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J. W. DOYLE.

FLUE CUTTER.

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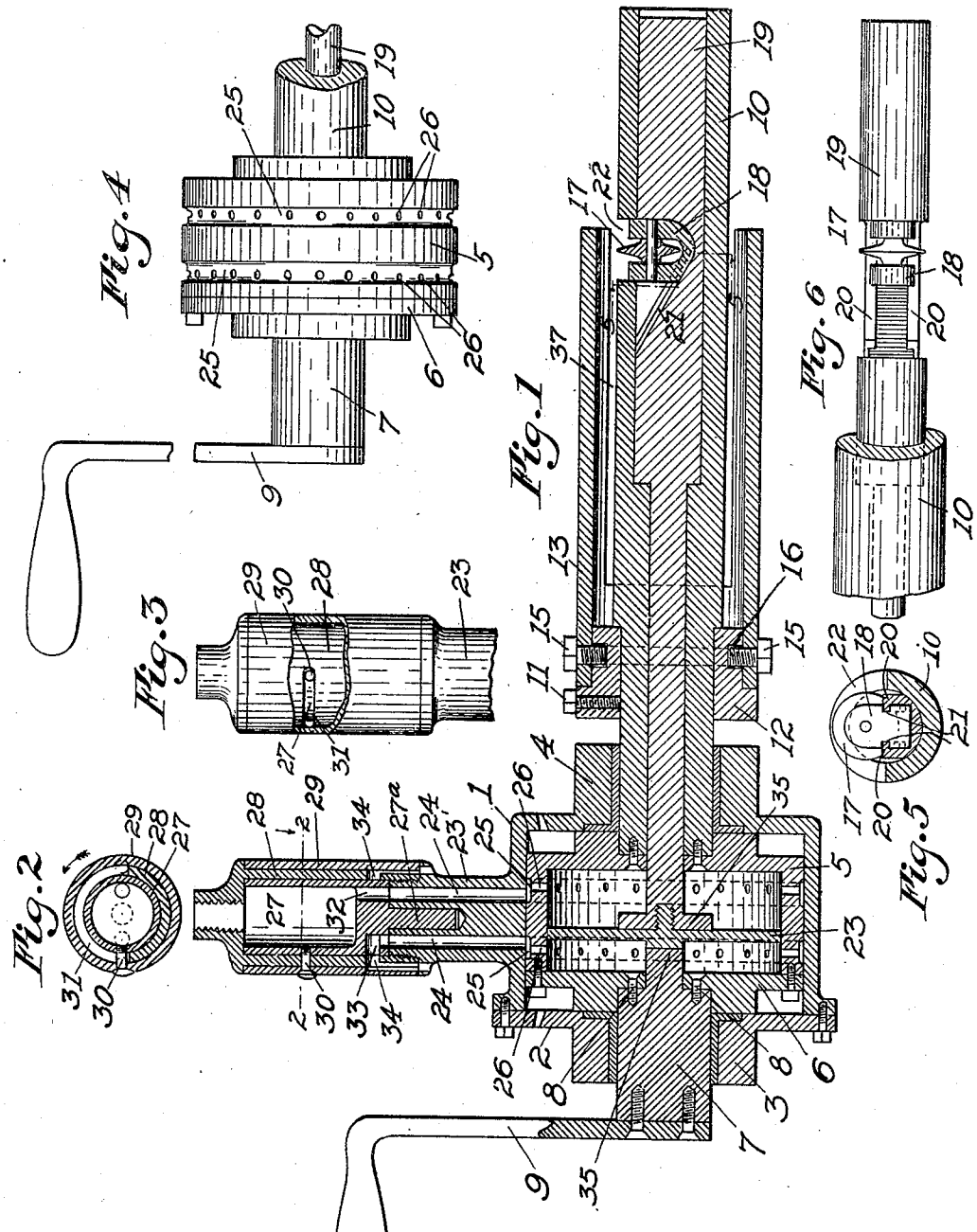

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FLUE-CUTTER.

No. 806,878. Specification of Letters Patent. Patented Dec. 12, 1905.

