

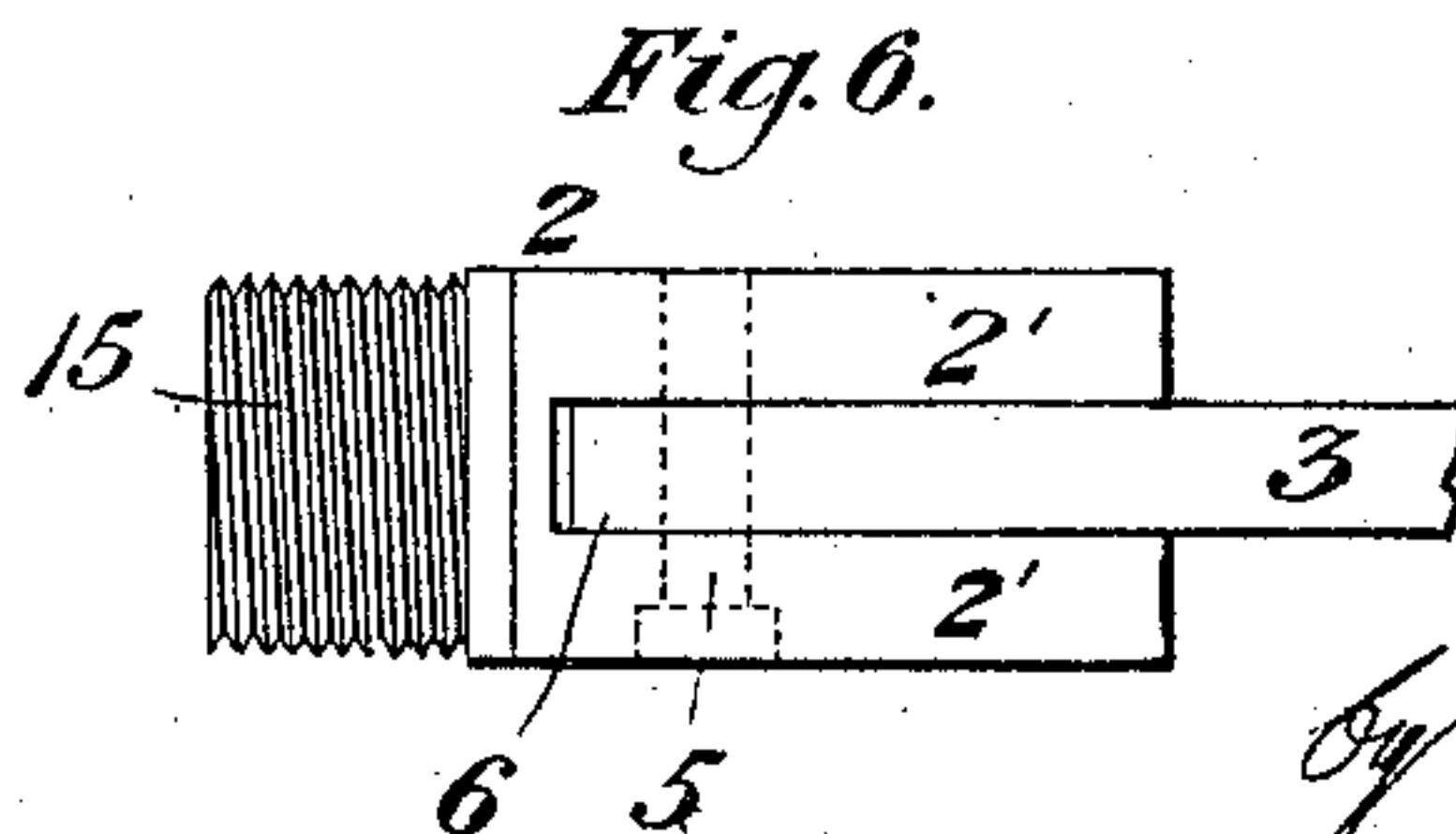
