

No. 608,418.

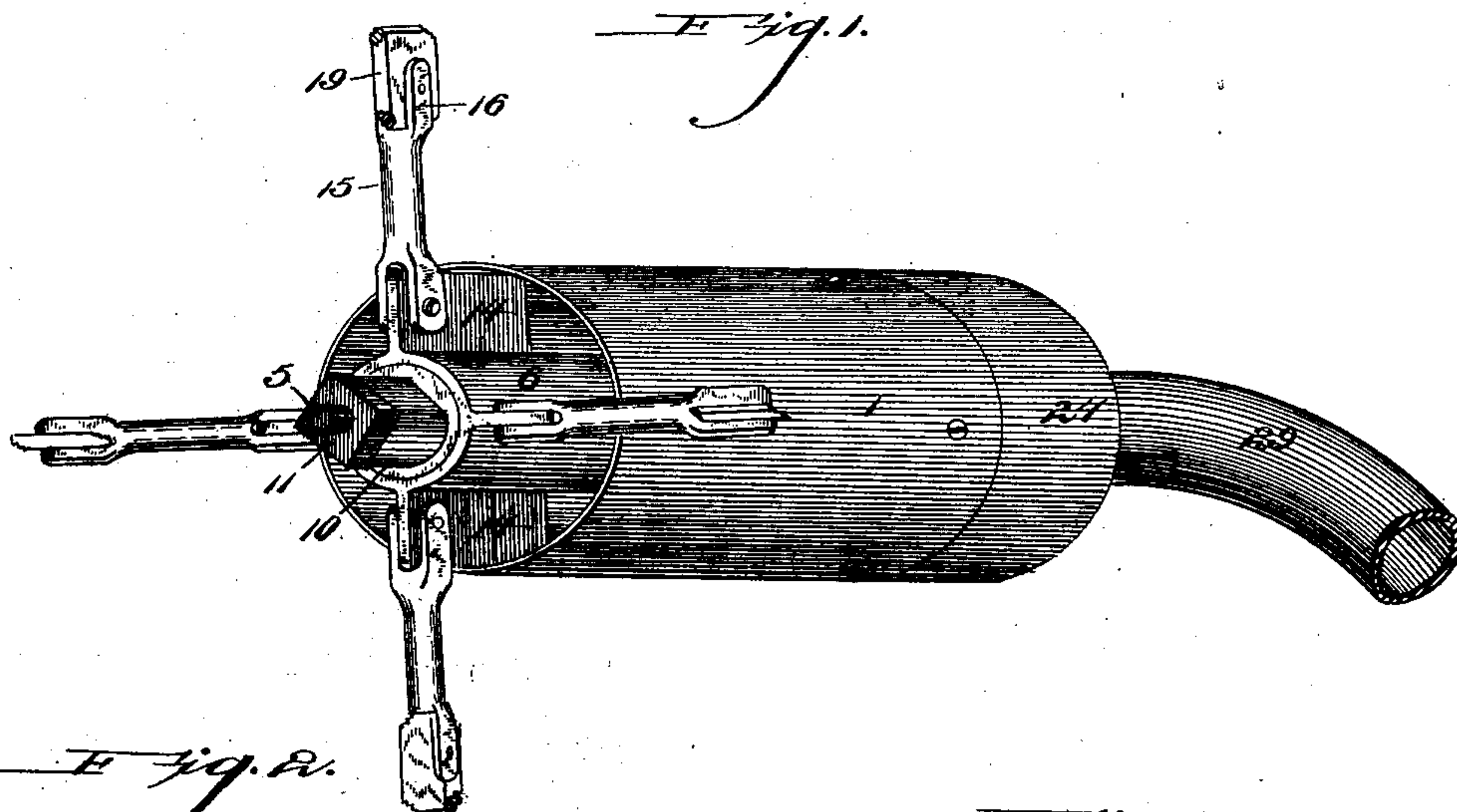
Patented Aug. 2, 1898.

