

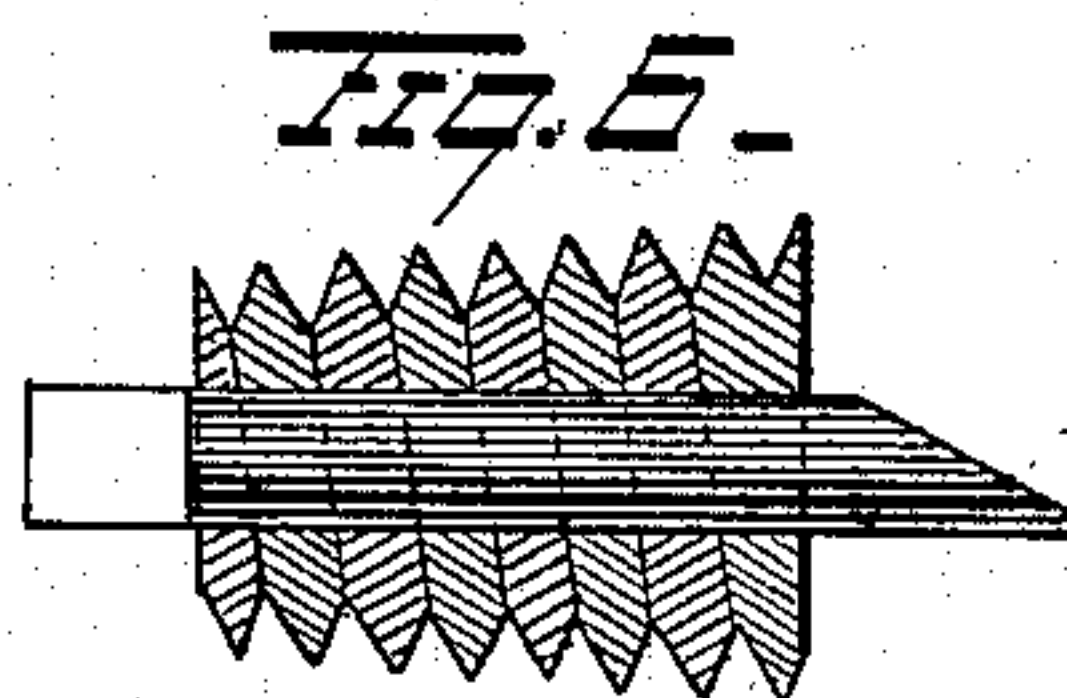
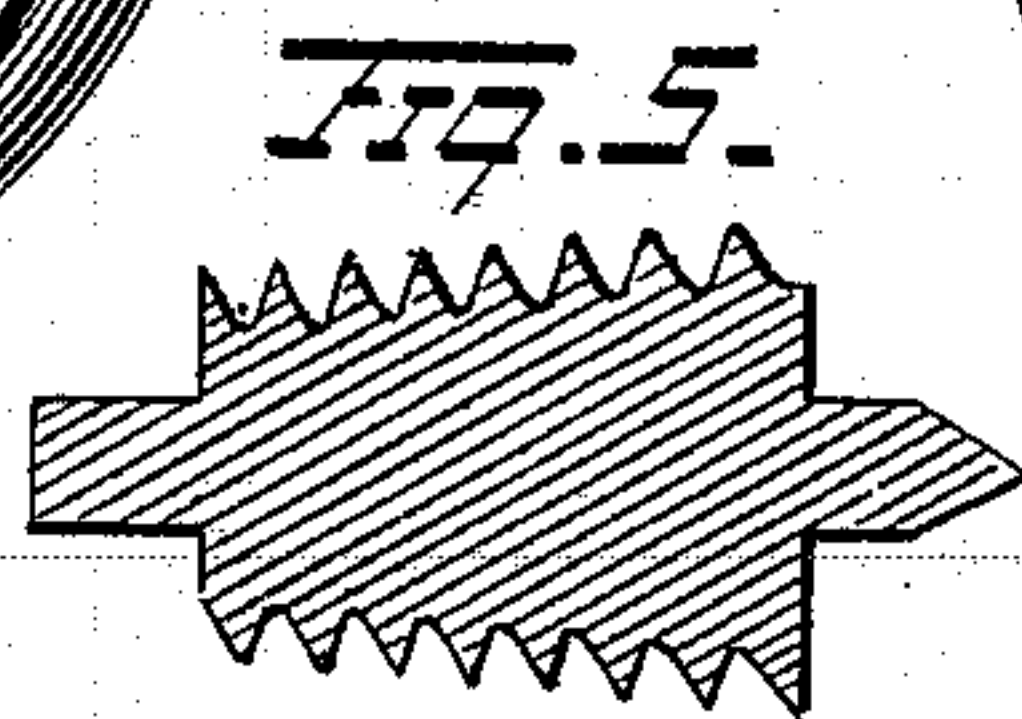
