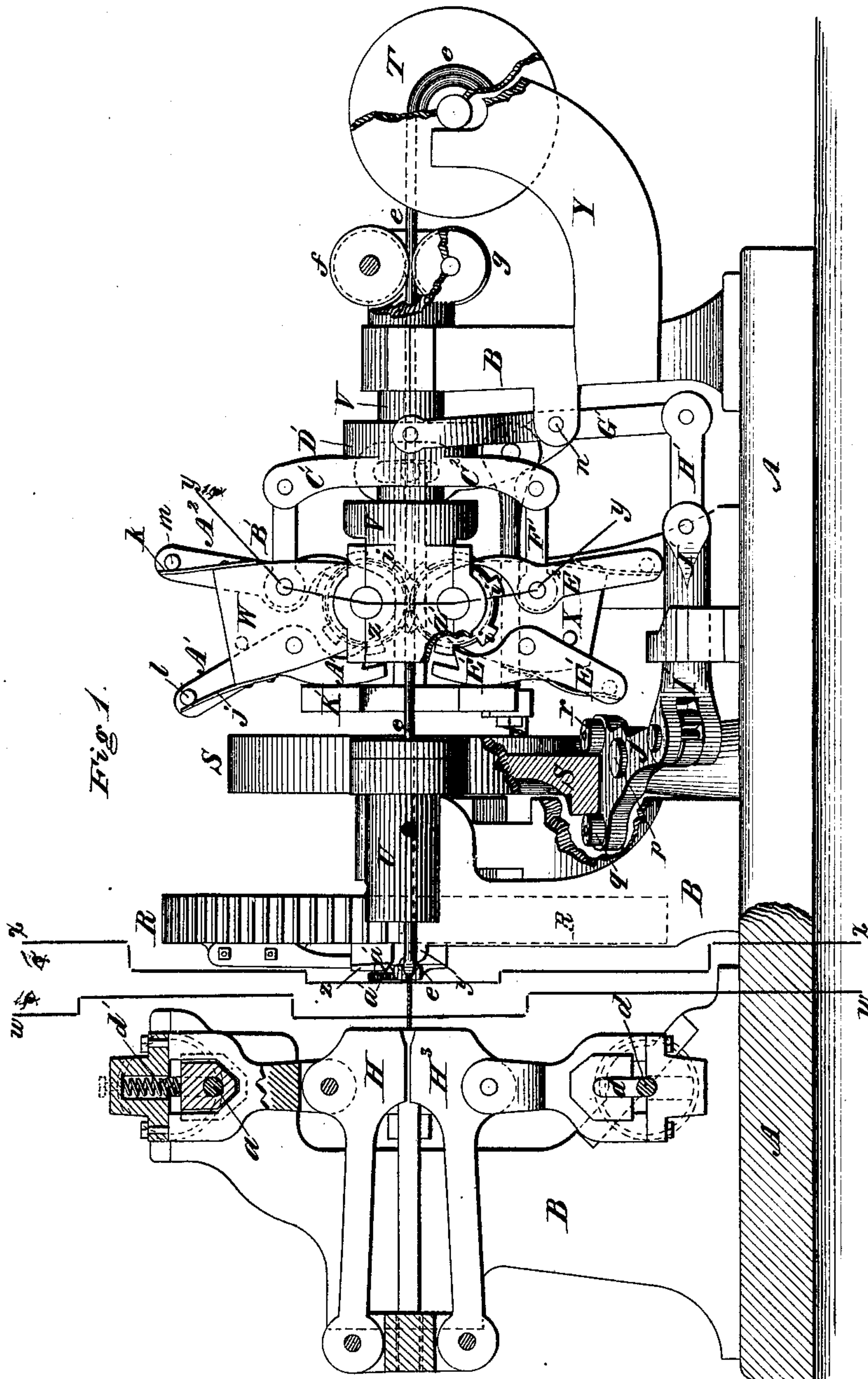


J. ROY.

MACHINES FOR FORGING HORSESHOE-NAILS.

