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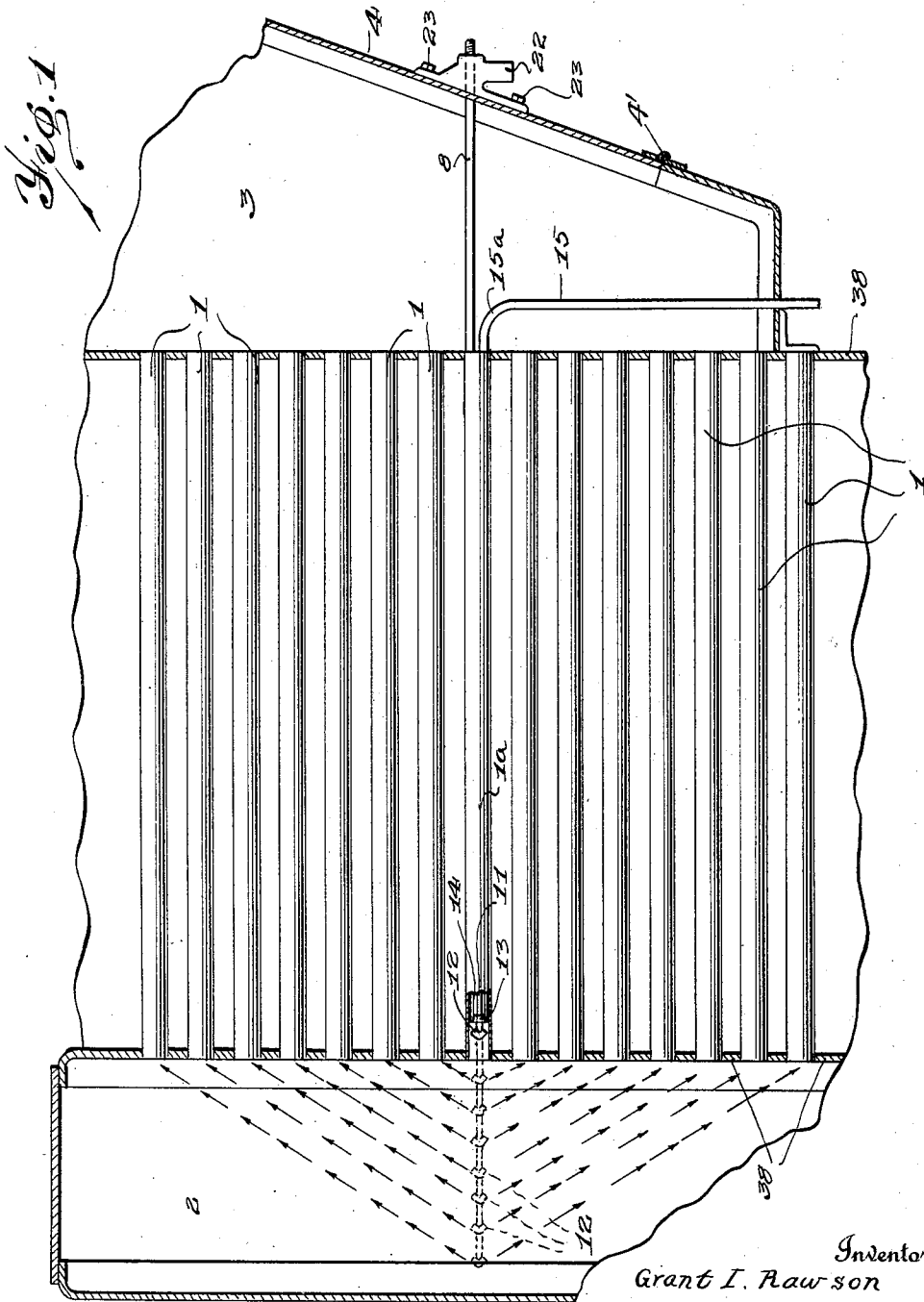
G. I. RAWSON

