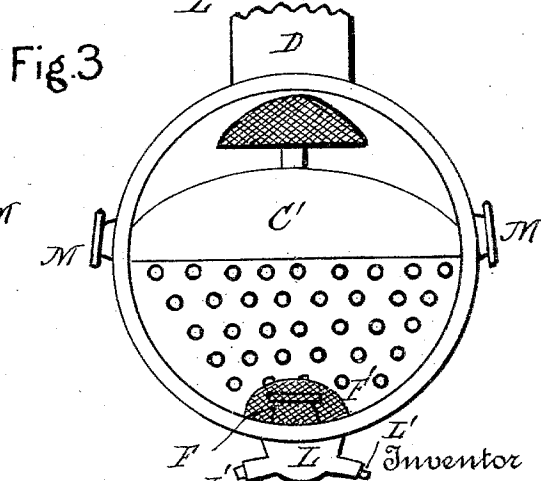
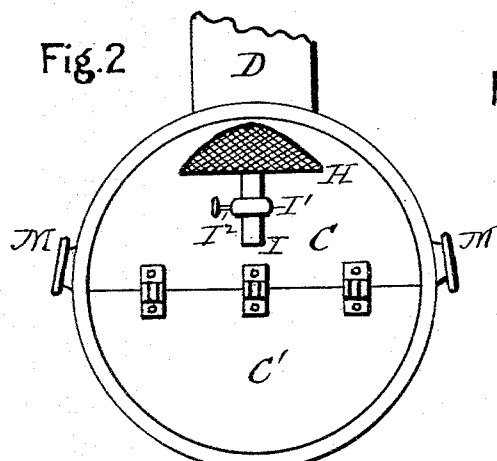
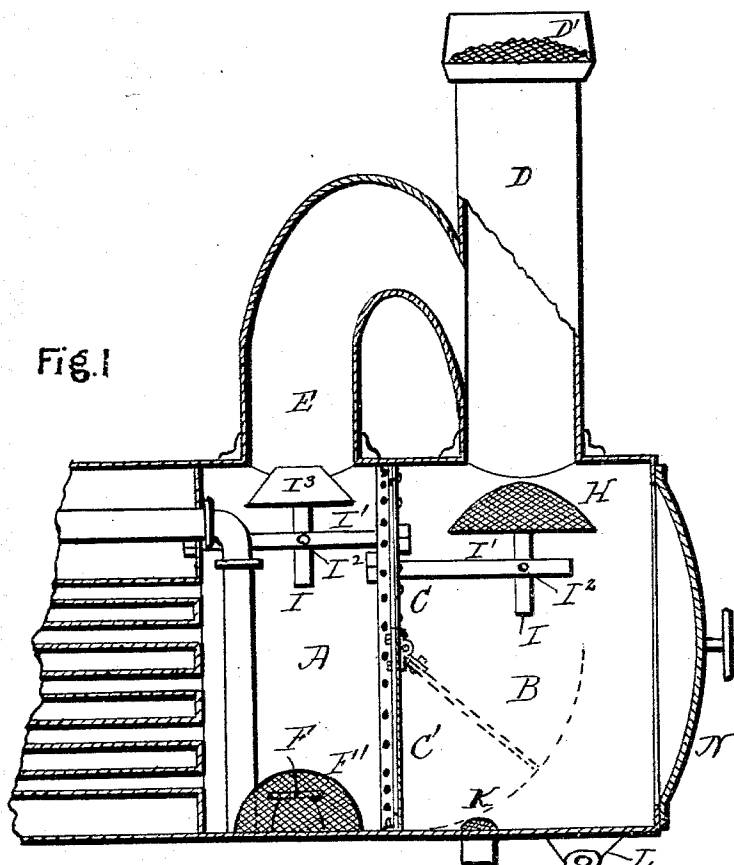


(No Model.)

E. C. R. HUMPHRIES.
SPARK ARRESTER.

No. 546,156.

Patented Sept. 10, 1895.



