

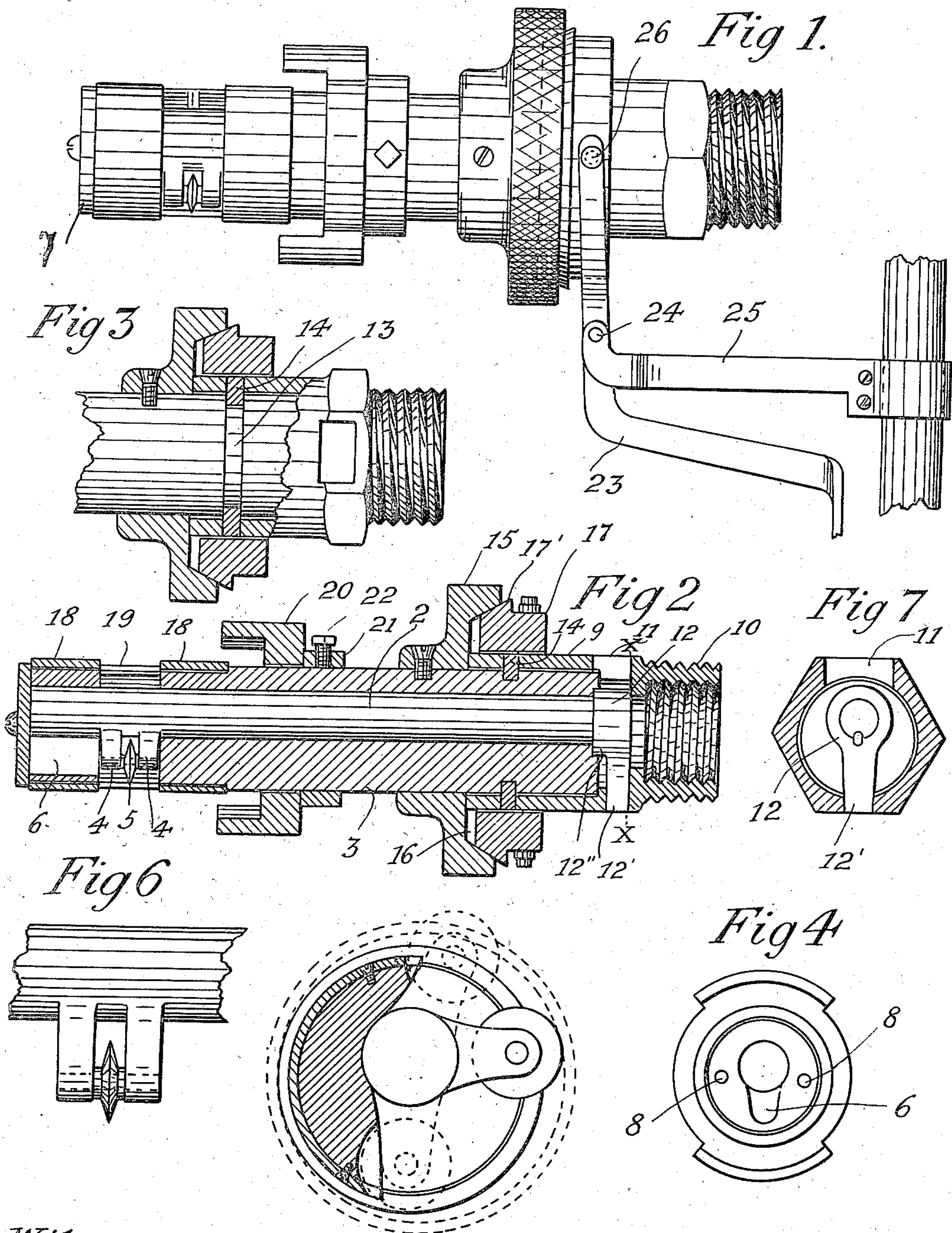
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Patented June 10, 1902.