1,807,255

SOOT BLOWER

Filed April 24, 1922

3 Sheets-Sheet 1



By Whittemore, Fullcut, Whittemore, & Belknap  
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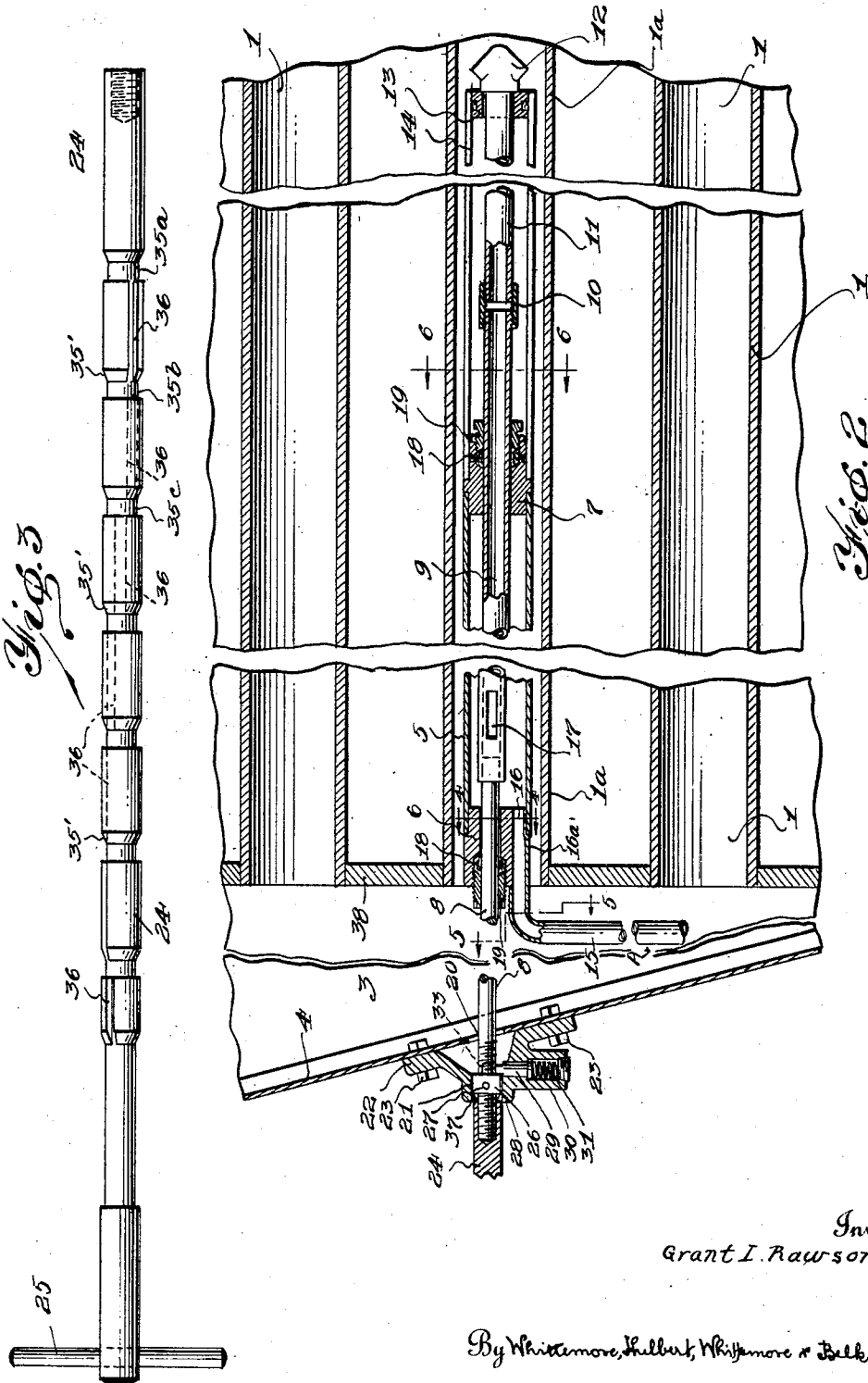
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