

(No Model.)

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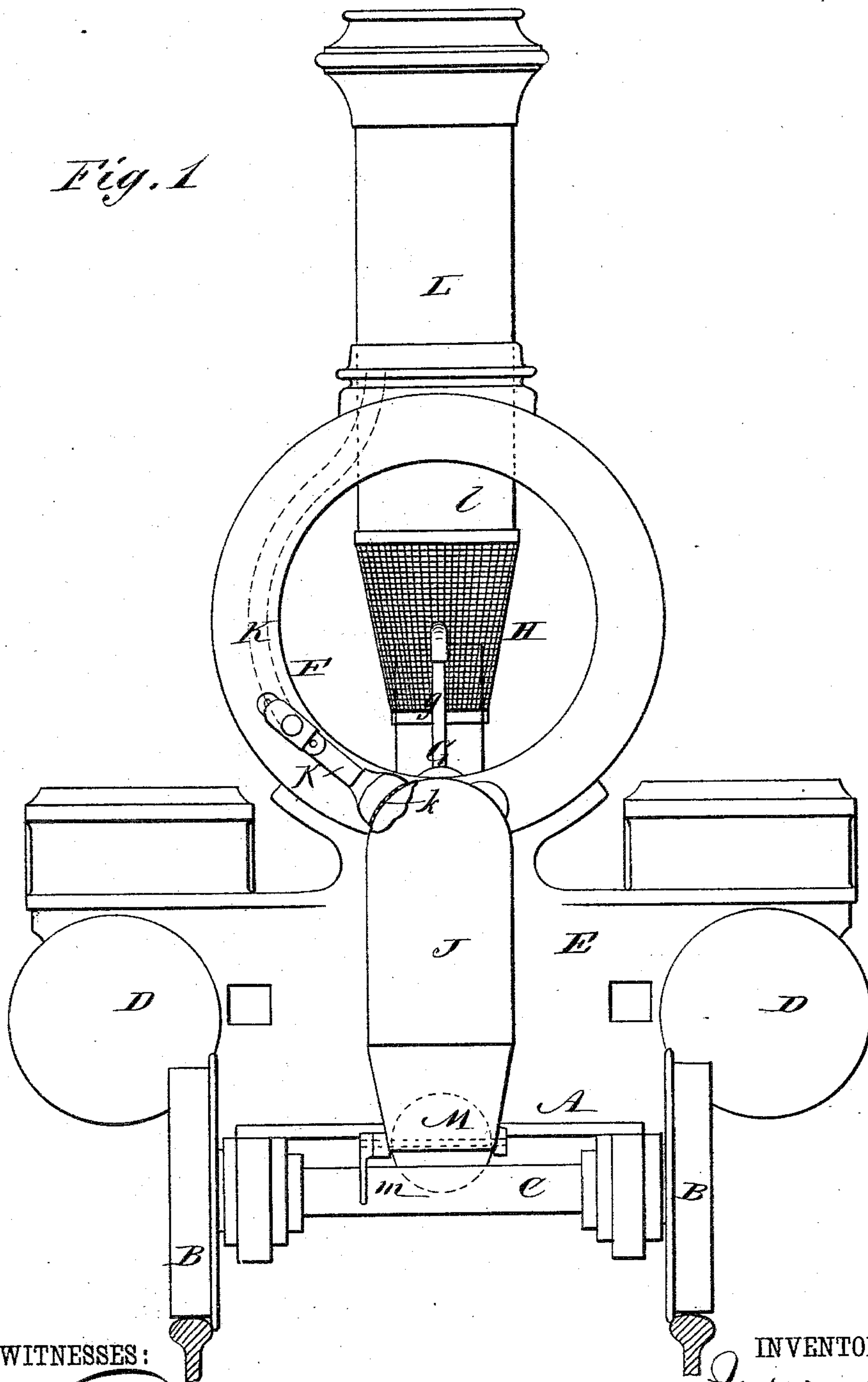
J. N. WEAVER.

