

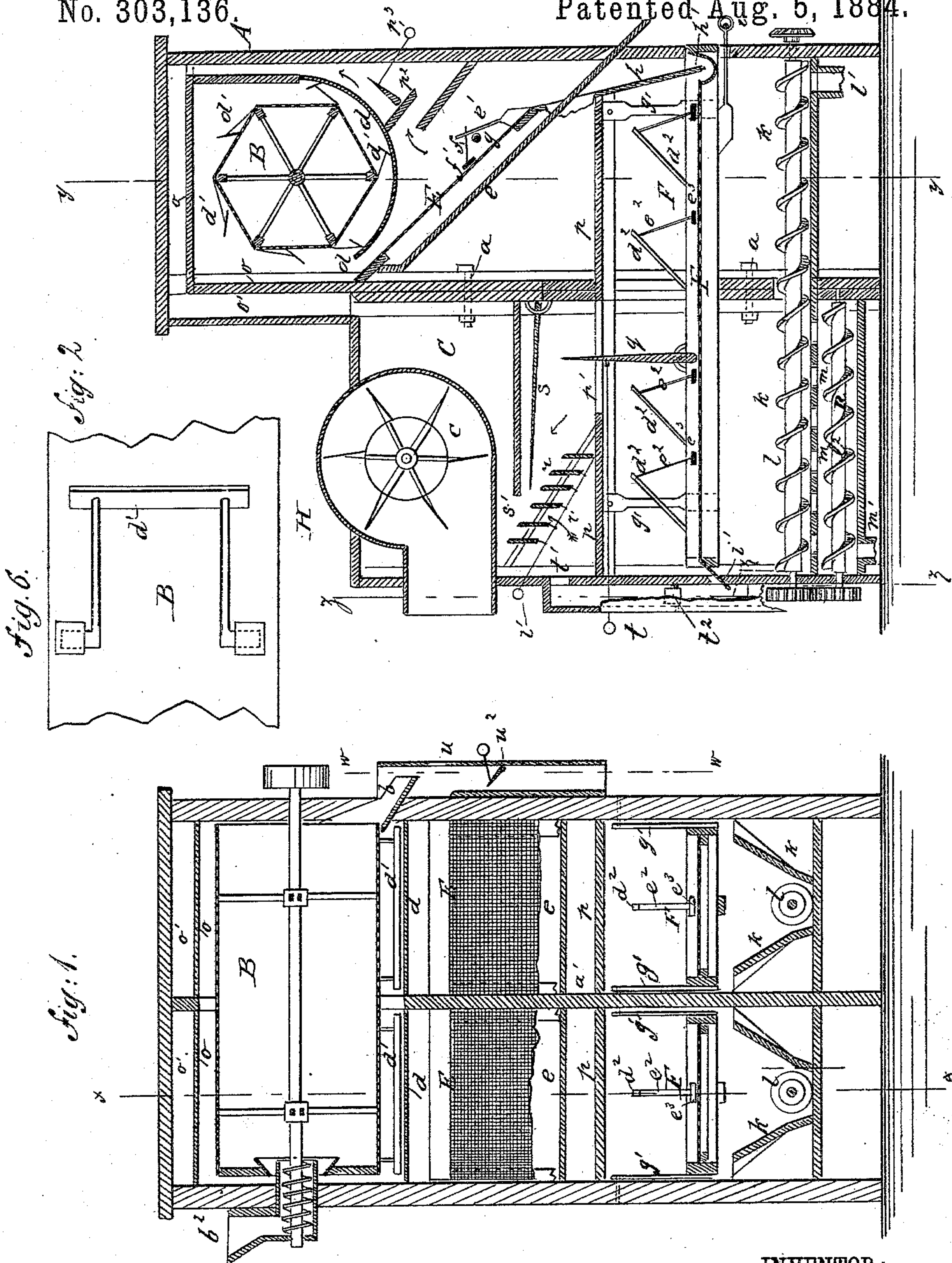
(No Model.)

