

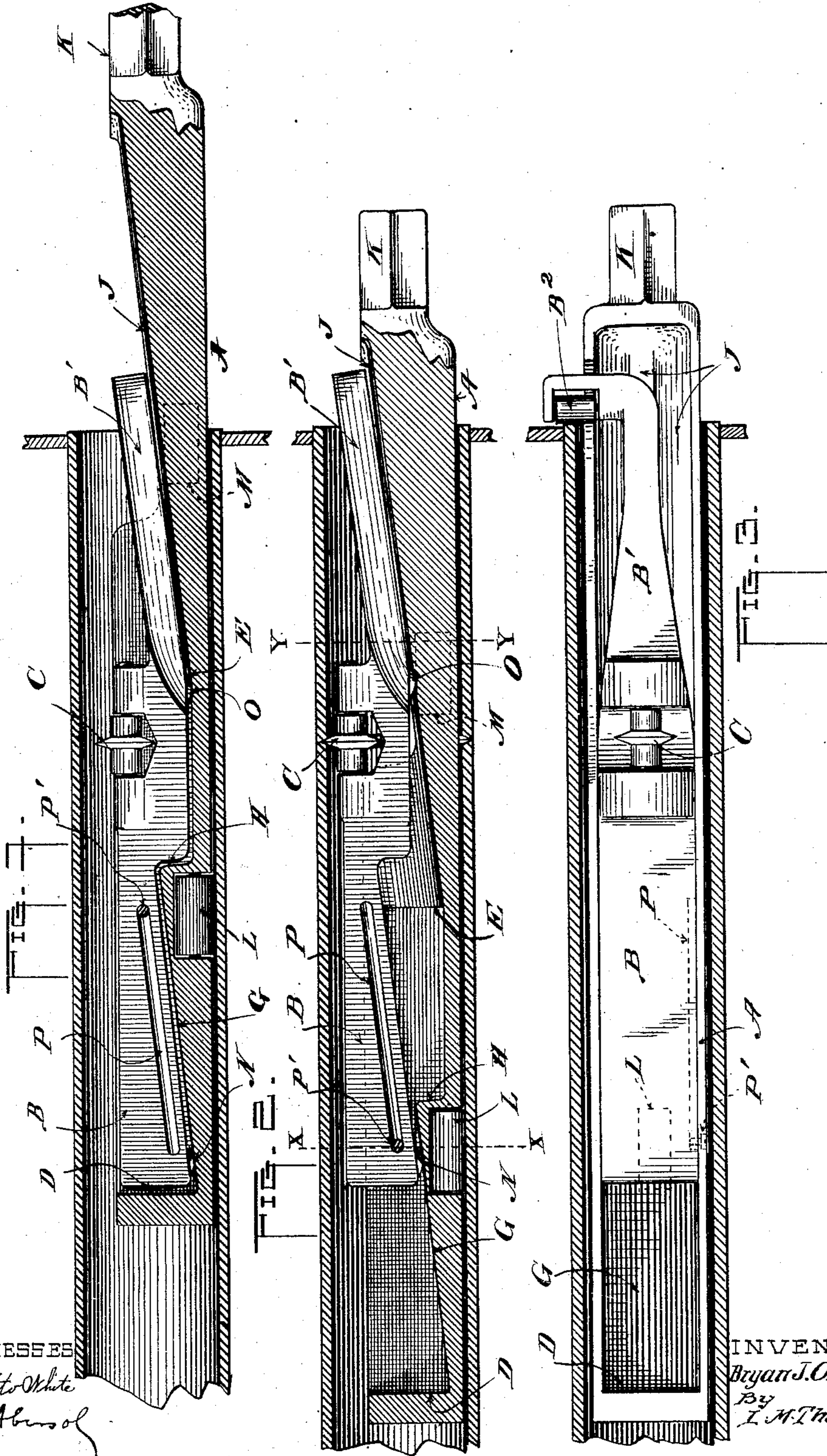
No. 859,574.

PATENTED JULY 9, 1907.

B. J. O'NEILL.
FLUE CUTTER.

APPLICATION FILED JULY 5, 1906.

