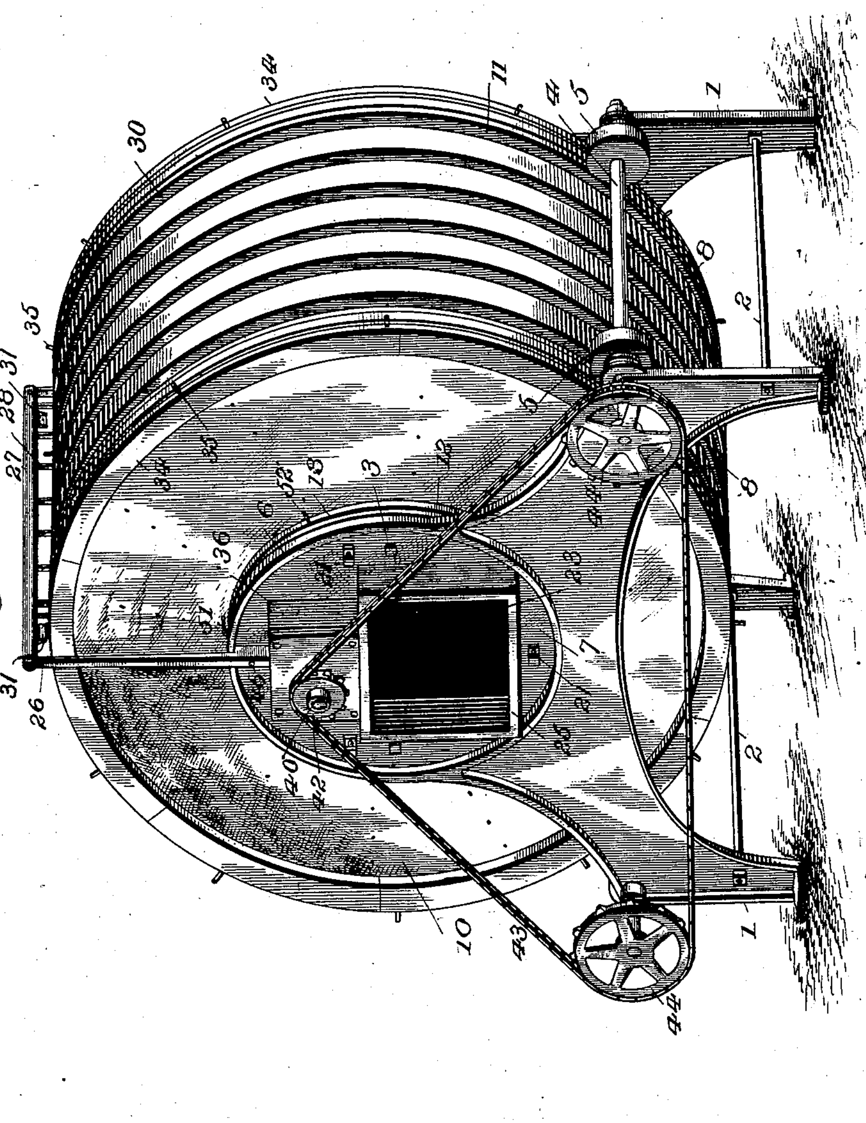
(No Model.) 4 Sheets—Sheet 1.

J. E. MITCHELL.

DUST COLLECTOR.

No. 576,878. Patented Feb. 9, 1897.

Fig. 1.



Witnesses

Inventor
John E. Mitchell
By James L. Norris
his Attorney

(No Model.)