2 Sheets—Sheet 1.

D. L. ELLIS.  
MIDDLINGS PURIFIER.

No. 303,136.

Patented Aug. 5, 1884.



WITNESSES:  
*Chas. Nide*  
*C. Sedgwick*

INVENTOR:  
*D. L. Ellis*  
BY *Mum & Co*  
ATTORNEYS.

(No Model.)

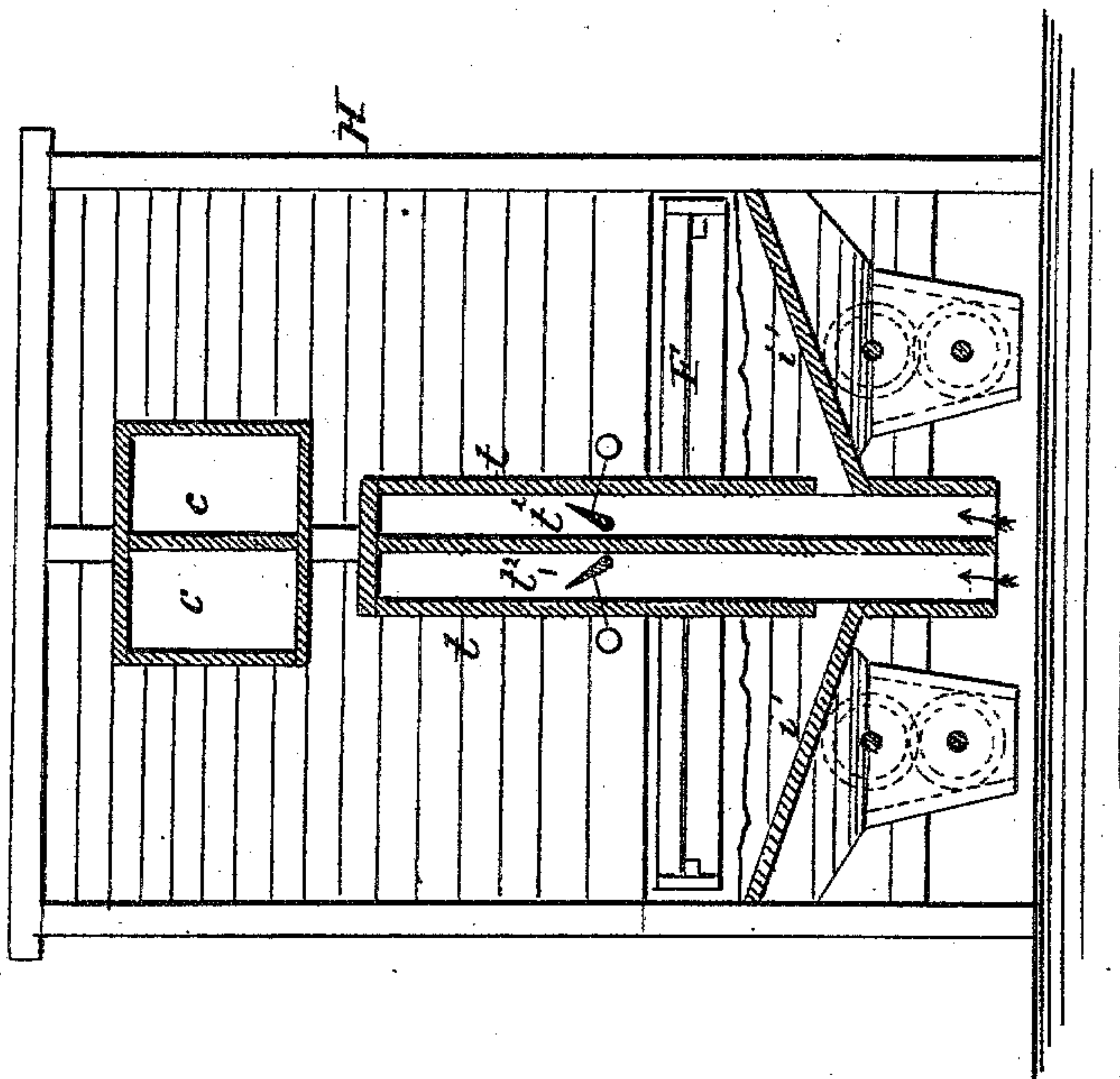
