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PATENTED AUG. 23, 1904.

J. A. CRAWFORD.
SPARK ARRESTER AND FUEL SAVER.

APPLICATION FILED JAN. 6, 1904.

NO MODEL.

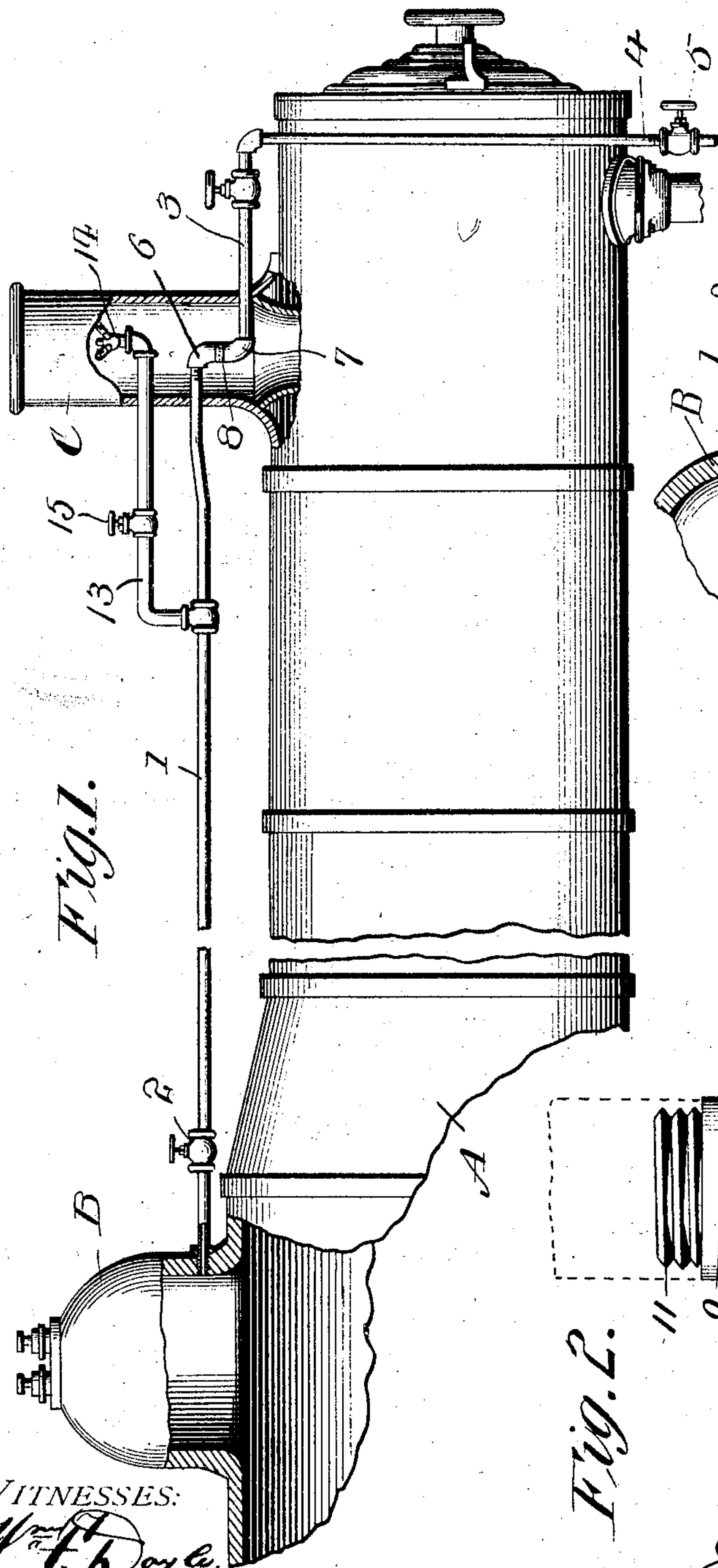


Fig. 1.

