

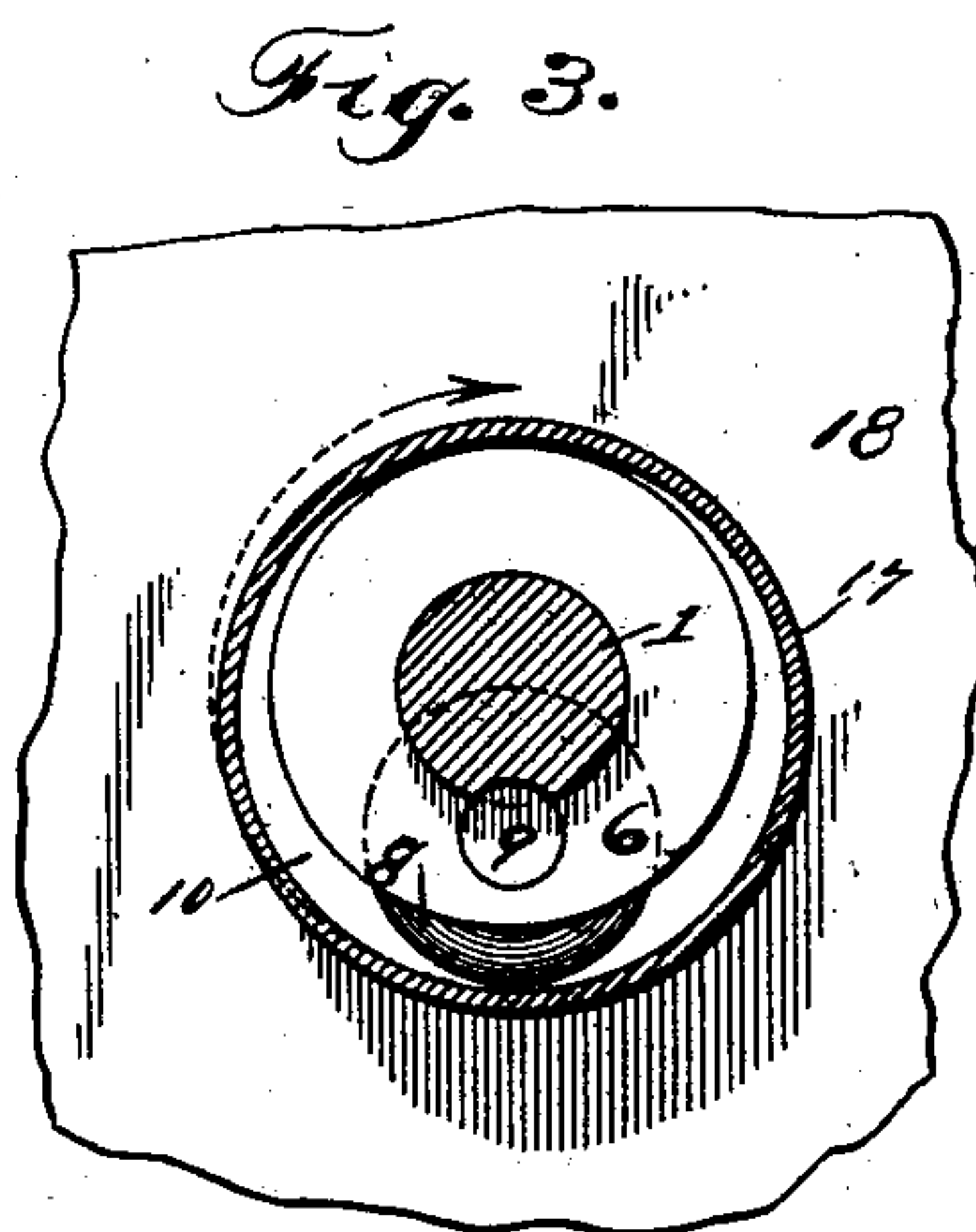
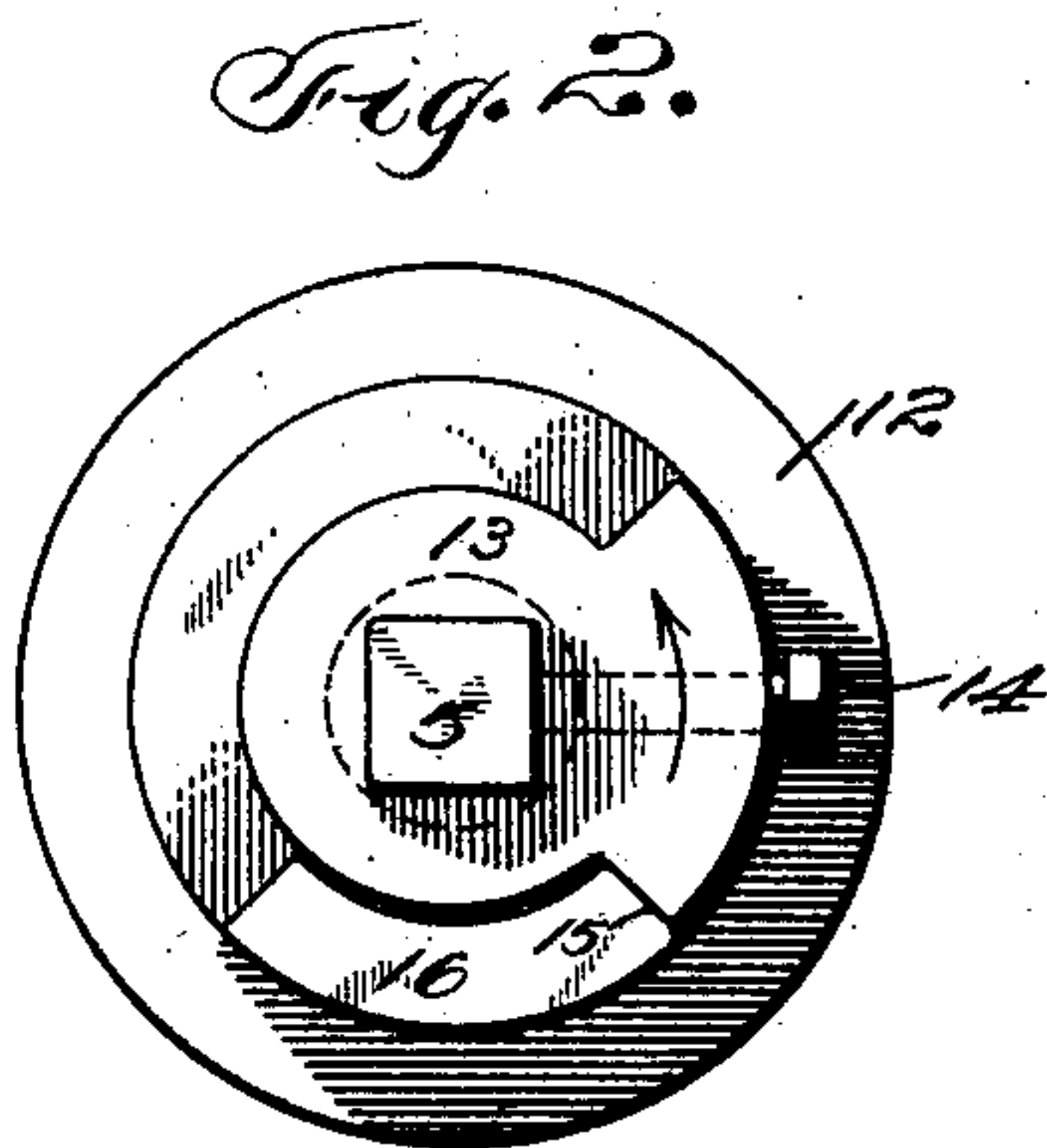
