(No Model.) 2 Sheets—Sheet 1

W. McCLAVE.

STEAM JET CONVEYER FOR ASHES OR OTHER LIGHT SUBSTANCES.

No. 490,584. Patented Jan. 24, 1893.

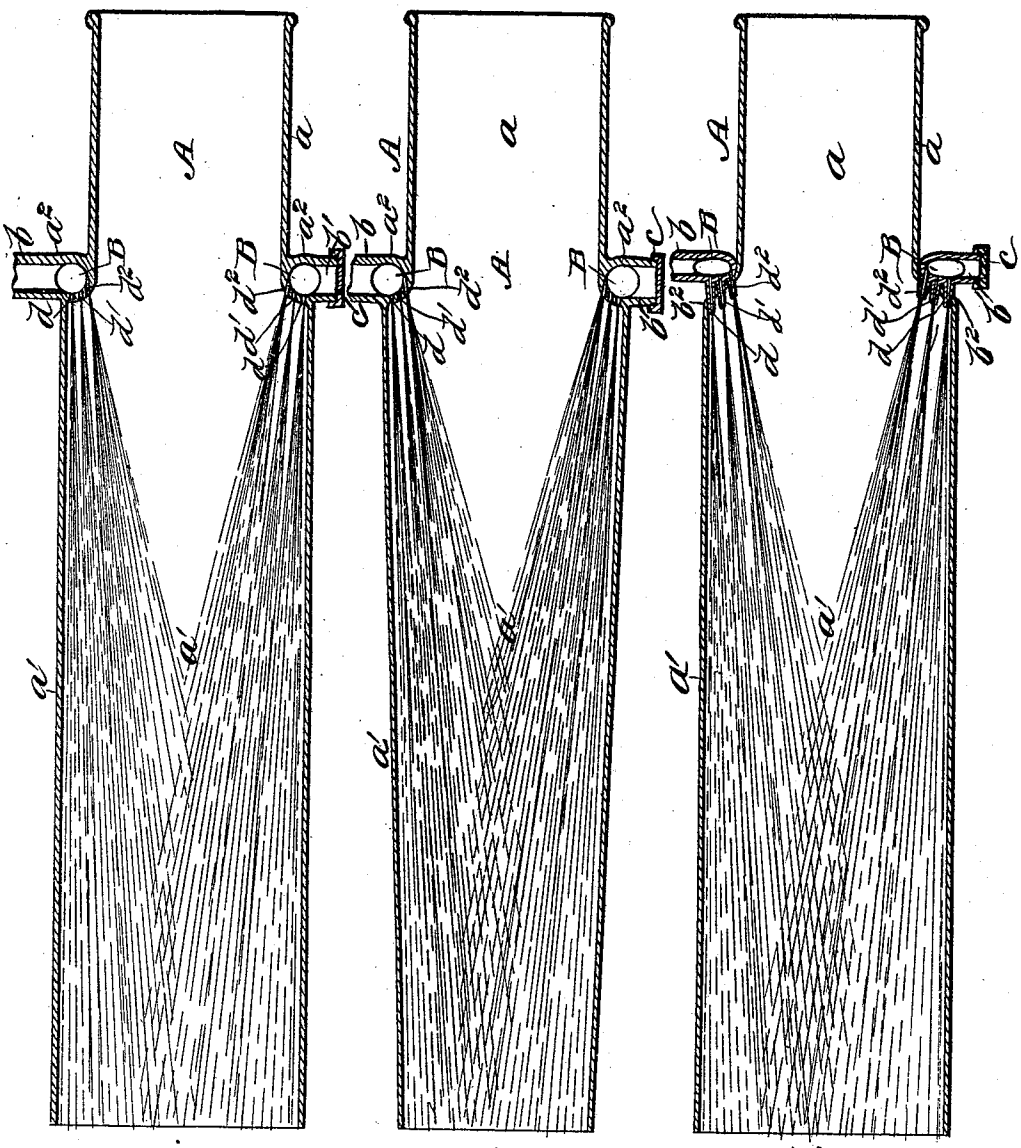

Fig. 1.

