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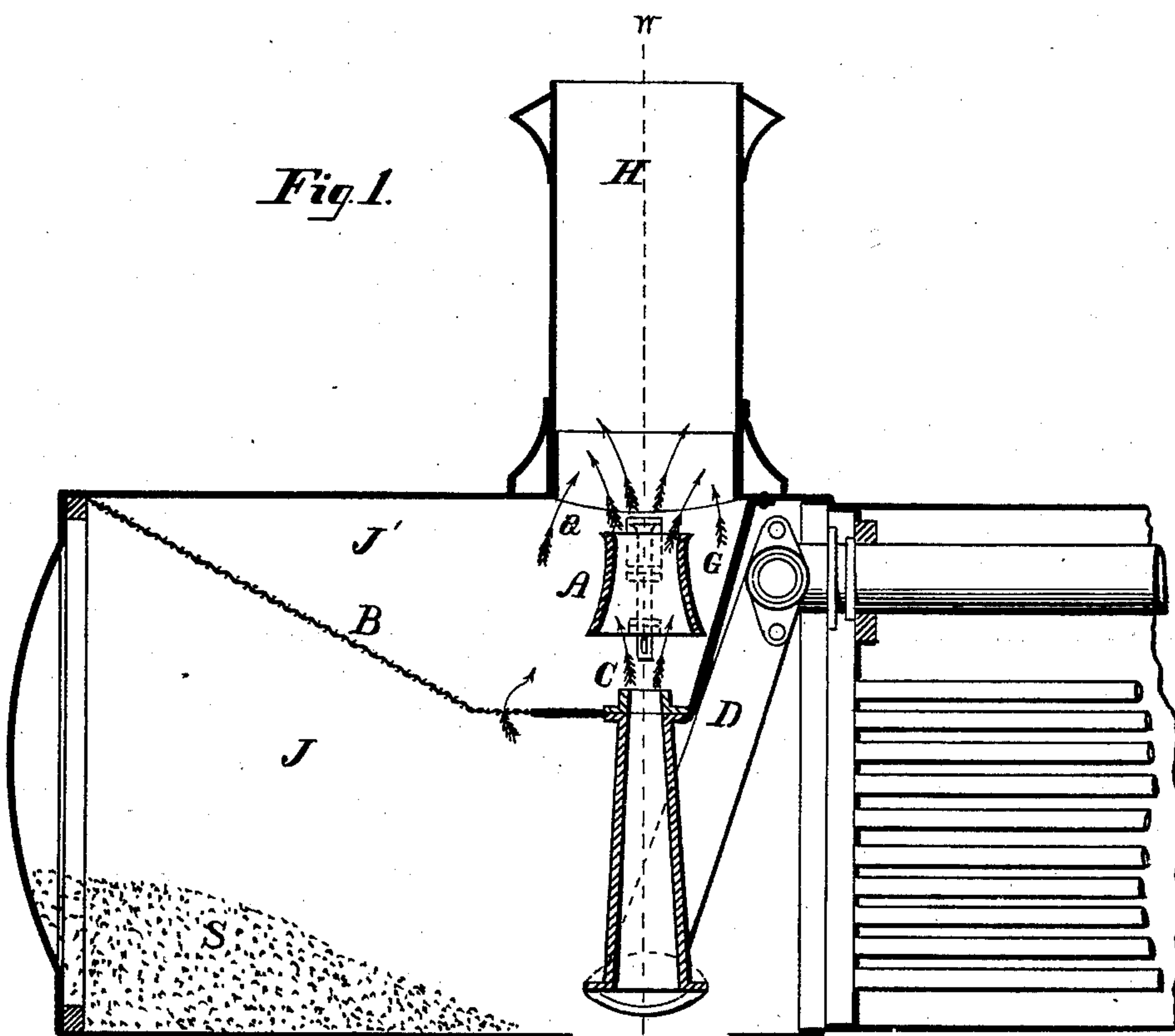
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H. MILLHOLLAND.

