A. FRYKMAN.

FLUE CUTTER.

APPLICATION FILED MAR. 16, 1908.

920,451.

Patented May 4, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

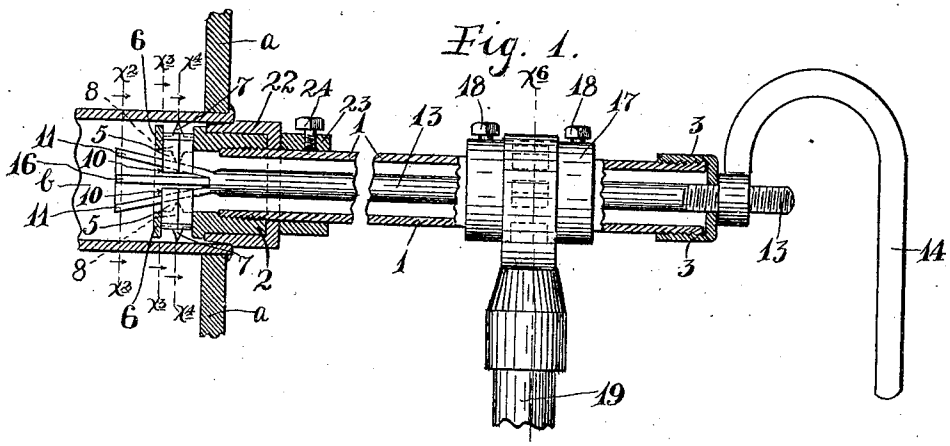


Fig. 9.

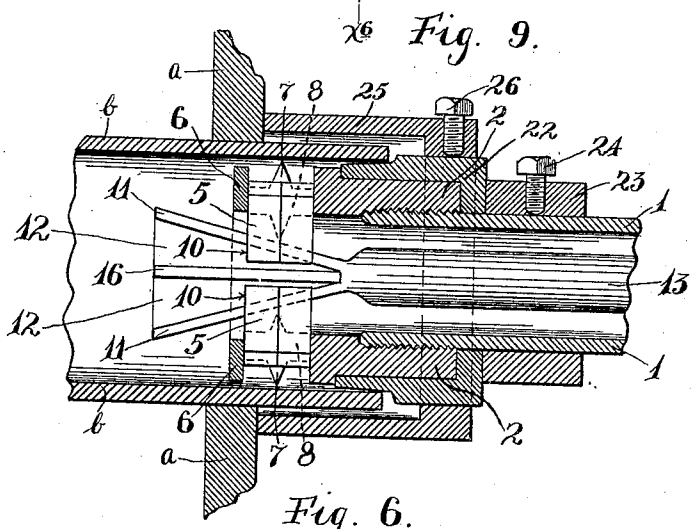
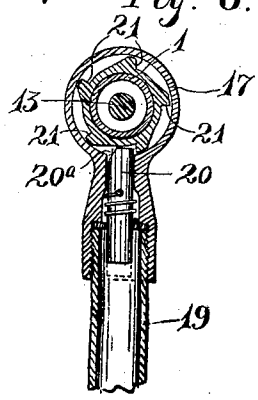


Fig. 6.



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2 SHEETS—SHEET 2.

Fig. 3.

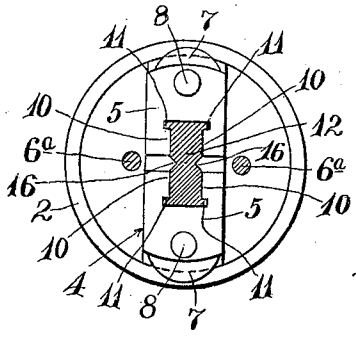


Fig. 2.

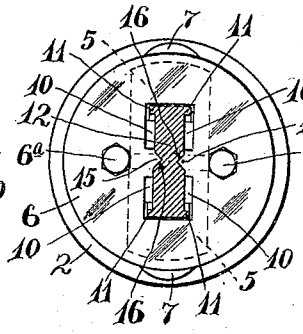


Fig. 4.

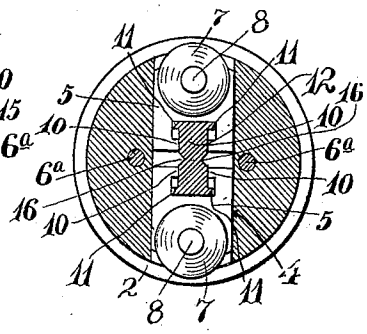
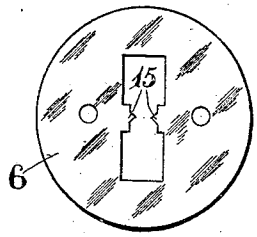


Fig. 7.

