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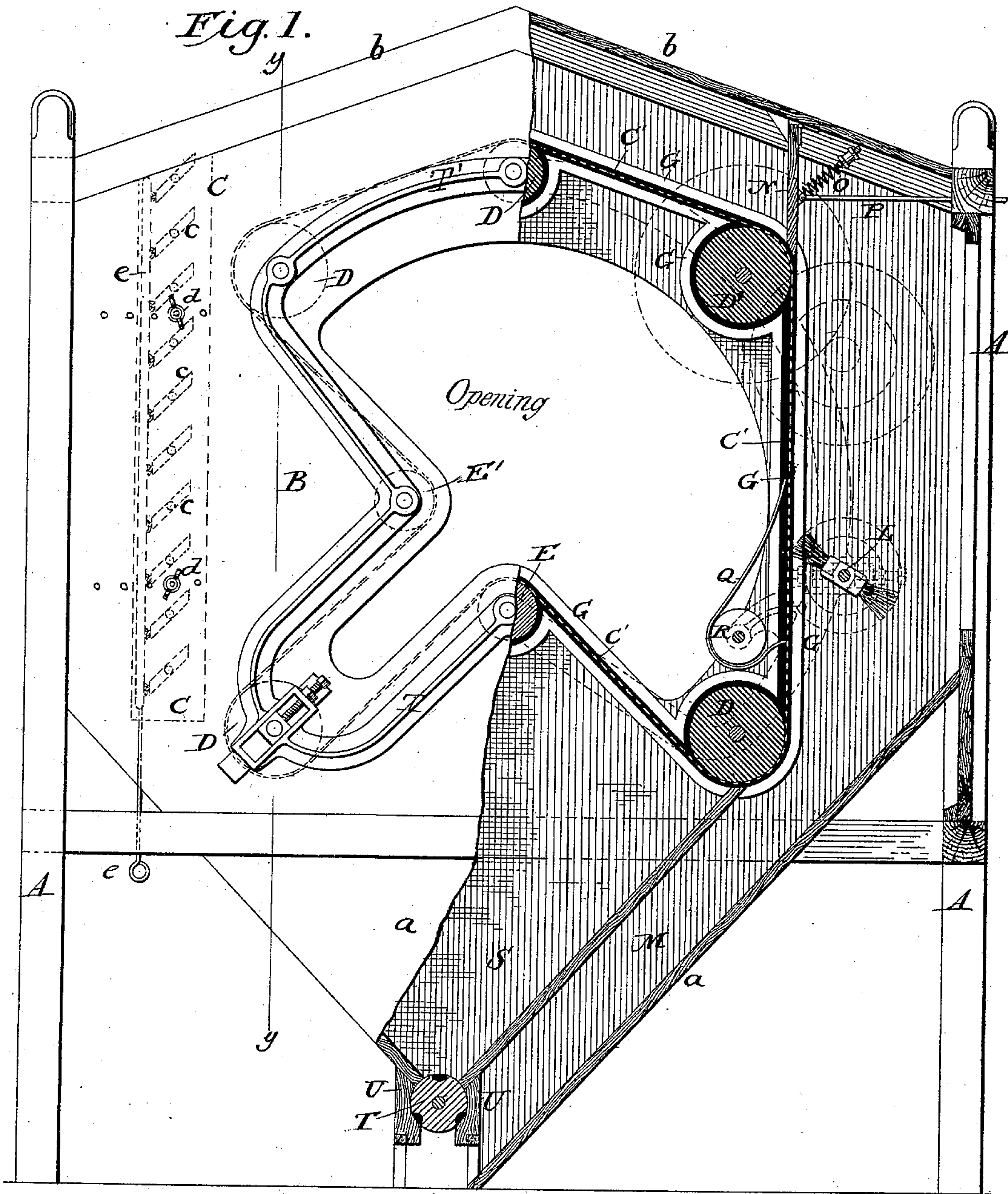
2 Sheets—Sheet 1.

J. S. BRANDSTAETTER.

DUST ARRESTING MACHINE.

No. 297,223.

