(No Model.) 2 Sheets—Sheet 1.

P. F. WHITE.

VARIABLE EXHAUST MECHANISM FOR LOCOMOTIVES.

No. 457,930. Patented Aug. 18, 1891.

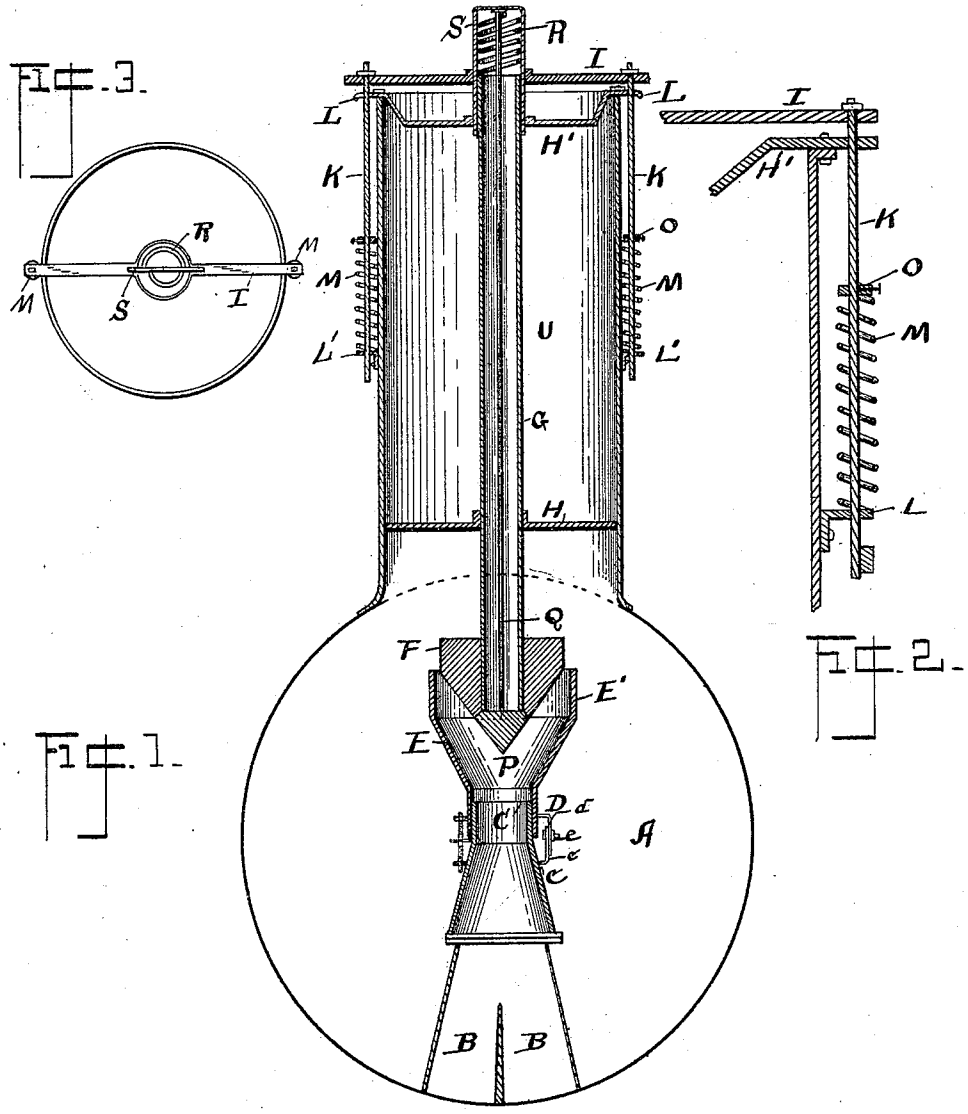


FIG. 3.

FIG. 2.

FIG. 1.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 4.