I. C. HICKS.
FLUE CUTTER ATTACHMENT.

(Application filed Feb. 8, 1901.)

(No Model.)



Witnesses
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Fig 5

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UNITED STATES PATENT OFFICE.

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FLUE-CUTTER ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 702,349, dated June 10, 1902.

Application filed February 8, 1901. Serial No. 46,470. (No model.)

To all whom it may concern:

Be it known that I, IRVING C. HICKS, a citizen of the United States of America, and a resident of the city of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Flue-Cutter Attachments, of which the following is a specification.

My invention relates to machines designed for cutting flues from boilers, and has for its object the provision of a flue-cutter which while simple, cheap, and durable in construction shall be exceedingly efficient and positive in operation and by which both time and labor heretofore consumed in cutting flues from boilers may be materially reduced and lessened.

To these ends my invention consists in a cutter-shaft, a cutter carried thereby, an eccentric sleeve in which said shaft is mounted and adapted to partial rotation, of means for connecting motive power to said sleeve and shaft, respectively, whereby said sleeve and shaft are rotated within the boiler-flue and said cutter fed against the flue, cutting the same.

More specifically the invention consists in a cutter-shaft mounted eccentrically in a sleeve and carrying a cutter adapted to cut the boiler-flue, an operating collar or sleeve, an eccentric ring connecting said shaft and operating-collar, resistance of the cutter against the flue adapted to retard the rotation of said shaft and to rotate said sleeve and therewith said shaft and cutter within said flue, whereby as the device is rotated in the boiler-flue the cutter is automatically fed out by the partial revolution of said shaft to cut said flue.

The invention consists, further, in means for retarding the revolution of said eccentric sleeve, and thereby rotating said shaft to throw out said cutter against said boiler-flue.

The invention consists, further, in the constructions and combinations of parts, all as hereinafter described, and particularly pointed out in the claims, and will be more readily understood by reference to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of a device embodying my invention. Fig. 2 is a longitudinal sectional view thereof. Fig. 3 is a de-

tail view showing the eccentric sleeve, the operating collar or sleeve, and the frictional cutter-feed, portions being shown in section to more clearly show the construction. Fig. 4 is an end view with the end plate removed. Fig. 5 is a sectional view of the eccentric sleeve, cutter-shaft, and cutter, illustrating the operation of the cutter. Fig. 6 is a detail view of the cutter and manner of mounting same on the cutter-shaft. Fig. 7 is a sectional view on the line X X of Fig. 2 and shows the eccentric ring, cutter-shaft, and eccentric shaft.

As shown in the drawings, 2 represents the cutter-shaft, which is mounted eccentrically in the sleeve 3. Near the forward end of the shaft 2 arms 4 are formed integrally with the shaft, as shown, and a cutter 5 is mounted between these arms, its shaft having bearings in the ends of these respective arms. The sleeve 3 is cut away, as shown, to permit a half-revolution of the arms 4, as hereinafter described. The forward end of the sleeve 3 is provided with the recess 6 (see Fig. 4) to permit of the insertion of the shaft with the arms 4 into the sleeve. An end plate 7 is secured by screws passing through suitable holes in the end plate into threaded holes 8 in the end of the sleeve 3. (See Fig. 4.)

The operating-sleeve 9 slips over the rear end of the sleeve 3 and is adapted by suitable threads 10 to connect with the operating-shaft of the motor. The sleeve 9 is provided with a slot 11, through which an eccentric ring 12 is passed. This ring is provided with an extension adapted to fit in a slot in the opposite side of the sleeve 9. This ring 12 slips over the end of the shaft 2, as shown in Fig. 2, the sleeve 3 being provided with a bearing for the portion 12' of the ring.