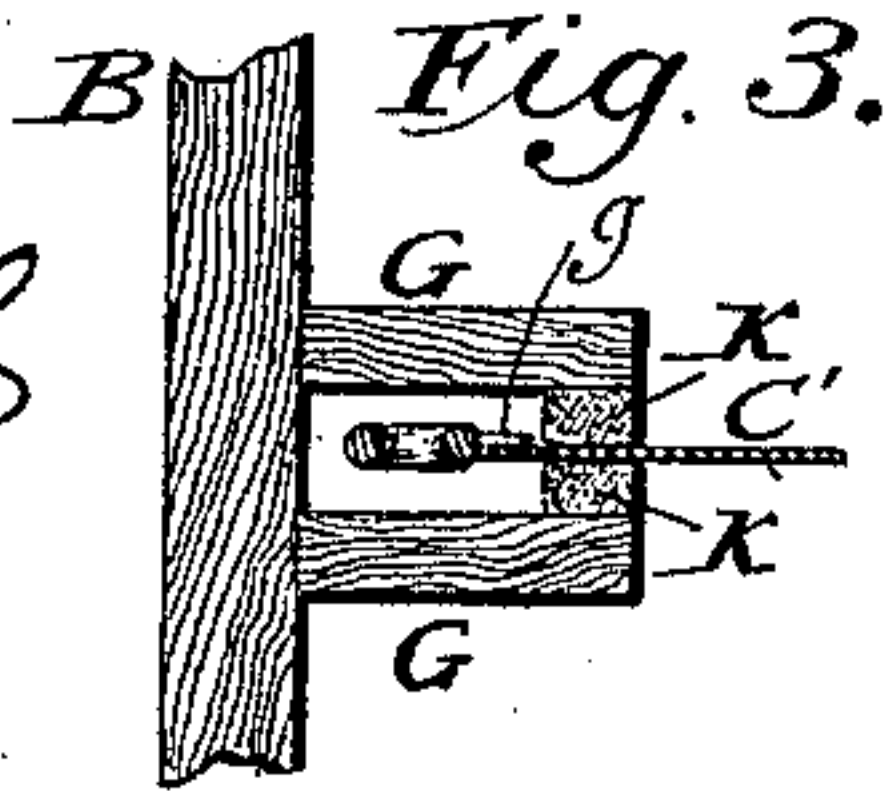
Patented Apr. 22, 1884.



Attest.

Sidney P. Hollingsworth

Harry Shipley



Inventor.

J. S. Brandstaetter

By his atty.

Philip T. Dodge.

(No Model.)