Fig. 2.

Fig. 3.

Witnesses:
Severance.
C. Calvert Hines.

Inventor:
William McClave
by his Attorneys
Mason, Fenwick & Lawrence

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

W. McCLAVE.

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Fig. 4.

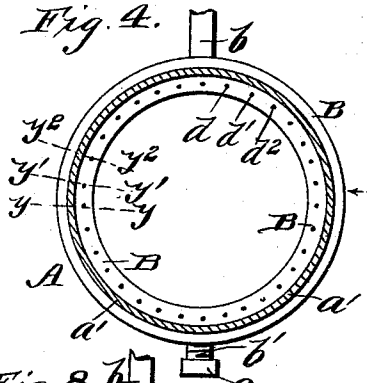


Fig. 5.

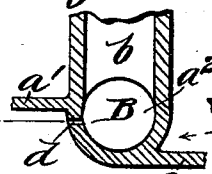


Fig. 6.

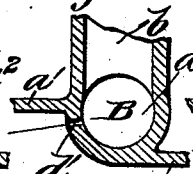


Fig. 7.

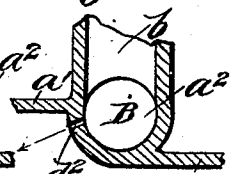


Fig. 8.

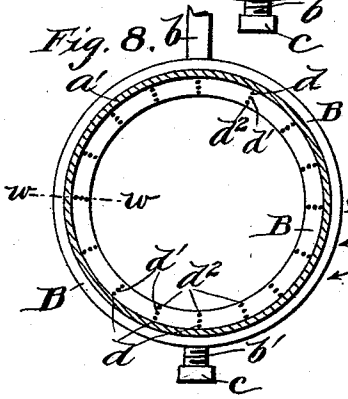


Fig. 9.

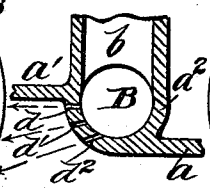


Fig. 10.

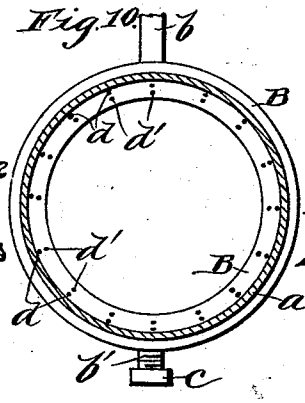


Fig. 11.

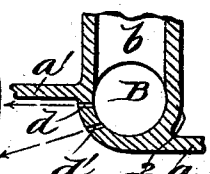


Fig. 12.

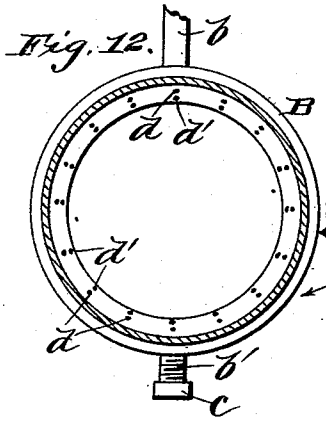


Fig. 13.

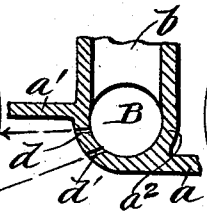


Fig. 14.

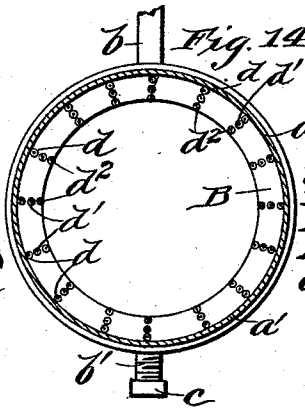
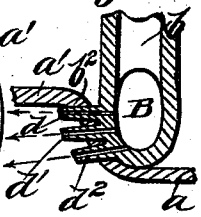


Fig. 15.