2 SHEETS—SHEET 1.



WITNESSES
Loretto White
E. Johnson

INVENTOR
Bryan J. O'Neill,
By *I. M. Thurston,*
Atty.

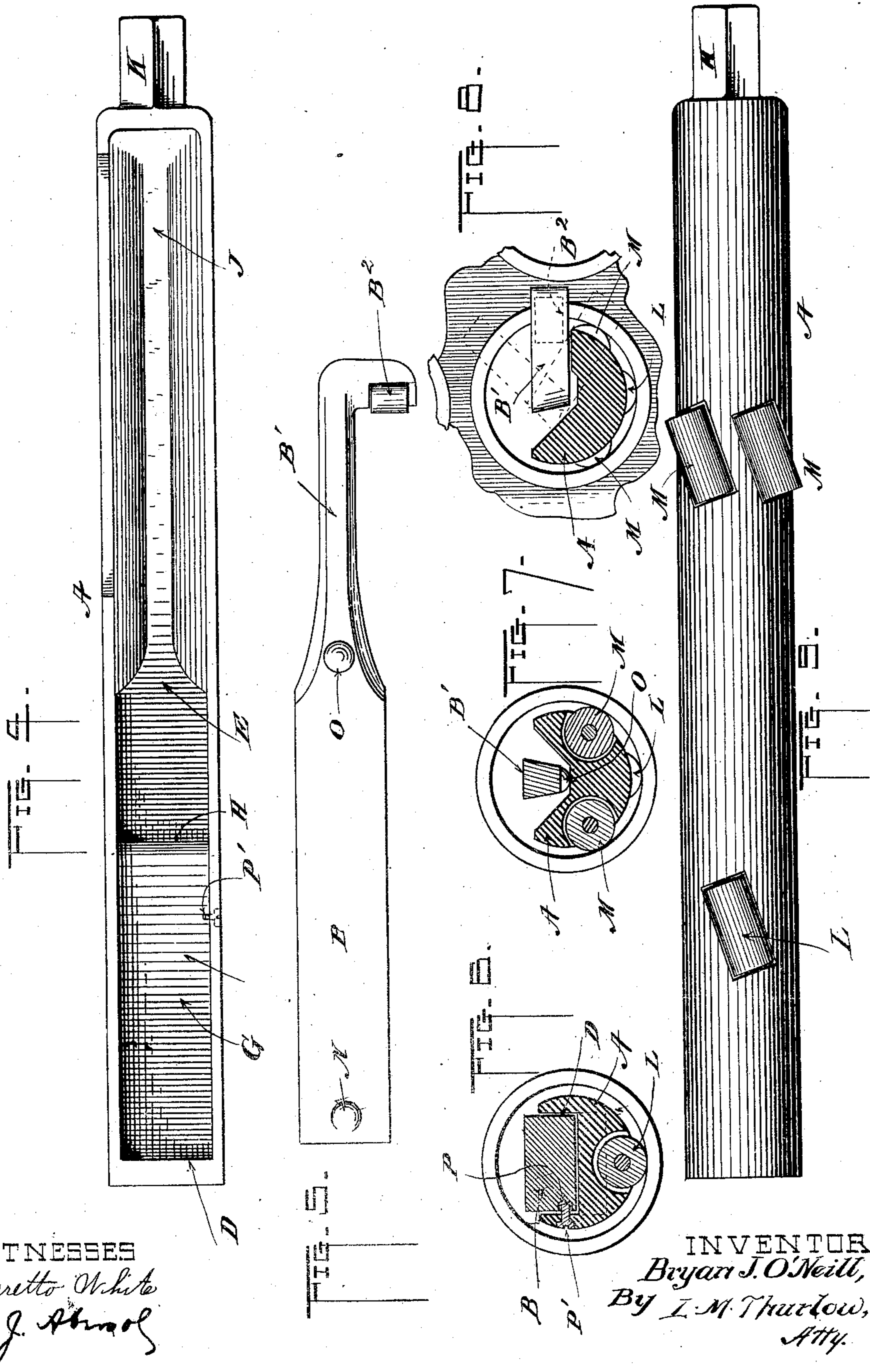
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WITNESSES
Loretto White
E. J. Arnold

INVENTOR
Bryan J. O'Neill,
By *L. M. Thurlow,*
Atty.

