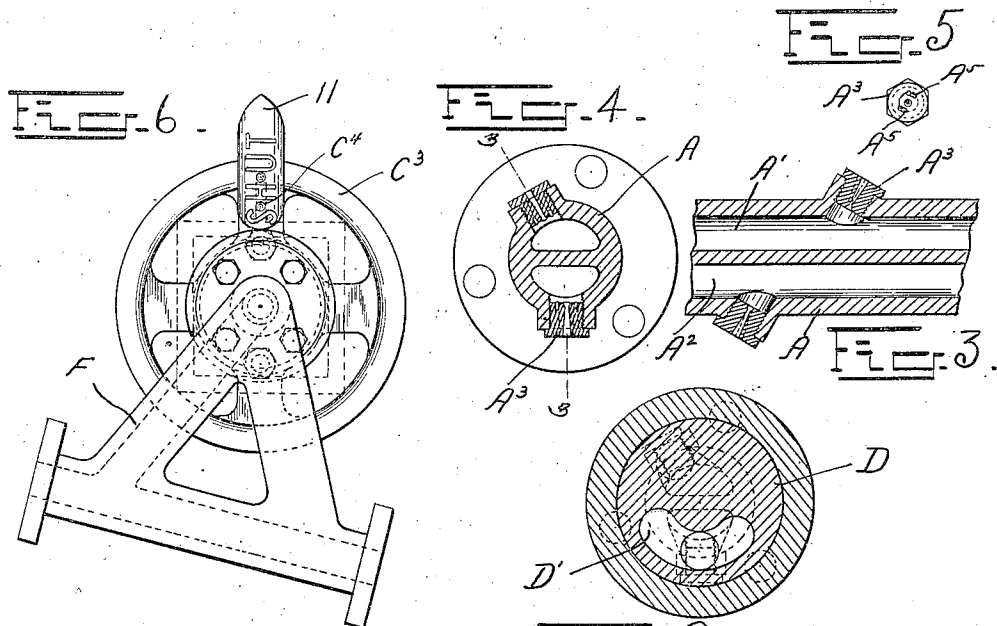
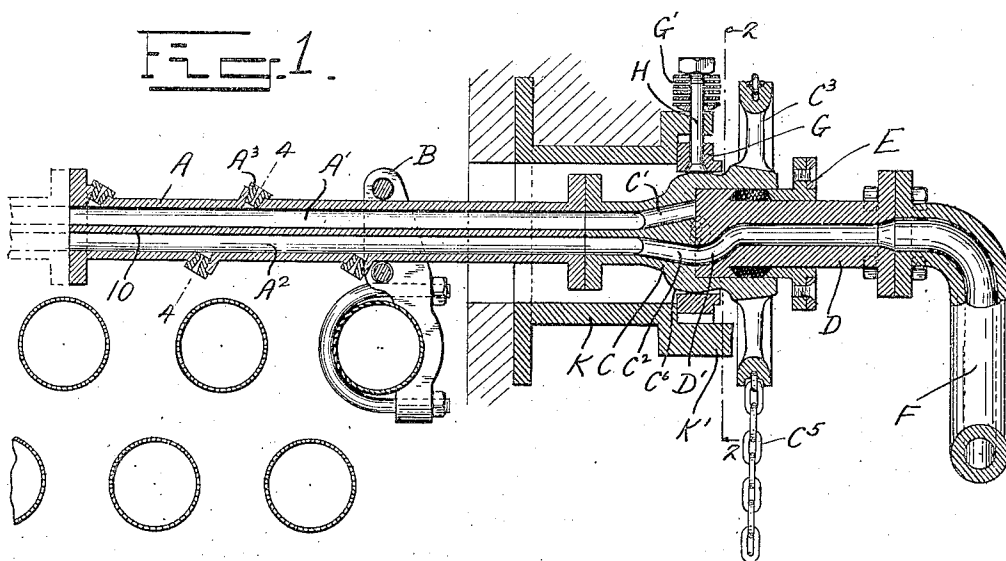


J. KEMNAL AND J. HENRY.
 SOOT BLOWING DEVICE.
 APPLICATION FILED DEC. 15, 1920.

1,377,622.

Patented May 10, 1921.
 2 SHEETS—SHEET 1.

