(No Model.) 3 Sheets—Sheet 1.

A. E. HOTCHKISS.

MECHANISM FOR MANUFACTURING PINIONS FOR CLOCKS, WATCHES, &c.

No. 245,068. Patented Aug. 2, 1881.

Fig. 1.

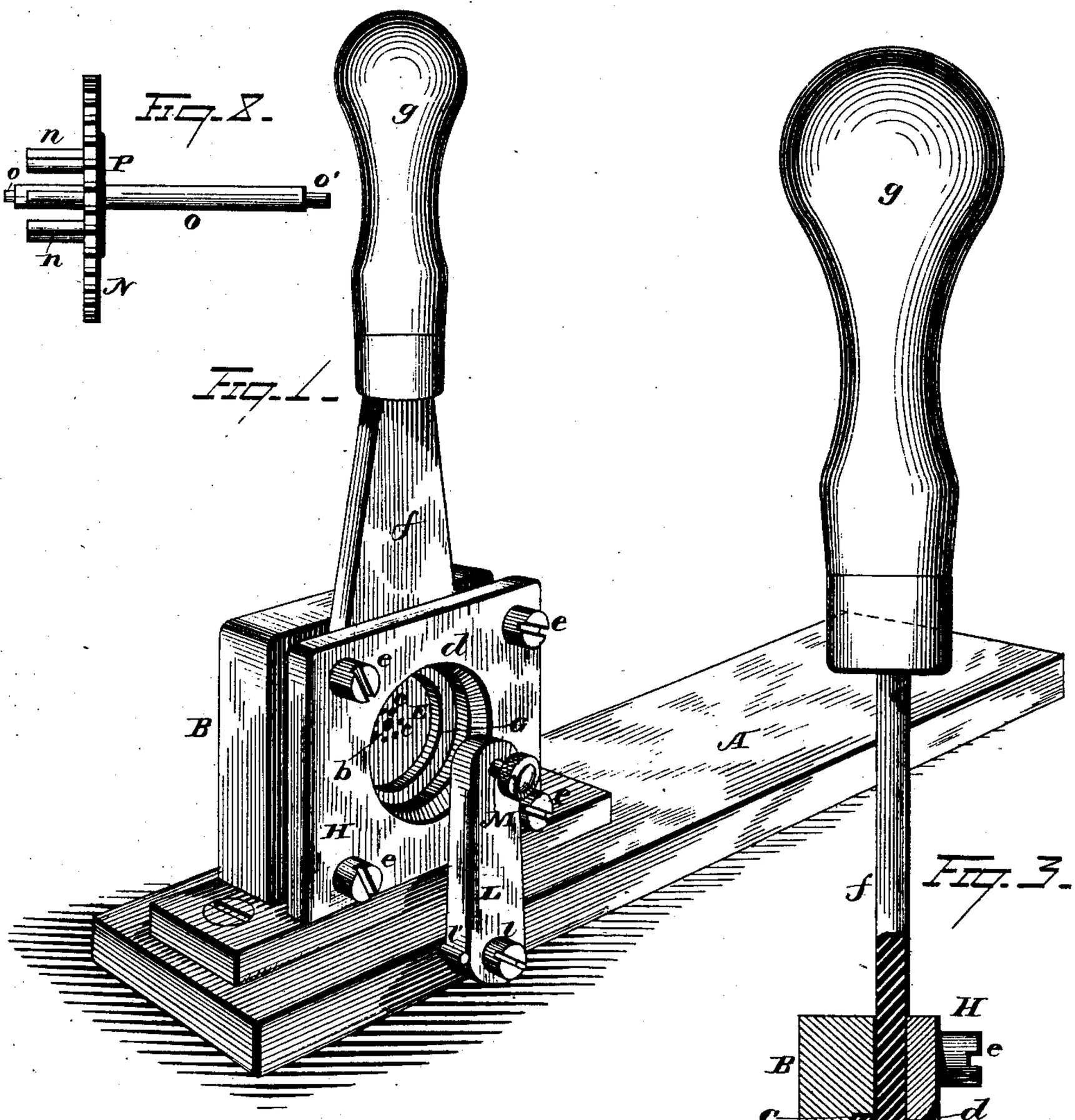


Fig. 2.

Fig. 3.