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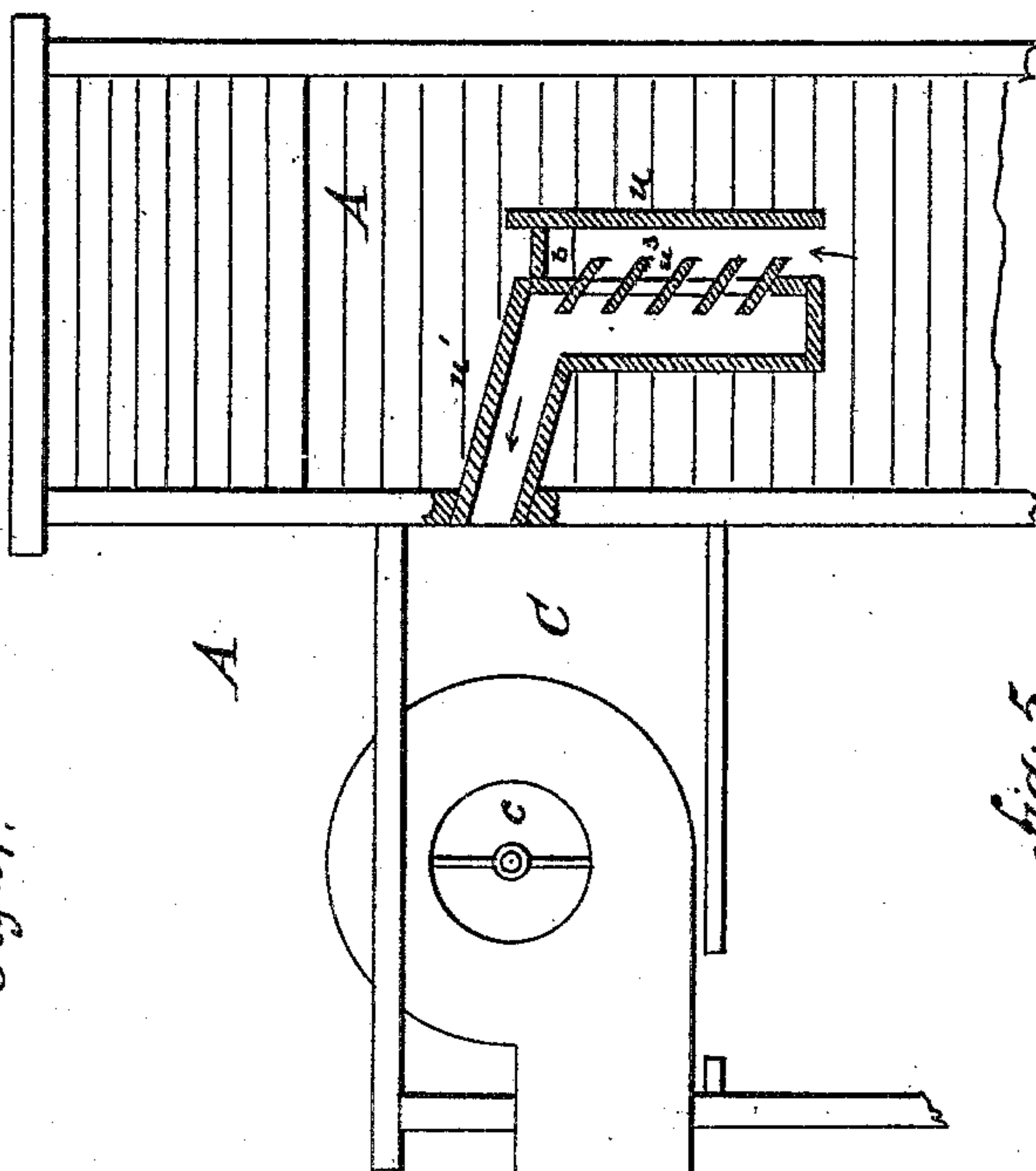
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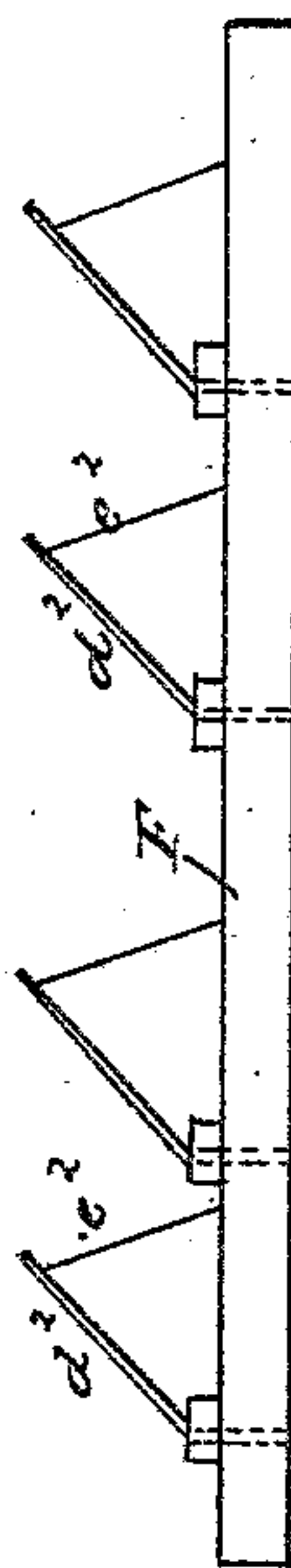
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