SPARK ARRESTER.

No. 303,249.

Patented Aug. 5, 1884.

*Fig. 1*



WITNESSES:

*C. Neveu*

*C. Sedgwick*

INVENTOR:

BY

*J. N. Weaver*

*Munn & Co*

ATTORNEYS.

(No Model.)

2 Sheets—Sheet 2.

J. N. WEAVER.

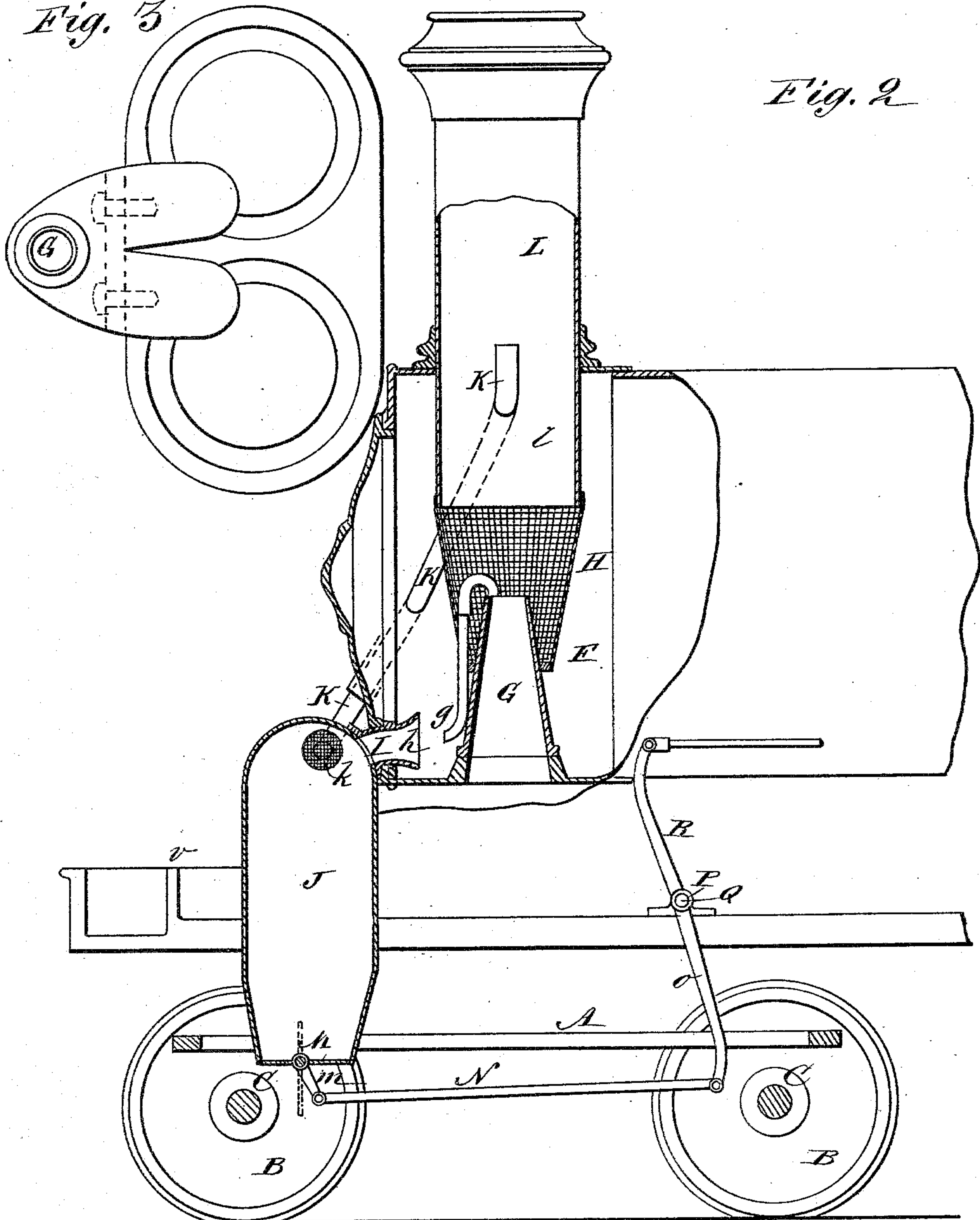
SPARK ARRESTER.