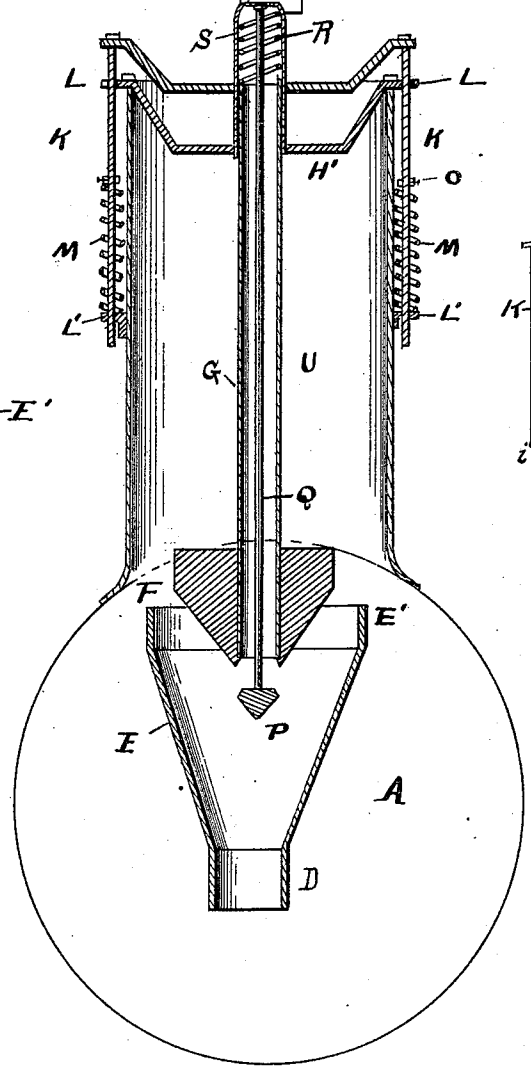


FIG. 5.

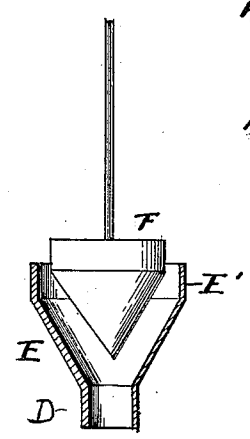
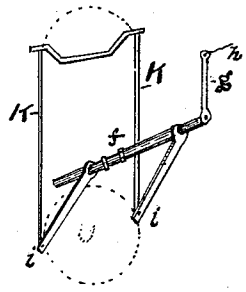


FIG. 6.



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UNITED STATES PATENT OFFICE.

PATRICK F. WHITE, OF WESTERNPORT, MARYLAND, ASSIGNOR OF ONE-HALF TO JACOB S. JAMESSON AND WILLIAM F. MANSFIELD, OF SAME PLACE.

VARIABLE EXHAUST MECHANISM FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 457,930, dated August 18, 1891.

Application filed May 14, 1891. Serial No. 392,688. (No model.)

To all whom it may concern:

Be it known that I, PATRICK F. WHITE, residing at Westernport, in the county of Allegheny and State of Maryland, have invented certain new and useful Improvements in Variable Exhaust Mechanisms for Locomotives and Similar Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to exhaust mechanisms for steam-engines, especially locomotive-engines.

The object of the invention is to give a smooth and uniform draft through the flues of a boiler by causing the steam to enter the smoke-stack in an annular film; also, to make the draft adjustable; also, to generally improve the construction of the exhaust mechanism.

Figure 1 is a central vertical section through the smoke-stack of a locomotive-boiler having double nozzle. Fig. 2 is a broken detail of part of the adjusting mechanism near the top of the stack. Fig. 3 is a plan of the stack and mechanism near the top thereof. Fig. 4 is a vertical central section of the device applied to a single exhaust-nozzle engine. Fig. 5 is a detail of a construction referred to herein. Fig. 6 is a perspective of a lever mechanism which may be used to lift the adjustable cone.

A indicates the smoke-box of a locomotive or similar boiler.

B B, Fig. 1, denote exhaust-nozzles from the cylinders of the engine, of any usual construction.

