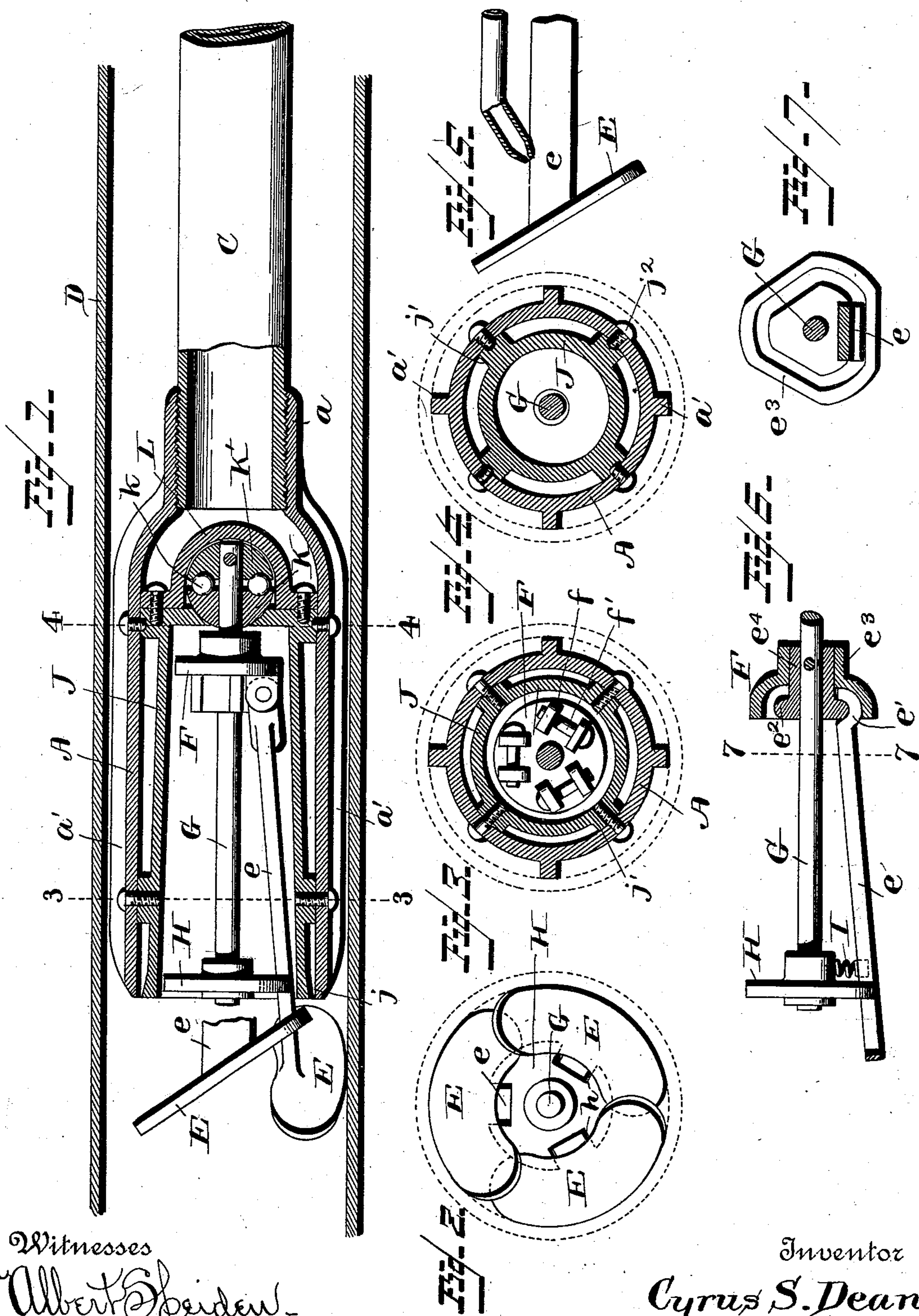


(No Model.)

C. S. DEAN.
BOILER FLUE CLEANER.

No. 507,421.

Patented Oct. 24, 1893.



Witnesses
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UNITED STATES PATENT OFFICE.

CYRUS S. DEAN, OF FORT ERIE, CANADA, ASSIGNOR OF ONE-HALF TO
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BOILER-FLUE CLEANER.

SPECIFICATION forming part of Letters Patent No. 507,421, dated October 24, 1893.

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To all whom it may concern:

Be it known that I, CYRUS S. DEAN, a subject of the Queen of Great Britain, residing at Fort Erie, in the county of Welland, Province of Ontario, Canada, 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 flue cleaners and aims to fill a long felt want in the provision of a device which can be conveniently and easily handled and which will render easy the heretofore laborious work of cleaning boiler tubes and facilitate the process of removing the soot and scale from the tube and prevent the banking of the loosened matter in front of the cleaning tool.

