

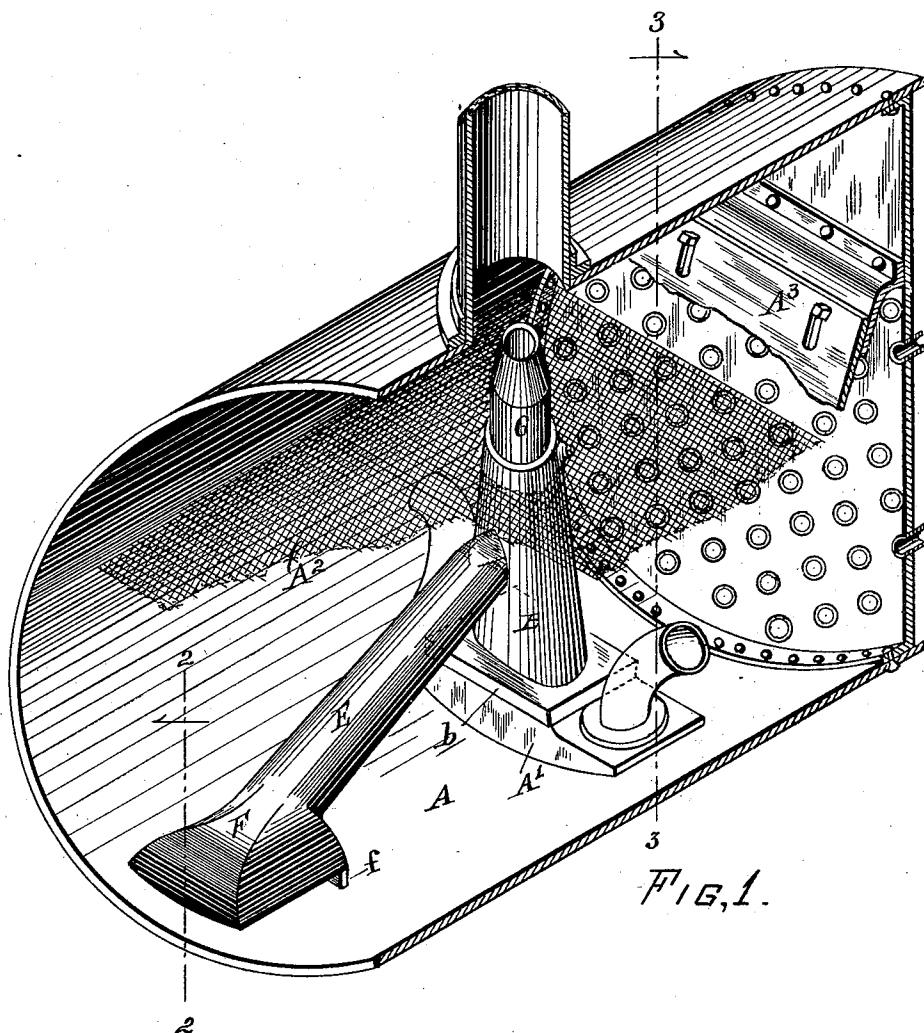
(No Model.)

2 Sheets—Sheet 1.

P. G. LEONARD.
CINDER EXTRACTOR.

No. 592,011.

Patented Oct. 19, 1897.



WITNESSES.

John. N. Murphy
James Brewer.

INVENTOR.

PETER G. LEONARD.
By Atty N. DuBois.

