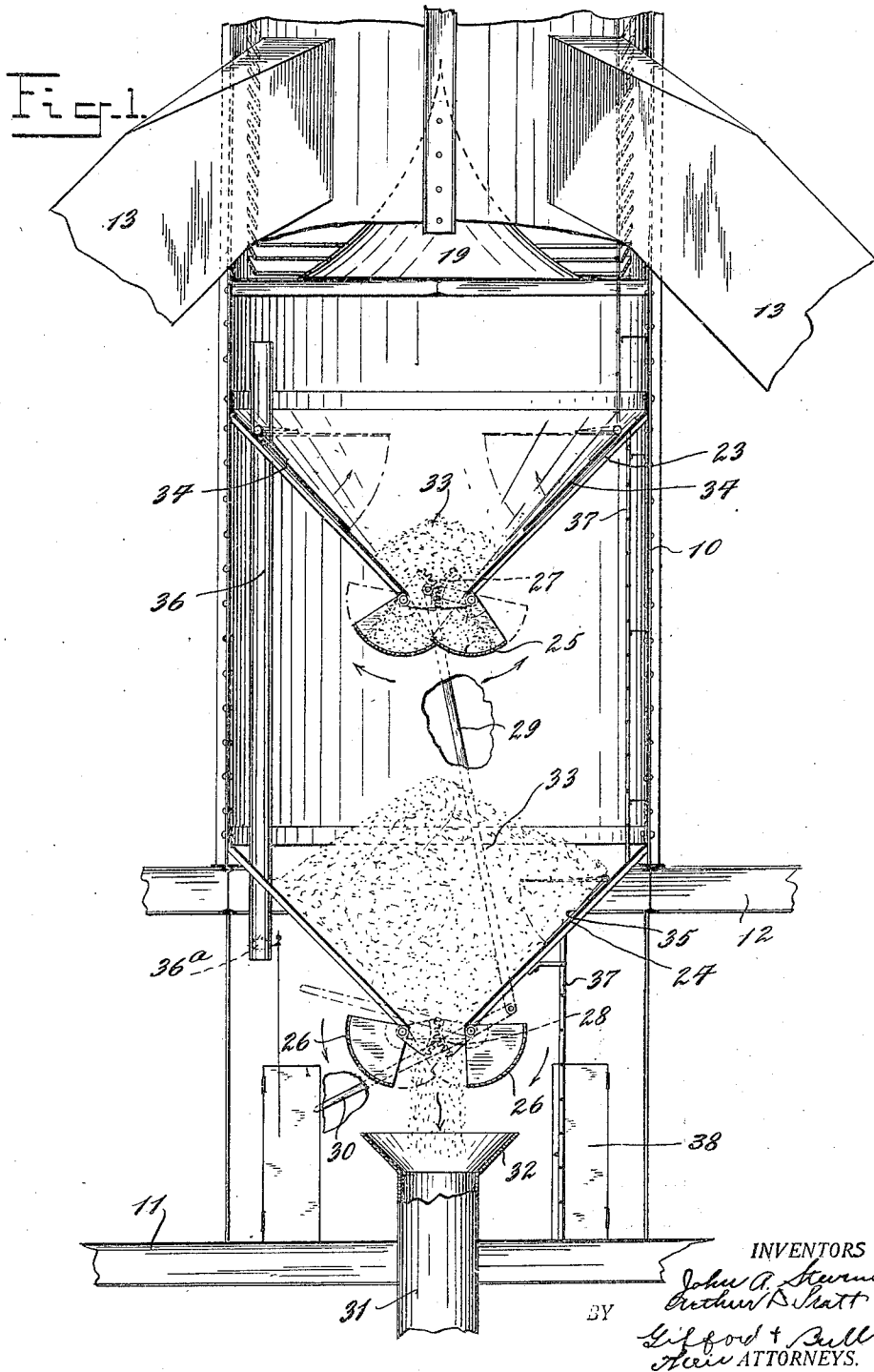


Dec. 26, 1922.

