(No Model.)

E. PEMBER.

BOILER FLUE CUTTER.

No. 523,370. Patented July 24, 1894.

Fig. 1.

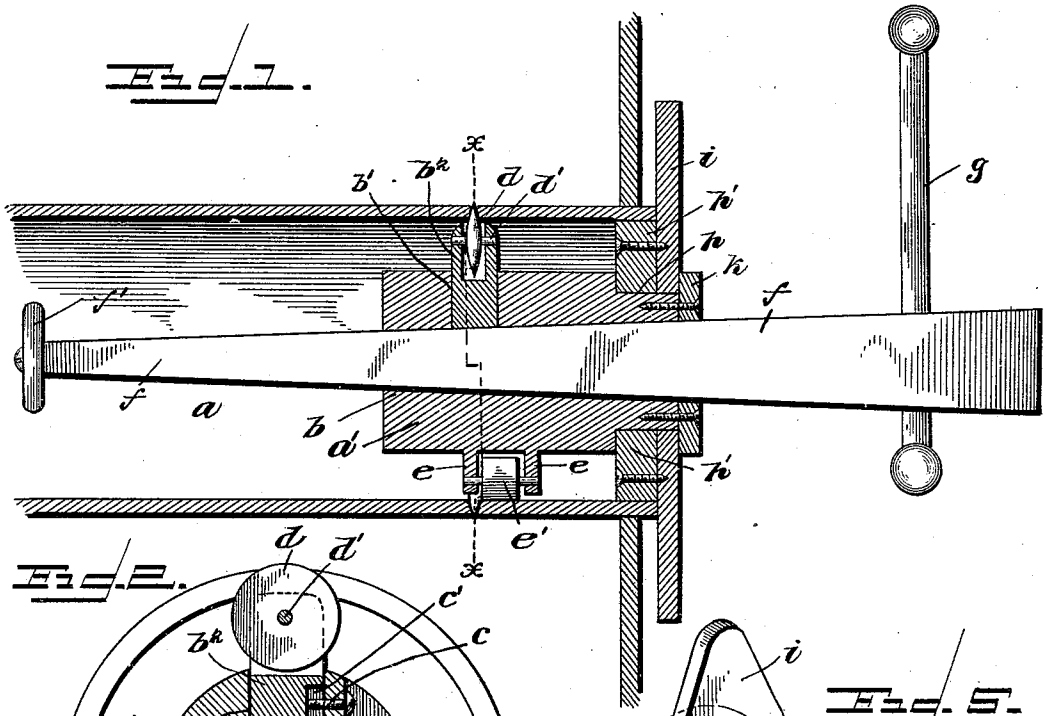


Fig. 2.

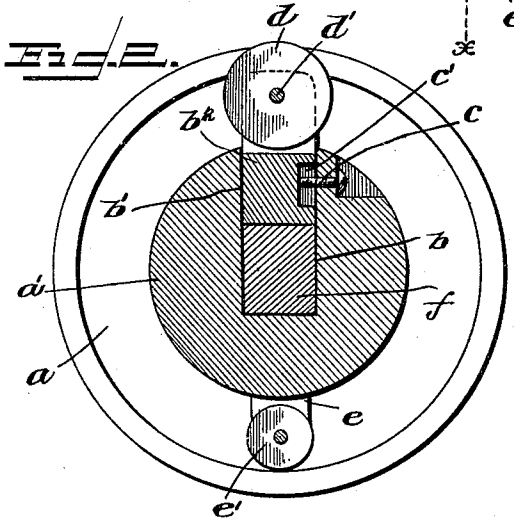


Fig. 5.

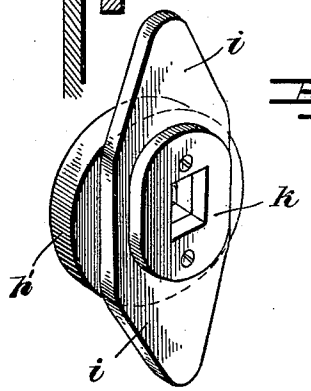


Fig. 3.