Witnesses
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EDWIN C. R. HUMPHRIES, OF LEXINGTON, VIRGINIA, ASSIGNOR OF ONE-HALF TO WILLIAM H. GARNETT.

SPARK-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 546,156, dated September 10, 1895.

Application filed March 20, 1895. Serial No. 542,473. (No model.)

To all whom it may concern:

Be it known that I, EDWIN C. R. HUMPHRIES, a citizen of the United States, residing at Lexington, in the county of Rockbridge and State of Virginia, have invented certain new and useful improvements in Spark-Arresters; 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.

The invention relates to that class of devices known as "spark-arresters," and has for its object the more perfect arresting and trapping of all sparks and cinders that may come from the material under combustion, and while being applicable in the construction to new and improved styles of locomotive or other classes of steam-generating boilers may also be readily applied to the old forms with but few alterations or changes and at small cost; and the invention consists in certain novel features in the construction, arrangement, and combination of parts, all as hereinafter described.

In the accompanying drawings, Figure 1 is a longitudinal section of the forward or discharge end of a steam-boiler, showing a portion of the tube or flue head and the smoke flue and stack in section with my improvements applied. Fig. 2 is a front or end view with the door opening from the pilot removed. Fig. 3 is a similar view showing the door or swinging half of the partition which separates or divides the smoke-box and spark or cinder chamber elevated.

The boiler and the several parts, except in the particulars hereinafter stated, may be of the usual or any other desired form.

The space or extension in front of the tube or flue head is divided into two compartments A B by a partition C C', the lower portion C' of which is hinged for adapting it to be swung upward, as shown in dotted lines in Fig. 1 and full lines, Fig. 3, but when closed and the boiler in use, forming a tight seal between the two compartments, being sufficiently braced to resist the force of the heavy exhaust, one of those compartments forming the smoke-box and the other the spark or cinder chamber.

Directly over the spark or cinder chamber and communicating therewith is the smoke-stack D, which is preferably of the standard dimensions, and directly over the smoke-box and also communicating therewith is a discharge-stack E, which extends upward in curved form from the smoke-box and then downward, communicating with the stack near its base or entering said stack at an angle. Nozzles F are located or arranged just in front of the tube or flue head near the level of the lower set of flues, and which nozzles communicate with the steam-cylinders, and through which the spent or exhaust steam is discharged into the smoke-box. These nozzles are made adjustable to permit the same to be raised or lowered as may be found necessary to give sufficient force in the base of the smoke-box to perfectly clear it of sparks and prevent any choking of the nozzles or flues. These nozzles are covered or inclosed by a wire netting or screen F' to form a guard to prevent anything from falling into the nozzles.

Located at the base of the discharge-stack is a cone-shaped deflector or short conical pipe I³, made of such size at its receiving and discharge end as shall be found most desirable, and said deflector or pipe is made adjustable to or from the opening in the discharge-stack, the adjustment and the receiving of the same being effected by means of the rod I, plate or bracket I', and set-screw I². The object of making said pipe adjustable is that it has been found from experiment and from experiment it has been shown that the position of the pipe affects the draft in a marked degree, and that there is less consumption of fuel and better steaming powers are developed in the boiler, and in order to obtain the maximum vacuum from the use of the exhaust said pipe is made adjustable, as above described, in order to obtain the proper position.

The upper end of the smoke-stack is covered by a wire-netting D' for arresting any sparks or cinders that may have accidentally escaped the force of the downward course of the exhaust or may have been drawn upward from any cause whatever.

Located at the base of the smoke-stack is a

hood II, preferably in semispherical form, and composed either of wire or solid cast or sheet iron, which acts to trap the sparks or cinders in the chamber which may be agitated or disturbed by the force of the exhaust coming down the smoke-stack from its junction with the discharge-stack, and this serves to prevent any sparks or cinders that have once entered the chamber from escaping. This hood is also made adjustable for a similar purpose and manner as the deflector or conical pipe.

To prevent the formation of an air-cushion in the spark or cinder chamber, the formation of which would cause or change the force of the exhaust from its downward course into the spark and cinder chamber upward and out at the top of the stack, a valve K is located at the base of said chamber, which is termed an "air-cushion valve," which can be adjusted to any required air-pounds' pressure.

