A. BERNEY.

Spark-Arrester for Locomotives.

No. 163,568. Patented May 25, 1875.

Fig. 1.

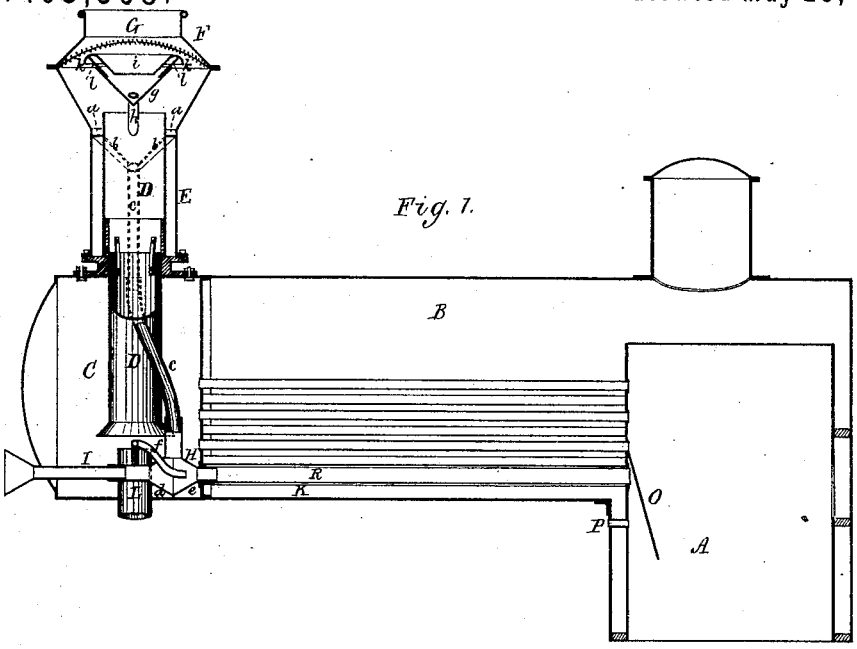


Fig. 2.

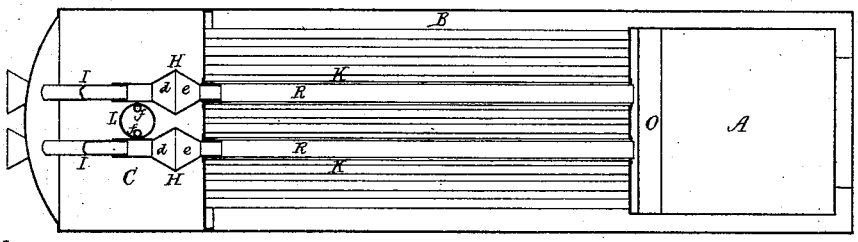


Fig. 3.

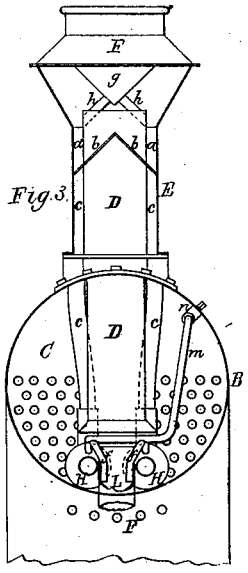
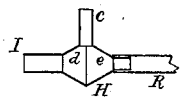


Fig. 4



Witnesses.
S. W Pipes
J. P. Dawson

Alfred Berney.
by his attorney.
R. H. Eddy

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

ALFRED BERNEY, OF SOMERVILLE, MASSACHUSETTS.

IMPROVEMENT IN SPARK-ARRESTERS FOR LOCOMOTIVES.

Specification forming part of Letters Patent No. **163,568**, dated May 25, 1875; application filed January 27, 1875.

To all whom it may concern:

Be it known that I, ALFRED BERNEY, of Somerville, of the county of Middlesex, of the State of Massachusetts, have invented a new and useful Improvement in Railway-Locomotive or Steam Fire-Engines; and do hereby declare the same to be fully described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is a vertical and longitudinal section, and Fig. 2 a horizontal section, of the boiler-furnace, smoke-box, and chimney of a locomotive-engine with my invention. Fig. 3 is a front-end view with the head of the smoke-box off. Flg. 4 is a vertical section of the spark-receiver, its educt, and air-induct, all as hereinafter explained.