Witnesses:—

C. Everance.

C. Calvert Hines

Inventor:—

William McClave

by his Attorneys

Mason, Fenwick & Lawrence

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM McCLAVE, OF SCRANTON, PENNSYLVANIA.

STEAM-JET CONVEYER FOR ASHES OR OTHER LIGHT SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 490,584, dated January 24, 1893.

Application filed November 12, 1892. Serial No. 451,818. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MCCLAVE, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Jet Conveyers for Ashes and other Light Substances; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to steam jet suction conveyers for removing ashes and clinkers from ash pits, and also for moving coal-dust, culm and the like from one place to another, and its object is to provide for insuring an open or unobstructed passage substantially equal to the internal diameter of the conveyer tube, within the circle of a steam jetting device of ring or other analogous form, and at the same time insure an effective displacement of air at both the central portion and inner surface of the conveyer tube, and thereby cause a powerful suction of air for performing the conveying operation.

This invention consists in a specific construction and combination of a conveyer tube, and a ring or other analogous steam jetting device applied outside the internal diameter of the receiving end of the conveyer tube, said ring jetting device being arranged to jet steam by one portion of the orifices with a convergence at a certain angle or at different angles toward the center of the tube, and with the other portion parallel with and near the inner surface of said tube; and the ring of the jetting device being arranged substantially outside the range of the substances being conveyed, and thus not materially offer an obstruction to the passage of the same.

In the accompanying drawings, Figure 1 is a longitudinal section of a portion of my improved conveyer tube with steam jetting suction ring or device constructed as a part of it; Fig. 2 is a similar section, showing the tube slightly changed in form, and its orifices constructed and arranged in a slightly different manner. Fig. 3 is a section similar to Fig. 1, showing the steam jetting ring constructed separately from the tube, and provided with nozzles which eject the steam in the same manner as it is ejected in Fig. 1. In all the views mentioned, the steam jetting orifices or nozzles are intended to be extended entirely around the ring, but they are left out of the views in order to more plainly illustrate the manner in which the steam is ejected by every two or every three of the jets throughout the circle of the ring. Fig. 4 is a cross section of a conveyer having a steam jetting ring with one circle of jet orifices looking toward the induction end of the tube. Figs. 5, 6 and 7 are sections of the ring in the lines y—y, y'—y', y^2—y^2 of Fig. 4, showing the manner in which the steam is jetted by every triplet set of the circle of orifices. Fig. 8 is a cross section of Figs. 1 and 2, and Fig. 9 a section of the ring in the line w—w of Fig. 8, showing the manner in which the steam is ejected from every triplet set of jet passages arranged in three circles in the ring. Fig. 10 is a cross section of a tube with a ring having two circles of steam jet passages, and Fig. 11 is a section of the ring, showing the manner in which the steam is jetted from every pair of jet passages arranged in two circles in the ring. Fig. 12 is a section of a tube, and Fig. 13 is a section of a ring adapted for such tube, showing how steam is ejected substantially parallel with the inner surface of the tube, and also converging toward the center of the same, from every pair of orifices of two circles of orifices in said ring. Fig. 14 is a cross section of the tube shown in Fig. 3, and Fig. 15 is a section of a hollow ring having a chamber of oval form in cross section, used in said tube, and showing the manner in which the steam is jetted in triplet jets from every three nozzles of the three circles of nozzles in the ring.