The sleeve 3 is provided with a groove 13. Two slots, one on each side, are provided in the sleeve 9 near its inner end. Keys 14 are slipped through these slots and, extending into the groove 13, hold the sleeve 9 in place. A collar 15 is set on the eccentric sleeve 3, as shown, by suitable set-screws. This collar is provided with a recess 16. A friction-collar 17 is slipped over the sleeve 9 and serves to hold the keys 14 in place. The collar 17 is provided with an inclined surface 17', adapted to bear against the inclined surface of the

collar 15. The pitch or inclination of these surfaces is such as to give a gradual friction, for the purpose hereinafter explained.

Loose collars 18 are provided on the eccentric sleeve 3 on opposite sides of the recess in the sleeve 3, provided for the cutter-arms, the sleeve 3 being turned down slightly, so that bearings for the collars 18 are formed between the end plate 7 and the half-collar 19, fixed on the eccentric sleeve, as shown in Figs. 1, 2, and 5, and the half-collar 19 and the sleeve 3.

A steady-collar is slipped over the sleeve 3 and the set collar 21, provided in connection therewith. A lever 23 (shown in Fig. 1) is fulcrumed at 24 on a rod 25, supported on the handle of the motor-rod, (or other suitable support.) This lever is forked and its end connected to the friction-collar 17 by suitable set-screws 26 on opposite sides of the collar 17.

The operation is as follows: The device is inserted into the end of the flue to be cut off, the end of the flue extending out from the boiler-head passed under the steady-collar 20, the sleeve 3 pushed into the flue until the cutter reaches the point at which it is desired to cut off the flue. The steady-collar is then pushed up against the end of the flue and the collar 21 set by means of the set-screws 22. The shaft of the motor is then attached to the operating-sleeve 9. The cutter being in the position shown in Figs. 1 and 2, the shaft of the motor being rotated rotates the operating-sleeve 9. The direct connection between this sleeve 9 being with the shaft 2 through the eccentric ring 12, the shaft is rotated, and being eccentrically mounted in the sleeve 3 its rotation throws out the arms 4, with the cutter 5, until the cutter presses against the inner periphery of the flue. The friction of the cutter retards the revolution of the shaft 2. Thereupon the sleeve 3 is revolved inside the flue, carrying the cutter about the inner surface of the flue. As the cutter penetrates the flue it is automatically fed outward by the shaft 2. The collars 18, operating against the inner surface of the flue, revolving freely on the sleeve 3, prevent friction between the sleeve 3 and the flue, as the whole device revolves in the flue. When it is desired to accelerate the cutting of the flue and to feed the cutter out more rapidly, by throwing the lever 23 the friction-collar 17 is thrown into engagement with the collar 15, the rotation of the sleeve 3 retarded, permitting more of the power exerted on the sleeve 9 to be directed to rotate the shaft 2 and throw the cutter more forcibly into contact with the boiler-flue.

Many modifications of my device and many equivalents of parts shown and described will readily suggest themselves, and I do not, therefore, confine myself to the constructions or details shown or described.

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

1. The combination, of a sleeve, a shaft mounted eccentrically therein, a cutter carried thereby, an operating collar or sleeve loosely mounted on said sleeve, and an eccentric ring connecting said collar and shaft whereby the rotation of said operating-collar first rotates said shaft to throw said cutter against the boiler-flue and then rotates said sleeve and cutter within said flue, substantially as described.

2. The combination, of a sleeve, a shaft mounted eccentrically therein, a cutter carried thereby, an operating collar or sleeve loosely mounted on said first-named sleeve and adapted to be driven concentric therewith, and means operatively connecting said loose collar and said shaft, substantially as described.

3. The combination, with a sleeve, of a shaft mounted eccentrically therein, a cutter carried thereby, an operating collar or sleeve mounted on said first-named sleeve, an eccentric ring connecting said operating collar and shaft, a collar fixed on said first-named sleeve, a friction-collar loosely mounted on said sleeve and adapted to engage said fixed collar, and means for forcing said friction-collar into engagement with said fixed collar, substantially as described.