C denotes a hollow cone which is applied above the upturned end of the exhaust-nozzles B for the purpose of bringing the steam-jets through the pipes B B to a central position. The hollow cone C may well be permanently attached to the exhaust-pipes B and must be firmly held. The upper end of cone C is extended in form of a cylinder C′. A cylinder D slides over the same and is vertically adjustable thereon, as by means of straps *c d*, attached to the parts, and held in longitudinal relation by set-screws *e*. The upper end of cylinder D is expanded and continued as a hollow conical or funnel-shaped conveyer E, with its larger end upward, and the upper end of this funnel E has a cylinder E′, extending upward and preferably integral therewith. The upper end of the ring E′ is a little below the base of the smoke-stack when in normal position, but may be raised or lowered by means of set-screws *e*.

A conical piece, plug, or valve F is suspended just above the hollow cone E. This plug tapers less than the inside of hollow cone or funnel E, as shown, and is a little less in diameter than the interior of the hollow cone E. As the plug F may be adjusted vertically within limits, it will when down nearly close the top of cone E, but will leave an annular space between the outside of the plug and the inside of the hollow cone, which space will be increased or diminished in area as plug F is raised or lowered. The upper end of plug F is cylindrical for the same purpose as the upper end of hollow cone E—namely, to deflect the steam straight up, and not out toward the sides of the stack.

The plug F is preferably hung on a tube or support G, which is secured thereto by a screw, pin, or in other suitable manner. The supporting-tube G is guided in bearings in pieces H H′. The bars H H′ extend across the smoke-stack and have holes through which the support G passes, so as to be vertically adjustable. The upper end of tube G passes through a bar I, which crosses the smoke-stack at the top and is adjustable vertically to raise or lower tube G and plug F.

Bar I and bars H H′ are as narrow as consistent with strength, and may be mere blades with their edges turned up and down, so as not to obstruct the stack unnecessarily. Bar I extends outside the stack at its ends and has rods K K firmly attached, which rods extend down parallel with the sides of the smoke-stack. The rods K K are guided in supports or bearings L L′ on the stack, and when lifted vertically will lift the bar I and its tube G and plug F, thus enlarging the space between plug F and hollow cone E.

Light springs M surround the rods K and rest on bearing-brackets L′. The upper ends of these springs bear upward on collars O, which are held to the rods by set-screws or in other

suitable manner. The tendency of these springs is to lift the rods K, and thus lift the plug; but as all the parts are held by connection to the cab the result is merely to lighten the parts until the connections to the cab are released, when springs M will tend to lift plug F through the connections described.

The passage through plug F may be closed at the bottom by a valve P, preferably a double cone, which is attached to a light rod Q. A spring R surrounds the upper end of rod Q and tends to lift it; but the rod is held down by a cage S, which is attached to the fixed cross-bar H'. The conical form of the valve causes it to center itself in the plug. As this valve controls the passage through the plug, it is not material to this part of the invention which of the parts is made to move to open the passage through the plug.

When the bar I and tube G are raised, the rod Q is held down by cage S. Thus the lifting of rods K K not only lifts the bar I and the tube G and plug F, opening a wider annular passage around the plug F and permitting a freer upward passage of steam through said annular openings, but as the rod Q is held from rising by cage or basket S the spring R is compressed and the valve P is left below the main body of the plug F, thus opening a passage through the pipe G, through which steam may pass. In other words, the raising of plug F enlarges the outer passage and opens an inner passage from the hollow conical chamber E.

It is not essential to the operation of my device that the valve P should be movable, as very good results will follow from the use of a solid plug, as indicated in Fig. 5, in which case the tube G may be simply a rod. Such may be made by fixing valve P to the plug in any suitable way.

The mechanism by which the rods K may be raised is not material. Any good mechanic can devise mechanism for the purpose. A device which will answer is shown in diagram in Fig. 6, in which *f* represents a rock-shaft suitably supported in bearings on the smoke-stack U. A crank-arm *g*, rigid with the shaft, is connected by a draw-bar *h* with the cab. Arms *i i*, rigid with the rock-shaft, are pivotally connected to the bottom of rods K K. A pull on the rod *h* will rock the shaft *f*, and thus swing arms *i* and lift rods K K.