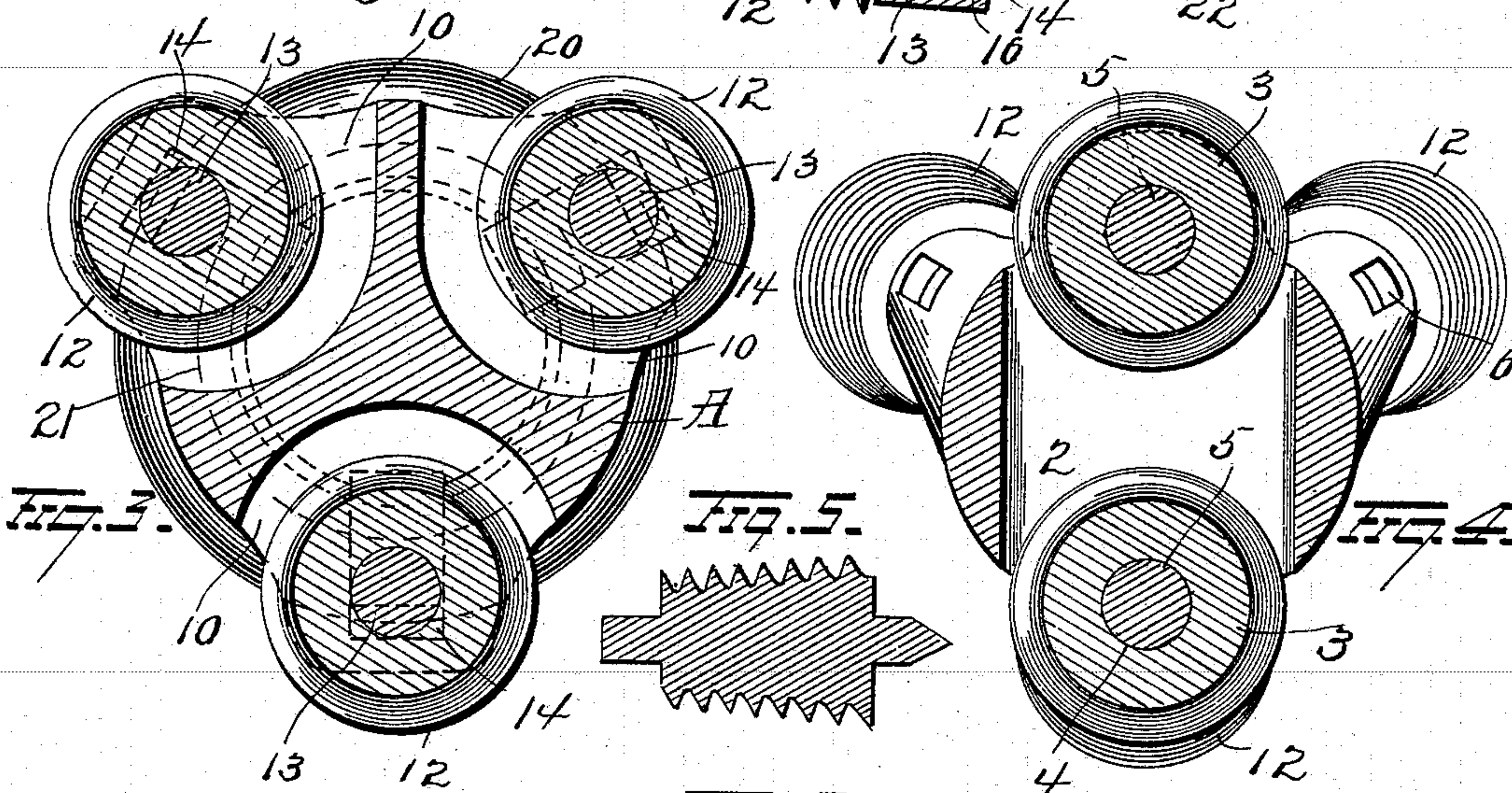
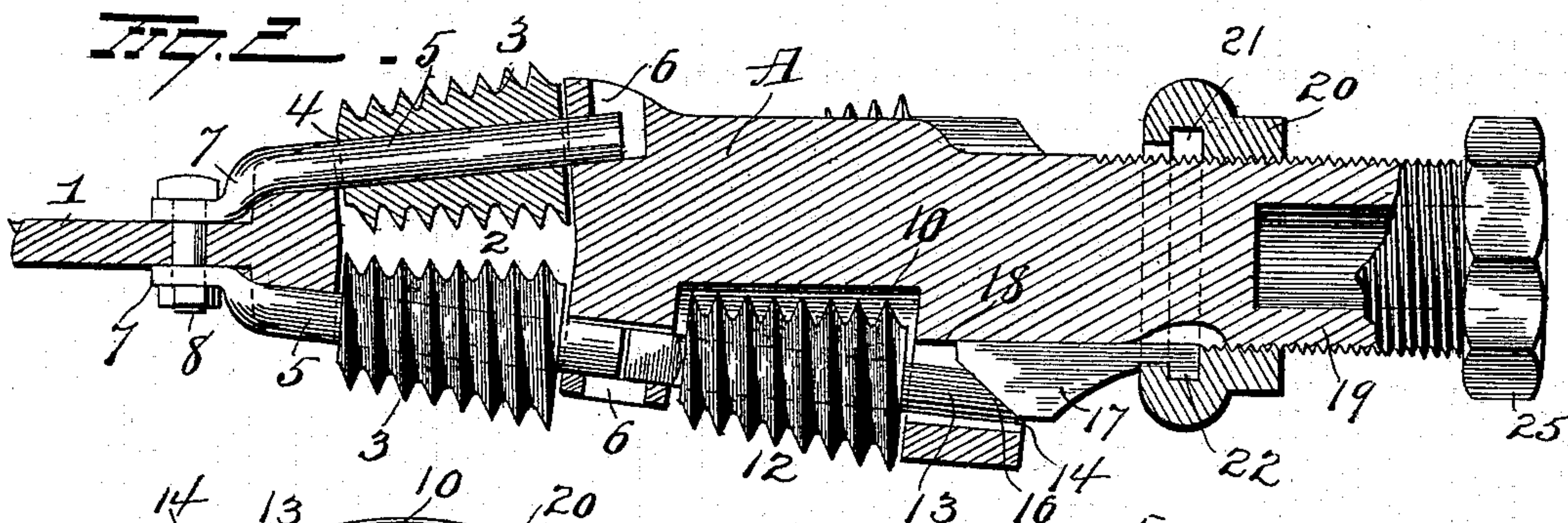
