

R. H. SMITH & B. CRASWELL.
LOCOMOTIVE EXHAUST PIPE AND SPARK ARRESTER.
APPLICATION FILED MAY 8, 1911.

1,032,711.

Patented July 16, 1912.

2 SHEETS—SHEET 1.

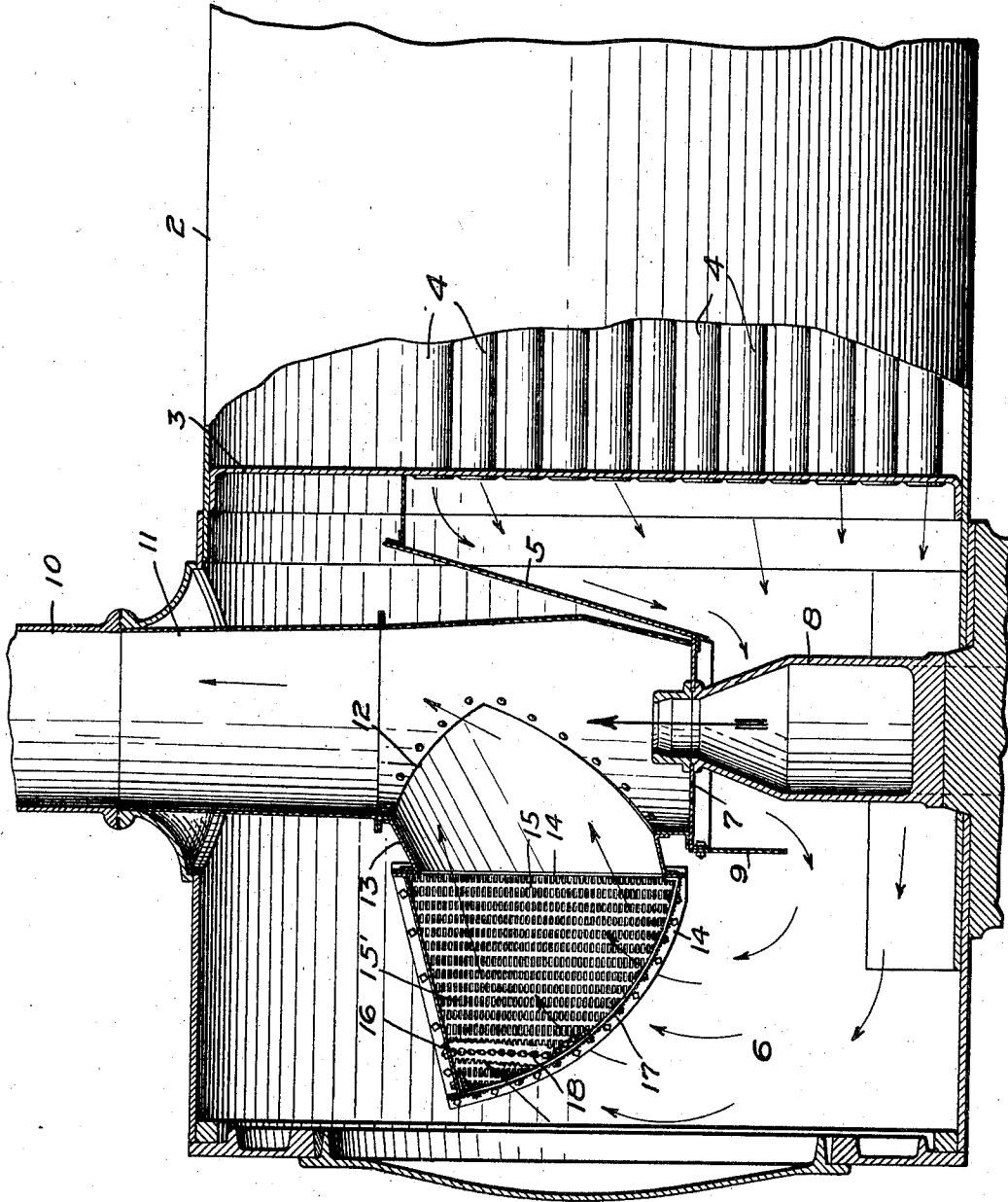


FIG. 1

WITNESSES
M. R. M. Davis
E. A. Paul

INVENTORS
ROBERT H. SMITH
BRADWELL CRASWELL
BY *Paul & Paul*
THEIR ATTORNEYS

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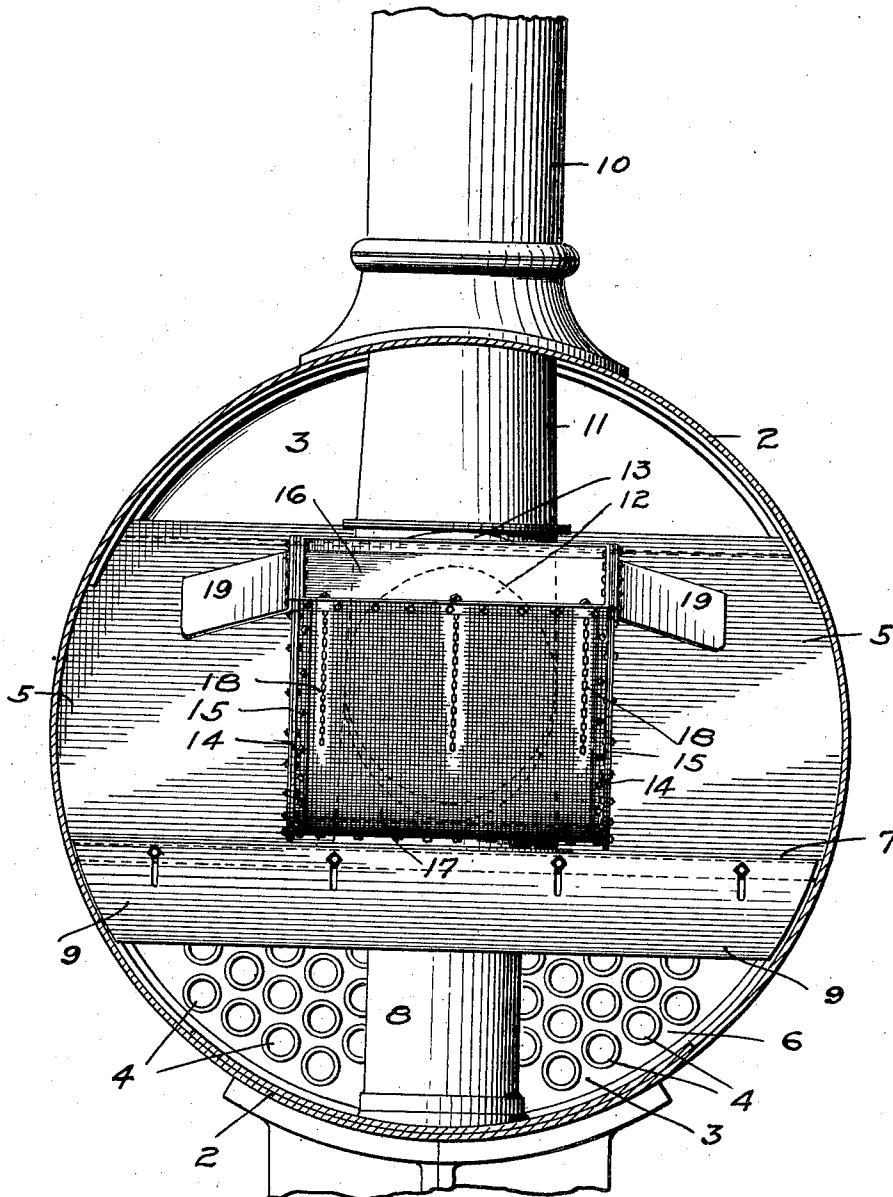


FIG. 2.

WITNESSES

M. R. M. Smith
E. A. Paul

INVENTORS

ROBERT H. SMITH
BRADWELL CRASWELL

BY Paul Paul
THEIR ATTORNEYS

UNITED STATES PATENT OFFICE.

ROBERT H. SMITH AND BRADWELL CRASWELL, OF MELROSE, MINNESOTA.

LOCOMOTIVE EXHAUST-PIPE AND SPARK-ARRESTER.

1,032,711.

Specification of Letters Patent.

Patented July 16, 1912.

Application filed May 8, 1911. Serial No. 625,855.

To all whom it may concern:

Be it known that we, ROBERT H. SMITH and BRADWELL CRASWELL, of Melrose, Stearns county, Minnesota, have invented certain new and useful Improvements in Locomotive Exhaust-Pipes and Spark-Arresters, of which the following is a specification.

The object of our invention is to provide an improved exhaust pipe and spark arrester for a locomotive to the end that the burning cinders entering the smoke box from the flues will be crushed or broken and extinguished before entering the stack, thereby avoiding the danger of fire along the right of way by the passage of a locomotive.

Other objects of the invention will appear from the following detailed description.

The invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings forming part of this specification, Figure 1 is a vertical, sectional view through the forward portion of a locomotive boiler, showing the smoke stack, flue sheet, and the location of our invention with respect to the stack and the exhaust nozzle, Fig. 2 is a transverse sectional view through the forward portion of the smoke box, looking toward the flue sheet.

