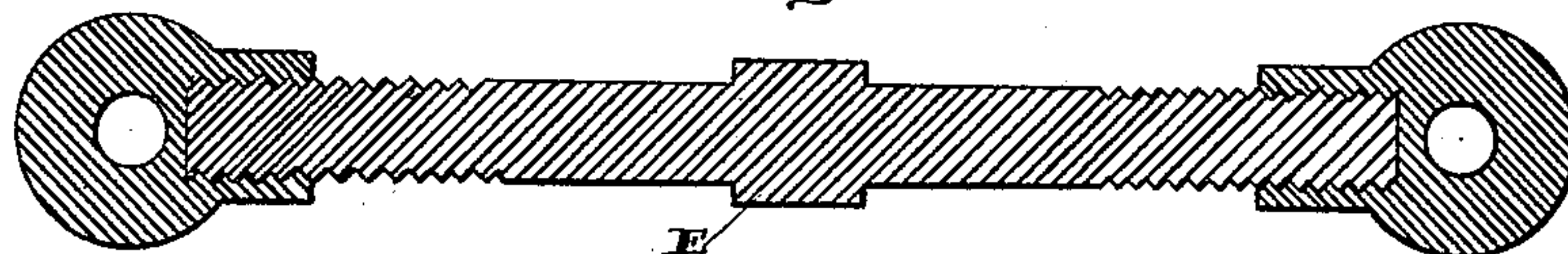
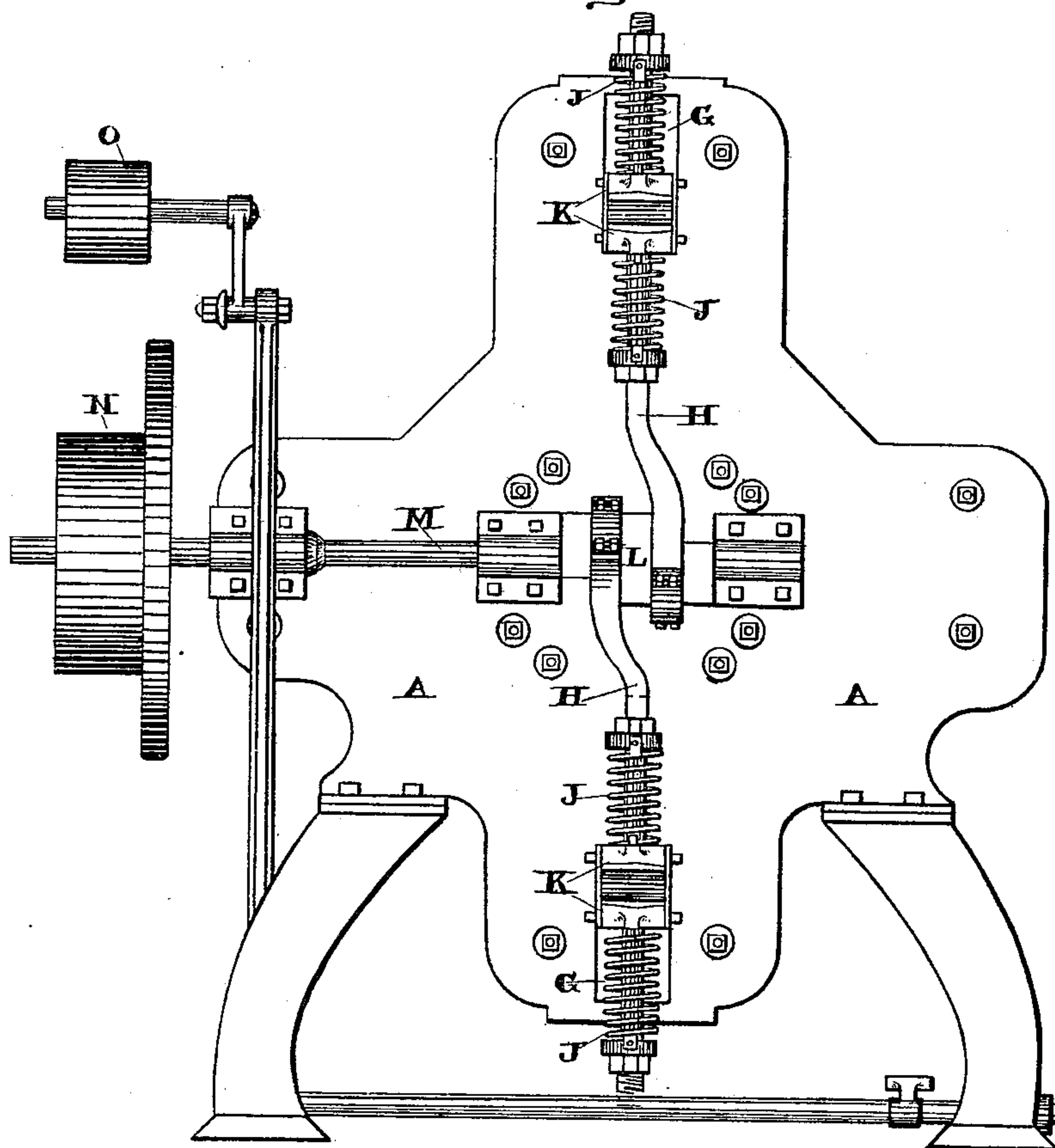