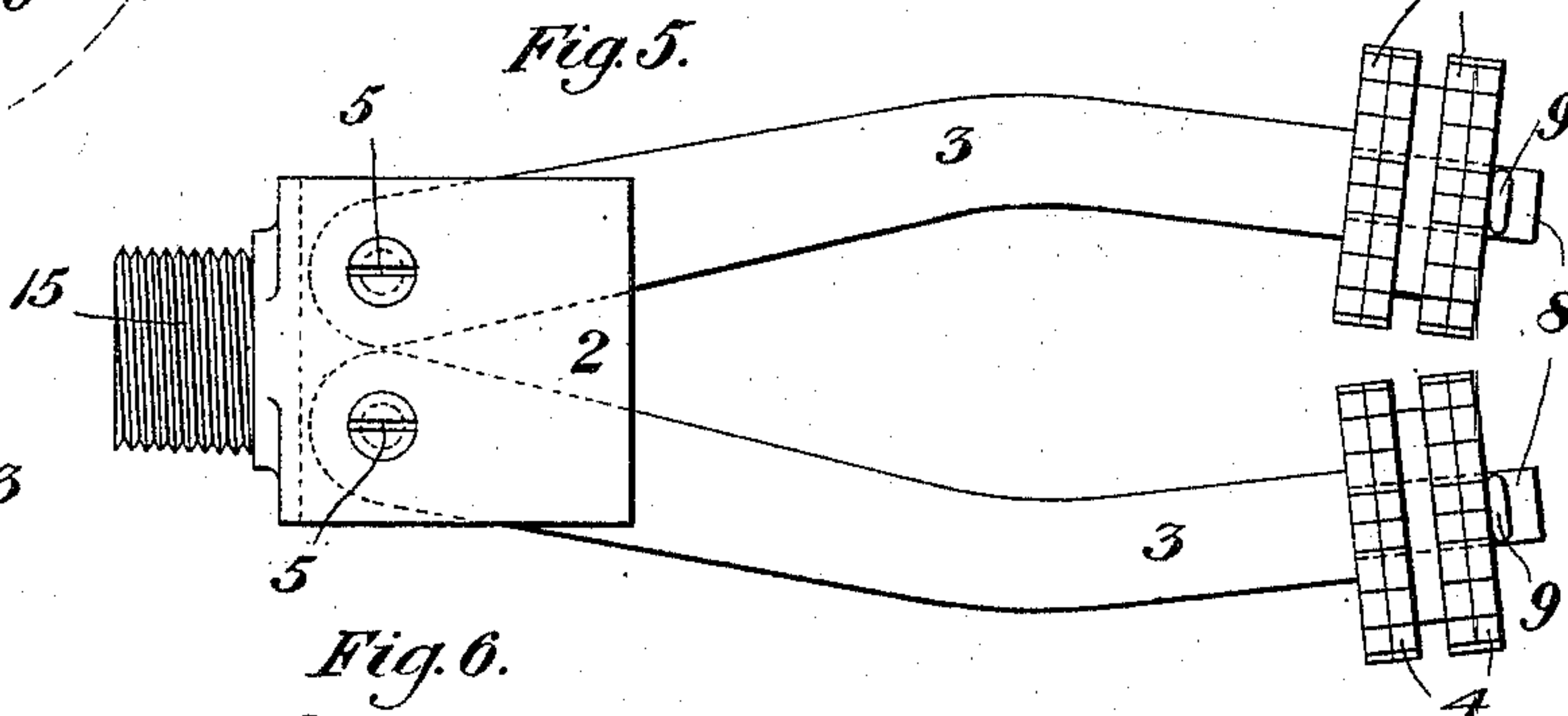