In the drawing, 2 represents the boiler having a flue sheet 3 and a series of flues 4 as usual in locomotive boilers.

5 is an imperforate plate, extending transversely of the smoke box 6 in front of the flue sheet from side to side of the boiler and inclined forwardly and downwardly and provided with a horizontal, forwardly extending portion 7, also imperforate, through which the exhaust nozzle 8 projects, and has a close joint therewith. This plate is generally known as the "smoke box dead plate." The depending draft plate 9 is suspended at the forward portion of the plate 6 and is vertically adjustable, as usual in locomotives.

10 represents the stack and 11 is a pipe communicating with the stack at its upper end and having its lower end seated on the portion 7 of the plate 5 and inclosing the open upper end of the exhaust nozzle. The pipe 11 has an opening 12 in its side wall communicating with the space at the forward

end of the smoke box and above the draft plate 9. This opening is preferably oval in form, as shown in Fig. 2, though it may be of any suitable shape and size. A collar 13 is secured to the edges of this opening and projects forwardly into the smoke box and to this collar our improved spark arresting device is secured by suitable means.

The spark arresting device comprises a frame 14 to which are secured plates 15, preferably substantially sector shaped, provided with elongated perforations 15', as indicated in Fig. 1. A top plate 16 is secured to said side plates and is preferably forwardly and downwardly inclined, as shown in Fig. 1, and the opening between the forward edge of the top plate and the lower wall of the collar 13 is filled by a screen 17 of suitable mesh to cause the cinders contacting therewith to be crushed and broken and deposited in the bottom of the smoke box. The screen is preferably curved, as shown, and is inclined from its upper edge downwardly and backwardly toward the flue sheet, so that the cinders will strike it angularly or at a tangent and while being broken or crushed by such contact will not tend to cling to the screen or become wedged in its meshes, which might be the case should the screen be arranged at right angles to the direction of travel of the cinders.

We prefer also to suspend chains 18 or similar agitating means from the top plate 16 and allow them to rest on the inner surface of the screen, the suction through the screen causing the agitating means to be moved back and forth thereon and preventing the meshes of the screen from becoming clogged. We have shown three of these chains, but any suitable number may be employed. We prefer also to provide wings or deflectors 19 projecting laterally on each side of the top plate 16 and operating to break and pulverize the cinders that may contact therewith and being preferably inclined downwardly to direct the crushed material to the bottom of the box. These wings may be made of any suitable size and may be mounted on the top of the spark arresting apparatus in any suitable way.

In the operation of the apparatus, a strong draft will be created through the exhaust nozzle past the opening into the pipe

11 and the cinders carried along with the products of combustion will be drawn down under the dead plate beneath the draft plate and sucked into contact with the inclined screen, which will so crush and pulverize the cinders that all of the sparks will be extinguished and most of the material will drop from the screen to the bottom of the box, the products of combustion passing into the pipe 11 and from thence to the stack. A portion of the products of combustion will pass through the side plates, which will cooperate with the screen to crush and pulverize the cinders, so that when the products of combustion are finally discharged from the stack said products will be practically free from cinders, or, if cinders or portions thereof pass into the stack, the fire will be entirely extinguished and ignition of combustible material along the track will be entirely prevented.

The location of the exhaust with respect to the intake opening of the stack is such that a strong draft will be created through the screen and the side plate and most of the cinders will be crushed by contact therewith, and should any of the finer particles lodge in the screen, the agitating means, sweeping back and forth thereon, will prevent any accumulation of such small particles and preserve the screen or portions thereof from becoming clogged.

This device, in addition to being an exhaust pipe and spark arrester will also effect a considerable saving in the consumption of fuel. We have also found from various experiments that the apparatus will prevent clogging and choking of the flues, due to the fact that the draft is concentrated at one point in the pipe and causes an equal or uniform draft through all of the flues.

We do not limit ourselves to the details of the construction, as the same may be varied in many particulars without departing from our invention.

We claim as our invention:—

1. The combination, with a boiler having a flue sheet and flues, a smoke box and a dead plate extending across said box in front of said flue sheet, of an exhaust nozzle having its open upper end projecting through said dead plate, a pipe seated on said dead plate and inclosing the open end of said nozzle, said pipe communicating with the smoke stack and provided with an opening in its lower forward walls above the open end of said nozzle, the side and rear walls of said pipe being imperforate, and a spark arrester covering said opening and against which spark arrester the cinders are drawn by the suction of the exhaust past said pipe opening.