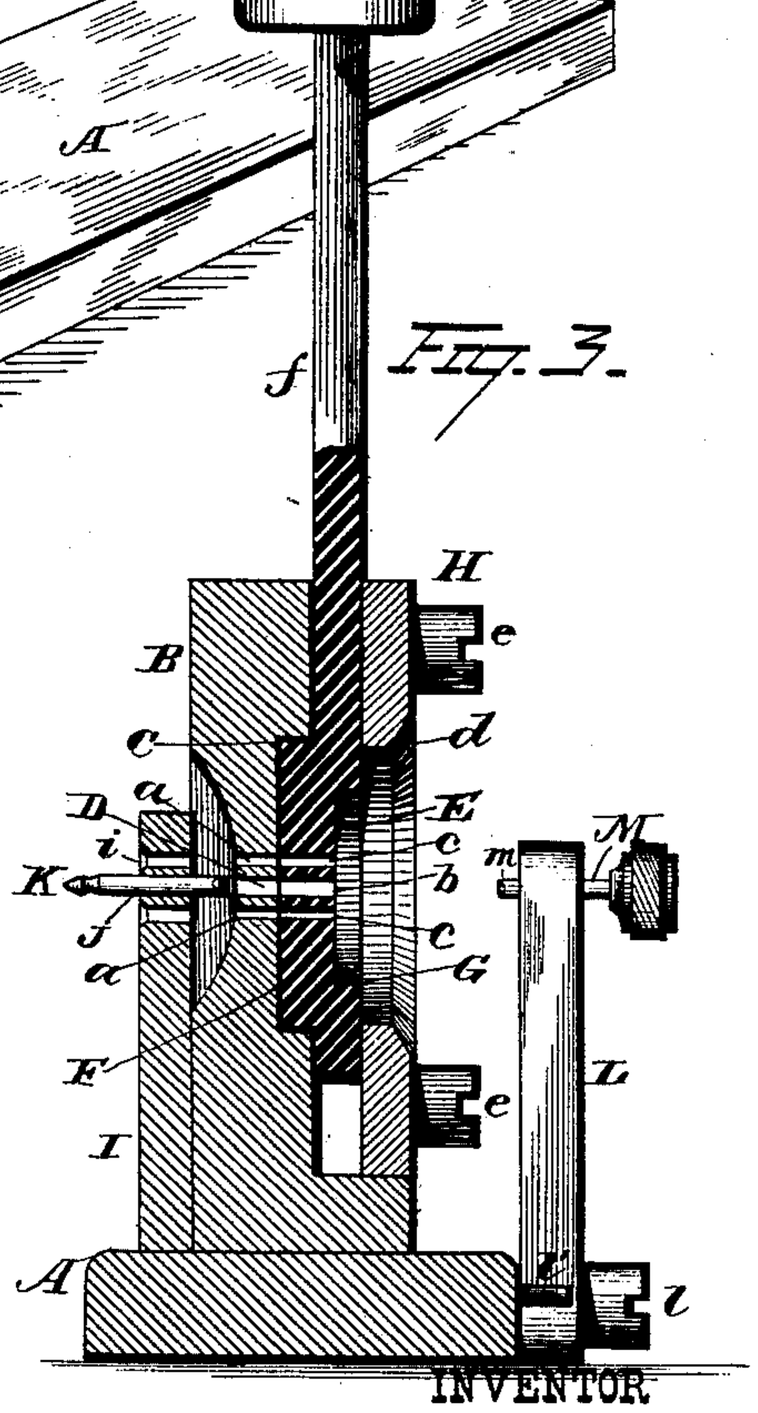
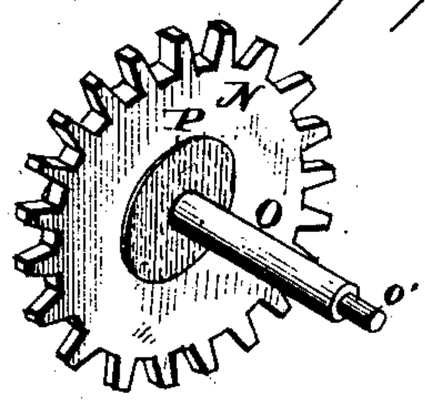


Fig. 4.



WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

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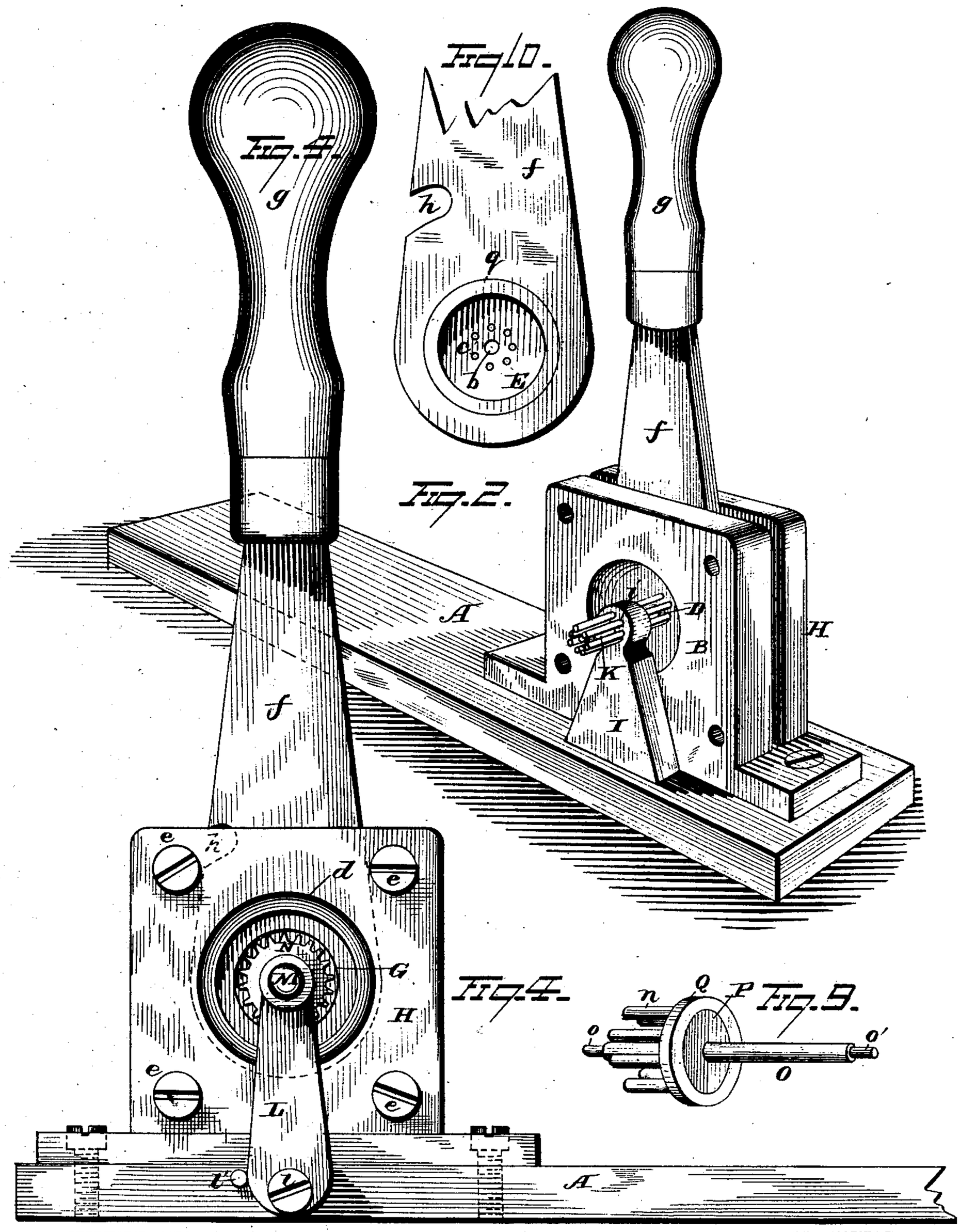
MECHANISM FOR MANUFACTURING PINIONS FOR CLOCKS, WATCHES, &c.

No. 245,068. Patented Aug. 2, 1881.



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3 Sheets—Sheet 3.

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MECHANISM FOR MANUFACTURING PINIONS FOR CLOCKS, WATCHES, &c.

No. 245,068. Patented Aug. 2, 1881.

Fig. 5.