F. W. BRADLEY.  
BOILER TUBE CLEANER

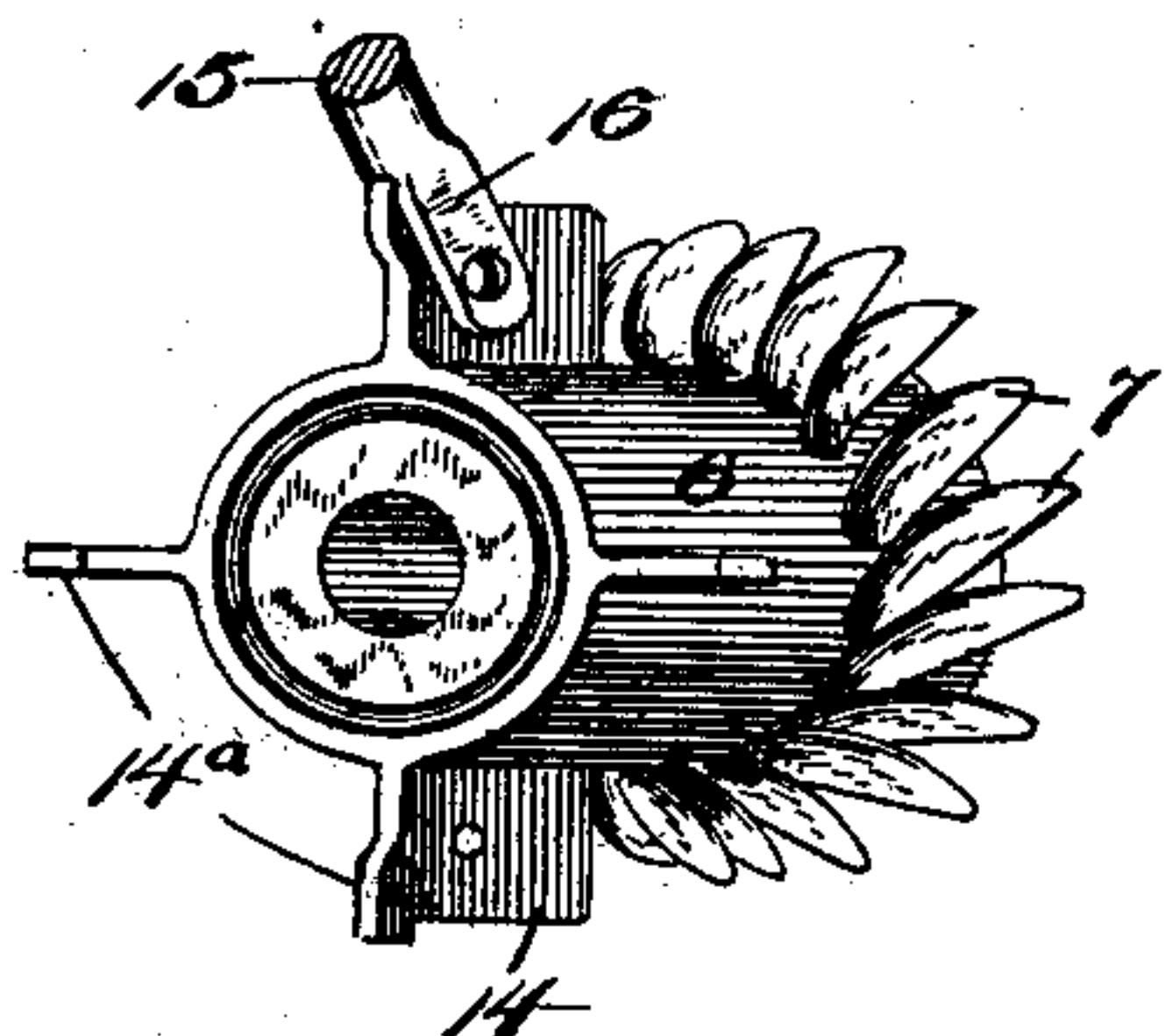
(Application filed Jan. 8, 1898.)

(No Model.)

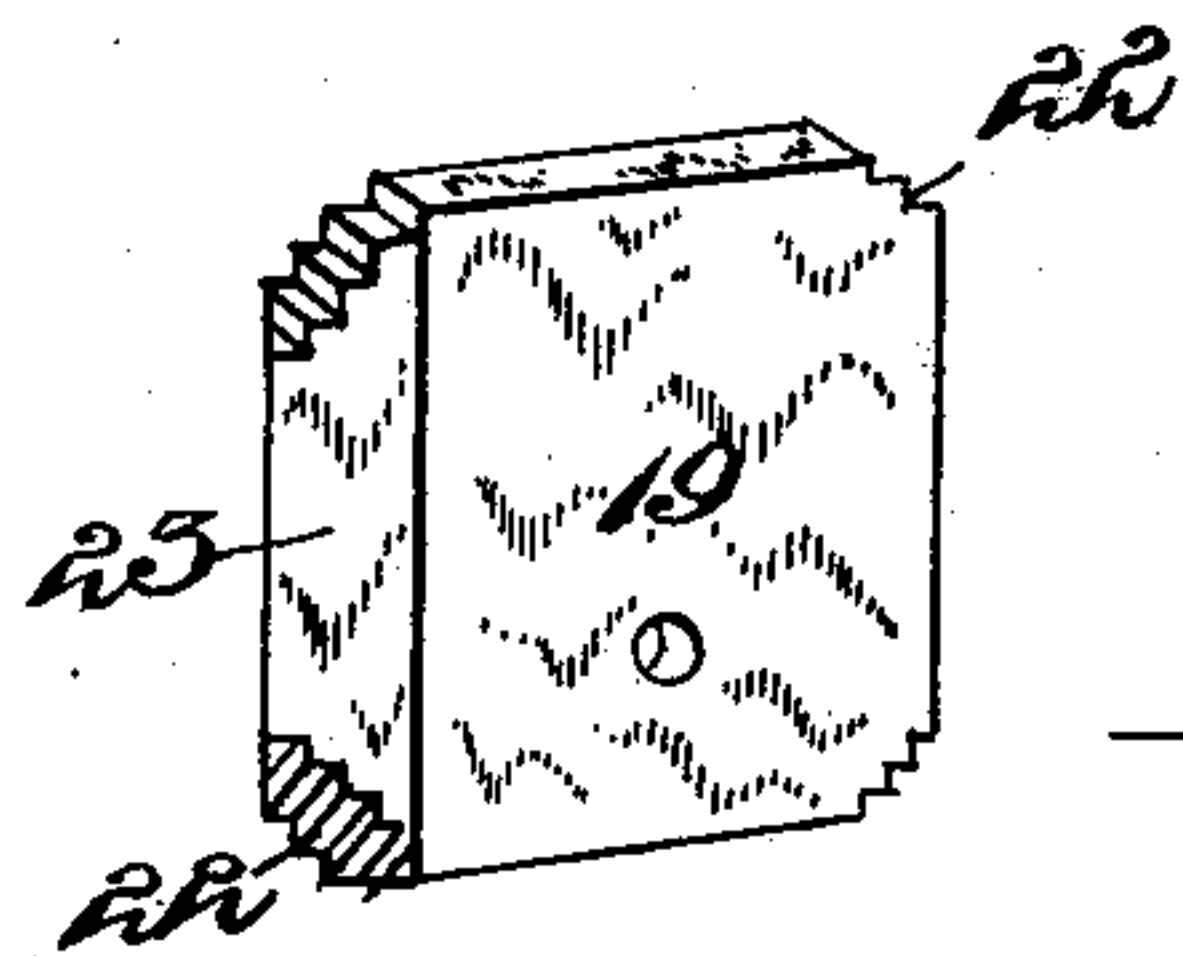
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*Fig. 2.*