DAVID LANLEY ELLIS, OF BROOKVILLE, ASSIGNOR OF ONE-FOURTH TO  
MICHAEL H. RISINGER, OF SALTSBURG, PENNSYLVANIA.

## MIDDLINGS-PURIFIER.

SPECIFICATION forming part of Letters Patent No. 303,136, dated August 5, 1884.

Application filed May 17, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID L. ELLIS, of Brookville, in the county of Jefferson and State of Pennsylvania, have invented a new and Improved Middlings-Purifier, of which the following is a full, clear, and exact description.

The object of my improvements is to construct a middlings-purifier that shall save all of the fine middlings and flour-dust entering the machine.

Another object is to obtain a machine of large capacity and occupying comparatively little floor-space, as well as to save the grading-machines, spouting, and other appurtenances required by the different machines for which mine is a substitute.

A further object of my invention is to effect a first grading of the middlings before they are subjected to the air-currents, and to subject each grade to the same number of currents, and to further grading separately, as in separate machines.

The invention consists in certain novel features of construction, in the grading-reel, in the screens, in the arrangement of the air-passages, and means for regulating the currents, and in other parts for insuring the effective operation of the machine, all as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which the same letters of reference indicate the same or corresponding parts in all the figures.

Figure 1 is a vertical longitudinal section of the machine, taken through the grading-reel on line *y y* of Fig. 2. Fig. 2 is a vertical transverse section on line *x x* of Fig. 1. Fig. 3 is a sectional end view on the line *z z* of Fig. 2. Fig. 4 is a sectional end view on the line *w w* of Fig. 1, and Fig. 5 is a detail view of the vibrators for cleaning the screens. Fig. 6 is a detailed plan view of one of the combined scrapers and knockers of the grading-reel.