My invention has reference to mechanism or means for arresting sparks, cinders, or combustible products in the chimney, and transferring them therefrom into the fire-place, the mechanism or mechanical means which contain my invention, or to which it is applied or is combined, containing a flue or flues leading from the chimney to the fire-box, through which flue or flues the sparks are not driven by continuous action of the steam-blast, but first fall into an annular chamber, and, by the action of a current of air, forced into and through the return pipe or pipes, are drawn from said chamber down one or more pipes connecting it with the return flue or flues, and driven through such flue or flues, which go through the boiler, and to the fire place or box, the said combustible products, gaseous or carbonaceous as they may be, being carried or forced into the fire, to be consumed thereby, in order to be utilized or aid in producing heat.

The purpose of my additions to the mechanism, as aforesaid, is to prevent settlement of sparks or other matters in, or their clogging, each of the return flues, and particularly at and near the junction of each, with the pipe leading down into it, from the receiving or annular chamber, and this I accomplish by means of an enlargement or chamber, and a jet-pipe to lead steam, whether direct or waste, into such chamber to clear it, as may be occasionally or from time to time necessary.

Furthermore, I have arranged in the fire-place, at its back, and in rear of the return flue or flues, an inclined deflector or plate, and have provided the fire-box with one or a series of air-passages, to open outward in advance of the deflector and into the atmosphere, so that one or more currents of air may rush through said passage or passages and impinge against the deflector, in order to be heated thereby, and to preserve it from being burned or injured by the fire, such deflector also being to deflect down into the fire the cinders and gases drawn through the return-flue or flues. The entering air thus heated aids in the combustion of the gaseous or carbonaceous products in the fire-box.

In the drawings, A denotes the fire-box, B the boiler, C the smoke-box, and D the chimney, of an ordinary locomotive-engine. The chimney extends down within and above the smoke-box, and where projecting above it is surrounded concentrically by a casing, E, provided with an open bonnet, F, across which is a concavo-convex wire netting or strainer, G. There is an annular space or chamber, *a*, between the casing E and the chimney C, such chamber, as shown, being provided with a double sloped bottom, *b b*, to lead to two pipes, *c c*, or conduits, that open out of and extend down from the chamber *a*, and to and into auxiliary chambers H H, arranged as shown. I prefer to form each of the said chambers H of two hollow conic frustums, *d e*, united at their bases. Each of these auxiliary chambers opens at one end into one of two air-blast pipes, I I, and at its opposite end into one of two return flues or pipes, K K, that go through the lower part of the boiler, and open into the fire-box or fire-place thereof, all being as shown.

Into the interior of the steam-blast pipe L, that opens into the lower end of the chimney C, I lead two small ducts or pipes, *f f*, and continue them from the blast-pipe L to and into the auxiliary chambers H H of the return flues K K, in manner as shown.

The air-blast pipes I I open through the front head of the smoke-box, so as to lead air from the atmosphere into the duplex conical auxiliary chambers H H, and thence into the return flues K K.

Above the chimney C C, and within the bonnet, is an inverted hollow cone, *g*, supported in position as shown by two pipes, *h h*, opening out of it, and extending from the chimney, the said pipes at their lower ends opening into the annular chamber *a*.

Above the cone *g*, with a space between them, is a hollow conic frustum, *i*, provided with an intercepting and deflecting lip, *k*. The said frustum and lip are supported in position by standards *l*, projecting up from the cone *g*, all being arranged as represented, the frustum being open at its interior base.

The smoke and waste steam, after escaping from the top of the chimney C, flow, or are forced, up outside of the cone *g*, and the sparks, striking against the lips *k*, fall down into the said cone, then pass from the cone down through the pipes *h h* into the annular chamber *a*. The combined smoke, gases, and steam escape up through the frustum *i*, and the wire netting of the bonnet, freely.