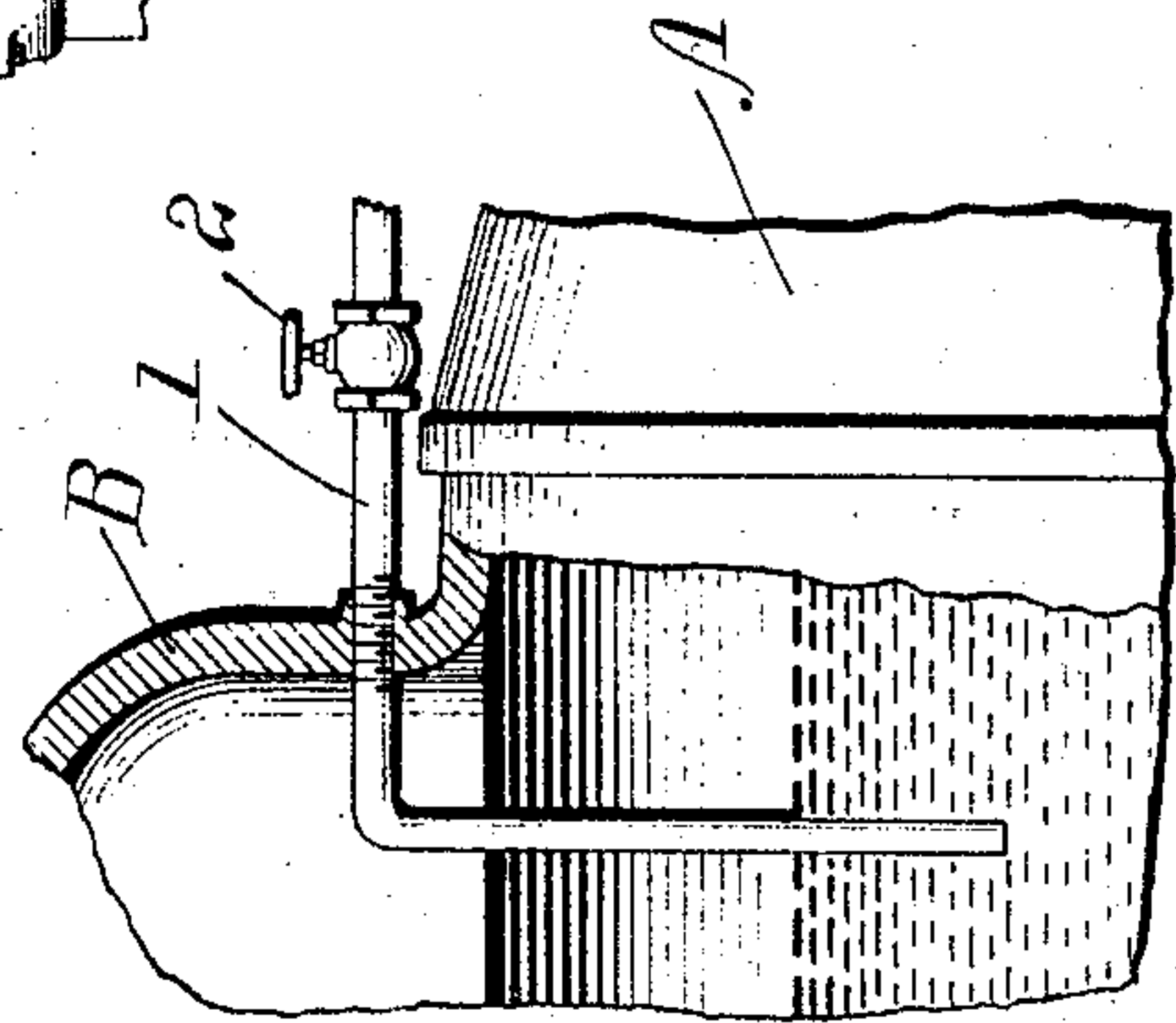


Fig. 3.

