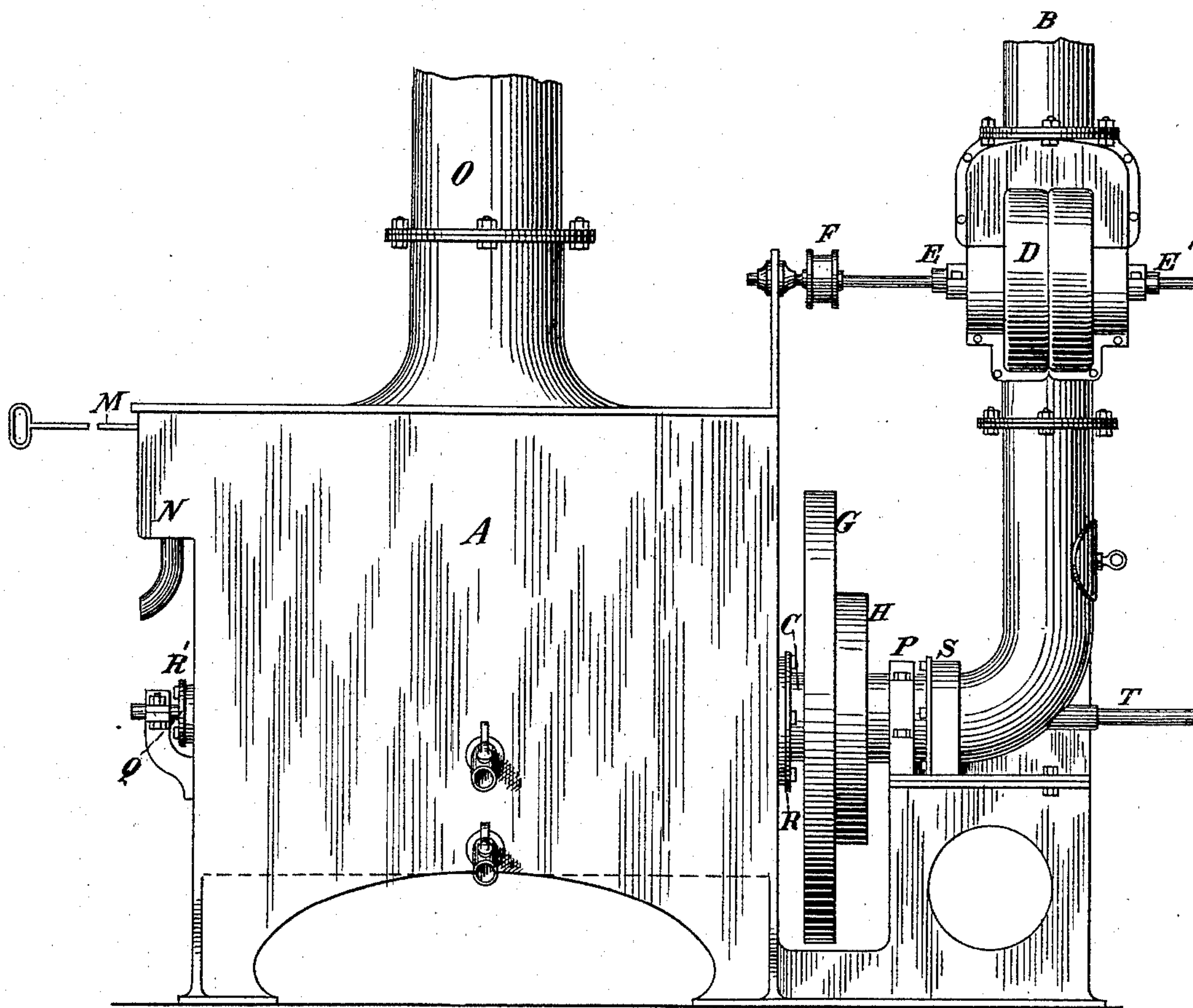


(No Model.)

4 Sheets—Sheet 1.

S. ELLIOTT.
APPARATUS FOR PURIFYING SMOKE.
No. 442,112. Patented Dec. 9, 1890.

FIG. 1.