4 Sheets—Sheet 2.

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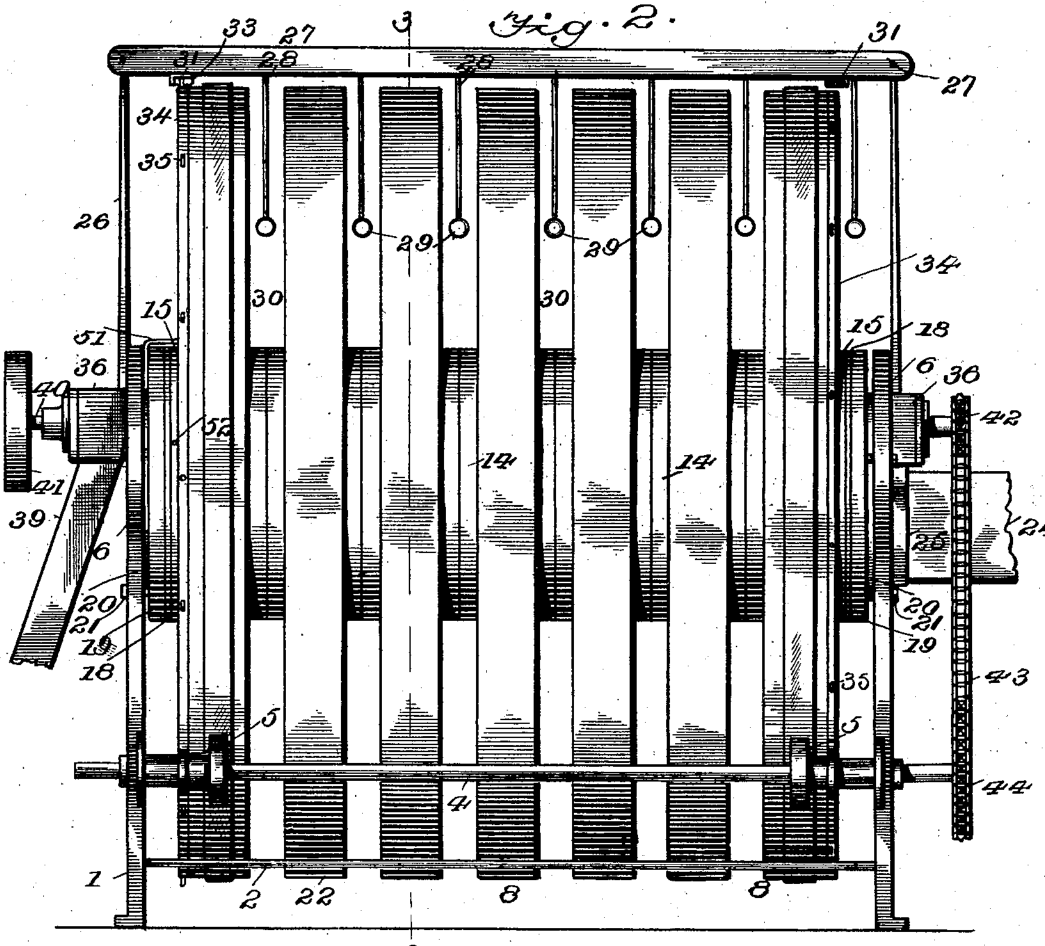
Fig. 2.



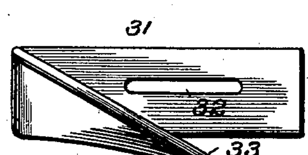


Fig. 6.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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Fig. 3.