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To all whom it may concern:

Be it known that I, JOHN W. DOYLE, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Flue-Cutters, of which the following is a specification.

My invention relates to flue-cutters; and the primary object thereof is to provide a construction which embodies but few parts and is very efficient in operation.

A further object is to provide improved means for projecting and retracting the cutter-head.

With the above and other objects in view, as hereinafter set forth, the invention consists of the parts, arrangement, and combination of parts described in the following, and succinctly pointed out in the appended claims.

In the accompanying drawings, wherein like numerals of reference indicate like parts throughout the several views, Figure 1 is a longitudinal section of the present invention. Fig. 2 is a section taken on line 2 2 of Fig. 1. Fig. 3 is a fragmentary view in elevation of the valve and its supporting means, the outer shell of the valve being broken away. Fig. 4 is a fragmentary side view showing the rotary casing removed from the housing or casing in which it is normally arranged. Fig. 5 is a section taken on line 5 5 of Fig. 1; and Fig. 6 is a detail view of the mandrel, parts being broken away to show the mechanism mounted therein.

In carrying out my invention I provide a housing or casing 1, which has removable head 2, and this head and the closed end wall of said housing are both formed with outwardly-projecting castings or sleeves 3 and 4, respectively.

Reference-numeral 5 indicates the inner casing, the same having a removable head 6, to which the shaft 7 is rigidly secured in any desired manner, a simple means, however, consisting of screws 8, as shown. This shaft is rotatable in sleeve 3 and is operated as by means of a crank 9. The mandrel (indicated by reference-numeral 10) is preferably removably secured to the other end of casing 5 and projects through sleeve 4 and has fixed thereon by set-screw 11 the collar 12. To this collar a gage 13 in the form of a graduated tube is secured by screws 15, which engage in a circumferential groove 16 in said collar for a purpose described hereinafter. The mandrel is hollow and in the bore thereof I mount a longitudinally-slidable means for projecting and retracting the cutter 17, which is rotatably supported in the cutter-head 18. This means comprises a bar 19, which is cut out to provide an inclined face on which opposite angular flanges 20 (see Fig. 6) are secured. The inturned portions of these flanges fit in correspondingly-inclined grooves 21 in the sides of the cutter-head. Consequently when said bar 19 is moved longitudinally of the mandrel said cutter-head will be alternately projected and retracted, it being understood that said cutter-head at all times has snug engagement in the opening 22 of the mandrel and is thereby prevented from any longitudinal movement with said bar. (See Figs. 1 and 5.)

Reference-numeral 23 indicates a piston which is slidable in casing 5 and secured to the adjacent end of bar 19, and this piston is reciprocated by alternately admitting a motive fluid—as, for example, air or the like—into casing 5 on opposite sides of said piston.

The housing or outer casing 1 is formed with an elongated neck or casting 23′, and this casting is bored to provide channels 24. These channels always register with circumferential grooves 25, formed in casing 5, and therefore the air or other motive fluid can be admitted into either of said grooves 25, so as to pass through apertures 26 into casing 5 on either side of piston 23, this depending on the set of the valve which I will now proceed to describe. The valve consists of an inner shell 27, which has a stem 27ª rotatably fitting in a socket in neck 23′, an intermediate shell 28, which is threaded onto the neck, and an outer shell 29, which is rotatable on shell 28, and a pin 30 connects the inner and outer shells, the same passing through a slot 31 in the intermediate shell. Therefore the said outer and inner shells can be moved in unison about said shell 28. The inner shell has its bottom formed with inlet and outlet ports or ducts 32 and 33, respectively, which alternately register with the respective channels 24. The inlet-port extends entirely through the bottom of said inner shell, and consequently when air is admitted into said inner shell it will pass through said port 32, and the channel 24, groove 25, and apertures 26 registering therewith into casing 5 and drive the piston to the position shown in Fig. 1. The exhaust port or duct 33, however, is of angular form, and while its lower end will register with either of channels 24 its upper