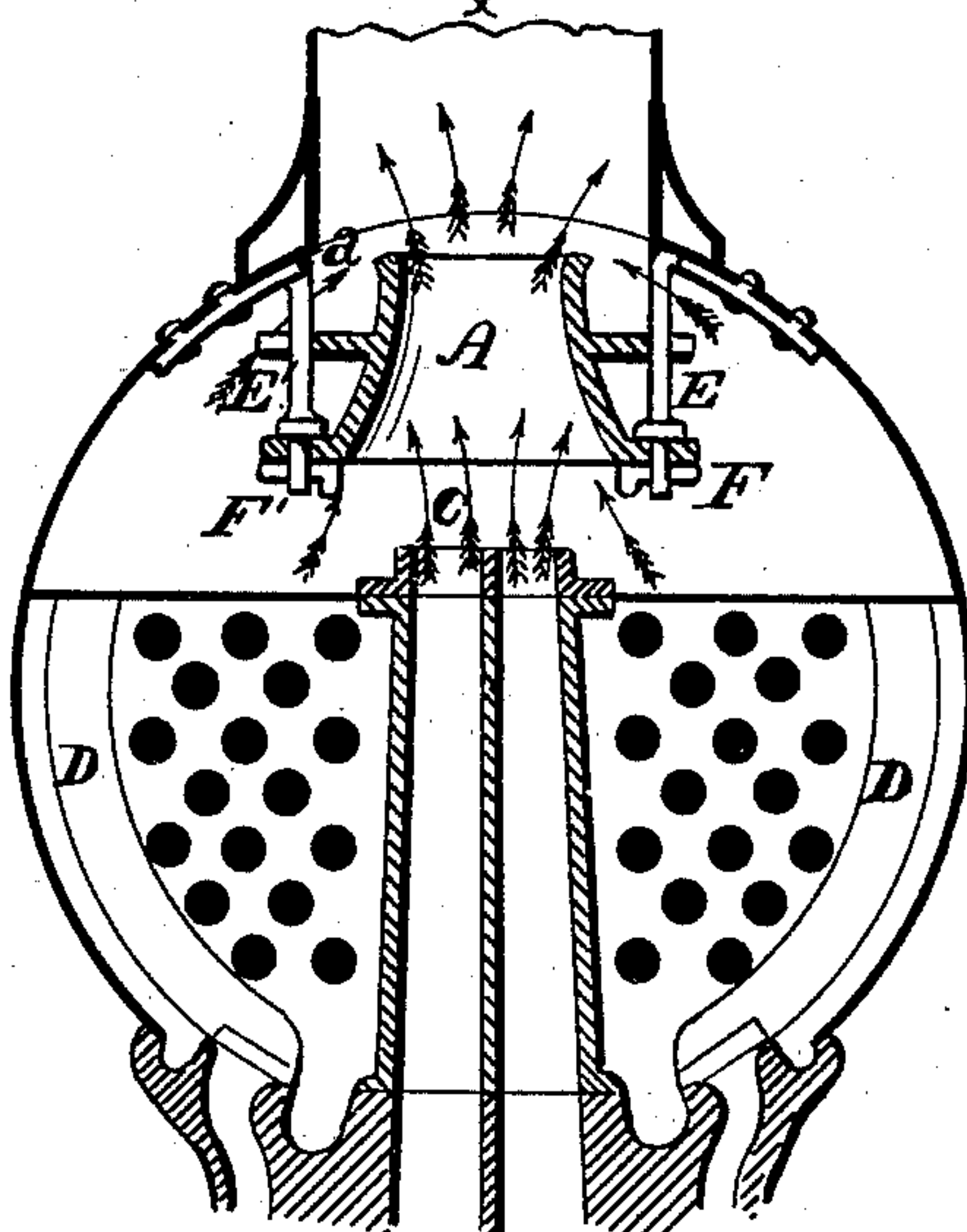
BLAST CONCENTRATOR FOR LOCOMOTIVES.

No. 282,103.

Patented July 31, 1883.



*Fig. 2.*



WITNESSES:

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(No Model.)