WITNESSES:

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(No Model.)

4 Sheets—Sheet 2.

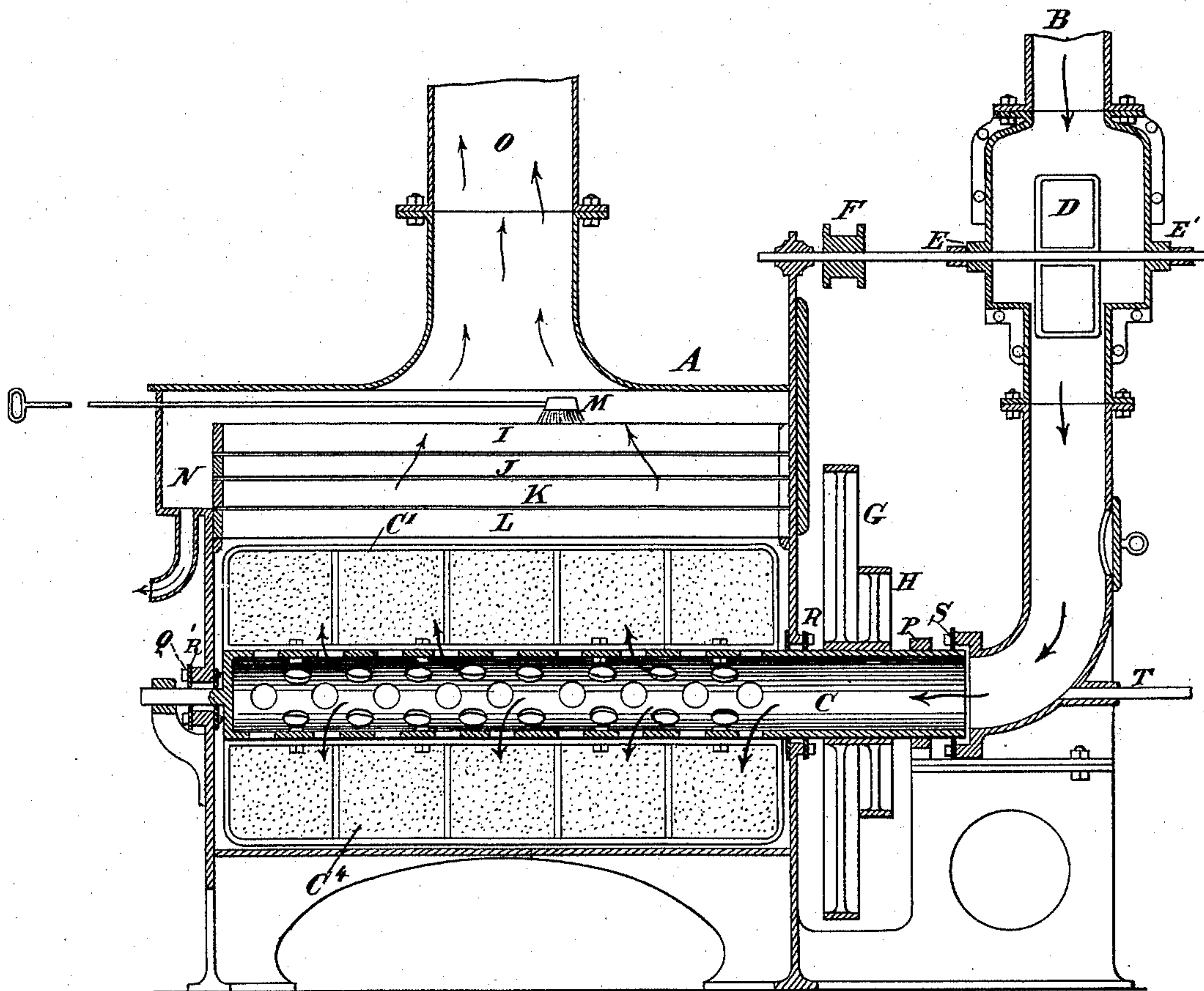
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Patented Dec. 9, 1890.

FIG. 2.



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FIG. 3.