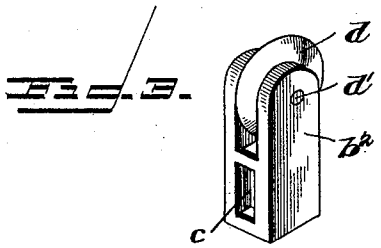
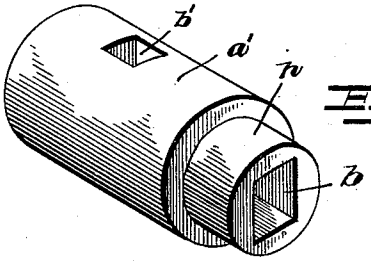


Fig. 4.



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ELBA PEMBER, OF PEMBERVILLE, OHIO.

BOILER-FLUE CUTTER.

SPECIFICATION forming part of Letters Patent No. 523,370, dated July 24, 1894.

Application filed February 16, 1894. Serial No. 500,384. (No model.)

To all whom it may concern:

Be it known that I, ELBA PEMBER, a citizen of the United States, residing at Pemberville, in the county of Wood and State of Ohio, have invented a new and useful Boiler-Flue Cutter, of which the following is a specification.

My invention relates to an improvement in those tube cutters which are adapted to cut out the flues of boilers while in place; and my principal object is to so improve the construction of such devices that they will be more efficient and easy to use, and at the same time to increase their simplicity, thereby reducing their cost and the liability of their becoming broken or disarranged.

To these ends the invention consists of certain improved features of construction and combination and arrangement of parts that will be more fully described hereinafter and finally embodied in the claims.

In the accompanying drawings:—Figure 1 represents a longitudinal section of my appliance in use. Fig. 2 is a section on the line *x*—*x* of Fig. 1. Fig. 3 is a detail perspective view of the cutting device. Fig. 4 is a similar view of the body or main portion of the appliance. Fig. 5 is a detail perspective view of the plates for regulating the distance which the appliance should enter the flue.

The reference letter *a* indicates the flue in connection with which my appliance is shown, and *a'* the body or main portion of the cutter. This consists of a cylindrical casting having a longitudinal passage *b* therein. Passage *b* is rectangular in cross section, and tapers from the outer end as shown in Fig. 1.

Formed in the side of the body *a'* and extending at right angles to the passage *b* is a smaller passage *b'*, in which the cutter block b^2 is arranged so as to be capable of a limited independent and longitudinal movement therein, its movement being restricted by the screw-pin *c*, which extends into the body *a'* and operates with the groove *c'* in the block b^2.

The cutter block b^2 is bifurcated at its outer end, and has arranged between its arms the disk cutter *d*. This cutter is provided with the stout spindle *d'*, whereby it is revolubly mounted. Formed integral with or rigidly secured to the body *a'* on the side opposite that which has the cutter *d*, are the two lugs or projections *e*, between which the roller *e'* is journaled. This roller *e'* is adapted to bear against the inner side of the flue and to hold the cutter *d* in engagement therewith, as will be more fully described hereinafter.

f indicates a tapering rectangular bar, which is largest at its outer end and which is adapted to fit within the passage *b* of the body portion *a'*. This bar is provided at its inner end with a button *f'*, which prevents it from being withdrawn from the body portion, while its outer end is provided with the operating handle *g*. By means of this latter device the bar is revolved.

The outer end of the body *a'* is formed with a rabbet-groove *h*, therein, and this is adapted for the reception of the ring *h'*, which is of a diameter equal to the interior diameter of the flue, and adapted to fit snugly therein. This ring has a broadened periphery, and by its means the body is held squarely and prevented from playing laterally in the flue. Secured to the outer surface of the ring *h'* is an elliptical plate *i*, which is adapted to bear against the end of the flue and thus prevent the appliance from entering the flue too far, while by means of the binding-plate *k* the ring and plate are held in place.

To use my device for cutting out the flues of boilers, the bar *f* is drawn out of the body *a'* until the button *f'* engages the end of the body and prevents further movement. The cutter-block b^2 is then allowed to drop as far into the recess or passage *b'* as possible, whereupon the device is inserted into the flue as far as the plate *i* will admit, and the bar *f* driven into the body. This latter operation, driving the bar *f*, will result in the outward movement of the cutter-block b^2 and its cutter *d*, and this movement will be stopped by the engagement of the cutter with the interior of the flue. The bar *f* is then revolved, which will be followed by the revolution of the body *a'* and cutter *d*, and a consequent cutting of the flue. As the cutter *d* enters the side of the flue, the bar *f* is pushed up so as to take up the space left by the outward movement of the block b^2, and so the device is operated until the flue is entirely cut through. When this has been done the bar *f* is withdrawn until the button *f'* stops fur-

ther movement, and the entire device may then be withdrawn.

