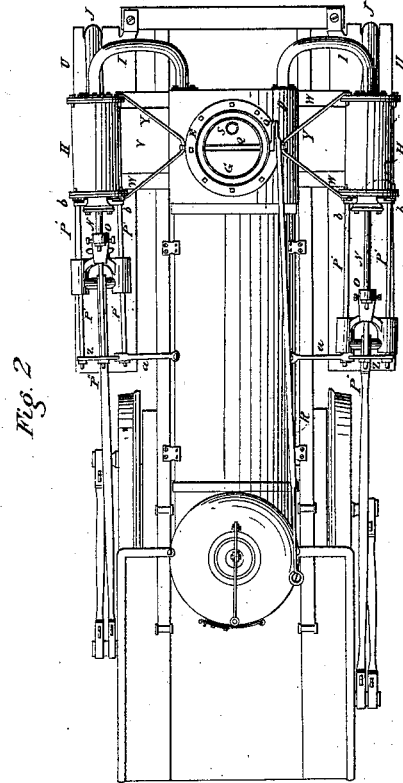
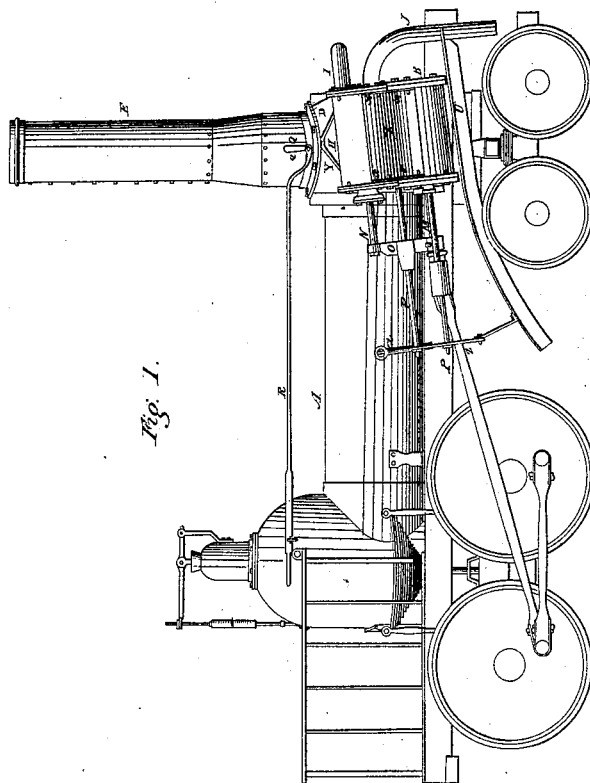
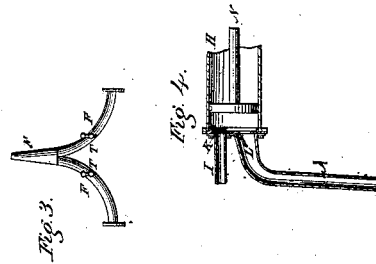
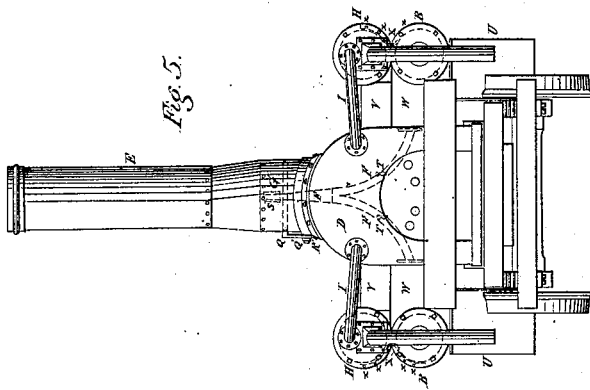


*R. M. Wade,*  
*Spark Arrester.*

*N<sup>o</sup> 5,081.*

*Patented Apr. 24, 1847.*



*Witnesses.*

*Inventor*

# UNITED STATES PATENT OFFICE.

ROBERT M. WADE, OF SUMMIT POINT, VIRGINIA.

## SPARK-ARRESTER.

Specification of Letters Patent No. 5,081, dated April 24, 1847.

*To all whom it may concern:*

Be it known that I, ROBERT M. WADE, of Summit Point, Jefferson county, State of Virginia, have invented a new and useful  
5 improvement in the mode of conveying the smoke and sparks from the smoke-stacks of furnaces of engines and extinguishing the sparks, which is described as follows, reference being had to the annexed drawings of  
10 the same, making part of this specification.

Figure 1 is a side elevation of a locomotive engine showing the apparatus combined therewith for drawing the smoke, and sparks from the smoke box and discharging  
15 them beneath the engine. Fig. 2 is a top view or plan of ditto. Fig. 3 is an elevation of the combined escape steam pipes, and cocks. Fig. 4 is a section of the pump, showing the valves and piston. Fig. 5 is an  
20 end elevation of the engine, and pumps.

The nature of this invention and improvement consists, in combining with the ordinary steam engine a pump for pumping the smoke and sparks for the smoke chamber  
25 and discharging them below the engine into water, or otherwise or wherever desired, the piston rod of said pump being connected with the piston rod of the steam cylinder by a cross head or other suitable means causing  
30 them to work simultaneously, by which arrangement the annoyance and danger arising from the smoke stack, as ordinarily arranged, will be removed.

