No. 677,119. Patented June 25, 1901.

H. H. CRAMER.

BOILER FLUE CLEANER.

(No Model.) (Application filed July 13, 1900.)

2 Sheets—Sheet 1.

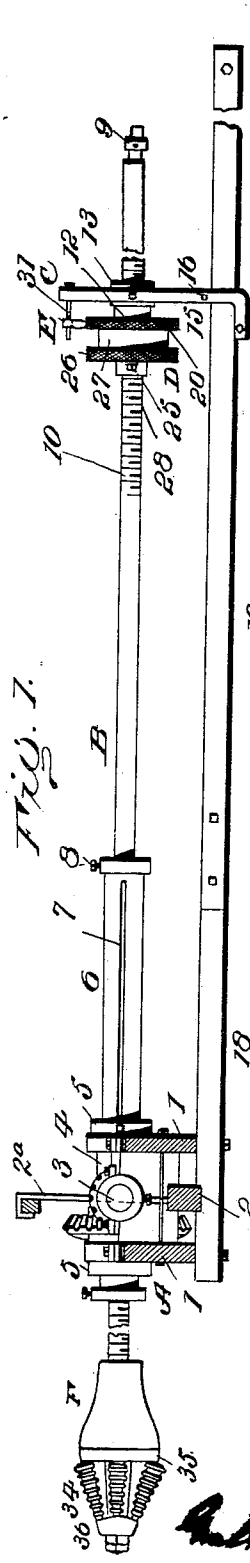

Fig. 1.

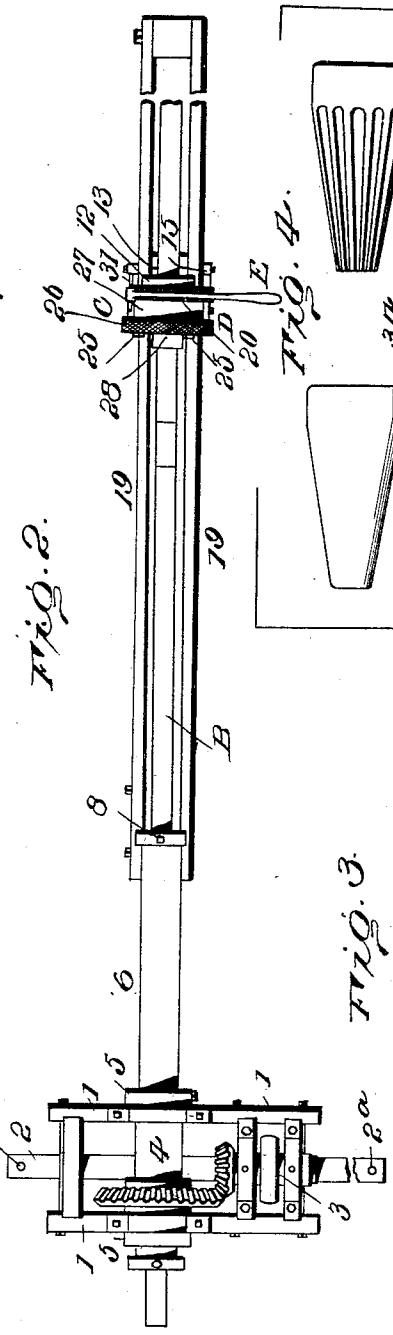

Fig. 2.

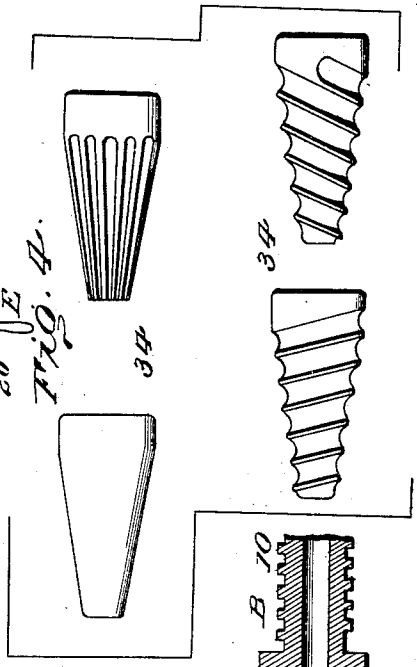

Fig. 4.