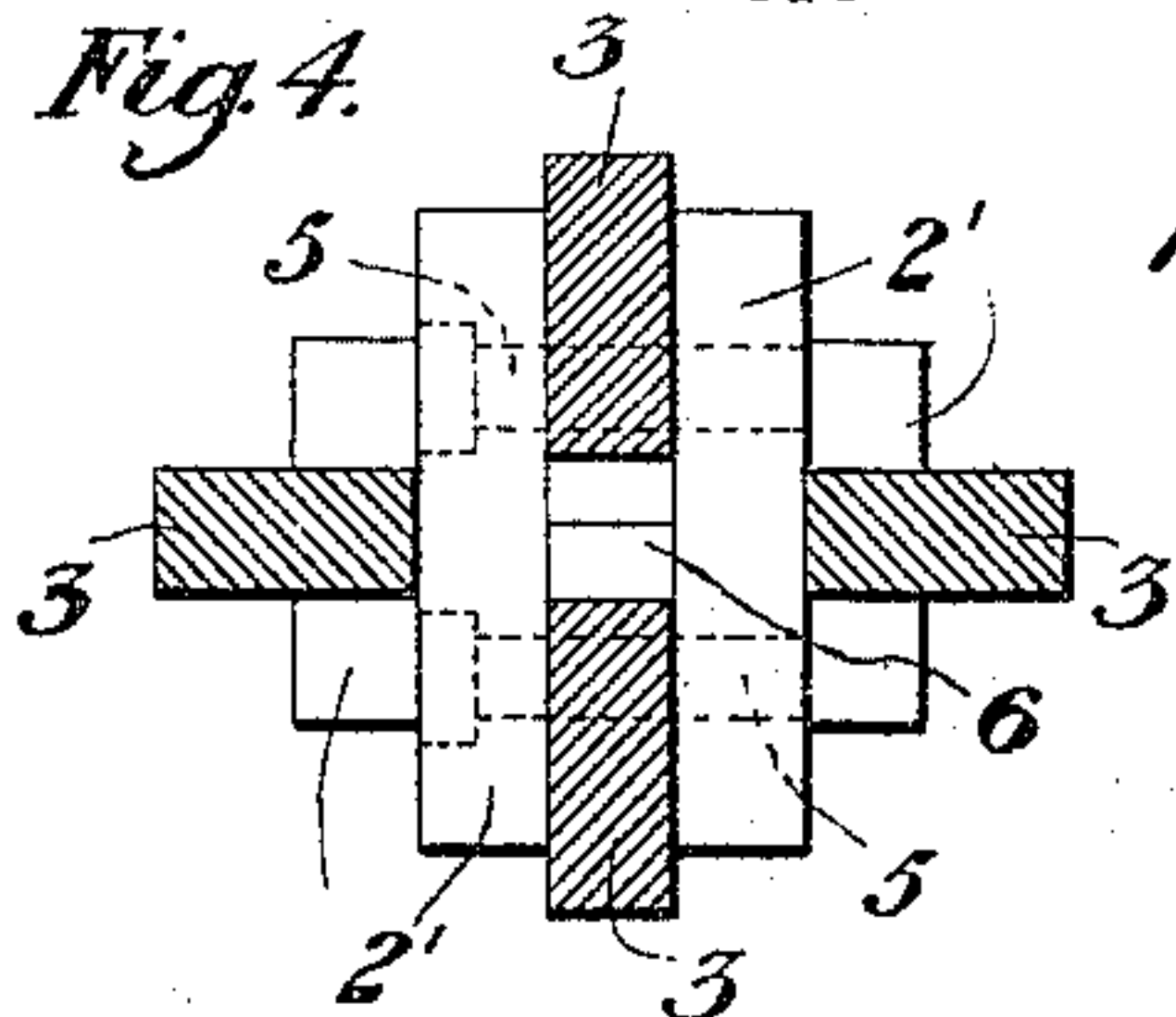
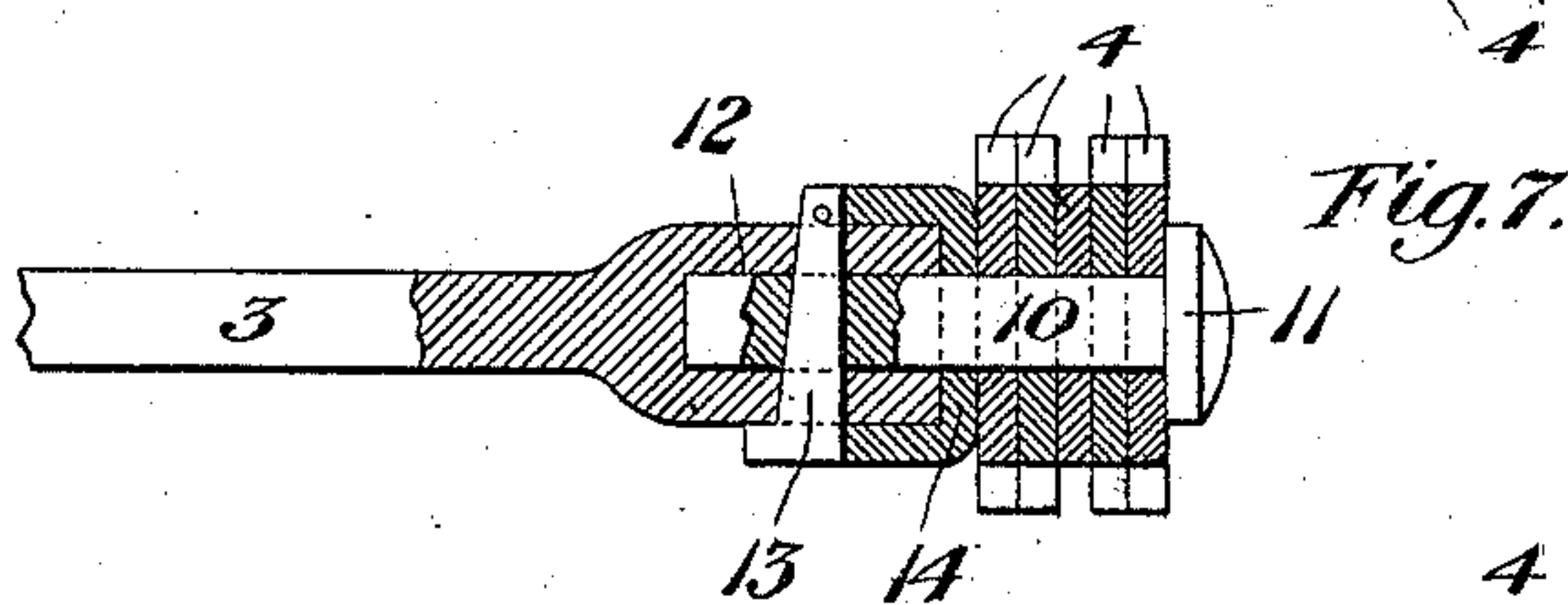