2 Sheets—Sheet 2.

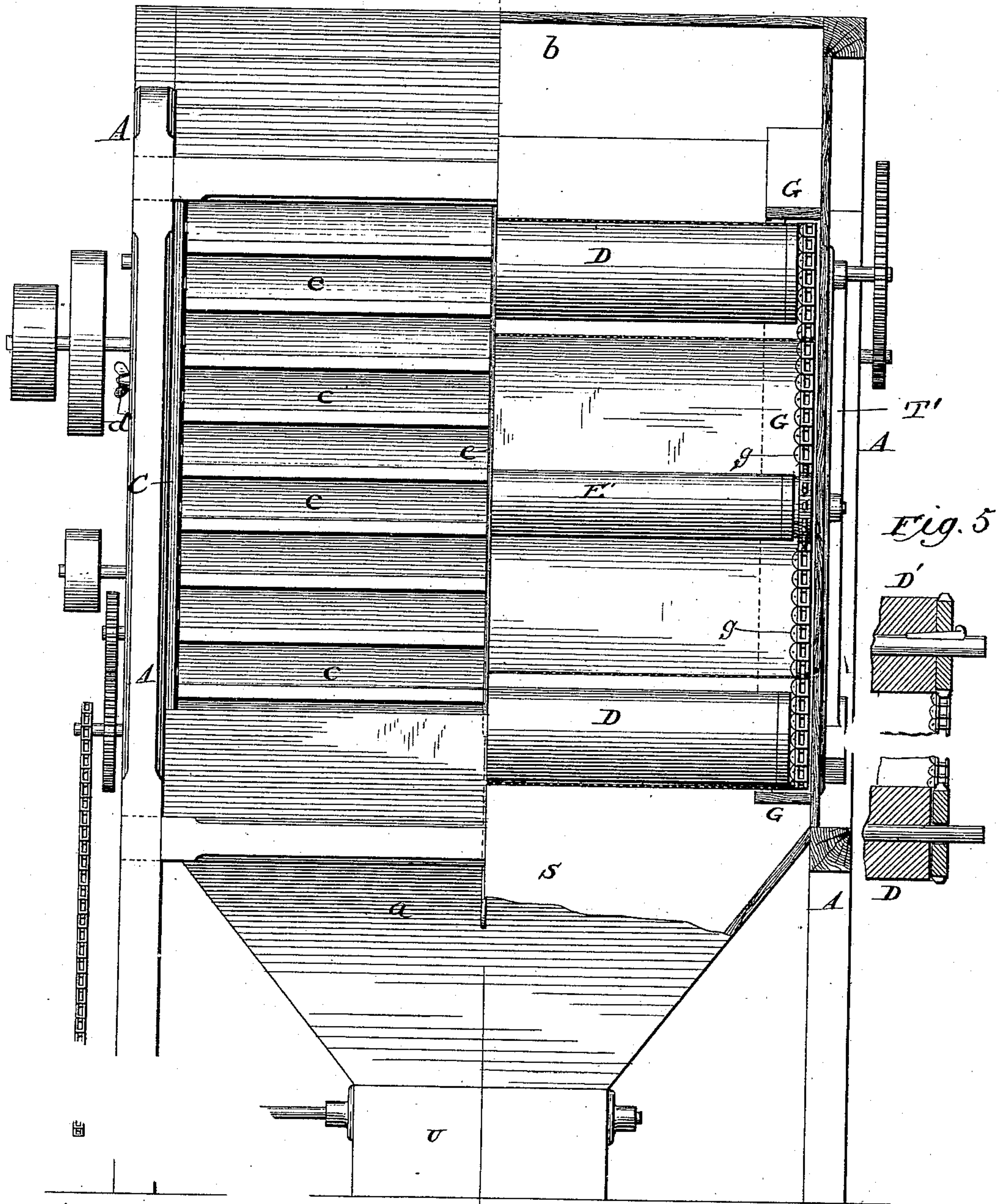
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Fig. 2

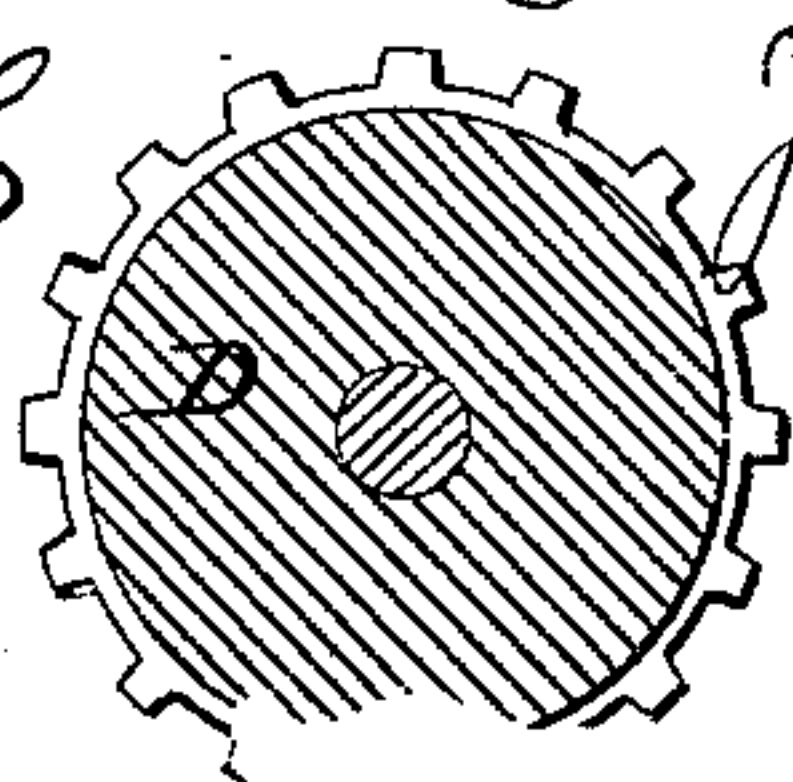


Attest.

