

H. E. FULLER.
METHOD OF ROLLING NAILS.

No. 397,422.

Patented Feb. 5, 1889.

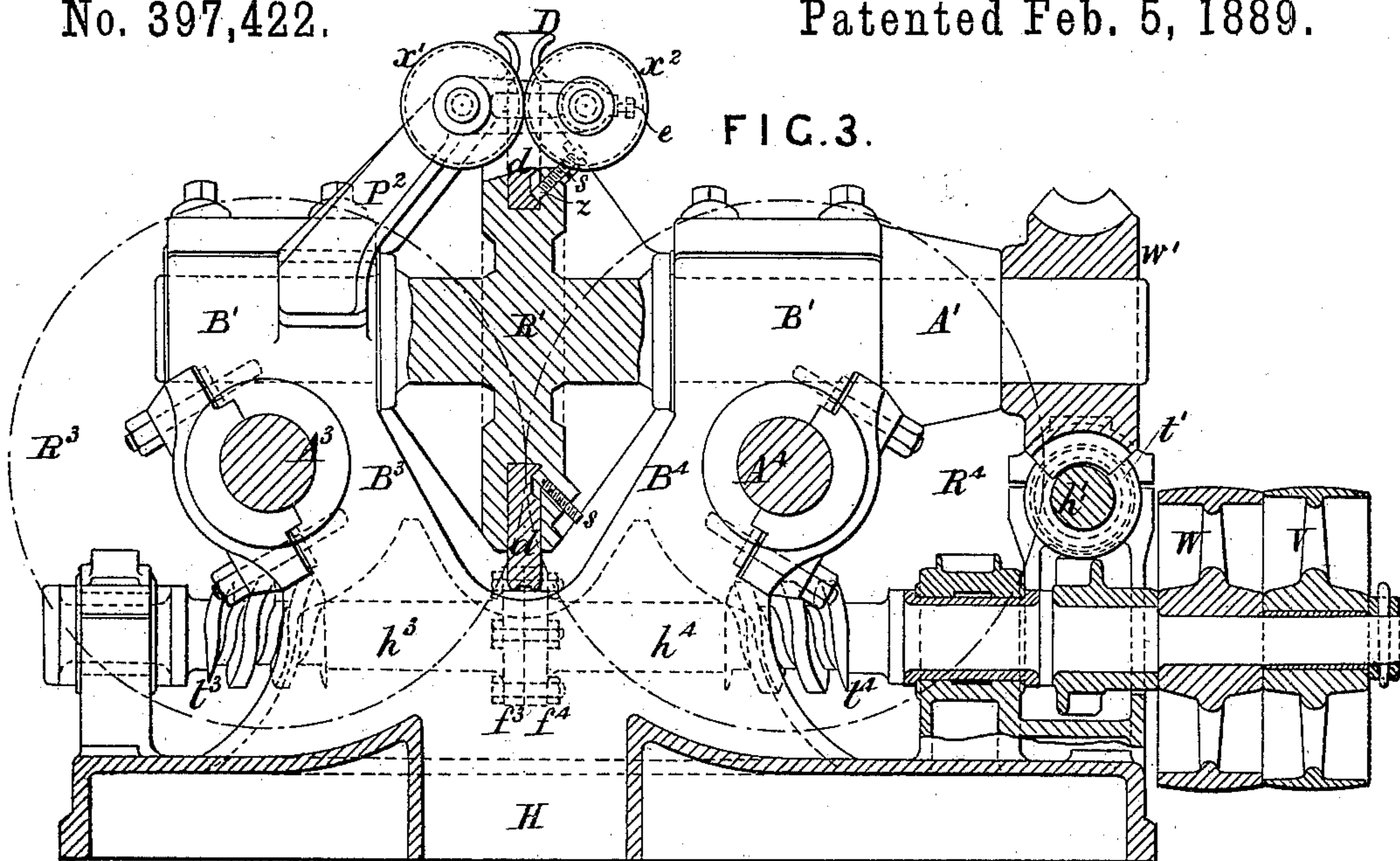
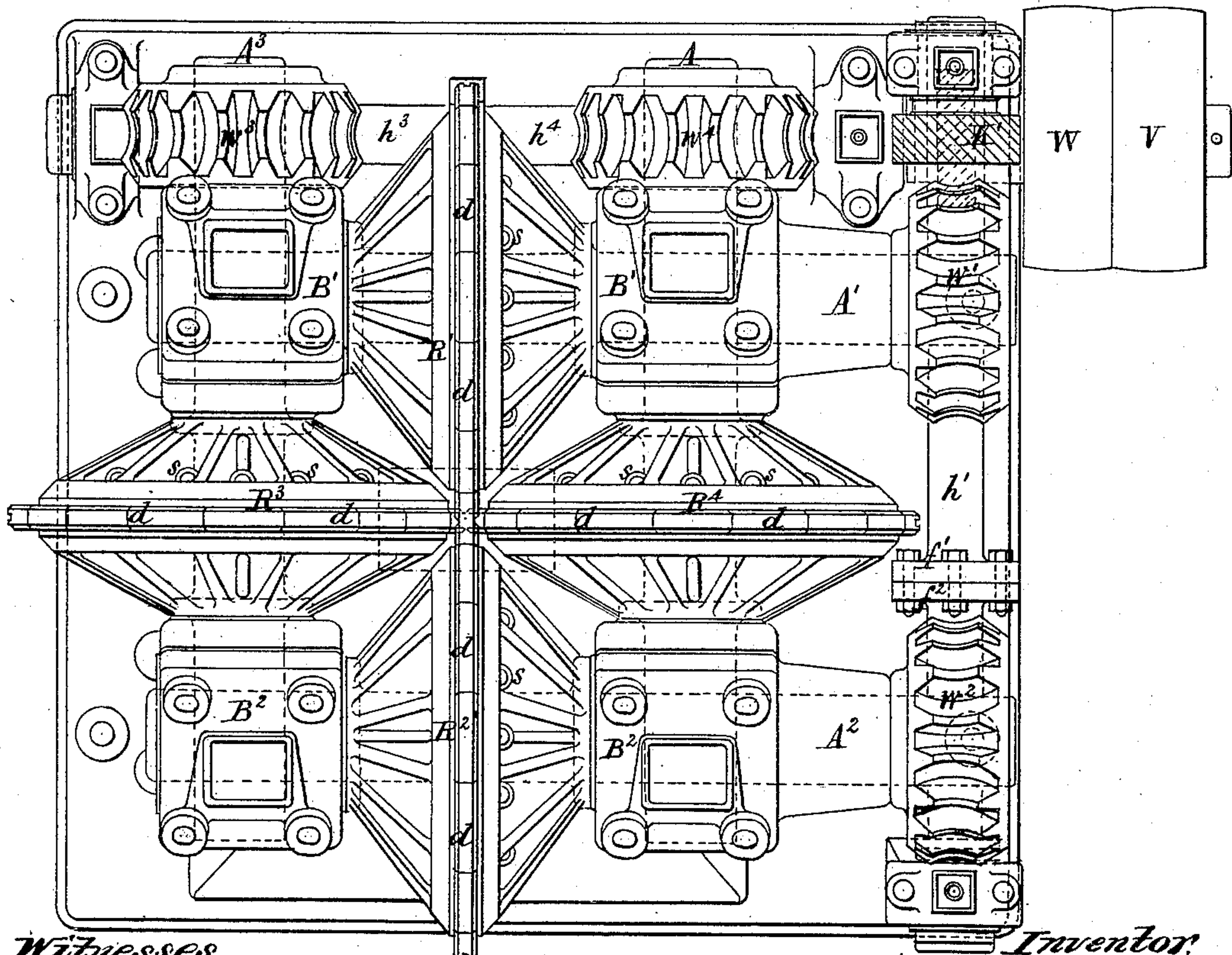