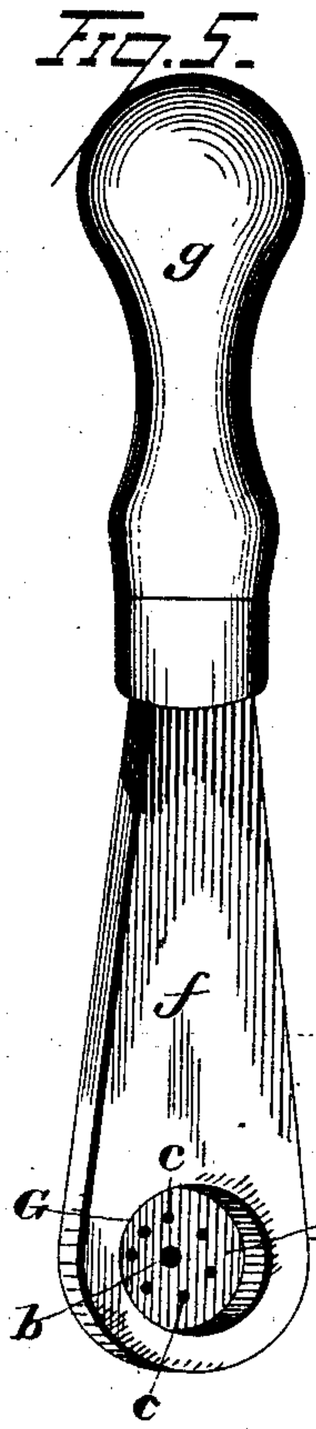


Fig. 6.

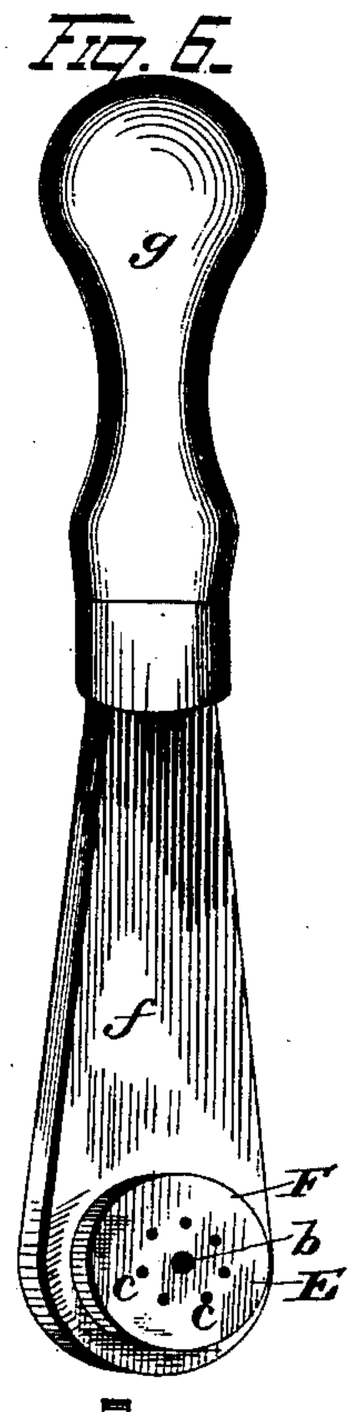


Fig. 11.