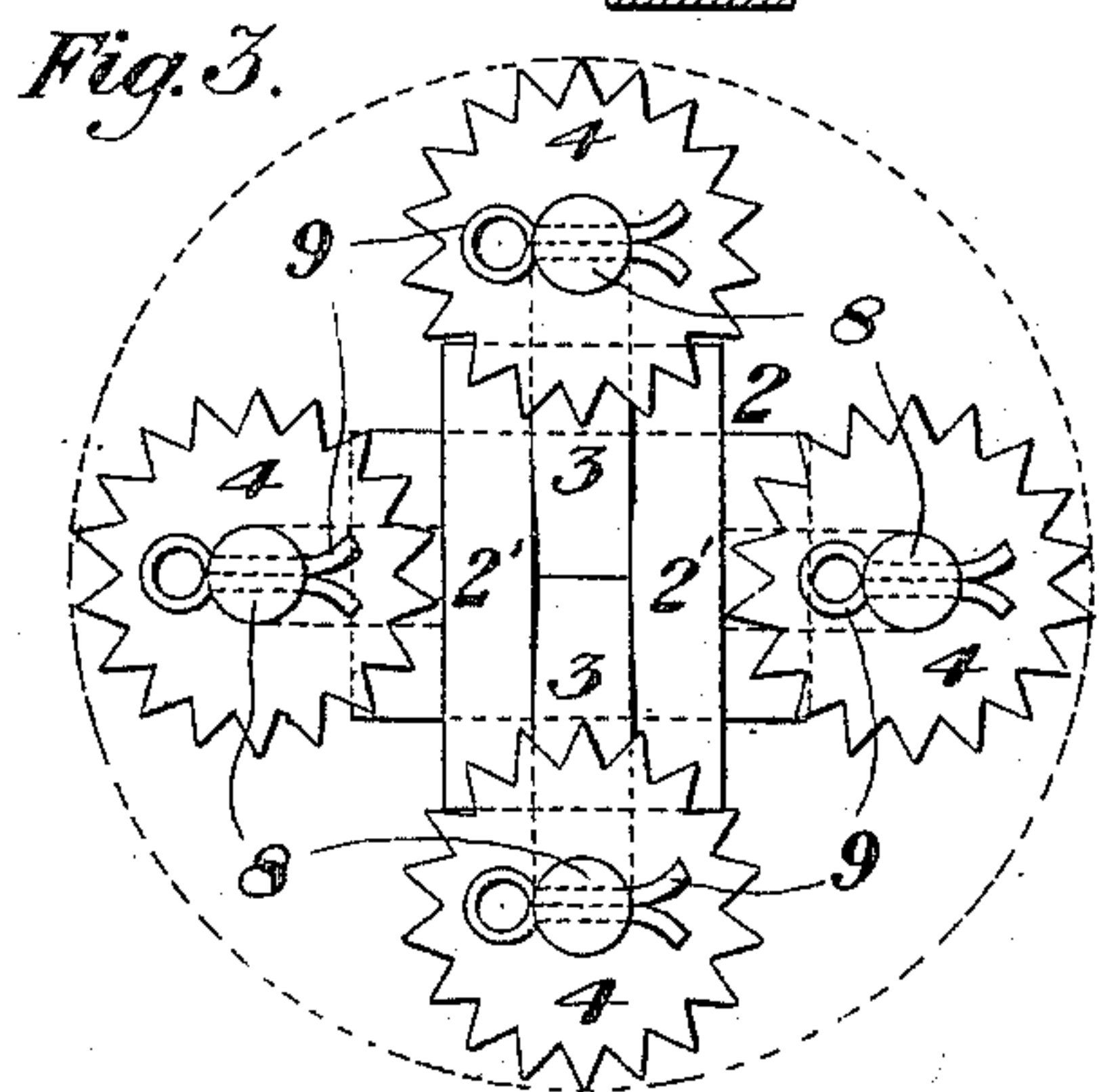