Fig. 2.



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UNITED STATES PATENT OFFICE.

CARL SYVERSON, OF MADISON, WISCONSIN, ASSIGNOR OF TWO-THIRDS TO
MADISON H. BALL AND HIRAM W. BALL, BOTH OF SAME PLACE.

FORGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 371,638, dated October 18, 1887.

Application filed November 13, 1886. Serial No. 218,834. (No model.)

To all whom it may concern:

Be it known that I, CARL SYVERSON, a citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin,
5 have invented a new and useful Forging-Machine, of which the following is a specification.

My invention relates to forging-machines in which radial hammers reciprocate to and from a central forging-point.

10 Heretofore in such machines the hammers have been actuated either by the use of springs and cams or by gearing and connecting-rods, both of which methods are objectionable, because a blow of the same power is always
15 struck under any given adjustment of the operative parts and cannot be changed except by stopping and readjusting them, and because each hammer operates independently of the others, rendering it impracticable to secure
20 simultaneity of action, and because the power required to operate the hammers when their striking power is derived from springs is equal to the combined power of all the springs.

The object of my invention is to provide a
25 forging-machine in which the hammers are united, and their action is therefore positive and simultaneous, and which will permit of the changing of the power of the blows while the machine is at full speed, and that shall
30 require the least expenditure of power to effectively operate.

My invention consists of a forging-machine having its hammers arranged in radial guides upon a bed-plate to reciprocate to and from
35 a central forging-point, the hammers being connected together by links pivotally attached to the hammer-heads in such manner that the links form a parallelogram, having its diagonals coincident with the lines of motion of the
40 said hammer-heads.

A forging-machine having its hammers arranged and connected as above described can be operated by motive power applied to any one of the hammer-heads in such manner as to
45 cause it to reciprocate between its guides, such motion of any one of the hammer-heads being communicated by means of the links to all the others and causing the opposite hammers to meet at and recede from the central forging-point in alternate pairs.
50

My invention consists, further, of a means of applying motive power to the arrangement of hammers above described, which I accomplish as follows: A crank-shaft is attached to the back of the bed-plate. From the crank or
55 cranks thereon a connecting-rod extends to either one or both of the hammer-heads whose line of motion is at right angles to such crank-shaft, and passes through a lug projecting from the hammer-head back through a slot in the
60 bed-plate. Upon each side of the lug a powerful spring is placed around the connecting-rod, which springs are secured in place by set-nuts on the connecting-rod, the lug ends of
65 said springs being held in position by an oscillating socket which bears upon the lug and through which the connecting-rod passes.

The connecting-rod is not directly attached to the lug, but communicates motion to it by means of the springs bearing upon the opposite sides of the socket, which allows the connection sufficient freedom of motion to utilize the springs as a cushion for the blows given by the hammers, and to permit the weight of the blow to be regulated through the tension
75 obtainable on the springs by means of the set-nuts on the connecting-rod. By placing the tension on one of the springs in excess of the tension on the other the machine can be so adjusted that one pair of hammers will strike a
80 heavier blow than the other pair.

The length of the stroke can be regulated by means of the extension-link, which consists of three pieces. The middle portion having a right-and-left screw on its ends and working in the two outer portions of the link
85 operates to expand or contract the length of the link.

In the accompanying drawings, in which similar letters of reference indicate like parts, 90
Figure 1 is a front elevation of a device embodying my invention. Fig. 2 is a rear elevation of the same. Fig. 3 is an enlarged sectional view of a hammer-head upon the line 1 2, Fig. 1, showing the details of the lug and
95 connecting-rod joint. Fig. 4 is an enlarged longitudinal section of the extension-link. Fig. 5 is a cross-section of the hammer head and guides upon the line 3 4, Fig. 1.