No. 195,653.

Patented Sept. 25, 1877.



Witnesses.

Harry King
W. E. Chaffee.

Inventor.

Joseph Roy,
By his attorneys,
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Fig. 3.

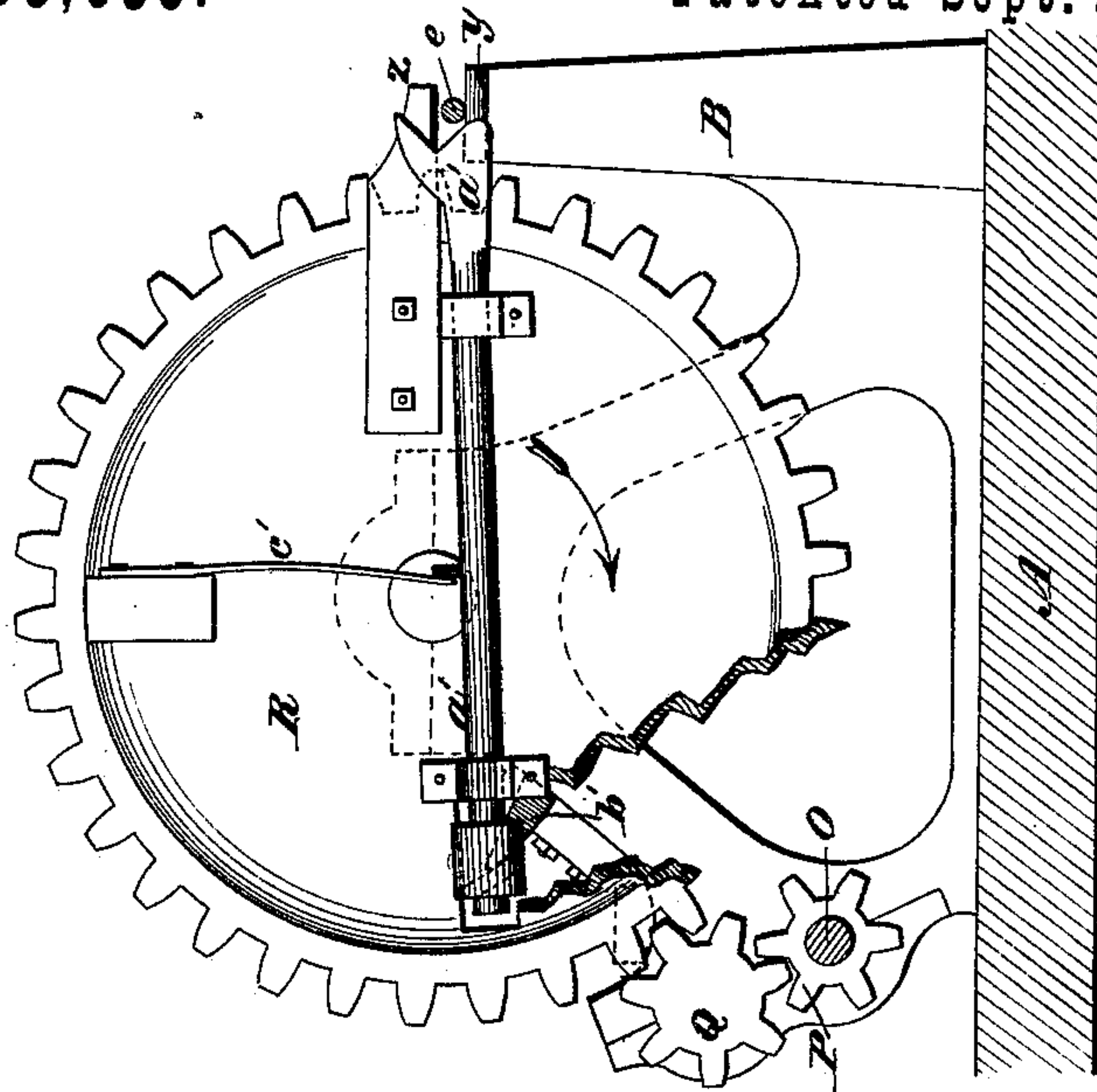
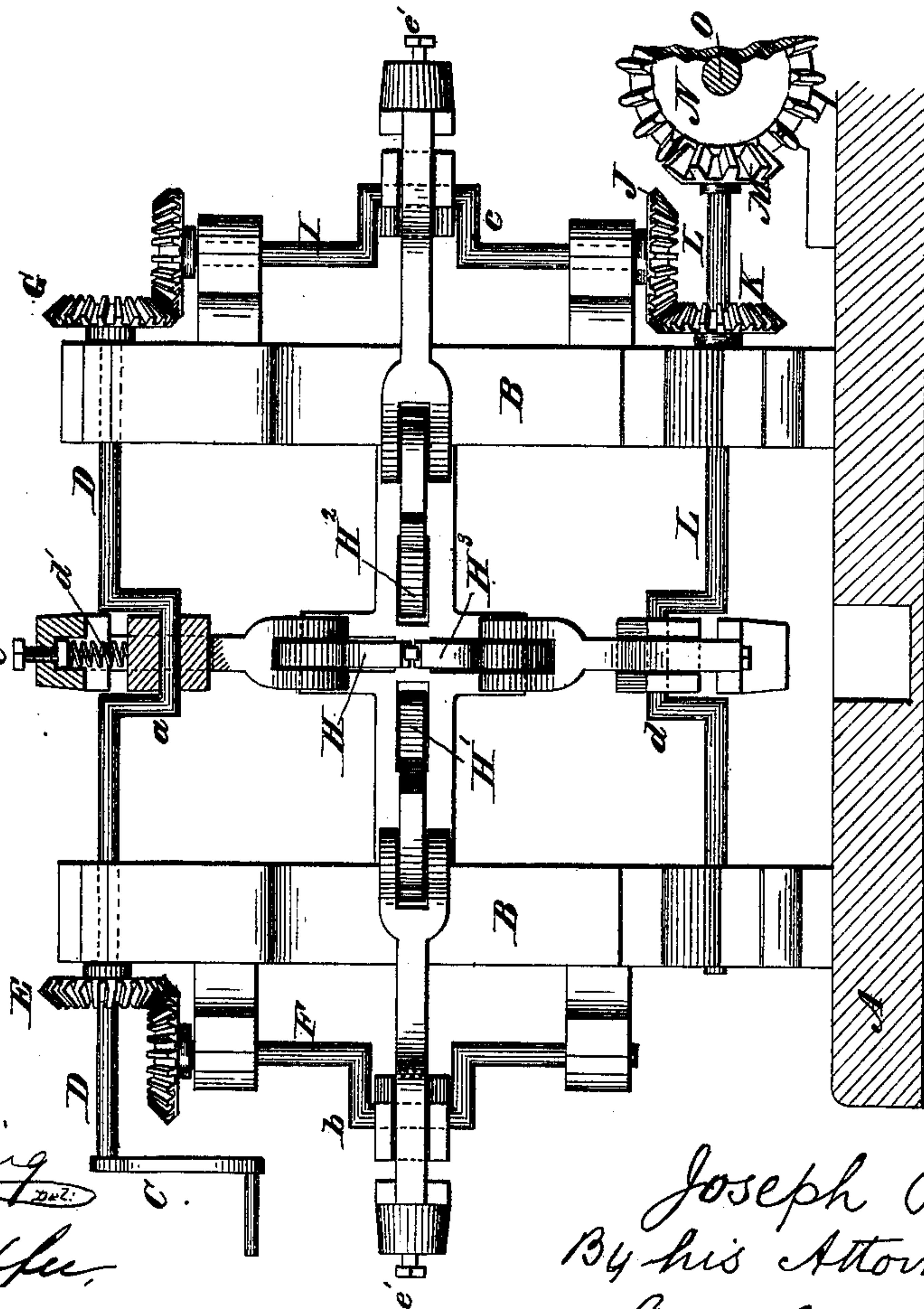


Fig. 2.