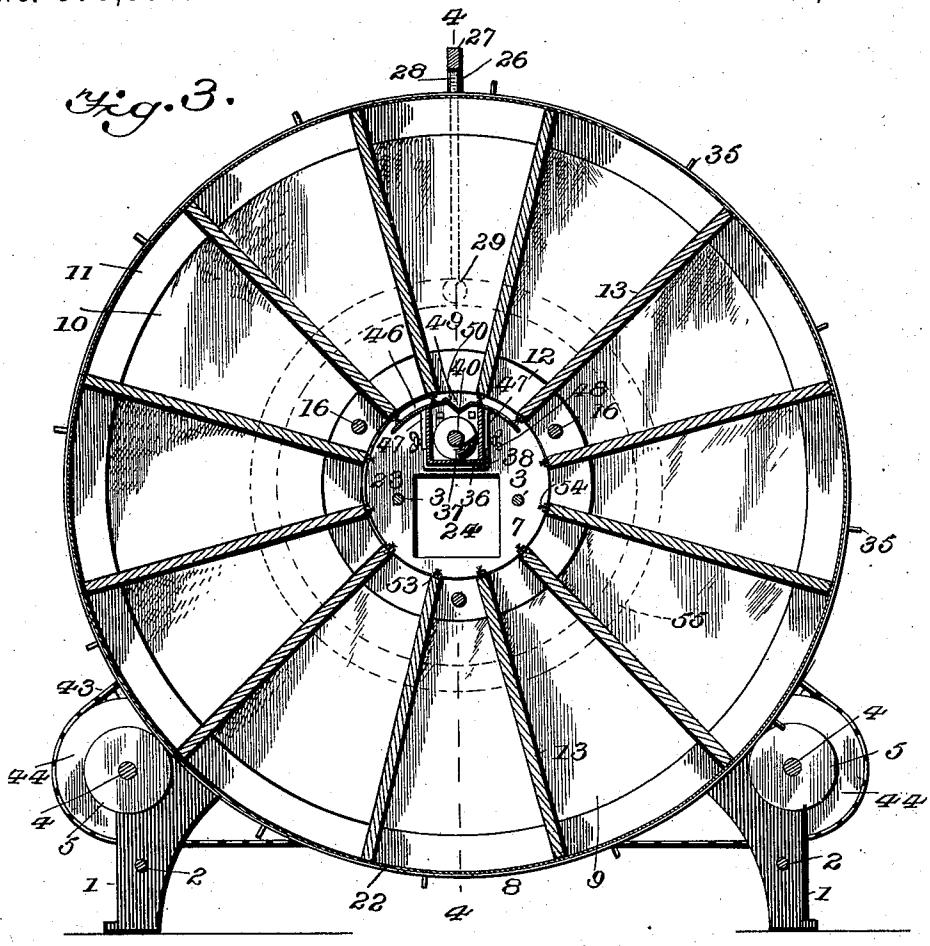
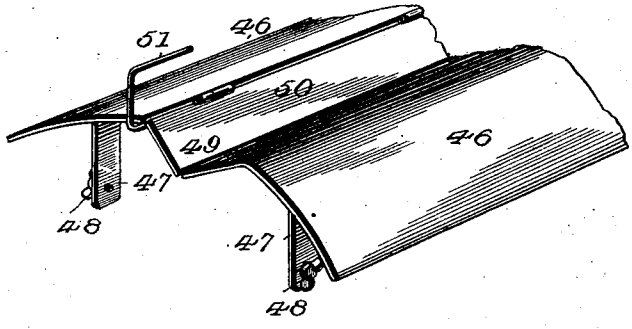


Fig. 7.



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(No Model.) 4 Sheets—Sheet 4.

J. E. MITCHELL.

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Fig. 4.