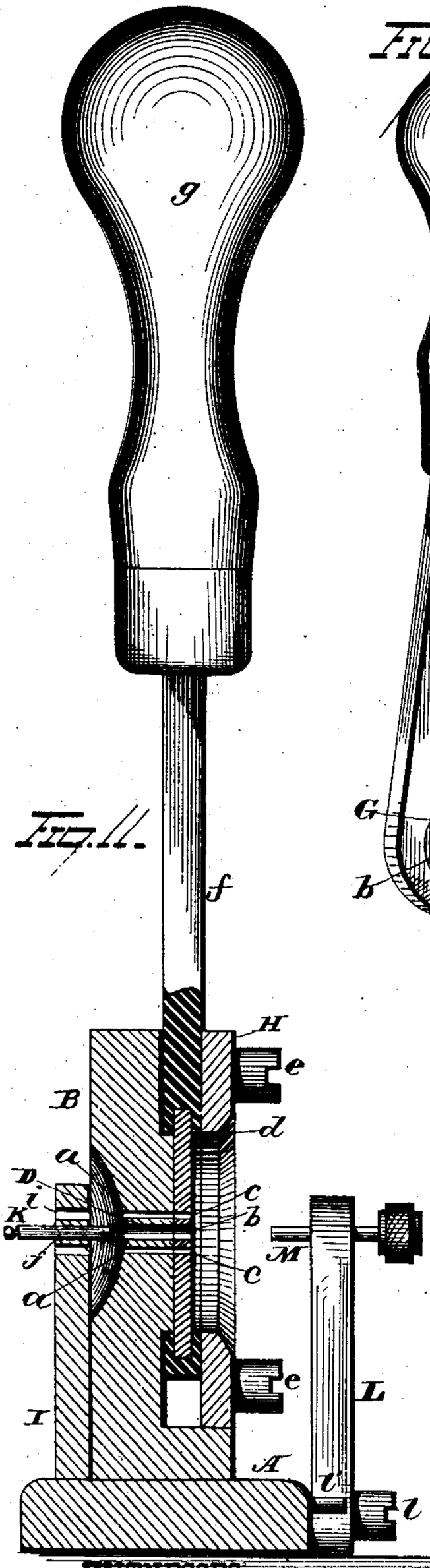


Fig. 13.

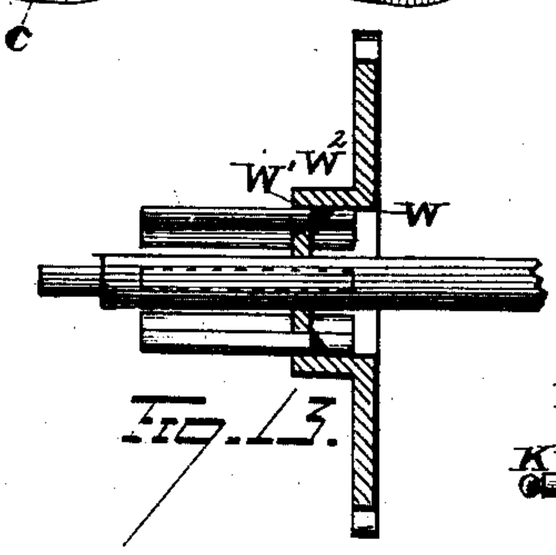


Fig. 14.

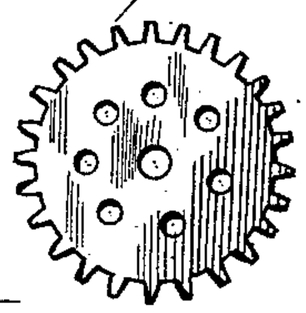
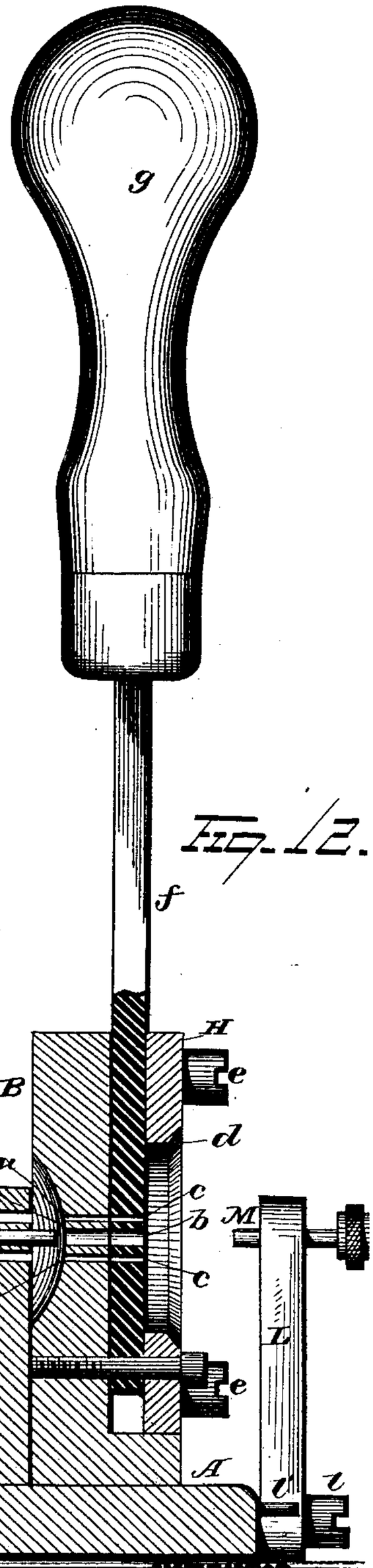


Fig. 12.



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MECHANISM FOR MANUFACTURING PINIONS FOR CLOCKS, WATCHES, &c.

SPECIFICATION forming part of Letters Patent No. 245,068, dated August 2, 1881.

