J. R. FISH.

Locomotive Smoke-Stack.

No. 215,342. Patented May 13, 1879.

Fig. 1.

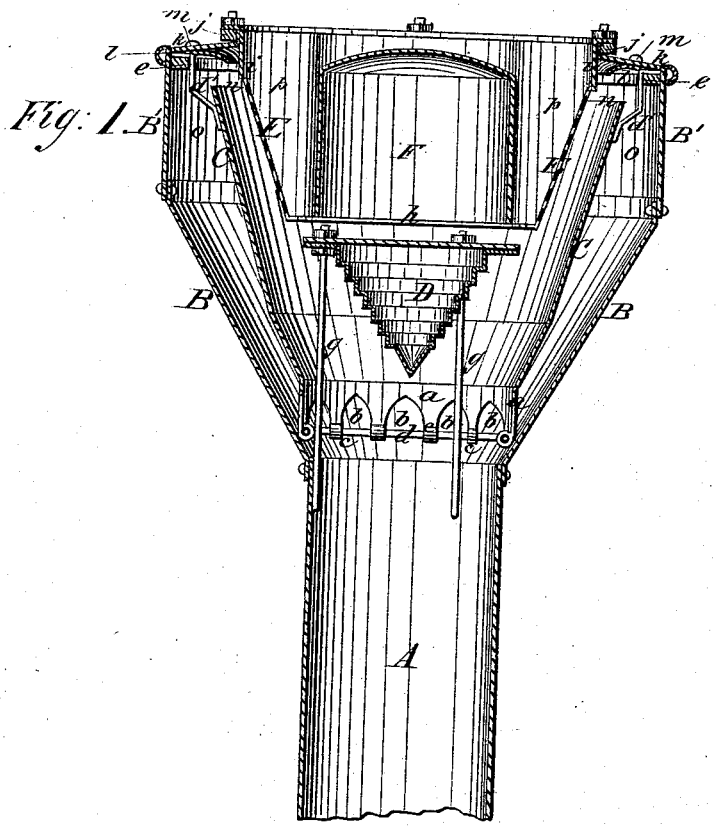
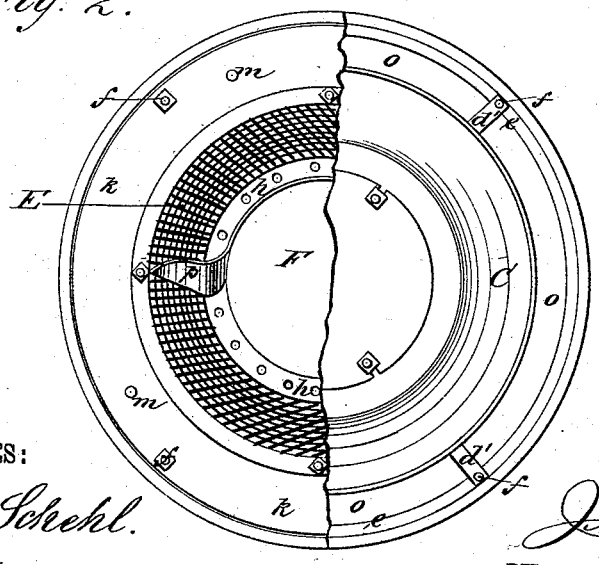


Fig. 2.



WITNESSES:

Achilles Schreckl.

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INVENTOR:

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UNITED STATES PATENT OFFICE

JOHN R. FISH, OF GRAND RAPIDS, MICHIGAN.

IMPROVEMENT IN LOCOMOTIVE SMOKE-STACKS.

Specification forming part of Letters Patent No. **215,342**, dated May 13, 1879; application filed March 13, 1879.

To all whom it may concern:

Be it known that I, JOHN R. FISH, of Grand Rapids, in the county of Kent and State of Michigan, have invented a new and Improved Smoke-Stack for Locomotives, of which the following is a specification.

My invention relates particularly to the arrangement of the spark and cinder deflectors and the shield for preventing back draft from the exhaust-steam and currents of air, the objects whereof are to arrest the ejection of sparks and cinders, and to deliver them back into the stack; also, to prevent the exhaust-steam from interfering with the draft or currents of air when the engine is running rapidly from driving down the stack, and causing back drafts.

The invention will be first described in connection with the drawings forming part of the specification, and then particularly ascertained in the claims.