In each of the return flues K I place a movable interlining or guard-tube, R, to extend from one end of the return flue to the other, and to fit thereto. This auxiliary tube is to save the flue from wear and injury by the sparks.

After the guard-tube may have become worn by the heat and sparks, I extract it from the return-flue and substitute another. This saves all necessity of removing the return-flues from the boiler and substituting others.

The said guard-tube R is for use with the said flue K only when the latter is combined with means, substantially as described, for drawing the sparks into and through the flue, and thence into the fire-box, to be there consumed. It is found in practice that a flue under such conditions is readily worn by the sparks, and to be kept in order it must be reenforced by the tube R.

Instead of the jet-pipes to lead from the waste-steam blast-pipe to the auxiliary chambers H H, a conduit to lead steam from the steam-space of the boiler to such chambers may be employed, or such conduits from the steam-space may also be used with those leading from the said blast-pipe. In the drawings the said conduit is shown at *m*, such being provided with a cock, *n*, to close or open it.

While the engine may be advancing on a railway, air will be caused to pass through the air-inducts I I, and thence into and through the auxiliary chambers H H, and thence into and through the return-flues, such currents of air inducing currents down the educts *c c* of the annular chamber *a*, and thereby drawing with them the sparks or combustible products of such chamber down into the chambers H H, and expelling them therefrom through the return-flues K K.

The steam-jets let into the auxiliary chambers serve to free them of any sparks or waste matters that may be in them, or be disposed to remain in them, and will, when the jets are not over three-quarters of an inch in diameter, aid combustion very much.

Generally speaking, the chambers alone will prevent the gathering of sparks, and choking the return-flues at their junctions with the pipes *c c*. I have found that without such chambers combined and arranged with the pipes *c c*, the air-blast pipes I I, and the return-flues K K, clogging of the return-flues will immediately follow.

The jet-pipe from the boiler steam-space to the auxiliary chamber H enables me to clear the chamber when the engine may be either at rest or retrograding, the clearance while the engine may be advancing being effected by the steam deflected into the chamber from the steam-blast pipe. Such steam will also prevent smoke from issuing from the stack, and when let in in large quantities will deaden the fire.

At the back of the fire-place, and with respect to the rear ends of the return-flues, as shown, there is an inclined plate or deflector, O, in advance of which, and through the back of the fire-place, and to open into the atmosphere under the boiler, are one or more tubes or air-passages, P, such being to let air in upon the deflector, so as to be heated thereby, and to preserve it from injury by the fire. The air in thus entering and impinging against the deflector becomes heated by the abstraction of heat from the deflector, and aids in combustion of the smoke and gases.

I do not claim, in connection with a return-flue and a boiler, a pipe to lead steam into such flues, all being as shown in the United States Patent No. 142,308, in which case there is no air-blast pipe like my pipe I to connect with the return-flue, nor is there any enlargement or chamber like the chamber H, as hereinbefore described.

I claim—

1. The combination of the enlargement or auxiliary chamber H with the air-blast pipe I, the return-flue K, and the conduit *c* from the annular chamber *a*, such chamber surrounding the chimney, and being provided with means, as described, for intercepting sparks from the chimney and deflecting them into it, the said chamber, in order that they may be drawn from it by the air blast or current into the auxiliary chamber, and from thence forced by said blast into and through the return-flue K, and thence into the fire-place.

2. In combination with the enlargement or chamber H, spark-induct C, the air-blast pipe I, and the return-flue K, applied to a boiler and its smoke-box, as set forth, a pipe or pipes, *f* or *m*, to lead steam from the steam-blast pipe, or from the steam-space of the boiler, or both, into the said chamber H, all being substantially and for the purpose as described.

3. The combinatiou, with the deflector, arranged in the fire-place, and with the rear ends of the return-flues, as shown, one or more air-inlets, P, arranged in advance of the deflector, all substantially as and for the purposes set forth.

4. The re-enforce guard-tube R, in combination with the return-flue K, the blast-pipe I, and the conduit *c*, to lead the cinders from the chimney down into the pipe K, all being substantially as described.

ALFRED BERNEY.

Witnesses:
R. H. EDDY,
J. R. SNOW.

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