The invention consists of a shell to travel through the tube to be cleaned provided with a rotary cutter, the shell confining the steam, compressed air or other propelling media and provided with an escape which directs the propelling media on the wings or blades of the cutter to rotate the latter, the said propelling media escaping through the tube after rotating the cutter and carrying with it all the loose matter.

The invention also consists in outwardly moving wings or blades to fill the space of the tube and impinge against the inner sides thereof to remove all scale and foreign matter.

The invention further consists in a ball and socket joint between the stem carrying the rotary cutter and the shell whereby the said stem can adapt itself to the tube without frictional binding.

The invention also further consists of the novel features and the peculiar construction and combination of the parts which will be hereinafter more fully described and claimed and which are shown in the annexed drawings, in which—

Figure 1 is a central longitudinal section of a flue and tube cleaner embodying my invention showing the application of the same, one of the wings being removed and the arm of another being broken away. Fig. 2 is a front end view of the cleaner. Fig. 3 is a sec-

tion on the line 3 3 of Fig. 1 looking to the right. Fig. 4 is a section on the line 4 4 of Fig. 1 looking to the left. Fig. 5 shows a modification in which the jet strikes the wing at or about right angles. Fig. 6 shows a modification in which the wings or blades are moved outward by a spring pressure and a different way of pivotally connecting the arms of the said wings with the head. Fig. 7 is a cross section on the line 7 7 of Fig. 6 looking to the right.

The shell A is cylindrical and tapers at its inner or rear end to form the reduced portion α which is threaded to receive the tube C by means of which the cleaner is operated and supplied with steam, compressed air or other media for propelling the rotary cutter which hereinafter will be more particularly referred to. The shell A is generally constructed of less diameter than the tube for which it is designed and is provided on its exterior surface with longitudinal ribs a' which touch the inner sides of the tube to be cleaned and support the shell A within the said tube. These ribs a' also provide a space between the opposing sides of the tube D and the shell A for the passage of air around the said shell A thereby obviating the production of a vacuum in the rear of the said shell A the formation of which would interfere with the successful operation of the cleaner. These ribs a' serve to strengthen the shell A and relieve the frictional contact between the shell A and the tube D which would result if the shell A were of a size to fit within the tube D.

The rotary cutter is journaled within the shell A and the wings or blades E are adapted to project beyond the sides of the shell and engage with the inner side of the tube D to remove the soot and scale therefrom by direct action. These wings or blades E are set obliquely, as shown most clearly in Figs. 1, and 5, and curve in their circumferential length, as shown in Fig. 2, and have arms e by means of which they are pivotally connected to a head F. The head F is composed of a disk having a hub which is secured to a spindle G, and pairs of ears f between which the inner ends of the arm e are inserted and to which they are pivotally connected by means of pins f' . The outer end of the spindle G is pro-

vided with a guide H which in the present instance is composed of a disk having notches h in its edge to receive the arms e and permit of the latter having a limited movement whereby the wings or blades E are adapted to move outward to engage with the inner sides of the tube D. The wings or blades E are attached to the arms e midway of their length, and the said arms e have connection with the said blades at the inner edge, as shown most clearly in Fig. 1, thereby leaving the outer portion of the wings or blades unobstructed so as to be acted upon by the steam or other propelling media issuing from the shell A.

The wings E are adapted to move outward by centrifugal action in the rotation of the cutter, but a spring may be provided to press the same outwardly against the sides of the tube D whether the cleaner is in operation or not.

In Fig 6 a spring I is shown interposed between the guide H and the arm e as being the simplest form of arrangement. Obviously any form of spring that will effect the desired result may be employed and the same may be disposed as found most advantageous.

The purpose in having the wings or blades E to move outward is to have them adapt themselves to the size of the tube to be cleaned and yield when engaging with irregular portions in the tube as will be readily understood. Any form of construction that will admit of the outward movement of the blades or wings may be devised, but I prefer the arrangement herein shown and described because of the superior result. The arms e may be pivotally attached to the head F in any desired manner and require pins in the form shown in Figs. 1 and 3. As shown in Figs. 6 and 7 the pins are disregarded and hooks e' are provided at the inner ends of the arms e which are adapted to embrace a raised portion e^2 on a sleeve which is placed on the spindle G, and a sleeve e^3 encircles the inner sleeve and retains the hooked ends e' in engagement with the raised portion e^2 , the two sleeves e^3 and e^4 being suitably secured to the spindle G.

A shell J is located within the shell A and is of less diameter to provide a space between the opposing sides of the shells A and J for the passage of steam or other media for propelling the rotary cutter. This shell J tapers slightly in its length and its outer end flares slightly as shown at j to provide a narrow passage for the escape of the steam or other media and direct the same against the outer portions of the wings or blades E. The inner end of the shell J is closed and centrally apertured to permit the passage of the inner end of the spindle G. A ball and socket joint is provided between the inner end of the shell J and the inner end of the spindle G. The ball is composed of two halves K and K' which are provided in their opposing faces with a circumferential groove to receive

ball bearing k . The half K' is secured to the end of the spindle G and the half K is loosely mounted upon the said spindle G and obtains a bearing in a seat which is formed in the closed end of the shell J. A cap L is fastened to the closed end of the shell J and completes the socket for the ball at the inner end of the spindle G. The shell J is provided with projections j' , as shown in Figs. 1, 3 and 4, to engage with the inner side of the shell A and hold the shell J in proper relation thereto. The screws j^2 for securing the two shells A and J together pass through the shell A and enter the projections j' provided on the shell J.