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J. A. STEVENS ET AL.  
DUST REMOVING AND COLLECTING MEANS.  
FILED SEPT. 28, 1918.

2 SHEETS—SHEET 1.



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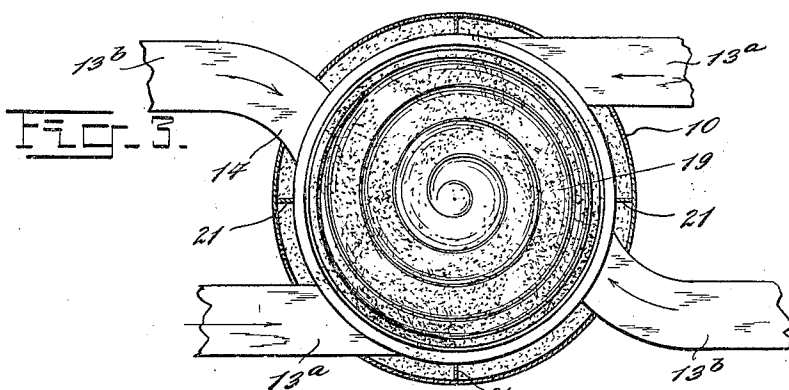
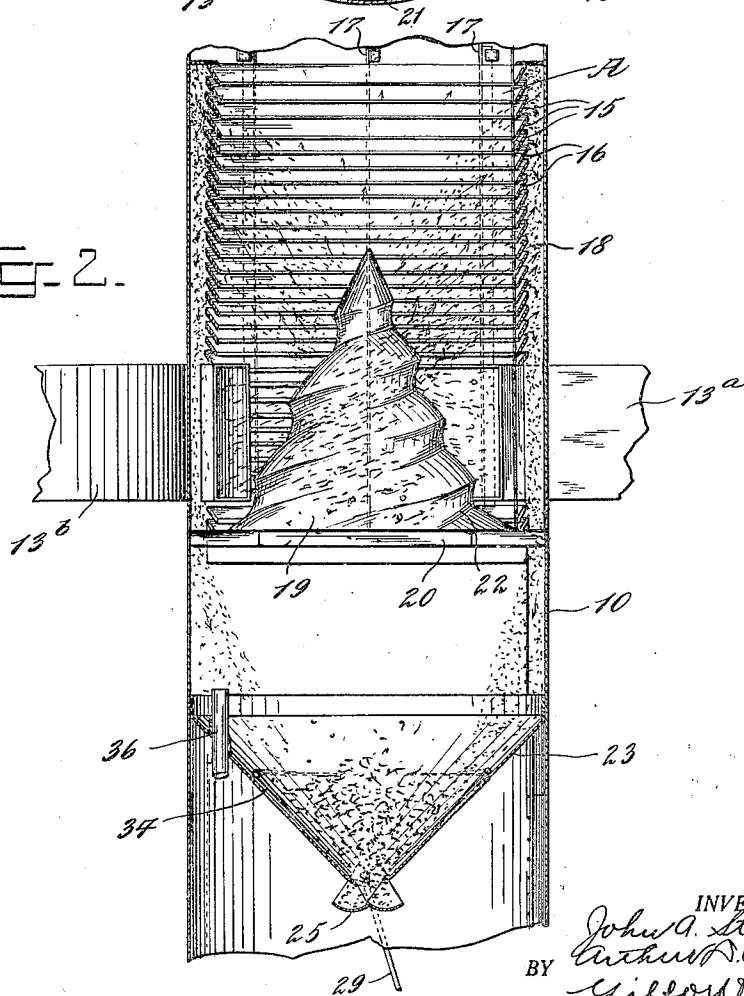


FIG. 2.



INVENTORS  
*John A. Stevens*  
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BY *Gifford F. Bull*  
ATTORNEYS.

## UNITED STATES PATENT OFFICE.

JOHN A. STEVENS, OF LOWELL, MASSACHUSETTS, AND ARTHUR D. PRATT, OF SUMMIT, NEW JERSEY, ASSIGNORS TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## DUST REMOVING AND COLLECTING MEANS.