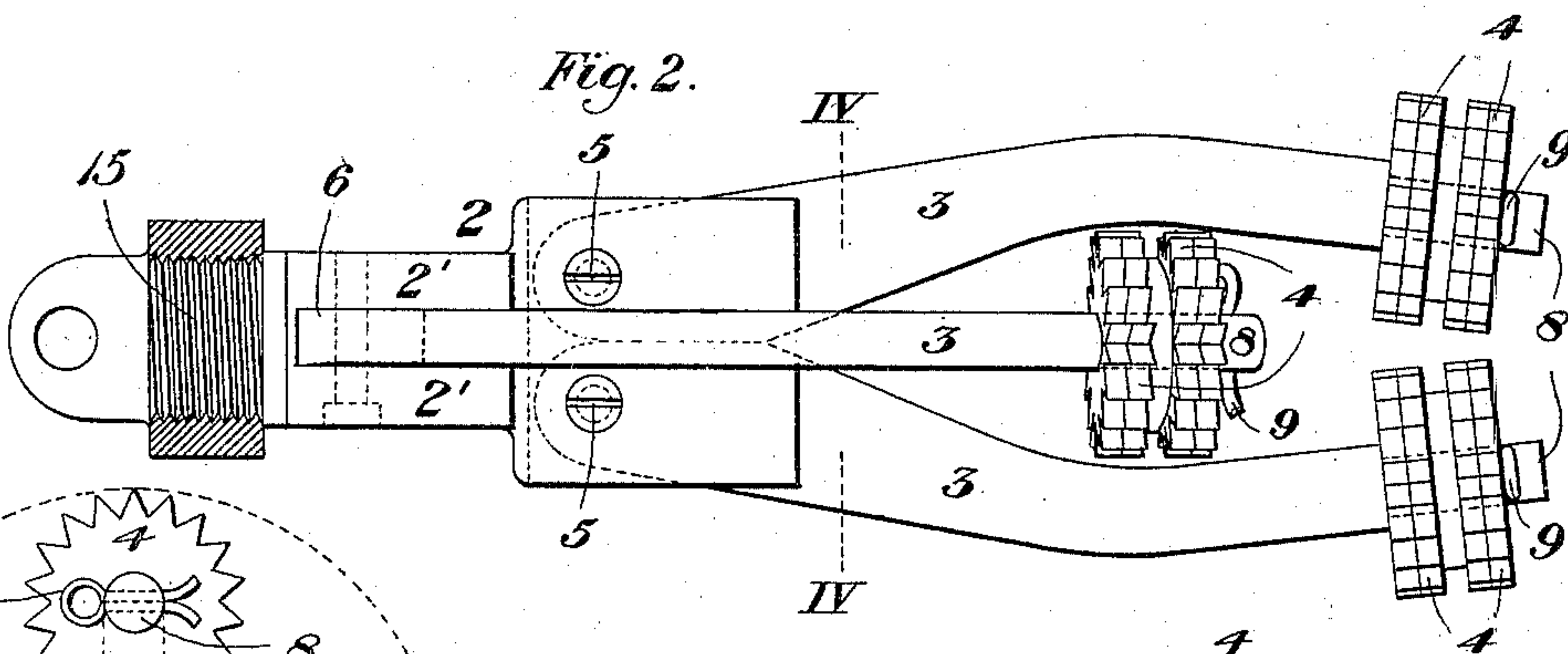