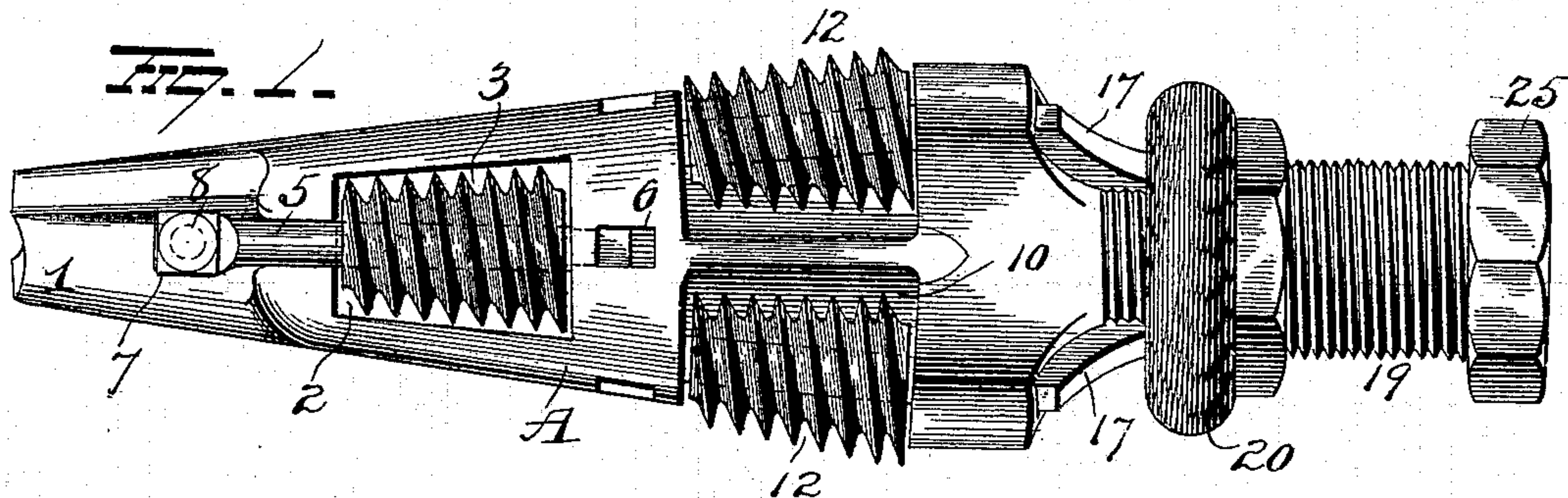
No. 615,427.