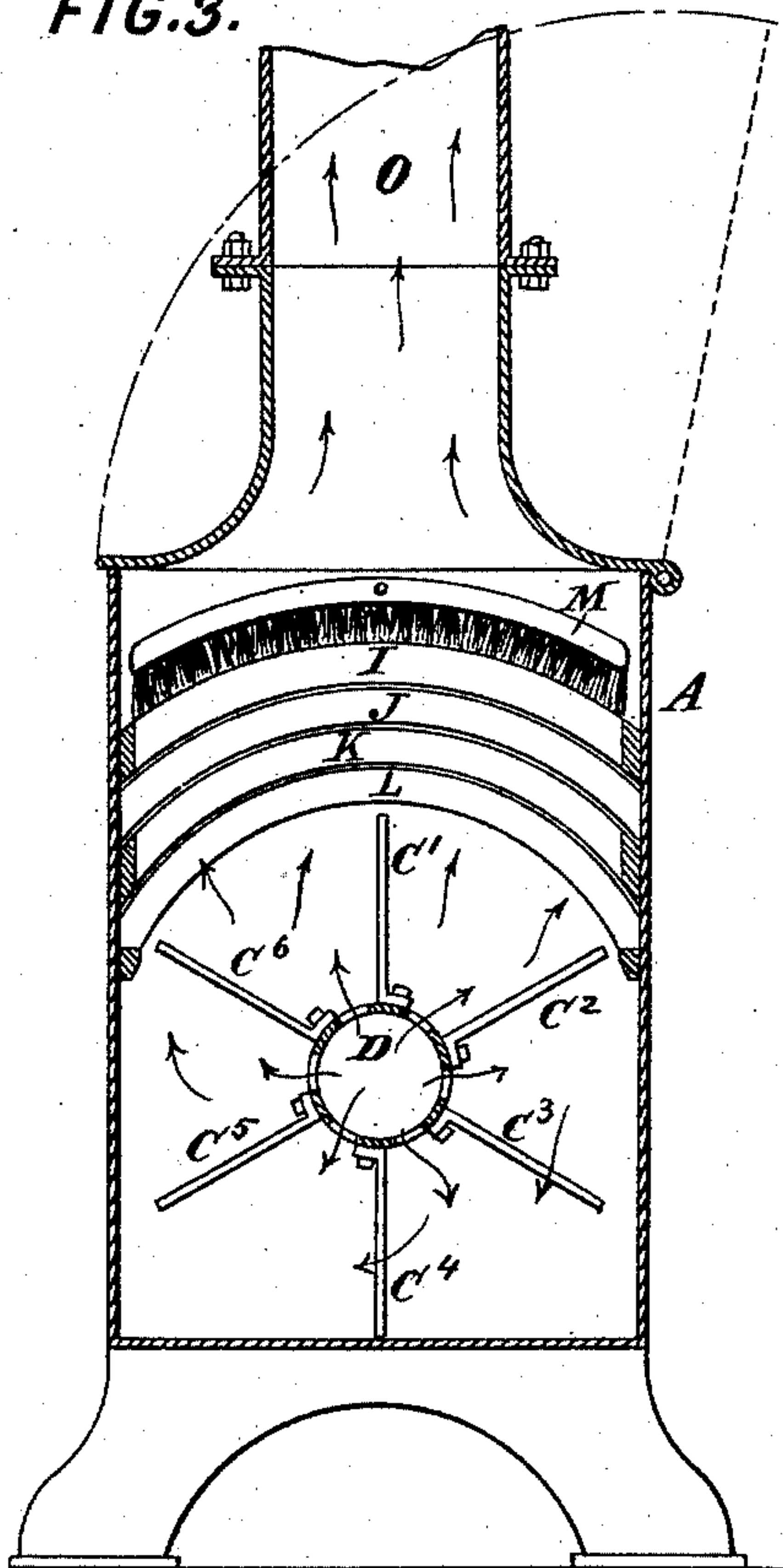


FIG. 4.