Application filed September 14, 1880. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR E. HOTCHKISS, of Cheshire, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Mechanism for Manufacturing Pinions for Clocks, Watches, Toys, and other Purposes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in mechanism for manufacturing pinions for clocks, watches, toys, or other purposes.

Heretofore clock-pinions of the type known as "lantern-pinions" have ordinarily been made as follows: Two brass collets are driven onto the pinion-shaft and the pinion and collets then turned to the proper size and form. The collets are then drilled with any desired number of holes, according to the number of leaves required in the pinion. Steel wires are then driven or inserted in the holes in the collets, and constitute the leaves of the pinion, the wires being secured by upsetting the collet around the holes for the pinion-leaves by a prick-punch. The wheel is then staked onto one of the collets by a prick-punch. This method of making clock-pinions is objectionable for several reasons, among which the following are noted: Delicate machinery and comparatively high-priced labor is required in drilling the collets and securing the pinion-leaves therein; second, the leaves sometimes become loose owing to the insecure fastening afforded by upsetting a portion of the collet around the ends of the pinion-leaves; third, the wheels secured to the collets by staking are drawn out of true in two directions—viz., axially and laterally—and to properly fit the pinions calls for slow and high-priced labor, as the wheel must be fitted so that its periphery will be perfectly concentric with the shaft and at right angles thereto, in order to form a perfect mesh with its pinion; fourth, the employment of two brass collets to support the ends of the pinion-leaves increases the length of the pinion to such an extent that the train requires more space between the movement-frames than is desirable in many styles of clock-cases.

The object of my invention is to obviate the defects and objectionable features hereinbefore referred to in the manufacture of pinions and to provide novel mechanism for manufacturing an improved construction of clock or watch pinion, whereby such articles may be produced very rapidly and by the employment of a cheap grade of labor, and the pinions made strong and durable and perfectly fitted and adapted to be supplied at small initial cost.

With these ends in view my invention consists, first, in the combination with the cutter block or plate, provided with holes for the several wires to form the leaves of a pinion, of a movable die provided with holes corresponding in number and arrangement to those in the cutter block or plate, said movable die arranged to fit snugly against the cutter-plate, and provided with means for holding a wheel or collet on the outer face thereof, whereby the wires may be inserted through the holes in the cutter-plate, the movable die, and collet or wheel, the ends of the wires be then secured to the collet or wheel by soldering, and all the wires cut off or severed to form pinion-leaves of the proper length by imparting movement to the movable die.

My invention further consists in certain other details in construction and combinations of parts in mechanism for manufacturing clock-pinions, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figures 1 and 2 are views, in perspective, showing the opposite sides of my improved device for manufacturing clock-pinions. Fig. 3 is a vertical section taken through the die. Fig. 4 is a plan view, showing the toothed wheel and shaft in place for receiving the wires forming the leaves. Figs. 5 and 6 are perspective views, showing the opposite sides of the die and handle. Fig. 7 is a view, in perspective, of the improved wheel and pinion. Fig. 8 is a view in side elevation of the same. Fig. 9 represents a collet constructed in accordance with my invention. Figs. 10, 11, 12, and 13 are modifications. Fig. 14 is a plan view of the wheel.

A represents the base-plate, which is of proper size and shape to form a firm founda-

tion for the other portions of the device. The base-plate A may be provided with holes to allow it to be attached to a bench, or it may be secured against displacement in any desired manner.

B is a cutter plate or block, and is mounted in an upright position with respect to the base-plate A and suitably connected with the latter. Cutter block or plate B has a circular recess, C, formed in its inner face and a hole, D, is formed in the center of said recess. Around the center hole, D, and equidistant therefrom, are formed the small holes *a*, seven being shown in the drawings, but any desired number of holes *a* are provided, according to the number of leafed pinions required.

E is the die, which is provided with a circular bearing, F, on one side, which snugly fits within the circular recess C in the cutter plate or block B. The opposite side of the die is provided with a circular recess, G, in which the toothed wheel is placed, as clearly illustrated in Fig. 4.

In the center of the die is formed a hole, *b*, and around the latter is formed a series of holes, *c*, corresponding in size, number, and arrangement to the series of holes *a* in the cutter-block.

H is a face-plate provided with an opening, *d*, said face-plate being firmly secured to the cutter-block B by screws *e* or other devices, and serving to retain the die in snug contact with the cutter-block.