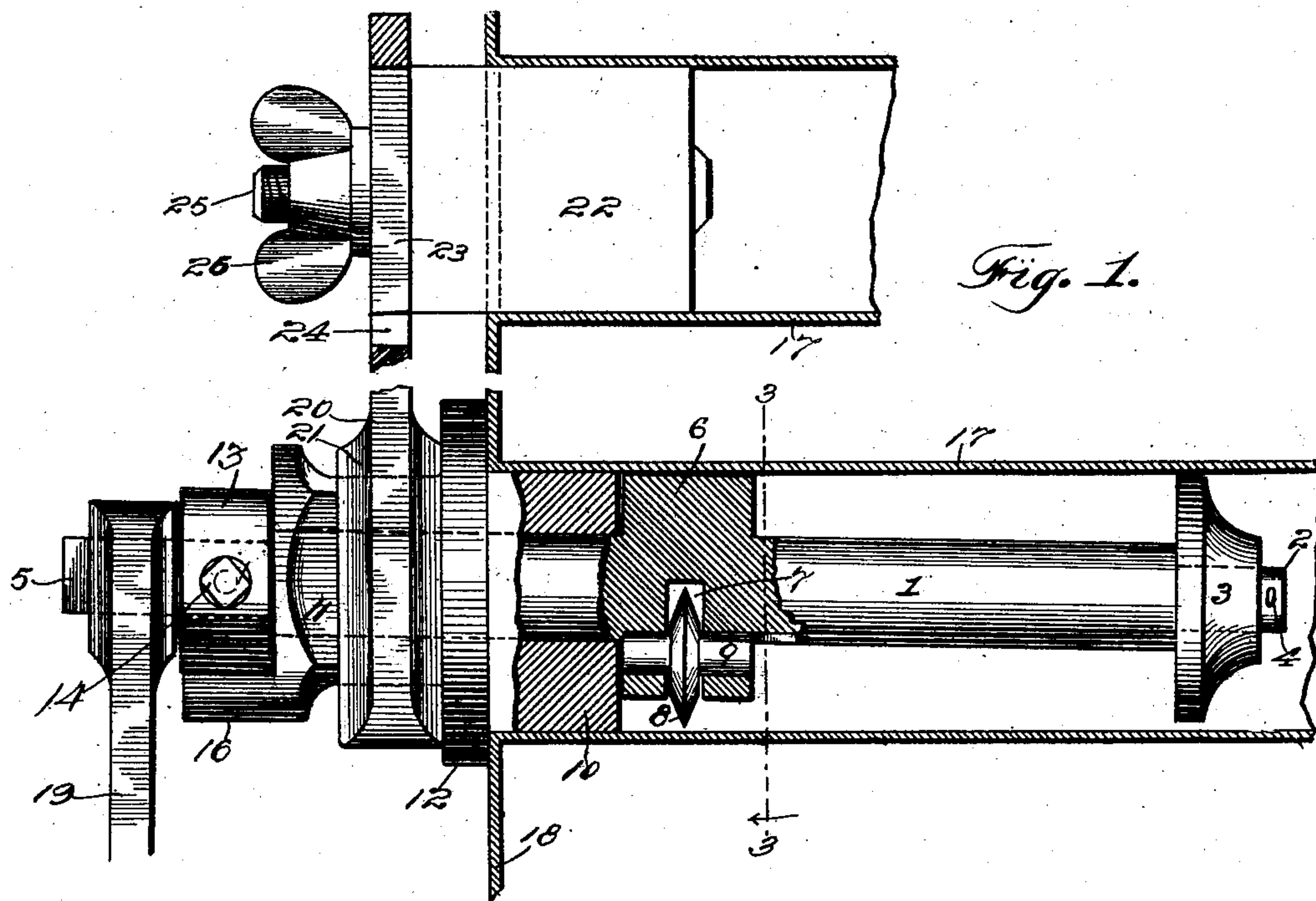
**No. 700,197.**