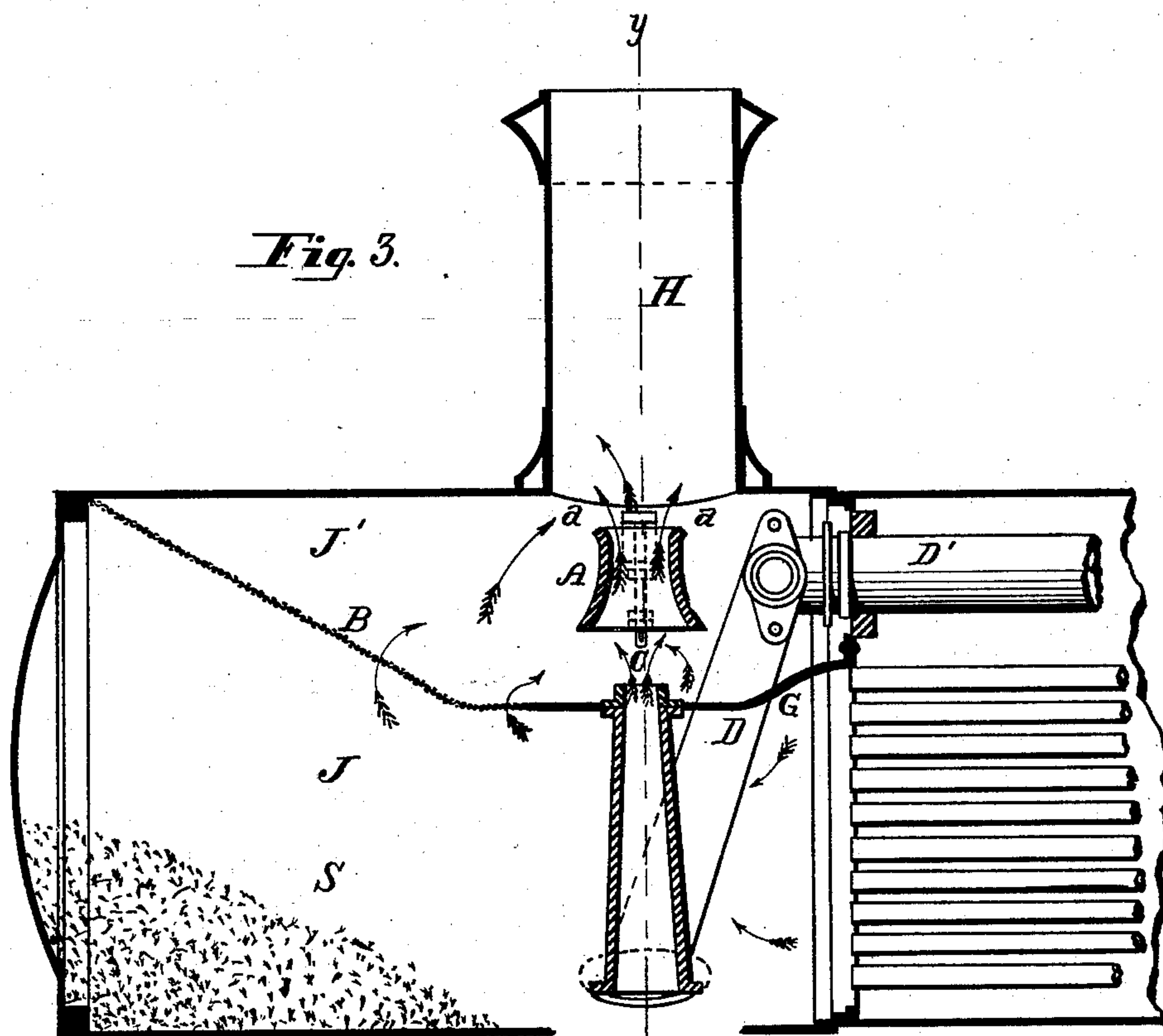
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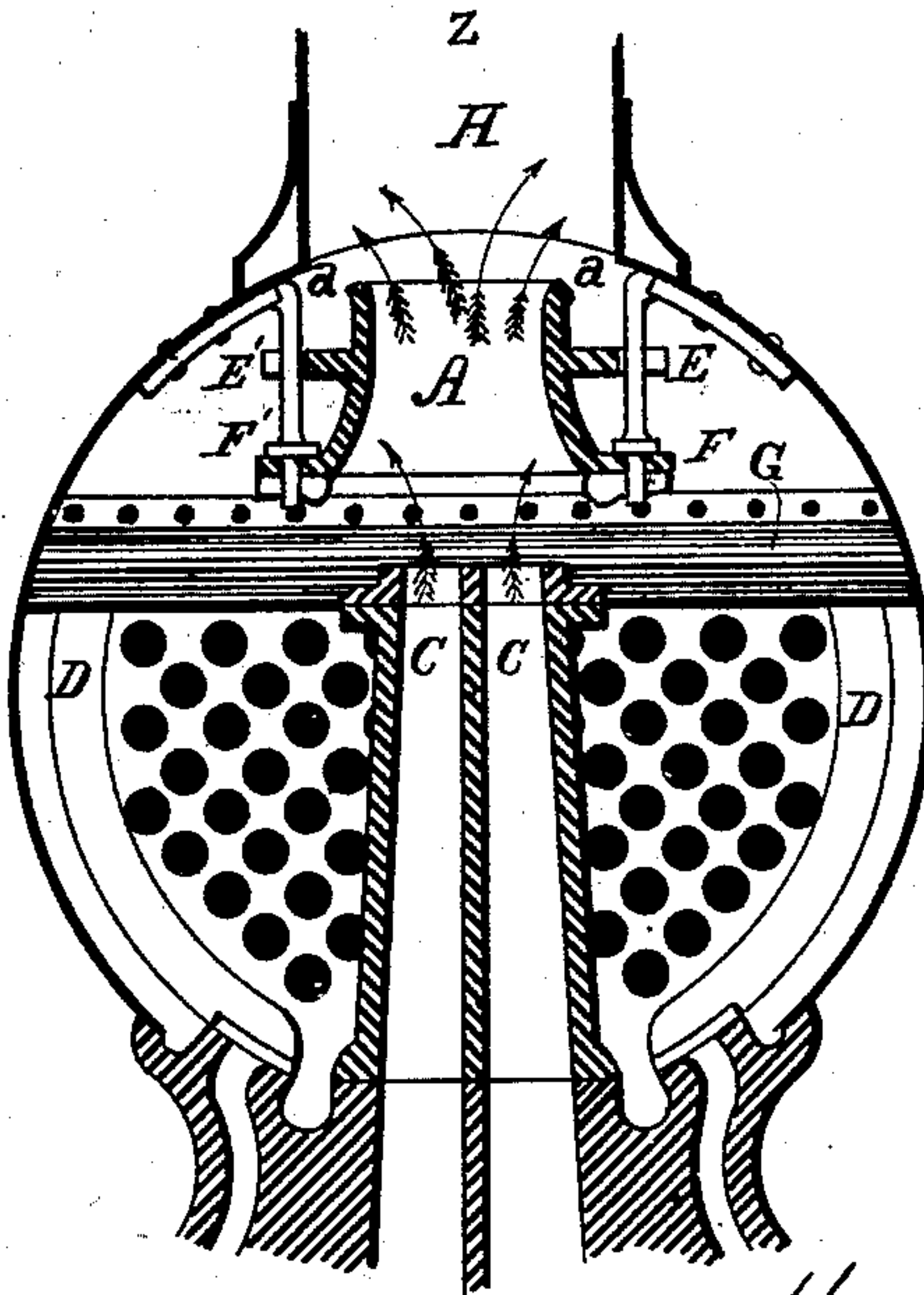
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*Fig. 4.*



