

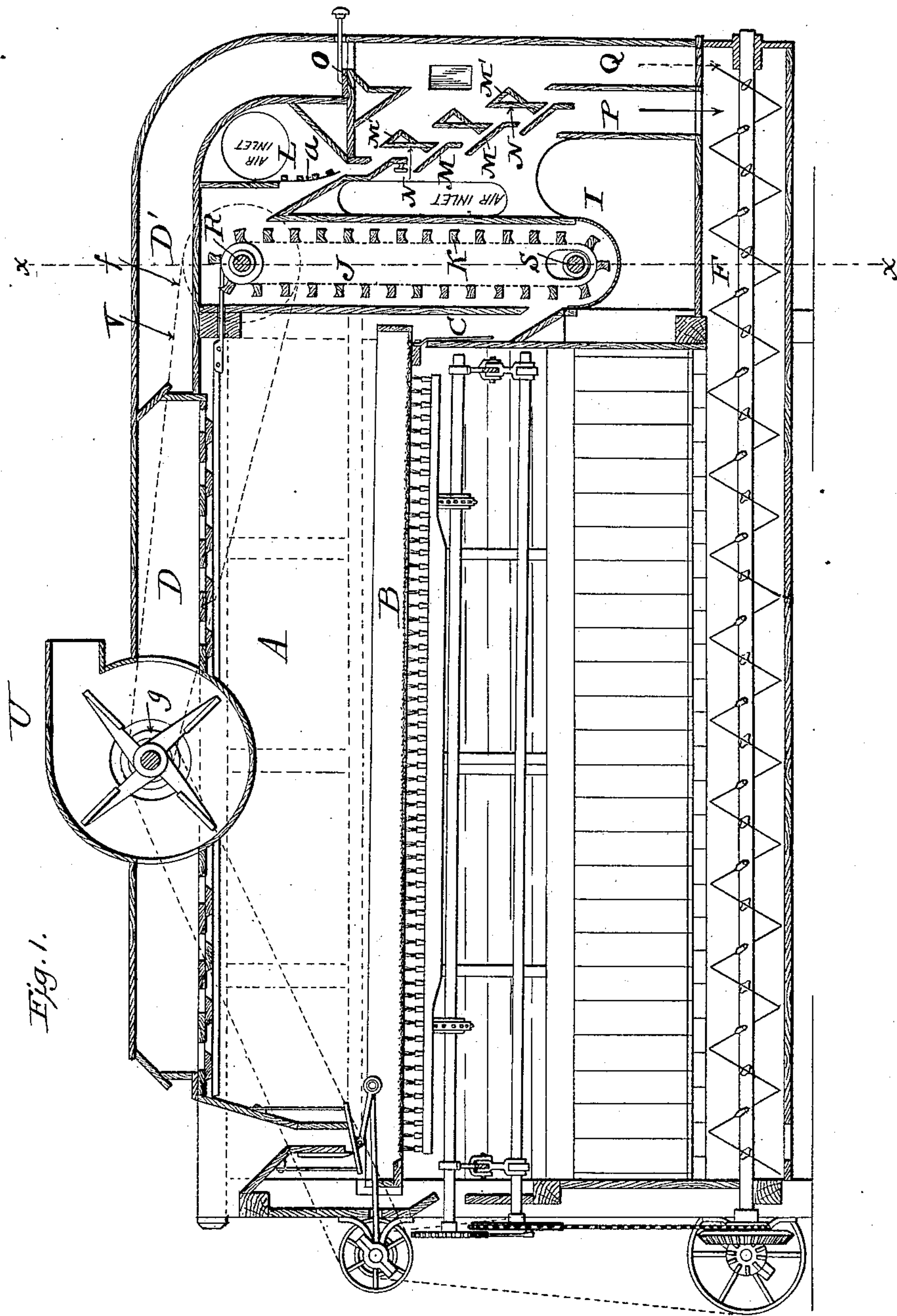
(No Model.)

2 Sheets—Sheet 1.

W. D. GRAY.  
MIDDLINGS PURIFIER.

No. 428,674.

Patented May 27, 1890.



Witnesses:

James F. Duhamel

Arthur Ashley

Inventor:

William D. Gray,

by Dodge & Sons  
his Attys.