**Patented May 20, 1902.**

**W. HERVEY.**  
**TUBE CUTTER.**

(Application filed Apr. 22, 1901.)

(No Model.):



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# UNITED STATES PATENT OFFICE.

WALTER HERVEY, OF CHENOA, ILLINOIS.

## TUBE-CUTTER.

SPECIFICATION forming part of Letters Patent No. 700,197, dated May 20, 1902.

Application filed April 22, 1901. Serial No. 56,925. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER HERVEY, a citizen of the United States, residing at Chenoa, in the county of McLean and State of Illinois, have invented a new and useful Tube-Cutter, of which the following is a specification.

This invention relates to flue-cutters, and has for its object to provide an improved device of this character which may be conveniently inserted through one end of the flue and mounted therein for operation to cut the tube. It is furthermore designed to provide an improved eccentric mounting of the cutter, so as to facilitate the insertion of the implement and to insure an effective operation thereof, and finally to arrange for maintaining the outer bearing of the rotatable parts fixed or rigid during the operation of the device and without requiring the operator to hold the same.

With these and other objects in view the present invention consists in the combination and arrangement of parts, as will be hereinafter more fully described, shown in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes in the form, proportion, size, and minor details may be made within the scope of the claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a plan section of the device applied for cutting a flue. Fig. 2 is an elevation of the outer end of the device. Fig. 3 is a detail transverse sectional view taken on the line 3 3 of Fig. 1, the tube and boiler-head being omitted.

Like characters of reference designate corresponding parts in all of the figures of the drawings.