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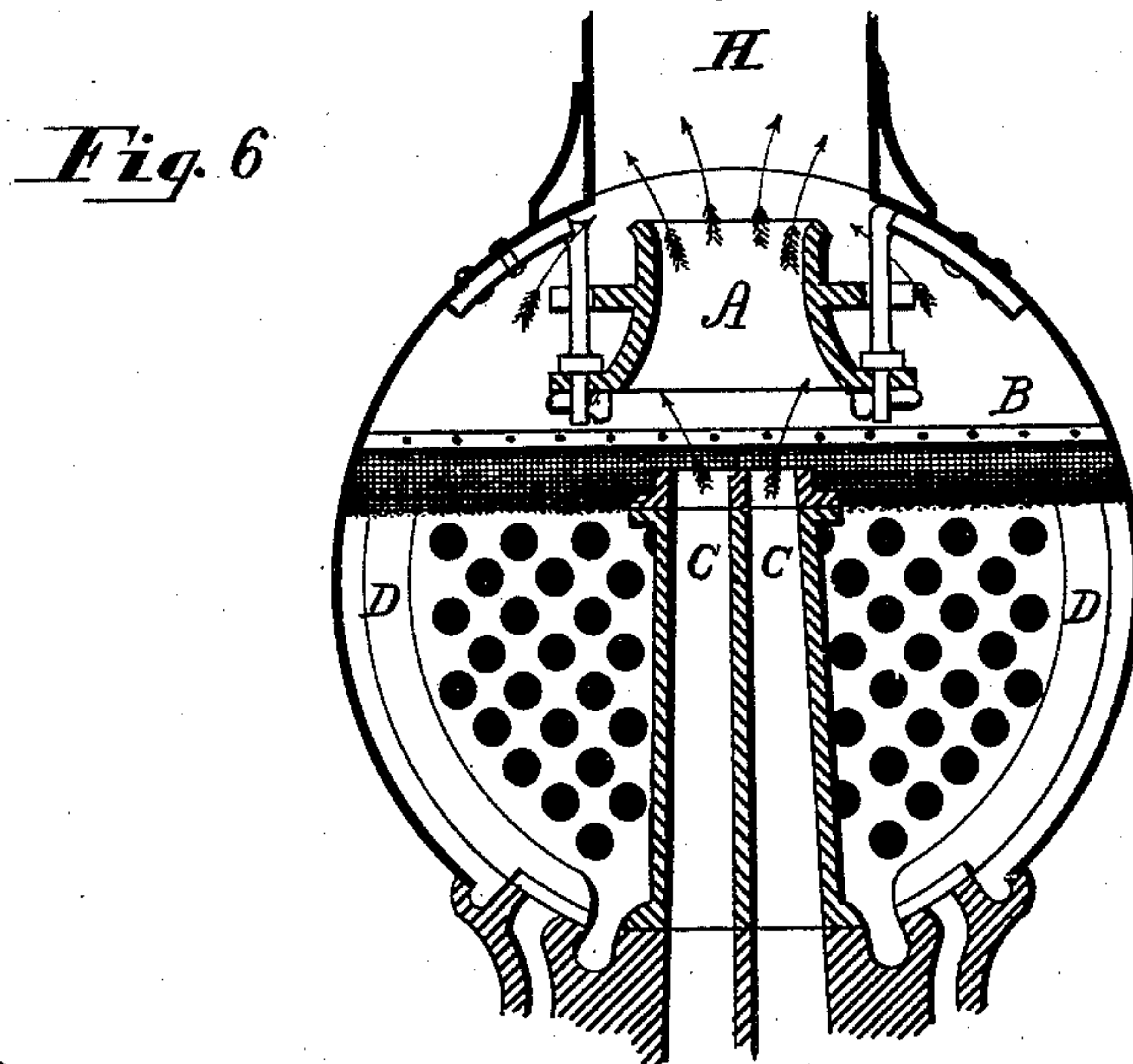
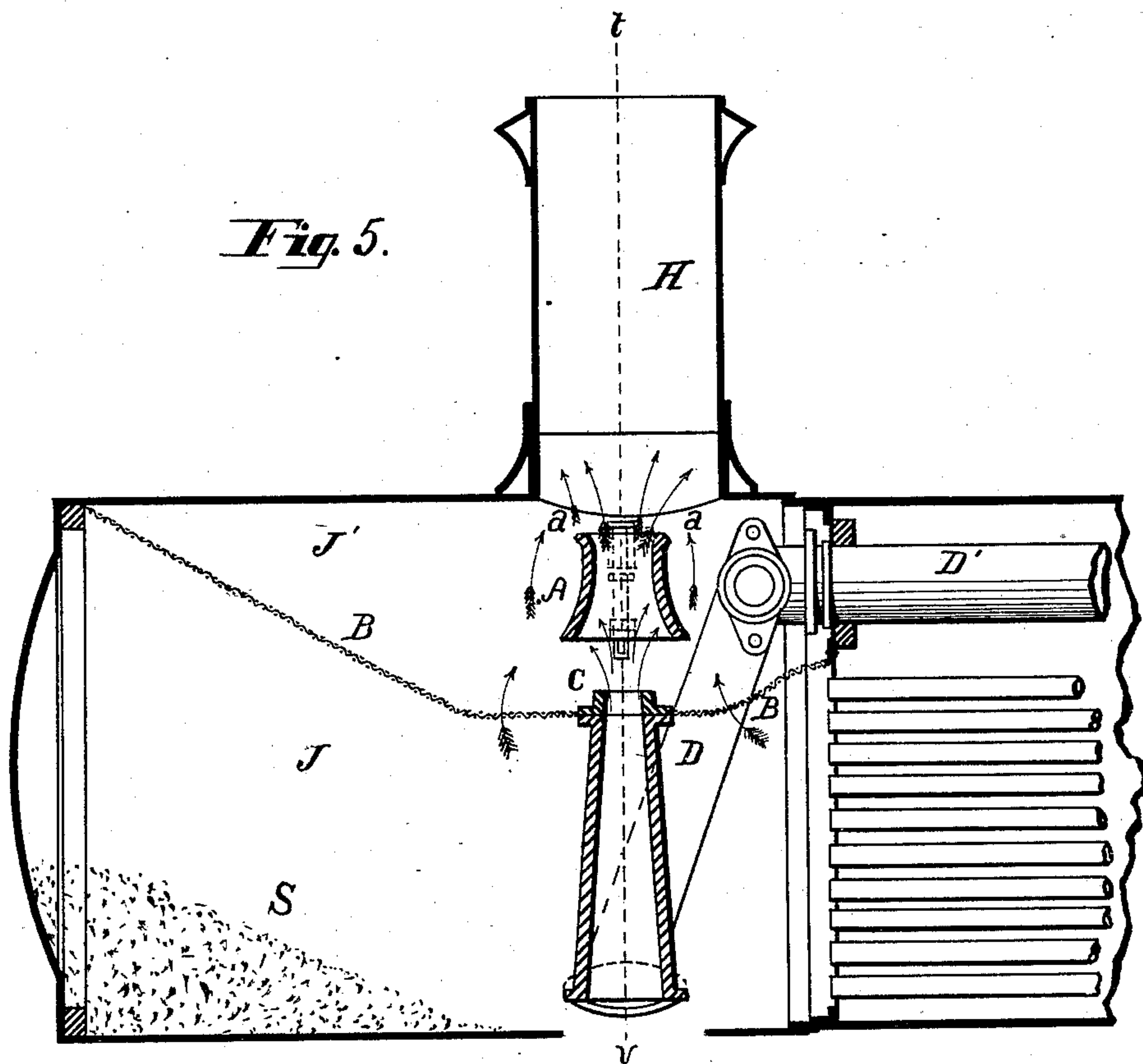