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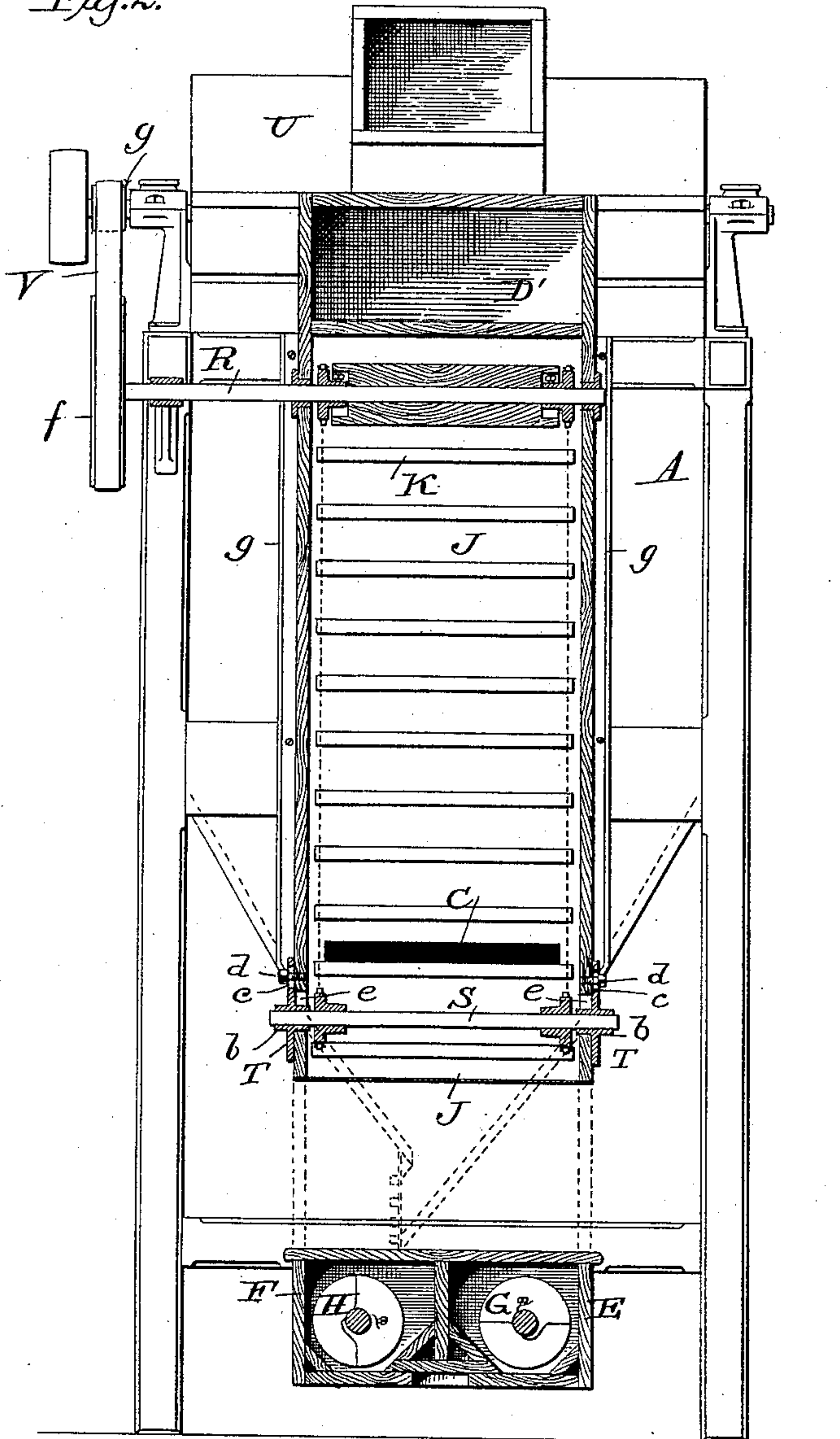
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