Fig. 5.



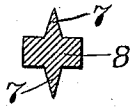


Fig. 10.

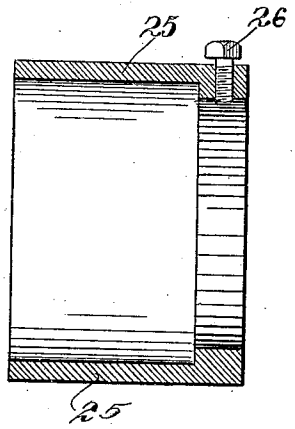
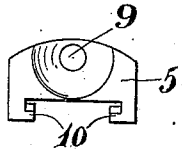


Fig. 8.



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UNITED STATES PATENT OFFICE.

AUGUST FRYKMAN, OF SOURIS, NORTH DAKOTA.

FLUE-CUTTER.

No. 920,451. Specification of Letters Patent. Patented May 4, 1909.

Application filed March 16, 1908. Serial No. 421,493.

To all whom it may concern:

Be it known that I, AUGUST FRYKMAN, a citizen of the United States, residing at Souris, in the county of Bottineau and State of North Dakota, have invented certain new and useful Improvements in Flue-Cutters; 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 has for its object to provide an improved flue cutter, and to this end it consists of the novel devices and combinations of devices hereinafter described and defined in the claim.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings; Figure 1 is a view partly in elevation, but chiefly in vertical section, showing my improved flue cutter applied to a flue, some parts being broken away. Fig. 2 is a section on an enlarged scale, taken on the line $x^2 x^2$ of Fig. 1. Fig. 3 is a section on an enlarged scale, taken on the line $x^3 x^3$ of Fig. 1. Fig. 4 is a section on an enlarged scale, taken on the line $x^4 x^4$ of Fig. 1. Fig. 5 is a detail of the so-called retaining plate which is applied to the inner end of the flue cutter. Fig. 6 is a section, taken on the line $x^6 x^6$ of Fig. 1, some parts being broken away. Fig. 7 is a section, taken through one of the cutting disks or wheels removed from working position. Fig. 8 is a detail showing one section of the cutter wheel bearings. Fig. 9 is a view in vertical section, on an enlarged scale, showing my improved flue cutter applied to a flue in position to cut off the end of said flue outside of the flue sheet, some parts broken away; and Fig. 10 is a view in vertical section showing the so-called outside gage ring removed from the flue cutter.

The letter *a* indicates the flue sheet of a boiler, and the letter *b* a flue applied thereto, said flue sheet and flue being of the usual construction. In this boiler flue *b* (see Fig. 1), the cutter is shown as applied for the purpose of cutting off the end thereof.

The improved flue cutter comprises a tubular stock 1, to one end of which an annular bearing head 2 is secured, preferably by screw-threaded engagement, and to the other end of which is applied a detachable screw-threaded cap 3. The annular bearing head 2 is formed in its inwardly projecting portion with diametrically extended notches 4 (see particularly Figs. 3 and 4) that constitute seats in which work split or two-part bearing blocks 5. The bearing blocks 5 are guided for true radial movements by the said seats 4, and the sections thereof are held together by a disk-like retaining plate 6 that is rigidly but detachably secured to the said annular head 2, preferably by means of screws 6^a.

The cutters proper are in the form of sharp-edged double convex wheels or disks 7 of hardened steel that are provided with projecting trunnions 8, preferably formed integral therewith. The opposing faces of the sections of the divided bearing blocks 5 are formed concave to closely fit the opposite faces of the coöperating cutting wheel 7 and to cover up considerably more than one-half thereof; and the said sections are also formed with trunnion seats 9 (see particularly Fig. 8) that are adapted to receive the wheel trunnions 8.

At least one section of each split block 5 has inturned guide lugs 10 that are arranged for a dove-tailed engagement with flanges 11 of the wedge block 12, which wedge block is secured to the inner end of a stem or bolt 13. This stem or bolt 13 extends axially through the tubular stock 1 and through the cap 3, and working with threaded engagement on the outer end thereof is a hand-piece 14, the hub of which acts as a nut upon the said bolt.

