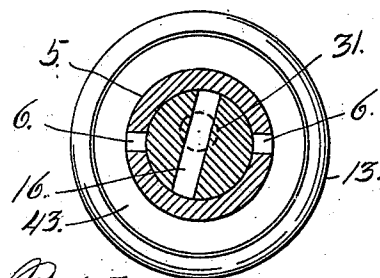
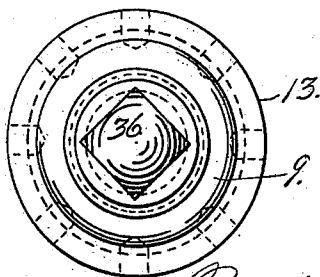
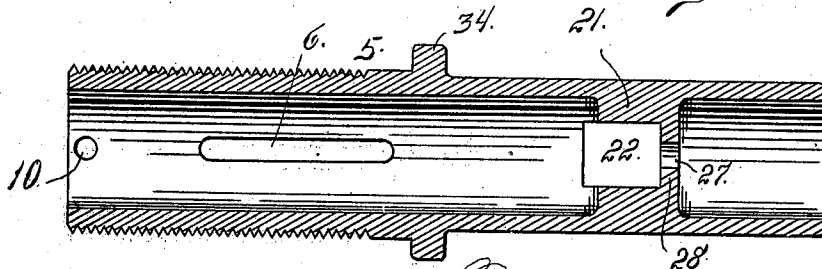
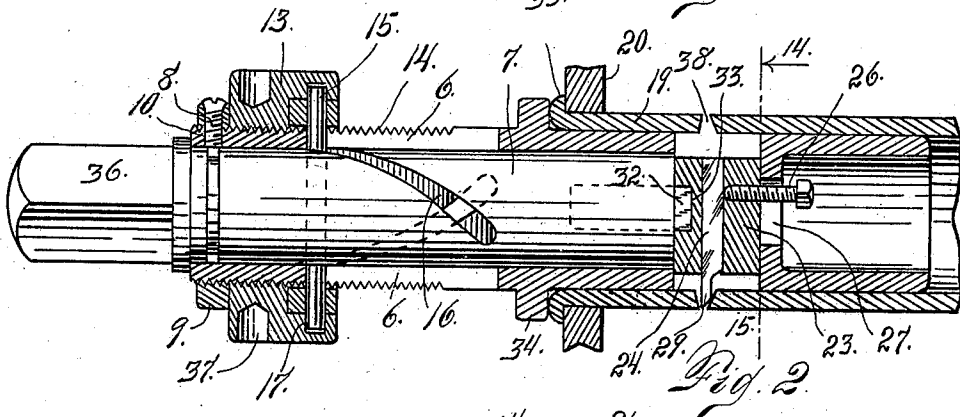
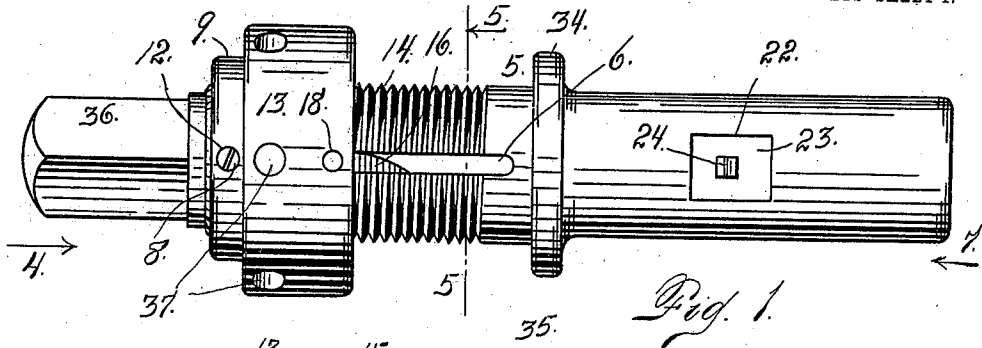


996,310.