Patented Dec. 6, 1898.

W. L. CASADAY.  
BOILER FLUE CLEANER.

(Application filed Feb. 8, 1898.)

(No Model.)



WITNESSES  
G. F. Downing  
S. W. Foster

INVENTOR  
W. L. Casaday  
By N. A. Seymour  
Attorney



# UNITED STATES PATENT OFFICE.

WILLIAM L. CASADAY, OF SOUTH BEND, INDIANA.

## BOILER-FLUE CLEANER.

SPECIFICATION forming part of Letters Patent No. 615,427, dated December 6, 1898.

Application filed February 8, 1898. Serial No. 669,580. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM L. CASADAY, of South Bend, in the county of St. Joseph and State of Indiana, have invented certain new and useful Improvements in Boiler-Flue Cleaners; 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.

My invention relates to an improvement in boiler-flue cleaners, the object being to provide a device for effectually cutting and removing the hard incrustation which accumulates on the inside of boiler-flues and water-tubes and for removing any indentations and irregularities which may from time to time be formed in the tubes.

A further object is to provide means for expanding certain of the cutters to adjust them to the bore of the flues or tubes to be operated upon and to compensate for wear of the cutters.

A further object is to provide a flue-cleaner of such construction that it will tend to feed itself forward and at the same time force the scale removed from the tubes rearward.

With these ends in view the invention consists in certain novel features of construction and combinations of parts, which will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view of my improved flue-cleaner. Fig. 2 is a longitudinal section. Figs. 3 and 4 are transverse sections, and Figs. 5 and 6 are views showing slightly-modified forms of cutters.

