No. 699,460. Patented May 6, 1902.

E. R. DRAVER.

DUST COLLECTOR.

(Application filed Mar. 28, 1900.)

(No Model.) 2 Sheets—Sheet 1.

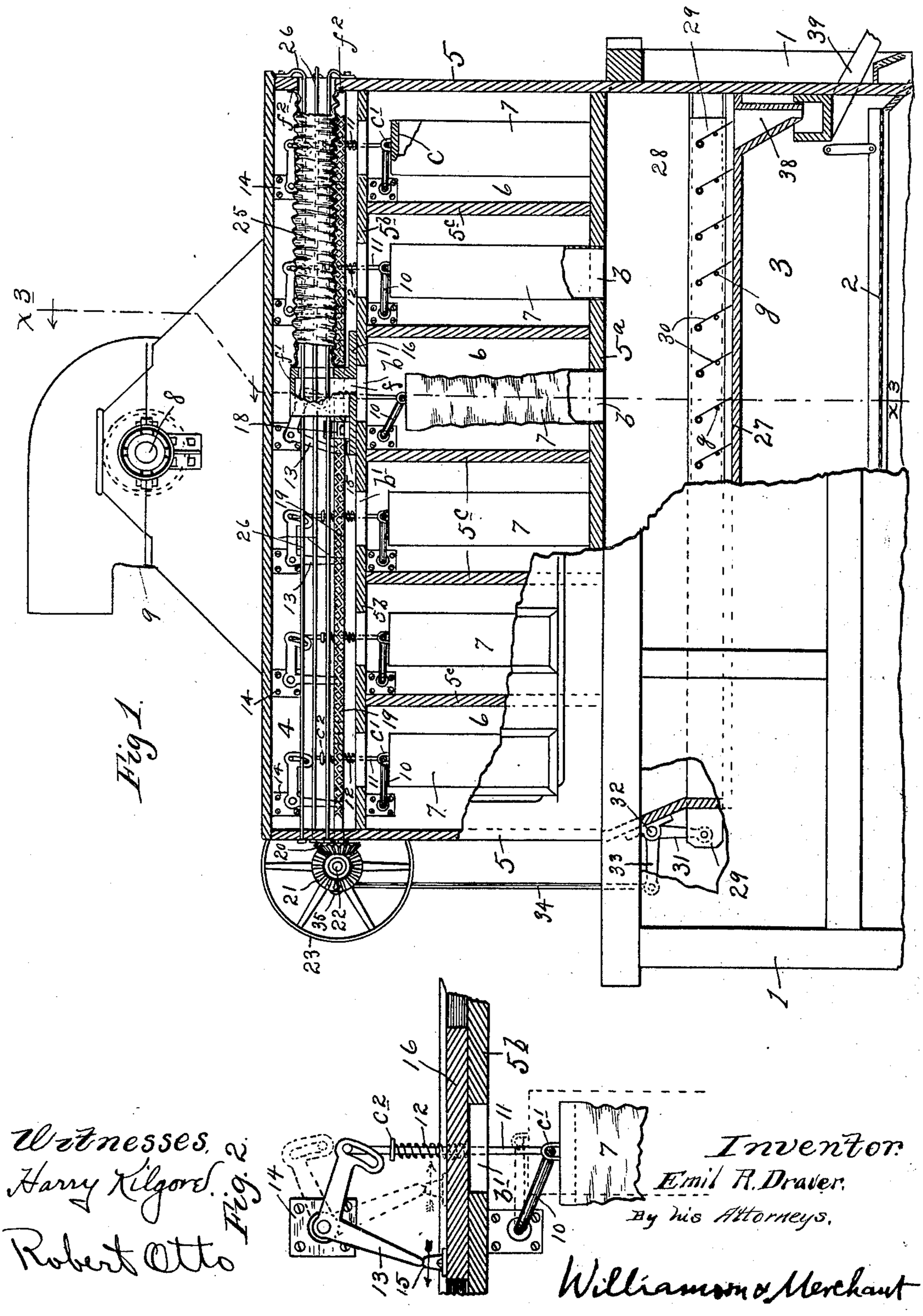

Fig. 1.

Fig. 2.