Application filed September 23, 1918. Serial No. 256,136.

*To all whom it may concern:*

Be it known that we, JOHN A. STEVENS, a citizen of the United States, residing at Lowell, in the county of Middlesex and State of Massachusetts, and ARTHUR D. PRATT, a citizen of the United States, residing at Summit, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Dust Removing and Collecting Means, of which the following is a specification.

Our invention relates to improvements in dust removing and collecting means for a stack or the like, and more particularly to such means in which use is made of the centrifugal force and the kinetic energy of moving particles of soot and of unused carbon, and it has for its object the improvement in a device of this character.

Our invention will best be understood by reference to the accompanying drawings, in which Fig. 1 is a side view, partially in section, of a stack and the parts associated therewith for removing dust from the gases and collecting the same; Fig. 2 is a vertical section of a modified construction, showing more in detail the parts for removing the dust from the gases, and Fig. 3 is a cross-sectional plan view of Fig. 2.

Referring now to the drawings, 10 is a stack for a steam boiler, or the like, arranged to carry away gases, which gases carry, or may carry, soot or other solid products. The stack is supported by a foundation 11, which may be the inter-framing for the boiler and associated parts and for the housing therefor. The stack may also pass through a floor 12. The gases carrying soot or other solid matter, are conducted by flues 13 to the stack 10, the flues shown in Fig. 1 being disposed at 90° apart. In Figs. 2 and 3 the flues 13<sup>a</sup> and 13<sup>b</sup> are shown paralleling each other, the two opposite straight flues 13<sup>a</sup> entering the stack tangentially, while the flues 13<sup>b</sup> are curved at their entering ends towards their companion flues 13<sup>a</sup>, as at 14, in such a way as to cause the gases from these flues to enter the stack tangentially and impart to the gases within the stack a whirling motion in the same direction as that caused by the gases entering from the flues 13<sup>a</sup>. An annular member, which we have indicated in general by the reference character A, is disposed within

the stack surrounding and above the intake flues, and comprises a plurality of annular plates or louvres 15, spaced from each other as at 16, to form openings therethrough and arranged at an angle to the axis of the stack. The louvres, which are supported by suitable ribs 17, are arranged concentrically within the stack and form therewith a space 18, within which the gases are substantially quiet, so that the dust which is expelled into the space in the manner hereinafter described, will settle, within this space to a point in the stack where the gases are not substantially affected by the entering gases and where they may settle into hoppers provided for their reception as will also later appear. A member 19 is arranged within the louvres 15, and opposite the inlets of the flues 13, and is supported by a structure 20, comprising ribs 21 (see Fig. 3), which extend to and are secured in position by the stack. The member 19 may be regularly conical in form as indicated in Fig. 1, but is preferably provided with a groove 22, which imparts an upward movement to the entering gases. The function and operation of the conical member 19 provided with the groove will best be understood by assuming, for the moment, that the cone rotates and the gases within the stack are normally in a state of quietude. Under these circumstances, it will readily be understood that the gases would be forced upwardly by the grooved cone which would act as a propeller. In the actual case, in which the entering gases are the moving element and the conical member the stationary one, while the conditions are reversed, the grooved conical member acts in substantially the same manner to project the entering gases upwardly.

The soot or dust thus collected in the space 18 between the member A and the stack 10, settles through the stack and is collected by upper and lower conical or funnel shaped hoppers 23 and 24, disposed at the base of the stack. These hoppers are closed at their lower ends by pivoted valves or dampers 25 and 26. The shafts of said valves carry segments 27 and 28 and are inter-connected by a link or links 29 in such a manner that when one set of valves is closed the other set will be open, and vice versa. The valves may be operated by a