4. The combination, with a sleeve, of a shaft mounted eccentrically therein, a cutter mounted in arms formed integral with said shaft, an operating-sleeve loosely mounted on said first-named sleeve, an eccentric ring mounted on said shaft and connecting said shaft and operating-sleeve, and a steady-collar adjustably mounted on said first-named sleeve, substantially as described.

5. The combination with a main sleeve, of a shaft mounted eccentrically therein and carrying a cutter, an operating-sleeve loosely mounted on said main sleeve, an eccentric ring connecting said operating sleeve and shaft, a collar fixed on said main sleeve, a friction-collar loosely mounted on said operating-sleeve, and means for throwing said friction-sleeve into frictional contact with said fixed collar, substantially as described.

6. The combination, with a main sleeve, of a shaft mounted eccentrically therein and carrying a cutter, an operating-sleeve loosely mounted on said main sleeve, an eccentric ring connecting said operating sleeve and shaft, and a friction feeding device whereby the rotation of said main sleeve may be retarded, substantially as described.

7. The combination, with a main sleeve, of a shaft mounted eccentrically therein and carrying a cutter, an operating-sleeve loosely mounted on said main sleeve, an eccentric ring connecting said operating sleeve and shaft, a collar fixed on said main sleeve, a friction-collar loosely mounted on said operating-sleeve, means for throwing said friction-sleeve into contact with said fixed collar, and a loose collar provided on the front end of said main sleeve, substantially as described.

8. The combination, of a sleeve, a shaft mounted eccentrically therein, a cutter carried thereby, operating means adapted to operate concentric with said main shaft whereby said shaft is rotated within said sleeve to automatically throw said cutter into engagement with the boiler-flue and then said sleeve rotated by and with said shaft revolving said cutter within and against said flue, and a loose collar provided on the front end of said sleeve, substantially as described.

9. The combination, with a sleeve, a shaft mounted eccentrically therein, a cutter carried thereby, operating means adapted to operate concentric with respect to said main sleeve whereby said shaft is rotated within said sleeve to automatically throw said cutter into engagement with the boiler-flue and then said sleeve thereby rotated by and with said shaft revolving said cutter within and against the flue, and means whereby the rotation of said sleeve is retarded to accelerate the rotation of said shaft in said sleeve, substantially as described.

10. The combination, with a main sleeve, of a shaft mounted eccentrically therein, a cutter carried thereby, operating means operating concentric with respect to said main sleeve whereby said shaft is rotated to automatically throw said cutter into engagement with the boiler-flue and said sleeve then rotated by and with said shaft revolving said cutter within and against the flue, means whereby the rotation of said sleeve is retarded to accelerate the rotation of said shaft in said sleeve, and a loose collar provided on the front end of said sleeve, substantially as described.

11. The combination, with a main sleeve, of a shaft mounted eccentrically therein and carrying a cutter, an operating-sleeve 9, a key 14 adapted to be passed into a slot in said sleeve 9 and rest in a groove in said main sleeve, a collar 15 fixed on said main sleeve, a friction-collar 17 mounted loosely on said sleeve 9 and adapted to engage with said fixed collar 15, an eccentric ring 12 fixed on said shaft and operatively connected with said operating-sleeve, and a loose collar 18 provided on said main sleeve, said operating-sleeve adapted to be connected with the motive power, substantially as described.

12. The combination, of a sleeve, a shaft mounted eccentrically therein, a cutter carried thereby, an operating collar or sleeve loosely mounted on said sleeve, an eccentric ring connecting said collar and shaft whereby the rotation of said operating collar or sleeve first rotates said shaft to throw said cutter against the boiler-flue and then rotates said sleeve and cutter within said flue, and a steady-collar mounted on said first-named sleeve, substantially as described.

13. The combination, of a sleeve, a shaft mounted eccentrically therein, a cutter carried thereby, an operating collar or sleeve loosely mounted on said sleeve, an eccentric ring connecting said collar and shaft where-

by the rotation of said operating collar or sleeve first rotates said shaft to throw said cutter against the boiler-flue and then rotates said sleeve and cutter within said flue, a steady-collar mounted on said first-named sleeve, and a collar loosely mounted on the front end of said main sleeve, substantially as described.