A in the drawings represents a portion of a conveyer, tube, its air induction portion a being of less diameter than its steam induction or receiving portion a'. The portion a', by means of a shoulder or step portion a^2, is united to the portion a, and this step portion is made in form of a hollow ring B with a steam induction pipe b and blow off or eduction passage b'. The eduction passage is furnished with a screw collar in which a screw cap c is fitted. In the forward surface of the hollow ring, steam jet passages d, d', d^2, are provided, those d being bored parallel with the inner surface of the tube; those d' slightly convergent toward the center of the tube, and

those d^2 having a still greater convergence in the same direction. These jet passages are arranged in a single circle around the ring, as shown in Fig. 4, and every three of the circles act to jet steam in the manner indicated in Figs. 1, 5, 6 and 7. With this construction, the steam is jetted parallel with the inner surface of the tube, and convergent at different angles toward the center of the tube, or so as to displace the air near the surface of the tube, and also at the center of the tube, and thus produce a powerful suction of air behind it through the receiving end of the tube, and thereby convey light fine substances, such as ashes, coal-dust, culm and the like very effectively through the tube to a place of deposit. By the construction shown in Figs. 8 and 9, the same result is produced by constructing and arranging the jet orifices in three circles in the ring. By the construction shown in Figs. 10 and 11, the same result is produced, substantially, by constructing and arranging the steam jet orifices in two circles in the ring, and with one of each pair bored parallel with the inner surface of the tube, and the other convergent toward the center of the tube. By the plan shown in Figs. 12 and 13, the same result is produced by giving both of the steam jet orifices of each pair of the two circles of orifices a convergence toward the center of the tube, the convergence of the orifices d being so slight that its action is practically the same as when the bore is parallel with the said surface of the tube; and in Figs. 14 and 15 the construction is changed simply by having the ring constructed with an oval chamber and provided with nozzles instead of orifices, and to slip upon the tube, its nozzles entering the portion a' of the conveyer tube through the shoulder b^2. This construction is more especially substantially the same as that shown in Figs. 8 and 9.

With all the constructions, an improved conveyer, comprising a tube and steam jetting device of ring or any other suitable geometrical form is provided; and either of the forms shown affords free passage through the tube of ashes, coal-dust culm and the like. It is a very important matter to have the central portion of the tube supplied with the jetted steam, and to this end I took out Letters Patent dated May 19, 1885, No. 318,008, and were it not necessary to keep the central opening of the ring substantially unobstructed, my said patent would answer perfectly. But the smaller inner ring of said patent cannot be used as beneficially for the purposes herein mentioned, as it would interfere somewhat with the conveyance of clinkers and the like through the center of the steam jetting device used in my present invention.

I am aware that outside a tube, and used separately therefrom, jetting devices, having divergent spraying orifices, are old, but it is the steam jetting device inclosed in a conveyer tube that makes up the novelty and utility of my construction and combination.

It is practical to employ the construction herein described in a suction conveyer where the steam jetting devices are placed tandem as in my application for a patent, Serial No. 448,999, filed October 15, 1892, and I contemplate using the same in that manner, but make no claim here for the tandem arrangement described and claimed in said application.

The improved steam jetting devices herein described can be used to advantage for supplying air to ash-pits or furnaces for promoting combustion of fuel on grates; and the peculiar jetting devices inclosed in a tube can be applied at the ends of boiler tubes for the purpose of sucking and conveying soot and ashes out of said tubes.

What I claim as my invention is:—

The combination with a conveyer tube, of a hollow steam jetting device of ring or analogous geometrical form and having steam jet discharging orifices or nozzles between its inner and outer boundaries, said devices being applied substantially outside the range of the substances being conveyed as well as of the air which is caused to flow into the tube by the action of the steam jets, and thus offering no obstruction to the same within the tube; the said steam jet orifices or nozzles of said steam jetting device being arranged to jet steam from the same jetting device by one portion of the orifices or nozzles with a convergence at a certain or different angles toward the center of the tube, and with the other portion of the orifices or nozzles parallel or substantially parallel with and near the inner surface of the said tube, substantially as described.

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

WILLIAM McCLAVE.

Witnesses:
E. T. FENWICK,
C. CALVERT HINES.