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Fig 6.

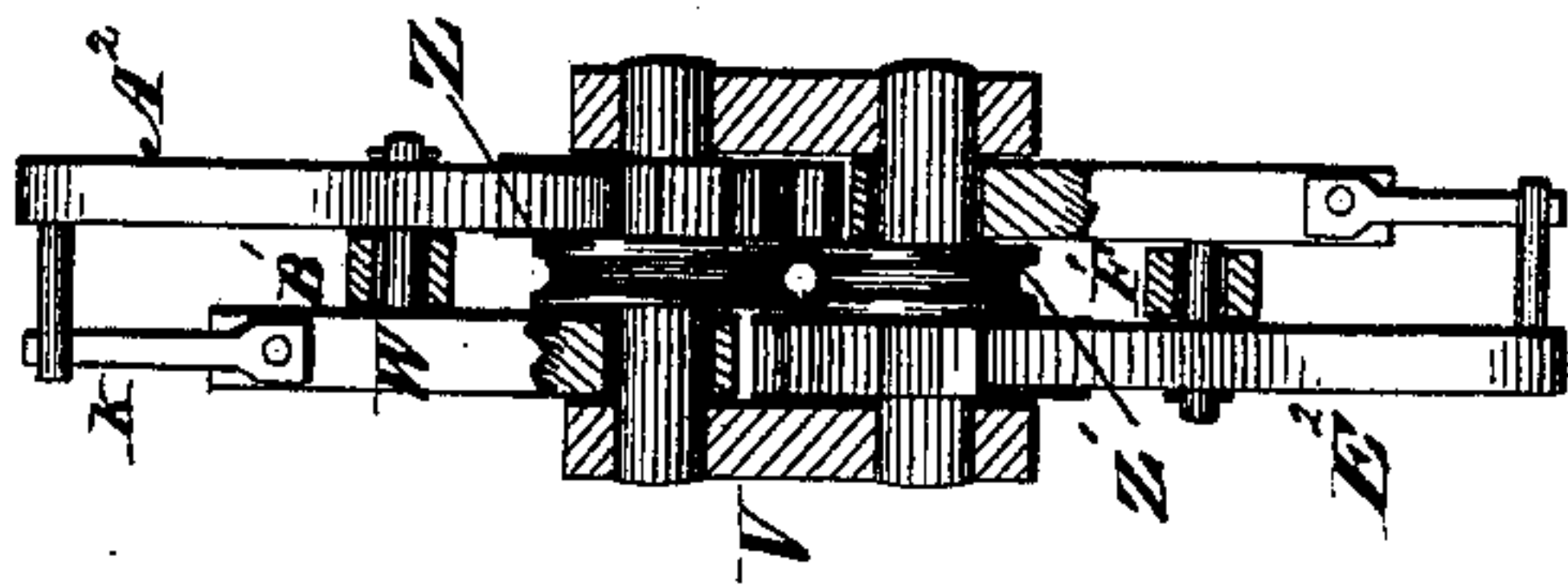


Fig 5.