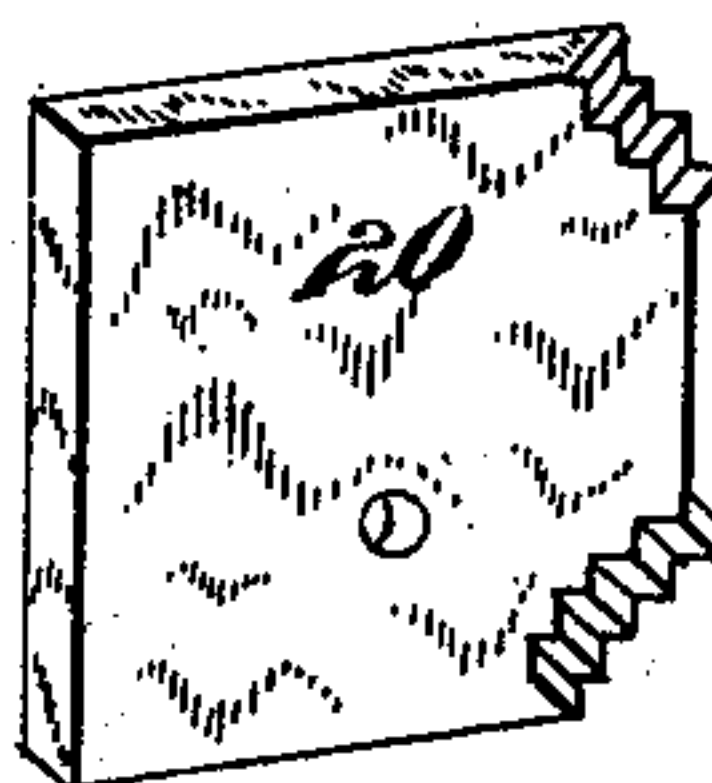


*Fig. 3.*

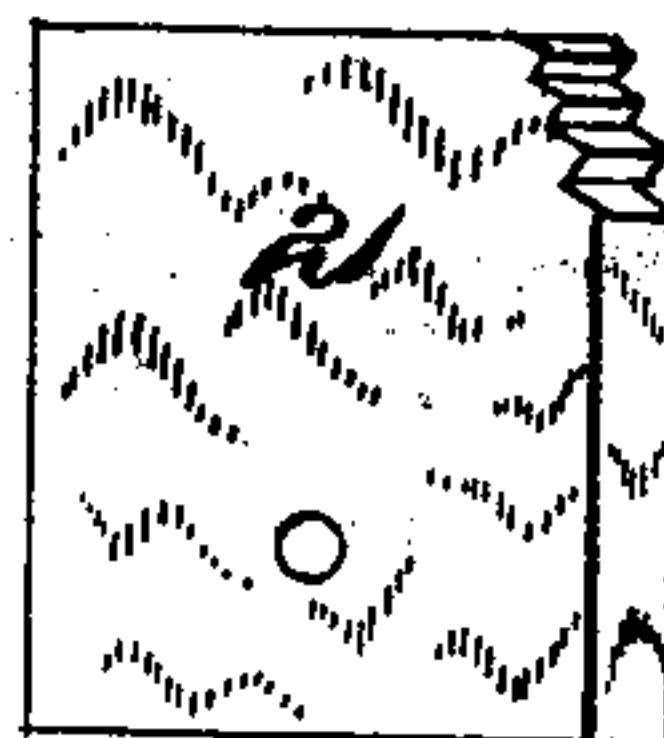


*Fig. 4.*