suitable arm or lever 30. The soot or dust from the lower hopper is discharged into a suitable chute 31, preferably provided with a funnel-shaped opening 32 at its upper end  
 5 for collecting the soot, the soot or dust being discharged at any suitable point by the chute. The soot within the hoppers is indicated by the reference numeral 33. The upper hopper is provided with upwardly  
 10 swinging doors 34, which are readily opened in the event that an explosion should occur within the space between the two hoppers. The lower hopper may also be provided with one or more explosion doors 35 opening  
 15 upwardly to take care of an explosion in the space in the stack below the lower hopper. The carbon which is ordinarily carried away by the draft, and the presence of which is objectionable, is, in accordance  
 20 with our invention, collected and used, thus conserving the carbon. A ventilating flue 36 furnishes communication, when desired, between the spaces below the lower hopper and that above the upper hopper, respectively, a suitable valve 36<sup>a</sup> being provided  
 25 in the lower end of the flue. A ladder 37 may also be provided by which access may be had by the operator to the parts within the stack. While we have here shown two  
 30 hoppers for the reception of the dust, disposed one above the other, it will, of course, be understood that a single hopper may be used.

The provision of the double hoppers with  
 35 the valves inter-connected, in the manner specified, permits of the removal of the dust without disturbing the draught. Suitable doors 38 are provided in the lower portion of the stack through which the operator  
 40 may enter the stack. The manner in which the soot or other solid matter is removed from the gases within the stack, collected and removed, will readily be understood from the foregoing description and is  
 45 as follows:

The gases entering the stack from the flues are given a whirling movement in the manner described, the centrifugal force to which the particles of soot in the gases are  
 50 thus subjected combined with the upward movement imparted to the particles by the grooved conical member acting to expel the soot or dust outwardly and upwardly through the spaces between the louvres 15  
 55 into the space 18, in which the gases are in a state of quietude, and from which the dust may settle through the stack into the upper hopper. From the upper hopper the operator, by actuating the valves 25, causes  
 60 the soot to descend into the lower hopper, from which it is discharged into the chute, the bottom of the stack always remaining closed through the described co-action of the two hoppers.

65 While we have illustrated and described

four flues leading to the stack, it will be understood that our invention is equally applicable when a single flue, or any other number of flues, are used. It will also be understood that while we have here shown  
 70 a chute 31 for the reception of soot from the hoppers, any suitable means may be provided for removal of the soot, such, for example, as a vehicle which is driven through the stack beneath the lower hopper.  
 75

What we claim and desire to secure by Letters Patent of the United States is:—

1. A draft producing stack having a closed bottom, a cylindrical member closed at the bottom and open at the top and located within the stack above the bottom thereof, said member having its walls spaced from the walls of the stack and having  
 80 louvres therein, and a flue arranged to introduce gases within said member and tangentially of the walls thereof, whereby dust carried by the gases may pass through said  
 85 louvres to the bottom of the stack without substantial reduction of velocity of the gases.

2. A draft producing stack having a normally closed bottom, a cylindrical member closed at the bottom and open at the top and located within the stack above the bottom thereof, said member having its walls  
 90 spaced from the walls of the stack and having louvres therein, and a flue arranged to introduce gases within said member and tangentially of the walls thereof, whereby dust carried by the gases may pass through said  
 95 louvres to the bottom of the stack without substantial reduction of velocity of the gases, said bottom being provided with valves, whereby the accumulated dust may be removed.  
 100

3. A draft producing stack having a normally closed bottom, a cylindrical member closed at the bottom and open at the top and located within the stack above the bottom thereof, said member having its walls  
 105 spaced from the walls of the stack and having louvres therein, and a flue arranged to introduce gases within said member and tangentially of the walls thereof, whereby dust carried by the gases may pass through  
 110 said louvres to the bottom of the stack without substantial reduction of velocity of the gases, said bottom being provided with valves, whereby the accumulated dust may be removed, and a secondary valved bottom below said normally closed bottom, constructed and arranged to be closed when  
 115 said normally closed bottom is opened, whereby a reversed draft through the louvres is prevented.  
 120

4. A draft producing stack having a closed bottom, a cylindrical member closed at the bottom and open at the top and located within the stack above the bottom thereof, said member having its walls spaced  
 125

from the walls of the stack and having  
louvres therein, and a flue arranged to in-  
troduce gases within said member and tan-  
gentially of the walls thereof, said louvres  
5 extending down to and opposite the mouth  
of said flue, whereby dust carried by the  
gases may pass through said louvres to the  
bottom of the stack without substantial re-  
duction of velocity of the gases.