UNITED STATES PATENT OFFICE.

BRYAN J. O'NEILL, OF PEORIA, ILLINOIS.

FLUE-CUTTER.

No. 859,574.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed July 5, 1906. Serial No. 324,757.

To all whom it may concern:

Be it known that I, BRYAN J. O'NEILL, a citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Flue-Cutters; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

10 This invention pertains to improvements in flue-cutters.

One of the objects of my present invention is to provide a flue-cutter of simple design, of few parts and thoroughly efficient in its work, coupled with the advantage of being low in cost.

15 Still another advantage of my improved flue-cutter is that there is practically no machine work necessary in its production or in assembling its parts.

20 A further object of the invention is to produce a flue-cutter having no threaded parts by which to draw it into the flue in order to carry the cutting member to its work.

25 A further object is to produce a flue-cutter of simple arrangement whereby with light pressure from the hand of the operator it is made to feed or draw into the flue and cause its cutting member to perform its required work.

30 A still further object is to provide a peculiar construction in a flue-cutter wherein friction rollers are employed, which in addition to the cutting member, all of which bear upon the inner surface of the flue, serve, by means of a peculiar form of wedge, to accomplish the severing of said flue.

35 The invention further relates to certain details of construction and arrangement of parts to be clearly pointed out in the following specifications.

In the appended drawings forming a part of this application, Figure 1 is a longitudinal sectional elevation of my flue-cutter shown within a flue. Fig. 2 is a similar view of the device within a flue showing its cutting member at work. Fig. 3 is a top view of the device also shown within a flue. Fig. 4 is an interior view of the body of the device. Fig. 5 is a view of the underside of a member which carries the cutter. Fig. 6 is a transverse section of the body on line *x x*, Fig. 2. Fig. 7 is a transverse section of the body and cutter-carrying member on line *y y*, Fig. 2. Fig. 8 is an end view of a flue and a portion of the flue sheet showing position and travel of a friction roller carried on the cutter-carrying member. Fig. 9 is a view of the underside of the body of my device showing a series of friction rollers positioned with their axes at an angle to the axis of said body.

55 This application is provided to take the place of my former one for a flue-cutter, filed by me on the 11th day

of September, 1905, and bearing the Serial Number 277864 to be abandoned.

My improved cutter consists of two main portions. One of which is the main body indicated by the letter A within which is carried the second portion B provided with the cutter C. The said body is preferably a casting of some 14 inches in length, whose form in cross section is substantially half round, having a groove at D the sides of which are parallel, said groove extending from the extreme rear to substantially the middle of the length of said body to a point indicated at E in the figures, and in Figs. 1 and 2 the bottom of the groove is shown provided with an inclined surface indicated at G extending from the rear towards the front end of the device the forward end of the incline as shown at the point H being higher than at the extreme rear. At the said point H is an abrupt drop, as shown, from which a second incline extends upward and forward as indicated at J, the same terminating at its highest point at the front end of the body as shown. These slanting surfaces G and J are shown in the drawing as being of substantially the same angle of inclination. This is not absolutely necessary to the proper working of the implement, as slight changes in said angles will make no material difference. From the point E in said body the groove instead of being square as described extends forward in the form of a V as clearly shown in Fig. 7, the purpose of which will be described later. Thus formed the body is adapted for insertion into a flue to be severed, there being a square member K at its extreme outer or forward end, by which rotary motion may be imparted to it by the use of a suitable motor or even a hand wrench, the latter method having been used successfully.

In the underside of the body as shown in Fig. 9, I insert three friction rollers, one of which indicated by L, is located just below the center or axis of the body, its position being within the metal left below the upper forward end of the incline G before described this being clearly shown in Figs. 1 and 2. The two rollers indicated by M are positioned at each side of the axis of the body as shown in Fig. 7, there being sufficient stock at each side thereof for the formation of recesses to permit entrance of said rollers. It will be noted by reference to Figs. 6 and 7 that the body is now supported upon the three rollers described when positioned within the flue. Thus constructed and arranged I place within the groove the member B hereinbefore referred to, which as stated, carries the cutter C. This member is of rectangular cross section, beneath and rearward of the cutter and is designed to seat within the groove of the body. The member is undercut to correspond substantially to the incline of the body G as clearly shown, and when lying at rest therein the rear end of the member lies at the extreme bot-

tom or rear end of the groove as shown in Fig. 1. Said member drops from the undercut as shown and then has an upward slant substantially parallel with the incline J. The portion having this upward incline is an extension or arm B', the under portion of which is in the form of a V to correspond with the groove J described.