35 A is a common locomotive engine.

B is the steam cylinder; D, the smoke box; E, the smoke stack; F, the pipes for conveying the escape steam into the smoke stack—the two upper ends being united  
40 into one pipe in the smoke stack and containing two stop cocks T.

G is a valve for closing the smoke stack attached to a horizontal axle Q having a crank Q' operated by a rod R and having  
45 an opening in the same surrounded by a short pipe S' which is open at both ends and which closes over the connected ends of the steam pipes F allowing the escape steam to pass through the said valve into the  
50 smoke pipe E when said valve is closed.

H is a pump combined with the steam cylinder for drawing the sparks and smoke from the smoke box and discharging them wherever required.

55 I is the induction tube through which the sparks are drawn by suction from the smoke

box into the cylinder of the pump, one end of said tube being bolted to the end of the plate of the pump cylinder and the other  
60 end to the end plate of the smoke box.

J is the eduction tube through which the sparks are driven by the piston of the pump, one end of said tube being bolted to the end plate of the pump and the other end  
65 opening into the air, or into a receiver containing water, or other suitable place.

K is a valve at the end of the induction tube hinged to the inside of the end plate of the pump, being open while the piston is moving toward the head of the pump and  
70 closed when moving in a contrary direction as represented in Fig. 4.

L is a valve in the eduction tube arranged so as to close when the valve K opens and to open when the valve K closes, being  
75 hinged to the outside of the end plate of the pump.

M is the piston rod of the steam cylinder.

N is the piston rod of the pump.

O is the cross head connecting the piston  
80 rods M and N together causing them to work simultaneously in the same direction.

P' P' are the parallel guides for the steam cylinder crosshead.

P'' is the guide for the cross head of the  
85 pump.

Q is the crank axle of the valve G.

R is the rod for turning the crank axle.

S is the opening in the valve G surrounded by the short pipe S' attached to  
90 the valve and closing down over the united ends of the steam pipes F which conducts the escape steam through the same while the valve G prevents the escape of the smoke and sparks through the stack. The valve G  
95 is brought to a horizontal position for closing the smoke stack when the pump is in operation and is turned to a vertical position, or opened, when the engine is at rest.

T T are the cocks for allowing a portion  
100 of the exhaust steam to escape into the smoke box for the purpose of extinguishing the sparks and to prevent the pump becoming overheated the steam being partially condensed in the smoke box.

105 U is an inclined guard for giving the fire a downward direction to prevent the ascent of the same among the machinery.

The pumps are combined with and secured to the smoke box by means of the braces Y  
110 and steam chests V adapted and fitted to the sides thereof and by making the under sides

of the flanges of the pump concave and corresponding with the convex sides of the flanges of the steam cylinders and properly secured upon them in any permanent and durable manner by means of double concave plates X secured to the sides of the pump and cylinder by the screws *x* or in any convenient manner.

A similar pump and arrangement of parts are combined with the other steam cylinder for a like purpose—similar letters being used for similar parts.

The several parts of the apparatus may be constructed, arranged, and operated in any convenient way or manner for producing results similar to the above by means substantially the same, as those above described. The head of the pump may be made concave on the inner side or of an obtuse angled shape; or in two segments, or semicircles, the upper segment being stationary and bolted to the cylinder and the lower segment hinged by its straight side to the straight side of the upper segment to answer as a valve for preventing clogging from an accumulation of sparks in the pump, the end of the eduction tube bolted to the outside of the head of the pump being made sufficiently large to embrace and cover the said lower segment of the head which is to serve the double purpose of a head and valve, which arrangement would require the eduction tube to be bolted to the circular flange of the pump instead of the head of the pump as described.

The parallel guides P' P'' are sustained in their required position by the plate *b* fixed to the end of the cylinder and the plate Z secured to the frame of the engine by the brace or arm *a*.

On firing up the engine the valve G must be turned to a vertical position by moving

the rod R to which it is attached; the furnace and engine being in full operation and it being required to prevent the sparks escaping from the smoke stack the engineer must move the rod R longitudinally which will turn the valve G to a horizontal position, the aperture in the same surrounded by the additional pipe S' allowing it to drop over the upper end of the exhaust or escape steam pipe F' thus shutting off the communication between the smoke box and smoke stack E. The cocks T T are then partially opened which allows a portion of the waste steam to enter the smoke box in quantity sufficient to extinguish the sparks, and regulated by said cocks the main body of the waste steam being allowed to escape in the usual manner through the chimney or stack it being unnecessary to allow all the waste steam to enter the smoke box and pumps as it would create an undue pressure on the several ports.

What I claim as my invention and desire to secure by Letters Patent is—

1. Pumping the sparks from the smoke box of a locomotive engine when the sparks are extinguished or partially so by the introduction of a portion of the escape steam through the cocks T T substantially in the manner and for the reasons above stated.

2. I likewise claim the arrangement of the valve G in the smoke stack E as constructed with the short pipe S' in combination with the united steam pipes F for preventing the escape of the smoke and sparks during the operation of the pump and at the same time allowing the waste steam to escape through the smoke pipe E.

ROBT. M. WADE.

Witnesses:

A. E. H. JOHNSON,  
HORATIO N. CASE.