14. The combination, with a main sleeve, of a shaft mounted eccentrically therein and carrying a cutter, an operating-sleeve loosely mounted on said main sleeve, an eccentric ring connecting said operating sleeve and shaft, a friction feeding device whereby the rotation of said shaft in said main sleeve may be accelerated, and a steady-collar mounted on said main sleeve, substantially as described.

15. The combination, with a main sleeve, of a shaft mounted eccentrically therein and carrying a cutter, an operating-sleeve loosely mounted on said main sleeve, an eccentric ring connecting said operating sleeve and shaft, a friction feeding device whereby the rotation of said shaft in said main sleeve may be accelerated, and a collar loosely mounted on the front end of said main sleeve, substantially as described.

16. The combination, with a main sleeve, of a shaft mounted eccentrically therein and carrying a cutter, an operating-sleeve loosely mounted on said main sleeve, an eccentric ring connecting said operating sleeve and shaft, a friction feeding device whereby the rotation of said shaft in said main sleeve may be accelerated, a steady-collar mounted on said main sleeve, and a collar loosely mounted on the front end of said main sleeve, substantially as described.

17. The combination, of a sleeve, a shaft mounted eccentrically therein, a cutter carried thereby, operating means whereby said shaft is rotated within said sleeve to throw said cutter into engagement with the boiler-flue and said sleeve rotated with said shaft revolving said cutter within said flue, and a friction feeding device whereby the rotation of said shaft within said sleeve may be accelerated, substantially as described.

18. The combination, with a main sleeve, of a shaft mounted eccentrically therein, a cutter carried thereby, operating means whereby said shaft is rotated within said sleeve to throw said cutter into engagement with the boiler-flue and said sleeve then rotated by and with said shaft as said shaft continues to rotate revolving said cutter within and against the flue, means whereby the rotation of said main sleeve may be retarded to accelerate the rotation of said shaft in said sleeve, a loose collar provided on the front end of said sleeve, and a steady-collar mounted on said main sleeve, substantially as described.

19. The combination, with a main sleeve, of a shaft mounted eccentrically therein, a cutter carried thereby, operating means adapted to rotate in a forward direction first rotating said shaft within said sleeve and then carrying said sleeve with said shaft automatic-

ally feeding said cutter outward by the rotation of said shaft within said sleeve, and a steady-collar mounted on said main sleeve, substantially as described.

5 20. The combination, of a main sleeve, a shaft mounted eccentrically therein, a cutter carried eccentrically thereby, and an operating collar or sleeve loosely mounted on said main sleeve and operatively connected with
10 said shaft, said operating-collar operating concentric with respect to said main sleeve, whereby the forward rotation of said operating-collar first rotates said shaft within said main sleeve to throw said cutter into opera-
15 tive contact with the boiler-flue and then rotates said main sleeve and shaft together within said flue carrying said cutter around against the inner surface thereof, substan-
tially as described.

20 21. The combination, of a main sleeve, a shaft mounted eccentrically therein, a cutter carried eccentrically thereby, an operating collar or sleeve loosely mounted on said main

sleeve and operatively connected with said shaft, said operating-collar operating con- 25 centric with respect to said main sleeve, whereby the forward rotation of said operating-collar first rotates said shaft within said main sleeve to throw said cutter into opera- 30 tive contact with the boiler-flue and then rotates said shaft and sleeve together within said flue carrying said cutter around against the inner surface thereof, and means in connection with said main sleeve whereby the rotation thereof may be retarded to accelerate 35 the rotation of said shaft within said main sleeve, substantially as described.

In testimony whereof I have hereunto set my hand, at Minneapolis, in the county of Hennepin and State of Minnesota, this 17th 40 day of December, A. D. 1900.

IRVING C. HICKS.

In presence of—

FREDERICK S. LYON,
H. M. STOCKING.