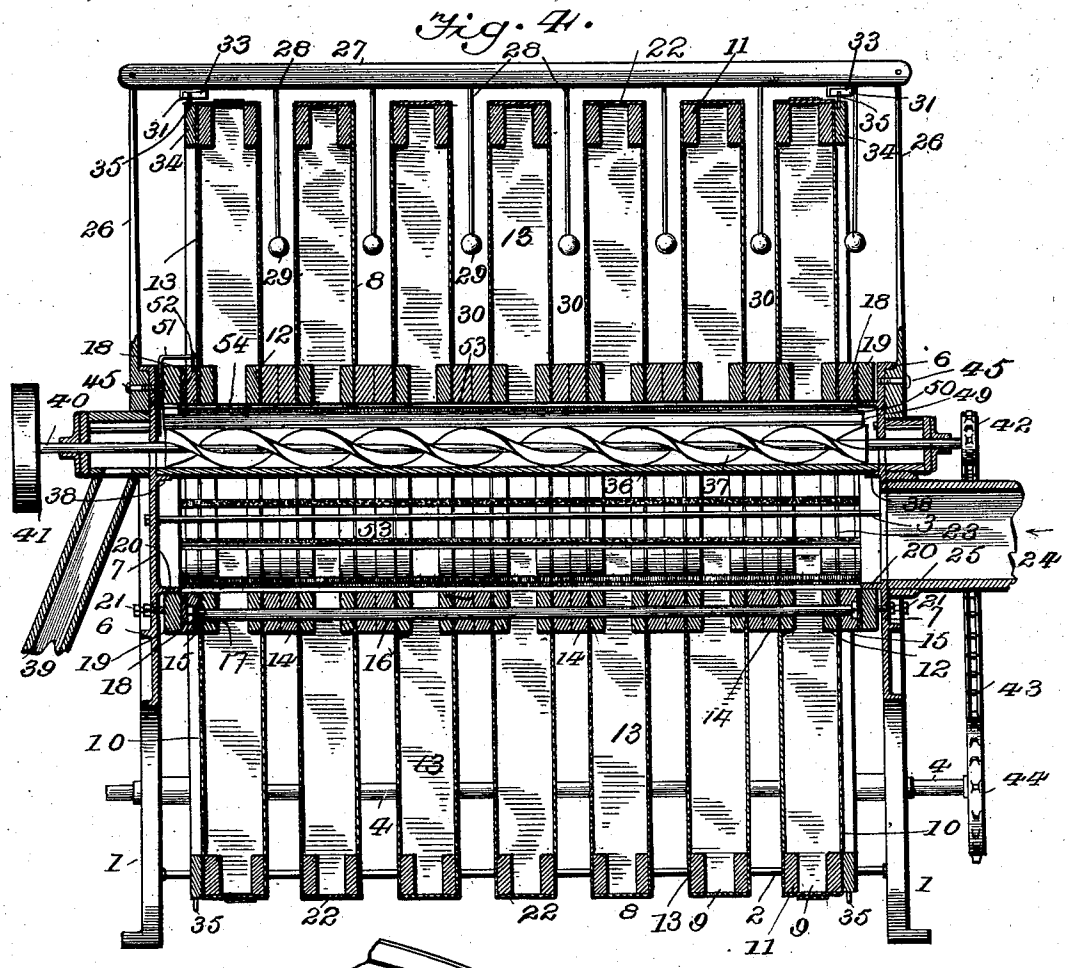
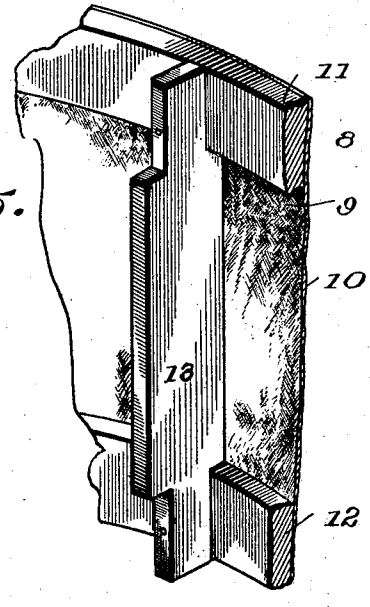


Fig. 5.



Witnesses

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UNITED STATES PATENT OFFICE.

JOHN E. MITCHELL, OF JACKSON, MICHIGAN.

DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 576,878, dated February 9, 1897.

Application filed November 16, 1896. Serial No. 612,295. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. MITCHELL, a citizen of the United States, residing at Jackson, in the county of Jackson and State of Michigan, have invented new and useful Improvements in Dust-Collectors, of which the following is a specification.

This invention relates to dust-collectors, and has for its object to provide a simple, thoroughly efficient, noiseless, and easy-running machine for the separation of dust from dust-laden air.

The invention consists in features of construction and novel combinations of parts in a rotary dust-collector, as hereinafter more particularly described and claimed.

In the annexed drawings, Figure 1 is a perspective of my improved dust-collecting machine. Fig. 2 is a side elevation of the machine. Fig. 3 is a transverse vertical section of the machine on the line 3 3 of Fig. 2. Fig. 4 is a vertical longitudinal section of the machine on the line 4 4 of Fig. 3. Fig. 5 is an enlarged detail perspective view illustrating the construction of the dust-collecting chambers. Fig. 6 is an inverted plan of an adjustable bearing for contact of pins through which is obtained a vibratory action of a series of spring-supported knockers suspended from a longitudinally-movable bar on which said bearing is carried. Fig. 7 is an enlarged perspective of a cut-off shield for preventing access of air to the rotary dust-collecting chambers in succession, and in which is a valved trough for discharging accumulations of dust into a conveyer.

The frame of the machine consists of end standards 1, that are connected and braced by horizontally-arranged rods 2 near the bottom and by similar rods 3 near the top. In their lower portions the standards 1 are provided with bearings for two horizontal shafts 4, on which are secured the friction disks or rollers 5, through which the dust-collecting mechanism is supported and rotated.

At their upper ends the standards 1 are cast with annular rims 6, that surround integral circular heads 7, through which the brace-rods 3 are extended.