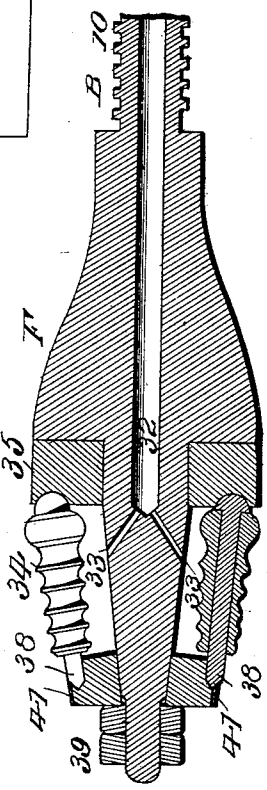

Fig. 3.

Witnesses:

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(No Model.) 2 Sheets—Sheet 2.

Fig. 10.

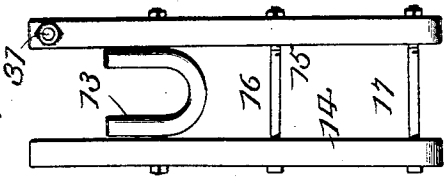


Fig. 6.

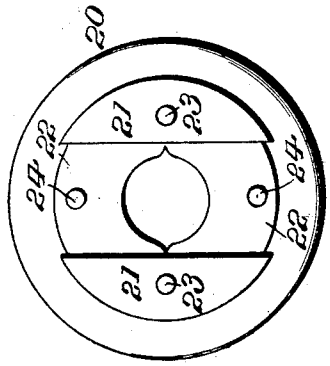
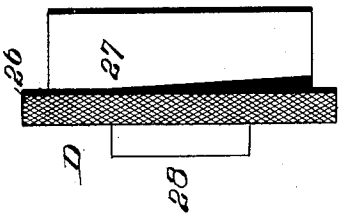


Fig. 9.



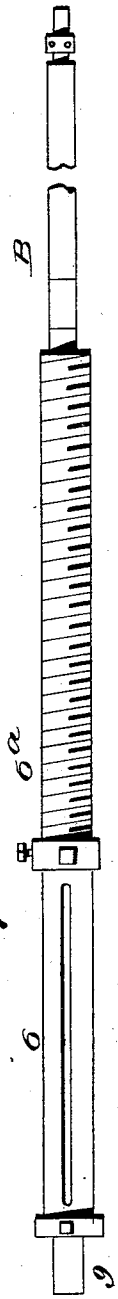


Fig. 11.

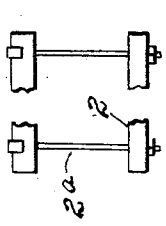


Fig. 8.

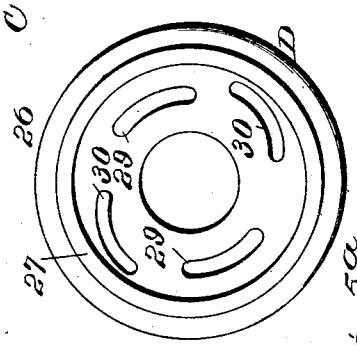


Fig. 5.