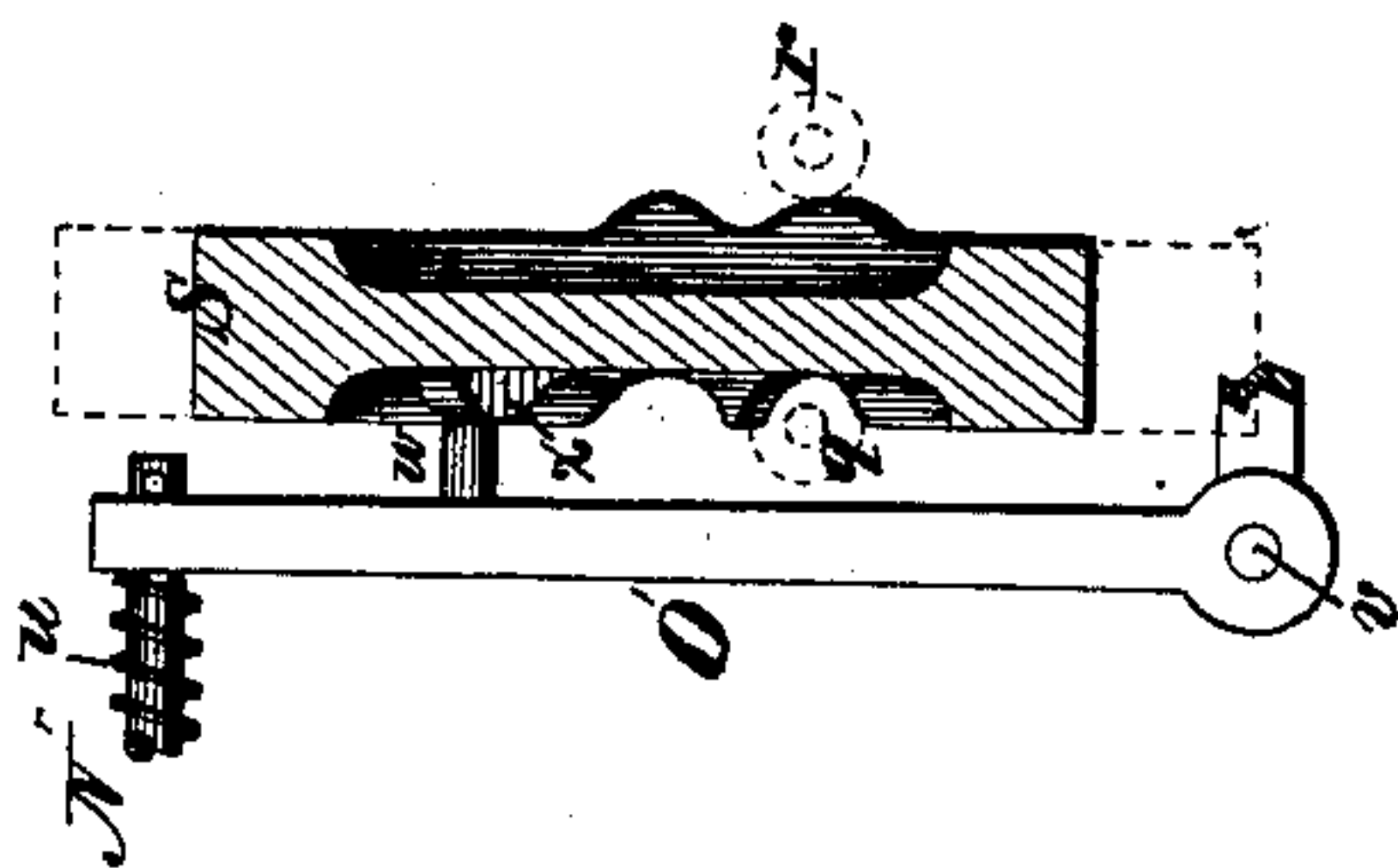
