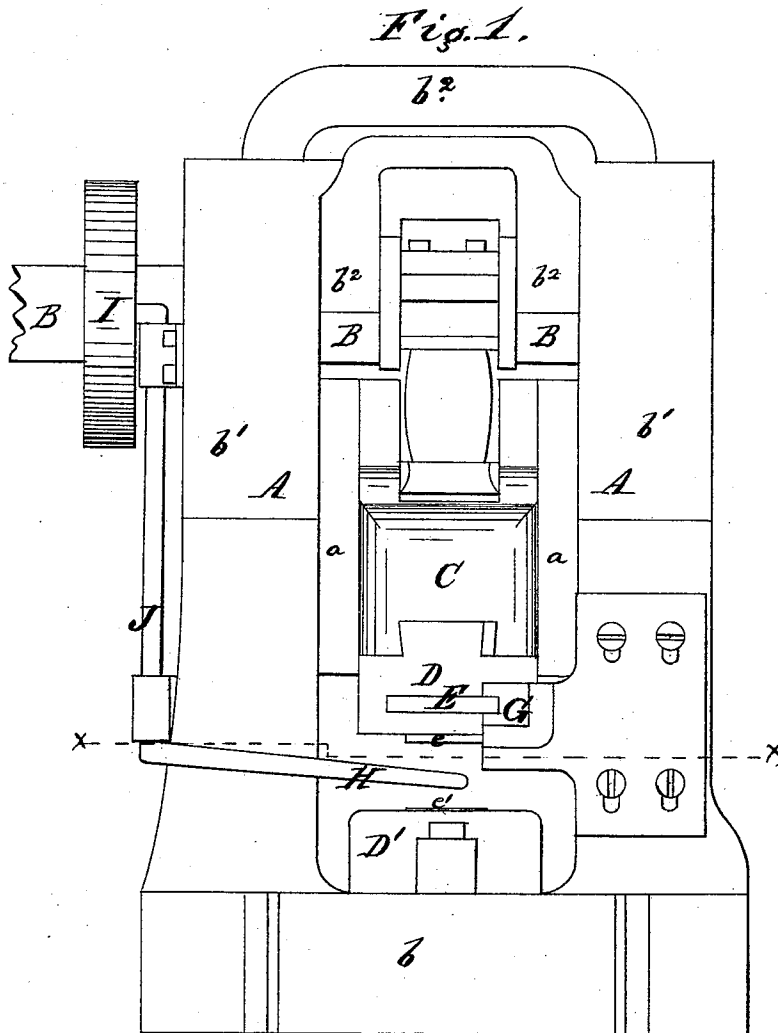


J. J. & L. CROOKE.
Machines for Forging Solid Belted Hinge Pivots.
No. 142,774. Patented September 16, 1873.



Witnesses
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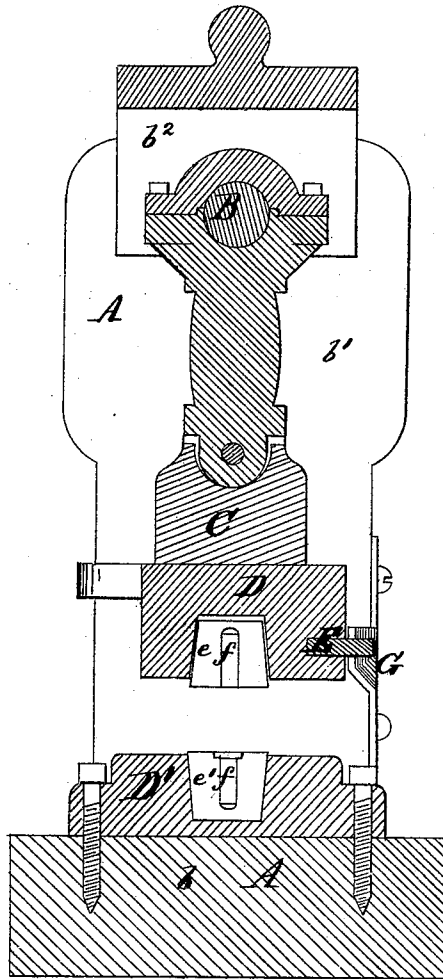
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Fig. 2.



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Fig. 3.

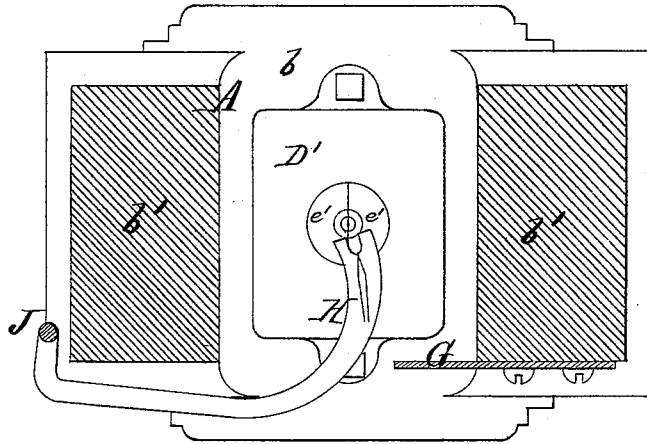


Fig. 6.