FIG. 1.



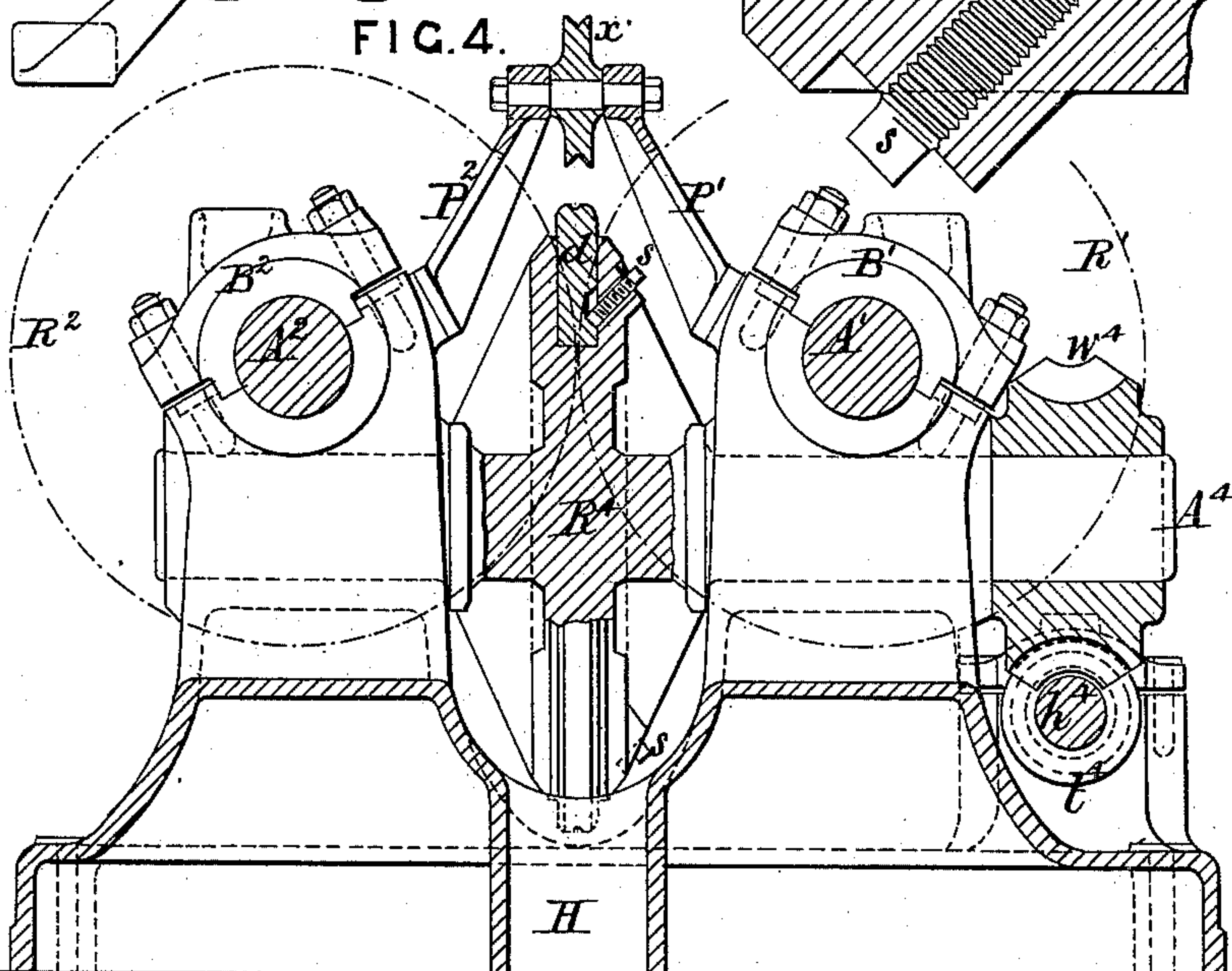
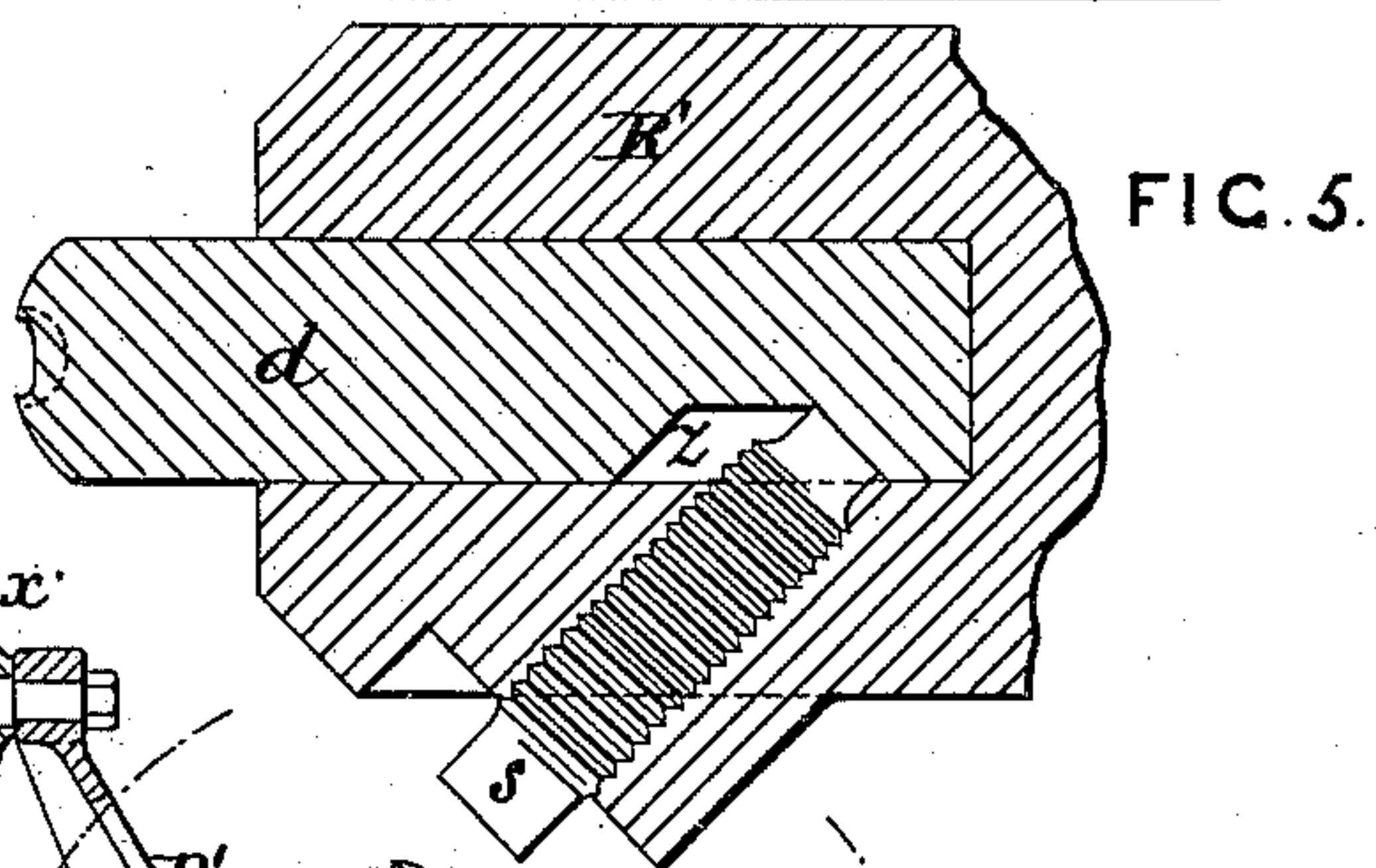
