

(No Model.)

2 Sheets—Sheet 1.

W. D. HERVEY.
FLUE CUTTER AND EXPANDER.

No. 594,081.

Patented Nov. 23, 1897.

Fig. 1.

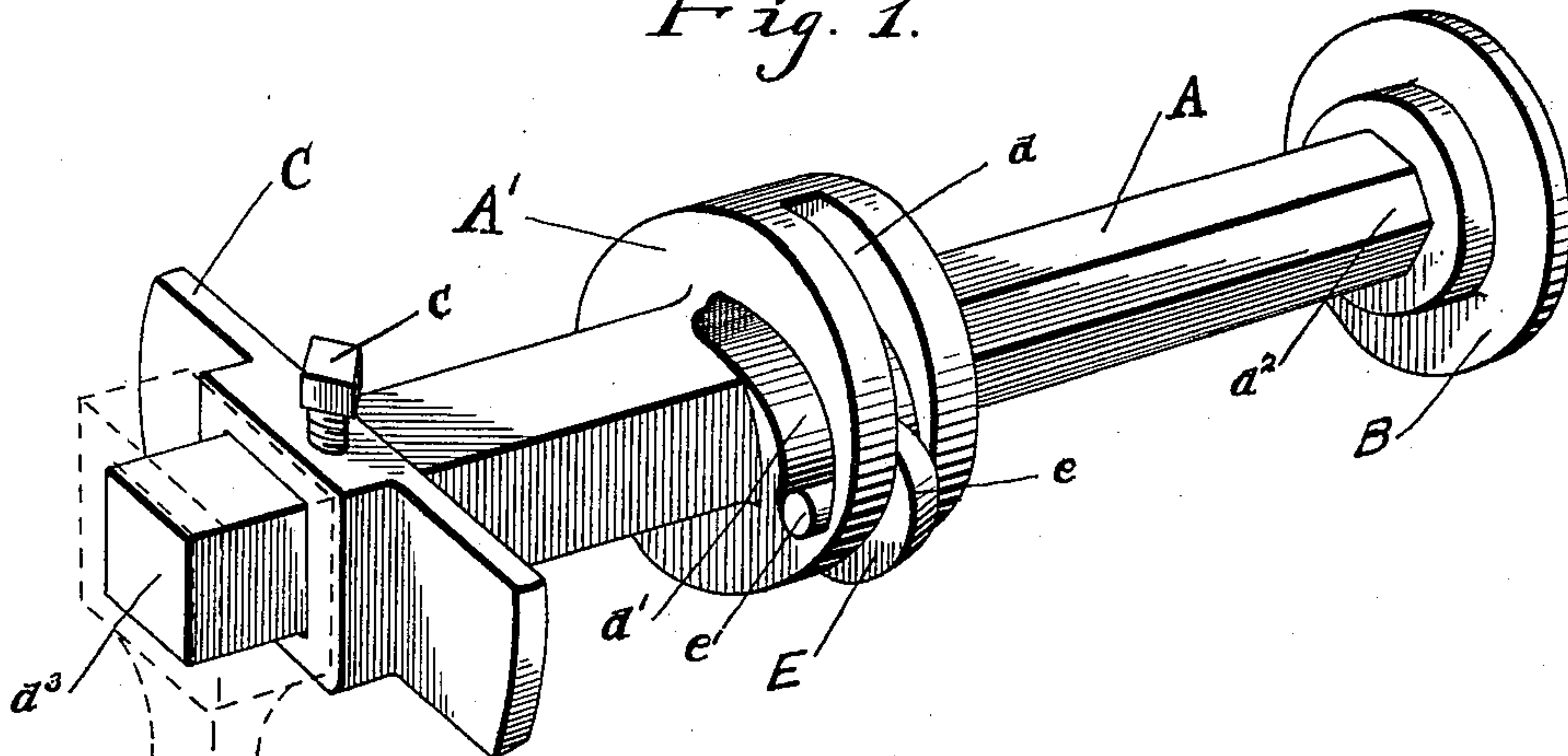


Fig. 2.