As shown in Fig. 1 the steam escapes from the shell A in a direct line and striking the wings or blades E imparts a rotary motion thereto. In some instances the steam or other media for propelling the rotary cutter may be deflected and caused to strike the wings or blades at right angles, as shown in Fig. 5. In this latter construction short tubes will be provided and attached to the shell A and have their outer end bent to the required angle. The steam or other media for rotating the cutter in its passage to the tube D to be cleaned carries along with it all the loose soot and scale removed by the cutter thereby preventing the same banking in front of the cleaner and impeding the progress and operation of the same.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A flue and tube cleaner comprising a shell, a rotary head located within the shell, and arms pivoted at their inner ends to the said rotary head, and having blades at their outer ends contiguous to the forward end of the shell to be operated upon by the steam or other media escaping from the said shell, substantially as set forth.

2. A tube and flue cleaner comprising a shell to receive and confine the steam or other media and adapted to travel through the flue or tube to be cleaned, and provided with exterior projections to center the shell within the tube or flue, and a rotary cutter carried by the said shell and adapted to be operated by the steam or other media contained therein, consisting of a spindle journaled within the shell, and having a head to which arms are pivotally connected carrying blades at their outer ends, substantially as described.

3. A tube and flue cleaner comprising an inner and an outer shell between which a space is formed to receive and confine the steam or other media, a spindle journaled within the inner shell and having a head, and arms pivotally connected at their inner ends with the said head, and having blades or wings at their outer ends to be operated upon by the steam or other media contained in the said space between the two shells, substantially as described for the purpose set forth.

4. A flue and tube cleaner comprising a

shell to receive and confine the steam or other media, a rotary cutter, and a ball and socket joint between the said rotary cutter and shell, substantially as set forth.

5 5. A flue and tube cleaner comprising a shell to receive and confine the steam or other media, a spindle journaled in said shell and having a guide at its outer end and a head near its inner end, and wings or blades pro-
10 vided with arms which are pivotally connected at their inner ends to the said head and are directed in their inner and outward movements by the said guide, substantially as set forth.

15 6. In a flue and tube cleaner the combination with a shell adapted to receive and confine the steam or other media, of a rotary head located within the shell, and arms pivoted at their inner ends to the said rotary head, and
20 having curved wings or blades at their outer ends contiguous to the forward end of the shell, the outer portions of the said wings or blades being unobstructed to receive the force of the steam or other media as it escapes
25 from the shell, substantially as described for the purpose specified.

7. A flue and tube cleaner comprising an inner and outer shell between which a space is provided, the inner shell being closed at its
30 inner end and provided with a ball seat, a rotary cutter journaled in the inner shell, a ball made in two halves and mounted on the inner end of the spindle, and having ball bearings between the halves, the outer half
35 of the ball being secured to the spindle and the inner half being loosely mounted thereon and obtaining a bearing on the said ball seat, and a cap fastened to the inner shell and completing the socket for the said ball, sub-
40 stantially as set forth.

8. A flue and tube cleaner comprising an outer shell, an inner shell tapering slightly in length and having exterior projections,

for the purpose specified and having the outer end flared outward, and having the inner end
45 closed and provided with a ball seat, a rotary cutter having its spindle projected through the closed end of the inner shell, a ball on the inner end of the spindle and composed of halves between which are provided
50 ball bearings, the inner half of the ball being loosely mounted on the spindle and obtaining a bearing in the ball seat, the outer half of the ball being secured to the spindle, and a cap secured to the closed end of the
55 inner shell and completing the socket for the said ball, substantially as described.

9. The herein shown and described flue and tube cleaner composed of an outer shell having exterior projections, and having its inner
60 end reduced and threaded, an inner shell slightly tapering in length having its inner end closed and provided with a ball seat, and having exterior projections and its outer end slightly flared, a spindle journaled in the in-
65 ner shell and provided at its outer end with a guide and near its inner end with a head, blades having arms which are directed in their movements by the said guide and which have their inner ends pivotally connected to
70 the said head, a ball mounted on the inner end of the spindle and composed of two halves between which ball bearings are provided, the outer half of the ball being secured to the spindle and the inner half being loosely
75 mounted on the said spindle and obtaining a bearing on the ball seat, and a cap secured to the inner shell and completing the socket for the said ball, substantially as described.

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

CYRUS S. DEAN.

Witnesses:

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FRANK H. BURNS, Jr.