For the purposes of convenient transportation the frame of the machine is made in two parts, as shown most clearly in Fig. 2, A being one portion and H the other, and the two

are connected together by bolts *a*, (see Fig. 2,) which being removed the two parts can be readily transported, each portion of a convenient size, and not too bulky for passing through doors. The machine is also constructed in sections longitudinally from two up to ten, and these may be made separable, if required. Two sections only are shown, divided by a vertical partition, *a'*, and according to the number of sections, so the middlings are graded by the reel on entering the machine.

B is the grading-reel, of any suitable construction, and extending through the several sections. At one end is the feed-spout *b'*, and at the other end is a discharge-spout, *b*, for the tailings from the reel. In a chamber, C, is the suction-fan *c*, which serves to maintain the air-currents in all the sections of the machine, although a second and a third fan may be used, if necessary. In the several sections the screens, air-passages, and other parts are alike, and as follows:

Beneath the reel B is fixed a concave board, *d*, which, at one side, is extended above the reel, and serves to catch and hold the material passing through.

To the reel scrapers *d'* are pivoted so as to fall upon the board *d* and carry the accumulated material over the edge of the board, and they also, by falling upon the reel, serve to keep the meshes of the cloth free.

E is a stationary screen placed at an incline in position for receiving the material from the board *d*, and provided with a bottom board, *e*, extending out through the side of the case, this being the first delivery of the machine, the material delivered being the finest in that grade. For keeping the cloth of screen E clean I provide the spring-arm *e'*, having a stem, *f*, designed to be adjustable, and having a rubber knocker, *f'*, and vibrated by an eccentric, *g*, for bringing the knocker into contact with the screen-frame. The screen E is provided with a cant-board, *h*, extending downward to carry the material for passing off the end of the screen to a trough in the head of vibrating screen below for further separation.

F is the vibrating screen suspended by



springs  $g'$  and provided with a trough or cavity,  $h'$ , at its upper end, into which the cant-board  $h$  projects, as above stated. This arrangement is for trapping the space at the bottom of the board to prevent any suction of air from the space above, thereby allowing the exact regulation of currents upon the screen F.

At  $i$  are shown an eccentric and strap connected to this screen for vibrating it, and the screen is fitted at its lower end with a tail-board,  $i'$ , for delivery of material passing over the screen. In order to keep the screen F free I provide cleaners composed of spring-arms  $d^2$ , that are attached to the frame, so as to project upward, and to these are attached stems  $e^2$ , having rubber knockers at their ends. The spring-arms are set in motion by the vibration of the screen with the result that a continuous tapping of the knockers on the screen takes place.

Beneath screen F are gathering-boards  $k$ , forming a hopper, in which is fitted a conveyor,  $l$ , for carrying the material sifted through the screen to the spout  $l'$ . Slides  $m$  are fitted in the bottom of the hopper, and beneath that a second conveyor,  $l''$ , for carrying back to a spout,  $m'$ , such portion of the material as is desired.

The arrangement of air-passages for insuring separate currents is as follows: By an inner partition,  $o$ , an air-passage,  $o'$ , is formed from fan-chamber C over the reel B and communicating with the space above the screen E. A valve at  $p^2$ , fitted for operation by a handle,  $p^3$ , furnishes the means for regulating this current. The screen F is separated from the action of this current by a horizontal partition,  $p$ , in which is an opening,  $p'$ , that gives communication to the fan-chamber. This separation is necessary, as stronger currents are required after the material leaves the screen E.

It is of further advantage that means be provided for regulating the currents through screen F, so that the current at one end can be made stronger than at the other. For that purpose a valve,  $q$ , extending the whole width of the screen-chamber is pivoted above the screen-frame, and extends through the opening  $p'$ . On one of its pivots outside the case is to be placed a handle, whereby the valve can be moved back and forth in the opening  $p'$ , and thus the current through the opening be thrown more or less to either end of the screen. To regulate the whole current, the single valve  $s$  and series of shutter-valves  $r$  are fitted beneath the opening  $s'$  in fan-chamber C. The valves  $r$  are all connected to a stem,  $r'$ , for their simultaneous adjustment. By moving valve  $s$  downward the current is weakened, and when valves  $r$  are closed and valve  $s$  rests upon them, the current is entirely cut off from screen F. By these various means the exact regulation of the currents can be attained.

