(No Model.)

J. B. BARNES.

SPARK ARRESTER.

No. 403,984. Patented May 28, 1889.

Fig. 1.

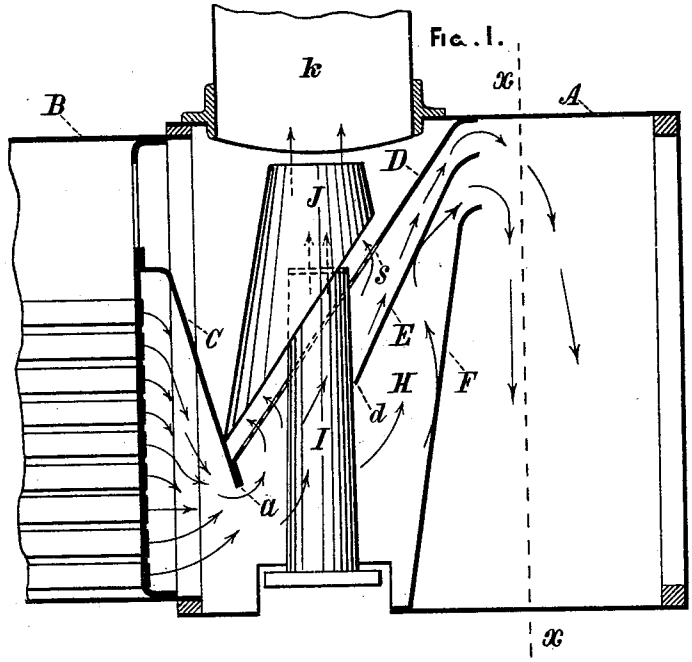
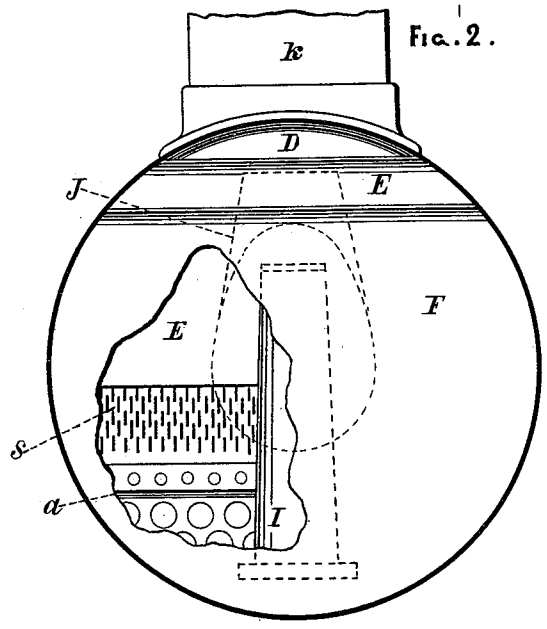


Fig. 2.



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JOSHUA B. BARNES, OF SPRINGFIELD, ILLINOIS.

SPARK-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 403,984, dated May 28, 1889.

Application filed February 4, 1889. Serial No. 298,647. (No model.)

To all whom it may concern:

Be it known that I, JOSHUA B. BARNES, of Springfield, in the county of Sangamon and State of Illinois, have invented a new and Improved Spark-Arrester; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to an improvement in spark-arresters for locomotive and other boilers.

The prime object of my device is to arrest the sparks and cinders as they issue from the flues and project them by the action of the draft into a receptacle of large capacity, so constructed and located in the smoke-box that however full it may be its contents will be protected against disturbance by direct or reactionary currents of air induced by the draft.

A further object of my device is to provide means for strengthening the draft in the lower part of the smoke-box and to check its force near the exhaust-nozzles, where it would have a tendency to draw the sparks through the screen.

In addition to the above, a still further object of my device is to improve the effectiveness of what is commonly termed the "petticoat" or "lifting" pipe, which is simply a short conical tube supported above the exhaust-nozzles, so as to form a draft-concentrator.

With these ends in view my invention consists, essentially, of a novel combination and disposition of curved deflectors and screen, one of the deflectors being so located as to divide the smoke-box into two compartments, one of the latter serving as a receptacle for cinders and sparks, the other filling the office of an auxiliary draft-concentrator, in which the cinders and sparks are lifted and impelled by the draft with such initial velocity that their own momentum will project them beyond the reach of the draft against curved deflectors, by which they are thence directed into the ash-bin.

My invention further consists in the employment of a curved imperforated deflector interposed between the partition which separates the ash-bin from the rear of the smoke-box and the inclined screen, so as to intercept the sparks that rebound from the partition toward the upper part of the screen.

My invention still further consists in giving to the lifting or petticoat pipe such basal form that its effectiveness is more advantageously distributed over the screen than heretofore.

The details by which I accomplish these ends are more fully explained in the following specification and illustrated in the accompanying drawings, in which—

Figure 1 is a side sectional view of the flue end of the boiler and smoke-box, taken in the line of their axes, but showing the exhaust-pipes and the petticoat-pipe in full. Fig. 2 is a front end view of the smoke-box, taken in the line x x, showing the interior arrangement of deflectors and screen.