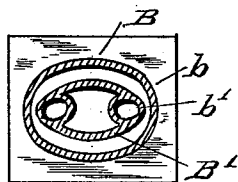
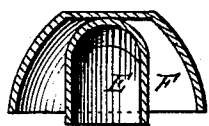
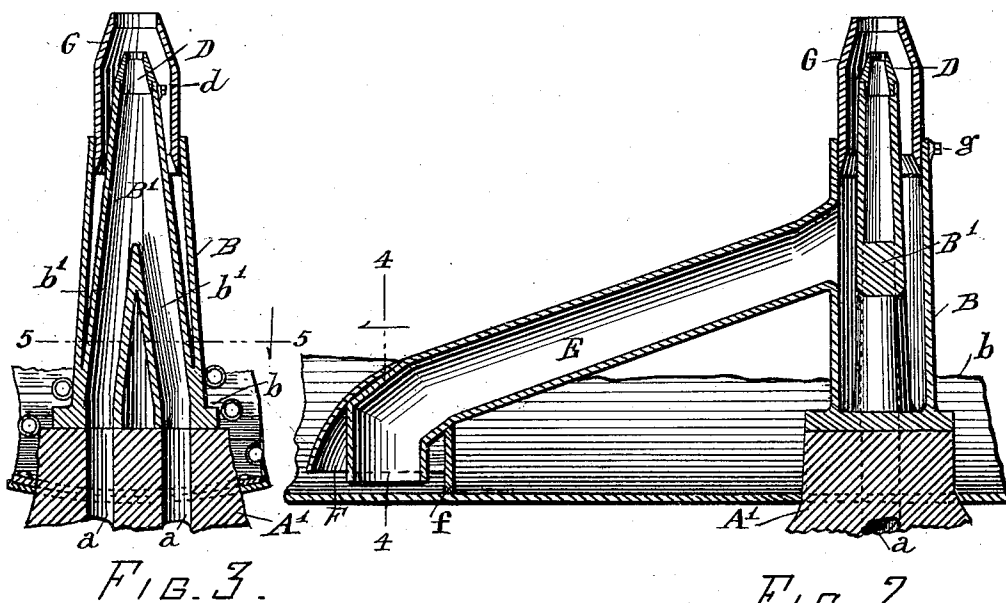
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UNITED STATES PATENT OFFICE.

PETER G. LEONARD, OF SPRINGFIELD, ILLINOIS.

CINDER-EXTRACTOR.

SPECIFICATION forming part of Letters Patent No. 592,011, dated October 19, 1897.

Application filed March 13, 1897. Serial No. 627,334. (No model.)

To all whom it may concern:

Be it known that I, PETER G. LEONARD, a citizen of the United States, residing at Springfield, in the county of Sangamon and State of Illinois, have invented a certain new and useful Cinder-Extractor, of which the following is such a full, clear, and exact description as will enable others skilled in the art to which it appertains to make and use my said invention.

My invention is applicable to the smoke-boxes of locomotives, and is designed to draw off from the bottom of the smoke-box and discharge through the smoke-stack such cinders as enter the smoke-box through the boiler-flues, and do not pass directly out through the screen.

The purposes of my invention are to provide simple and effective means whereby the exhaust-steam from the locomotive-cylinders may be utilized to create within a suitably-constructed induction-pipe a vacuum into which the cinders on the bottom of the smoke-box will enter, and thence be drawn into position to be acted upon directly by the escaping jet of steam and thus expelled through the smoke-stack; to provide a bifurcated steam-pipe, adapted to fit on the upper ends of both of the cylinder exhaust-pipes of a locomotive, and having an adjustable nozzle; to provide a shell inclosing said steam-pipe in such manner that the steam escaping from said steam-pipe shall create a vacuum within said inclosing shell; to provide an adjustable tapering sleeve on said shell adapted to regulate the discharge of cinders through said shell proportionately to the pressure of the exhaust-steam; and to provide a hood covering the lower end of the induction-pipe, in such manner that the induction-pipe will draw in such cinders only as are on the bottom of the smoke-box, and will not draw cinders directly from the flues before they are thrown up against the screen and cooled in falling to the bottom of the smoke-box.

With these ends in view my invention consists in certain novel features of construction and combinations of parts, shown in the annexed drawings, to which reference is hereby made, and hereinafter particularly described and specifically claimed.

Figure 1 is a perspective view of the com-

plete cinder-extractor in position in the smoke-box of a locomotive, only so much of the smoke-box being shown as is necessary to illustrate the connection of the cinder-extractor therewith. Fig. 2 is an enlarged vertical longitudinal central section through the cinder-extractor on the line 2 of Fig. 1. Fig. 3 is an enlarged vertical section through the shell and exhaust-pipe of the cinder-extractor on the line 3 of Fig. 1. Fig. 4 is a vertical transverse section through the induction-tube and its projecting hood on the line 4 of Fig. 2. Fig. 5 is a transverse section through the shell and the exhaust-pipe on the line 5 of Fig. 3.