*Fig. 5.*



*Fig. 5.*



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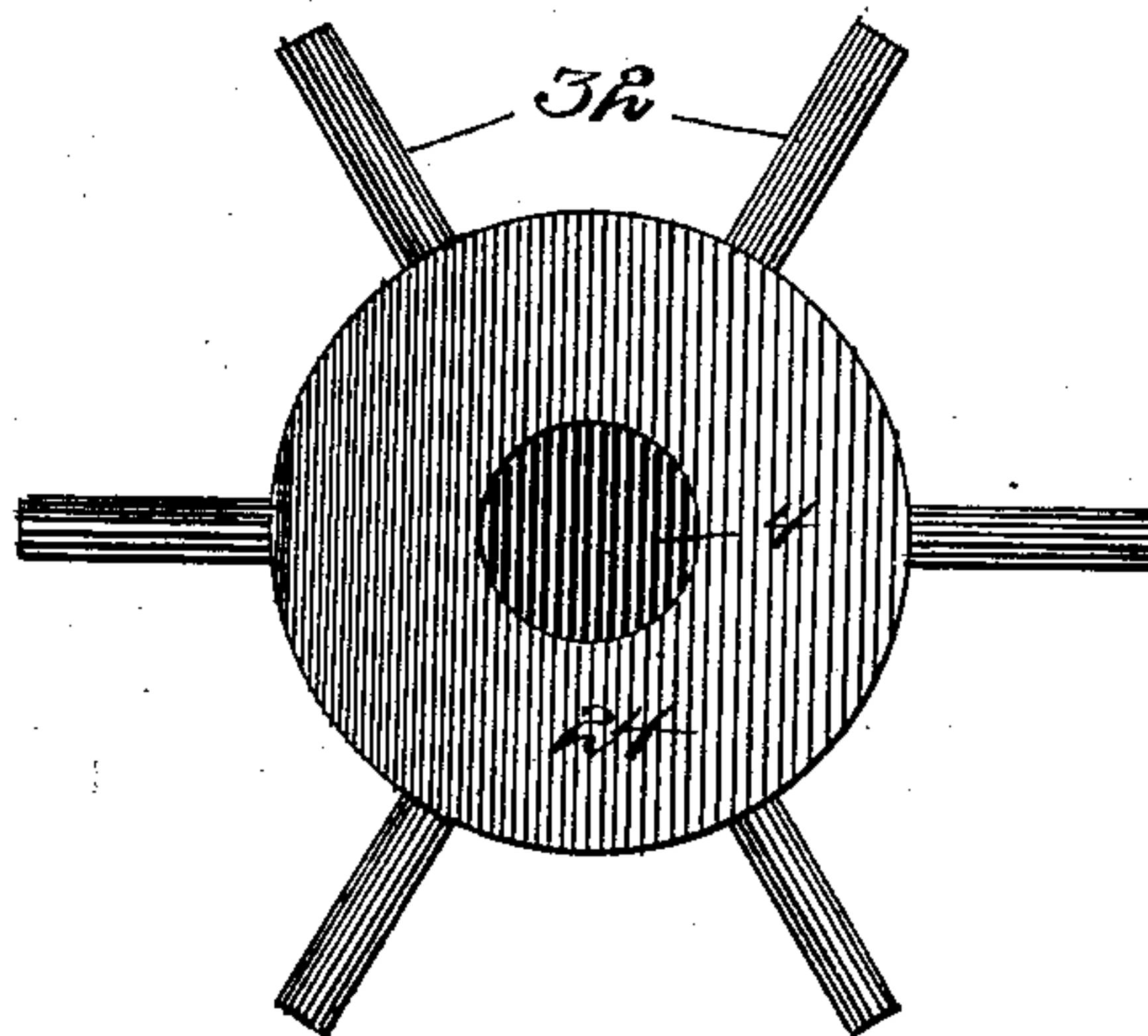