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Fig. 4



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UNITED STATES PATENT OFFICE.

JOHN S. BRANDSTAETTER, OF LIVERPOOL, COUNTY OF LANCASTER,
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DUST-ARRESTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 297,223, dated April 22, 1884.

Application filed March 21, 1883. (No model.) Patented in England November 17, 1882, No. 2,367, and in France November 18, 1882, No. 152,186.

To all whom it may concern:

Be it known that I, JOHN S. BRANDSTAETTER, of Liverpool, in the Kingdom of Great Britain, have invented certain new and useful Improvements in Dust-Arresting Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to a machine designed for filtering air, or removing therefrom flour, dust, or other finely-comminuted material held in suspension thereby.

The invention has reference particularly to that type of machines wherein the air to be purified is caused to pass through an endless belt or apron of pervious material into the central space, from which it is discharged in a purified condition, the solid matters being retained on the outer surface of the belt, from which they are subsequently removed and discharged into a hopper thereunder.

The improvements relate more particularly to the peculiar manner of sustaining and driving the pervious belt, in means for effecting the removal of adhering material therefrom, and in means for discharging the material which lodges on the outer side of the belt into the receptacle below.

Referring to the accompanying drawings, Figure 1 represents a side elevation of my improved machine, one side of the machine being shown in section on the line *x x*, Fig. 2. Fig. 2 represents a front elevation of the machine, with one side shown in section on the line *y y*, Fig. 1. Fig. 3 is a vertical section through one edge of the pervious apron and the body and packing adjacent thereto. Fig. 4 is a cross-section of one of the belt-supporting rolls, showing the chain-wheel at its end. Fig. 5 is a vertical central section through one end of the two rolls which sustain the rear side of the pervious belt, showing the chain-carrying wheels fast upon the upper roll and loose upon the lower roll.

Referring to the drawings, A represents a rigid main frame, the upper part of which

gives support to a chamber or body, B, having flat end walls, but having its bottom *a* inclined downward at the center to form a hopper or receptacle for the accumulated material. At its top the body rises from each side toward the center, as shown at *b*, this construction being adopted because of the economy in space secured thereby. At its front side the body is open to admit the air to be purified, and is provided with a series of transverse inclined slats or deflectors, *c*, which serve to divide the inflowing current of air and distribute the same equally over the entire surface of the pervious belt hereinafter described.

Inasmuch as the air will be admitted into the front of the machine from different directions, according to the particular position in which the machine may require to be placed with respect to the source of supply, it is necessary that means shall be provided by which the position of the series of deflectors may be varied bodily. To this end I mount the entire series of slats in a rectangular sustaining-frame, C, secured in position within the body by means of thumb-screws *d* or equivalent fastening devices passing through the outside body. By removing the fastening devices the frame may be released, after which it may be adjusted at any desired inclination in the front of the body, and then refastened permanently in place. In adjusting the frame care is taken to have the same face as nearly as possible the inflowing current of air, in order that the slats *c* may lie with their faces oblique to the inflowing current, the better to divide and distribute the same.

I am aware that inclined slats have been employed in dust-arresting machines to divide and deflect the inflowing air, and also that a series of such slats, each sustained by journals or pivots, has been connected by a bar in such manner as to admit of all the slats being turned simultaneously.

My improvement consists, not in providing for the automatic turning of the slats, but in mounting the entire series in a frame, said frame being movable or adjustable within the body, in order that it may be caused to face in different directions, as the different course

pursued by the inflowing air may render advantageous.