Similar reference-letters designate like parts in all of the views.

The smoke-box A, the saddle A', having cylindrical exhaust-pipes *a*, the screen A², and the diaphragm A³ are all of the usual well-known forms, and only so much thereof is shown as is necessary to show their relation to the cinder-extractor.

The shell B, which is preferably of cast-iron, is in cross-section, elliptical in its lower part and circular in its upper part, and has a base *b*, which fits on and may be secured in any suitable manner to the saddle A'. Within the shell B is a bifurcated steam-pipe B', having two members *b'*, which at their lower ends register with the cylinder exhaust-pipes *a* and merge together in the upper part of said steam-pipe, so that all of the steam entering through the cylinder exhaust-pipes *a* will pass out through a single opening in the upper end of the steam-pipe.

The shell B may be made integral with the pipe B', or it may be made separately and attached in any suitable manner to the exhaust-nozzles of locomotives as now commonly constructed, without departing from the spirit of or sacrificing any of the advantages of my invention.

A nozzle D is supported on and fits and is adjustable vertically in the upper end of the pipe B' and may be clamped in any desired position within the limits of its movement by means of set-screws *d*. The nozzle D is made adjustable in order to control the passage of steam through the nozzle, so as to regulate the draft through the boiler-flues, also so as to obviate back pressure on the cylinders of the engine in a manner which is well known.

The induction-tube E is cylindrical in form and its upper end opens into the interior of the shell B. The lower part of the induction-tube is turned downward, so that its lower end lies parallel to the bottom of the smoke-box, as shown in Fig. 2. A dome-shaped hood F surrounds the lower part of the induction-tube, and has a downwardly-extending leg *f*, which rests on the bottom of the smoke-box and supports the lower end of the induction-tube. The leg *f* rests on the bottom of the smoke-box and closes the rear end of the dome-shaped hood, so that cinders entering the hood must enter under the front and side edges thereof and hence cannot be driven from the flues directly into the hood.

A sleeve G, tapered to form a nozzle at its upper end, fits and is vertically adjustable in the upper end of the shell B. Set-screws *g* on the shell B serve to secure the sleeve G in any desired position.

The sleeve G is adjustable in order that the vacuum within the shell and the induction-tube may be increased or diminished by raising or lowering the sleeve as may be necessary for the most effective operation of the device in removing the cinders from the smoke-box.

If the steam-pressure within the sleeve is too strong, cinders coming from the flues will be drawn directly into the mouth of the induction-tube without passing upward through the screen, or without striking against the screen and then falling back into the smoke-box, being cooled as they fall, and the draft through the flues will be unduly increased, thereby greatly increasing the risk of live sparks being carried out through the smoke-stack to set fire to adjacent property, whereas if the steam-pressure within the sleeve is not strong enough there will be insufficient suction in the induction-tube to draw in the cinders, and insufficient draft through the flues to drive the lighter cinders up through the screen, and hence an undue accumulation of cinders in the smoke-box.

When in position in the smoke-box of the locomotive, the shell rests vertically over the cylinder exhaust-pipes *a* and directly under the smoke-stack. In operation the steam passing upward through the nozzle D creates a vacuum within the shell B and the tube E, causing the cinders to enter the tube and pass upward through the shell until they reach the upper end of the nozzle D, and thence are driven out through the smoke-stack by the direct action of the steam escaping through the nozzle.

Among the great practical advantages of my invention I desire to mention the following:

By the employment of my cinder-extractor the cinders are constantly and regularly withdrawn from the smoke-box, and hence cannot accumulate therein to such extent as to impair the draft of the flues.

When cinders accumulate in large quantities in the smoke-box, they obstruct the draft, thus deadening the fire and diminishing steam production, and incidentally increasing wasteful fuel consumption.