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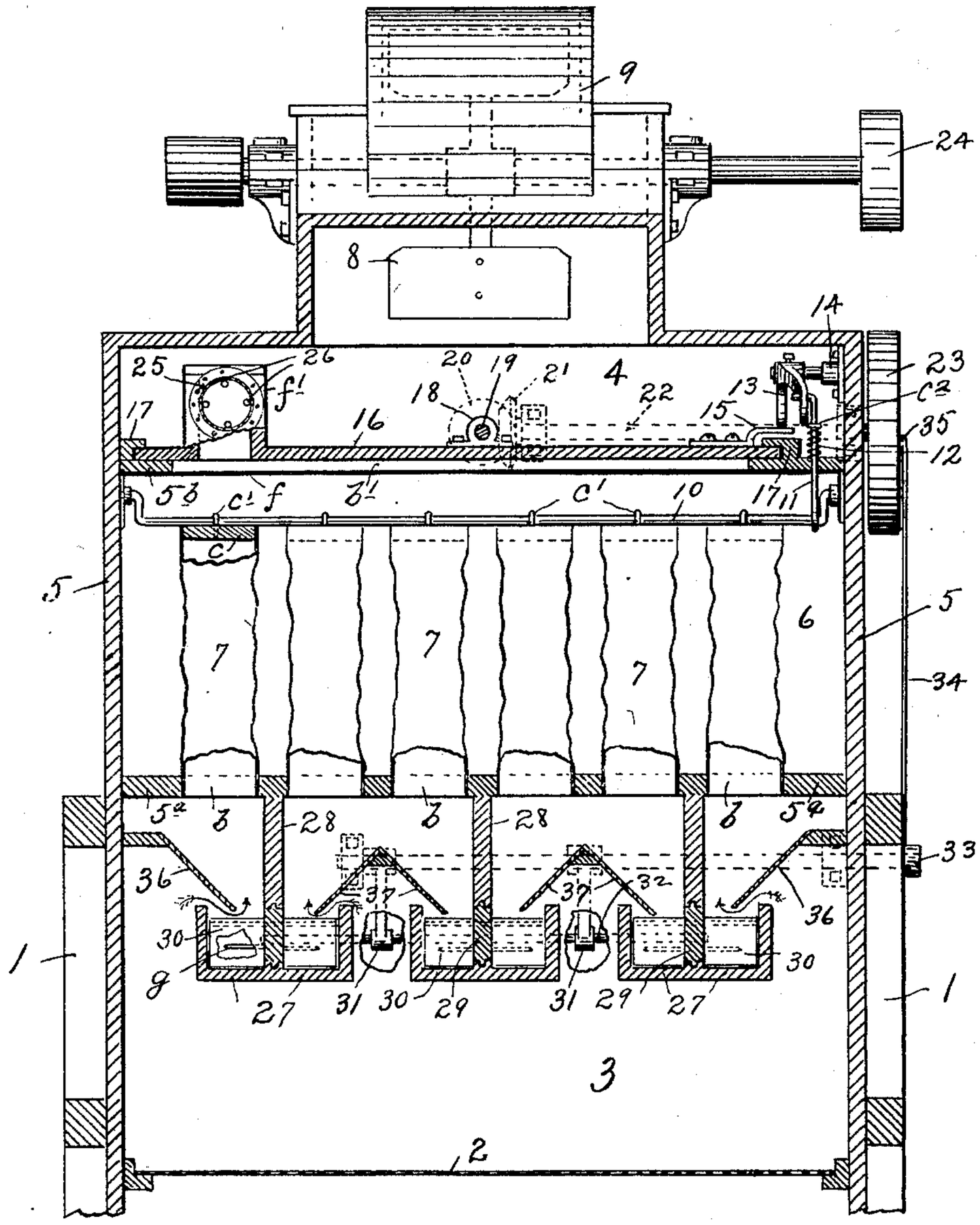
Fig. 3.



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UNITED STATES PATENT OFFICE.

EMIL R. DRAVER, OF WINCHESTER, INDIANA.

DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 699,460, dated May 6, 1902.

Application filed March 28, 1900. Serial No. 10,458. (No model.)

To all whom it may concern:

Be it known that I, EMIL R. DRAVER, a citizen of the United States, residing at Winchester, in the county of Randolph and State of Indiana, have invented certain new and useful Improvements in Dust-Collectors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art which it appertains to make and use the same.

