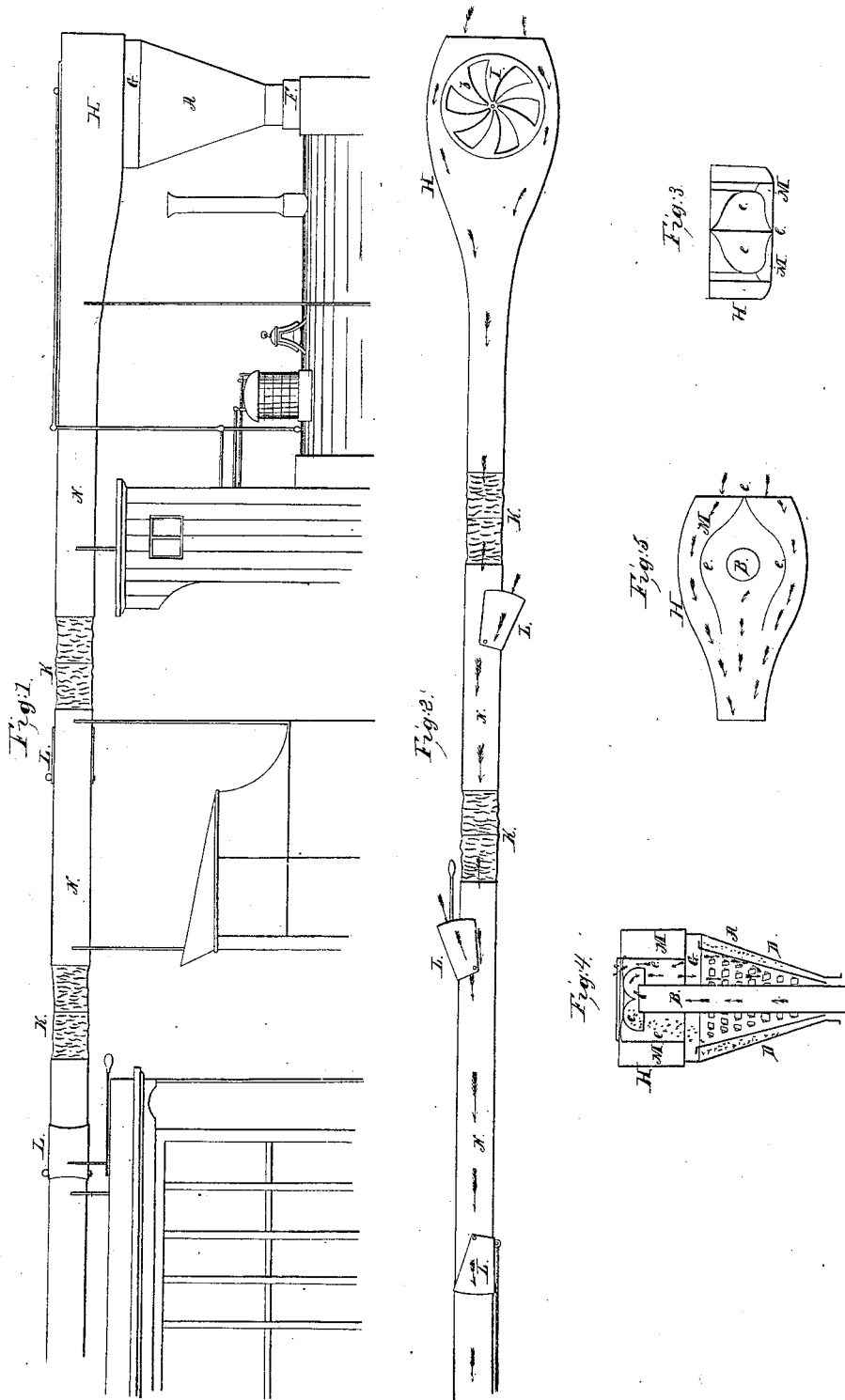


J. F. FLAGG.  
CHIMNEY AND SMOKE CONDUCTOR FOR LOCOMOTIVES.  
No. 6,637. Patented Aug. 7, 1849.



# UNITED STATES PATENT OFFICE.

JOSIAH F. FLAGG, OF BOSTON, MASSACHUSETTS.

## LOCOMOTIVE SPARK-ARRESTER AND SMOKE-CONDUCTOR.

Specification of Letters Patent No. 6,637, dated August 7, 1849.

*To all whom it may concern:*

Be it known that I, JOSIAH F. FLAGG, of Boston, in the county of Suffolk and State of Massachusetts, have invented a Chimney and Smoke-Conductor for a Locomotive Steam-Engine, and that the following description, taken in connection with the accompanying drawings hereinafter referred to, forms a full and exact description of the same.