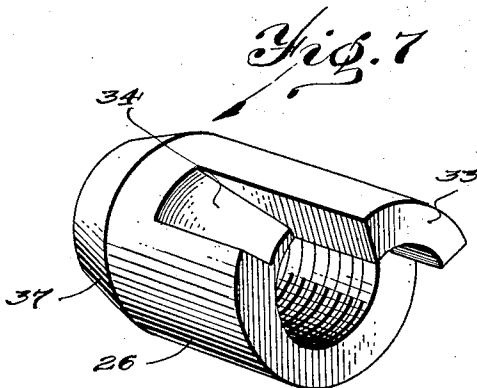
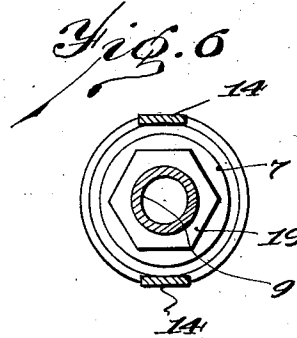
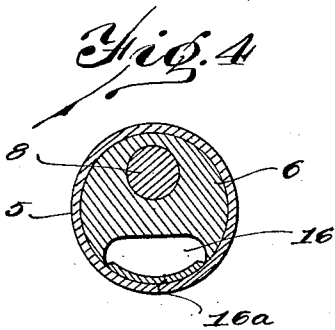
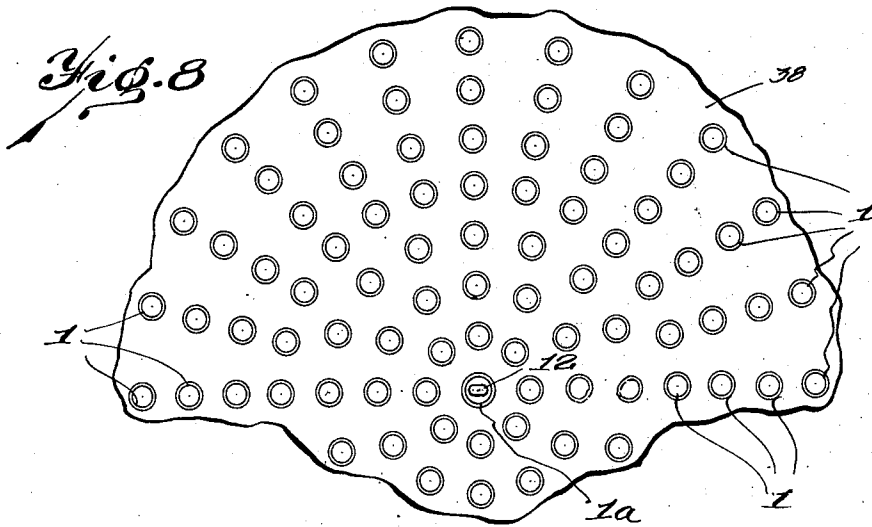
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## UNITED STATES PATENT OFFICE