While the thumb-screws represented serve as a convenient means of securing the frame in position, it is to be understood that it may be secured by wedges or other equivalent fastening devices, which will readily suggest themselves to the skilled mechanic.

In order the better to regulate and control the admission of air, each of the slats may be supported upon trunnions or journals at its ends and the series connected by an operating-bar, *c*, protruding through the body to the exterior, whereby the entire series of slats may have their inclination varied after the manner of the ordinary rolling slats employed in window-shutters.

The endless pervious belt by which the purification of the air is effected is represented at *C'* in the drawings. It is constructed of bolting-cloth or other suitable pervious material, and is sustained by internal rolls, *D D'*, and external rolls, *E*, so disposed or arranged within the machine as to cause the cloth to travel in the irregular or serpentine course represented in Fig. 1.

An important feature of the invention consists in the disposition of the rollers in such manner as to give to the cloth the peculiar course represented. There are five of the internal rolls, *D*, extending from side to side across the interior of the machine, and two of the external rolls, *E*, extending in like manner. It will be observed that the cloth is sustained at the top by three rolls, the center one of which is higher than the others, so that the upper surface of the cloth has a downward inclination from the center in both directions. This is an important feature, in that the cloth admits of the material upon the upper surface passing freely therefrom, there being no pocket, cavity, or recess in which the material can lodge and be retained. At the rear said apron descends in a vertical or substantially vertical direction to the lower roll, whence it ascends over the central outside roll, *E*, and then descends around the lower inside roll at the front. From the lower front roll it passes upward and inward around the external roll, *E'*, and thence upward and forward around the upper internal roll, as shown. In this manner the cloth is caused to traverse a great distance and to present a greatly extended surface within a small compass, the machine having in consequence a large filtering capacity while occupying but a comparatively small space.

It is to be noted as a peculiarity of the arrangement shown that the exterior surface of the cloth upon which the solid material is retained extends downward in all directions, so that the adhering material finds no place of lodgment therein, and consequently may be readily removed therefrom.

In order that the delicate fabric of which the belt is composed may be employed and driven without danger of its being strained, torn, or injured by wear, it is necessary that its two

edges shall be driven positively at absolutely uniform speeds. The edges are supported and carried by means of endless chains passed around driving-pulleys and attached to the edges of the fabric. The chain may be of any suitable construction and the fabric attached thereto in any suitable manner; but it is preferred to make use of an open-link drive-chain or sprocket-chain such as represented in the drawings, and to provide the links with one or more laterally-projecting ears, *g*, to receive eyelets, rivets, or stitches for connecting the fabric thereto, the edge of the fabric being bound with leather or other equivalent material, if desired. There will be one chain attached to each edge of the belt, these chains being passed around the ends of the several rolls which carry the belt, or around pulleys mounted upon the journals of said rolls.

It is found in practice that the best results are secured when each chain is driven by a single sprocket-wheel applied to the rear upper roll, *D'*, which are fast to the shaft of and turn with said roller *D'*, as plainly represented in Fig. 5, the chains being permitted to pass freely around the smooth surfaces on the remaining rolls, or preferably around loose pulleys at the ends of the remaining rolls.

Experience has proven to me that it is better that the pulleys or wheels over which the chains pass, with the exception of the driving one and that by which the internal worm is driven, should run loose on the shaft of the rolls, as I find that the filtering web or cloth is sufficiently strong to turn the rolls without being geared thereto. The objection of being made fast to the shaft is that should any inequality exist in the links of the chain, which is likely to be the case, such inequalities will interfere with the synchronous and simultaneous running of the chains. When the wheels or pulleys are loose on the shafts, it can adjust itself to suit inequalities. The utility of the chains at either side of the filtering-web passing over wheels, besides receiving the motion in the first place, is to keep the web stretched laterally and prevent its wrinkling or puckering to the center.

In order to prevent the driving-chain from touching and wearing the cloth adjacent to the sprocket-wheels, I construct the latter with their pitch-line about one-eighth of an inch beyond the outside of the periphery of the rolls, as indicated in Fig. 4. Previous to the action of this feature, much difficulty was encountered for the reason mentioned before; but this simple modification effectually remedies all difficulty. To keep the pervious belt and chains tight, the axles of one of the rolls are made to move in slides, and regulated by means of screws and jam-nuts, as shown in Fig. 1.