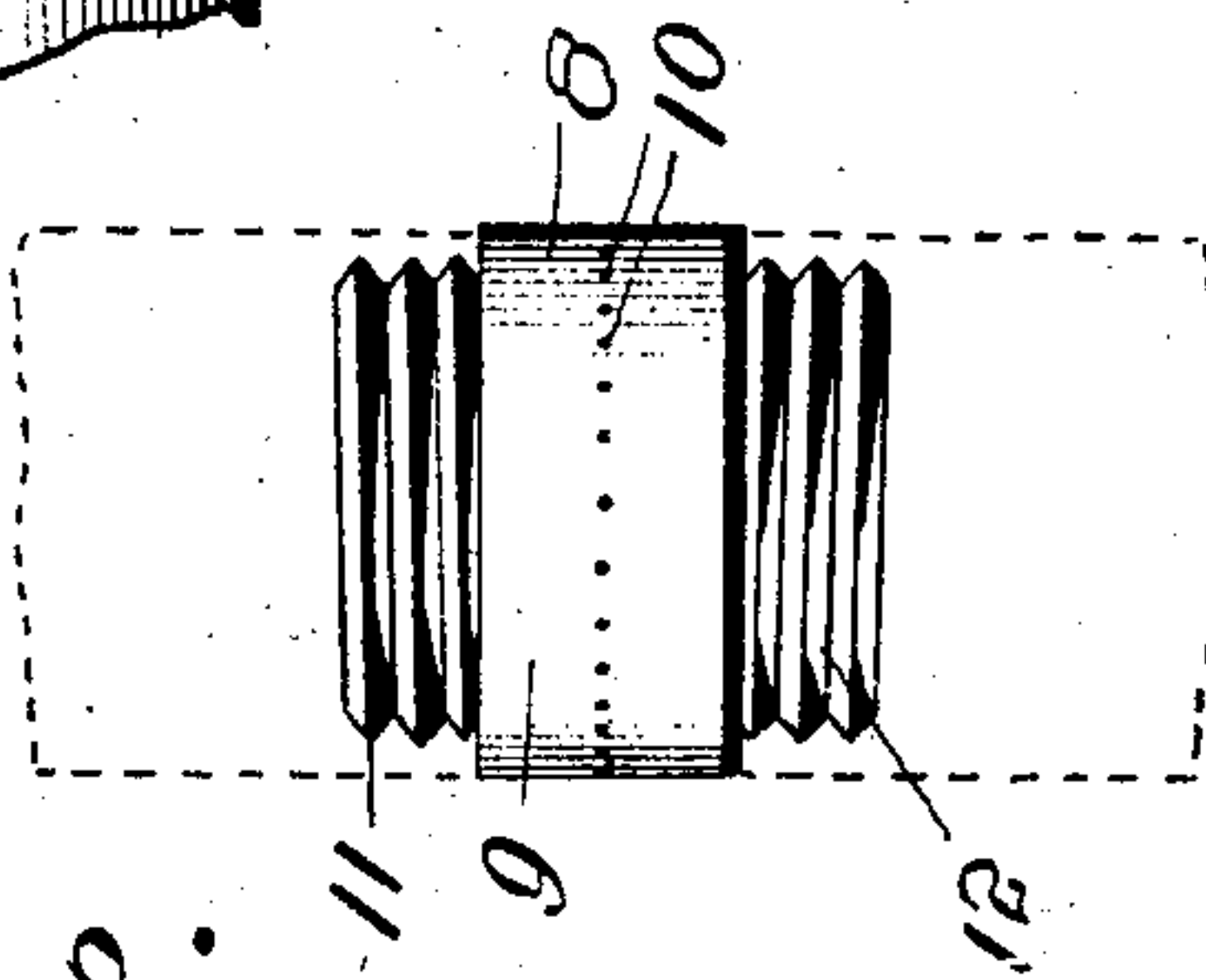


Fig. 2.

WITNESSES:
W. F. Doyle
E. R. Rufford

INVENTOR
John A. Crawford
BY *A. G. Heylman*
Attorney

UNITED STATES PATENT OFFICE.