The rollers 5 support, between the standards 1, a series of parallel annular dust-collectors 8, each of which comprises a number of segmental dust-collecting chambers 9, provided with porous walls 10, through which the air is allowed to escape, while the dust is retained within said chambers for subsequent removal. Each annular dust-collector or section 8 of a series is constructed from two parallel outer rings 11 and two parallel inner rings 12 of smaller diameter, the rings 11 and 12 being concentric and preferably composed of wood. These inner and outer rings 11 and 12 are connected by radial partitions 13, that are sufficiently wide to extend entirely across the annular space between the said outer and inner rings, but are narrowed at their ends, as shown in Figs. 4 and 5, so as to fit between and space apart the two parallel outer rings and the two parallel inner rings.

As shown in Figs. 2 and 4, the several annular dust-collecting sections 8 are spaced apart for a suitable distance by means of rings 14, that are located between and parallel with the inner rings 12 of adjoining sections. At the outside of each annular end section 8 of the dust-collector there is placed a ring 15, parallel with the rings 12, and through the several rings 15, 12, and 14 are extended tie-rods or long bolts 16, that bind the series of parallel annular dust-collecting sections 8 firmly together in one rotary body. The nuts or heads 17 on the ends of the rods or bolts 16 are countersunk in the outer faces of the rings 15, as shown in Fig. 4. Against the outside of each ring 15 there may be placed a gasket or packing-ring 18, and outside this again a stationary ring 19 on an inner annular flange 20 of the adjoining standard. Set-screws 21 are inserted through the heads 7 at suitable points to bear against the rings 19, and thereby exert a pressure on the gaskets 18 for taking up any wear. The flanges 20 will serve to prevent any dust from getting between the rings 19 and the end standards of the frame.

In each annular dust-collecting section 8 the segmental chambers 9 are closed in at their sides by the porous walls 10, which are preferably composed of woolen cloth cut to annular shape and secured to the outer sides of the rings 11 and 12 and to the edges of the partitions 13 in any suitable manner. The

several segmental dust-collecting chambers 9 are closed at their outer ends by a covering 22, preferably of sheet metal, secured to the peripheral portions of the outer rings 11 in each annular dust-collecting section.

At their inner ends the segmental dust-collecting chambers 9 are open and communicate with a central cylindrical space 23, around which the several annular dust-collecting sections rotate in a body. One end of this cylindrical space 23 communicates with a duct or conduit 24, leading from the exhaust of a suitable fan or blower or other source of dust-laden air. This duct or conduit 24 is supported at one end in flanges 25, formed on one of the heads 7 of the machine-frame. The dust-laden air enters the machine in the direction of the arrow shown in Fig. 4 and passes from the central cylindrical space 23 into each of the segmental dust-collecting chambers 9 and is carried around therein as the several annular collectors rotate slowly in a body.

On the ends of the machine are secured two spring-standards 26, that project above the highest part of the rotary body of dust-collectors. The upper ends of these spring-standards support a longitudinally-movable bar 27, that is extended lengthwise above the series of dust-collectors. From this bar 27 depend a series of spring-arms 28, each of which carries a rubber ball 29 at its lower end. The several rubber balls 29 hang within the upper portions of annular spaces 30, that are intermediate the several annular dust-collecting sections. On the under side of the longitudinally-movable bar 27, near its ends, are secured adjustable bearings 31, the form of which is shown in Fig. 6. Each of these bearings 31 is provided with a longitudinal slot 32 to permit adjustable engagement of the bearing with a pin or screw secured in the under side of the longitudinally-movable bar. An inclined cam face or rib 33 is formed on the under side of each bearing. Each end section of the dust-collector has secured to its outer side a ring 34, carrying a series of radial pins 35, each of which is in line with the central outer portion of each segmental dust-collecting chamber. As the body of dust-collecting chambers are rotated these pins 35 will successively strike against the cam face or rib 33 of the bearing 31, and will thereby impart a longitudinal movement to the bar 27, from which the balls 29 are suspended. Through the resiliency of the spring-standards 26 and the spring-arms 28 a nearly constant vibration is thus imparted to the balls 29, thus causing them to act as knockers against the porous walls 10 of the uppermost segmental chambers 9, between which the said knockers are suspended. Thus as the segmental chambers 9 successively come into proximity with these knockers 29 the dust contained in the chambers is shaken down, and the porous walls 10 of the chambers are kept clean for the free outward passage of the cleansed air.