10 5. A draft producing stack, a flue ar-  
ranged to introduce gases into the stack and  
tangentially of the walls thereof, and a  
conical member located centrally of the  
stack and opposite the mouth of the flue,  
15 with the apex of the cone above the level of  
the mouth of the flue.

6. A draft producing stack, a flue ar-  
ranged to introduce gases into the stack and  
tangentially of the walls thereof, and a con-  
ical member located centrally of the stack  
20 and opposite the mouth of flue, with the  
apex of the cone above the level of the  
mouth of the flue, the surface of the cone  
being provided with a thread-like, spiral  
25 groove.

7. A draft producing stack, a cylindrical  
member closed at the bottom and open at  
the top and located within the stack, said  
member having its walls spaced from the  
30 walls of the stack and having louvres there-  
in, a flue arranged to introduce gases with-  
in said member and tangentially of the  
walls thereof, and a conical member located  
centrally in said member and opposite the  
35 mouth of the flue, with the apex of the cone  
above the level of the mouth of the flue.

8. A draft producing stack, a cylindrical  
member closed at the bottom and open at  
the top and located within the stack, said  
40 member having its walls spaced from the  
walls of the stack and having louvres there-  
in, a flue arranged to introduce gases with-  
in said member and tangentially of the  
walls thereof, and a conical member located  
45 centrally in said member and opposite the  
mouth of the flue, with the apex of the cone  
above the level of the mouth of the flue,  
the surface of the cone being provided with  
a thread-like, spiral groove.

50 9. A draft producing stack, a cylindrical  
member closed at the bottom and open at  
the top and located within the stack, said  
member having its walls spaced from the  
walls of the stack and having louvres there-  
55 in, a flue arranged to introduce gases within  
said member and tangentially of the walls  
thereof, and a conical member located cen-  
trally in said member and opposite the mouth  
of the flue, with the apex of the cone above  
60 the level of the mouth of the flue, said  
louvres extending down to and opposite the  
mouth of said flue.

10. A draft producing stack having a  
continuous vertical flue therein, a substan-  
65 tially horizontal gas flue connected to said

vertical flue at a point above the bottom of  
the stack and having a substantially unob-  
structed connection with said vertical flue,  
a normally closed dust-receiving bottom be-  
neath said vertical flue and between the 70  
bottom of the stack and the horizontal flue,  
and means whereby the dust-receiving bot-  
tom may be opened to permit the dust to  
drop into a dust-conveying device.

11. A draft producing stack having a con- 75  
tinuous vertical flue therein, a substantially  
horizontal gas flue connected to said vertical  
flue at a point above the bottom of the stack  
and having a substantially unobstructed con-  
nection with said stack, a dust separator 80  
in the vertical flue adjacent the horizontal  
flue entrance, a normally closed dust-receiv-  
ing bottom beneath said vertical flue and  
between the bottom of the stack and the  
horizontal flue, and means whereby the dust- 85  
receiving bottom may be opened to permit  
the dust to drop into a dust-conveying de-  
vice.

12. A draft producing stack having a con-  
tinuous vertical flue therein, a substantially 90  
horizontal gas flue connected to said vertical  
flue at a point above the bottom of the stack  
and having a substantially unobstructed con-  
nection with said vertical flue, a pair of nor-  
mally closed dust-receiving bottoms spaced 95  
apart and located beneath said vertical flue  
and between the bottom of the stack and  
horizontal flue entrance, and means whereby  
the dust-receiving bottoms may be opened to  
permit the dust to drop into a dust-convey- 100  
ing device.