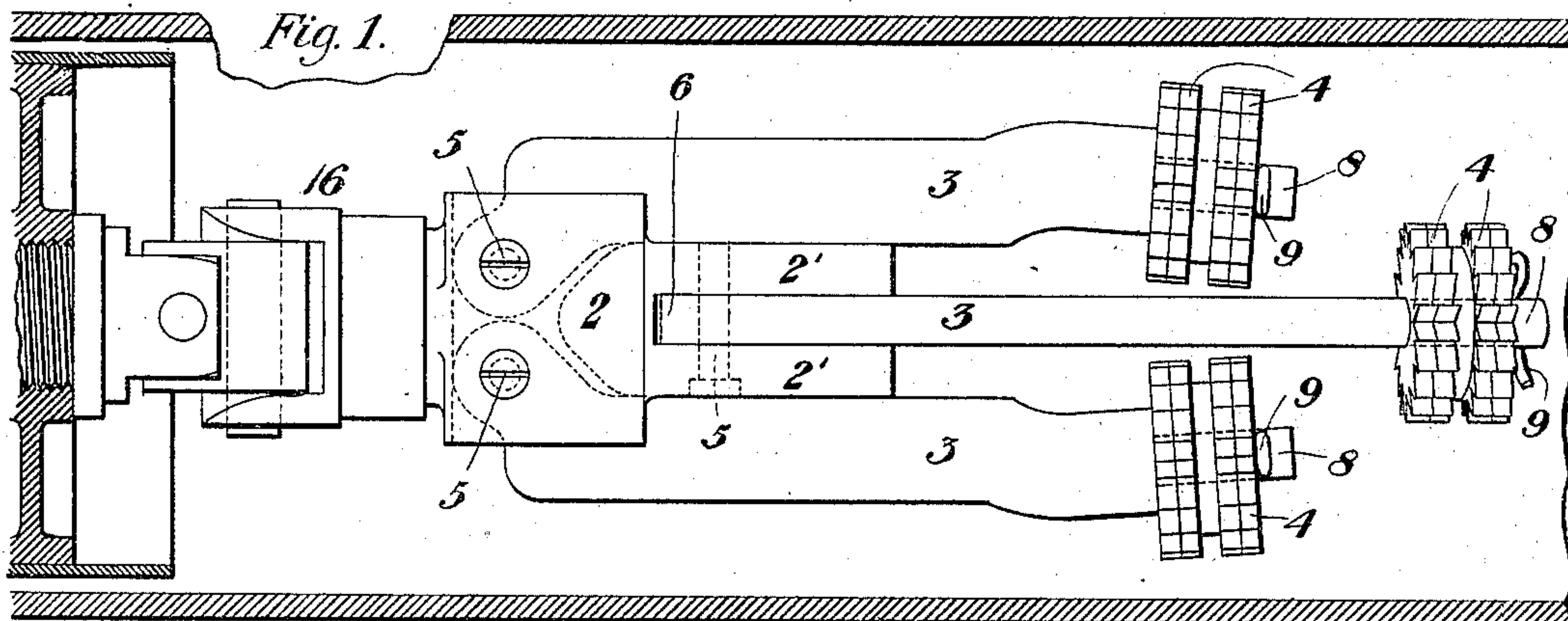
No. 641,092.