In carrying out the present invention there is provided a rotatable shaft or spindle 1, which has its inner end reduced, as at 2, for the reception of a concentric bearing-disk 3, which fits up against the shoulder formed by the reduced terminal portion of the spindle and is rotatably held in place in any suitable manner—as, for instance, by a pin or key 4, driven transversely through the part 2 and at the outer side of the bearing. The opposite terminal of the spindle is made polygonal, as at 5, for the reception of a wrench to turn

the spindle, and the remaining intermediate portion thereof is cylindrical in shape. About midway of the length of the spindle there is provided a head or enlargement 6, which is concentric with respect to the spindle and is provided with a marginal socket or recess 7, in which is rotatably mounted a cutting-disk 8. This disk has a sharp cutting marginal edge and is mounted upon a removable pivot-pin 9 in order that the cutting-disk may be replaced when worn. A bearing 10 is provided for the outer portion of the spindle and is in the form of a sleeve slipped upon the outer end of the spindle and bearing against the enlarged head 6 to limit the inward play of the sleeve, the inner end portion thereof being cylindrical and mounted eccentrically upon the spindle, the diameter of said part being substantially equal to that of the opposite terminal concentric bearing-disk 3. The outer end portion of the bearing 10 is made polygonal, as at 11, for engagement by a part to hold the bearing rigid during the operation of the device, and an outwardly-directed marginal flange or shoulder 12 lies between the cylindrical and polygonal portions of the eccentric bearing and is designed to form a stop for engagement with a boiler-head to limit the inward thrust of the device. A removable stop-collar 13 is slid upon the outer polygonal end of the spindle and lies close up to the outer end of the eccentric bearing to prevent outward play thereof, there being a set-screw 14 passed through the margin of the collar to engage with the polygonal end of the spindle to prevent displacement of the collar. A marginal projection or stop-shoulder 15 is formed integral with the collar and is designed to be engaged by a terminal projection 16 upon the outer end of the eccentric bearing, whereby the rotation of the spindle is limited. These projections are in the form of quadrants for the purpose of limiting the spindle to a half-revolution and are arranged to stop the spindle at one limit when the cutting-disk is at the longest radius of the eccentric bearing-sleeve, the peripheral edge of the cutter being thus flush with or within the outer marginal edge of said bearing, whereby the device is free from projections which would interfere with the insertion of the spindle into a tube. As



the spindle is turned from one limit to the opposite limit thereof the cutting-disk is gradually projected beyond the marginal edge of the bearing in an eccentric path (shown by the dotted arrow in Fig. 3) and will thereby cut the tube within which the device may be mounted.

In using the device to cut a tube out of a boiler, as indicated in Fig. 1 of the drawings, the spindle is first turned to that limit where the cutter is not projected, and the inner end of the spindle is inserted into the open end of the tube 17 until the stop-flange 12 comes in contact with the flue-sheet 18 and the device is in position for operation. It will be understood that the cylindrical bearings 3 and 10 are of a diameter to snugly fit within the tube or flue, and thereby form relatively fixed terminal bearings for the spindle, which therefore will be inclined across the longitudinal axis of the flue. The spindle or mandrel is then rotated by a suitable wrench 19, applied to the outer projected end thereof, whereby the cutter is caused to travel about the spindle in a circular path to cut the flue.

In order that the eccentric bearing of the spindle may be positively held against rotation, there is provided a holder in the form of a bar 20, having a bifurcated end or terminal wrench-head 21 to detachably embrace the polygonal portion 11 of the outer eccentric bearing, the opposite end of the rod or bar having a lateral projection 22 to enter and fit snugly one of the other adjacent flues, and thereby lock the bar and the bearing against rotation upon or with the spindle. The projection 22 has a tongue portion 23, adjustably fitted in a longitudinal slot 24, formed in the bar, and also a bolt or screw-threaded stem 25, projected from the tongue and through the slot, with a thumb-nut 26 fitted to the outer end thereof, whereby the projection may be adjusted longitudinally of the bar to fit the same in one of the flues or tubes.

It will be understood that in order to project the cutter into engagement with the tube that outer eccentric bearing must be rigidly held when the spindle or mandrel is first rotated to give the initial cut. When the cutter has made a one-half revolution, the holder 20 is removed from the outer eccentric bearing and the spindle is then rotated (the cutter being now projected to the limit of its outward movement) through a complete circle, thereby cutting entirely through the tube.

What is claimed is—

1. A device of the character described, comprising a rotatable spindle carrying a cutter, a concentric bearing at one end of the spindle, an eccentric bearing at the opposite end, and means for limiting the rotation of the spindle.