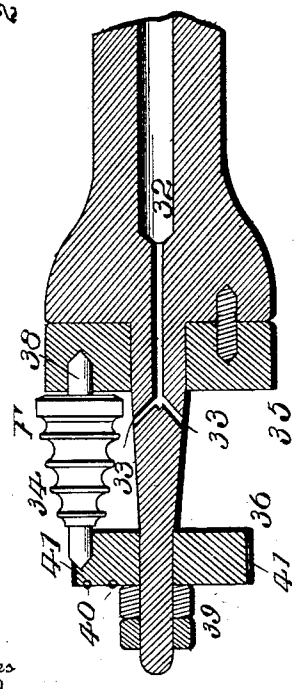
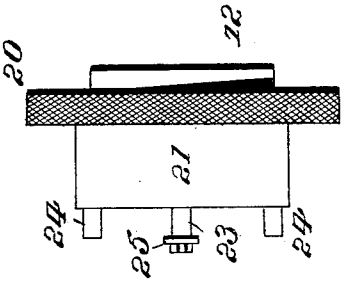


Fig. 7.



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Witnesses

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UNITED STATES PATENT OFFICE.

HERBERT H. CRAMER, OF VICTOR, COLORADO.

BOILER-FLUE CLEANER.

SPECIFICATION forming part of Letters Patent No. 677,119, dated June 25, 1901.

Application filed July 13, 1900. Serial No. 23,512. (No model.)

To all whom it may concern:

Be it known that I, HERBERT H. CRAMER, of Victor, in the county of Teller and State of Colorado, have invented certain new and useful Improvements in Boiler-Flue Cleaners; and I do hereby 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.

This invention relates to boiler-flue cleaners.

The primary object is to provide a simple and inexpensive supporting-frame by the adjustment of which the cleaner can be given the proper inclination relative to the tubes.

A further object is to provide simple means for regulating the feed and also for taking up the thrust of the feed-rod.

A further object is to provide an improved boring or drilling head and means for supplying water to the working parts thereof while in operation.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in side elevation showing the feed-rod, its actuating mechanism, and the supporting-frame. Fig. 2 is a plan view of the same parts. Fig. 3 is an enlarged view in section of the drill-head and its rolls. Fig. 4 shows various forms of the rolls. Fig. 5 shows a slight modification of the drill-head. Fig. 5ª is another slight modification. Fig. 6 is a face view of the feed-regulator. Fig. 7 is a side view of Fig. 6. Fig. 8 is a face view of the adjusting-head of the regulator. Fig. 9 is a side view of Fig. 8. Fig. 10 is a rear view of the regulator-frame. Fig. 11 shows means for adjusting the supporting-frame, parts being broken away.

Referring to the drawings, A designates the frame for supporting the operating mechanism, including the feed-rod. It is shown composed of suitably-connected parallel sides 1. It is adjustable longitudinally upon a timber 2, which latter is suspended in position by any suitable means, such as rods 2ª, fitted in holes in the ends of the timber. By raising or lowering the frame on the suspending-rods and also by shifting it on timber 2 the frame may be moved into any desired position in relation to the end of a boiler. Within frame A is mounted the driving-shaft 3, which is geared to a driven shaft 4, held in place by collars 5. Through the shaft 4 is passed a tubular sleeve 6, having longitudinal slots 7 to accommodate suitable splines (not shown) within shaft 4, which splines permit of the longitudinal movement of sleeve 6 and effect the rotation of the latter with the shaft 4.

B is the feed-rod, which is made hollow throughout its length and extended through the sleeve 6, which latter is made fast to the former by screws 8. The feed-rod has a sleeve 9, projecting from its rear end, for the reception of a hose (not shown) for supplying water to the drill-head, mounted on the other end of said rod. Throughout a portion of its length the feed-rod B is screw-threaded, as at 10, upon which threaded portion is located a feed-regulator C, or such thread may be formed on an extension of sleeve 6, as shown at 6ª, Fig. 5ª, which extension may be part of or separate from and secured to said sleeve. The regulator C has a projecting hub 12, which fits within a U-bar 13, pivotally hung between the side bars 14 of a frame 15. These side bars are of approximately L shape and are connected together by upper and lower cross-rods 16 and 17.