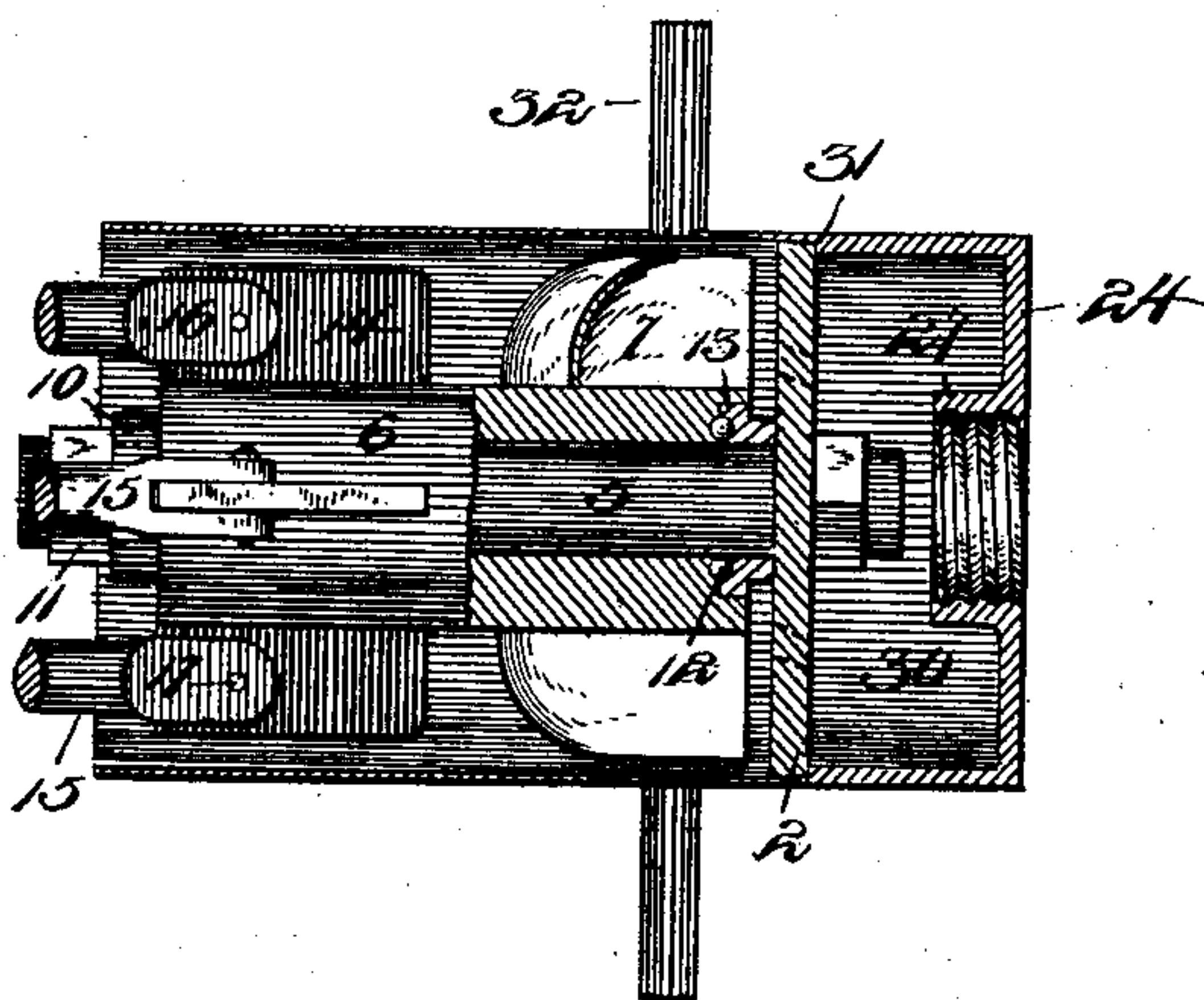
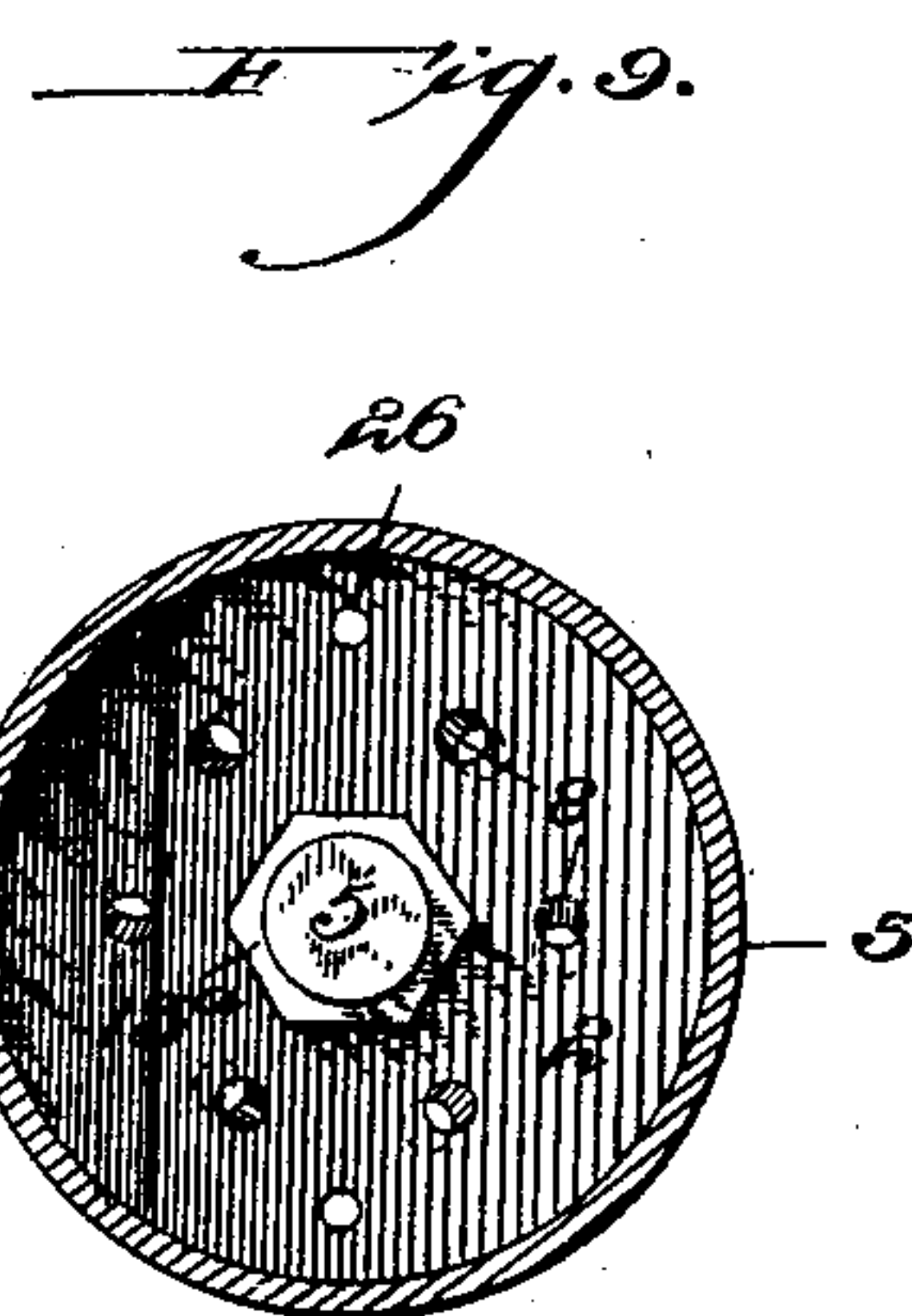