In the accompanying drawings, Figure 1 is a vertical section of a smoke-stack provided with my improvements; and Fig. 2 is a top view or plan of the stack, a part being removed to expose the interior arrangement.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the straight part of the stack extending up from the locomotive, and joining the inverted conoidal head B, the base whereof joins the crown B′. The parts B B′ form the shell or jacket of the stack inclosing the deflectors, spark-arresters, and other interior parts.

C is the outside deflector, conoidal in form, placed within the shell in an inverted position, extending from near the top of the crown downward, at any suitable angle, nearly to the junction of the shell with the straight part A of the stack, joining at this point a flange, *a*, provided with openings *b*, while the points *c* between the openings are bent around the hoop *d*, fixed to the stack. At the top of the deflector are fastened angular supports *d′*, the upper ends being secured to the purfling *e*, fixed to the inside of the crown B′. The hoop *d* and supports *d′* sustain the deflector C within the shell.

D is a pyramidal deflector, supported in an inverted position by rods *g*, attached at their lower ends to the inside of stack A, and their upper ends bolted to the base of the deflector D, whereby it is sustained in a central position within the stack.

Above deflector D is a wire screen spark-arrester, E, the lower edge joined to a circular plate, *h*, while the upper is joined to a flange, *i*, extending from a line just above the upper edge of deflector C to a point or line above the top of the shell, and having its upper edge turned over and bolted to an inclosing-ring, *j*, which, in turn, is attached to a collar, *k*, covering the space between the flange *i* and the crown B′.

Under collar *k* is an annular concave deflector, *l*, extending from the exterior of flange *i* near its bottom edge to the collar *k* beyond the line of the top of deflector C, and secured to said collar by rivets *m*. This furnishes an outwardly-deflecting surface over the opening *n*, between the deflector C and the spark-arrester E, whereby sparks and cinders carried up between the spark-arrester and deflector pass out of the opening *n*, and, striking the deflector *l*, are thrown outwardly beyond deflector C into space *o* between the shell and deflector C.

F represents a circular dome or shield rising from the plate *h*, within and concentric to spark-arrester E, to a height above the edge of same. Wings *p p* extend from this shield on either side to the spark-arrester, and from the bottom plate, *h*, above the top of the shield, thus dividing the hollow conical space within the spark-arrester diametrically.

The purpose of the shield and wings is twofold: first, to prevent the exhaust-steam from driving across from side to side, or forming a vortex within the stack, and thus interfere with the draft; secondly, to prevent currents of air, when the engine is running at high speed, from driving down the stack, and thus create a back draft.

Ample draft-space is allowed through the meshes of the spark-arrester E; but incandescent sparks and cinders carried up by the draft and exhaust-steam strike the pyramidal deflector D, and by the violence of the concussion are broken and shattered; thence they are carried up between deflector C and the spark-arrester, and passing out of the opening *n* impinge upon the concave surface of de-

flector *l*, whence they are deflected outwardly beyond the top of deflector C into the space *o* between the shell and deflector C, and falling through said space into the openings *b* in flange *a* are delivered back into stack A, and follow this course until reduced to ashes, and pass through meshes of the netting or spark-arrester with smoke and steam. The effect is to prevent the ejection of live sparks and cinders from the stack without, however, interfering with the draft.

In using this stack it is made necessary to enlarge the exhaust-nozzles from one-fourth ($\frac{1}{4}$) to three-eighths ($\frac{3}{8}$) of an inch in diameter, on account of a more perfect vacuum being formed in the smoke-box; also, the petticoat or lifting pipe over the exhaust-nozzles in the smoke-box must be shortened at the top end, so as not to stand more than two inches above the line of the upper row of tubes. There must be two and a half ($2\frac{1}{2}$) or three (3) inches of space between the top of the exhaust-nozzles and the lower edge of the said pipe, otherwise there will be too much draft through the lower flues.

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

1. The combination, in a smoke-stack, of the straight part A, conoidal head and crown B B′, the deflector C, provided with openings at the lower end, the deflector D, and the wire screen having dome F, as shown and described.

2. The wings *p*, dividing the space within the spark-arrester E diametrically, in combination with spark-arrester E and shield F, to prevent interference with the draft by the exhaust-steam and back drafts from currents of air drawn into the stack, substantially as described.

JOHN RANDOLPH FISH.

Witnesses:

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JOHN A. W. BOSSLER.