Patented Jan. 9, 1900.

W. S. ELLIOTT.  
TUBE CLEANER.

(Application filed Sept. 11, 1897.)

(No Model.)



Witnesses:  
*J. Edwards*  
*Watson Large*

Inventor:  
*William S. Elliott*  
by *O. M. Clarke*  
his attorney.



# UNITED STATES PATENT OFFICE.

WILLIAM S. ELLIOTT, OF PITTSBURG, PENNSYLVANIA.

## TUBE-CLEANER.

SPECIFICATION forming part of Letters Patent No. 641,092, dated January 9, 1900.

Application filed September 11, 1897. Serial No. 651,301. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM S. ELLIOTT, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a new and useful Improvement in Tube-Cleaners, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 is a view in elevation of my device attached to a motor and in position for operation inside a tube. Fig. 2 is a plan view of the tool detached. Fig. 3 is a front end view showing the cutters extended. Fig. 4 is a cross-sectional view taken on the line IV IV of Fig. 2. Fig. 5 is a view in side elevation, detached, of a modified construction provided with two arms. Fig. 6 is a plan view thereof. Fig. 7 is a sectional detail view illustrating a different attachment of the cutters.

My invention relates to the class of devices for removing scales from the inner shells of boilers, more particularly from the interior of the tubes of water-tube boilers, and is particularly designed to be used in combination with a turbine-wheel motor or other similar fluid-actuated prime mover, one of the objects in view being to reduce the obstructive area of the cleaning-tool, so as to allow for free passage of exhaust water or steam, cuttings, &c. To this end the tool is composed of a skeleton head or holder 2, in which are pivoted the longitudinally disposed arms 3, having mounted upon their outer ends the cutters 4, composed of toothed wheels adapted to rotate about the longitudinal center of the arm extremity. The arms 3 are pivoted closely adjacent to each other upon screws or pins 5, passing through cheeks 2', which embrace the ends of the arms within the intervening slot-cavity 6 and serve as supports and guides for a considerable portion of the arm, so that in the action of the tool under rapid rotation the arms will be firmly braced in a lateral direction.

In the principal figures of the drawings I have shown the head 2 provided with two transversely-disposed pairs of cheeks 2', one pair in advance of and at an angle to the other, joined by the intervening section of metal. In each pair of such cheeks is a pair of arms 3 3, having at the ends the cutters 4, the first pair of said arms being located in

advance of the second and the arms being of approximately the same length.