In what is known to the trade as the "dead-air" cell or "Draver" type of dust-collectors the dust-receiving and the clean-air chambers are connected only through the intermediacy of a series of cells and the dust-collecting media contained in said cells. Means are then provided for cutting off the dust-laden draft through the cells and media and for jarring the collecting media within the said cells when the dust-laden draft is cut off from the cells and collecting media. In this way it is rendered possible to shake or jar the collecting media in a dead-air chamber.

This invention is disclosed and broadly claimed in my prior patent, No. 641,681, of date January 23, 1900, issued on an application filed by me November 5, 1896. A dust-collector containing this feature, together with some further improvements, is also disclosed in my Patent No. 608,587, of date August 9, 1898, issued on an application filed by me of date January 25, 1897.

My present invention has for its object to provide certain further improvements in this class of dust-collectors with a view of securing greater efficiency.

The chief feature of improvement consists in the provision of means whereby a reverse current of clean air becomes available for backward movement through the collecting media at the time when the dust-laden draft is cut off from the collecting media and the cells, whereby the reverse current of clean air will assist in cleaning the collecting media.

The invention both in respect to the main feature hereinbefore noted and in respect to minor features not above noted is hereinafter fully described, and defined in the claims.

The invention is illustrated in the accompanying drawings, wherein like notations refer to like parts throughout the several views.

Figure 1 is a view chiefly in vertical longitudinal section, but partly in elevation, showing my improved dust-collector as applied in working position for coöperation with a middlings-purifier. Fig. 2 is a detail showing on a larger scale, partly in elevation and partly in vertical section, the tube-shaking mechanism illustrated in Fig. 1; and Fig. 3 is a view of the machine shown in Fig. 1 in vertical cross-section on the irregular line x^3 x^3 of Fig. 1.

The middlings-purifier frame or casing 1 is of the customary or any suitable form and is provided with the customary sieve 2 below the dust-chamber 3. The casing 5 of the dust-collector is adapted to rest on the top of the purifier-frame, with the floor 5^a of the collector serving to close the top of the purifier. The casing 5 is divided by a horizontal cross-partition or decking 5^b and by a series of cross-partitions 5^c, connecting the side walls of the casing, the floor 5^a, and the decking 5^b. The space above the decking 5^b serves as a clean-air chamber 4. The floor 5^a of the casing 5 is provided with a series of circular openings b, centrally disposed between the partitions 5^c, and the decking 5^b is provided with the corresponding series of openings b'. This construction affords a series of cells 6 in the collector, which are open below to the dust-chamber 3 and open above to the clean-air chamber 4. In said cells 6 are suspended or otherwise mounted suitable collecting media, so arranged and mounted that the dust-laden air must pass therethrough on its way from the dust-chamber 3 to the clean-air chamber 4 through the cell 6. As shown, said collecting media are in the form of collecting-tubes 7, closed above by disks c or otherwise and open at their lower ends, with the latter secured to the walls of the openings b in the floor of the collector. With this construction the dust-chamber 3 and the clean-air chamber 4 can communicate with each other only through the intermediacy of said cells 6 and the collecting-tubes 7. A suitable suction-fan 8 is applied to produce the dust-laden draft or forced circulation of the dust-laden air through the tubes and cells. As shown, the fan-house 9 is applied to the top of the collector-casing.

A crank-shaft 10 is located in each cell 6 with its ends journaled in the side walls of the casing and having its crank connected by eye-screws c' or otherwise to the disks c at the tops of the tubes 7. Each crank-shaft 10 has attached thereto a pitman or rod 11, which extends upward through the top wall of the cell, and has on its exterior a collar c^2. A coiled spring 12 encircles each rod 11, between the decking 5^b and the collar c^2, and serves to normally hold the rod and crank-shaft 10 in their uppermost position, thereby holding the tubes 7 in their distended position. The end of the rod 11 is hook-shaped and is engaged by the slotted arm of a bell-crank shaking-lever, shown as pivoted to a suitable bearing-bracket 14, fixed to the side wall of the casing, as best seen in Figs. 1 and 2. The other or free arm of the shaking-lever 13 depends downward in position to be acted on by a suitable trip-arm 15, carried by a traveling cut-off gate 16. The cut-off gate 16 is mounted on the decking 5^b and is held between guide-cleats 17 for parallel straight-line motion over the said decking. The cut-off gate 16 is of proper width to span the cell 6, or, in other words, the cut-off gate is wider than the cross-section of the outlet-openings b' from the cell. This gives the proper lap for the proper action of the cut-off gate.