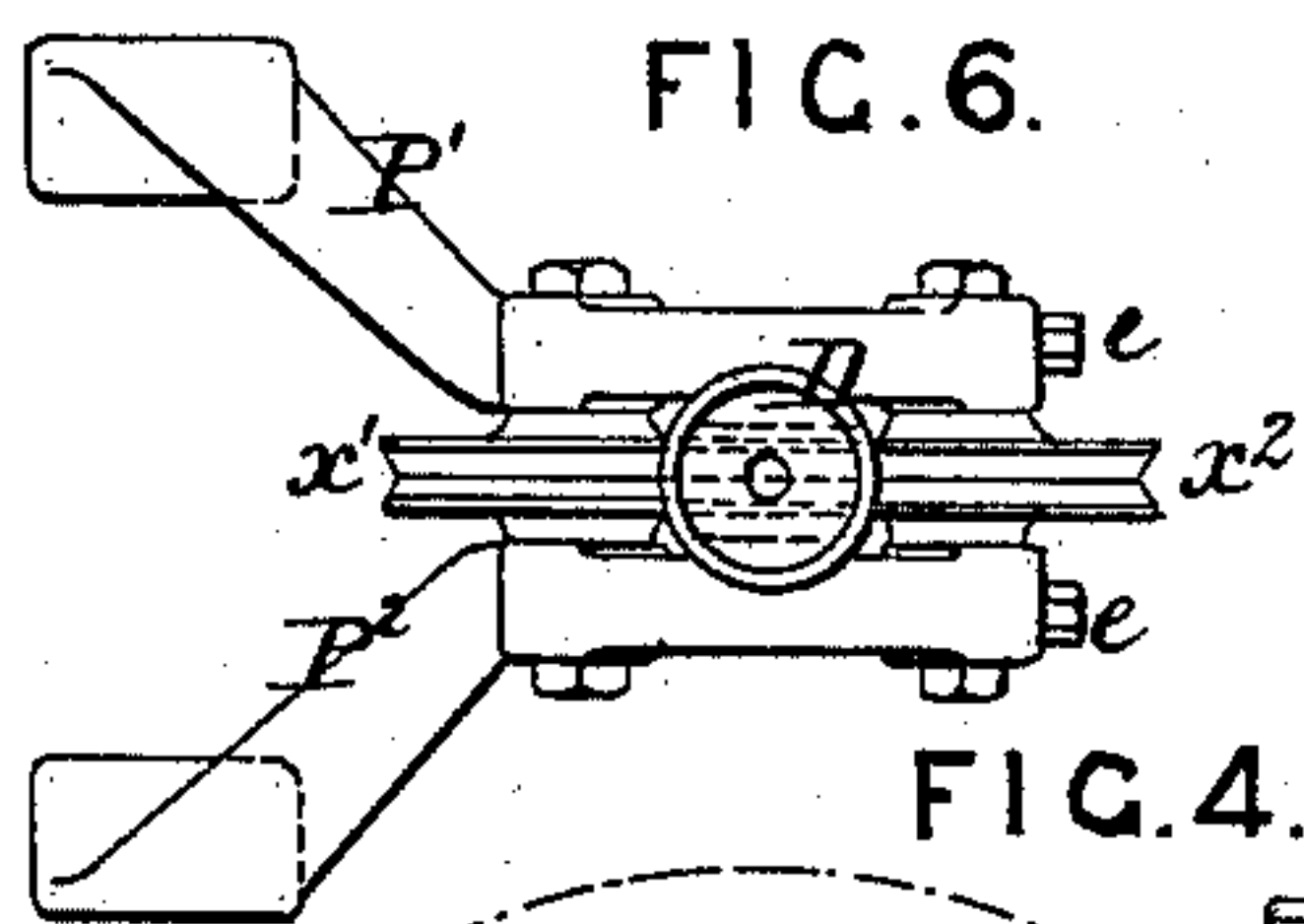