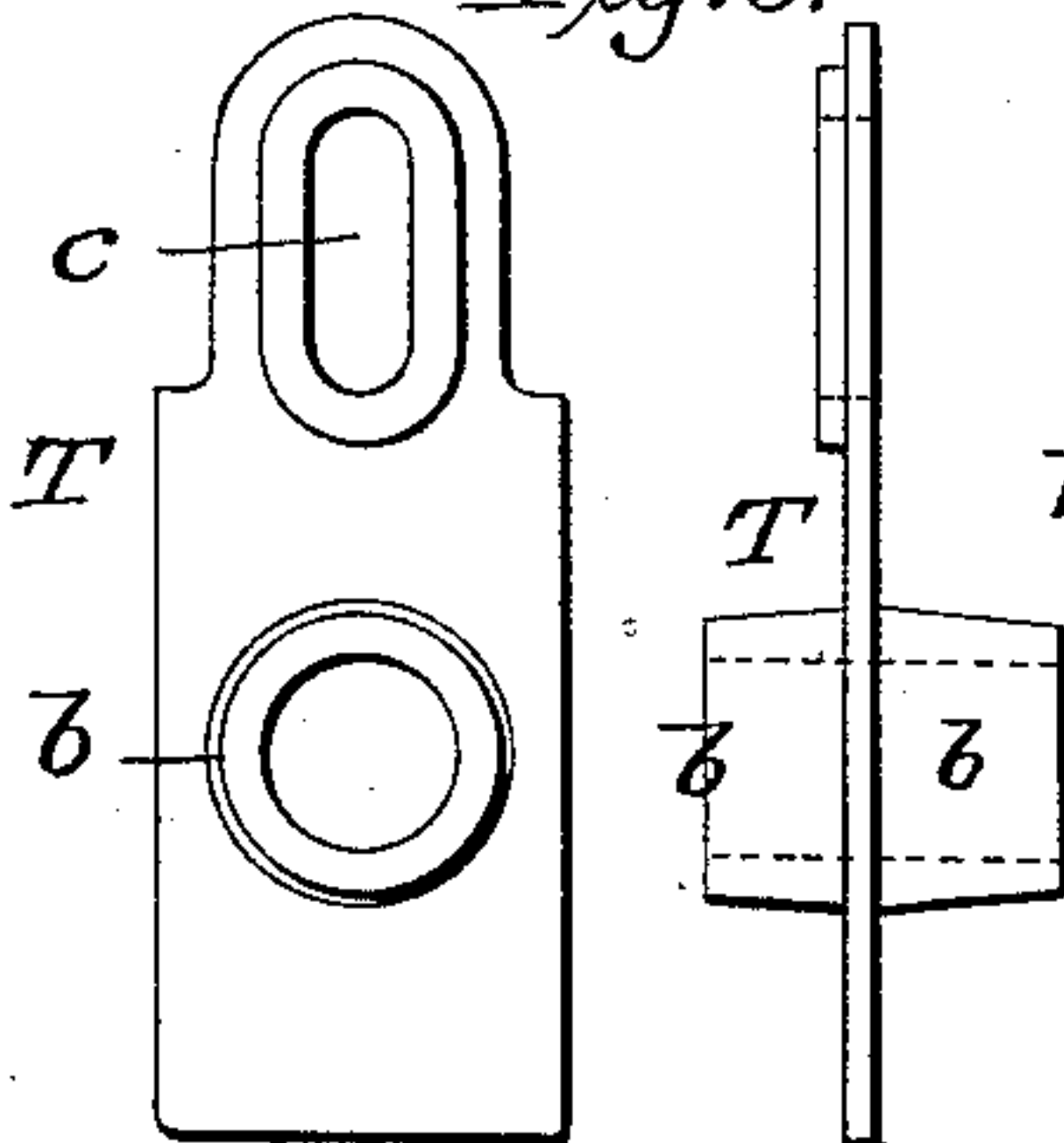
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*Fig. 2.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