The cut-off gate 16 is provided with a central nut 18, which is engaged by a double or right-and-left screw-shaft 19. This shaft 19 extends lengthwise of the casing 5 and is held in suitable bearings with freedom for rotary motion without permitting any longitudinal motion thereof. Hence under the action of the screw-shaft 19 the cut-off gate 16 will be moved back and forth over the decking 5^b, thereby closing the outlet-openings from the cells 6 one after the other in succession. The screw-shaft 19 projects at one end and carries a bevel-gear 20 enmesh with a bevel-gear 21 on a cross-shaft 22, suitably supported from the casing and provided with a pulley 23, which, as shown, receives motion from the pulley 24 on the fan-shaft through a belt. (Not shown.)

The cut-off gate 16 is provided with an opening f, covered by a suitable hollow cap f', which is kept in constant communication with a supply of clean air for delivery to the cells and tubes through the opening f when the dust-laden draft is cut off therefrom by the cut-off gate 16. The supply of clean air to the cap f' may be afforded in any suitable way. As shown, a flexible collapsible tube 25 has its inner end attached to the cap f' and its opposite end extended outward to a suitable opening in the end wall of the casing, with its margins made fast thereto at f^2, as best shown in Fig. 1. The tube 25 is therefore in communication with the atmosphere outside the casing 5. In order to make sure that the tube will not when collapsed prevent the free inlet of the air, it is mounted on suitable laterally-distending guide-rods 26, which are shown as extending from one end wall of the casing to the other and passing through the cap f' over the opening f in the cut-off gate.

Instead of a single tube 25 two such tubes might be employed, one at each side of the cap f. In that event when one tube 25 is in its most collapsed condition the other tube is in its most distended position. A telescoping tube or tubes might also be substituted or an unwinding-coil be used for the same purpose. It might also be possible to obtain the supply of clean air otherwise than from the external atmosphere. For example, if the purifier and collector were organized for the continuous circulation of the air then the discharge-pipe from the suction-fan might be tapped to secure the supply of clean air.

From the construction described it follows that whenever the cut-off gate 16 is in position to cut off the dust-laden draft from any given row of collecting-tubes 7 in a given cell 6 the said cell and row of tubes will be in communication at their upper ends with the external atmosphere or supply of clean air through the opening f, cap f', and tube 25, as described. At the same time the draft or suction from the fan 8 will be operative on the collecting-tubes 7 through their open lower ends. Hence it is obvious that a reverse current or back draft of clean air will be pulled through the tubes, while the dust-laden draft is cut off, thereby thoroughly cleaning the same. The trip-arm 15 on the cut-off gate is so located in respect to the bell-crank 13 as to engage the lower arm of said bell-crank and throw the latter from its vertical position into the position shown in full lines in Fig. 2, thereby depressing the rod 11 against the retracting-spring 12 and forcing downward the bell-crank 10, together with the row of tubes 7, carried thereby. Then as the trip 15 passes by the depending arm of the bell-crank 13 the spring 12 will throw the rod 11, bell-crank 10, and the row of tubes 7, carried thereby, back upward with a sharp jerk, thus jarring the tubes, while the dust-laden draft is cut off. This jarring action takes place and is completed before the opening f in the cut-off gate has passed over the opening b' in the top of the cell, so as to permit the tubes 7 to have assumed their distended position and remain subject to the back draft for a sufficient interval after the jarring before the cut-off gate moves into its cell-opening position. The jarring therefore occurs in the dead-air chamber within the cell 6, and the tubes 7 are subjected to the back draft of the clean air when distended and while the dust-laden draft is still cut off. This insures the desired cleaning action.

In the dust-chamber 3 of the purifier, at a proper distance below the floor of the collector, I mount a series of collecting-troughs or dust-receivers 27. Vertical partitions 28 ex-