By means of my invention old and worn-out flues may be removed from the boilers with greater facility than ordinarily and owing to the simplicity of the device, there is little danger of the parts becoming disarranged or broken.

The groove or reduced portion *h* of the main portion or body *a'* forms the journal to permit free rotation of said main portion or body within the ring *h'*, whereby said ring may be fitted tightly in the end of the flue, and inasmuch as said ring is removably attached to the main portion or body, it is obvious that in case it is found necessary it may be replaced by a larger or smaller ring to fit flues of different sizes. The elongation of the plate *i* causes it to project beyond the periphery of the ring *h'* in opposite directions from the axis of rotation of the main portion or body *a'*, and in applying the apparatus to a flue, these projecting portions or extensions of the plate *i* form handles by which the ring *h'* may be forced snugly into the end of the flue. Inasmuch as the projecting ends or extensions of the plate *i* bear against the end of the flue and thus limit the inward movement of the ring *h'*, the side portions of said plate may be cut away as shown in Fig. 5 to enable the operator to observe when the ring *h'* is properly fitted within the flue. In applying the device as above stated, the operator may grasp the projecting ends or extensions of the plate *i* and by turning the same insure a proper and firm seating of the ring *h'*. It will be seen furthermore, that inasmuch as the main portion or body, the ring *h'*, the plate *i*, and the cap *k* are constructed separately and subsequently assembled, an injured part may be replaced without necessitating the abandonment of the entire device. It will also be seen that the pressure-roll *e'* does not follow precisely in the path of the cutting disk, but is arranged outside of said path, the inner side of the roll being approximately flush with the path of the cutter, and therefore any expanding effect which said roll may have during the process of cutting a flue does not affect the body portion of the flue, but is sustained entirely by the end of the flue which is being detached. Thus, after the detachment of the end the body portion of the flue may be again used if desired, and there is no extended terminal to interfere with the insertion thereof in an opening in a flue-sheet.

Having thus described my invention, I claim—

1. In a device of the class described, the combination with a ring adapted to be fitted within the end of a flue, an elongated plate secured to the outer surface of said ring and having projecting ends to extend beyond the sides of the flue to facilitate a seating of the ring, a main portion or body revolubly fitted in aligned openings in said ring on the plate, means for preventing longitudinal movement of the main portion or body in said openings, a roller carried by the main portion or body to bear against the inner surface of the flue, a cutter-block slidably fitted in radial guide-openings in the main portion or body and provided with a cutting disk adapted to bear against the inner surface of the flue at a point diametrically opposite to the point of contact from that of said roller, and a tapered bar fitting in a correspondingly shaped axial opening in the main portion or body and adapted to engage the inner end of said cutter-block to extend the latter as the cutting operation proceeds, substantially as specified.

2. In a device of the class described, a main portion or body provided with an axial tapered opening and a reduced upper end and having a radial guide opening communicating with said axial opening, a roller carried by said main portion or body, a cutter block slidably fitted in said radial opening, a ring *h'* adapted to fit in the end of a flue and having a central opening fitted upon the reduced outer end of the main portion or body, an elongated plate *i* secured to said ring and having a central opening fitted upon the reduced end of the main portion or body with its outer surface flush with the extremity of said main portion or body, a cap removably secured to said extremity of the main portion or body to hold said elongated plate and ring in place thereon, and a tapered bar fitting in said axial opening of the main portion or body and adapted to engage and extend the cutter block as the cutting operation proceeds, substantially as specified.

3. In a device of the class described, the combination with a rotatable main portion or body, and means for mounting the same in a flue, of a pressure-roll carried by the main portion or body, an adjustable cutter-block mounted in a guide-opening in the main portion or body and carrying a cutting disk, said pressure-roll and cutting disk being so disposed relatively that the path of the cutting disk is adjacent to the inner end of the pressure-roll, whereby the pressure-roll bears upon the interior surface of that portion of a flue which is to be detached to avoid expanding the adjacent portion of the main body of the flue, and means for extending the cutter-block, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ELBA PEMBER.

Witnesses:
THOMAS J. LAKE,
AARON VAN ELTEN.