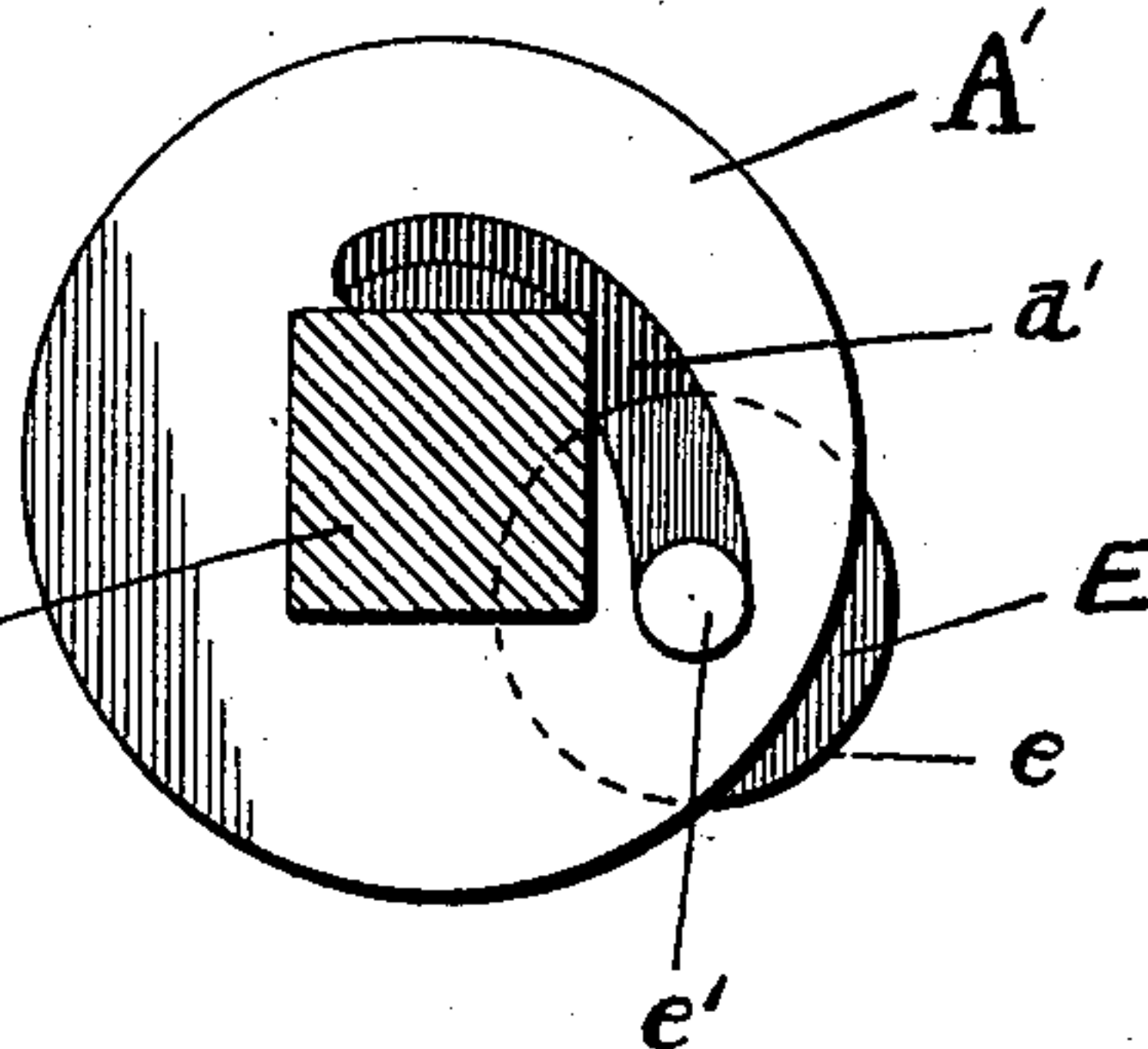


Fig. 3.