tend downward from the floor of the collector into but stop short of the bottoms of said troughs on their median lines. Reciprocating bars 29 are fitted to work between the bottoms of said troughs and the said partitions 28 and to coöperate with said parts to divide the said troughs each into two compartments. The said bars 29 have pivoted thereto on their opposite sides shovels 30, the pivotal motion of which in one direction is free and in the other direction is limited by suitable stops *g*, carried on said reciprocating bars 29. The bars 29 pass outward through the troughs at one end and are engaged by crank-arms 31, attached to rock-shaft 32, which has another crank-arm 33 at one end connected by a rod 34 with a crank-pin 35 on the pulley 23. In this manner the shovels 30 are operated by the bars 29 and will serve to engage and propel the stock collected in the troughs 27 when moving in one direction, while they will feather or move freely over the stock when the bars 29 move in the opposite direction, all in the same manner as is described in my Patent No. 608,587. Deflecting-plates 36 and 37 coöperate with the vertical partitions 28 and the troughs 27 to afford a preliminary separator, through which the dust-laden air from the chamber 3 must pass before it can enter the open lower ends of the dust-collecting tubes 7. Otherwise stated, the dust-laden air from the chamber 3 must pass over the edges of the vertical walls of the troughs 27 and under the lower edges of the deflectors 36 or 37, as the case may be, before it can pass to the collecting-tube 7. These successive changes of direction under the contact with these deflecting-surfaces 36 and 37 have the effect of precipitating a large part of the dust from the dust-laden air before the latter becomes subject to the collecting-tubes 7. All the heavier particles of dust will be precipitated in this manner into the collecting-troughs 27 and be carried out by the shovels 30 through the delivery-spout 38 and the offleading chute 39. This preliminary collector is identical with that shown in my prior patent, No. 608,587.

All the parts of the machine have now been specified, and the actions of same are thought to be clear from the detail description, and a general summary of the operation is not deemed necessary for the purposes of this case.

It will be understood that the invention herein disclosed may be varied in form or detail of construction without departing from the spirit of my invention.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a dust-collector, the combination with a casing having a series of cells and dust-receiving and clean-air chambers in communication through said cells, dust-collecting media within said cells, and a cut-off device traveling over said cells and operating to cut off therefrom, in succession, the dust-laden air, which cut-off device is in communication with the supply of clean air, whereby a reverse current of clean air will be forced through the dust-collecting media of said cells while the dust-laden draft is cut off from the particular cells containing the same.

2. In a dust-collector, the combination with a casing having a series of cells and dust-receiving and clean-air chambers in communication through said cells, dust-collecting media supported in said cells, a cut-off device mounted to travel back and forth over said series of cells and operating to cut off the dust-laden draft through the said cells and their collecting media, in succession, which cut-off device is in communication with the supply of clean air and delivers the same to said collecting media while the dust-laden air is cut off from the particular cells containing the same, and means for jarring the collecting media while the dust-laden air is cut off from the same, substantially as described.

3. In a dust-collector, the combination with a casing having dust-receiving and clean-air chambers, and a series of cells affording communication between said chambers, dust-collecting tubes suspended in said cells, a suction-fan applied to produce the dust-laden draft through said tubes and cells, a cut-off gate mounted to travel over the delivery end of said cells and operating to cut off the dust-laden draft from said cells, in succession, which cut-off gate is in communication with the supply of clean air, and delivers the same to said cells and the tubes therein contained while the dust-laden draft is cut off therefrom, and means for jarring said tubes while the dust-laden draft is cut off from the particular cells containing the same, substantially as described.

4. In a dust-collector, the combination with the casing having dust-receiving and clean-air chambers in communication only through the intermediacy of a series of stationary cells and dust-collecting tubes suspended in said cells, of means for forcing the dust-laden air through said tubes and cells, a cut-off gate mounted to travel over the delivery end of said cells, for cutting off the dust-laden draft from the tubes and cells, which cut-off gate is provided with an opening in communication with the external atmosphere by an extensible tube, for supplying clean air to said cells and tubes when the dust-laden draft is cut off by said gate, substantially as described.

5. The combination with the middlings-purifier having the dust-chamber 3, of the dust-collector casing 5 applied to said purifier and constructed to afford the clean-air chamber 4, the interposed series of cells 6 and collecting-tubes 7, through which the said chambers 3 and 4 communicate with each other, the suction-fan applied to produce the dust-laden draft through said cells and tubes, a cut-off gate mounted to travel back and forth over

the delivery ends of said tubes, which cut-off gate is provided with an opening connected by an extensible tube with the external atmosphere for delivering clean air to said cells and tubes when the dust-laden draft is cut off, and shaking devices operated by said cut-off gate for jarring the said tubes within said cells when the dust-laden draft is cut off, all substantially as and for the purposes set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EMIL R. DRAVER.

Witnesses:
H. C. DRAVER,
MARTHA DUNHAM.