WILLIAM D. GRAY, OF MILWAUKEE, WISCONSIN.

## MIDDLINGS-PURIFIER.

SPECIFICATION forming part of Letters Patent No. 428,674, dated May 27, 1890.

Application filed December 21, 1887. Serial No. 258,599. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM D. GRAY, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain  
5 new and useful Improvements in Middlings-Purifiers, of which the following is a specification.

My invention relates to middlings-purifiers; and it consists in features, combinations, and  
10 details hereinafter described.

In the accompanying drawings, Figure 1 is a longitudinal vertical section of a purifier embodying my improvements; Fig. 2, a vertical transverse section on the line *xx* of Fig.  
15 1; Fig. 3, face and edge views of the adjustable plate or hanger in which the lower shaft of the elevator is carried at each end.

So far as the purifier itself independent of the aspirating attachment is concerned the  
20 construction may be more or less varied, the invention being applicable to various styles of machine, but being more particularly designed for use in connection with the purifier known to the trade as the "Reliance Purifier," manufactured by E. P. Allis & Co., of  
25 Milwaukee, Wisconsin.

It is well known to millers and others that a considerable amount of coarse middlings tails over with the bran and coarser impurities from the shaking sieve or screen, and heretofore it has been customary to return the tailings to rolls or other reducing machinery for further reduction. Such treatment, however, involves the comminution of  
30 the bran and the intimate mingling of the bran particles and other impurities with the middlings thus reduced, thereby rendering extremely difficult the subsequent operation of separating the middlings from the mass.

The passage of the coarse middlings over the tail of the sieve with the impurities is inevitable, for the reason that if the cloth be made sufficiently coarse to permit the coarser middlings to fall through a considerable  
40 amount of bran and impurities will likewise pass through the sieve; hence the clothing of the sieve must be fine enough to exclude these foreign matters, and consequently fine enough to prevent the coarse middlings from  
45 falling through.

By my invention the tailings are subjected to the action of air-currents, which effectually

separate the coarse middlings from the bran and impurities and deliver said middlings into the conveyer-trough, which receives the  
55 fine middlings falling through the sieve, or to any suitable receptacle, and discharges the bran and impurities into the tailings-trough or from the machine.

Referring to the drawings, A represents  
60 the casing of the machine; B, the shaking sieve or screen frame clothed in the usual manner; C, the tailings-spout, through which the bran, coarse middlings, and other matters which fail to pass through the meshes of the  
65 sieve are delivered.

D indicates the air-trunk at the top of the machine, through which the air is drawn from the casing by a fan U, and E and F indicate the conveyer-troughs, into which the mid-  
70 dlings and the bran or impurities are delivered, said troughs being provided with conveyers G and H for removing the materials therefrom.

I indicates the aspirating attachment as a  
75 whole, which is preferably so constructed that it may be applied directly to purifiers already manufactured and in use. This attachment consists, essentially, of a casing provided with an elevator trunk or chamber J,  
80 containing an endless bucket-elevator K, which is so located with reference to the tailings-spout C as to receive the material discharged therefrom and carry it upward to the top of a hopper L, and a series of inclined  
85 shelves or boards M, over which the material gravitates as it flows from the hopper, being subjected in its travel to currents of air, which carry off the lighter particles and permit the middlings to fall into a spout pro-  
90 vided for them.

As shown in Fig. 1, the hopper L is provided with a gravitating valve or gate *a*, which serves to prevent the air from being drawn down through the elevator-trunk and  
95 into the body of the chest A. Opposite the inclined face of each shelf M is placed an upright board or guard N, provided with a secondary inclined shelf M', the upright boards forming, together with the depending por-  
100 tions of the shelves M, a series of short vertical trunks, through which the material falls in passing from one shelf to another, during which fall it is acted upon by currents of air



passing across the heads or upper edges of the respective shelves and up through said trunks.

D' indicates an air-trunk connecting with  
 5 the interior of the aspirating-chamber I in rear of the inclined shelves M M', and which may open into the trunk D of the main machine or sieve-purifier A, or may pass to a separate fan provided especially for the aspirating attachment, this being a question of  
 10 judgment and convenience not affecting the invention herein described. The strength of the air-current through the aspirator is regulated and controlled by a valve O at the top  
 15 of the aspirating-chamber, as seen in Fig. 1. The material which travels over and falls from the shelves or boards M is delivered into a spout P, which is represented as opening into the conveyer-trough E, which re-  
 20 ceives the purified middlings which fall through the sieve B of the sieve-purifier. The light dust and impurities are drawn outward from the shelves or boards M by the force of the air-current and caused to pass either  
 25 through the air-trunk D' or to fall from one shelf M' to another and to be delivered finally into a trunk Q, which may communicate with the conveyer-spout F or may open out of the machine to discharge the heavy  
 30 impurities into any suitable receptacle.

In order to simplify the construction of the machine as far as practicable, the conveyer-troughs E and F are extended or prolonged  
 35 made to serve for both the main body of the machine and the aspirating attachment, as indicated in Fig. 1, though this is not essential, as separate troughs and conveyers might be employed.

10 The elevator K consists, preferably, of two endless separable link chains carrying buckets formed of hard-wood strips grooved or made concave on their carrying-faces, the chains passing about sprocket-wheels carried  
 45 by an upper driving-shaft R and a lower shaft S. For the purpose of permitting proper adjustment of the lower shaft S it is carried in vertically-adjustable boxes or bearings of the form shown in Fig. 3—that is to say, in sleeves  
 50 or boxes b, which are cast integral with plates T, which are provided with elongated eyes c to receive the fastening bolts or screws d, by which the plates are secured to the side walls of the aspirating-chamber I. These sleeves  
 55 or boxes extend into or through slots e, formed in the side walls of the aspirating-chamber, and thus prevent the lateral movement of the boxes and the shaft S, which is carried in them. The particular form of elevator shown  
 60 and described is not, however, essential, it being obvious that any convenient or usual form of elevator may be substituted.