Upon the bed-plate A the radial guides B B 100

B B are secured by bolts or otherwise, between which guides the hammer-heads C C C C are fitted to slide freely back and forth, such hammer-heads being dovetailed upon their inner ends to receive the dies or hammers D D D D. The links E E E E are pivoted at each end to the hammer-heads C C C C in such manner that the said links E E E E shall form the sides of a parallelogram having its diagonals coincident with the lines of motion of the hammer-heads C C C C. From the back of two of the hammer-heads C C a projection or lug, F, Fig. 3, extends through the slot G in the bed-plate A. Through said lug F the connecting-rod H extends to a sufficient distance beyond the lug to afford room for the spring J.

The outer end of the springs J J are held in place by set-nuts upon the connecting-rod H, which is threaded for that purpose, the inner or lug ends of said springs being held in position by the socket K (which is shown as consisting of two separate parts, it being equally efficient when so constructed) bearing upon the lug F. The end of the lug F is shown as having a cylindrical form, the socket K being formed to oscillate thereon, and the hole or slot in the lug F, through which the connecting-rod H passes, is shown of such form and size as will permit the oscillation of the connecting-rod H to the extent rendered necessary by the throw of the crank L, Fig. 2. This form of construction is necessary when the power is derived from a crank-shaft, as shown in the drawings; but when the power is received direct from a steam-cylinder attached to the bed-plate A there need be no oscillation of the connecting-rod H, as it will be but a continuation of the piston and have only a longitudinal reciprocating motion.

Fig. 2 shows the crank-shaft M, having two cranks placed opposite to each other, from which the connecting-rods H H extend to and are connected with the opposite hammer-heads of a pair.

The links E E E E may be constructed of but one piece, but the use of the extension-link, shown on the drawings as Fig. 4, produces a machine of much greater capacity both as to size and variety of work by reason of the adjustability of the stroke of the hammers.

The crank-shaft M can be placed at one side of the center of the bed-plate A to make an open-center machine, and if connected to a pair of hammer-heads, as shown, the connecting-rods H H can be of different lengths and one of them curved to avoid the central opening. As it is only necessary to impart motion to one of the hammer-heads to cause them all to operate, there need be only one connecting-rod used where an open-center machine is desired.

The operation of the device is as follows: When power is applied to the crank-shaft M, it is transmitted to the hammer-head by the

connecting-rod H, and such hammer-head imparts its motion to all the others through the links E E E E, causing said hammer-heads C C C C to alternately reciprocate to and from the center in pairs. The links E E E E cause the hammers to reach the center at exactly the same instant, a result not heretofore attained in machines of this class. The weight of the blows given by the hammers may be changed by moving the set-nuts on the connecting-rod H so as to tighten or loosen the springs J J, the outer springs being tightened when it is wished to cause a pair of hammers to which the connecting-rod is attached to strike a heavier blow than the other pair, the inner springs being made the tightest when the opposite effect is desired. They can be further regulated by the speed of the machine, which is governed by the idle-pulley and treadle in the machine shown at O in the drawings. When a blow is struck by either pair of hammers, the outward impetus of the other pair of hammers is added, by reason of the link-connection, to the momentum of the striking pair at the culmination of the stroke, nearly doubling the effectiveness of the blow given, so that a hammer-head one-half lighter than in any other machine of this class heretofore devised can be used to produce a given effect. As the recoil of the striking pair of hammers at each blow overcomes the momentum of all of them, the working parts can be so adjusted as to commence the reverse motion at the instant of the recoil, and the power required to operate the device will be only so much as is necessary to overcome the inertia of the moving parts and raise them to the desired speed. When it is desirable to have a machine with only one pair of hammers, simple guide-blocks or "dead-heads" may be substituted for the other pair of hammer-heads as a means of connecting the links, and the device will then be equally efficient for the operation of the single pair of hammers.

Having fully described the construction and operation of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a forging-machine, the hammers arranged in guides upon a bed-plate to reciprocate to and from a central forging point, combined with extensible links pivotally connected with them, substantially as set forth.

2. In a forging-machine, the hammers arranged in guides upon a bed-plate to reciprocate to and from the central forging point, combined with links pivotally connected with them and a cushioned reciprocating connecting-joint interposed directly between the hammers and the driving mechanism, substantially as set forth.

3. In a forging-machine, the combination of the hammer-heads C C C C, carrying the dies or hammers D D D D, and reciprocating

between the radial guides B B B B, the latter secured to the bed-plate A, with the pivotally-attached connecting-links E E E E, and the cushioned reciprocating connecting-joint, which
5 consists of the lug F, springs J J, socket K, and the connecting-rod H, said connecting-rod H receiving its motion from the crank L upon

the crank-shaft M, to which the motive power is applied by means of the pulley N, substantially as set forth.

CARL SYVERSON.

Witnesses:

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C. L. BURDICK.