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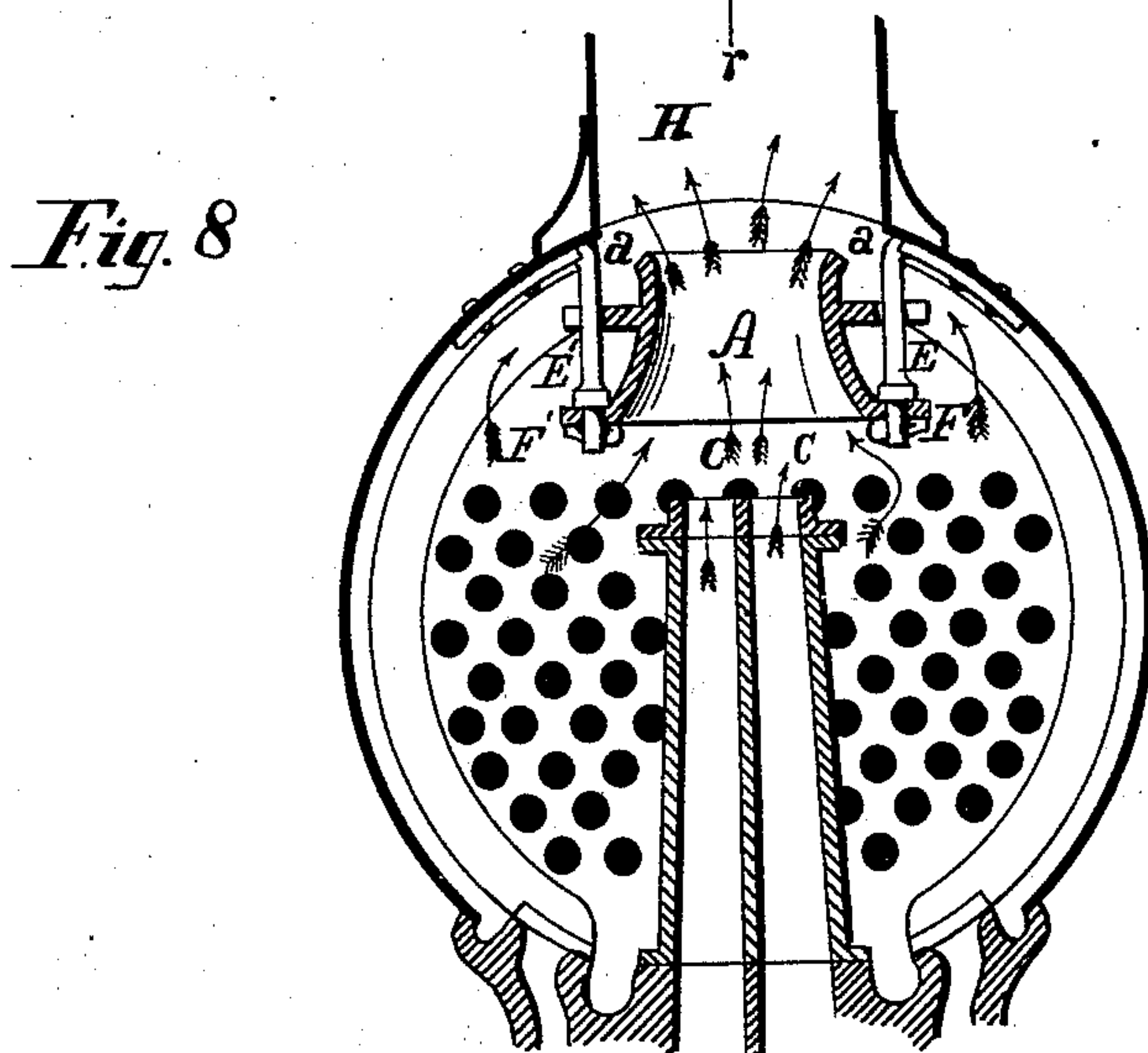