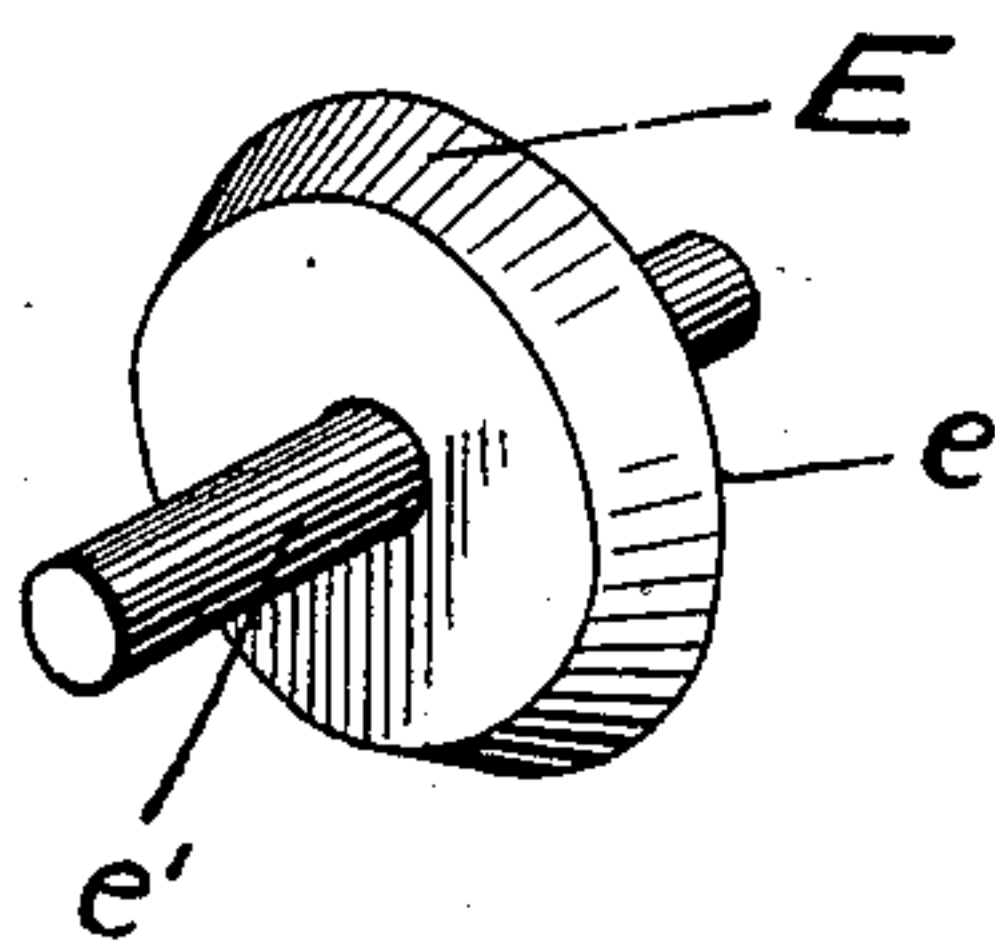