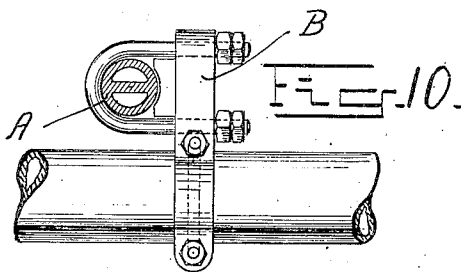
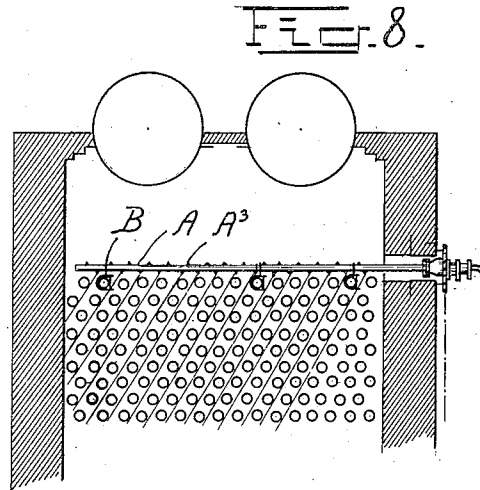
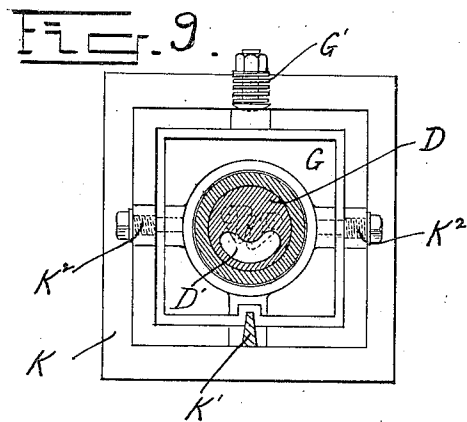
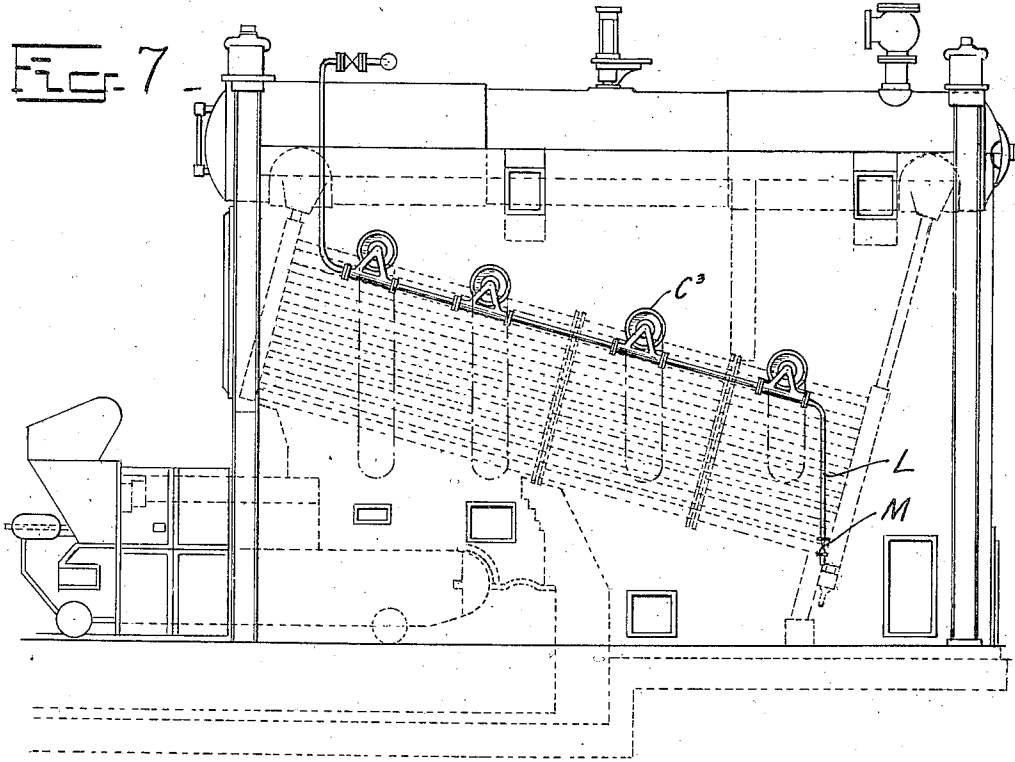


INVENTOR.
 James Kemnal
 John Henry
 BY Clifford H. Bull
 ATTORNEYS.

J. KEMNAL AND J. HENRY.
SOOT BLOWING DEVICE.
APPLICATION FILED DEC. 15, 1920.

1,377,622.

Patented May 10, 1921.
2 SHEETS—SHEET 2.