The die E is provided with an arm, *f*, which extends upwardly between the cutter-block and face-plate, said arm having a handle, *g*, secured thereto. Arm *f* may be provided with a slot, *h*, located to receive one of the screws *e* when turned in one direction, the screw serving as a stop; but it is not necessary to provide the slot *h*, as the edge of the arm will strike the screw and thus limit the movement of the die.

I is a standard attached to the base-plate A, and provided at its upper end with a series of holes, *i*, corresponding in number and arrangement with the series of holes *a* in the cutter-block, and located in horizontal line with said holes. Standard I is also provided with a central hole, *j*, in which is fitted an endwise-adjustable shaft, K, the inner end thereof being countersunk to form a bearing for the pivot on one end of the pinion-shaft.

L is an oscillating standard pivoted on the screw or stud *l*, connected with base A, a stop, *l'*, being located at one side of the standard to limit its movement in one direction, and arresting its movement when it stands in a vertical position. The upper end of the standard L is furnished with an endwise-adjustable shaft, M, provided with a thumb-disk, to allow of the ready adjustment of the shaft. The shaft M may be made to fit snugly in the hole in the standard to be retained against accidental displacement by friction, or it may be screw-threaded, if desired. The inner end of shaft M is countersunk, as at *m*, to receive one of the pivots in the pinion-shaft.

Having described the construction and arrangement of parts of my improved device, I will now briefly describe the process of making pinions thereon.

A toothed wheel, N, is first placed on pinion-shaft O, the latter having its pivots *o o'* turned either before or after the wheel is secured thereto. The wheel is provided with the desired number of holes for the pinion-leaves. One end of the pinion is then inserted in the central hole in the die, forced through the central hole in the cutter-block, and the pivot on the end of the shaft inserted in the countersunk end of the shaft K. The standard L is then turned upwardly into its vertical position, and the pivot on the opposite end of the pinion-shaft inserted in the countersunk end of the shaft M. Shaft M is then forced toward the die in order to secure the pivots of the pinion against displacement. The toothed wheel is rotated on its shaft until the series of holes therein correspond with the corresponding series in the die, cutter-block, and standard. Steel wires of the proper size are then fed, by any suitable mechanism, through the series of holes in the standard I, cutter-block, die, and wheel, the feed mechanism being adjusted so that the ends of the wires shall be fed through the wheel flush with its surface. Solder P is then applied to the side of the wheel in any convenient or suitable manner, and when hardened serves to firmly secure the ends of all the several wires in the wheel and also firmly secure the wheel to its shaft. The handle connected with the rotating die is then grasped by the operator, and the die is slightly rotated, which operates to neatly sever all the wires without danger of bending them, and thus forms the pinion-leaves all perfectly straight and true and of equal length. The pinion is then removed by slightly withdrawing the shaft M, to release the pivot therefrom, and depressing the standard L and removing the complete wheel and pinion. The wires are retained in their places in the cutter-block, and another wheel and shaft are inserted and the pinion-leaves secured in place, as described.

It will thus be observed that no particular skill or high order of labor is required to produce uniform and perfect work in the machine, and the pinions may be made very rapidly and at small cost.

In Figs. 7 and 8 I have illustrated my improved wheel and pinion. The leaves *n* are secured at one end to the wheel, while the opposite ends of the leaves are unsupported. This form of construction insures ample strength to the leaves for clock-pinions, and all fitting or truing of the leaves or wheels is obviated. Much less stock is required in the manufacture of my improved pinion than those of ordinary construction, as the two collets ordinarily employed are dispensed with, and, further, the clock-train can be disposed in consid-

erably smaller compass, owing to the fact that the pinions can be made of less length than those of ordinary construction.

Fig. 9 shows a modified form of construction, the leaves being secured to a collet, Q, instead of being secured to the wheel. This form of pinion is used when it is necessary to have the pinion located at a distance from the wheel.

In order to make the pinion shown in Fig. 9, the movable die is either specially made to receive and hold the collet or a removable ring, *q*, as shown in Fig. 10, may be inserted in the recess of the die.

Different sizes of rings may be inserted in the recess of a single die for holding different sizes of wheels or collets; or the die may be provided with a rim made to contract and expand, and thus adapted to receive and retain different sizes of wheels or collets.

Instead of making the die integral with the arm it may be made separate therefrom, and removably secured thereto by screws, keys, or other devices. Again, instead of having a circular bearing formed on the die the bearing may be formed on the face of the center block and the die be provided with a circular recess, within which said bearing may fit.