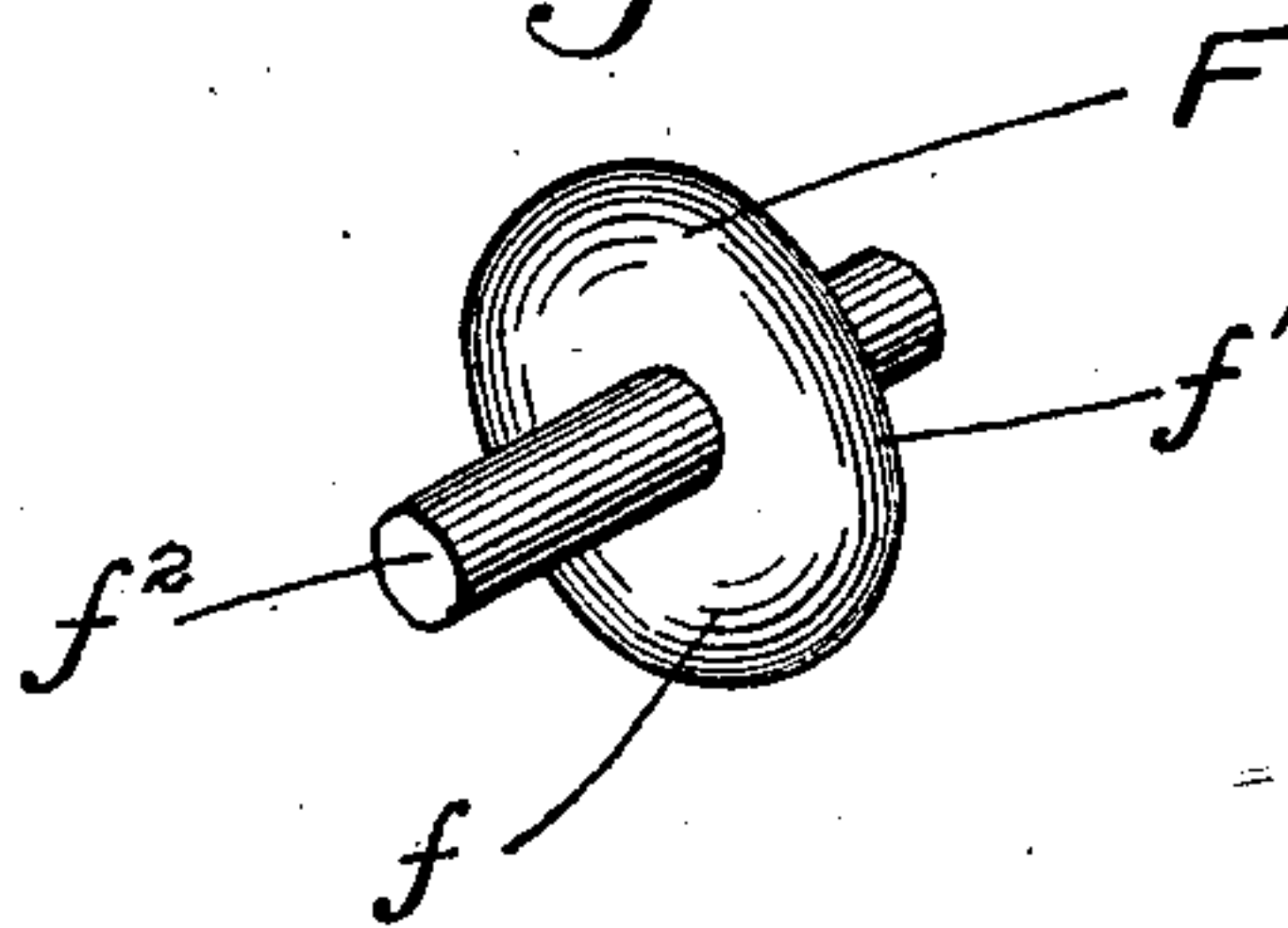