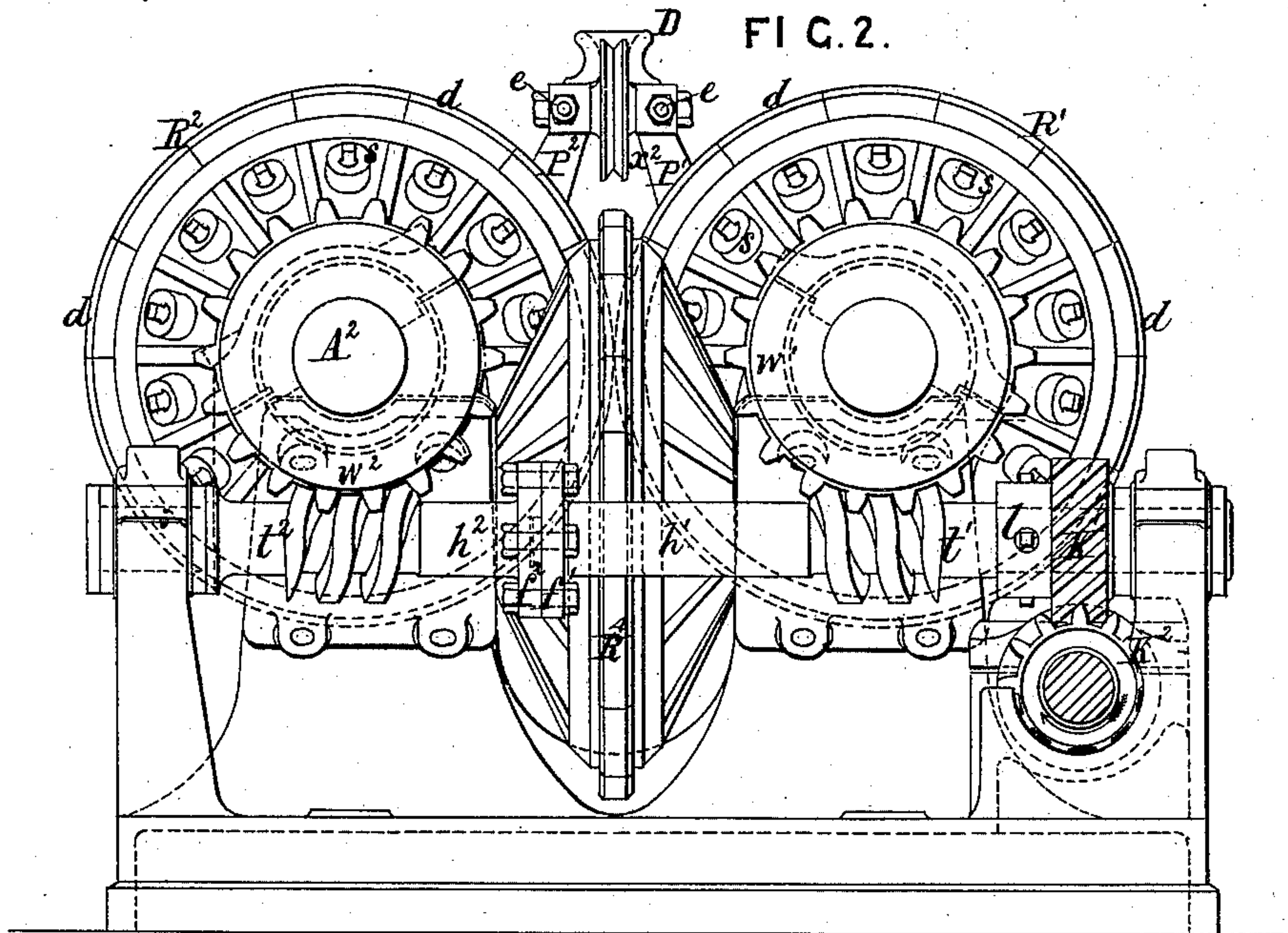
Witnesses:
J. A. Rutherford.
Robert Everett.