JOHN A. CRAWFORD, OF ALLEGHENY, PENNSYLVANIA.

SPARK-ARRESTER AND FUEL-SAVER.

SPECIFICATION forming part of Letters Patent No. 768,520, dated August 23, 1904.

Application filed January 6, 1904. Serial No. 187,951. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. CRAWFORD, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Spark-Arresters and Fuel-Savers, of which the following is a specification.

My invention has relation to improvements in spark-arresters and fuel-savers; and the object is to provide a new and improved device for the purposes intended which is of simplified construction and adapted to be disposed in the smoke-stack of a boiler-furnace or in the stack of any style of furnace employed for generating steam for motive purposes.

Another object is to provide and apply this improved means in position to retard the smoke and heat in its progress through the boiler-tubes, and thus cause the soot and dust and heavier materials carried by the currents and smoke into the tubes to be consumed and the heat products to be fully and directly applied to the boiler-surfaces.

Still another object is to combine and associate my improved device with a draft-expediter, which is adapted to be used as occasion may require or the experience of the operator may desire.

I have illustrated the invention as associated with a locomotive-boiler and arranged to take steam from the dome of the boiler and convey it to the device in the smoke-stack and discharge the steam radially through the jet holes or perforations in the thimble or ring. It is readily perceived that the device may be utilized by providing any suitable connection to a steam-space adapted to convey the fluid therefrom to the device and having force or pressure to spray the steam within the stack in the path of the rising currents or drafts, so that when the steam issuing through the jet-apertures encounters the rising fumes, smoke, and sparks it will cause them to be arrested in their ascent and eliminated and at the same time effect a sufficient retardation of the drafts to cause complete combustion of the fuel in the fire-chamber of the furnace, with material reduction in the amount of fuel

consumed. It is apparent that instead of steam from the boiler water therefrom may be used, as indicated in Fig. 3 of the drawings.

I have fully and clearly illustrated the invention in the annexed drawings, to be taken as a part of this specification, and wherein—

Figure 1 is a side elevation of a well-known style of locomotive-boiler, showing the dome of the boiler and the base of the smoke-stack partly in vertical section, so as to disclose the connection of the steam-feed pipe to the dome and the arrangement of the device within the smoke-stack. Fig. 2 is a detail enlarged view of the spraying-ring, thimble, or piece which unites the ends of the feed-pipe and the drip-pipe. Fig. 3 is a detail view showing the delivery-pipe extended below the water-line in the boiler.

Referring to the drawings, A designates a boiler of a well-known make adapted for locomotives.

B designates the steam-dome of the boiler, and C is the smoke-stack. In the shell of the steam-dome B is secured one end of a steam-pipe 1, the other end of the pipe being passed through the wall or shell of the smoke-stack and extended radially to the center or axial line of the stack and is provided with screw-threads on its free end portion. In the pipe 1 is interposed a suitable turning plug 2 or other proper valve, whereby the flow of steam or fluid may be regulated or entirely cut off.

3 designates a pipe let through the shell or wall of the smoke-stack at a point opposite to the entrance of the pipe 1, but on a lower plane, substantially as seen in the drawings, the end portion of the pipe 3 extending into the stack until substantially in vertical alignment with the end of the pipe 1 and is provided with exterior screw-threads on the inner end. The pipe 3 has suitably coupled to its end a depending section or knuckle-piece 4, wherein is a turning plug 5 or other proper cut-off to close, open, or regulate the flow of steam through the pipe. The pipe 3 may be operative to serve the purposes intended of acting as a blow-off pipe and terminate at any point desired in an open end and be provided with a turning plug to control the steam. On the alining ends of the pipes