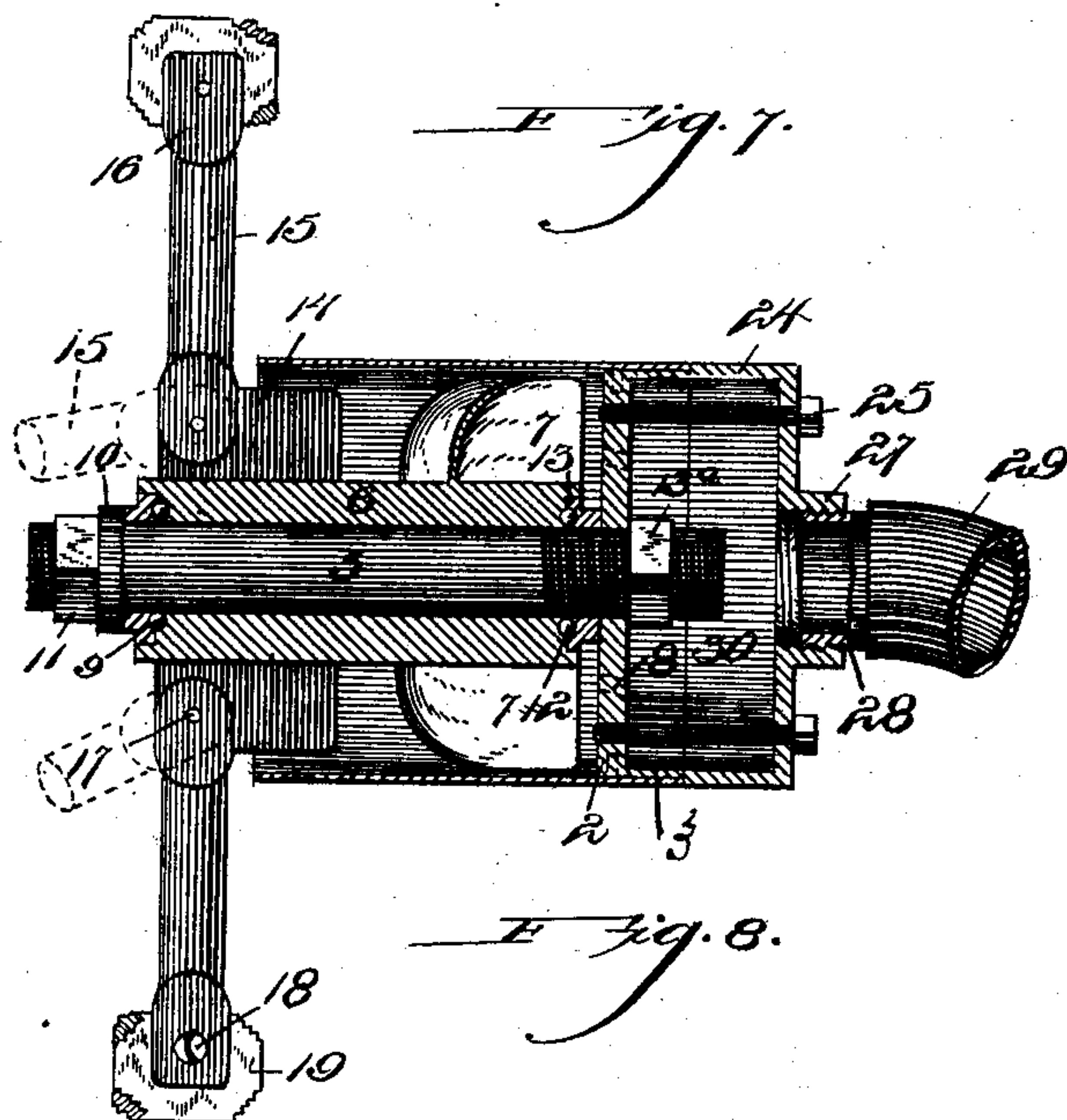
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# UNITED STATES PATENT OFFICE.