I. The whole chimney is made of sheet iron of suitable thickness to insure the strength required.

II. The lower half of the chimney, from the part where it is attached to the upper side of the smokebox and cinder box is similar in its exterior form to those in common use on many of the railroads in this country, as shown in drawings Nos. 1 and 4 A. It is conical, about five feet high, one foot and a half in diameter at its lower end, and diverging to a width of about four feet at its upper edge which is terminated by a vertical rim of about six inches in width. See drawings Nos. 1 and 4, G.

III. Within the above described outer case, a circular partition is placed, corresponding to it in form but of smaller dimensions, and having a horizontal rim extending outward from its upper edge. This partition is so suspended and adjusted by its rim's resting against the sides of the outer case A, that there is a space, all around between it and the case, of about three or four inches at the top, and one or two inches at the bottom. This partition, which I call the colander, is designed as an improvement upon and a substitute for the perforated sheet iron or wire netting heretofore used in the same situation, yet it is not intended that it should operate like either of these, by arresting the passage of the large cinders in their course with the smoke and steam, but to disengage them from this situation, and direct them into the space above mentioned between the colander and the sides of the chimney, whence they will be driven, by each jet of waste steam, into the cinder box. The colander is perforated, in its whole surface, by successive rows of oblong slits arranged either horizontally or obliquely. From the lower edges of these openings, (which should be about two inches in width and from three to five in length), project flanges or leaves which are designed to aid in directing the cinders as above de-

scribed. These flanges, which slope obliquely upward from the inner surface of the colander, are continued obliquely downward from the outer surface, for the purpose of arresting any reverberatory motion of the cinders. See drawing No. 4, D.

IV. The upper half of the chimney, on account of its structure and use, I call the inhaler. Its form is oblong and four sided. It is open at each extremity. The forward opening—the mouth of the inhaler—should measure about three feet by one foot and a half; the backward opening, about fourteen inches square. The vertical sides should be about eighteen inches high, and the upper and under sides, across their anterior, broadest part, should measure the same as the largest diameter of the lower half of the chimney. For an illustration of these proportions, see drawings Nos. 1, 2, 3, 4, 5. The inhaler is placed horizontally upon the lower division of the chimney, and is secured to its vertical rim marked G, in drawings Nos. 1, and 4. The upper and under sides have circular openings at their widest part, about three feet in diameter; the under one to form a communication with the great cavity in the lower half of the chimney, and the upper for the adjustment of a common circular register. See drawing No. 2, I. This register is arranged so as to be under the management of the engineer. It is designed to be kept open, while the fire is kindling, and while the engine is moving very slowly, or backing; but to be closed, when it is at full, or ordinary speed.

V. The smokepipe—a funnel which is about one foot in diameter, passes, from its connection with the smokebox of the engine, through the center of the chimney, nearly to the upper side of the inhaler, allowing room only for placing the deflector and a space for the smoke to pass freely above it and out at the open register. See drawings Nos. 4, and 5, B.

VI. Between the top of the smokepipe B, and the under surface of the circular register I, within the inhaler, is suspended, horizontally, a circular iron cap called a deflector, which is firmly secured in its place by an iron bar which is attached to the vertical sides of the inhaler. The deflector is greater in circumference than the smokepipe; and is deeply concave on its under surface, except at the center where it

projects in the form of an inverted cone. This iron cap is designed to meet the upward jet of stream, smoke and cinder, and give these all a curved direction outward and downward on all sides into the main cavity of the chimney. See, in drawing No. 4, *c*, a vertical section of the deflector, and the course of the smoke and steam as marked by the arrows. That part of the smokepipe which ascends through the inhaler is partially inclosed on the front and sides by two upright partitions which meet in a vertical line at the middle of the open front of the chimney—the mouth of the inhaler—and pass around by the edge of the circle which bounds the register, and that of the corresponding circular opening below, leaving ample space between their back edges, for the egress of smoke and steam, and on each side, for a current of air through the whole length of the inhaler. See Figs. 3, 4, 5, *e*, *e*, (*M*, *M*).

VII. The remaining part of the apparatus consists of a set of funnels (made of sheet iron, copper or other suitable materials) designed to conduct all smoke, waste steam and fine cinder from the chimney over the tender and cars to the end of the train. See drawings Nos. 1, 2, *N*, *N*.