Inventor:
Hiram E. Fuller.
By James L. Norris.
Atty.

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Att'y.

UNITED STATES PATENT OFFICE.

HIRAM EMERY FULLER, OF LONDON, ENGLAND.

METHOD OF ROLLING NAILS.

SPECIFICATION forming part of Letters Patent No. 397,422, dated February 5, 1889.

Application filed January 5, 1888. Serial No. 259,909. (No model.) Patented in England July 5, 1887, No. 9,513; in France December 30, 1887, No. 187,894, and in Belgium December 30, 1887, No. 80,115.

To all whom it may concern:

Be it known that I, HIRAM EMERY FULLER, a citizen of the United States, residing at Leadenhall Buildings, in the city of London, England, have invented a new and useful Method of Rolling Nails and such like Articles, (for which I have obtained a patent in France, dated December 30, 1887, No. 187,894; in Belgium, dated December 30, 1887, No. 80,115, and have made application for patent in Great Britain, which patent, when granted, will bear date July 5, 1887, No. 9,513,) of which the following is a specification.

This invention relates to an improved method of rolling nails and such like articles from continuous lengths of wire or rod by passing same between rollers having on their peripheries die-recesses suited to the form of the nails. For this purpose I employ two or more pairs of rollers, the axes of those of a pair being parallel to each other, but at right angles to the axes of those of the next pair, so that the wire or rod being squeezed in the one direction in passing between the first pair is squeezed in the transverse direction in passing between the next pair, and so on. I make the rollers of considerable diameter at their middles, tapering down to small diameter at each end, and thus I am enabled to bring the bite of each lower pair of rollers nearly up to the bite of the pair of rollers above it, so that the nail is seized by the dies in each pair of rollers before it has fully left the dies of the pair of rollers immediately above it. Instead of engraving or otherwise forming the die-recesses in the rollers themselves, I form them in separate pieces, which are keyed or otherwise fixed in beds formed in the circumferences of the rollers, so that each die can be tempered, fixed, removed, or replaced independently of the others on the same roller.