When the tool is rotated at a high speed, the arms 3 will fly out by centrifugal force into the position shown in Fig. 3, bringing the cutters into contact with the scale with considerable force, and the constant delivery of quick blows of the cutters against the scale in a revolving cutting action will rapidly dislodge and remove it. The cuttings are carried forward by the exhaust-current from the turbine, and because of the skeleton form of the head they have free and unobstructed passage.

In tools having but one pair of arms and cutters, as shown in Fig. 5, the head 2 is provided with two extended cheeks 2' only, serving as bearings and guides for the pivoted ends of the arms 3, and I have found such a construction to give good results in practice, while being very light and easily operated.

In the principal figures of the drawings I have shown the cutters 4, mounted on a reduced extension 8 of the arm and held in place by a cotter 9. For the purpose of more readily and conveniently removing and replacing the cutters I have designed the construction shown in Fig. 7, in which the end of the arm 3 is reinforced or upset, and a pin 10, provided with a head 11, is inserted through the center of the cutters 4 and into a corresponding recess 12 in the end of the arm, being retained in position by a key 13, or the pin 10 may be threaded and screwed into position, if desired. An intervening washer 14 serves as a bearing for the inside cutter and to relieve the end of the arm from wear.

At the back end of the head 2 is a threaded extension 15 for engagement with one member of a universal coupling 16, connecting the tool with the turbine wheel or other operating mechanism. Such coupling permits the cleaner to be used in bent tubes, and while not absolutely necessary in straight tubes I have found that a certain degree of flexibility which it affords is of advantage in permitting free action of the arms. The universal coupling may, however, be dispensed with and the head screwed directly into the turbine wheel with satisfactory results.

Any other operating mechanism may be substituted for the turbine wheel, and, if de-



sired, the tool may be operated by hand through proper shaft connections.

I am aware that devices employing pivoted arms carrying toothed cutters have been patented for the purpose of removing scale from tubes, and I am familiar with the patents granted to Schmandt, No. 161,558, Rast, No. 386,848, and Forsythe and Bell, No. 526,997; but none of these show my construction as covered in the following claims.

The construction of my device is very simple and cheap, and by reason of the pivotal bearings for the arms being made as closely adjacent as possible the cross-section of the supporting-head is reduced to a minimum, and in consequence the surrounding area for passage of the cuttings is proportionately greater.

I claim—

1. A rotatory tube-cleaner having freely-swinging arms, the planes of movement of the arms being longitudinal of the axis of the tool, and cutting-disks secured to the arms and lying in planes transverse to the axes of said arms; substantially as described.

2. A rotatory tube-cleaner, having freely-swinging arms moving in planes longitudinal of the axis of the tool, each arm carrying a series of toothed disks lying in planes transverse to the axes of said arms; substantially as described.

3. A rotatory tube-cleaner having a head provided with an uninterrupted cross-slot

and freely-swinging arms having their ends mounted in the slot and closely adjacent to each other, said arms projecting beyond the head and provided at their free outer ends with cutters; substantially as described.

4. A rotatory tube-cleaner having a head provided with a plurality of uninterrupted cross-slots arranged at opposing angles, and sets of arms having their pivotal ends mounted in the slots closely adjacent to each other, one set of such arms being in advance of the other; substantially as described.

5. A rotatory tube-cleaner, having freely-swinging arms moving in planes longitudinal of the axis of the tool, said arms carrying cutting-disks lying in planes transverse to the axes of the arms, the cutters upon one arm being in advance of those upon the other; substantially as described.

6. A rotatory tube-cleaner, having pivoted thereto freely-swinging arms with free outer ends, said arms moving in planes longitudinal of the axes of the tool, and cutting-disks rotatably mounted upon the arms near their outer ends and lying in planes transverse of said arms; substantially as described.

In testimony whereof I have hereunto set my hand this 21st day of August, 1897.

WILLIAM S. ELLIOTT.

Witnesses:

PETER J. EDWARDS,  
C. M. CLARKE.