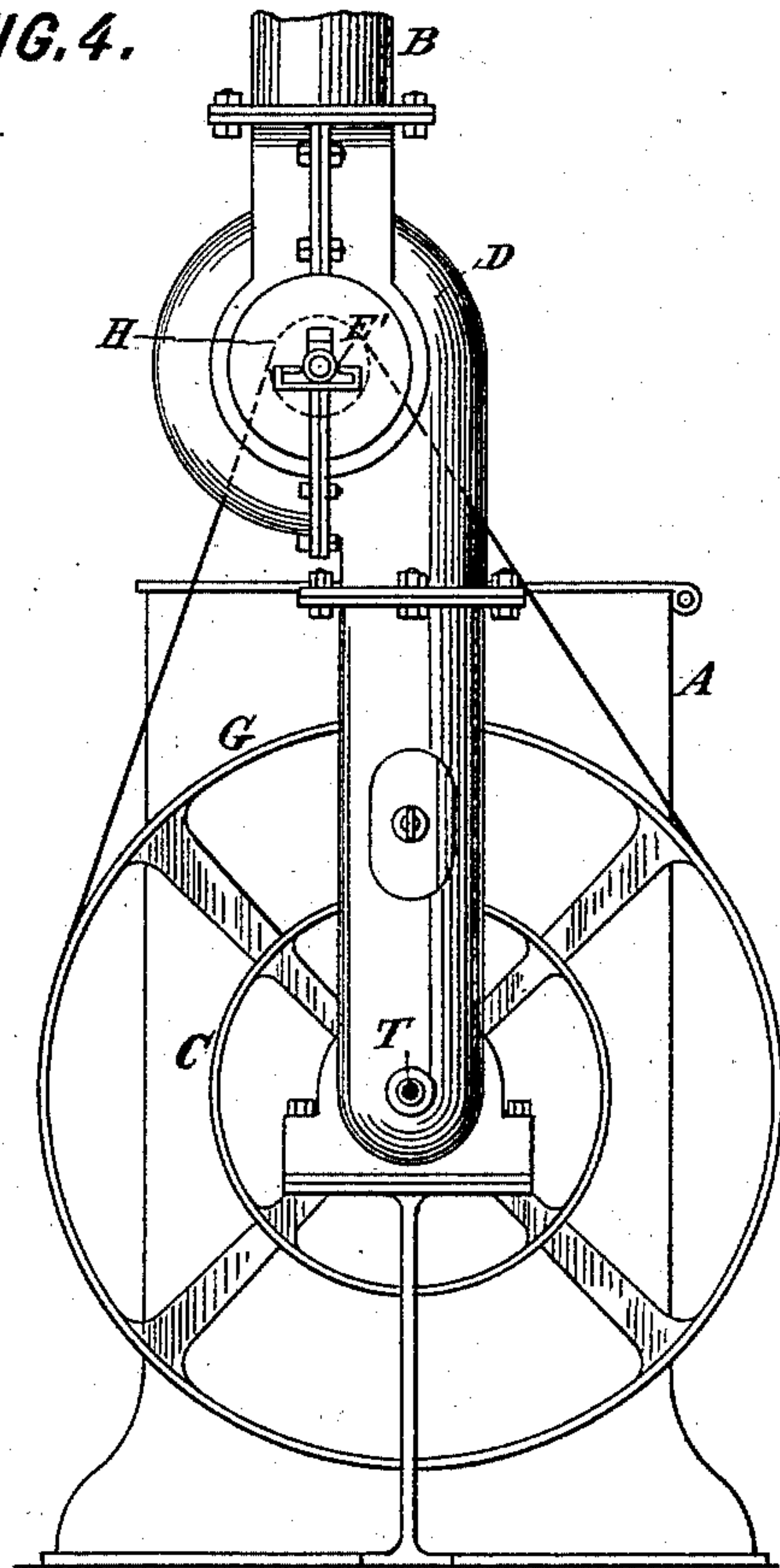