At the bottom of the member B, at the rear, is a boss N there being also a boss at O near the forward end, said bosses being so positioned that the cutter lies above and between them, said cutter and bosses being relatively stationary. The outer end of the finger or extension B' is provided with a bend at right angles which carries a friction roller B² adapted to bear against the end of the flue within which the body is at work, the side of the body being cut away slightly to permit this right angled bend with its roller to extend outside the body without interfering therewith. However, it is to be understood that the arrangement may be such that the said extension can be elevated above the body and thus obviate the necessity of cutting out the side of the body to accommodate said extension.

I have provided means whereby the member is prevented leaving the body while being permitted to travel endwise within the groove. This is accomplished by forming a groove P in one side of the member parallel with the incline G of the body A and providing a set screw P' in the body A as shown in Fig. 6, the end of which enters said groove P. When it is desired to sever a flue the device is entered into said flue as shown in Fig. 1, the parts A and B occupying the positions shown relatively. As the device enters, the friction roller B² of the extension B' engages the end of the flue and stops further entrance of the member while the body A continues further into the flue beneath the now stationary member B. Since the cutter is seated upon the incline of the body it is evident that if the body is pushed beneath it will be forced to rise since it cannot move in the direction of its length. The rising or vertical movement must result by reason of the inclines G and J described. The bosses N and O serve to reduce friction between the member and the body but these are not absolutely necessary to the use of the device. Fig. 2 illustrates the relative positions of the body and member D when the flue is being cut, it being observed that the deeper the cutter enters its work the higher the bosses travel upon the inclines. These bosses, when the member B is at its highest point where its work is about completed, occupy positions just above the rollers L M as shown. However, the arrangement may be such that the bosses may be positioned above and between the rollers or may straddle the same, that is, the rollers in the latter instance being below or between the bosses, since this is not of great moment except that the pressure downward from the cutter must be properly distributed upon the rollers so the body will not teeter on the latter. It is to be remembered that at the time the body A is being forced beneath the member B, a rotary motion is imparted thereto by the means hereinbefore stated so that the cutter C will describe a path around the interior surface of the flue. I have referred hereinbefore to the said rollers L M as being positioned with their axes at an angle to the axis of the body as shown in Fig. 9. This angle is such that by a pressure on the

body the rollers frictionally engage and grip the inner surface of the flue caused by the pressure of the cutter against the flue as it performs its work. The action of the cutter and the rollers is theoretically to enlarge the flue. This however, in practice is obviously not the case, but the intense pressure exerted in forcing the body beneath the cutter causes the rollers to retain a firm grip as described, and being inclined at an angle causes the body to be drawn into the flue in a spiral manner as though caused by a screw or thread-bar.

I am fully aware in presenting the inclined rollers as a part of my invention that other devices have been provided with them, but the use thereof in a flue-cutter I regard as new, since heretofore flue-cutters have not been provided with them making it necessary to employ other and more complicated means for feeding the cutter to the work. The vertical movement of the cutter need be but substantially $\frac{1}{4}$ of an inch, hence it will be seen that a long incline can be employed and great power produced in raising the cutter, a long incline permitting greater power than a shorter one of a steeper angle. In withdrawing the tool from the flue the body is grasped and pulled outward thus permitting the member B to lower into the groove D to its original position as shown in Fig. 1, a finger pressure upon the extension of the part B' causing this action. It is noted that the operation is extremely simple and the act of insertion and withdrawing is almost instantaneous, there being no long thread-bars to be turned as in many devices of this class by which to lower the cutter into the body and consume time.