Motion may be imparted to the shaft R by belt V, passing about pulleys f and g, respectively secured on the shaft R and the shaft of fan U; or motion may be taken from any other convenient moving part of the machine.

The casing of the aspirating-chamber I is formed with air-inlets at suitable points to permit the free passage of air across the fall-  
 70 ing streams of material between the hopper L and the spouts P Q.

g g indicate cleats formed or secured upon the sides of the aspirator-chamber for convenient attachment to the rear end of the  
 75 purifier-casing A.

It is designed to construct this attachment with special reference to machines already sold and in use; but it may obviously be built as an integral part of new machines.  
 80

It has been customary from the earliest construction and use of middlings-purifiers to subject the material tailing over the sieve to the action of a current of air, or, in other words, to so arrange the fan and the ducts  
 85 communicating therewith as to cause an upward current of air past the end or tail of the sieve. This action, though somewhat beneficial, is wholly inadequate for effecting thorough aspiration of the tailings, and will not  
 90 secure the results sought and attained by me. The material which passes over the end of the sieve consists of coarse middlings and tailings, and the aspirator acts as a coarse-middlings purifier, effecting a complete separation  
 95 of the coarse middlings and the tailings. When the aspirator is combined with and made a part of the purifier, (utilizing thereby the same fan and the same conveyers and conveyer-troughs,) the miller is enabled to  
 100 clothe the sieve fine enough to insure clean middlings passing through the cloth and to cause the coarser middlings containing the impurities to pass over the tail of the sieve. The aspirator acting upon the materials thus  
 105 tailing over the sieve takes out the impurities, thereby making a separation into two products—one poor enough for feed and the other in excellent condition to go to the rolls or other reducing apparatus. In speaking of  
 110 the aspirator, therefore, I do not mean to be understood as referring to or including a mere trunk or spout extending from the tail of the sieve to the fan, but a structure in which the material tailing over the sieve is caused to  
 115 fall in a sheet or stream from one shelf or surface to another successively, subject to a cross-current of air at each fall or passage from shelf to shelf, whereby perfect aspiration is insured and complete removal of impurities is  
 120 effected.

The employment of the elevator to carry the material to the top of the machine enables me to secure a sufficient fall to subject the material to the repeated action of the air-current without unduly lengthening the machine and without increasing its height.  
 125

Having thus described my invention, what I claim is—

1. In a middlings-purifier, the combination  
 130 of a casing and sieve or screen, a spout to receive the tailings of the screen, an elevator located in position to receive the tailings from said spout, a hopper arranged to receive the



material carried up by the elevator, a series of inclined shelves or boards beneath the hopper, an air-trunk communicating with the sieve-chamber and shelf-chamber of the casing, and a fan communicating with the trunk, and serving to cause a current of air through the sieve and between the boards and shelves, the sieve, elevator, or shelves being arranged within one casing.

2. In combination with the casing and sieve or screen of a middlings-purifier, an aspirating attachment arranged, substantially as shown, to receive the tailings from the sieve and provided with discharge-spouts P Q, one communicating with the middlings-trough and the other with the tailings-trough of the casing A.

3. In combination with the casing A and sieve B of a middlings-purifier, middlings-trough E and tailings-trough F, extending along the lower part of said casing and projecting beyond the same, and an aspirating attachment I, provided with discharge-spouts P and Q, communicating, respectively, with the troughs E F.

4. In combination with the casing A and sieve B of a middlings-purifier, an aspirating attachment consisting of a casing I, provided with elevator-trunk J and elevator K, hopper L, inclined boards M M', spouts P Q to receive the material from said inclined boards or shelves, a fan, and an air-trunk communicating with the casing I and with the fan, all substantially as shown and described.

5. In a middlings-purifier, the combination of a casing divided into two chambers, a sieve located in one of said chambers, an aspirator, a hopper at the head of the aspirator, and an elevator located between the tail of the sieve and the hopper in the second of said chambers, a fan, an air-trunk communicating with both of the chambers of the casing, and a conveyer-trough and conveyer, also common to both chambers.

In witness whereof I hereunto set my hand in the presence of two witnesses.

WILLIAM D. GRAY.

Witnesses:

B. T. LINZARDER,  
RICHARD HOPPIN.