The wedge block 12, when removed axially toward the outer end of the stock 1, causes the bearing blocks 5 and cutting wheels 7 to move simultaneously outward in reverse directions; and, when the said wedge block is moved in a direction away from the outer end of said stock 1, it causes the said bearing blocks 5 and cutting wheels 7 to move simultaneously inward. To hold the wedge block 12 against lateral movements and the bolt 13 alined with the axis of the stock 1, the retaining plate 6 is shown as provided with V-shaped guide lugs 15 that engage V-shaped grooves 16 in the sides of the said wedge block.

A hub 17, slidably mounted on the stock 1, is adapted to be held in any desired set position thereon by set screws 18. An operating lever 19 is mounted to oscillate on the hub 17, and is connected thereto by a one-way pawl and ratchet device comprising a spring-pressed dog 20 mounted on the lever 19 and

having a beveled end 20^a that coöperates with circumferentially spaced notches or seats 21 formed in the said hub 17.

The reduced sleeve portion of the annular guide head 2 is loosely mounted in the hub portion of the so-called inside gage ring 22, the outwardly projecting portion of which is adapted to engage the end of the flue to determine the distance from the end of the flue that the cutting wheels 7 will engage with the interior of the flue; and, hence, of course, to determine the length of the end section that is to be cut off from the flue. A stop collar 23 engages the outer face of the inside gage ring 22 and is itself rigidly but adjustably secured to the stock 1 by a set screw 24. When the stop collar 23 is moved on the stock 1, farther toward the right than shown in Fig. 1, the annular head 2 may be slipped in the inside gage collar 22 so that the cutting wheels 7 will be spaced farther from the said inside gage ring, and thereby adapt it to cut off a longer section from the end of the flue.

When the cutter is applied, as shown in Fig. 1, the hand-piece 14 should be held in one hand and the lever 19 should be oscillated backward and forward so as to rotate the stock 1 and bearing head 2, wedge 12 and stem 13, step by step in a constant direction. This will, of course, cause the cutting wheels 7 to travel over the inner surface of the flue and cut a crease therein. When the said stem 13 is rotated, while the hand-piece 14 is held against rotation, the latter will act as a nut on the said stem; and the wedge 12 will be drawn gradually into the stock 1, thereby gradually forcing outward the bearing blocks 5 and cutting wheels 7.

The split or divided bearing blocks 5, it will be noted, engage more than one-half of the cutting wheels 7, and thereby relieve the trunnions 8 from strain and so firmly hold the said cutting wheels that very thin and hard cutting wheels may be employed with little or no danger of the breaking thereof. Also, it will be noted that when the parts are put together, as shown in the drawings, the trunnions of the cutting wheels lock the sections of the coöperating bearing blocks for common radial movements, and the seats in the bearing head 2 and the retaining plate 6 securely hold the sections of said split bearing blocks together or against separation. To remove the bearing blocks and rollers from the bearing head 2, it is necessary to slide the wedge 12 out of engagement with the bearing blocks, whereupon the said bearing blocks may be slid radially from working position, and the sections thereof may thereafter be separated.

When it is desired to cut off the end of the flue *b* outside of the flue sheet *a*, as indicated in Fig. 9, an outside gage ring 25 is slipped over the inside gage ring 22 and is rigidly but adjustably secured thereto by a set screw 26. The outwardly projecting portion of said outside gage ring 25 is adapted to engage the outside face of the flue sheet *a* to determine the distance from the flue sheet that the cutting wheels 7 will engage with the interior of the flue *b*; and, hence, of course, to determine the length of the flue to be left outside of the flue sheet for the purpose of forming a bead.

What I claim is:

In a flue cutter, the combination with the tubular stock having at one end an annular bearing head and a cap at its other end, of a retaining plate rigidly, but detachably secured to said head and having V-shaped guide lugs, bearing blocks mounted for radial movements in said bearing head, cutting wheels carried by said bearing blocks, a reversely beveled wedge block having at opposite faces dovetail engagement with said bearing blocks, longitudinally extended V-shaped grooves formed in said wedge block and located between said dovetailed surfaces for coöperation with the V-shaped guide lug on the retaining plate to guide said wedge block, a threaded stem secured to said wedge block and working through and guided by the cap on said stock, said wedge block and stem being supported entirely by the retaining plate and cap, a hand piece reacting against said cap and acting as a nut on the threaded end of said stem, and a lever for rotating said stock, substantially as described.

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

AUGUST FRYKMAN.

E. L. GARDEN,
A. L. STAUBINS.