In the tailings from all middlings-purifiers, there is always more or less material too coarse to pass through the screens, and which has heretofore been used only for very low-grade

flour on account of the difficulty of separating it from the refuse. By the means next described I utilize air-currents for separating this material, so that it may be used for high-grade flour.

At the end of tail-board  $i'$  of screen F is fitted an aspirator-spout,  $t$ , (see Figs. 2 and 3,) the upper end of which communicates by an opening,  $t'$ , left between the casing and a semi-partition, with the space beneath valves  $r$ , and thence to the fan-chamber. This insures an upward current through the material falling from the tail-board, and the refuse being lighter than the flour particles, the former is carried to the fan. A valve,  $t^2$ , in spout  $t$  is provided for regulating the current. A similar arrangement is fitted in connection with tail-spout  $b$  of reel B, as shown in Figs. 1 and 4.

$u$  is an air-spout covering the tail-spout  $b$ , connected by an extension,  $u'$ , with the fan-chamber. This spout has a regulating-valve,  $u^2$ , and a series of slots,  $u^3$ , for regulating the separation. The directions of the various currents hereinbefore mentioned are indicated by arrows. It will be seen that the various currents, though separate and separately controllable, all lead to the one fan-chamber, and that the material in all the various stages is subjected to air-currents that can be readily regulated to suit its condition.

The advantages of the primary grading and the subjection of the different grades to independent means for further separation will be readily apparent.

The capacity of the machine is largely increased, and the work of many machines can be done in the one machine occupying but little space. The work is also better done, and with no waste.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a middlings-purifier, the scrapers hinged to the ribs of and in combination with the grading-reel, and the concaved partition disposed beneath the said reel, substantially as shown and described, and for the purpose herein set forth.

2. In a middlings-purifier, the combination, with the grading-reel, of the scrapers pivoted or hinged to the said reel, the concaved partition beneath the reel, the stationary inclined cloth screen, the cleaners consisting of spring-arms, stems, and rubber blocks or knockers, the eccentric, and the spout or board disposed beneath the inclined cloth screen or its frame, substantially as described.

3. In a middlings-purifier, the combination, with the grading-reel and the suction chamber or fan, of an air passage or channel extending around the reel, the concave partition at the inlet or supply end of said passage, and the air-regulating valve disposed on the under side of the concave partition for controlling the force of the current therethrough, substantially as specified.

4. In a middlings purifier, the combination,



with the fixed inclined screen and the vibratory screen having a trough or cavity in its head or upper end, below its sifting-cloth, of the cant-board with its lower end entering said trough, substantially as and for the purpose set forth.

5 5. In a middlings-purifier, the combination, with the vibratory screen, of the cloth-cleaning device for said screen, consisting of spring-arms with stems connected thereto, and rubber blocks or knockers on the lower ends of said stems, substantially as specified.

15 6. In a middlings-purifier, the combination, with the suction-chamber, the semi-partition arranged below said chamber, the screen-chamber, and the vibratory screen, of a series of valves arranged in the opening between

said semi-partition and the casing, and a valve disposed to operate in an opening in the top of the screen-chamber, substantially as and for the purpose set forth.

7. In a middlings-purifier, the combination of the vibratory screen, the aspirator-spouts, their regulating-valves, the tail-boards leading from the vibratory screen to said spouts, the air-spout with its exhaust-extension, and provided with a regulating-valve, and the suction-fan, substantially as and for the purpose set forth.

DAVID LANLEY ELLIS.

Witnesses:

W. F. STEWART,  
W. D. J. MARLIN.