In order that the improved method of rolling nails and such like articles may be more readily understood, I have shown in the accompanying drawings a machine in its simplest form, in which only two pairs of rollers are used, which machine constitutes the subject-matter of my application filed of even date herewith, Serial No. 259,910.

In the drawings, Figure 1 represents a plan with the feeding-mouth removed, and Fig. 2 shows a side elevation of the machine. Figs. 3 and 4 are sectional elevations of the machine taken at right angles to one another, showing, respectively, one of the upper rollers and one of the lower rollers in section. Fig. 5 shows, to an enlarged scale, the way in which the dies are secured in the rollers, and Fig. 6 shows a plan of the feeding-mouth.

On the bed-plate or framing of the machine are mounted two pairs of rollers, $R^1 R^2$ and $R^3 R^4$. The axes $A^1 A^2$ of the upper pair of rollers, $R^1 R^2$, revolve in bearings $B^1 B^2$, parallel with one another, while the axes $A^3 A^4$ of the lower pair of rollers, $R^3 R^4$, revolve in bearings $B^3 B^4$, also parallel to one another, but at right angles to the axes of the upper pair of rollers and at such a distance below them that the point where the peripheries of the lower pair of rollers nearly meet is brought immediately under and in close proximity to the point where the peripheries of the upper pair of rollers nearly meet.

The caps of the bearings $B^1 B^2 B^3 B^4$ are oblique, so that all the wear that takes place when taken up by screwing the caps down keeps the centers of each pair of rollers in the same relative position and the distance between the axes of the two pairs of rollers constant.

Above the upper pair of rollers and in line with the intersection of the planes of the four rollers are mounted two small grooved rollers, $x^1 x^2$, between brackets $P^1 P^2$, which support a feeding-mouth, D , through which the wire or rod is fed into the rollers. The axis of the roller x^2 is fitted into slots in the brackets, so that it can be adjusted nearer to or farther from that of x^1 , by means of the set-screws e , in order to suit varying gages of wire.

The several rollers are constructed with considerable width at their centers, tapering down to a small width at their peripheries, in which are formed deep channels. In these channels are arranged a series of movable die-blocks, $d d$, preferably arranged in sections corresponding with the lengths of the

article to be produced. These die-blocks are fitted into the rollers, so as to form a true-rolling circle, and each pair is arranged in close rolling-contact with one and another.
 5 They are all made with grooves z , formed at the lower part of one side, into which inclined set-screws s are screwed to keep the die-blocks firmly down in their respective places. Suitable cotters are inserted in each other to
 10 prevent the slipping of the dies in the channels.

The die-blocks of the upper pair of rollers are each milled out at their peripheries to the required configuration for forming a primary
 15 blank of the nail or article to be produced. The die-blocks of the lower pair of rollers are also milled out to a configuration suited to the finished nail or other article, and are made of greater length than the dies of the
 20 upper rolls to allow for the drawing out and pointing of the blanks.

The two pairs of rollers are rotated at a uniform speed by worm-wheels $w' w^2 w^3 w^4$, keyed on the axes $A' A^2 A^3 A^4$, and driven by
 25 the worms $t' t^2 t^3 t^4$ on the shafts $h' h^2 h^3 h^4$, the motion of the shafts $h' h^2$ for the upper pair of rollers being derived from the shafts $h^3 h^4$, by means of skew-wheels $K' K^2$, and the shafts $h^3 h^4$ being in their turn driven by
 30 the driving-pulley V , at the side of which is mounted a loose pulley, W .

In order that the peripheral positions of the dies on the upper pair of rollers, $R' R^2$, may be accurately adjusted to each other, I
 35 connect the two shafts $h' h^2$ together by means of flanged couplings $f' f^2$, in one of which couplings are formed elongated bolt-holes, so that the one shaft may be moved round until the true relative angular position of the pe-
 40 ripheral dies of the rollers is arrived at, whereupon the nuts are screwed up, so as to hold the two shafts firm in their relative positions. Similarly the peripheral positions of the dies on the lower pair of rollers, $R^3 R^4$,
 45 are adjustable by means of the flanged couplings $f^3 f^4$.