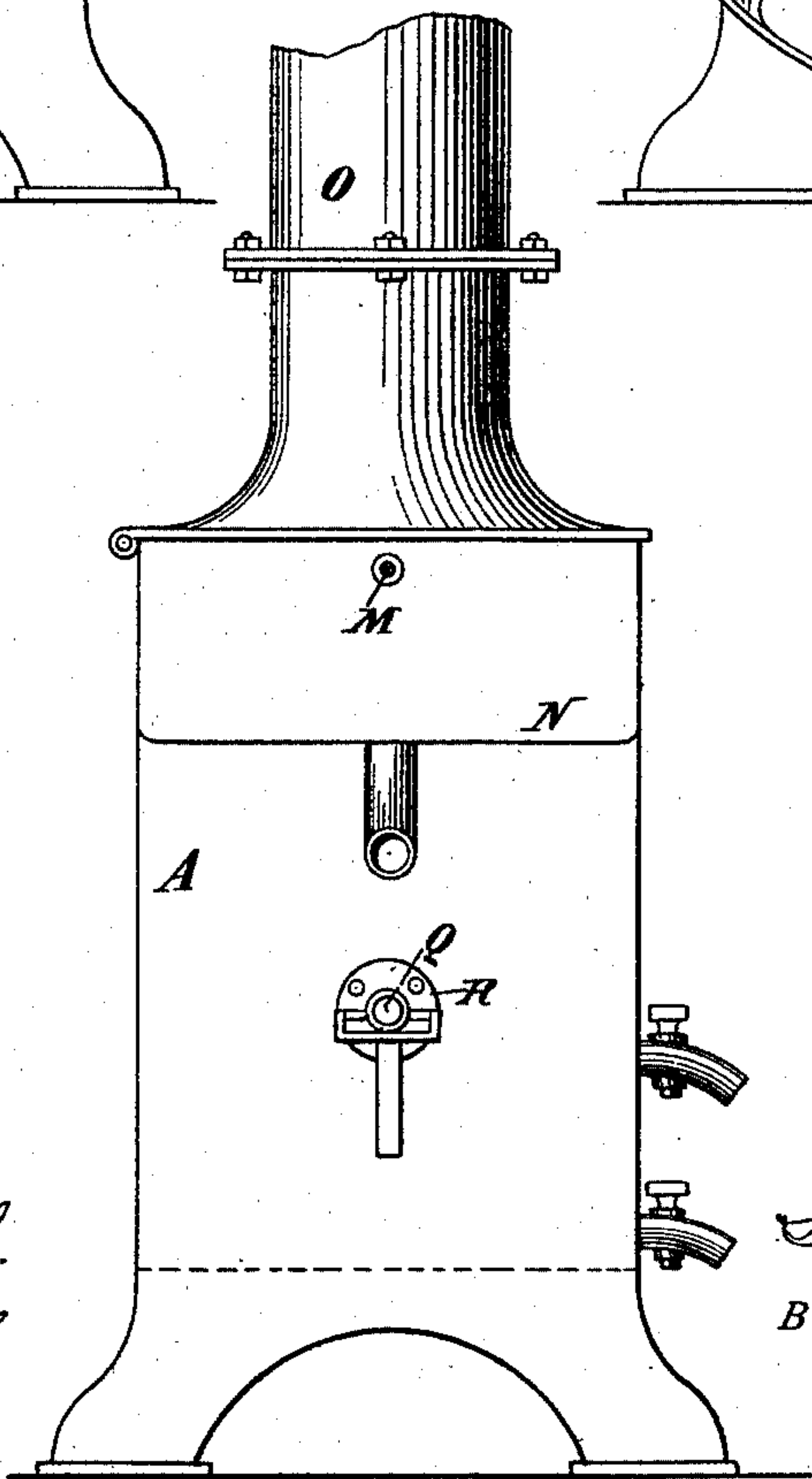