Projecting from the under side of frame A is a timber 18, to which are secured two parallel bars 19, all of which form an extension of frame A. This extension is projected through frame 15, the cross-rods 16 and 17 being so positioned that one will be above and the other below the extension-bars 19. In this way the thrust of the feed-regulator against the frame 15 is taken up by the frame extension—that is, as the regulator bears against frame 15 the latter retains its proper position by the binding action of its cross-rods 16 and 17 against the top and bottom of the extension.

The feed-regulator C has on that side of its flange 20 opposite to the hub 12 two curved flanges 21, between which are placed the two sections of a split nut 22, having threaded recesses to accommodate the threaded portion 10 of the feed-rod. From the flanges 21 and sections of nut 22 project lugs 23 and 24, re-

spectively, the former, 23, being threaded to receive nuts 25. The adjusting-head D of this regulator C is formed on one side of its flange 26 with a ring 27 and on the opposite side with a hub 28, said ring being designed to encircle and inclose the flanges 21 and the interposed split nut 22. In flange 26 are formed two concentric slots 29 and two eccentric slots 30, the former accommodating the lugs 23 and the latter the lugs 24. Hence by turning the adjusting-head D the split nut may be moved into or out of engagement with the thread of rod B, the sections of the nut sliding inwardly and outwardly between the flanges 21. The peripheries of the flanges of the regulator and its adjusting-head are milled. The regulation of the feed may be accomplished by holding the regulator as against turning with rod B by hand or by a brake, which latter is shown as consisting of a rod E, pivoted at its outer end on a stud 31 of frame 15. If a coarse feed is desired, the regulator is held sufficiently tight to prevent its turning, while for a finer feed the hold or pressure on the regulator is lessened, so that it may slip enough to give the desired feed.

Suitably coupled to the forward end of the feed-rod B is the drill-head F, which is shown as formed with a central bore 32, terminating in lateral outlets 33, said bore being coincident with that of the feed-rod for supplying water to the drill-rolls 34. These rolls are mounted between disks 35 and 36. They are loose on axle-pins 38, set at an angle to the axis of the drill-head. I prefer to have the axle-pins 38 formed with rounded heads and pointed ends, held in position by the disks and binding-nuts 39. By mounting the rolls at an angle to the axis of the drill-head the pressure is against the forward tapered ends of the pins, and in this way the drilling is quickly effected. Various forms of tapered grinding-rolls may be employed. In Fig. 4 plain, fluted, and spirally-grooved rolls are shown. Instead of mounting these rolls at an angle to the axis of the drill-head they may be so arranged in parallelism to the latter, as shown in Fig. 5. As shown in Figs. 3, 4, and 5, the various forms of rolls are made smooth at their rear ends to the end that as the cutting edges complete their work no injury will be done to the flues. In Fig. 5 I have indicated the disk 36 as provided with diamond cutting-points 40 to aid in drilling the incrustation where it is too thick to permit of the entrance of the rolls and disk. When the diamonds are employed, the disk 36 is formed with peripheral cut-outs 41, Fig. 5, to permit of the passage of water to the front of such disk.

The end of the drill-head adjoining disk 35 is expanded so that its periphery will be flush with such disk to prevent injury to the ends of the flues as the drill reaches the full limit of travel. By arranging the rolls in opposite pairs—that is, employing four rolls—one pair of rolls counteracts the strain put upon the flue by the other pair.

In practice the main supporting-frame is adjusted in position with the view of presenting the drill-head and its feed-rod coincident with each tube to be drilled. In that class of boilers wherein tubes are set on an incline the proper inclination is given the feed-rod and drill-head by raising the rearward end of the frame extension. In this way the drill-head will bore partly through the tube without injury to the latter, it being understood that the construction and arrangement of the drill-rolls are such that with the feed-rod in proper line such rolls will act only on the incrustation within each tube. Power is imparted to the driving-shaft by any suitable means and is communicated to the driven shaft, which in turns acts upon the sleeve 6, secured to the feed-rod, the connection between said sleeve and driven shaft being such as to permit of the longitudinal movement that the feed-rod requires. The feed-rod is maintained in proper position in relation to the frame extension by its regulator being supported by and bearing against the frame 15. The extent of the feed is controlled by this regulator. During the action of the drill-rolls water is supplied through the feed-rod to said rolls, passing outwardly to the rolls through the lateral outlets 33.