13. A draft producing stack having a con-  
tinuous vertical flue therein, a substantially  
horizontal gas flue connected to said vertical  
flue at a point above the bottom of the stack 105  
and having a substantially unobstructed  
connection with said vertical flue, a dust sep-  
arator in the vertical flue adjacent the hori-  
zontal flue entrance, a pair of normally  
closed dust-receiving bottoms spaced apart 110  
and located beneath said vertical flue and  
between the bottom of the stack and the  
horizontal flue entrance, and means whereby  
the dust-receiving bottoms may be opened to  
permit the dust to drop into a dust-convey- 115  
ing device.

14. A draft producing stack having a con-  
tinuous vertical flue therein, a substantially  
horizontal gas flue connected to said vertical  
flue at a point above the bottom of the stack 120  
and having a substantially unobstructed con-  
nection with said vertical flue, a pair of nor-  
mally closed dust-receiving bottoms spaced  
apart and located beneath said vertical flue  
and between the bottom of the stack and 125  
horizontal flue entrance, and means where-  
by the dust-receiving bottoms may be  
opened to permit the dust to drop into a  
dust-conveying device, said means compris-  
ing a valve in each dust-receiving bottom, 130

said valves being interconnected to prevent the opening of one valve until the other valve is closed.

15. A draft producing stack having a continuous vertical flue therein, a substantially horizontal gas flue connected to said vertical flue at a point above the bottom of the stack and having a substantially unobstructed connection with said vertical flue, a normally closed dust-receiving bottom beneath said vertical flue and between the bottom of the stack and the horizontal flue, and means whereby the dust-receiving bottom may be opened to permit the dust to fall into and be removed by a vehicle moved through the stack beneath the dust-receiving bottom.

16. A draft producing stack having a continuous vertical flue therein, a substantially horizontal gas flue connected to said vertical flue at a point above the bottom of the stack and having a substantially unobstructed connection with said vertical flue, a dust separator in the vertical flue adjacent the horizontal flue entrance, a normally closed dust-receiving bottom beneath said vertical flue and between the bottom of the stack and the horizontal flue, and means whereby the dust-receiving bottom may be opened to permit the dust to fall into and be removed by a vehicle moved through the stack beneath the dust-receiving bottom.

17. A draft producing stack having a continuous vertical flue therein, a substantially horizontal gas flue connected to said vertical flue at a point above the bottom of the stack and having a substantially unobstructed connection with said vertical flue, a pair of normally closed dust-receiving bottoms spaced apart and located beneath said vertical flue and between the bottom of the stack and the horizontal flue entrance, and means whereby the dust-receiving bottoms

may be opened to permit the dust to fall into and be removed by a vehicle moved through the stack beneath the dust-receiving bottoms. 45

18. A draft producing stack having a continuous vertical flue therein, a substantially horizontal gas flue connected to said vertical flue at a point above the bottom of the stack and having a substantially unobstructed tangential connection with said vertical flue, a normally closed dust-receiving bottom beneath said vertical flue and between the bottom of the stack and the horizontal flue, and means whereby the dust-receiving bottom may be opened to permit the dust to drop into a dust-conveying device. 50

19. A draft producing stack having a continuous vertical flue therein, a substantially horizontal gas flue connected to said vertical flue at a point above the bottom of the stack and having a substantially unobstructed connection with said vertical flue arranged to cause the column of gases in the stack to rotate as the gases pass upward, a normally closed dust-receiving bottom beneath said vertical flue and between the bottom of the stack and the horizontal flue, and means whereby the dust-receiving bottom may be opened to permit the dust to drop into a dust-conveying device. 65

In testimony whereof we have hereunto signed our names in the presence of two subscribing witnesses.

JOHN A. STEVENS.  
ARTHUR D. PRATT.

Witnesses to the signature of John A. Stevens:

JOHN A. W. DIXON,  
D. S. JACOBOS.

Witnesses to the signature of Arthur D. Pratt:

JOHN A. W. DIXON,  
NATHAN E. LEWIS.