There are but the two main portions A and B in my improved flue-cutter; the cutter and the rollers being the only additional parts except the small stationary set screw hereinbefore described. By providing the groove D with parallel sides, the member B being of rectangular form in cross section, fits snugly therein and is turned by the body as in a wrench. The screw P' is merely employed, as already stated, to hold the member within the body so that the parts cannot become detached and lost and no strain is put upon it in the operation of the implement at any time. The groove in the forward half of the body is in the form of a V as described, thereby leaving plenty of stock for carrying the rollers L M described, the extension B' of the member B being also in V form as also described to travel therein, the boss O traveling upon the bottom of said groove. The extent of the travel of the body beneath the member B is only such that the cutter is given its full amount of vertical motion while being kept between the rollers L M as already intimated.

The double inclines G and J cause both ends of the member D to move alike so that as it rises it is always horizontal thereby feeding the cutter squarely to its work. By extending that portion of the part B' which carries the roller, out to one side, when the cutter is uppermost, I am permitted to raise the body as high as necessary without interfering with the flue above. The roller, as will be understood, is employed for the purpose of gaging the distance between the end of the flue and the position where a flue is to be severed which is usually a fixed distance. It is usual to remove about 4 inches of the flue and in consequence

of this the arm B' of the member is made substantially that length. However, it is not absolutely necessary to depend upon this extension B', since by holding the member B in a desired location by means of the finger 5 and forcing the body A beneath said member, the cutter may be carried to its work and by a single revolution of the body the cutter will produce a cut of a depth that will cause it to remain and travel therein without further attention, the cut then acting as the 10 means for holding the member B in a fixed position as regards longitudinal movement while at work.

The groove in the body need not have the double incline G and J necessarily, since a single incline could extend from one end to the other without the 15 abrupt offset H described. In this case the roller L would be set rearward of such incline thus showing that I do not wish to limit myself to the particular construction and arrangement of parts shown and described.

20 Having described my invention I claim

1. In a flue cutter, the combination with a body adapted to be inserted and rotated in a flue, of flue-engaging rollers mounted upon one side of said body, inclined to the axis of the flue and in planes approximately parallel to said 25 axis, a cutting device upon the opposite side of said body, and means whereby said rollers in advancing said body automatically force said device outward.

2. A flue cutter comprising a forwardly tapered body adapted to be advanced and rotated within a flue to be cut, inclined flue-engaging rollers mounted upon one side of said body, and a cutting device mounted upon the opposite side of said body to rotate therewith and to slide, relatively in a longitudinal direction thereon.

3. A flue-cutter comprising a longitudinally grooved 35 body for entrance into a flue to be cut, the groove having an inclined bottom extending inward and downward, from the outer end of the body, a cutter carrying member carried upon such inclined bottom, the cutter therefor, the body adapted to be drawn beneath the member to carry the cutter to its work, and a series of friction rollers for drawing the body into the flue beneath the said member. 40

4. A flue cutter comprising a longitudinally shiftable body within a flue to be cut, there being inclined surfaces therein extending inward and downward, a cutter carrying member carried thereby adapted to receive vertical motion 45 by the shifting of said body there-beneath, a cutter for the member for severing the flue, friction rollers carried in the body to engage the interior surface of the flue, the same being inclined at an angle to cause said body to draw into the flue beneath the member, the said rollers and the cutter acting together by pressure against the flue to cause the advance of the body as described. 50

5. A flue-cutter comprising a body for entrance into the flue, there being an inwardly and downwardly inclined surface substantially as described, a cutter carried by the 55 latter for severing the flue, the inclined surface of the body when the latter is drawn into the flue beneath the member acting to raise the latter and to carry the cutter against and into the metal of the flue, and a series of rollers in the body for engaging the inner surface of the flue, the axes of the rollers being inclined at an angle to the axis of the body carrying them, whereby by the pressure between the cutter and the roller the body is drawn into said flue in a spiral manner for the purpose explained. 60

6. In a flue-cutter a body for entrance to a flue to be severed there being a groove therein extending longitudinally, part of said groove having parallel sides as described and also having an inclined bottom, a cutter carrying member carried within the groove upon the inclined 65 bottom, and partially of rectangular cross section to seat within the groove, to be turned by the body during its rotation as in a wrench, a cutter for the member for flue severing purpose, and a series of rollers carried by the body and inclined at an angle to the axis of the flue whereby by pressure imparted thereto due to the cutter and the in-

clined grooved surface of the body causes the body to be drawn into the flue beneath the cutter carrying member in a spiral manner, the said cutter-carrying-member turning with the body and having movement in a direction at right angle to and away from the axis of the body due to 80 the inclined surfaces when the body is drawn inward by the means described.