Fig. 4.



WITNESSES

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Fig. 5.

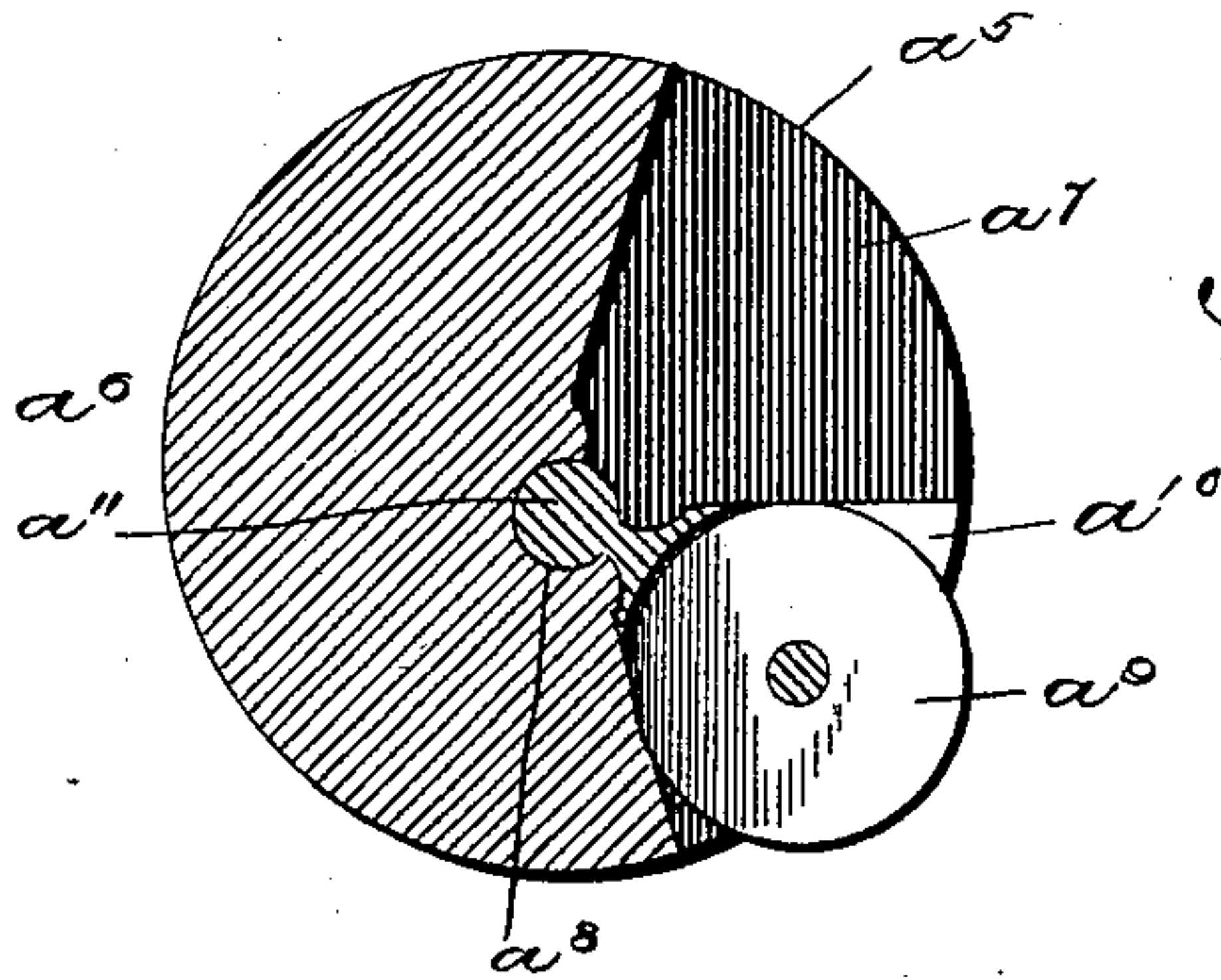
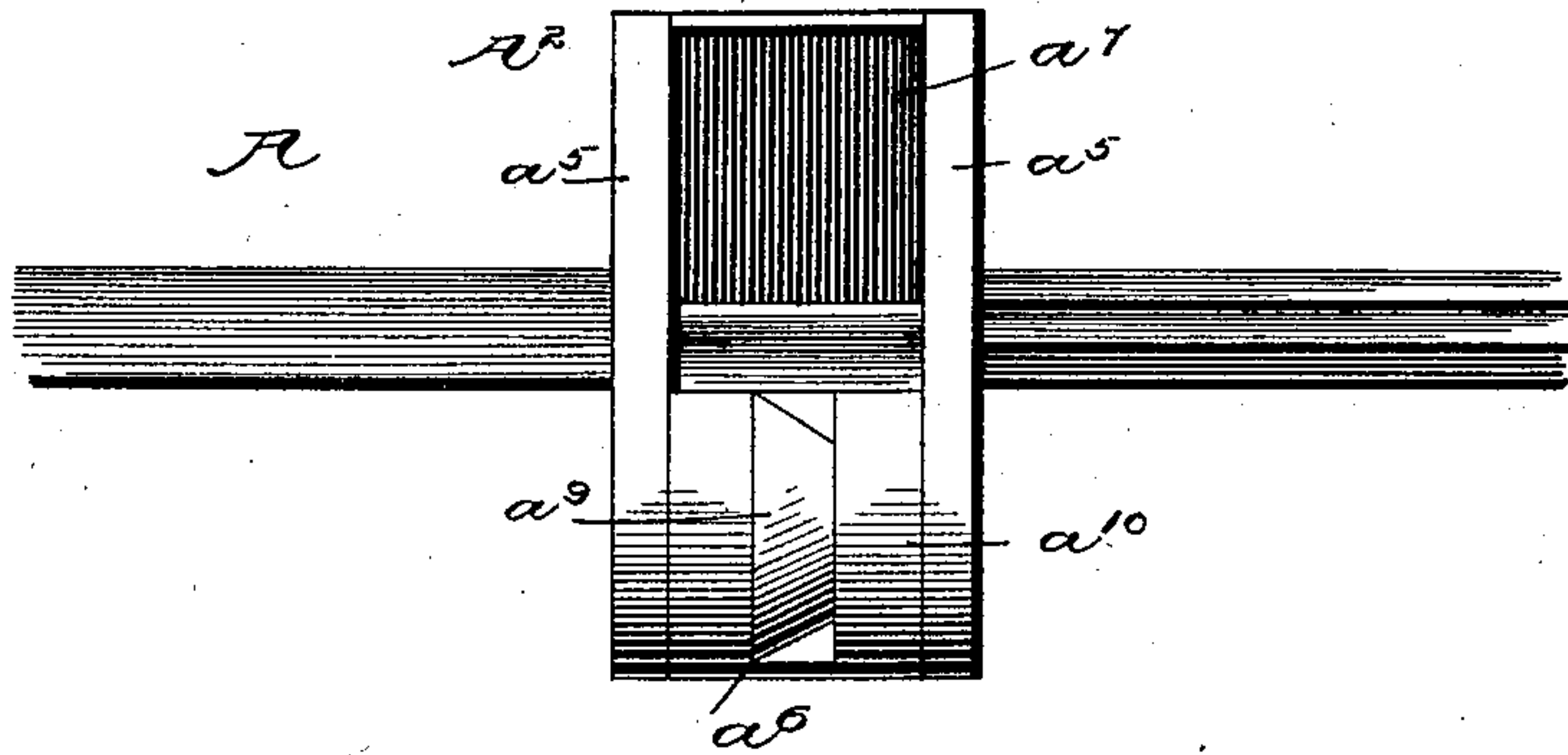