2 SHEETS--SHEET 1.



Witnesses
Otto E. Hoddick.
C. H. Roessner.

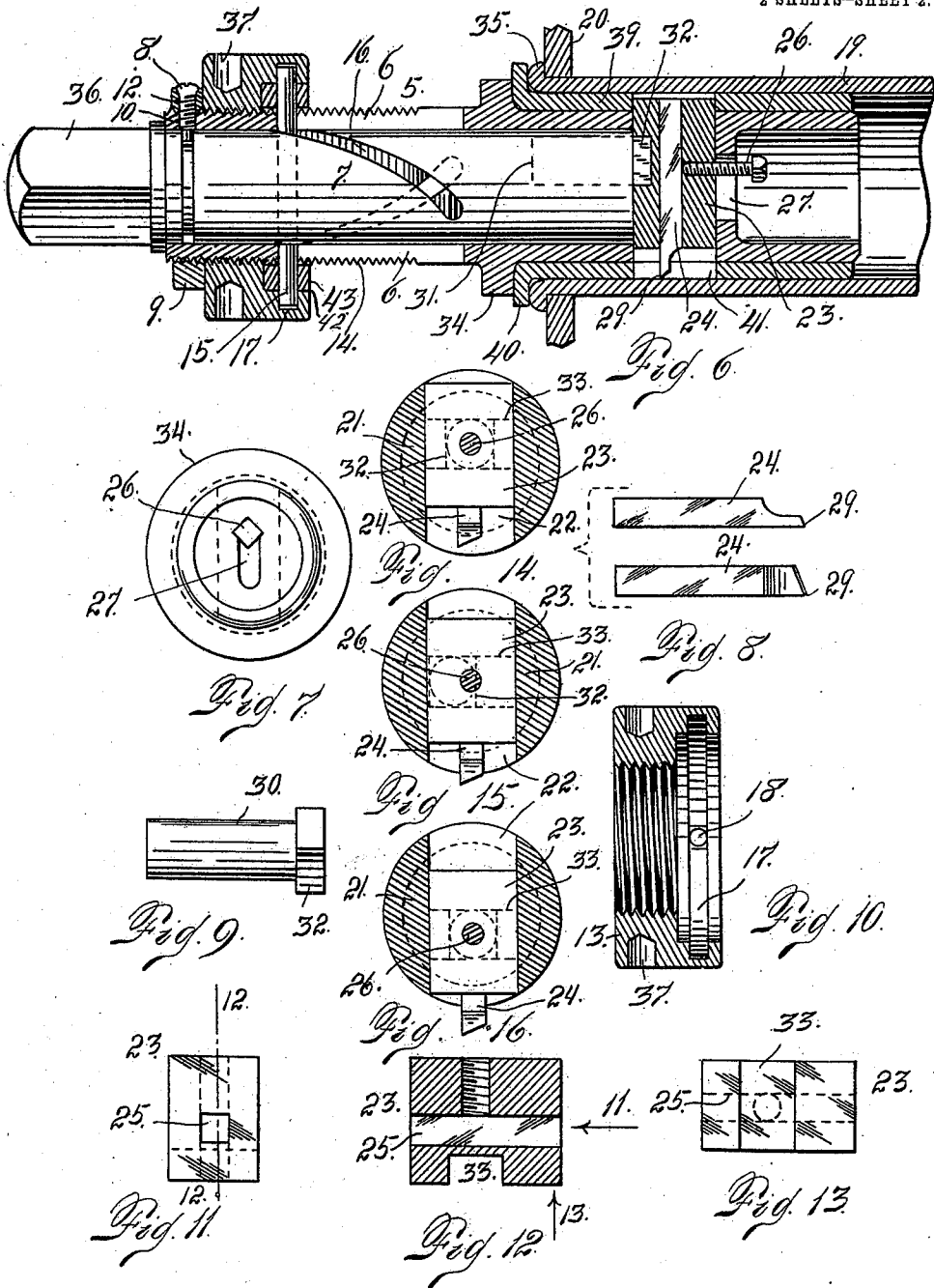
Fig. 5. Inventor
John Casagrande.
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J. CASAGRANDE.
FLUE CUTTER.
APPLICATION FILED AUG. 11, 1910.