7. A flue-cutter comprising a body, a cutter carrying member seated therein said body adapted for longitudinal shifting movement thereunder, there being an extension 85 of said member for the purposes set forth, and a series of frictional advancing rollers in the body, there being an inclined surface between the body and the member for the purposes set forth.

8. A flue-cutter comprising a body having a longitudinal-groove, there being an inclined bottom therefor, a series of frictional advancing rollers in said body for the purposes described, a cutter carrying member seated within the groove upon the inclined bottom and removably secured within said body. 95

9. A flue-cutter comprising the body having frictional advancing rollers for entrance into the tube to be severed, there being a longitudinal groove in said body, the bottom thereof slanting downward toward the inner end of the body for the purposes described, a member seated therein, 100 a cutter carried by said member, means for preventing the member from leaving the body but permitting longitudinal movement of the body and member relatively, there being means on the member for engaging the flue to be severed for the purposes set forth, the cutter carrying 105 member adapted for movement in a direction vertical to the axis of the body to bring its cutter against the flue, such movement resulting from the entrance of the body beneath the member.

10. A flue-cutter comprising the body, a single longitudinal groove therein deepened from its outer end toward its inner end, a cutter carrying member seated in the groove and having a projection at one end for contacting with the end of the flue to be cut for the purposes set forth, and means between the opposite end of the 115 member and the body permitting movement of said member longitudinally while preventing separation of the parts, the body adapted to shift beneath the member to raise and lower it for the purposes explained.

11. A flue-cutter comprising a body, a cutter carrying member seated therein, said body adapted when shifting in one direction beneath the member to carry the cutter to its work and when shifted in the other direction to permit the said cutter to leave its work, means on the cutter carrying member for positioning the cutter for 125 work, and a series of rollers on the body for carrying the latter beneath the cutter carrying member when the body is revolved on its axis.

12. A flue-cutter comprising a body, a cutter carrying member seated therein, the former shiftable beneath the latter and for turning it within a flue, said body adapted for changing the position of the cutter with relation to the work for the purposes described, means for positioning the cutter for work, and rollers on the body and disposed at an angle to the axis thereof as described for 135 causing the body to be drawn into the flue when said body is revolved on its axis, the cutter being positioned between two series of the rollers when at work.

13. In a flue-cutter, a cutter carrying member, a body in which it is seated and carried, there being a longitudinal depression for receiving said carrier, said body adapted to revolve on its axis and simultaneously enter beneath the cutter member to cause the cutter to approach its work and describe a circular path within the flue, means for positioning the cutter within the latter at the point where said flue is to be severed, the cutter carrying member being of some considerable length and having 145 slidable relation with the body, the latter causing it to raise and lower, and a series of rollers carried in the body with their axes lying at an angle to the axis of the body for drawing the latter into the flue beneath the cutter carrying member. 150

14. A flue-cutter comprising the body thereof, having a longitudinal groove therein the bottom of which is provided with two inclines of substantially the same angle 155

the same extending inward and downward toward the inner end of the body, a cutter carrying member resting upon such incline, and turned by the body in the rotation of the latter, a cutter carried by the member in contact
5 with the interior surface of the flue to cut the same during the rotary movement of said body, and a series of inclined rollers for engaging the flue for drawing the body into said flue beneath the member to gradually force the cutter into the metal for severing the flue, and a gage
10 for positioning the cutter with reference to the end of the flue, said gage extending horizontally away from the

said cutter carrying member when the cutter is uppermost, said gage forming part of the cutter carrying member, and a friction roller carried by said gage substantially as described.

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

BRYAN J. O'NEILL.

Witnesses:

C. B. McDUGAL,
L. M. THURLOW.