The skew-wheel K' is made adjustable on its shaft by means of the set-screws l , so that the relative positions of the shafts $h' h^2$ and
 50 $h^3 h^4$ may be altered, and through them the relative position of the dies of the upper pair of rollers, $R' R^2$, may be adjusted to that of the dies of the lower pair of rollers, $R^3 R^4$, so that the article to be rolled on being released
 55 from the first dies is at the right moment gripped by the finishing-dies of the second pair of rollers.

The operation of the machine is as follows: A continuous length of wire is fed from a reel
 60 above through the feeding-mouth D , where it is seized by the first pair of rollers, $R' R^2$. In rolling through the dies of these rollers it becomes squeezed to their shape, and is partially or wholly severed at intervals suited
 65 to the length of the nail, rivet, or other article to be made. These partially-formed arti-

cles or primary blanks before passing out of the grip of the upper pair of rollers are seized by the dies of the second or lower pair
 of rollers, $R^3 R^4$, and in passing through 70 them are squeezed in a direction transverse to that in which they were squeezed in the first pair of rollers, and are thus formed into the finished nails, rivets, or other articles and drop into the hole H made in the frame-work 75 of the machine, whence they can be collected in any suitable manner.

It should be stated that according to my method the conical form of the rolls is important and essential, in that it brings the
 80 bite of the lower pair of rolls up to or nearly up to the bite of the upper pair of rolls, and hence the blank is never released by the rolls until the squeezing operations are effected. In former methods, as in Letters Patent No. 85 62,684, which is hereby disclaimed, there is a considerable space between the "bites" of the two pairs of cylinders, down which space (through a guide-tube) the blank must de-
 90 scend by gravity, being quite released from the upper pair of cylinders before it is seized by the lower pair. This is an objection which renders the former machine practically use-
 95 less, because a little more or less friction in the guide-tube down which the blank descends so changes the path of the blank that it is not caught in the proper place by the dies of the lower cylinder. In my method the blank is not released by the upper con-
 100 cal rolls until after it meets the lower pair with absolute certainty in the correct place.

Having thus described the nature of this invention and the best means I know for carrying the same into practical effect, I
 105 claim—

1. The method herein described of making nails and similar articles from a continuous length of wire or rod, which consists in pass-
 ing the continuous wire or rod between die-rollers, forming the primary blank by such 110 rollers, holding and advancing the said blank to a pair of finishing-die rollers, entering the blank between and engaging it with the dies of the finishing-die rollers prior to releasing
 115 said blank from the primary blank-forming-die rollers, squeezing the blank in the finishing-die rollers in a direction transverse to that in which it was squeezed by the primary blank-forming-die rollers, and finishing and
 120 severing the nail from the wire or rod by the finishing-rollers, as set forth.

2. The method herein described of making nails and like articles, which consists in pass-
 ing a continuous wire or rod between travel-
 125 ing primary blank-forming dies, and while each blank is held by said dies advancing it between and grasping it by traveling finish-
 ing-dies, pressing it in a direction transverse to that in which it was first pressed, and finishing and severing the nail from the wire or
 130 rod by the finishing-dies, as set forth.

3. The method herein described of making

nails and like articles, which consists in seizing a continuous wire or rod by traveling dies and forming it into primary nail-blanks, holding each separate blank by said dies, and
5 while so held advancing it to and seizing it by traveling finishing-dies, pressing it transversely to the direction in which it was first pressed, and finishing and severing the nail from the wire or rod by the finishing-dies, as
10 set forth.

In testimony whereof I have signed my name to this specification, in the presence of two sub-

scribing witnesses, this 21st day of December, A. D. 1887.

H. EMERY FULLER.

Witnesses:

OLIVER IMRAY,
Patent Agent, 28 Southampton Buildings, London, W. C.

JNO. P. M. MILLARD,
Clerk to Messrs. Abel & Imray, Consulting Engineers and Patent Agents, 28 Southampton Buildings, London, W. C.