996,310.

Patented June 27, 1911.

2 SHEETS-SHEET 2.



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UNITED STATES PATENT OFFICE.

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FLUE-CUTTER.

996,310.

Specification of Letters Patent. Patented June 27, 1911.

Application filed August 11, 1910. Serial No. 576,672.

To all whom it may concern:

Be it known that I, JOHN CASAGRANDE, a subject of the Republic of Switzerland, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Flue-Cutters; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in means for cutting out boiler flues, and consists of a tool whose cutting extremity is adapted to enter the flue, the tool being bodily rotated by suitable power, while an independent movement is imparted to one member of the device, being that which carries the knife or cutter, whereby the cutting point or edge of the latter is gradually fed outwardly to perform the cutting function as the cutter extremity of the tool is rotated bodily. From this it will be understood that the tool consists of two members movable independently of each other yet connected to rotate bodily in unison.

Generally speaking the device consists of a sleeve in which is inserted a cylindrical shank having a spiral slot extending there-through and extending a portion of the distance therearound. This shank is connected with the sleeve by passing a pin through the spiral slot of the shank and straight slots formed in opposite sides of the sleeve. The sleeve is exteriorly threaded to receive a feed nut which is interiorly threaded to correspond with the exterior sleeve threads. This nut is provided with an interior circumferential groove into which the protruding extremities of the pin extend. The nut is provided with perforations intersecting the interior groove, whereby the pin may be dropped into place. Then as the nut is turned on the sleeve, the pin will be carried forwardly with the nut and will be forced through the spiral groove of the shank and straight slots of the sleeve, thus causing a partial rotary movement of one of these members with respect to the other, whereby the knife holder carried by the sleeve, by virtue of its connection with the protruding

head of a pin eccentrically mounted in the shank, is fed laterally in one direction, while the tool is bodily rotated for cutting purposes, the feeding movement of the knife being caused to harmonize with the rapidity of its cutting action. The pin which is eccentrically mounted in the shank, has a rectangular head which fits into a straight groove formed in the knife holder and extending at right angles to the direction of the feeding movement of the blade holder, the construction and arrangement of the parts being such that a partial independent rotary movement of the sleeve or shank with respect to the other will carry the blade and its holder laterally a sufficient distance to perform the flue-cutting function.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is an elevation of my improved tool, the same being illustrated in detail. Fig. 2 is a sectional view taken through the tool and the crown sheet of the boiler, the cutting extremity of the tool being inserted in a flue for cutting purposes. Fig. 3 is a sectional view of the sleeve member of the tool shown in detail. Fig. 4 is an end elevation of the tool looking in the direction of arrow 4, Fig. 1. Fig. 5 is a cross section of the tool taken on the line 5—5 Fig. 1, looking toward the left or in the direction of the arrow. Fig. 6 is a view similar to Fig. 2 showing a slightly modified form of construction. Fig. 7 is an end elevation of the tool looking in the direction of arrow 7, Fig. 1. In this view the feed nut does not appear. Fig. 8 illustrates the cutting device properly shown in two different positions. Fig. 9 is a detail view of the pin which, when the parts are assembled, is eccentrically mounted in the shank and engages the knife holder to impart the lateral movement thereto. Fig. 10 is a sectional view in detail of the feed nut. Fig. 11 is an end elevation of the knife holder shown in detail, being a view looking in the direction of arrow 11, Fig. 12. Fig. 12 is a section taken on the line 12—12 Fig. 11. Fig. 13 is an elevation looking in the direction of arrow 13 Fig. 12. Figs. 14, 15 and 16 are cross sectional views taken on line 14—15