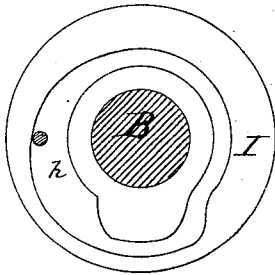


Fig. 5.



Fig. 4.

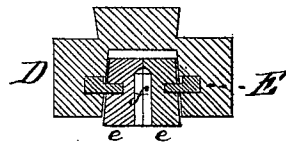


Fig. 9.

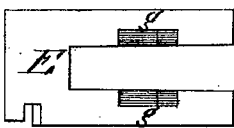


Fig. 7.

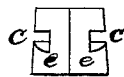


Fig. 8.



Fig. 10.

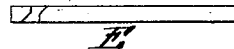
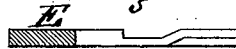


Fig. 11.



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UNITED STATES PATENT OFFICE.

JOHN J. CROOKE, OF SOUTHFIELD, AND LEWIS CROOKE, OF NEW YORK, N. Y.

IMPROVEMENT IN MACHINES FOR FORGING SOLID-BELTED HINGE-PIVOTS.

Specification forming part of Letters Patent No. **142,774**, dated September 16, 1873; application filed August 30, 1873.

To all whom it may concern:

Be it known that we, JOHN JEREMIAH CROOKE, of Southfield, in the county of Richmond and State of New York, and LEWIS CROOKE, of the city, county, and State of New York, have made an invention of a new and useful Machine for Forging Solid-Belted Hinge-Pivots; and that the following is a full, clear, and exact description and specification of the same.

The object of the invention is to produce from round iron solid-belted hinge-pivots, or hinge-pivots having a belt or enlargement between their ends, which belt is of one and the same piece of metal as the stem of the pivot. The principal feature in this machine is a combination of two pairs of gripping and upsetting dies, which gripe the opposite extremities of a pivot-blank or piece of round iron, leaving a portion between their ends free, and then forcibly approach each other in the direction of the length of the blank, so as to upset the metal, or compress the blank in length, and compel the metal to expand radially and form an enlarged belt. The said dies may be operated in various ways—as, for example, by means of a slide or slides driven by one or more cranks, or by means of a drop.

In order that the invention may be fully understood, we have represented in the accompanying drawings, and will proceed to describe, a machine embodying the said invention in a form which operates satisfactorily.

Figure 1 represents a front view of the machine. Fig. 2 represents a central vertical transverse section of it. Fig. 3 represents a horizontal section of the machine at the line *xx* of Fig. 1. Figs. 4 to 11, inclusive, represent detached parts of the machine, denoted by the same letters as are applied to the same parts in the other figures.

The machine represented in the said drawings has a strong frame, A, comprising a base, *b*, two standards, *b'* *b'*, and the bridge *b''*, uniting the said standards. The standards sustain a revolving crank-shaft, B, by means of which a reciprocating motion is imparted to a slide, C, which is arranged to move vertically in guides *a* secured to the inner faces of

the standards of the frame. The slide is fitted at its lower end with the die-block D of the upper dies *ee*. Below this die-block is the die-block D' of the lower dies *e'e'*. Each die-block is formed with a socket to contain a pair of dies. (See Fig. 4.) The cavity *f* of each pair of dies is of the same curvature as the stem of the hinge-pivot to be formed. The depth of the cavity of the upper dies *e* is equal to the distance between the end of the said pivot and the adjacent face of the solid belt. The depth of the cavity of the lower dies *e'* is equal to the length of the residue of the hinge-pivot, and the mouth of the cavity is counter-bored to admit the belt when it is formed. The exteriors of both pairs of dies are conical, and the sockets in the die-blocks correspond in conicity with said exteriors, so that the forcing of the dies into the sockets of the die-blocks causes the faces of the dies of a pair to approach each other horizontally, and to gripe the blank which may be between them. On the other hand, the partial withdrawal of the dies from the sockets in the die-blocks permits the faces of the dies of a pair to separate horizontally, and release the article between them. The upper pair of dies are moved partially into and out of the socket of the upper die-block by means of the transverse slide E and the incline G. The former is forked at its inner end, and the branches, *g g*, Fig. 9, of the fork are inclined and arranged to move to and fro in transverse slots *cc*, Figs. 7 and 8, formed in the sides of the dies, while the incline E is secured to the frame of machine, and is received in a slot of the transverse slide. The faces of the incline G vary from the plane of movement of the die-slide C, so that the upward and downward movement of the transverse slide by the die-slide, causes the transverse slide to move to and fro under the action of the incline G, and compels the two upper dies *ee* to separate and approach each other. The separation of these dies releases the pivot that may have been gripped by them, and their approach causes them to gripe the new blank which may be presented to them.