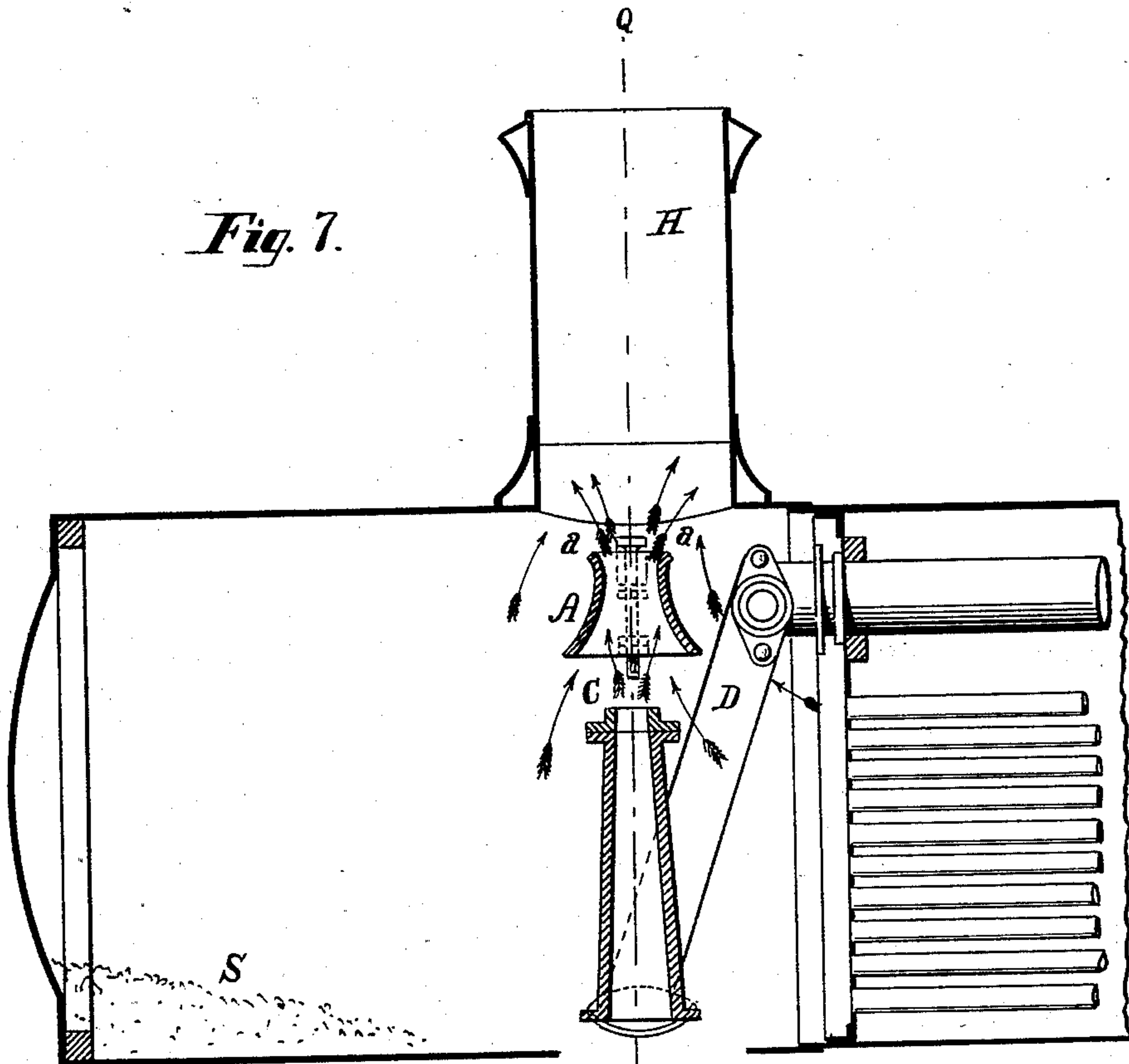
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# UNITED STATES PATENT OFFICE.