1 and 3 within the smoke-stack are elbow coupling-pieces 6 7, disposed with their free ends in reverse direction and in vertical alinement, and in these coupling-pieces and closing the space between them is secured the vertically-positioned spraying-section 8. This spraying-section 8 consists of a short ring 9, provided with a series of small steam-apertures or jet-openings 10, extending around it and through which the steam or water is forced in radial jets directly across the smoke-stack and presenting a film or disk of fluid affording sufficient resistance to cause the saturation of all ordinary ascending fumes, sparks, and dust and to arrest and precipitate the fumes, ore-dust, or other unconsumed material accompanying the discharging smoke and at the same time acting to retard the draft sufficiently to produce complete combustion in the furnace and boiler-tubes without detriment to the most favorable caloric results. The ends of the ring or thimble 9 are extended, as at 11 12, and provided with reversely-pitched screw-threads, which engage in the approaching ends of the coupling-pieces of the pipes, so that the spraying-section will stand vertical and in the proper position to throw the steam or water radially and directly across the interior of the smoke-stack.

It may become desirable or necessary to relieve the retardation of the draft through the boiler-tubes and increase the draft through the smoke-stack, and to accomplish this I let into the pipe 1 a pipe 13, which reaches into the smoke-stack, as shown, and on the end within the stack is secured a tripartite jet-piece 14, which delivers steam in upward direction, and thus tends to create an increase of the draft. A turning plug 15 is interposed in the pipe 13, whereby the passage of fluid through the jet-piece 14 may be regulated. It is apparent that the arrangement and direction of the pipes 1 and 3 outside of the stack may be varied or changed to suit the adaptation to other styles of boilers and furnaces so long as the interior arrangement or disposition of the parts within the smoke-stack is maintained.

The smoke being the unconsumed products of combustion travels slower through the channels or pipes than the heat-currents, so that if both emanations—the heat and the smoke—are retarded in their movements or progression the former is given increased opportunity to act on the latter and burn whatever may be consumable therein. This desirable result is attained by the interposition of my improved device. It may be stated also that under ordinary circumstances the pipes used and the spraying-thimble interposed may be from one-half an inch to one inch in diameter.

Having thus described my invention, what I claim is—

1. A device of the character described, consisting of a conduit-pipe extending horizontally into the smoke-stack and stopping at the vertical center thereof, an escape-pipe leading from the center of the smoke-stack and arranged on a different plane from the conduit-pipe, and a vertical coupling-pipe piece uniting the ends of the said pipes and provided with a series of jet perforations, substantially as described.

2. In a device of the character described, the combination with a boiler and the smoke-stack thereof, of a pipe opening from the boiler and projecting through the wall of the smoke-stack to the center thereof, means to regulate the flow of the fluid through the pipe, an escape-pipe leading from the center of the smoke-stack on a lower plane than the inlet-pipe, means to control the flow of the fluid through the escape-pipe, and a vertically-arranged coupling-pipe uniting the ends of the said pipes within the stack and formed with a series of radial steam-jets to spray the steam radially across the smoke-stack.

3. The combination with the smoke-stack, of a steam conduit-pipe let horizontally into the stack and extending to the center thereof, a depending coupling-piece on the end of the pipe, an escape or discharge pipe leading from the center of the stack on a lower plane than the steam-pipe, a vertically-disposed coupling-piece on the escape-pipe within the stack, a vertical spraying-ring section secured between the said coupling-pieces and formed with radial steam-jet apertures, and means in the pipes to control the passage of steam therethrough.

4. The combination with a smoke-stack, of a steam-pipe let horizontally into the stack and extending to the center thereof, a depending coupling-piece on the end of the pipe, an escape or discharge pipe leading from the center of the stack on a lower plane than the steam-pipe, a vertical spraying-piece secured between the said coupling-pieces and formed with radial steam-jet apertures, means in the pipes to control the passage of steam therethrough, a pipe leading from the inlet-pipe into the smoke-stack, a tripartite jet-piece on the said pipe within the stack positioned above the spraying-ring, and means to control the passage of the fluid through the tripartite jet-piece.

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

JOHN A. CRAWFORD.

Witnesses:

AMNON BEHREND,
W. E. WRIGHT.