In order to render the machine efficient in action, it is necessary that means shall be provided for preventing the leakage of air between the edge of the pervious belt and the inner surface of the body. I therefore apply

to the inner surface of the body, on each side of the machine, two permanent strips or guides, G, one following the inner and the other the outer surface of the chains and belt, these guides 5 being extended also around the ends of the chain-carrying pulleys and rolls, as shown.

It will be observed on reference to Fig. 3 that each chain and the edge of the cloth attached thereto pass between the two guides. 10 To the inner faces of the guides, near the free edge, I apply a lining, K, of sheepskin or other similar soft material, which, bearing upon opposite surfaces of the belt, will effectually prevent the passage of the air around the same 15 without subjecting the belt to objectionable friction or wear. This packing is usually at one side of and out of contact with the chains, which are left free to move without interruption while being effectually protected from the 20 ingress of the flour or dust thereto. The essential feature of the invention in this regard consists in applying an elastic packing between the edge of the belt and the body or casing to prevent the leakage of the air, and it is manifest that the details may be modified in various 25 respects which will suggest themselves to the skilled mechanic without essentially changing the mode of action or departing from the limits of the invention. By the expression 30 "packing between the edge of the belt and the body" is meant packing so arranged or located as to close or seal the joint or space between the edge of the belt and the body, in order to prevent the air from passing by or 35 around the edge of the belt.

For the purpose of removing from the surface of the belt the adhering material, I mount transversely in the rear side of the machine a rotary brush, L, consisting of a shaft provided 40 with bristles or equivalent material adapted to act upon the rear ascending surface of the belt. The material removed by the brush descends through a chute or passage, M, and is discharged thereby at the base of the machine. 45 The brush is adjusted by being held in bearings sliding in a direction perpendicular to the surface of the pervious belt, and regulated by a screw and jam-nut on each side, as shown in Fig. 1.

In order to prevent the inflowing air from passing around the belt into the spout M without passing through the pervious material, I locate at the top of the machine a valve or gate, N, hinged at its upper end to the body and 55 arranged to rest at its lower edge against or in close proximity to the belt. A spring, O, applied as shown, tends to hold the gate in a closed position, while a rod, P, attached to the gate and extending thence to the exterior of 60 the body, serves as a means whereby the operator may open the gate and discharge the accumulated material from the top of the belt downward through the spout M at will.

During the long-continued operation of the 65 machine, it is found that more or less of the solid matter will find its way through the

meshes of the fabric having more or less nap, and remain upon its inner surface. To provide for the removal and discharge of this material, I mount transversely across the interior 70 of the machine, within the belt, a sheet-metal guard or trough, Q, the lower edge of which, bearing against the cloth, serves as a scraper to remove adhering material, which, falling downward, is caught and retained within the 75 lower portion of the trough, whence it is removed by means of a spiral conveyer, R, mounted therein, and delivering the material at one end through a suitable opening in the side of the machine. 80

As before mentioned, the lower portion of the body is made of suitable form to constitute a hopper beneath the interior of the belt, to receive those solid matters which may be discharged directly therefrom, or which may be 85 deposited by the air-current previous to its reaching the belt, as shown in Fig. 1. This hopper S has no direct communication with the chute M. The removal of the accumulated material from the hopper into the chute M is 90 effected at regular intervals by means of a revolving valve, T. (Clearly represented in Figs. 1 and 2.)