Fig. 6.

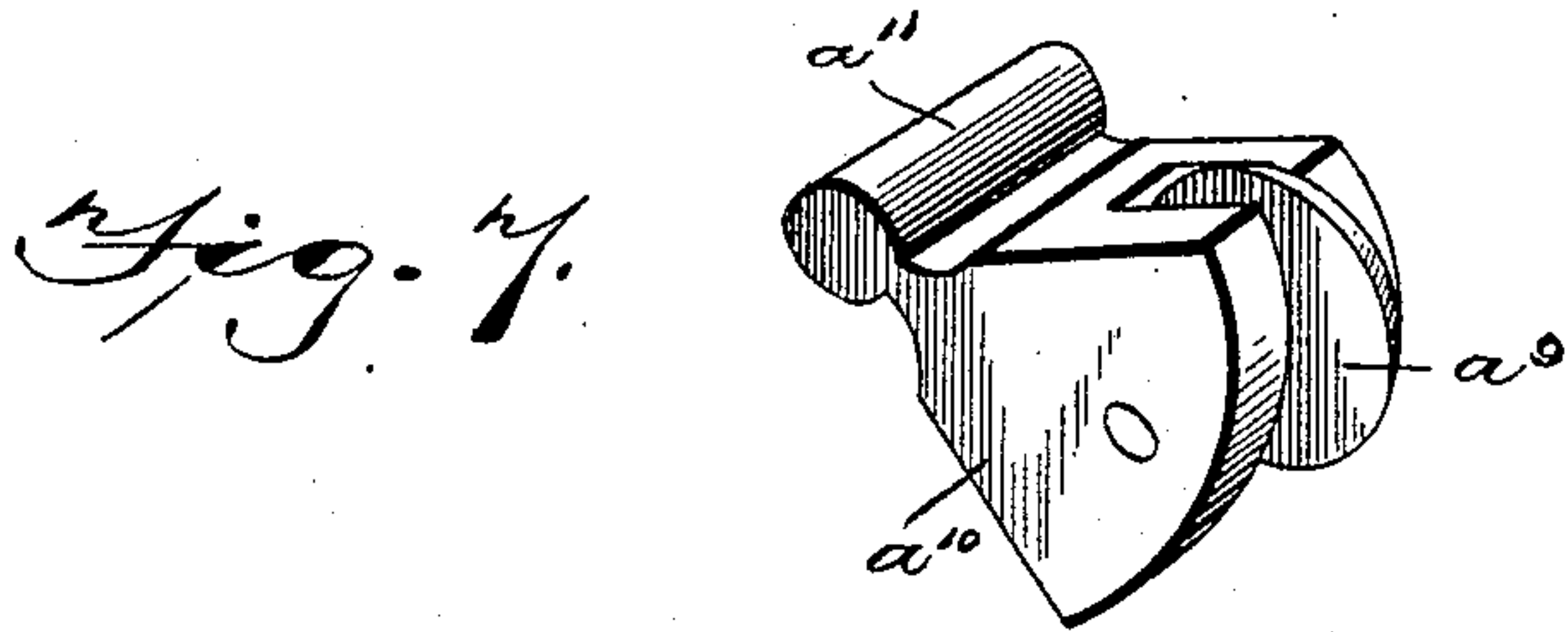


Fig. 7.

WITNESSES

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UNITED STATES PATENT OFFICE.

WALTER D. HERVEY, OF CHENOA, ILLINOIS.

FLUE CUTTER AND EXPANDER.

SPECIFICATION forming part of Letters Patent No. 594,081, dated November 23, 1897.

Application filed February 12, 1897. Serial No. 623,031. (No model.)

To all whom it may concern:

Be it known that I, WALTER D. HERVEY, a citizen of the United States, residing at Chenoa, in the county of McLean and State of Illinois, have invented certain new and useful Improvements in Flue Cutters and Expanders; 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 appertains to make and use the same.

This invention relates to improvements in flue cutters and expanders, and has more particular relation to such devices as are interchangeable, so that they may be either made to cut or expand, at the will of the operator.

The invention consists of certain novel constructions, combinations, and arrangements of parts, all of which will be hereinafter more particularly set forth and claimed.

In the drawings forming part of this specification, Figure 1 represents a perspective view of the device embodying my invention. Fig. 2 represents a transverse vertical section through the same just forward of the circular enlargement. Fig. 3 represents a detail perspective view of the cutting-wheel. Fig. 4 represents a detail perspective view of the expanding-wheel. Fig. 5 represents a side elevation of a modified form of my invention. Fig. 6 represents a transverse section through the same, and Fig. 7 represents an enlarged detail perspective view of the lever and cutting-wheel.

A in the drawings represents the power shaft or shank; A', the circular enlargement formed thereon; B, the circular guide attached to one end of said shaft; C, the guide or gage, and D the operating-handle.

The circular enlargement A' is formed with a segmental slot a , in which the cutting or expanding wheel, hereinafter described, is adapted to travel. Each wall of this slot is formed with a segmental cam-slot a' , one end of each of said latter slots being at a greater distance from the periphery of the said enlargement A' than the opposite end. The cutting-wheel E preferably has a periphery beveled from one side only, so as to form a cutting edge e . This wheel is mounted in the slot a by means of trunnions e' , with which it is provided, entering the respective cam-

slots a' . A guide-wheel B is journaled upon the reduced end a^2 of the shaft A, so as to be capable of rotation thereon. The diameter of this guide B, as well as the enlarged portion A', is just equal to the internal diameter of the flue to be cut or expanded. When this device is to be applied within a tube, it is slipped into the same until the gage-plate C, which is adjustably mounted upon the squared end a^3 of the shaft A, contacts with the outer surface of the head-plate, to which the tube is secured. This gage is secured in any desired position upon the squared end of the shaft A by a set-screw c . Any suitable form of operating-handle D is applied to the forward protruding end of the shaft A for operating the same.