FIG. 5.



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(No Model.)

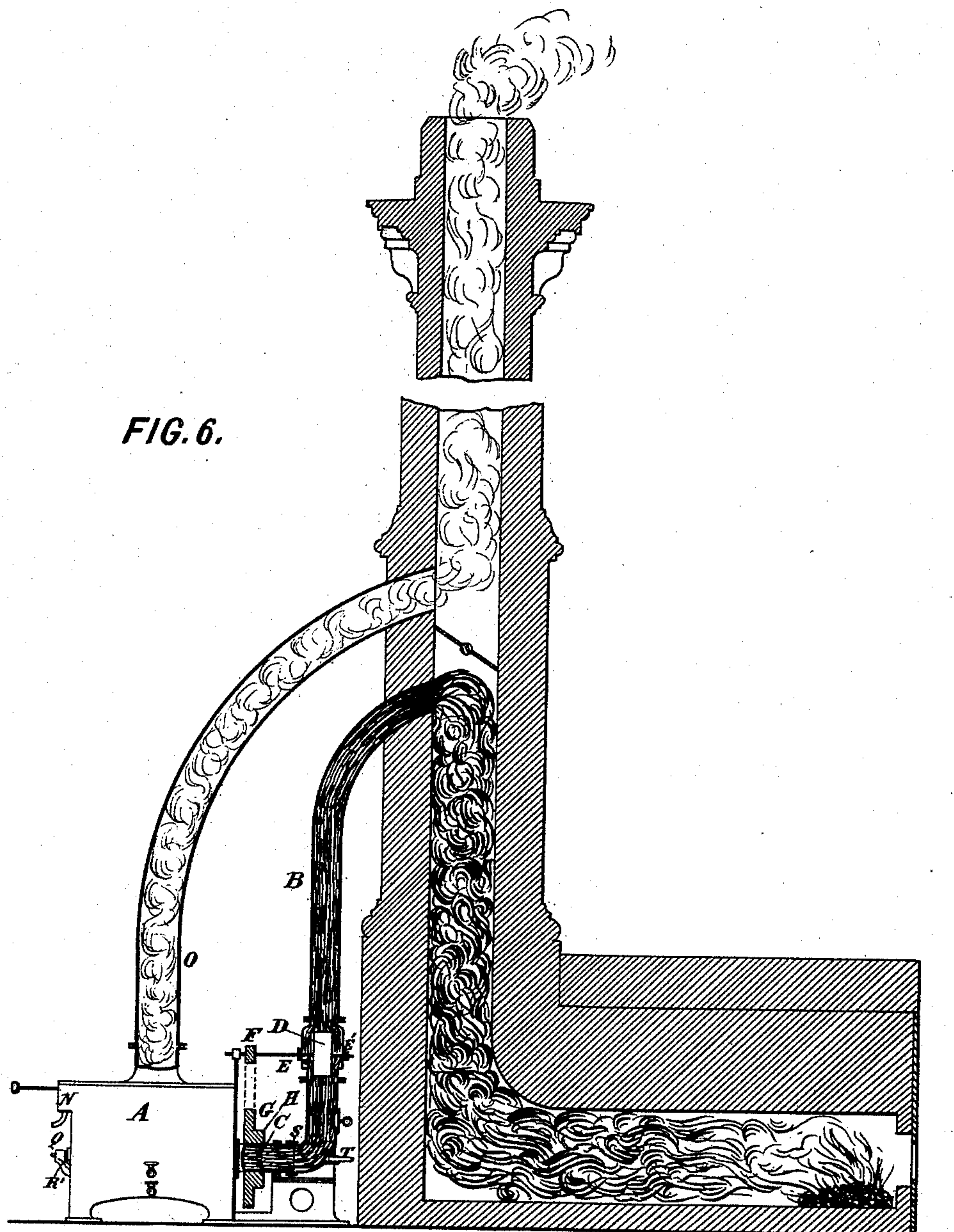
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APPARATUS FOR PURIFYING SMOKE.

No. 442,112.

Patented Dec. 9, 1890.



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UNITED STATES PATENT OFFICE.

SAMUEL ELLIOTT, OF NEWBURY, ENGLAND.

APPARATUS FOR PURIFYING SMOKE.

SPECIFICATION forming part of Letters Patent No. 442,112, dated December 9, 1890.

Application filed December 30, 1889. Serial No. 335,356. (No model.) Patented in England August 7, 1889, No. 12,460.

To all whom it may concern:

Be it known that I, SAMUEL ELLIOTT, of Newbury, in the county of Berks and Kingdom of Great Britain, have invented certain new and useful Improvements in Apparatus for Purifying Smoke, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

Letters Patent for these improvements were granted in Great Britain, which Letters Patent bear date the 7th day of August, 1889, No. 12,460.