FRANCIS W. BRADLEY, OF SHARPSBURG, PENNSYLVANIA.

## BOILER-TUBE CLEANER.

SPECIFICATION forming part of Letters Patent No. 608,418, dated August 2, 1898.

Application filed January 8, 1898. Serial No. 666,022. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS W. BRADLEY, a citizen of the United States of America, residing at Sharpsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Boiler-Tube Cleaners, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain new and useful improvements in boiler tube or flue cleaners, and has for its object to provide a flue-cleaner that is forced through the tube or flue by means of a hose through which the  
15 water passes through the cleaner and into the tube to assist in the removal of the scale or other sediment that has adhered to the inner face of the tube or flue.

The principal features of my invention consist of a cylinder within which is arranged a sleeve or hub which has a turbine formed thereon, the latter, receiving the impulse of the water, communicating a rotary motion to the sleeve or hub. To the upper end of this  
25 sleeve or hub is attached a series of pivotable arms carrying interchangeable cutters which are thrown by the centrifugal force of the sleeve or hub into contact with the inner periphery of the tube or flue for the purpose of  
30 cutting the scale or other sediment that has accumulated thereon and which is washed out of the tube or flue after being loosened by means of the water passing into the cleaner.

35 The invention aims to construct a flue-cleaner of this class provided with pivoted arms and cutters which will conform to the size of the tube or flue and which will readily permit the withdrawal of the cleaner from the  
40 flue after the same has been driven through to perform the cleaning purpose.

With the above and other objects in view the invention finally consists in the novel construction, combination, and arrangement of  
45 parts to be hereinafter more specifically described, and particularly pointed out in the claims.

In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, and wherein like figures of reference indicate simi-

lar parts throughout the several views, in which—

Figure 1 is a perspective view of my improved flue-cleaner, showing a portion of the  
55 hose attached thereto. Fig. 2 is a perspective view of the sleeve or hub and its turbine. Figs. 3, 4, and 5 are detail perspective views of the interchangeable cutters or knives, the two latter views being modifications of Fig. 60  
3. Fig. 6 is an end or edge view of one of the cutters or knives. Fig. 7 is a longitudinal sectional view of the cleaner. Fig. 8 is a similar view showing the cylinder extended so as to limit the radius to which the arms  
65 may be extended. Fig. 9 is a transverse vertical sectional view. Fig. 10 is a rear view showing the removable arms in position for supporting the rear of the cleaner, and Fig. 70  
11 is a detail perspective view of one of these removable arms.

Referring now to the drawings by reference-figures, 1 denotes the cylinder, within which the sleeve or hub and its turbine are arranged. In the rear of this cylinder is se-  
75 cured a plate 2, which is provided with a projecting flange 3, thereby forming a means for securing the plate rigidly within the cylinder by means of screws engaging through the  
80 said cylinder and flange or any other suitable fastening means. This plate is provided with a central aperture 4 to receive the shaft 5, which carries the sleeve or hub 6, the latter having formed integral therewith at its  
85 rear end a series of buckets arranged circumferentially around the sleeve or hub, and thereby forming a turbine 7 to receive the water as it passes through the inclined aper-  
90 tures 8 in the plate 2. The sleeve or hub 6 is provided at its forward end with suitable ball-bearings 9, the bearings 10 for which are retained rigidly in their position by means of a lock-nut 11, and at its rear end similar  
95 ball-bearings 12 are provided for this sleeve or hub, their bearings 13 serving the triple purpose of bearing for the shaft 5, a nut to lock the same in position, and a bushing which abuts against the inner face of the  
100 plate 2 to hold the sleeve or hub away from the said plate, and thus retain the turbine at a proper distance to receive the impulse of the water passing into the cleaner, the shaft



5 being retained in its position by means of the nut 13<sup>a</sup> on its rear end.

Formed integral with the sleeve or hub at its forward end is a series of flanges or lugs 14, arranged circumferentially around the sleeve or hub and to which the pivotable arms 15 are pivotally secured. These arms are bifurcated on each of their ends, thereby forming jaws 16 to engage the aforesaid flanges or lugs 14 and to which the arms are secured by means of a suitable screw or other device 17. In the outer ends of these pivotable arms are pivotally secured by means of a screw or other fastening device 18 the cutters or knives 19, as shown in Fig. 3, or these knives may be made of the forms 20 or 21, as shown in Figs. 4 and 5.