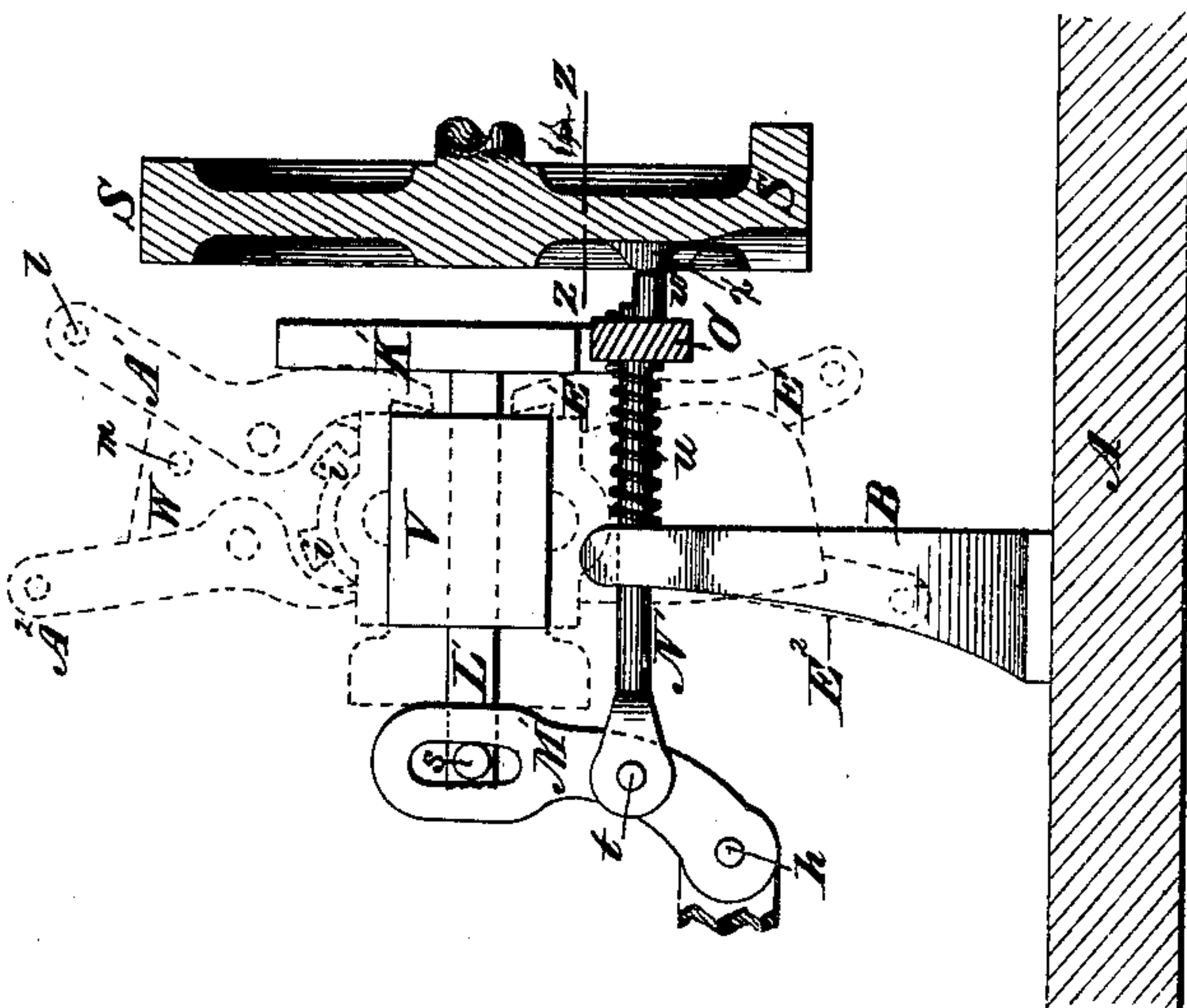