In order to sustain the various rolls and maintain them in the exact relations required 95 without the employment of expensive framing, I employ on each side of the machine a cast-iron frame, T', made in a single piece and bolted against the outside of the case or body. The frame is of suitable form to encircle the 100 air-opening, with an open center, and has, as shown, bearings for all the roll-journals on one side of the machine. The lower forward roll, D, has its journal seated in a sliding box seated in a slot in the frame, and acted upon by a 105 screw mounted in the frame, as shown, so that by means of the screw the roll may be adjusted to give the required tension to the pervious belt. This valve consists simply of a revolving cylinder mounted horizontally beneath and 110 serving to close the hopper. A series of longitudinal pockets or cavities are formed in the surface of the cylinder, so that the material accumulating therein will be carried downward by its rotation and discharged into the spout below. The smooth or cylindrical surface of the 115 cylinder between its pockets is of such width as to keep the mouth of the hopper closed from the time that one pocket is carried out of communication until the next is brought into action. The action is rendered more effective 120 by means of a boxing or housing, U, which closely encircles the cylinder, as shown, and which is provided with a discharge-opening in the under side. 125

One or both sides of the main body or casing is provided with an outlet-opening communicating with the space inclosed by the endless belt.

In the operation of the machine the air laden 130 with dust is directed into the body between the deflectors at its front, and, after passing

through the pervious belt into the central space, escapes from the body through the side opening or openings therein.

The passage of the air through the machine may be effected by means of a blast.

Having thus described my invention, what I claim is—

1. In an air-purifying or dust-arresting machine, the combination of the endless belt of pervious material, a series of rolls sustaining the same, an inclosing case or body, and elastic packing closing the space between the edges of the belt and the interior surface of the body, substantially as described, whereby the leakage of air past the edges of the belt is prevented.

2. In a dust-arresting machine, the combination of an external case or body, an internal endless belt of pervious material, and flanges or ribs applied to the inner surface of the body and embracing the edges of the belt.

3. In combination with the inclosing case or body, the endless pervious belt, flanges, or guides, between which the edges of the belt are carried, driving-chains applied to the edges of the belt, and elastic packing applied to the guides and acting against the belt, substantially as described, whereby the edges of the belt are carried uniformly and positively and the leakage of air past them prevented.

4. In a dust-arresting machine, an endless belt of pervious material, combined with a series of sustaining-rolls, the central roll at the upper end being located at a greater elevation than its companions, whereby the upper surface of the belt is given a downward inclination in both directions, as and for the purpose described.

5. In a dust-arresting machine, the combination of the endless belt of pervious material, the two external rolls, and the five internal rolls, arranged in the relative position described and shown.

6. In a dust-arresting machine, the combination of the endless pervious belt of flexible material, the receiver Q, having at its lower edge a scraper to act upon the belt, and the conveyer R, arranged as described, whereby the material adhering to the inner surface of the belt is detached and removed from the machine.

7. The external body or casing, in combination with the endless pervious belt, the spout

M, to receive material from the rear side of said belt, and a valve, N, closing communication between said spout and the front of the apparatus.

8. In a dust-arresting machine, the combination of the external body, the internal endless pervious belt arranged to permit the passage of air from its exterior surface inward, and the rotary brush, arranged, as described, to act upon the exterior surface of the belt, and a chamber closed from communication with the inflowing air.

9. In combination with the body, the endless belt, and the supporting-rolls, the flanges or guides attached to the inside of the body, and following the inner surface of the pervious belt, and encircling the sustaining rolls or pulleys, in the manner described and shown.

10. In a dust-arresting machine, the combination of the external case or body provided with openings in its sides, the internal belt encircling said opening, the belt-sustaining rolls, and external metallic frames, T', each constructed complete of one piece, and applied to the outside of the body to sustain the journals of all the rolls on that side of the machine.

11. In a dust-arresting machine embracing an exterior case or body and an internal screen, a frame located in the mouth or inlet of said chamber and provided with a series of blades or deflectors, said frame being arranged and combined with means, substantially as described, adapted to permit its adjustment to different positions, whereby the series of deflectors, as a whole, may be adjusted to suit the different directions from which the air may enter the machine.

12. In a dust-arresting machine, the endless pervious belt and driving-chains attached to its edges, in combination with the supporting-roll, and with the sprocket-wheels concentric with said roll, the wheels having their pitch-lines outside of or beyond the periphery of the roll, as and for the purpose described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

J. S. BRANDSTAETTER.

Witnesses:

GEO. BURROW,

WM. P. THOMPSON.