HENRY MILLHOLLAND, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF  
ONE-HALF TO ROBERT W. LESLEY, OF SAME PLACE.

## BLAST-CONCENTRATOR FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 282,103, dated July 31, 1883.

Application filed May 28, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY MILLHOLLAND, of Philadelphia, Pennsylvania, have invented a certain new and useful Improvement in Blast-Concentrators for Locomotives and other Engines, of which the following is a specification.

My invention relates to that class of mechanical devices known as "blast-concentrators," and its object is to prevent back-pressure, and to promote a more full and perfect consumption of fuel and more rapid and certain steaming qualities, where the exhaust-steam from an engine is used to produce an artificial draft for the furnace or fire-box.

For the purpose of illustration the accompanying drawings show several views of the waist and smoke box, stack, induction and exhaust pipes of tubular locomotive-boilers, and also several spark-arresting devices to which my invention is especially applicable.

Figure 1 is a longitudinal vertical central sectional elevation, showing the blast-concentrator A, conveniently applied within the upper compartment of the spark-arresting smoke-box, formed by a diaphragm or division plate, G, extending across the smoke-box from side to side and projecting from the crown-sheet of the same, at any convenient line between the stack H and the induction-pipe D, downwardly and forwardly to a line beyond the exhaust-nozzle C, which passes through it, and thence extending in the form of a netting or screen, B, forwardly by any convenient line to the head or crown of the smoke-box. Fig. 2 is a transverse sectional elevation of the same, taken on the dotted line *w x* in Fig. 1. Fig. 3 is a longitudinal vertical central sectional elevation, in all respects substantially similar to that shown in Fig. 1, excepting that the diaphragm or division-plate G is projected forwardly in any suitable form from a line on the flue or tube-sheet between the induction-pipe D' and the upper row of boiler-tubes. Fig. 4 is a transverse sectional elevation of the same, taken on the dotted line *y z* in Fig. 3. Fig. 5 is a longitudinal vertical central sectional elevation of a smoke-box divided into upper and

lower compartments by a spark-arresting netting or screen, B, projecting from a convenient line on the flue or tube-sheet above the upper row of tubes, in any convenient form to the head of the smoke-box. The nozzle C projects through the dividing-screen, and the blast-concentrator A is shown as applied in the upper compartment. Fig. 6 is a transverse sectional elevation of the same, taken on the dotted line *t v* in Fig. 5. Fig. 7 is a longitudinal vertical central sectional elevation of a smoke-box in one compartment without any division-plates, screens, or special spark-arresting devices, and shows the blast-concentrator A fixed in position above the exhaust-nozzle C and below the base of the stack H, and axially in line with both stack and exhaust-nozzle. Fig. 8 is a transverse sectional elevation of the same.

Similar letters of reference indicate like parts in all the figures, and the location of the blast-concentrator A is the same in all the views.