The object of my invention is to destroy the smoke and noxious vapors proceeding from factory, engine, and other chimneys and flues by condensing and absorbing them by means of washing with water in a state of agitation, and thus to purify the same and prevent the pollution of the atmosphere thereby.

In carrying out my invention I conduct the smoke from the chimney by means of a pipe connected with a revolving fan or other suitable exhaust apparatus, which sucks the smoke and vapors from the chimney and takes them through a continuation of the pipe into a perforated revolving pipe in the cylinder or apparatus hereinafter mentioned, which is partly filled with water, and in which the smoke being driven through the holes in the perforated pipe is, as it were, churned and beaten and thoroughly washed and purified by the water, the solid matter contained therein being absorbed and decomposed, and the effluent vapor and steam being purified to such a degree as to be innoxious and not to pollute the air or darken or discolor anything with which it may come into contact.

The smoke from the chimney is conducted by means of the revolving fan or exhaust apparatus and by means of a suitable bend in the pipe upward or downward, as may be required, until it reaches the cylinder or apparatus in which it is washed and cleansed. This apparatus I make preferably in the shape of a square or oblong box or tank or stand, and it may be either of cast-iron or of wood. It is fitted with a hinged top having in its center a discharge tube or pipe projecting therefrom. In this apparatus and at an equal distance from the bottom as from the sides is

a pipe of the same size as the pipe bringing the smoke from the chimney through the revolving fan, which pipe is perforated with holes throughout its circumference and having fastened thereon extending its whole length five or six wings or beaters made of perforated zinc or wire netting or other perforated material. This perforated pipe is closed at the extreme end, and works in bearings at both ends. At the extreme end it works through a stuffing-box in the side of the apparatus with a small spindle on a bearing fixed onto the outside of the tank, and at the inlet it works in the end of the pipe leading from the revolving fan, being jointed thereto by a stuffing-box joint on a plumber-block bearing. Above this pipe, and inside the tank, are four covers of perforated zinc or other perforated material on light wooden frames extending the length of the apparatus and having a curved shape to follow the sweep of the beaters upon the perforated pipe. The bottom one of these frames rests upon lugs cast in the corners of the tank at a short distance from the sweep of the beaters, and the remainder rise one above the other at a distance of about two inches apart. I partially fill the tank or apparatus with water, but so that it does not come to the bottom of the perforated pipe, and I insert a tap in the front of the apparatus for the purpose of regulating this. I fix upon the part of the pipe which is outside the apparatus, and between the plumber-block joint and the stuffing-box on the end of the tank, two pulleys, the smaller one of which is driven from the shafting of a steam-engine, and the other and larger communicating by a belt with the pulley of the revolving fan, so that when motion is applied to this pulley the motion is communicated to the fan, which revolves very rapidly and sets the apparatus in motion. The fan both sucks the smoke from the chimney and drives it through the pipe into the tank or apparatus, and by the revolving of the perforated pipe with the beaters attached the smoke and water are beaten against the perforated trays and the sides of the apparatus, and the smoke is thoroughly washed and purified. The effect of the churning and the beating of the smoke in the water against the beaters and perforated trays is to absorb and

condense the smoke and to cause all the solid matter therein to be decomposed and separated and to rise through the covers in the shape of sooty foam, which accumulates and is driven through the covers until it settles upon the uppermost in the shape of lamp-black or moist soot, which may be removed by a brush into a trough by the side of the apparatus, and so taken away, while such part of the smoke as may not be absorbed and condensed by the churning and beating of the water escapes by the outlet-pipe in the shape of a white vapor more resembling steam, and innocuous.

Where convenient to do so, I assist the operation of the fan, and also aid in the cleansing and decomposition of the solid matter in the smoke by introducing at the bend of the inlet-pipe conducting the smoke into the tank or washing apparatus a jet of steam from the exhaust or waste steam of the cylinder of the engine supplying the power for working the pulley.

To assist in understanding and carrying into effect my invention, I will proceed to describe the accompanying drawings, reference being had to the letters marked thereon.