INVENTOR.
James Kemnal
BY *John Henry*
Gifford & Bull
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JAMES KEMNAL, OF CHISLEHURST, AND JOHN HENRY, OF LONDON, ENGLAND,
ASSIGNORS TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOOT-BLOWING DEVICE.

1,377,622.

Specification of Letters Patent. Patented May 10, 1921.

Application filed December 15, 1920. Serial No. 430,989.

To all whom it may concern:

Be it known that we, JAMES KEMNAL and JOHN HENRY, subjects of the King of Great Britain, residing at Kemnal Manor, Kemnal Road, Chislehurst, in the county of Kent, England, and 112 Dalmeny avenue, Norbury, London, S. W., England, respectively, have invented certain new and useful Improvements in a Soot-Blowing Device, of which the following is a specification.

Our invention relates to soot-blowing devices for cleaning the soot from the tubes of water tube boilers. It has been proposed previously, in such cleaners, to arrange the soot-blowing elements, or distributing pipes, transversely of the longitudinal axes of the tubes either above or below the same and to furnish the blower units with nozzles adapted to be rotated, the discharging opening of said nozzles being disposed obliquely to the axis of the blower unit to discharge throughout the length of the spaces between the tubes.

One of the objects of our invention is to provide an improved valve arrangement for controlling the supply of the cleaning medium to the blower units. Another object is to provide an improved construction of soot-blowing element particularly suited to such improved controlling means. A further object is to provide improved means permitting the blower elements to move freely in any direction and independently of the boiler side walls, whether the latter be of brickwork or of iron casings. With these and other objects in view, our invention consists in the arrangements and constructions hereinafter described and more particularly pointed out in the appended claims.

The invention is illustrated in the accompanying drawings, in which Figure 1 is a longitudinal section of one of the improved distributing or blower elements; Fig. 2 is a section on the line 2—2 of Fig. 1, showing a part of the construction; Fig. 3 is a section on the line 3—3 of Fig. 4; Fig. 4 is a section on an enlarged scale on the line 4—4 of Fig. 1; Fig. 5 is a detail view of one of the nozzles; Fig. 6 is an end view of a blower device, showing the supply connections for the cleaning fluid and the controlling indicator; Fig. 7 shows an arrangement of a series of the improved blower de-

vices applied to a Babcock & Wilcox type of boiler; Fig. 8 is a transverse section of the boiler illustrated in Fig. 7, showing one of the blower units in operation; Fig. 9 is a sectional elevation on the line 2—2 of Fig. 1, showing the manner in which the blower unit is suspended to allow for expansion, and Fig. 10 is a detail view illustrating one of the brackets by which the blower element is secured to boiler tubes.

Referring to the drawings, A denotes the soot-blowing element to which fluid under pressure, such as compressed air or steam, is supplied. The soot-blowing elements may conveniently be secured to the top row of tubes of the boiler by brackets B, each of the elements preferably being provided with two independent chambers, compartments or passages A¹ and A² formed by a partition 10.

Each of the chambers or passages A¹ and A² is fitted with a plurality of nozzles A³, the nozzles for the separate passages pointing in different directions and each nozzle being preferably provided with a number of differently directed jet orifices A⁴ and A⁵, as shown in Fig. 5, for a purpose explained later.

From an inspection of Fig. 8, it will be apparent that oblique aisles are formed inclined in two directions, one such set of oblique aisles being indicated by the lines from the series of nozzles shown in that figure as being directed toward such aisles. Similarly, the series of nozzles at the top of the blower element are arranged so that, when the element is turned through a half turn, this series of nozzles will cooperate with the other set of aisles inclined to the set indicated by the straight lines of Fig. 8.

To each distributing pipe or soot-blowing element A is connected, by means of flanges or other suitable connections, a valve body C formed with two internal ports C¹ and C² cast or machined therein, which ports register with passages A¹ and A² in such blower element formed by the partition 10.

Cast in one with the valve body C or otherwise secured thereto, is a hand wheel or chain wheel C³, which can be operated from the ground if necessary by the usual light chain C⁵.

Within the valve body C is mounted a valve member D in which is formed an internal central passage having an elongated

port D¹, preferably arcuate in cross-section, as indicated in Fig. 2, so as to overlap considerably the ports A¹, A² when in registry with either, the valve D being kept tight by the usual packing gland E. The supply piping is connected to each blower unit by a bent pipe F, as best shown in Figs. 1 and 6.