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## SOOT BLOWER

Application filed April 24, 1922. Serial No. 556,308.

This invention relates to boiler cleaners and more particularly to boiler cleaners employing a nozzle adapted both for reciprocatory and rotatable movement.

It is an object of the invention to provide a boiler cleaner of the specified type in which positive provision is made for determining consecutive positions of reciprocation of the nozzle and for compelling a definite rotation of the nozzle in such positions. A further object is to positively prevent rotatable actuation of the nozzle in any position of reciprocation intermediate said predetermined rotatable positions.

The invention consists further in a novel provision for maintaining the fluid supply to the nozzle in its various positions of use.

In the drawings:—

Figure 1 is a longitudinal vertical sectional view showing the improved blower in its application to a tubular boiler of the Scotch marine type;

Figure 2 is a view showing the blower unit, in side elevation and partial section, in its position of use in a boiler tube;

Figure 3 is a view in elevation of the actuating member for the blower;

Figures 4, 5 and 6 are cross sections taken respectively on lines 4—4, 5—5 and 6—6 of Figure 2;

Figure 7 is a perspective view of a collar which forms a control element of the blower;

Figure 8 is a view showing the relation of the blower nozzle to the flue sheet in which the fire tubes open.

In these views, 1 designates the fire tubes of a Scotch marine boiler communicating at their ends respectively with the combustion chamber 2 and smoke box 3, the latter provided with the usual door 4 hinged as at 4'. The hereindescribed blower is disposed within a fire tube 1<sup>a</sup>, which occupies, preferably, a substantially central position with respect to the remaining tubes. Said blower comprises a pipe 5 adapted to fit freely within the front portion of the tube 1<sup>a</sup>. In the ends of the pipe 5 there are fixedly inserted forward and rear plugs 6 and 7, and a rod 8 passing slidably through the plug 6 and a tube 9 slidably engaging the plug 7 are rigidly

connected within said pipe. This connection is established, preferably, by inserting the rod a short distance within the tube, and brazing or similarly securing the engaged portions. The rear end of said tube is connected by a suitable coupling 10 with a tubular extension 11 which terminally carries a nozzle 12 in the form shown being a double nozzle, the outlets of which as shown, open back to discharge against the forward flue sheet at opposite inclinations to the axis of the blower although various combinations of outlets could be employed. Adjacent said nozzle, the extension 11 slidably engages a guide collar 13 which is secured to the plug 7 by a pair of bars 14 arranged to securely connect 7 and 13. Steam is delivered to the pipe 5 by a pipe 15 opening into a passage 16 in the lower portion of the plug 6 and rigidly secured to said plug by a tongue 16<sup>a</sup>. From the pipe 5 the steam is free to enter the tube 9 by way of a port 17 in the forward portion of the latter, said tube and its extension 11 delivering the steam to the nozzle 12. To prevent a leakage of steam from the pipe 5 around the rod 8 and tube 9, as they pass through the plugs 6 and 7, packing rings 18 are arranged within said plugs to snugly embrace said rod and tube, and are maintained under suitable compression by glands 19. Owing to the presence of the steam passage 16 in the lower portion of the plug 6 it is necessary to pass the rod 8 through the upper portion of said plug. Said rod 8 and the tube 9 and its extension 11 are consequently slightly inclined downwardly as they extend rearwardly so that said tube may centrally engage the plug 7.

The rod 8 passes through the smoke box 3 and through an aperture 20 formed in the door 4. Said rod further is adapted to project through a central opening 21 in a plate 22 exteriorly secured to the door 4 by bolts 23 or other suitable means. The forward end portion of said rod is threaded for detachable engagement by the aligned elongated stem 24 of an actuating member provided upon its forward end with oppositely projecting handles 25 which serve both to apply rotation and reciprocation to the actuating

member. The threaded forward portion of the rod 8 is furthermore engaged by a collar 26 which is fixed upon said rod, as by a set screw 27 and which when the unit is out of use, is disposed, (as shown in Figure 2), within a housing 28 integral with the plate 22. Said collar coacts with a plunger pawl 29 when the blower unit is out of use to prevent any accidental or improper forward shifting of the reciprocatory parts. Said pawl is mounted within a downward cylindrical extension 30 of the housing 28 and is upwardly urged by a coiled spring 31, so as to normally project said pawl into the path of the collar 26. When the blower is retracted and the actuating member is being screwed upon the rod 8 to adapt the blower for use, a lug 33 projecting rearwardly from the collar 26, is engageable, through a slight angular movement of the blower, with the pawl 29 to hold the rod 8 against further turning. Such engagement of the lug 33 and pawl 29 registers a beveled portion 34 at the rear extremity of the collar 26 with said pawl, so that, forward pressure exerted through the actuating member upon the reciprocating parts, will cause the beveled face 34 to depress the pawl, thus permitting the initial projecting movement of said reciprocating parts.