end terminates at the side of said inner shell and alternately registers with exhaust-channels 34, formed in the intermediate and outer shells. Therefore, assuming that the piston has been moved to the position shown in Fig. 1, as previously described, that air which was in the casing 5 in advance of the piston was expelled through the adjacent channel 24, the exhaust port or duct 33, and channel 34. To advance the piston, the operator grasps the outer shell and rotates the same one-half of a revolution in the direction of the arrow, (see Fig. 2,) thereby causing the inlet and outlet ports to assume a reversed position with respect to channels 24. The motive fluid is thereby admitted into the casing 5 in the rear of the piston. The mandrel is rotated simultaneously with the advance movement of the piston, and the cutter being gradually projected beyond the mandrel will impinge against the flue, which is normally arranged thereon, and sever the same. Suitable stops, as 35, prevent the piston moving past the respective series of apertures 26.

In operation the mandrel is slipped into the flue, or vice versa, and the gage will then inclose said flue, and in order that the operator will be fully aware of the length of flue arranged in said gage I slot the same longitudinally, as at 37, whereby sight-openings are provided. After the mandrel has been advanced the required distance into the flue air is admitted into casing 5 to project the cutter, and the mandrel is then rotated, as heretofore stated. The gage by reason of its connection with collar 12, the screws 15 engaging in the circumferential groove 16 thereof, will be allowed to remain free from movement with the mandrel should the same engage the boiler, as when cutting a flue attached thereto.

The crank 9 has merely been illustrated for the purpose of disclosing a simple means for revolving the mandrel. It will be obvious, however, that other means can be substituted therefor without departing from the spirit of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States of America, is—

1. A flue-cutter comprising a housing formed with channels, a casing rotatable in the housing and being formed with continuous grooves registering with said channels, said casing having apertures communicating with said grooves, a valve formed with inlet and outlet ports alternately registering with said channels, a piston operating in said casing, a mandrel secured to said casing, a cutter slidably mounted in said mandrel, and means actuated by said piston for projecting and retracting said cutter.

2. A flue-cutter comprising a housing formed with channels, a rotary valve secured thereto and having inlet and outlet ports alternately registering with the respective channels of the housing, a casing formed with apertures to receive a motive fluid from said channels, a piston slidable in the casing, a mandrel rotated by said casing, a cutter slidable in said mandrel, means actuated by said piston for projecting and retracting said cutter.

3. A flue-cutter comprising a housing formed with channels, a casing rotatable in the housing, means for rotating the same, a piston slidable in said casing and being driven by a motive fluid received from the channels in said housing, a mandrel secured to said casing, a cutter movable into and out of the mandrel, and means actuated by said piston for projecting and retracting said cutter.

4. A flue-cutter comprising a housing formed with a neck having channels, a rotary valve mounted on said neck and having inlet and outlet ports alternately registering with the respective channels thereof, a rotary casing in said housing formed with apertures to receive motive fluid from said channels, a piston slidable in the casing, a mandrel rotated by said casing, a cutter slidable in said mandrel, and means actuated by said piston for projecting and retracting said cutter.

5. A flue-cutter comprising a housing having a neck formed with channels, a rotary valve removably secured to the neck of said housing and having inlet and outlet ports alternately registering with the respective channels thereof, a casing formed with apertures to receive a motive fluid from said channels, a piston slidable in the casing, a mandrel rotated by said casing, a cutter slidable in said mandrel, means actuated by said piston for projecting and retracting said cutter.

6. A flue-cutter comprising a housing formed with a neck having channels, a rotary valve comprising an inner shell formed with inlet and outlet ports adapted to alternately register with the respective channels, a shell fixed to said neck and inclosing the first shell, and an outer shell connected to said inner shell, a casing rotatable in said housing and being formed with apertures to receive a motive fluid from said channels, a piston slidable in the casing, a mandrel rotated by said casing, a cutter slidable in the mandrel, and means actuated by the piston for sliding said cutter.

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

JOHN W. DOYLE.

Witnesses:
S. C. FREELS,
JAS. MACKNIGHT.