Each car has a funnel extending the whole length of the top, and suitably supported on the middle of the roof. This funnel is furnished, at each extremity, with an elastic or flexible portion extending to a proper length beyond the ends of the car, so as to meet and be readily coupled with that of the adjoining car, and be as readily detached when the cars are separated, without requiring any especial attention. These flexible terminations of the funnel are made of iron wire, or narrow strap-iron, wound into a cylindrical form, and covered with vulcanized india rubber cloth, or with any other sufficiently incombustible and pliable envelop. See drawing Nos. 1, and 2, *K*, *K*. For the purpose of increasing the draft through these funnels, each one has two or more circular holes on both sides of it nearly as large as its diameter will admit. Broad covers, which I call inhaling valves are adjusted to these openings, which shut over the whole width of the funnel and are hinged to the center of it by means of an iron pin which passes perpendicularly through it and is secured by a screw-nut beneath. By this arrangement, the valves are made to swing horizontally, and when open, to form lateral gorges for introducing currents of air which will be produced by the speed of the locomotive and train. By an alternate change in the arrangement of these valves, one half of them open toward one end of the car, and the others toward the opposite end; and each set of them being attached to a movable bar or register,

may be opened or closed at once, either set being opened for use, according as one or the other end of a car is required to go foremost when attached to the locomotive. See drawings No. 5, *L*, *L*.

VIII. The operation of this chimney and smoke conductors, and the objects to be obtained by the use of them, are as follows. While the fire is kindling, the engine at rest, and the circular register on the top of the chimney is open, the course of the draft will be directly from the fire box through the flues which perforate the boiler to the smoke box, thence through the smokepipe *B*, around the deflector to the open top of the chimney. When the engine commences moving, and until the speed is so increased as to produce a current of air through the inhaler and funnels, the course of the smoke and steam will remain the same in a great measure, but a part will pass out behind the smokepipe into the funnels, through the space left between the back edges of the vertical partitions in the inhaler. As soon as the locomotive is at ordinary speed, the register is to be shut. The course of the smoke and steam will then be upward through smokepipe *B*, at the top of which it will be thrown back by the deflector *c*, into the main cavity of the chimney. By this recurrence of the smoke and steam, all the cinders passing with them will be thrown with force against the surface of the colander *D*. The largest of them will be caught by its flanges and directed through the slits into the cinder box, as explained in section III, of this specification; the finer cinders will be forced upward again with the smoke by each jet of waste steam, and these all will pass backward into the funnels, and will be urged onward in this movement to the end of the train by the aid of currents of air through the inhaler and the open valves *L*, *L*.

The advantages which I expect to gain by the operation of my chimney and its appendages, over all others hitherto in use, are: 1st., that the heavy cinders will be principally collected in the cinder box. 2d., all the cinders which ascend after they leave the smokepipe will pass off so enveloped in the condensing steam as to be soon quenched; and hence the liability to set fire by them to buildings, forests and other combustible property on the road, in very dry seasons will be wholly prevented. 3rd., all the inconvenience and danger to which passengers are exposed from the smoke, dust, and cinders, even ignited cinders, which not only set fire to their clothes but burn their eyes, will be entirely removed. There will also be much saving from injury to the furniture of the cars, as all the smoke, dust and carbon which is showered into them from the chimneys now used, will

be confined in the funnel to the end of the train. 4th., another advantage, and a very important one, which I expect to gain, is a greater draft than has ever been obtained

5 with any locomotive chimney, and a consequent increase in the productions of steam; and this, by the great current of air which will rush in through the inhaler and the whole horizontal apparatus, and by  
10 other currents which will enter with the same pressure through the lateral gorges of the funnels, the tendency of which will be to produce a partial exhaustion in the main cavity of the chimney, as shown by the direction of the arrows in drawings Nos. 2,  
15 and 4, and described in Section VI.

This chimney may be used for the engines attached to merchandise trains, without the funnels, or with only as much as  
20 shall be found requisite for quenching the ignited cinders by the condensed steam.

I claim—

1. In combination with a deflector (c) for directing downward the current of the  
25 sparks, in a locomotive chimney, the inverted conical jacket or colander (D) when perforated with horizontal holes and each hole furnished with flanges which project upward within and downward on the out-  
30 side of said jacket, whereby the sparks are directed down into the space between the

jacket and the outer case of the chimney, and are prevented from rising upward as herein set forth.

2. I also claim in combination with a 35 horizontal chimney for locomotives, the mouth piece or inhaler, having two upright partitions meeting in an edge or vertical line at the front whereby the two parts of a divided current of air are made to pass 40 around the sides of the interior chimney, and to unite beyond the opening which gives exit to the smoke or gases in such manner as to augment the draft of the horizontal flue, while avoiding the entrance 45 of the air to the vertical part of the chimney.

3. I also claim in combination with a horizontal flue for locomotives, the movable inhaling valves, L, L, which form the 50 lateral gorges for the purpose of creating draft within the horizontal flues, in the manner and for the purposes herein set forth, whereby the amount of draft may be increased or diminished at pleasure whether 55 the cars move with one or the other end foremost.

Boston June 23d., 1849.

J. F. FLAGG.

Witnesses:

J. F. B. FLAGG,

J. C. NEILSON.