The valve body C, as shown in Figs. 1 and 9, is supported from a spring-balance neck or sleeve piece G, supported by means of a bolt H, or the like, from a lug on a box K secured to the side wall of the casing of the boiler, a spring G¹ being interposed between the nut on the bolt and the box K. This spring-balanced neck or sleeve G permits the blower element to slide or move in any direction when any expansion of the latter takes place or should the brickwork in the side wall move in the setting, and at the same time maintains a seal between the valve body C and the box K. As will be seen from Fig. 1, a portion of the outer surface of the valve body C is made spherical, as at C⁶, to facilitate its movement within the sleeve piece G. The sleeve piece G is preferably guided to some extent in its movement relatively to the box K by providing the box with projecting studs K² (see Fig. 9) entering oval or other recesses in the adjacent faces of the sleeve piece.

The box is also provided with a stop K¹ for coöperation with a stop C⁴ on the back of the hand or chain wheel C³.

The blower element may be made in one or more connected pieces, according to the width and size of boiler, and each passage at the end remote from the operating end may be fitted with plugs to permit the passage to be cleared of any impediment.

When cleaning the soot from the boiler tubes with steam as the cleaning medium, a drain pipe L with valve M is required, as shown in Fig. 7. When compressed air is used as the cleaning medium, the drain pipe and valve are not required.

As the valve D is stationary, port D¹ will always be at the bottom side, and when the indicator 11 on the hand or chain wheel C³ is vertical, corresponding to the shut or closed position, in the form illustrated, as shown in Fig. 6, the ports C¹ and C² in the valve body C, along with chambers A¹ and A² of the blower unit A, will be closed, as shown in Fig. 9.

The operation of the apparatus is as follows:

By revolving the hand or chain wheel to the left-hand side, port C¹ and chamber A¹ are brought into communication with port D¹, bringing the jets of chamber A¹ in contact with the space between the tubes slanting to the left-hand side, as indicated by lines in Fig. 8. Now, as soon as contact is made between ports D¹ and C¹, the cleaning

medium rushes out of the jet holes of the nozzles A³ of chamber A¹ only, passing into the spaces between the tubes to the left-hand side. This continues until the stop C⁴ on the hand or chain wheel C³ is stopped by the stop K¹ on the bottom flange of the box K. The wheel is reversed and the same operation is repeated until the indicator is again vertical. This completes the cleansing of the inclined spaces between the tubes to the left-hand side.

Now the wheel is revolved to the right-hand side, and this brings port C² and chamber A² into register with port D¹, the port C¹ and chamber A¹ being closed, and while the wheel is being revolved, the cleaning medium rushes through the nozzles A³ of the chamber A² and cleans the spaces between the tubes which incline to the right-hand side. As the wheel revolves, the cleaning medium continues to flow through the nozzles A³ until the stop C⁴ on the wheel again abuts against the stop K¹ on the box K. As the wheel cannot turn further and the cleaning medium is still rushing out of the nozzles into the spaces between the tubes which incline to the right-hand side, the wheel must be reversed and revolved until the indicator is brought into the upright position, when the ports C² and chamber A² are closed to the valve port. This completes the operation for the first blower unit, and the operation is repeated with all the other blower units until the cleaning of the boiler tubes is completed.

Now, as the planes of the spaces between the tubes lie at an angle to the blower units, and when the latter is being revolved the cleaning medium which passes from the jets travels through an arc of a circle, in certain positions some of the cleaning medium from the jet orifices in the nozzles moves away from the center line of the spaces. To overcome this disadvantage we provide a number of jet orifices A in each nozzle, as shown in Fig. 5, the outer holes being machined to different angles from the center hole, the center hole being set central at the required angle to suit the inclination of the spaces between the tubes. This arrangement insures that the whole of the spaces between the tubes, both in depth and length, are scoured by the cleaning medium.

It will be clear that the valve arrangement may be employed with an undivided blower unit having the nozzles all located on the same side of the distributing pipe.

We claim:

1. A soot-blowing device comprising a soot-blowing element provided with separate passages and series of nozzles arranged obliquely to the axis of said element and communicating with the respective passages, one series of nozzles being arranged to direct a cleaning fluid through one set of

oblique aisles in a group of boiler tubes and another set being arranged to direct a cleaning fluid through another set of oblique aisles, and means for connecting said passages alternately with a source of fluid supply.

2. A soot-blowing device comprising an element having separate passages and a series of obliquely-arranged nozzles on opposite sides of the element and communicating with the respective passages, one of such series being arranged to direct a cleaning fluid through one set of oblique aisles in a group of boiler tubes and the other series being arranged to direct the fluid through another set of oblique aisles, and means to connect said passages alternately with a source of fluid supply.