Fig. 2, illustrating the action of the eccentrically mounted pin on the knife holder during the operation of the device.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a sleeve having straight slots 6 formed in its opposite sides. A cylindrical shank 7 is adapted to enter the sleeve and is connected therewith to permit independent rotary movement by means of a set screw 8 passed through registering perforations formed in a lock nut 9 and the sleeve, the perforation in the sleeve being designated by the numeral 10 and that in the lock nut by the numeral 12. This lock nut abuts against the main feed nut 13 which is threaded on the exteriorly threaded portion 14 of the sleeve. A pin 15 is passed through a spiral slot 16 formed through the shank 7 and through the straight slots 6 formed in the sleeve. The extremities of this pin enter an exteriorly circumferential groove 17 formed in the nut, the pin being inserted through a perforation 18 formed in the nut and extending from the outside of the latter into the groove. By bringing this perforation into register with the straight slots 6 of the sleeve, the spiral slot 16 being in register with the said perforation and with the straight slots at a single point, the pin may be inserted as will be readily understood. Then as the feed nut 13 is rotated on the sleeve, the pin will be moved forwardly in the straight slots 6 and the spiral 16 to harmonize with the forward travel of the nut, thus imparting independent rotary movement to the sleeve independently of the shank. The forward extremity of this sleeve is adapted to enter a flue 19 where the latter passes through the crown sheet 20 of the boiler. The sleeve is interiorly reinforced as shown at 21 and in this reinforced portion is formed a rectangular opening 22 adapted to receive a holder 23 for the knife or cutter 24 which is inserted in a rectangular opening 25 formed in the holder and locked in place by a set screw or bolt 26, which is passed through a slotted opening 27 formed in a web or partition 28 located adjacent the blade holder opening 22. The cutting blade 24 is longer than the holder and its cutting extremity 29 protrudes therefrom for flue-cutting purposes. The knife holder is free to travel laterally in its opening 22, and this lateral movement is imparted by a pin 30 which is eccentrically mounted in a perforation 31 formed in the inner extremity of the shank, the head 32 of the pin, which is rectangular in shape, protruding from the inner extremity of the shank and entering a slot 33 formed in the adjacent face of the blade holder, and in which the head of the pin fits closely. The shank of this pin is cylindrical in

shape and fits loosely in the perforation of the shank. From this construction it will be understood that if either the shank or the sleeve be given rotary movement independently of or with respect to the other, lateral movement will be imparted to the knife holder in the opening 22.

Now if it is desired to cut a boiler flue, the tool in the form illustrated in Fig. 1, will be applied to the flue by inserting the inner extremity of the sleeve into the flue until a circumferential shoulder 34 formed on the sleeve abuts against the outer extremity 35 of the flue. The tool will then be rotated bodily through the instrumentality of an operating device or motor of any suitable character, the extremity 36 of the shank adjacent the threaded end of the sleeve, being formed polygonal in cross section to fit the chuck of the engine or motor. As the tool begins to rotate, it is assumed that the cutting extremity 29 of the knife will be in such position as to engage the inner surface of the flue and will therefore begin to cut the latter. Yet if no provision were made for feeding the blade holder laterally to keep pace with the cutting action of the knife extremity, the latter would of course be unavailable for the proper performance of its function. However, as the tool is rotated bodily, the feed nut 13 which is provided with recesses 37 for a spanner wrench, is turned on the threaded portion 14 of the shank, whereby it is caused to travel forwardly or toward the end of the flue to be cut. During this forward travel of the nut, the pin 15 is also carried forwardly to keep pace with the travel of the nut, and as the pin moves through the straight slots 6 and the spiral slot 16, rotary movement is imparted to one of these members with respect to the other, that is to say, independently of the other, and by virtue of the connection between the pin 30 which is eccentrically mounted in the forward extremity of the shank as aforesaid, and the knife holder, lateral movement is imparted to the latter to keep pace with the cutting action of the knife during the bodily rotary action of the tool, and the operation is continued until the flue is cut through, as shown at 38 (see Fig. 2.)