A represents a casting which constitutes the main portion or body of the flue-cleaner. This casting has a general tapering formation, which terminates at its extreme forward end in a drill-point 1, the end and edges of which are sharpened to cut their way through the scale, which frequently nearly fills the tubes. Rearward of this drill end the body portion is recessed or slotted, as at 2, and in this slot or recess a pair of cutters 3 3 are located, a little more than half of each cutter protruding preferably beyond the surface of the casting, as shown. As these cutters constitute one of the features of my present in-

vention, they will now be described in detail. In the preferred form, as illustrated in Figs. 1 and 2 of the drawings, they are cast in a solid tapering piece, with a spiral thread on the exterior surface of comparatively deep cut and sharp at the periphery. It is essential to the successful operation of these cutters that the threads be hard as well as sharp. This portion of the cutter is therefore given what is termed a "moldboard-chill," so that it will resist the hardest scale formation in the tubes, which not infrequently is nearly, if not quite, as hard as iron. The bores 4 are left unchilled to form an easy bearing upon the journals on which they turn. These journals 5 5 are conveniently formed of short rods, which pass through the bores of the cutters into the stock at 6 at one end, their opposite ends 7 being secured by a short bolt 8, passing through both. Departure might of course be easily made from these details, as they have only been described as desirable. Two things will be observed in this connection—first, that the journals or axles 5 5 of these cutters are set upon an incline, so as to insure a gradual entrance of the cutters all the time into the scale, and, secondly, the threads of the cutters always run opposite to the cutting edges of the drill-point 1. In other words, for a flue-cleaner rotating to the right the cutter-threads would be left hand, and vice versa. The object of this is twofold. The cutters being idly mounted, they are turned by their frictional contact upon the scale in the tubes. This engagement causes the cutters to turn in the direction of their threads, and such rotation makes them constantly feed forward, so that little or no forward thrust upon the cleaner is required, especially when it is driven by power at a speed of from one thousand to fifteen hundred revolutions a minute. This then is one function of the arrangement of the screw-threads. The other is to pull the scale off backward out of the way. Both are effectually accomplished by the present arrangement. While I have shown two of these cutters, it is obvious that three might be used, and although they are on fixed bearings that, too, is optional, as they might be adjustable somewhat as in the other set of cutters now to be described. In the preferred form there are three cutters 12 12



in this secondary set, the casting A being recessed, as at 10 10, to receive them. These cutters are similar to those just described; but instead of being on fixed bearings, as in the other instance, they are mounted on radially-adjustable bearings 13 13, their ends resting in elongated slots 14 14. To prevent their turning, one end of the bearings is made angular. As a means of imparting an outward thrust to these bearings simultaneously, they are provided with the outwardly-beveled ends 16 16. Operating in connection with these inclines are the wedges 17 17, which slide endwise in longitudinal grooves 18 18 in the threaded shank 19 of the cleaner. A threaded ring 20 on this shank is provided with an internal annular groove 21, which receives the hook-shaped rear end 22 of the wedge, so that in turning the ring is fed forward, thrusting the wedges positively forward beneath the beveled ends 16 16 of the bearings and forcing them outward. The forward ends of this second set cut within the cut of the forward set, and the rear ends are set to cut, say, within a sixteenth of an inch of the bore of the tube to be reamed. When these cutters are set at the required position, the jam-nut 25 is screwed up tight against the ring 20. Different plans might be adopted for adjusting these cutters. Also they might be fixed or vary in number and arrangement or be dispensed with altogether, the cutters 3 3 in that event being relied upon to do all the work.

In lieu of the construction of cutters described the journals might be integral, as shown in Fig. 5, or the spiral might be divided into a series of independent spiral disks, as in Fig. 6.