At predetermined spaced intervals, the stem 24 is formed with a series of annular grooves 35<sup>a</sup>, 35<sup>b</sup>, 35<sup>c</sup>, etc. which are connected by longitudinal channels 36 similarly offset circumferentially from end to end of the series. The rear wall of each groove 35 is beveled, as indicated at 35', and the forward face of the collar 26 is similarly beveled, as indicated at 37.

Considering now the operation of the described blower unit, it is to be understood first that in the normal or stored position of the unit the nozzle 12 is disposed within the fire tube 1<sup>a</sup>, slightly back from the rear end thereof, being thus protected from the high temperature prevailing within the combustion chamber. To put the blower into use, the actuating member is first applied by screwing the stem 24 thereof upon the forward end of the rod 8. The latter in the stored position of the blower projects some distance forwardly from the plate 22 (see Figure 2). When the actuating member has been thus applied, steam is turned into the delivery pipe 15 being delivered therefrom to the pipe 5 thence to the tube 9 by way of port 17, and through said tube and its extension to the nozzle. The unbalanced pressure of the steam upon the nozzle is sufficient to substantially counteract the frictional resistance arising from the packed bearings engaging the rod 8 and tube 9 within the plugs 6 and 7, so that very slight effort is sufficient to project the nozzle. In screwing the stem 24 upon the rod 8, the

latter will be turned sufficiently to engage the lug 33 with the pawl 29 and since under these conditions the beveled face 34 registers with said pawl, the initial projecting movement may be effected as soon as the actuating member has been attached. The first position of use of the nozzle is established when the projecting movement has registered the pawl 29 with the first annular groove 35<sup>a</sup>. Before further projecting the nozzle, the operator is now required to rotate the actuating member (and consequently the nozzle) through substantially a full revolution until the pawl 29 has been registered with the channel 36 which extends forwardly from said groove 35<sup>a</sup>. Only by deliberate turning of the actuating member in the wrong direction may this requirement be avoided. This permits the reciprocating parts to be advanced another step until the pawl 29 enters the second groove 35<sup>b</sup>. The blower is now actuated again through substantially a complete revolution until the next channel 36 is registered with the pawl 29. Thus there is effected a succession of alternating rotary and reciprocating movements of the nozzle, predetermined by the location of the grooves 35<sup>a</sup>, 35<sup>b</sup>, etc. and channels 36 in the stem 24, and the resulting rotatable positions of the nozzle are such as to register the discharging jets of cleaning fluid with successively enlarged circles of fire tube openings in the flue sheet 38. The rotatory actuation in each position of the nozzle should of course, be sufficiently gradual to effect an adequate delivery of the cleansing fluid (ordinarily steam) to all of the tubes to be cleaned. Having thus completed the cleaning operation, the operator returns the blower to its stored position by a direct forward movement, no opposition to said movement being offered by the pawl 29 since the same rides upon the beveled faces 35' and 37.

It is to be observed that in all position of reciprocation of the described blower, a supply of the cleansing fluid to the nozzle is maintained through the port 17, the length of the pipe 5 being adequate to maintain communication with said tube by said port in all of such positions. When the door 4 is to be opened, it is necessary only to slightly rotate the blower by means of the projecting end of the rod 8, registering the beveled face 34 of the collar 26 with the pawl 29, so that the latter may ride upon said face. Rod 8, with collar 26 may now be pushed inwardly a sufficient amount to permit the door 4 to open readily.

It is, of course, to be understood that the actuating member 24, 25 is applied to the blower only during use of the latter.

It is a feature of the invention that the operation of attaching the actuating member accomplishes a release of the reciprocating parts from the locking means (collar 26 and

pawl 29) whereby said parts are normally restrained from accidental shifting and similarly in unscrewing the handle, turning of the rod 8 is prevented by said collar 26 and pawl 29 after the same have been established in a locking relation.

What I claim as my invention is:—

1. In a boiler cleaner, the combination with a reciprocatory and rotatable nozzle, of an actuating member therefor freely movable between its limits of reciprocation in one direction, and means coacting with said actuating member to permit rotation at predetermined points only of reciprocatory travel in the other direction.