Figure 1 is a front view of the apparatus. Fig. 2 is a longitudinal section of the tank or apparatus, showing the fan, the inlet of the smoke, the perforated pipe with the wings or beaters attached, and the circular covers or trays over same. Fig. 3 is a cross-section through the center, showing the perforated pipe, beaters, and covers, and also the brush for cleaning. Fig. 4 is an end elevation showing the fan and the two pulleys by which the apparatus is set in motion. Fig. 5 is an end elevation of the opposite end to Fig. 4. Fig. 6 shows the method of applying the apparatus to a factory-chimney.

Similar letters in all the figures represent similar parts.

A is the apparatus or tank, into which the smoke is brought by the fixed pipe B through the revolving fan D into the perforated revolving pipe C in the apparatus, and showing in Fig. 2 two of the beaters C' C² attached.

D is the fan working in the bearings E E', and being set in motion by the pulley F, which is connected by a belt with the pulley G, which is fixed on the revolving pipe C outside the tank.

H is the pulley, also fixed on the revolving pipe outside the tank, and which is connected by a belt to the shafting of the engine supplying the motion.

I J K L are the four curved and perforated trays or covers over the beaters. These may be less in number without departing from my invention; but I prefer four. M is the brush for cleansing the accumulation of moist soot into the trough N.

O is the outlet for the cleansed vapor and steam which is left.

P is the bearing in which the perforated pipe works in the inlet-pipe B.

Q is the bearing at the extreme end of the perforated pipe, and R R' the stuffing-boxes at the two ends of the perforated pipe.

S is the stuffing-box connecting the inlet-pipe B and the revolving perforated pipe C.

T is the inlet for the waste or exhaust steam when used.

On the pulley H being set in motion, motion is imparted by the pulleys G F to the revolving fan D, which sucks the smoke from the chimney through the inlet-pipe B into the perforated pipe C, revolving in the tank or cylinder A, which is partially filled with water, and causes the beaters C' C² C³ C⁴ C⁵ C⁶ to strike the water with a very quick and rapid motion and cause it to be thrown continually against the perforated covers and to thoroughly wash and decompose the smoke, causing the solid matter therein, which is of a light character, to be separated and to be driven against and through the perforated trays I J K L and through the uppermost, on the top of which it settles, and is occasionally brushed away by the brush M into the trough N. Such part of the vapor of the smoke from the chimney and the steam let in by the inlet T as may not be absorbed passes out by the outlet O, which can either be carried direct into the air or back into the chimney at a point higher than the part of the chimney where the smoke has been taken from, or it may, if necessary, be taken to any convenient distance or position.

The method of application of the apparatus to a chimney varies somewhat, according to the kind of chimney for which the apparatus is intended.

In factory-chimneys I insert a stop-valve or door, and underneath I insert the pipe B, by means of which the smoke is sucked by the fan or other exhaust apparatus and driven into the tank or apparatus A. The outlet-pipe O, I return into the chimney at a point above the valve or door, as shown in Fig. 6, or it may, if preferred, be continued direct into the air or taken by bends to any convenient outlet.

For the funnels of engines I either insert a stop-valve or door in the same way as shown in Fig. 6 or continue the funnel by a movable cap or bend to connect it with the inlet-pipe B.

I claim—

1. In an apparatus for treating smoke in order to remove the solid matter from its gases, the combination of the revolving perforated pipe C, into which the smoke is conducted by an artificial exhaust, with the washing-tank A, containing means for beating and agitating the smoke with water or a mixture of water and steam, substantially as described.

2. In an apparatus for treating smoke in order to remove the solid matter from its gases, the combination of an exhaust apparatus with the revolving perforated pipe C, containing winged beaters, and sieves for catching the sooty foam, substantially as described.

3. In an apparatus for treating smoke in or-

der to remove the solid matter from its gases, the combination of the exhaust-fan D, revolving perforated pipe C, containing winged beaters, and sieves for catching and means for removing the sooty foam, substantially as described.

4. In an apparatus for treating smoke in order to remove the solid matter from its gases, the combination of the exhaust-fan D, revolving

perforated pipe C, containing winged beaters, a series of two or more sieves I J K L, and a brush M, for removing the sooty foam, substantially as described.

SAMUEL ELLIOTT.

Witnesses:

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W. A. CHADWICK.