In the form of construction shown in Fig. 6 the tool is adapted for use in cutting a larger flue and to this end an auxiliary sleeve 39 is applied to the portion of the main sleeve 5 which enters the flue, the extremity of the auxiliary sleeve being upset as shown at 40 to engage the upset end 35 of the flue, the upset end of the auxiliary sleeve being interposed between the shoulder 34 of the main sleeve and the end of the flue to be cut. In this event the knife holder and blade should be correspondingly

increased in length in order that the lateral movement imparted thereto may be sufficient to sever the larger flue. Attention is called to the fact that in this form of construction the auxiliary sleeve is provided with an opening 41 into which the knife holder 23 protrudes, whereby the auxiliary sleeve is keyed to the sleeve 5 and caused to rotate therewith during the operation of the device.

The nut 13 is provided with an annular groove 42 formed in one face thereof and adapted to receive a ring 43 having perforations through which the protruding extremities of the pin 15 pass. This ring forms a sort of supporting guide or holder for the pin 15 during the operation of the nut for the purpose of moving the pin in the slots of the sleeve and shank for the purpose heretofore explained.

Having thus described my invention, what I claim is:

1. A flue cutter composed of a sleeve, a shank within the sleeve, the sleeve having slots parallel with the axis of the tool, the shank having a spirally arranged slot pin passed through the slots of the sleeve and shank, means for imparting rotary movement to the tool as a whole, means for moving the pin in the slots of the two members for imparting independent movement to one member, a cutter device carried by one member, and a connection between the cutter device of the other member whereby as the independent movement is imparted to one member the cutter device is moved laterally, for the purpose set forth.

2. A tool of the class described composed of a sleeve, a shank within the sleeve, the two members being connected to rotate together and to have independent rotary movement, one of the said members having a straight slot and the other member a spiral slot, a pin passed through the slots of both members, a nut threaded on the sleeve and having a circumferential groove into which the extremities of the pin protrude, whereby as the nut is caused to travel on the sleeve the pin is moved in the slots of both members, a cutter device laterally slidable in an opening formed in one member, a pin eccentrically mounted in the other member and engaging an elongated recess formed in the cutter device.

3. A tool of the class described composed of a sleeve, a shank within the sleeve, the two members being connected to rotate bodily and also to have independent rotary movement, the sleeve member having oppositely located straight slots, the shank member having a spiral slot, a pin passed through the slots of both members and having pro-

truding extremities, a nut threaded on the sleeve and having a circumferential groove into which the protruding extremities of the pin project, a cutter device slidably mounted in an opening formed in the sleeve member adjacent the inner extremity of the shank member, a pin eccentrically mounted in the shank member and engaging an elongated recess formed in the adjacent face of the cutter device, substantially as described.

4. A flue cutter composed of a sleeve, a shank therein, the two members being connected to rotate together and to have a limited degree of independent rotary movement, a cutter device carried by one of the members, a nut threaded on the sleeve, and means carried by the nut and engaging the shank, whereby as the nut is rotated on the sleeve the said means is simultaneously caused to move longitudinally of the sleeve and impart a rotary movement to the shank and a lateral movement to the cutter device, substantially as described.

5. A flue cutter composed of a sleeve, a shank therein, the two members being connected to rotate together and to have a limited degree of independent rotary movement, one of the said members having a spiral slot, and the other member having a straight slot, and a pin passed through the slots of both members, whereby as the pin is moved one member is rotated independently of the other, means for rotating the tool bodily, a cutting device carried by one member of the tool, and a connection between the said device and the other member of the tool, whereby the cutting device is moved laterally for cutting purposes by the independent rotary movement of one of said members, substantially as described.

6. A flue cutter composed of two members, coaxially mounted and connected to rotate together and to have a limited degree of independent movement, one member having a spiral slot, and the other a straight slot, means passed through the slots of both members, whereby as the said means is moved, one member is rotated independently of the other, means for rotating the tool bodily, a cutting device carried by one member, and a connection between the said device and the other member, to impart lateral movement to the cutting device during the independent movement of one of the said members, substantially as described.

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

JOHN CASAGRANDE.

Witnesses:

HORTENSE UHLRICH,
F. E. BOWEN.