Referring to the drawings, A represents the smoke-box; k, the smoke-stack; B, the flue end of the boiler, and C a baffling-plate of the ordinary form, secured to the upper part of the flue-plate. To the lower edge, a, of said baffling-plate is secured the lower edge of a screen, S, inclined upward and forward, and having its upper edge secured to the lower edge of an inclined imperforated curved deflector, D, fitting and secured to the upper internal part of the smoke-box, a little forward of the smoke-stack. Said screen may be a perforated steel plate or a wire-netting, but in either case so located and connected with the deflector D that the latter will constitute an imperforated continuation of the screen, adapted to fill the office of a deflector, the screen being made to closely fit the sides of the smoke-box, to which it is secured by angle-irons and rivets or other suitable means.

Through an aperture in the central part of the screen project vertically the nozzles of the exhaust-pipes I, above which is suspended a petticoat-pipe, J, the lower part of which is sloped, as shown in the drawings, so as to coincide with the inclination of the screen, a little above which it is located.

Secured to the shell of the smoke-box, and calked air-tight as far as it reaches round, is a transverse inclined partition, F, which separates the forward part of the smoke-box from the rear part and adapts it for use as an ash-bin, and also fills the office of a deflector, to assist in directing the sparks and cinders upward as they issue from beneath the baffling-plate C.

To strengthen the draft in the lower part of the smoke-box, so as to give to the sparks and cinders the greatest possible initial velocity in order to project them, by their acquired momentum, beyond the influence of the draft and into the ash-bin, and also to intercept and conduct into the ash-bin the sparks and cinders that rebound from the partition-deflector at such an angle that they would, if unintercepted, strike the upper part of the screen and break up into fragments small enough to pass through the perforations or meshes of the screen, there is interposed between the deflectors D and F a third curved deflector, E, of the form and located about as shown in the drawings. For the purpose of still further intensifying the draft in the lower part of the smoke-box, the basal part of the petticoat-pipe is, as already stated, shaped to conform to the inclination of the screen.

It will be noticed that the forward inclination and curved upper part of the deflector F are both such as to prevent any draft interference with the contents of the ash-bin, however full it may be, thus doing away with the necessity for discharging it as frequently as heretofore, and, further, the ashes and sparks, being beyond the reach of air-currents, are not only quickly extinguished, but are also protected against either direct or indirect currents of air that would agitate them, and, finally, by abrasion so reduce them in size that they would be drawn through the openings in the screen and ejected from the smoke-stack.

The contents of the ash-bin may be discharged through an opening in the bottom closed by a sliding door, or through any other convenient outlet. The operation of emptying the ash-bin, as will be readily seen, is greatly facilitated by its form, being much wider at the bottom than at the top.

In Fig. 1 the arrows indicate the course of the products of combustion after they issue from the flues, the long arrows representing the heavier or solid products and the short ones the gaseous or lighter products. Now it follows that the gaseous products will be much more sharply deflected as they issue from beneath the baffling-plate than the solid and heavier products. Consequently the latter sweep round upon an arc of longer radius, and in so doing the greater part of them impinge upon the deflector F, from which they rebound at various angles across the auxiliary draft-concentrator H, and a portion of them would but for the interposition of the deflector E, by which they are again projected forward and upward, be impelled at point-blank against the screen, and consequently some of them through it, instead of over the top of the deflector F into the ash-bin.

The lighter portion of the sparks and cinders, sharply deflected upward on issuing from the lower edge of the baffling-plate, impinge upon the screen so obliquely that they cannot get through the openings, and consequently roll or slide upward against its face until they reach the imperforated curved deflector D, by which they are hurled forward into the ash-bin.

It will be observed that the inclination of the deflectors F and E toward each other and toward the upper imperforated part of the screen or deflector D produces an effect below the screen analogous to that produced above it by the petticoat-pipe, the former conducting the sparks and cinders into the ash-bin, while the latter draws off the waste gaseous products and ejects them into the smoke-stack, from which they are discharged by the draft or blast.

I am well aware that numerous inventions have from time to time been put forth for the accomplishment of the same purpose for which my device is designed; but I am not aware that any contrivance has ever before appeared which so effectively separates the sparks and cinders from the waste gases of combustion and deposits them in a receptacle, in which they may be allowed to accumulate in large quantities, and yet be completely protected against agitating air-currents, as by the device here presented.

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

1. In the smoke-box of a locomotive or other boiler provided with a partition-deflector, F, a baffling-plate, C, screen S, and deflector D, the three latter parts connected together and having positional reference to the deflector F, as herein described, the combination, with said parts, of an inclined deflector so interposed between the screen and the deflecting-partition F as to form with the screen and the deflector D a passage adapted to conduct the sparks and cinders that roll or slide up the face of the screen into the ash-bin, the interposed deflector being also adapted to intercept and conduct into the ash-bin the sparks and cinders that rebound from the partition-deflector, substantially as and for the purpose herein set forth.

2. In the smoke-box of a locomotive or other boiler provided with an inclined screen adapted to arrest the sparks and cinders, and so located that the exhaust-pipes project verti-

cally through its central part, the combination, with said screen, of a petticoat-pipe having its base sloped so as to coincide with the inclination of the screen and located slightly above it, substantially as shown, and for the purpose herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 17th day of January, A. D. 1889.

JOSHUA B. BARNES.

Witnesses:
C. F. LAPE,
S. W. JEFFERY.