2. In a boiler cleaner, the combination with a reciprocatory and rotatable nozzle, of an actuating member therefor comprising a stem formed with a plurality of spaced circumferential grooves and having circumferentially offset longitudinal channels connecting said grooves, and a pawl engaging in said grooves and channels during projection of the nozzle to permit a predetermined rotation of the nozzle at predetermined points in the projecting movement thereof.

3. In a boiler cleaner, the combination with a reciprocatory and rotatable nozzle, of an actuating member therefor, comprising a stem formed with a plurality of spaced circumferential grooves, each having a correspondingly beveled edge and having circumferentially offset channels connecting said grooves, and a pawl yieldably engageable in said grooves and channels to permit a predetermined rotation of the actuating member at predetermined points in its projecting movement, said pawl riding upon said beveled edges during the retractive actuation of the nozzle.

4. In a boiler cleaner, the combination with a reciprocatory and rotatable nozzle, of a member rigidly connected with the nozzle for movement therewith, said member having a lug projecting toward the nozzle and having an adjacent beveled face, a pawl yieldably urged toward the axis of said member, coacting with said member to normally maintain the retracted position of the nozzle, and coacting in said position with said lug to limit rotation of the nozzle, the beveled face of said member being adapted to ride on said pawl to retract the same and permit projection of the nozzle when said lug engages the pawl.

5. In a boiler cleaner, the combination with a reciprocatory and rotatable nozzle normally stored and having a series of projected positions of use, an actuating member for said nozzle, and means compelling rotative actuation in alternation with projecting movements of the nozzle to predetermine said successive positions of use of the nozzle.

6. In a boiler cleaner, the combination with a reciprocatory and rotatable nozzle, of

an actuating member therefor comprising a stem formed with a plurality of spaced circumferential grooves and having circumferentially offset channels connecting said grooves, and a pawl yieldably engageable in said grooves and channels to permit a predetermined rotation of the actuating member at predetermined points in its projecting movement, one of the faces of said pawl and of each groove engaging the same during retraction of the nozzle being bevelled to permit said faces to ride freely one on the other during such retraction.

7. In a boiler cleaner, the combination with a reciprocatory and rotatable nozzle within a boiler, of an actuating member for said nozzle projecting exteriorly of the boiler in the retracted position of said nozzle, and means coacting with said member to definitely determine rotative positions of the nozzle spaced in the direction of its reciprocation.

8. In a boiler cleaner, the combination with a reciprocatory and rotatable nozzle, an actuating member therefor, adapted to reciprocate and to rotate said nozzle, and means co-acting with said actuating member to permit rotation of said nozzle at predetermined points only of the reciprocatory travel of said nozzle.

9. In a boiler cleaner, the combination with a nozzle adapted in actuation to be both rotated and moved longitudinally, of means periodically limiting longitudinal movement of said nozzle to compel a rotation thereof during its cycle of longitudinal movement.

10. In a boiler cleaner, a blower mounted for rotative movement and for longitudinal movement to spaced blowing positions, means for imparting both of said movements to said blower, and means guiding the movement of said blower and providing for rotation of said blower without longitudinal movement thereof in one blowing position and for a longitudinal movement of said blower from this blowing position to a second blowing position, said last mentioned means including a member movable with said blower and having spaced circumferential grooves and a longitudinally extending groove connecting said circumferential grooves, and a second member fixed against movement with said blower and engageable in the said grooves.

11. In a boiler cleaner, a blower mounted for rotative and longitudinal movement, means for moving said blower, and means guiding the movement of said blower and providing for rotation of said blower without longitudinal movement thereof at spaced points and for a longitudinal movement of said blower from one of said points of rotative movement to a second point of rotative movement, said last mentioned means

including a member movable with the blower  
and having spaced circumferential grooves  
and a longitudinally extending groove con-  
necting said circumferential grooves, a pin  
fixed against movement with said blower,  
5 and means yieldably urging said pin in en-  
gagement with said grooves.

In testimony whereof I affix my signature.  
GRANT I. RAWSON.

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