In order to remove a pivot-blank from the

dies, the discharger H is provided. This discharger has the form of an arm, which projects from an upright rock-shaft, J. The latter is held in bearings at the side of the frame of the machine, and has at its upper end a toe, which is received in, and operated by, the cam-groove *h* of the cam I, that is secured to the shaft B. As the said cam revolves with the shaft, it causes the rock-shaft J to rock, so as to move the end of the discharger H into the space between the two pairs of dies *e e'*, when the upper pair is raised, and to withdraw the discharger from that space before the upper pair of dies is forced down. The end of the discharger is forked to receive the pivot, and one or both jaws of the fork are springs, so that the pivot is held by being clasped by the jaws with a yielding pressure. The arrangement of the parts is such that when the end of the feeder is innermost the pivot-blank held by the upper pair of dies is seized by the jaws of the discharger, so that when the upper dies separate and release the pivot it remains in the grasp of the discharger, and is withdrawn from beneath the slide by the outward movement of the discharger before the upper dies descend again.

The shaft B of the machine is fitted with a belt-pulley, to which the power is imparted by a belt, and also with a fly-wheel, to accumulate force. When the machine is in operation, pivot-blanks, consisting of straight pieces of round iron of the requisite length, are inserted, one at a time, into the cavity of the upper pair of dies, by an attendant, who handles the blanks with a spring-tongs. Then, as the upper dies descend and are moved into the conical socket of their die-block, they gripe the blank and permit the tongs to be withdrawn. As these dies continue to descend, they force the blank endwise downward into the cavities of the lower pair, and when the point of the blank touches the bottom of these cavities the lower dies themselves are forced downward in the conical socket of the die-block until further downward movement is impossible. The downward movement of the lower dies in the conical socket causes them to approach each other, so that when they cease to move downward the lower portion of the pivot-blank is griped and incased in the lower dies, its upper portion is griped and incased in the upper dies, and its central portion is at that time free; consequently the further descent of the upper dies upsets the metal of this central portion, compressing it in length, and compelling it to expand in diameter and form a solid belt, the form of which is determined by the horizontal surfaces of the dies, and by the counter-bore of the lower pair of dies.

After the completion of the pivot by the above-described operation, the continued rotation of the driving-shaft B withdraws the die-slide C from the lower dies. As it moves

upward the upper pair of dies are compelled to move with it by the action of the transverse slide E, and to maintain their gripe upon the pivot, so that it is pulled upward. The gripe of the lower dies upon the pivot causes them at first to adhere to the pivot, so that they are pulled slightly upward in the socket of the lower die-block; but as this socket is conical, a slight upward movement of the lower dies permits them to separate and release their gripe upon the pivot, so that it is drawn out of them by the continued upward movement of the upper dies. When the pivot is thus pulled out of the lower dies the discharger, advancing between the two pairs of dies, seizes the pivot in its jaws, and the upper dies, continuing to rise, are permitted to separate by the action of the incline G and transverse slide E, so as to free the pivot, which is then withdrawn from the space between the pairs of dies by the retrograde movement of the discharger. Meanwhile the attendant has picked up a pivot-blank with his tongs, so that when the completed pivot is withdrawn by the discharger, a new pivot-blank can be fed to the machine before the dies close. A stop is placed in the way of the pivot that is carried out of the machine by the discharger, so that the outward movement of the pivot is stopped before the discharger reaches its most outward position, and consequently the discharger is pulled off of the pivot, permitting the latter to drop.

We prefer to move the upper pair of dies in the die-block by means of the transverse slide and incline; but the movement of these dies may be accomplished, without discarding the invention, by any other suitable mechanical substitute which will move them the requisite extent at the requisite times.

From the above description it will be seen that the dies of each pair gripe the blank radially, and that the approach of one pair of the dies to the other pair in a direction longitudinally of the blank while the metal is so griped produces the enlargement of the blank at the ungripped portion; also, that the adjacent end surfaces of the pairs of dies finish the opposite surfaces of the said enlargement or belt.

We claim as the invention, to be secured by Letters Patent—

1. The combination, substantially as before set forth, of the two pairs of gripping and upsetting dies, so operated as to gripe the blank radially to upset the blank longitudinally by the approach of one pair to the other longitudinally of the blank, and to form the opposite faces of the upset portion of the blank.

2. The combination, substantially as before set forth, of the pair of gripping and upsetting dies having a conical exterior with a

die-block having a conical socket to receive said dies.

3. The combination, substantially as before set forth, of the pair of dies, the die-block, and the transverse slide and incline.

4. The combination, substantially as before set forth, of the two pairs of gripping and upsetting dies and the discharger for removing the pivot from between them.

Witness our hands this 28th day of August,
A. D. 1873.

J. J. CROOKE.
LEWIS CROOKE.

Witnesses:

W. L. BENNEM,
W. H. ISAACS.