If desirable, the cross-bar I can be bent, as shown in Figs. 4 and 6, so that the upper end of tube or connection G may be within the upper end of the stack when the plug F is raised.

The cylindrical rim on the upper edge of the hollow conical conveyer E and the corresponding cylindrical portion of plug F are considered desirable features; also the different inclination of the plug and the hollow conveyer by which the body of steam is gradually gathered into an annular film and directed perpendicularly upward parallel with the walls of a cylindrical stack. It is not, however, essential that a cylindrical stack be used.

I do not desire to limit myself to the precise construction shown, as many modifications may be made in construction without departing from the general principles of my invention.

What I claim is—

1. The combination, with the exhaust of a locomotive of the character described, of a conical conveyer above the exhaust, having its larger end upward, and a conical plug of less diameter than the conical conveyer, said plug adjustable in the mouth of the conveyer by a support connected to the stack above and outside said conveyer, substantially as described.

2. The combination, with the double exhaust-pipes, of a conical tube above the same, having its smaller end upward, a second hollow conical conveyer arranged in reverse direction, and a conical plug above the conveyer and adjustable by a support above and outside the conveyer.

3. The combination, with the exhaust-pipes B B, of the hollow cone C above the same, and the reversed cone E above the latter and adjustable relatively thereto, substantially as described.

4. The combination, with the exhaust, of the hollow conical conveyer-pipe having a cylindrical vertical portion at its upper end, and the conical plug having a cylindrical portion at its upper end and arranged substantially within the hollow cone and vertically adjustable thereon, substantially as described.

5. The combination, with the exhaust and the hollow conical conveyer, of the conical plug vertically adjustable within the conveyer, said plug being a cone of different taper from that of the conveyer, so as to change the area of the annular opening between the plug and conveyer, substantially as described.

6. The combination, with the exhaust and the conical conveyer within the smoke-box and below the stack of the locomotive-boiler, of the conical plug within the conveyer, a support extending from said plug to the top of the stack, and means for lifting or lowering said plug, extending to the vicinity of the cab, substantially as described.

7. The combination of the exhaust, the hollow conical conveyer having a vertical cylindrical upper portion, and the conical plug vertically adjustable within the conveyer and having a vertical cylindrical upper portion, substantially as described.

8. The combination, with the exhaust and conical conveyer above the same, of the conical plug having a passage therethrough, and a valve controlling said passage, substantially as described.

9. The combination of the exhaust, the conical conveyer, and a conical plug adjustable within said conveyer, of a tube leading through said plug and substantially to the top of the

stack, and a valve controlling the passage through said tube.

10. The exhaust, the hollow conical conveyer, and the conical plug, arranged substantially as described, the passage extending through said plug, the valve arranged at the bottom of said passage, and a rod supporting said valve which passes through the tube, substantially as described.

11. The combination of the conical conveyer and the conical plug substantially within the same, an independently-movable valve at the bottom of said conical plug, a support for said valve passing through the plug, and means for raising the plug without raising the valve, substantially as described.

12. The exhaust and conical conveyer, the conical plug substantially within the conveyer, the tubular support for said plug, extending substantially to the top of the stack, and means for raising and lowering the same, and the valve at the bottom of said plug, supported on a stem passing through the tube, all in combination, substantially as described.

13. The combination, with the exhaust, conical conveyer, and conical plug substantially within the same, of the plug-supporting devices and means for lifting the same, and springs bearing on said supporting devices to hold the same against rattle and looseness, substantially as described.

14. The combination, with the exhaust and conical conveyer, of the conical plug supported practically within said conveyer and having a passage therethrough, and a valve controlling said passage, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

PATRICK F. WHITE.

Witnesses:
W. A. BARTLETT,
PHILIP MAURO.