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*Fig. 3*

*Fig. 2*



WITNESSES:

*C. Newell*  
*C. Sedgwick*

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# UNITED STATES PATENT OFFICE.

JAMES N. WEAVER, OF SAYRE, PENNSYLVANIA.

## SPARK-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 303,249, dated August 5, 1884.

Application filed April 3, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES N. WEAVER, of Sayre, in the county of Bradford and State of Pennsylvania, have invented certain new and useful Improvements in Spark-Arresters, of which the following is a full, clear, and exact description.

This invention more particularly relates to spark-arresters for hard and soft coal burning locomotives, similar in certain respects to the means described in my Reissued Letters Patent No. 7,717, dated May 29, 1877, but more advantageous as regards arresting the sparks and promoting draft without increasing back-pressure on the pistons of the engine.

The improvements include certain means, whereby cinders or dirt are effectually prevented from being drawn into the valves and cylinders of the engine, an even draft on the fire is secured, a wire-drawing effect produced on the draft where the steam-nozzle is connected with the smoke-stack, and an increased length of smoke-stack within a given space is obtained, and a better draft produced on the fire, substantially as hereinafter described.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 represents a front view of a locomotive in part with the smoke-box cover removed and having my invention applied. Fig. 2 is a mainly centrally sectional vertical view of the same in a plane at right angles to Fig. 1; and Fig. 3, a top or plan view of the exhaust-nozzle with its pipes, branches, or connections to the cylinders of the engine.

A indicates the truck-frame of a locomotive-engine, B B its wheels, and C the axles thereof.

D D are the cylinders of the engine, and E the saddle carrying the same and supporting a cylindrical smoke-box, F.

G is the steam-exhaust nozzle, which may communicate with the cylinders of the engine in the usual manner. Said nozzle, as in my former patent hereinbefore referred to, opens at its upper end into a wire-netting tube, H, of an inverted conical shape, but which, instead of being attached at its larger and upper extremity to the inside of the upper part of the smoke-box, is attached to the lower end of

the smoke-stack L, that is extended far down into the smoke-box, as at l. This extension of the smoke-stack permits of the use of a nozzle of sufficient height or length to give a perfectly even draft on the fire, the length of said nozzle being determined by the length of the fire-box.

The portion of the netting H between the lower extension, l, of the smoke-stack and the nozzle G is of such area or capacity as to have a wire-drawing effect on the draft, the proportion of said area being determined by the length of the extension l of the smoke-stack within the smoke-box. By "wire-drawing effect on the draft" I mean that more air is displaced in the stack at every exhaust of the engine than can be taken in through the netting in the time required for each exhaust, which causes each exhaust to have a prolonging effect on the fire, whereby the exhaust-openings may be made larger than usual, and consequently less back-pressure be thrown upon the pistons of the engine. Likewise, by the downward extension of the smoke-stack, as described, a longer stack for a given height or space is obtained, thereby adding to the draft on the fire.

J is the spark-receiver; or there may be more than one. Said receiver, which is of close construction, and is arranged below the smoke-box, may be carried by the saddle E, and has a butterfly or other suitable valve, M, in its bottom.