2. A device of the character described, comprising a rotatable spindle carrying a cutter, a concentric bearing at one end of the spindle, an eccentric bearing at the opposite end

thereof, means for limiting the rotation of the spindle, and means for controlling the distance of its insertion into a tube.

3. A device of the character described, comprising a rotatable spindle having a reduced inner end and an outer polygonal end, an intermediate cutter, a circular rotatable bearing mounted concentrically upon the reduced end of the spindle, a circular bearing mounted eccentrically upon the outer portion of the spindle and carrying a stop projection, and a stop device fitted to the polygonal end of the spindle and located in the path of the stop projection.

4. A device of the character described, comprising a rotatable spindle having an outer polygonal end, an intermediate cutter, a rotatable bearing, mounted upon the spindle between the cutter and the polygonal end thereof, and carrying a stop projection, and a stop device carried by the polygonal end of the spindle and arranged in the path of the stop projection whereby to limit the rotation of the spindle.

5. A device of the character described, comprising a rotatable spindle having an outer polygonal end, an intermediate cutter, a rotatable bearing mounted, upon the spindle between the cutter and the polygonal end thereof, and having a stop projection, and a stop device having a polygonal opening fitting the outer end of the spindle and provided with means for rigidly securing it to the said end.

6. A device of the character described, comprising a rotatable spindle, having a lateral cutter, a bearing rotatably mounted upon the spindle at the outer side of the cutter, and an arm connected to the bearing, and having a lateral projection adapted to enter an adjacent flue and thereby hold the arm and bearing against rotation.

7. A device of the character described, comprising a rotatable spindle, having a lateral cutter, a bearing rotatably mounted upon the spindle at the outer side of the cutter, and provided with a polygonal portion, and a holding-arm, having a wrench-head adapted for detachable engagement with the polygonal portion of the bearing, and also provided with a lateral projection to enter a flue and hold the arm and bearing against rotation.

8. A device of the character described, comprising a rotatable spindle, having a lateral cutter, a bearing rotatably mounted upon the spindle at the outer side of the cutter, and provided with a polygonal portion, and an arm disposed at substantially right angles to the spindle, and having a terminal wrench-head for detachable engagement with the polygonal portion of the bearing, and an opposite terminal lateral projection, which is adjustable longitudinally upon the arm.

9. A device of the character described, comprising a rotatable spindle, having a lateral cutter, a bearing rotatably mounted upon the spindle at the outer side of the cutter, and pro-



vided with a polygonal portion, and a holder-arm, having a terminal wrench-head for detachable engagement with the polygonal portion of the bearing, the opposite end of the arm having a longitudinal slot, and a lateral projection adjustable longitudinally in the slot.

10. A device of the character described, comprising a rotatable spindle, having a polygonal outer end, an intermediate circular enlargement or collar, having a marginal recess, a cutter mounted in the recess and projected outwardly beyond the margin of the collar, a circular rotatable bearing mounted concentrically upon the inner end of the spindle, a sleeve-bearing mounted eccentrically upon the spindle between the collar and the polygonal portion of the spindle, the inner end portion of the sleeve being cylindrical in shape and of substantially equal diameter with the inner bearing, the outer end portion of the sleeve being polygonal in shape, and having an outer terminal longitudinal stop projection, there being an intermediate outwardly-directed marginal flange between the cylindrical and polygonal portions of the bearing-sleeve, a stop-collar removably fitted to the polygonal end of the spindle, and provided with a marginal stop projection lying in the path of the stop projection of the bearing-

sleeve, and also having a set-screw to engage the spindle, the polygonal end of the spindle projecting beyond the collar for the reception of an operating device, in combination with a holder-arm for the sleeve-bearing, consisting of an arm having a terminal bifurcation or wrench-head adapted for detachable engagement with the polygonal portion of the bearing-sleeve, and having an opposite terminal lateral projection extending toward the inner end of the spindle and adapted to be entered into a flue to hold the arm and bearing against rotation.

11. A device of the character described, comprising a rotatable spindle, having an intermediate lateral cutter an inner terminal concentric bearing, and an outer eccentric bearing, both bearings being of substantially the same diameter, and having correspondingly-inclined bearing-openings for the reception of the spindle, whereby the latter is inclined across the longitudinal axis of a tube when in operative position.

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

WALTER HERVEY.

Witnesses:

L. M. WILSON,  
R. G. JORDAN.