By forming the knives with the four notched or serrated corners 22 and the beveled edge 23, as shown in Fig. 3, these knives or cutters may be changed within the arms so as to use the four edges of the same for cutting the soot or other sediment from the inner face of the flue. It will readily be observed, however, that various forms of these knives or cutters may be employed.

Secured to the rear end of the cylinder is a cap 24, which is held in position by means of screws or bolts 25, engaging the apertures 26 provided therefor in the perforated plate 2, said cap having a nut 27 formed integral therewith for the reception of the nipple 28 of the water-hose 29. This construction forms a chamber 30 between the rear plate 35 of the cap and the perforated plate 2, and as the quantity of water passing through the hose into this chamber will be greater than can be carried off through the perforations in the plate 2 the same will naturally be forced outwardly into the flue at the joint of the cap 24 with the cylinder, and the force of the water thus spraying outwardly around the entire circumference of the cleaner will serve to elevate this end of the cleaner and retain the same at the same height as is assumed by the forward end of the cleaner, which will of course be regulated according to the distance that the pivotable arms have been thrown outwardly by the centrifugal force imparted to the same through the sleeve or hub and its turbine.

In Fig. 2 I have shown the lugs or flanges 14 provided at their inner end with a projection 14<sup>a</sup>, which serves to limit the closing movement of the reversible arms and their cutters, and in Fig. 8 I have shown the cylinder 1 extending outwardly at its forward end over these lugs or flanges 14, so as to limit the outward movement of the aforesaid pivotable arms and their cutters.

In Fig. 8 I have also shown a slight modification in the construction of the cylinder, the cap being formed integral with the cylinder, and the perforated plate 2 resting upon a shoulder 31, formed within the cylinder, where it is secured by means of screws or other suitable device. In this construction

the nut 27 is constructed in the inner instead of the outer face of the rear plate, and when the hose 29 is connected within said nut the water-chamber 30 will be perfectly tight, so as to prevent any escape of the water, except through the perforated plate 2. This construction is only adapted for small-sized tubes or flues not exceeding in diameter the distance to which the reversible arms may be extended and which is limited by reason of the cylinder extending outward a short distance from the same. For the purpose of assisting in retaining the rear end of the cleaner at the same elevation as the forward end where this form of closed water-chamber is employed I provide a series of removable studs or supports 32, having a screw-threaded shank 33 on one end, which engages apertures provided therefor at a suitable distance around the circumference of the cylinder. These may be readily detached and the cleaner used without the same when desired.

The perforations provided in the plate 2 are preferably arranged at an incline, so as to carry the water into direct contact with the buckets of the turbine, and as the pressure of this water acts upon the turbine the sleeve or hub is thereby revolved, while the pivotable arms, being pivotally connected to the sleeve or hub, are forced outwardly by reason of centrifugal force and the cutters or knives brought into engagement with the inner periphery of the flue or tube, so as to effectively remove the soot or sediment therefrom.

The cleaner is readily forced through the tube by means of the hose attached thereto and as readily withdrawn by the same means, while the water coursing through the cleaner and escaping into the tube serves to effectually wash out all the sediment that has been loosened by the action of the cleaner.

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

1. A flue-cleaner comprising a cylinder having a series of removable studs or supports arranged on its periphery, a plate secured at one end having inclined apertures, a cap secured to said plate forming a water-chamber, a water-pipe connection with said water-chamber, a turbine arranged in said cylinder and operated by water passing through the water-pipe connection and perforated plate, a series of pivoted arms carrying cutters which are forced into engagement with the inner face of the flue or tube by centrifugal force attained through the operation of the turbine, substantially as herein shown and described.

2. A flue-cleaner comprising a cylinder having a series of removable studs or supports mounted on its periphery, a plate secured at one end having inclined apertures, a cap secured to said plate forming a water-chamber, a water-pipe connection with said water-chamber, a shaft arranged in said cylinder, a sleeve or hub mounted upon said shaft,



said sleeve or hub having a turbine formed integral therewith and operated by water passing through the water-pipe connection, a series of pivoted arms carrying cutters or knives which are forced into engagement with the inner face of the flue or tube by centrifugal force attained by the operation of the turbine, substantially as herein shown and described.

3. A flue-cleaner comprising a cylinder having a series of removable studs or supports mounted on its periphery, a plate secured at one end having inclined apertures, a cap secured to said plate forming a water-chamber, a water-pipe connection with said water-chamber, a shaft arranged in said cylinder having bearings thereon; a sleeve or hub

mounted upon said shaft, the ends of said sleeve or hub abutting against the bearings of said shaft, suitable bearings between the ends of said sleeve or hub and the bearing of said shaft, a turbine formed integral with said sleeve or hub, a series of arms carrying serrated or beveled knives or cutters said arms being pivotally secured to flanges formed integral with said sleeve or hub, substantially as herein shown and described.

In testimony whereof I affix my signature in the presence of two witnesses.

F. W. BRADLEY.

Witnesses:

JOHN NOLAND,

JOHN GROETZINGER.