2. The combination, with a boiler having a flue sheet and flues, and a smoke box located in front of said flue sheet, of an ex-

haust nozzle having an open upper end, an upright pipe communicating with the smoke stack and having a closed lower end through which said nozzle extends into said pipe, said upright pipe having an opening in the lower portion of its upright wall, the remaining portion of said wall being imperforate, said opening being located above the closed lower end of said pipe, a collar encircling said opening and projecting horizontally into said smoke box, and a spark arrester secured to said collar and covering the opening into said pipe and operating to crush or pulverize the cinders contacting therewith.

3. The combination, with a boiler having a flue sheet and flues and a smoke box in front of said flue sheet, of an exhaust nozzle, a pipe having its lower end inclosing said exhaust nozzle and its upper end communicating with the smoke stack, said pipe having an opening in its front walls past which the exhaust is directed by said nozzle, and a spark arresting device disposed in said opening and comprising top and side plates projecting forwardly into said smoke box beyond the circumference of said pipe and a screen at the outer edges of said top and side plates and inclined to the horizontal and against which screen the cinders will be directed by the suction through said opening.

4. The combination, with a boiler having a flue sheet and flues and a smoke box in front of said flue sheet, of an exhaust nozzle having an open upper end, a pipe having its lower end inclosing said nozzle and its upper end communicating with the smoke stack, said pipe having an opening in its walls extending only partially around said pipe and past which opening the exhaust is directed by said nozzle, a spark arresting device mounted in said opening and comprising a top plate, perforated side plates and a screen secured to the outer edges of said top and side plates and to the lower edge of said opening, said screen operating to crush or pulverize the cinders contacting therewith.

5. The combination, with a boiler having a flue sheet and flues and a smoke box in front of said flue sheet, of an exhaust nozzle having an open upper end, a pipe communicating with the smoke stack above said exhaust nozzle, said pipe having an opening in its walls, a spark arresting device secured to said walls around said opening and comprising top and side plates projecting into said smoke box beyond the surface of said pipe, wings projecting into said smoke box laterally with respect to said side plates, and a screen interposed between said top and side plates and inclined with respect to said pipe and closing the passage between said plates to the opening in said pipe, the suction within

said pipe causing the cinders to be directed against said screen and broken and crushed thereby.

6. The combination, with a boiler having
5 a flue sheet and flues and a smoke box, of an exhaust nozzle having an open upper end, an upright pipe having a closed lower end inclosing the upper end of said nozzle and communicating with the smoke stack, said
10 pipe having an opening in the lower part of its upright wall extending only partially around said pipe, past which opening the exhaust is directed by said nozzle, said opening being above the closed lower end of said
15 pipe, a spark arresting device secured to the walls of said pipe around said opening and projecting horizontally therefrom into said smoke box, said spark arresting device having perforate side walls and a screen disposed between said walls and arranged at an
20 incline and against which the cinders are drawn by the suction through said opening.

7. The combination, with a boiler having
a flue sheet and flues and a smoke box, of
25 an exhaust nozzle having an open upper end, a pipe inclosing the open end of said nozzle, said pipe communicating at its upper end with the smoke stack and having an opening in its lower forward walls above
30 said nozzle and past which opening the exhaust is directed by said nozzle, the walls of said pipe being otherwise imperforate, said opening communicating with the forward portion of the smoke box, and a screen disposed in front of said opening and against
35 which the cinders are drawn by the suction through said opening.

8. The combination, with a boiler having
a flue sheet and flues, a smoke box, a dead
40 plate extending across said box in front of said flue sheet and provided with a horizon-

tal extension, of an exhaust nozzle having its open upper end projecting through said extension and forming a close joint there-
45 with, a pipe seated on said extension and inclosing the open end of said nozzle, said pipe communicating with the smoke stack and having an opening in its forward lower walls above the open end of said nozzle and
50 through which opening a suction is created by the passage of the exhaust from said nozzle, the walls of said pipe being otherwise imperforate, and a screen disposed in front
55 of said opening and operating to deflect the broken and crushed cinders downwardly to the bottom of said smoke box.

9. The combination, with a boiler having
a flue sheet and flues, and a smoke box, of
an exhaust nozzle having an open upper end,
60 a pipe having a closed lower end extending down to and inclosing the open upper end of said nozzle and leading therefrom to the smoke stack, said pipe having an opening
65 in its upright wall near said nozzle above the closed lower end of said pipe, said pipe, except for said opening, being imperforate, and a spark arrester secured to the walls of
70 said pipe around said opening, said arrester projecting outwardly from said pipe and comprising a supporting collar, perforate side plates, and an imperforate top, and a screen disposed between said top and side
75 plates and in the path of the material drawn toward said opening by the suction in said pipe.

In witness whereof, we have hereunto set our hands this 29th day of April, 1911.

ROBERT H. SMITH.
BRADWELL CRASWELL.

Witnesses:

E. W. QUINN,
E. W. W. CAMPBELL.