Fig 4.



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UNITED STATES PATENT OFFICE.

JOSEPH ROY, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR FORGING HORSESHOE-NAILS.

Specification forming part of Letters Patent No. 195,653, dated September 25, 1877; application filed February 28, 1877.

To all whom it may concern:

Be it known that I, JOSEPH ROY, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Horseshoe-Nail Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation of the machine, partly in section. Fig. 2 is a transverse section on line *ww* of Fig. 1, looking toward the hammers. Fig. 3 is a transverse section on line *xx* of Fig. 1, looking toward the feed end of the machine. Fig. 4 is a side elevation of the mechanism for operating the forward pawls, the cam-wheel S being shown in vertical section. Fig. 5 is a horizontal section on line *zz* of Fig. 4; Fig. 6, a vertical transverse section on line *yy* of Fig. 1, looking toward the delivery end of the machine.

In the description the hammer end is referred to as the front, and the reel end as the rear, of the machine.

The same part is indicated by the same letter of reference wherever it occurs in the drawings.

This invention relates to machinery for making horseshoe-nails by an automatic and continuous process, the nail-rod being subjected to the direct action of heat in the flame of a gas-furnace during the entire operation of forging.

It consists of a number of improvements on the horseshoe-nail machinery heretofore invented by me, and for which Letters Patent were granted to me October 2, 1866, No. 58,485, and October 19, 1875, No. 169,044; reissued November 30, 1875, No. 6,776.

The improvements on my former inventions consist, first, in dispensing with the anvillies, the nail being formed by the shape of the faces of the hammers, four of which cooperate in the forging process; second, in connecting the hammers with their driving crankshafts by adjustable springs, so as to give a regulated, elastic, yet strong and quick, blow;

third, in a simplification of the mechanism for severing the finished nail from the rod; fourth, in an addition to the rod-feeding mechanism by which the nail-rod, as soon as the forging of the nail is completed, is drawn back to the proper point to be severed; fifth, in a peculiar device for ejecting the finished nail from the machine.

In the accompanying drawings, A marks the bed-plate of the machine, from which rise a number of uprights, B, forming the frame by which the operative parts are supported. C indicates the point of application of the driving-power at the end of the main shaft D. At the middle of that shaft is a crank, *a*, by which one of the forging-hammers H is driven. On the end of shaft D is attached bevel-gear E, which meshes into a similar gear on the top of upright shaft F. This shaft has a crank, *b*, at its middle, by which one of the side forging-hammers H¹ is driven. On the opposite end of shaft D is a gear, G, meshing into a similar gear on the upper end of upright shaft I, the middle of which forms a crank, *c*, by which lateral hammer H² is driven. At the bottom of shaft I is fixed a bevel-gear, J, meshing into a similar gear, K, on shaft L, the middle of which forms a crank, *d*, to drive the bottom hammer H³.

On the end of shaft L is a bevel-gear, M, meshing into a similar but larger gear, N, on the end of shaft O. At the opposite end of O is gear P, engaging gear Q, which meshes into large gear-wheel R, carrying the severing and ejecting devices hereinafter described.

On the same shaft with wheel R is a wheel, S, on both of whose faces are cams, which control the mechanism, hereinafter described, for effecting the forward and back feed of the nail-rod.

T is the reel, hung in brackets Y, on which the nail-rod *e* is wound, and from which it is fed, between pulleys *f g* and through a tubular head, V, to the gas-furnace U, which is similar in construction and operation to that described in my former patents.

The feed of the nail-rod is effected by means of rollers Z Z' inserted in the head V, and each provided with ratchet-teeth *i* and a pair of pawls, by which its movements are effected. The upper pawls A¹ A² are pivoted to a plate,

W, vibrated on the journal of the upper roller Z by means of the rod B' pivoted to the upper arm C¹ of the annular slide D'. They are provided with pins *l m*, operating against springs *j k*, and by their action on the ratchet-teeth *i* of the upper roller Z serve to feed the nail-rod backward or forward, toward or from the hammers.

The lower pawls E¹ E² are pivoted to a plate, X, suspended from the journal of the lower roller Z', and vibrated by a rod, F', connecting it with the lower arm C² of the annular slide D'. This slide is hung in a Y-lever, G', having its fulcrum at *n*, and its lower arm pivoted to link H¹, which connects it with slide-rod I'. This rod is pivoted to lever J', which has its fulcrum at *p*, and whose short arm embraces, by two small friction-rollers, *q r*, the rim of cam-wheel S, and is operated by it.

The forward pawl A¹ is held out of engagement with the ratchet-teeth *i* of roller Z by means of the spring *j* until it is thrown into engagement with them by the slide K' attached to the arm L', pivoted at *s* to the slotted vibrating arm M', pivoted to the frame at *h*. (See Fig. 4.) To arm M' is pivoted, at *t*, the slide-rod N', whose opposite end is attached to lever O', as shown in Fig. 5. Around rod N' is wound the spiral spring *u*, whose reaction tends to drive the lever O' toward the cam-wheel S. A pin, *w*, on the inner side of lever O' engages at each revolution of wheel S with a projecting dog or cam, *x*, on the outer face of said wheel, and thus a backward movement of rod N' is effected, and the slide K' is drawn back into contact with the front pawls A¹ E¹, and throws them into engagement with the ratchet-teeth of rollers Z Z'. When thus engaged, these pawls act to draw the nail-rod *e* back from the hammers a distance equal to that between the ratchet-teeth, which is made equal to the length of rod required to make a nail. The rear pawls A² E² are always in engagement with the teeth of their respective rollers, and their operation is to turn the rollers in the direction to feed the nail-rod toward the hammers.