The blast-concentrator A may be made of any suitable material and of any desired form in cross-section; but in longitudinal vertical section I prefer the form indicated in the drawings—viz., a wide orifice narrowing by any suitable curved or straight line to a throat near its upper orifice, and the edges of the latter flared, as indicated at *a a*. The concentrator may be held in place by any suitable mechanical device attached to the base of the stack, the crown of the smoke-box, as shown in the several views, or to any dividing-plate or other convenient and adjacent part or parts. I prefer the device indicated by the drawings—the brace-rods E E' and the shoulder and keys F F—which provides a ready means for the removal of the concentrator for repairs, or to be replaced when worn out by the action of the blast. By whatever means the blast-concentrator is held in place it should be located in line with both the exhaust-nozzle C and the stack H, with its larger orifice projecting downward over and above the exhaust-pipe, and the smaller orifice projecting upward under and below the base of the stack. The location



which will give the greatest efficiency can readily be ascertained by temporary adjustment or experiment for any given engine or class of engines. When ascertained, the concentrator should be permanently attached, to prevent accidental disturbance or intentional displacement from its proper position.

The action of my invention is readily indicated by the arrows representing the direction of the blast-currents.

It is desirable, in creating an artificial draft for locomotives and other engines by means of the exhaust-steam, that the ejecting current shall strike and fill the stack as near its base as possible, in order to utilize the full height of the stack and create a more perfect vacuum. In ordinary cases, however, if the exhaust-pipe is lowered in order to produce this effect, there is more or less danger of back draft through the fire-tubes, owing to a spreading of the ejecting-current of exhaust-steam striking the crown of the smoke-box on all sides of the base of the stack.

My invention is especially designed and adapted to the use of a high exhaust-pipe, and yet so controlling and directing the ejecting-current of exhaust-steam as to cause it to pass into the stack with its full volume and strike and fill the stack on a line near its base. This result is accomplished by the wide flaring orifice of the concentrator projecting downward over and above the exhaust-nozzle, which receives and concentrates and transmits the exhaust-steam in its passage upward toward the stack, and prevents such spreading or diffusion of the current as might produce back draft. The flaring of the edges of the upper orifice of the concentrator promotes and induces a spreading or redistribution of the ejecting-current and causes the exhaust to strike and fill the stack at a point near its base, as indicated by the arrows in the several views. The exhaust-steam from the nozzle passes through the intervening air-space into the concentrator above it, and incidentally creates a local vacuum at that point, and, continuing upward through it, creates a secondary local vacuum in passing through the air-space between its upper flared edges and the base of the stack, and then, filling the latter near its base, forms in effect a primary piston-vacuum, with the full force of the exhaust completely filling the stack. The local vacuums at the bottom of the concentrator and between its upper flared orifice and the base of the stack tends to produce regularity and evenness in the draft through the tubes during the intervals between the formations of the main vacuum in the stack at each exhaust from the cylinders, and utilizes the full draft, producing effects of the ejecting-current, whether it be by vacuum or transfusion of the upward-moving currents. This device is especially

effective where a high-exhaust pipe and nozzle is desirable in combination with a spark-arresting screen or netting or plate, extended into a screen or netting dividing the smoke-box and spark-receptacle into upper and lower compartments.

Having in the foregoing described my invention, what I claim as that invention is—

1. In the smoke-box of a locomotive or other engine, the blast-concentrator A, located in line with any high-exhaust pipe C and stack H, with its lower orifice over and above the nozzle of the exhaust-pipe and its upper orifice below the base of the stack, and sufficiently flared to cause the concentrated exhaust-current to be redistributed in such a manner as to strike and fill the stack near its base, substantially as described, and for the purpose specified.

2. In the smoke-box of a locomotive or other engine, a blast-concentrator located in line with the exhaust-pipe and the stack, and situated within an upper compartment of the smoke-box, which compartment is formed by a screen, netting, or diaphragm, or combination of the same, through which the exhaust-steam pipe passes, extending across the smoke-box from side to side and from the flue-head to the forward part of the smoke-box by any suitable line or plane, substantially as described, and for the purposes specified.

3. In the smoke-box of a locomotive or other engine, a blast-concentrator located in line with the exhaust-pipe and the stack, and within an upper compartment formed by a screen, netting, or diaphragm, or combination of the same, through which the exhaust-pipe passes, extending across the smoke-box from side to side and from a line on the crown of the smoke-box back of the base of the stack to the forward part of the box by any suitable line or plane, substantially as described, and for the purpose specified.

4. The combination, with the smoke-box of a locomotive-engine which is divided into an upper and lower compartment by a screen and diaphragm through which an exhaust-steam pipe passes, of a blast-concentrator within the upper compartment, substantially as described, and for the purpose specified.

5. The combination, with a smoke-box of a locomotive-engine which is divided into an upper and lower compartment by a screen through which an exhaust-steam pipe passes, of a blast-concentrator placed within the upper compartment, substantially as described, and for the purpose specified.

In testimony whereof I have hereunto signed my name this 23d day of May, A. D. 1883.

HENRY MILLHOLLAND.

In presence of—

WM. B. EDWARDS,  
WM. H. ADDICKS.