Fig. 11 represents a modified construction. The cutter-block is provided with a circular bearing, upon which is placed the arm or lever for operating the die, said arm or lever having a slot formed in its lower end, within which the die is removably secured by screws or other suitable devices. Again, instead of providing a circular bearing in the die or cutter-block, in order to impart a rotary movement to the die, the engaging-faces of the cutter-block and die may be made plain, as represented in Fig. 12, the arm or lever in which the die is secured being pivoted to the cutter-block. A suitable stop is provided in order to arrest the movement of the die in one direction at such a point that the holes in the die will correspond with the holes in the cutter-block after the wires have been inserted and secured, as hereinbefore described. The die is then forced in the opposite direction, which operation neatly severs the wires and forms the leaves of the pinion.

If desired, the pinion-leaves may be cut by other devices than those shown and described, and the leaves inserted in the wheel or collet, and then secured by solder. Again, the wheels or collets may be driven onto the pinion-shaft, and only the pinion-leaves secured by solder. Further, a toothed wheel may be constructed in accordance with my invention by forming holes in the rim of the wheel and securing the teeth therein at right angles to the rim, in the manner hereinbefore described. Again, both standards of the device may be made stationary and an adjustable shaft of sufficient length employed to allow of the withdrawal of the pinion and shaft from the die and cutter-block.

In order to prevent the solder from adhering to the die, owing to the undue heating of the latter by constant use for a considerable length of time, the die may be provided with an annular flange or with a recess, in order to prevent the wheel or collet from coming in direct contact with the die, or the die may be insulated from the wheel or collet by the interposition of a disk of ivory, paper, or other substance.

In the manufacture of very small pinions a single hole may be formed in the wheel or collet and the shaft and wires placed within said hole and properly arranged therein, and the solder or fusible metal being dropped into the hole will flow around the wires and shaft and firmly secure them in place. This method of construction dispenses with the series of holes in the collet or wheel. Again, in order to produce a very strong and durable pinion and wheel embracing my invention, the construction may be of the kind illustrated in Fig. 13, wherein the wheel has a cup-shaped recess, W, formed therein. The leaves are then inserted in holes formed around the edge of the disk W′, the ends of the leaves resting against or in close contact with the rim or periphery W^2 of the cup-shaped recess. Solder or other soft metal is then poured into the recess W or otherwise applied to the ends of the leaves and around the shaft, thus securing the leaves and shaft to the wheel.

I have herein shown and described my improved construction of pinion in order to clearly set forth the purpose and object of the process and mechanism referred to; but I would have it understood that I make no claim to the pinion in this application, as I reserve such right for a separate application.

It is evident that many slight changes in the construction and relative arrangement of the several parts of my improvement might be resorted to without departing from my invention, and hence I would have it understood that I do not restrict myself to the exact construction and arrangement of parts shown and described; but

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

1. The combination, with a cutter block or plate provided with a hole for a pinion-shaft and a series of holes for the wires to form the pinion-leaves, of a die provided with holes corresponding in size and arrangement with those in the cutter-plate, one of said parts being provided with a circular bearing which fits and rotates in a circular recess in the other part, substantially as set forth.

2. The combination, with a cutter block or plate and a movable die, each provided with a hole for a pinion-shaft and a series of holes for the wires to form the pinion-leaves, of two standards, each provided with shafts for supporting the opposite ends of a pinion-shaft, substantially as set forth.

3. The combination, with a cutter block or plate provided with a hole for a pinion-shaft and a series of holes for the wires to form the pinion-leaves, of a movable die provided with holes corresponding in size and arrangement with those in the cutter-block, said die constructed and adapted to retain a wheel or collet concentric with the center of the die and cutter-block, substantially as set forth.

4. The combination, with a cutter block or plate and a movable die, each provided with a hole for a pinion-shaft and a series of holes for the wires to form the pinion-leaves, of two standards, each provided with shafts for supporting the opposite ends of a pinion-shaft, and one of the standards having a series of holes corresponding in arrangement with those of the cutter-block, and through which the wires are fed thereto, substantially as set forth.

5. The combination, with a cutter block or plate and a movable die, each provided with a hole for a pinion-shaft and a series of holes for the wires to form the pinion-leaves, of two standards for supporting the pinion-shaft, one of said standards being pivoted and adapted to be oscillated on its bearing, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand.

ARTHUR E. HOTCHKISS.

Witnesses:
A. W. BRIGHT,
CHAS. P. WEBSTER.