The lower set of pawls is operated in the same manner as the upper ones, and they cooperate with them in turning the rollers Z Z' so as to carry the nail-rod forward or back, as desired.

All the pawls except the upper forward one, A¹, are operated by the lever G', connected, by link H¹ and slide-rod I', with the lever J', which, by its friction-rollers *q r*, embraces the rim of cam-wheel S, and is operated by cam-surfaces on either side of said rim, as shown in Fig. 5.

The nail-rod is fed forward till a sufficient length to make a nail is subjected to the action of the hammers. When the forging of the nail is completed the rod is drawn back by one throw of pawls A¹ E¹ to the severing-cutters, that the nail may be cut from the rod. The rod is then thrown forward by two throws of the rear pawls A² E², to be again

subjected to the action of the forging-hammers. The severing device is placed back of the hammers a distance equal to one throw of the pawls, so that one throw brings the nail back to be severed, and two throws forward are necessary to introduce a new portion of the nail-rod between the hammers.

The rod is severed after the nail is completed by a cutter, *z*, attached to the periphery of wheel R, and coming down upon the nail when drawn back from the hammers and resting upon the stationary cutter *y*. Attached to the face of wheel R is a spring fork or slide, *a'*, for throwing the nail out of the machine at the instant it is severed from the rod *e*. This discharging fork or slide is drawn back just before the nail is severed, when it is released from the operation of cam *b'*, which drew it back, and allowed to spring forward, under the influence of spring *c'*, and forcibly eject the nail from the machine at the instant it is cut from the rod.

The faces of the hammers are made of the proper shape to act as dies in giving the desired form to the nail.

The rod, on its way to the hammers, passes through the gas-furnace U, which does not differ in its construction or operation from that shown in my former patents. The gas-flame surrounds the rod during the whole period of the forging of the nail, and produces the same effects, as to uniformity of product and saving of material, that have been pointed out in my previous patents.

The hammer-heads are hung on springs *d'* with adjustable tension. When the hammers are at rest their faces are not in contact; but when the machine is running at working speed the momentum imparted to the hammers causes them to strike together with a quick, strong, and yet elastic blow, the force of which can be regulated by the set-screws *e'*, which control the tension of the springs.

What I claim is—

1. The combination of the rollers Z Z', provided with ratchets, the double pawls A¹ A² E¹ E², hung as described, and the head V, together with mechanism for actuating the pawls, all constructed, arranged, and operating as and for the purpose described.

2. The combination of the cam *x* on wheel S, the lever O', slide-rod N', spring *u*, lever M', slide-arm L', and slide K', and pawl A¹, all constructed, arranged, and operating as and for the purpose set forth.

3. The combination of the cam-wheel S, provided with cams on its rim, as described, with the lever J', provided with the rollers *q r* on its short arm, and having its long arm connected with and operating the pawls controlling the feed mechanism of the machine, as specified.

4. The combination of lever J', slide-rod I', link H¹, lever G', and annular slide D', provided with arms C¹ C², connected with the feeding and retracting pawls to operate the same, as described.

5. The combination of wheel R, spring-fork a' , spring c' , cam b' , and cutters y z , all constructed, arranged, and operating in the manner and for the purpose set forth.

6. In combination with the hammer stocks and cranks, the adjustable springs d' and adjusting-screws e' , arranged and operating as and for the purpose stated.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOSEPH ROY.

Witnesses:

GEO. F. GRAHAM,
CHAS. F. STANSBURY.