At the base of the spark and cinder chamber, and preferably just in front of the air-cushion valve are arranged, as in the present type of locomotive-engines, twin nozzles L, communicating with pipes which extend out therefrom to the right and left sides of the boiler, and in which pipes are located small steam-pipes L', by which arrangement of parts the cinders may be rapidly and forcibly discharged from the box when it is desired to clean the same, which is accomplished by removing the cap from the nozzle, inserting a discharge-tube, therein, and admitting steam to the small steam-pipes. To further facilitate the removal of the accumulated cinders armholes M are arranged in each side of the spark or cinder chamber, through which to insert a proper implement to loosen up the cinders which may have become packed.

The door N opening to the spark or cinder chamber from the front of the boiler is sealed tight, as in the present form of locomotive-boilers, to prevent the combustion of sparks in the chamber.

The door or hinged portion of the partition separating the smoke-chamber from the cinder and spark chamber is constructed in such manner to permit ready access to the tube or flue head, nozzles, and other parts for repairs or other purposes.

The operation of the parts is as follows: When the engine is in operation, the spent or exhaust steam from the cylinder or cylinders is exhausted through the nozzles in the smoke-chamber, causing the sparks to be drawn through the flues and to be lifted by the force of the exhaust upward through the deflector or conical pipe, which acts to guide or deflect them toward the center of and into the curved discharge-pipe, and when reaching the curved portion thereof the course of the sparks and force of the exhaust is changed downward, causing the sparks and cinders to be driven downward into the spark or cinder chamber

and there trapped, the smoke by reason of the compactness of a certain amount of air in said chamber and the force of the exhaust being driven upward and out at the top of the smoke-stack with sufficient force to clear the train when used with locomotives, the hood II at the base of the stack preventing, as before stated, any sparks or cinders that have once entered the chamber from escaping therefrom.

In applying the device to the present form of locomotive-engines it has been found necessary, consequent to the placing of the stack over the spark or cinder chamber, to move the headlight forward and support the same on brackets as was common before the introduction of what are known as the "extension fronts."

It will be readily seen that the device is applicable to all classes of steam-boilers, either movable or stationary.

I am aware that an adjustable deflector located in the smoke-stack of a locomotive has been used, as shown in patent to Deshon, No. 13,216, July 10, 1855, and this I do not claim.

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

1. In a spark arrester, a smoke compartment located adjacent to the tube or flue head, a spark or cinder compartment stacks communicating with said compartments and with each other, an adjustable deflector or conical pipe located at the base of the stack communicating with the smoke compartment, and a steam outlet located in the smoke compartment, substantially as and for the purpose set forth.

2. In a spark arrester, a smoke compartment and a spark or cinder compartment formed at the end of the boiler, a smoke stack communicating with the cinder or spark compartment, a curved discharge stack leading from the smoke compartment into the smoke stack, a conical pipe located at the base of the discharge stack, a hood located at the base of the smoke stack, and a steam outlet located in the smoke compartment, substantially as and for the purpose set forth.

3. In a spark arrester, the smoke and spark or cinder compartments, a smoke stack located over the spark or cinder compartment, a discharge stack communicating with the smoke compartment, an adjustable conical pipe located at the base of the discharge stack, and an adjustable hood located at the base of the smoke stack, and a steam outlet communicating with the smoke compartment, substantially as and for the purpose set forth.

4. In a spark arrester, the spark and cinder compartments the stacks communicating therewith in combination with the adjustable conical pipe located in the smoke box and the adjustable hood located at the base of the smoke stack, substantially as set forth.

5. In a spark arrester, the smoke and spark or cinder compartments, the stacks con-

5 structed and arranged substantially as described communicating with said compartments and with each other, a steam outlet located in the smoke compartment, and an air valve located in the spark and cinder compartment, substantially as and for the purpose set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

EDWIN C. R. HUMPHRIES.

Witnesses:

C. A. BRADY,
G. W. CULIN.