Opening into the top or over the upper end portion of the steam-nozzle G is a small steam-conducting pipe or jet-tube, g, which, passing downward, faces at its lower end a flaring or bell-shaped mouth, h, of a spark-conducting pipe, I, which communicates with the upper portion of the spark-receiver J. At every exhaust of the engine a portion of the exhaust-steam is made to pass through the pipe g, and the sparks that are drawn into the smoke-box F, and which drop by gravity, will be blown by the steam issuing from the lower end of the pipe g into and through the spark-conducting pipe I, and from thence into the receiver J. At the same time the main body of the exhaust-steam, passing the upper end of a pipe, K, which projects upwardly within the stack and connects below with the spark-



receiver, creates a suction through the pipe K, which assists in drawing the sparks out of the smoke-box F, and also carries off the steam which is blown out with the sparks by the pipe *g*.

5 A wire screen, *k*, arranged at the connection of the pipe K with the spark-receiver J, prevents any sparks from being drawn out through said pipe K, and causes the sparks and cinders blown into the receiver J to remain there un-

10 til dumped out through the valve M.

By the arrangement, as described, of the exhaust-steam-conducting pipe *g* over or as compared with side exit tubes in the base of the nozzle G, as shown and described in my Let-  
15 ters Patent hereinbefore referred to, the liability of particles of cinders and dirt which lie on the bottom of the smoke-arch being drawn into the valves and cylinders of the engine, to the great detriment of the same, is entirely  
20 obviated. This is to be accounted for by the fact that when steam is shut off from the engine, or when the engine is being reversed, there is naturally a strong downward current or suction through the exhaust-nozzle, and a  
25 still stronger suction is established through the blow or exit tubes when connecting with the exhaust-nozzle at or near its base, whereas by the exposure of the connecting end of the conducting-tube over the upper end of the ex-  
30 haust-nozzle, suction through it is so far reduced or avoided as to entirely do away with the passage of cinders or dirt through it, while the other end of said tube occupies the necessary depressed position relatively to the bot-  
35 tom of the smoke-box.

Upon the shaft of the butterfly-valve M in the bottom of the spark-receiver J is a crank, *m*, for operating said valve. The mechanism for actuating said valve through said crank con-  
40 sists in part of a bar, N, which is connected with the lower arm, *o*, of a lever, R, fast on a sleeve, P, that encircles a shaft, Q. When said lever R is rocked backward or forward upon said shaft, longitudinal motion is given to the  
45 rod or bar N, and the valve M is made to open or close, according to the direction in motion of said lever R.

The invention is not necessarily restricted to locomotive-engines, and there may be any number of steam-conducting pipes or jet-tubes 50 *g*, or suction-pipes K and spark-receivers J, with their necessary attachments or connections.

Having thus described my invention, what I claim as new, and desire to secure by Let- 55 ters Patent, is—

1. The smoke-stack L, arranged to extend down into the smoke-box, in combination with the inverted conical or downwardly-tapering wire-netting or perforated tube H, connected 60 at its larger and upper end to the lower extension, *l*, of the smoke-stack within the smoke-box, and the exhaust-steam nozzle G, arranged to enter up within and through the smaller end of said wire-netting or perforated 65 tube, substantially as specified.

2. The combination, with the exhaust-steam nozzle, the smoke-box, and one or more spark-receivers arranged below said box and in open communication therewith near its base, of 70 one or more steam-conducting pipes or jet-tubes arranged to connect at their one end with or over the upper end of the exhaust-nozzle, and, dipping downward, to face at their lower end the inlet opening or openings to the spark 75 receiver or receivers, essentially as described.

3. The combination of the smoke-box F, the smoke-stack L, arranged to extend down within the same, the inverted conical wire-netting H, the exhaust-steam nozzle G, the steam-jet pipe 80 or tube *g*, constructed to open over the upper end of the exhaust-nozzle, the spark-receiver J, in communication, opposite the lower end of said jet-pipe, with the smoke-box near its bottom, and the steam and spark escape pipe 85 K, with its netting *k*, substantially as specified.

JAMES N. WEAVER.

Witnesses:

R. H. WINLACK,  
WM. B. HECKMAN.