From the foregoing it will be seen that the secondary or rear cutters may be adjusted to a nicety. As the cutters wear down they can be set out, and in consequence of the set of the threads every portion of the internal surface of the tube or flue is reached and thoroughly scraped. The two front cutters cut the way for the rear or secondary cutters. In some instances the tubes become entirely clogged, but this tool is so constructed by virtue of its drill-point that it will bore its way through and prepare the way for the cutters which follow, and by running water or steam in the cutters work free and the cuttings are constantly washed from the cutters.

This cleaner may be operated by hand by simply attaching a gas-pipe or shaft to it and providing it with a crank on its outer end, or it may be run by power in any approved way. The cutters will bore through the worst scale at the rate of fifteen feet per minute when rotated at a high speed, and the cutters when set opposite each other and at a triangle, or three cutters in a head, fit themselves to collapsed flues or tubes and correct any unevenness that may be found to exist. The tubes are never injured because of the shape and rotation of the flue-cleaner, which is always

kept centered by the inner wall of the tubes notwithstanding any resistance which may take place in consequence of excessive accumulation in the bottoms of the tubes or at any other place. The tool is cheaply made, most effectual in its operation, and it is very durable, because its cutters may be adjusted at any time or be easily and quickly renewed.

It is evident that other slight changes in addition to those mentioned might be made without departing from the spirit and scope of my invention, and hence I do not wish to limit myself to the exact construction herein set forth; but,

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

1. A flue-cleaner comprising a body portion, and a series of rotatable, tapering spiral cutters mounted in said body portion at an angle to the longitudinal axis thereof and at an angle to each other, substantially as set forth.

2. A flue-cleaner comprising a body portion, a series of rotatable, tapering spiral cutters mounted in said body portion at an angle to the longitudinal axis thereof and at an angle to each other, and means for adjusting said cutters radially, substantially as set forth.

3. In a flue-cleaner, the combination with a body portion, of a spiral cutter revolubly mounted therein and means for positively adjusting the rear end of the cutter radially with respect to the forward end thereof and the body portion of the cleaner, and retaining it in such adjustment, substantially as set forth.

4. A flue-cleaner comprising a body portion, a drill-point at the forward end thereof, rotatable, tapering spiral cutters mounted in said body portion in rear of the drill-point, at an angle to the longitudinal axis of the body portion and at an angle to each other, substantially as set forth.

5. In a flue-cleaner, the combination with a body portion, of spiral rotatable cutters mounted in fixed bearings in the forward end of said body portion, a series of spiral rotatable cutters arranged in rear of the forward cutters, and means for adjusting the journals of said rear cutters, substantially as set forth.

6. A flue or tube cleaner comprising a main body portion, and two sets of spiral cutters, one set in advance of the other set, and means for changing the angle of the axes of one set relatively to the axis of the body portion and to the axes of the other set.

7. A flue or tube cleaner comprising a main body portion and two sets of rotary spiral cutters, one in advance of the other set, one set having two cutters and the other three in triangular arrangement.

8. The combination with the main body portion having recessed sides, and cutters therein, of removable axles located in radial slots, the rear end of each axle being beveled, wedges for engaging said beveled ends and a



ring for simultaneously thrusting forward the several wedges, whereby to adjust the rear ends of the cutters with respect to the forward ends and to the main body portion.

- 5 9. The combination with the main body portion having recessed sides, a threaded shank and longitudinal grooves in said shank, of cutters, removable bearings or axles having beveled ends, wedges located in the grooves  
10 and engaging the beveled ends of the bearings, a screw-ring adapted to turn on the threaded shank and having an annular groove which receives the rear ends of the wedges  
15 the bearings to set the cutters outward.

10. The combination with the main body portion having a drill-point at one end, and adjustable and fixed rotary cutters, of bearings or axles for the fixed cutters, said bearings held at one end in openings in the stock 20 of the device and a common bolt passed through the other ends for securing them at the rear end of the drill-point.

In testimony whereof I have signed this specification in the presence of two subscrib- 25 ing witnesses.

WILLIAM L. CASADAY.

Witnesses:

VERNON E. HODGES,  
A. W. BRIGHT.