It will be observed from the foregoing description that when it is desired to cut out an old flue or tube from the boiler the device is inserted into the same and the shaft A rotated; the gage-plate B and the enlargement A' acting as guides to keep the device central within the tube.

As the shaft A revolves the periphery of the cutting-wheel engages and cuts the interior of the tube, and as the cutting proceeds the trunnions e' ride upon the inclined faces of the cam-slot a' and thus gradually project the periphery of the cutting-wheel more and more beyond the periphery of the enlargement A' until the tube has been cut through. A reverse operation of the shaft A will then cause the cutting-wheel to sink back into its normal position with its cutting periphery wholly within the periphery of the enlargement A'. The device can now be withdrawn from the tube without interference from the cutting-wheel.

When it is desired to expand a new tube in position in the head-plate, the operation is substantially the same as that just described, the expanding-wheel F being inserted in the enlargement A' in lieu of the wheel E. This expanding-wheel F comprises a wheel proper, f , having a rounded periphery f' and laterally-projecting trunnions f^2 . It will be observed that when this wheel is employed the rotation of the shaft A will cause it to press outward against the interior of the tube and thus will expand the tube at this point and hold the same firmly in position in the head-

plate. By means of the journal connection between the inner end of the shaft A and the guide B the friction is greatly reduced, and the said guide can remain fixed within the tube while still permitting the rotation of the shaft.

In the modified form of my invention shown in Figs. 5, 6, and 7 shaft A is provided with an enlarged portion A², made up of side apertured plates a⁵, and a central portion a⁶, cut away so as to form a segmental slot a⁷. The said central portion a⁶ is also provided with a transverse groove a⁸, so arranged as to be out of the true center of the two side plates a⁵. The cutting-wheel a⁹ is rotatably mounted in the outer bifurcated end of the short lever a¹⁰. The inner end of this lever is formed with an elongated circular head a¹¹, that is slipped into the groove a⁸ before one of the side plates a⁵ is applied in position, and is thus held in position by said side plate after its application. It will be observed from this description that the said lever a¹⁰ is pivoted eccentrically within the side plates a⁵. As said lever is operated the cutting-wheel will be projected beyond the peripheries of the said plates a⁵ and cut or expand the tube in substantially the same manner as heretofore described.

The several parts of this invention are very simple in construction and operation and are capable of great power in cutting or expanding operations as well as being interchangeable when so desired.

By the use of this device the old tubes may be removed from a boiler and new ones inserted in a very short time and without any of the annoyances usually incidental to this operation. The peculiar construction of the periphery of the cutting-wheels, which are beveled from one side only, enables this de-

vice to be operated with a shear cut, which has been found most desirable in flue-cutters.

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

1. In a flue cutter or expander, the combination with a power-shaft having an enlargement formed with a segmental recess and segmental cam-slots in each wall of said recess, of a wheel adapted to operate in said recess and having trunnions extending to opposite sides so as to rest in the cam-slots, and means for operating the power-shaft, substantially as described.

2. In a flue cutter or expander, the combination with a power-shaft having an enlargement formed with a segmental recess, and segmental slots in each wall of said recess, of a wheel adapted to operate in said recess and having trunnions extending to opposite sides and mounted in the cam-slots, a guide-plate mounted upon one end of said shaft, and an operating-handle mounted upon the opposite end, substantially as described.

3. In a flue cutter or expander, the combination with a power-shaft having an enlargement formed with a segmental recess and segmental cam-slots in each wall of said recess, of a wheel adapted to operate in said recess, and having trunnions extending to opposite sides of the same and mounted in the cam-slots, an adjustable plate mounted on said shaft, and an operating-handle also mounted on said shaft, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WALTER D. HERVEY.

Witnesses:

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ROSCOE G. JORDAN.