I claim as my invention—

1. In a boiler-flue cleaner, the combination of a frame, a hollow shaft mounted on said frame, operating mechanism mounted on said frame for rotating such shaft, means for adjusting the position of the frame, the hollow shaft and the operating mechanism in relation to the end of a boiler, a drill-head, a feed-rod therefor passed through and having a longitudinal sliding connection with said shaft, a feed-regulator on said rod, and a second frame carried by said former frame supporting said feed-regulator, substantially as set forth.

2. In a boiler-flue cleaner, the combination of a frame, operating mechanism mounted on said frame, an adjustably-supported member on which said frame is itself adjustable, an extension secured to said frame at one end and projecting rearwardly therefrom, a drill-head, a feed-rod therefor carried by said frame and designed to be operated by said operating mechanism, a feed-regulator on said feed-rod, and a second frame, mounted on said extension, in which said regulator works, said second frame taking the thrust of the feed-rod, substantially as set forth.

3. In a boiler-flue cleaner, the combination of a frame, a driving-shaft and a driven shaft, both mounted in said frame and having intermeshing gear-wheels, a sleeve fitted in said driven shaft, a drill-head, a feed-rod therefor extended through said sleeve, means for adjusting said frame vertically and horizontally in relation to the end of a boiler, a feed-regu-

lator on said feed-rod, and a second frame supporting said feed-regulator for taking the thrust of the feed-rod, substantially as set forth.

4. The combination with the operating mechanism, and a frame therefor, of a feed-rod operated by said mechanism and having a sliding movement in relation thereto, a drill-head, a feed-regulator on said rod, a second frame, and a swinging bearing for said regulator pivotally mounted in said frame, substantially as set forth.

5. The combination with the operating mechanism, and a frame therefor, having a rearward extension, of a feed-rod operated by said mechanism and having a sliding movement in relation thereto, a drill-head, a feed-regulator on said rod, a second frame having side bars and upper and lower cross-rods passed, respectively, above and below said extension, and a bearing for said feed-regulator mounted between said side bars, substantially as set forth.

6. The combination with the operating mechanism, and a frame therefor, having a rearward extension, of a feed-rod operated by said mechanism and having a sliding movement in relation thereto, a drill-head, a feed-regulator on said rod, a second frame on said rearward extension, a bearing for said regulator mounted in said second frame, and a brake pivoted to said second frame and designed to engage said feed-regulator, substantially as set forth.

7. The combination with the feed-rod, of a feed-regulator having a diametrical guideway, a split nut in said guideway, each section of said nut having a projecting lug, and an adjusting-head axially adjustable in relation to the regulator, said head having a ring inclosing said guideway and nut and also having two eccentric slots accommodating said lugs, substantially as set forth.

8. The combination with the feed-rod, of a feed-regulator having two spaced-apart flanges forming a guideway, a split nut in said guideway, said flanges and the sections of the nut having lugs projecting therefrom, an adjusting-head having a ring inclosing said flanges and nut and also having two sets of slots for said lugs, one set being concentric and the other eccentric, substantially as set forth.

9. In a boiler-flue cleaner, a drill-head, inner and outer disks thereon, and drill-rolls set on an incline between said disks, said rolls having cutting edges and rounded or smooth portion at their rear ends, said drill-head having an expanded portion flush with said inner disk, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HERBERT H. CRAMER.

Witnesses:
EDWARD E. BRUSOE,
WM. J. WASSER.