When there are large accumulations of hot cinders in the fire-box and air leaks in, as it often does, the accumulated cinders take fire and heat the head-plate to such extent that the sudden cooling of the head-plate, running against the wind, contracts the plate and cracks or breaks it, and such cracked or broken plate admits air into the smoke-box in such quantity as to impair the steaming qualities of the engine by reason of cooling the steam-pipes, also by reason of checking the draft of the flues.

I am enabled to use in connection with my cinder-extractor a screen of smaller mesh than has heretofore been used, because the heavier cinders fall to the bottom of the smoke-box and are drawn out through the induction-tube, and the use of the screen of smaller mesh greatly reduces the danger of large sparks passing out through the screen and setting fire to adjacent property. By keeping the smoke-box free from cinders uniformity of draft is attained, and frequent stops for the purpose of cleaning out the smoke-box are avoided.

The frequent opening of the cinder-hopper and the removal of the hand-hole plates in the smoke-box, for the purpose of removing the accumulated cinders, as now commonly practiced, is very objectionable, because large quantities of cold air are thus admitted to the smoke-box, which chills the steam-pipes, and by reason of the sudden contraction causes leakage, which is very wasteful of steam, and detracts from the steaming qualities of the engine.

My invention also obviates the piling of cinders on the roadway, which occurs when the smoke-box is cleaned in the usual manner. Such cinder-piles are usually made at stations, where they are objectionable, not only on account of obstructing the roadway, but because fire is likely to be communicated from them.

The use of my cinder-extractor in a locomotive obviates the necessity for using a diaphragm in the smoke-box. The purpose of the diaphragm as ordinarily constructed and used is to control the draft through the flues so as to obtain the best practical results in the steaming of the engine, and at the same time avoid back pressure on the cylinders. For example, if when the nozzle D is so adjusted as to give the best results with respect to the avoidance of back pressure on the cylinders the jet of steam escaping through the nozzle is so strong as to act directly on, and cause excessive draft through the flues, the diaphragm is lowered sufficiently to check the excessive draft and avoid drawing out sparks or partially-consumed fuel through

the flues. On the other hand if the draft is insufficient the diaphragm is raised to increase the draft.

When my cinder-extractor is used, the nozzle D being inclosed in the shell B does not so directly affect the draft of the flues as the nozzle commonly used does. Hence a larger nozzle may be used, which gives the best results with respect to the avoidance of back pressure, and such a nozzle will give all the draft necessary for removing the cinders, and all the boiler-flues may remain open and unobstructed, thus attaining the most perfect draft, and the most complete combustion of fuel, and hence the best results in the production of steam.

I am aware that a shell inclosing steam-nozzles and a steam-pipe and an induction-tube intercommunicating with said shell have been used in elevators for conveying coal, &c. I therefore do not claim those features broadly.

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

1. In a cinder-extractor for locomotives, the combination of a shell adapted to fit on the saddle above the cylinder exhaust-pipes of a locomotive, a bifurcated steam-pipe within said shell having members which at their

lower ends register with the cylinder exhaust-pipes and merge together in the upper part of said steam-pipe, a forwardly-projecting and downwardly-extending induction-tube opening into said shell, and a dome-shaped hood secured to and inclosing the lower end of said induction-tube, as set forth.

2. In a cinder-extractor for locomotives, the combination of a shell adapted to fit on the saddle of a locomotive above the cylinder exhaust-pipes thereof, a sleeve tapered to form a nozzle and vertically adjustable in the upper end of said shell, a bifurcated steam-pipe within said shell adapted to register with both of the cylinder exhaust-pipes in the saddle of the locomotive, a nozzle adjustable in the upper end of said steam-pipe, a forwardly-projecting and downwardly-extending induction-tube opening into said shell, and a dome-shaped hood closed at its rear end and secured to and inclosing the lower end of said induction-tube, as set forth.

In witness whereof I have hereunto subscribed my name, at Springfield, Illinois, this 3d day of March, 1897.

PETER G. LEONARD.

Witnesses:

TURNEY ENGLISH,
RALPH E. HAMBAUGH.