3. A soot-blowing device comprising an element having separate passages and a series of obliquely-arranged nozzles on opposite sides of the element and communicating with the respective passages, one of such series being arranged to direct a cleaning fluid through one set of oblique aisles in a group of boiler tubes and the other series being arranged to direct the fluid through another set of oblique aisles, means whereby said tube may be rotated to bring each of said series into position to direct jets of the fluid through the aisles with which the series coöperates, and means to connect each passage with a source of supply only when the series is in position to act on the aisles with which it coöperates.

4. A soot-blowing device comprising an element having separate passages and two series of obliquely-arranged nozzles, communicating with the respective passages, one of such series being arranged to direct a cleaning fluid through one set of oblique aisles in a group of boiler tubes and the other series being arranged to direct the fluid through another set of oblique aisles, means whereby said element may be rotated to bring each of said passages into position to direct jets of a cleaning fluid through the aisles with which the series coöperates, and means to connect each passage with a source of fluid supply while the associated series is being rotated in alinement with the aisles with which it coöperates.

5. A soot-blowing device comprising an element having separate passages and two series of obliquely-arranged nozzles communicating with the respective passages, one of such series being arranged to direct a cleaning fluid through one set of oblique aisles in a group of boiler tubes and the other series being arranged to direct the fluid through another set of oblique aisles, means whereby said element may be rotated to bring each of said series into position to direct jets of a cleaning fluid through the aisles with which the series coöperates, and

means to connect each passage with a source of fluid supply while the associated series is being rotated in alinement with the aisles with which it coöperates, each nozzle having a plurality of openings whereby the fluid is directed into the aisles as the nozzles are rotated.

6. A soot-blowing device comprising a rotary soot-blowing element provided with a plurality of nozzles and formed with separate passages with which different nozzles communicate, a source of fluid supply, and means for connecting said passages alternately to said source of fluid supply.

7. In a soot-blowing device, a stationary valve member provided with a port adapted to be connected to a supply of fluid under pressure, and a rotary soot-blowing element provided with separate passages and a separate series of nozzles communicating with the respective passages, the end of the element forming a rotary valve member provided with ports communicating with said passages and adapted to communicate with and to be cut off from said stationary port by rotating said member.

8. In a soot-blowing device, a stationary valve member provided with a port adapted to be connected to a supply of fluid under pressure, and a rotary soot-blowing element provided with separate passages and a separate series of nozzles communicating with the respective passages, the end of the element forming a rotary valve member provided with ports communicating with said passages and adapted to communicate with and to be cut off from said stationary port by rotating said member, one series of nozzles being arranged to direct the cleaning fluid through one set of oblique aisles in a group of boiler tubes and the other series being arranged to direct the fluid through another set of oblique aisles.

9. A soot-blowing device comprising a soot-blowing tube, a wall having a clearance opening through which the tube projects, a member surrounding the tube adapted to seal said opening, and means for resiliently supporting said member from said wall.

10. A soot-blowing device comprising a soot blowing tube, a wall having a clearance opening through which the tube projects, a member surrounding the tube and slidably closing said opening and arranged to permit the tube to be tilted and to be moved bodily at right-angles to its axis and constructed and arranged to prevent the escape of gases between the tube and said member and through said clearance space, regardless of the position of the tube.

11. A soot-blowing device comprising a soot-blowing element comprising a tube extending across and attached to the boiler tubes, a support for the end of the blower element fixed in the wall of the setting, and

resilient connections between the support and the end of the tube.

12. A soot-blowing device comprising a soot-blowing element extending across and
5 attached to the boiler tubes, a support for the end of the blower element fixed in the wall of the setting, and resilient connections between the support and the end of the tube
10 constructed and arranged to permit relative movement between the blower element and the support in a plane parallel to the boiler tubes.

13. A soot-blowing device comprising a soot-blowing element, a sleeve inclosing said
15 element, means for resiliently supporting said sleeve from a stationary part, said element being provided with a spherical portion engaging said sleeve.

14. A soot-blowing device comprising a soot-blowing element, a sleeve inclosing said
20 element, means for resiliently supporting said sleeve from a stationary part, said element being provided with a spherical portion engaging said sleeve, said sleeve forming a seal between said element and said sta-
25 tionary part.

JAMES KEMNAL.
JOHN HENRY.

Witnesses to the signature of James Kemnal:

HENRY PELHAM SMITH,
JOHN HARPER MCKINLAY.

Witnesses to the signature of John Henry:
JOHN WALTER HARGREAVES,
DOUGLAS BRUCE BREMNER.