In the upper part of the cylindrical space 23 is mounted a longitudinally-extended trough 36, in which a screw conveyer 37 is arranged. The conveyer-trough 36 is extended at both ends through the heads 7 and is supported upon flanges 38, formed thereon. One end of this conveyer-trough 36 has a chute or spout 39 leading therefrom, through which the dust is discharged from the machine. The shaft 40 of the screw conveyer 37 is extended through and beyond the ends of the trough 36 and carries a driving-pulley 41 on one end and a sprocket-wheel 42 on its other end. Through belting to the pulley 41 any suitable power may be applied to actuate the conveyer. The sprocket-wheel 42 is connected by a chain belt 43 with sprocket-wheels 44 on the shafts 4 of the rollers 5, that support and rotate the body of annular dust-collecting sections. It is my purpose to apply the driving power in such manner that the several dust-collecting sections will revolve slowly, thus affording ample time for collection and separation of the dust and its discharge from the machine without subjecting the machine parts to strain or excessive vibration.

The spring-standards 26 are preferably secured to the upper portions of the heads 7 by means of bolts 45, immediately above the projecting ends of the dust-conveyer trough. These spring-standards may be made of wood and are tapered toward their upper ends to impart a suitable resiliency. The springs 28, that support the balls or knockers 29, may be made from strips of flat steel and are fastened to the longitudinally-movable bar 27 in any suitable or convenient manner. By this arrangement of the knockers 29 they are caused to vibrate almost continually between the uppermost dust-collecting chambers against the porous walls of the same, and thus keep them free from dust and cause the chambers to discharge their contents in succession as they come into position above the dust-conveyer trough.

For the purpose of temporarily preventing the access of air into the three uppermost segmental chambers 9 of each annular dust-collecting section there is provided a concavo-convex shield 46, Figs. 3 and 7, which is supported intermediate the said three uppermost dust-collecting chambers and the conveyer-trough 36, that is below the same. This cut-off shield 46 is supported by arms 47, that are adjustably connected with the sides of the conveyer-trough 36 by means of thumb-screws 48 or otherwise. In the central portions of the cut-off shield 46, immediately above the conveyer 37, is formed an approximately V-shaped trough 49, one side of which is stationary while the other side is formed by a hinged valve 50, having at one end an upward and inward extended lever-arm 51, that is arranged in the path of a pin 52, car-

ried on a ring 15 at one end of the body of annular dust-collecting sections. This pin 52 is so arranged that once or oftener in each revolution of the dust-collectors it will come in contact with the lever-arm 51, and thereby trip the valve 50, so as to permit the contents of the trough 49 to drop onto the dust-conveyer. It will be observed that the segmental or concavo-convex cut-off shield 46 is so arranged that when the uppermost segmental dust-collecting chambers 9 are in position to be subjected to the action of the knockers 29 all access of air to said chambers is effectually prevented, and thus there is no air-pressure within said uppermost segregated chambers to obstruct a free disengagement of the dust from the porous walls 10 and its discharge into the trough 49, and subsequently into the screw conveyer.

There are secured within the inner rings 12 at the inner ends of the several partitions 13 a series of strips 53, to each of which is attached a cotton packing 54, arranged to close the slight space between the cut-off shield 46 and the uppermost segmental chambers 9 as they revolve slowly above and nearly in contact with said cut-off shield. These packing-strips 54 will not only assist in preventing the access of air to the uppermost dust-collecting chambers, but will also brush off from the upper surface of the shield 46 any dust that may have collected thereon. The annular spaces 30 between the several dust-collecting sections 8 will afford ample space for escape of air from the several segmental dust-collecting chambers, aided by the cleansing of the porous walls 10 as the several chambers come within range of the vibratory action of the spring-supported knockers 29, that are suspended between and adjacent to the uppermost chambers of the machine.

For the purpose of obviating wear of the porous-cloth walls 10 by the striking of the knockers 29 the said walls may be provided with a reinforcement 55, Fig. 3, consisting of an increased thickness of cloth applied over the points where the knockers would be liable to strike in their vibratory movements.

It will be observed that each dust-collecting section 8 is substantially in the form of a hollow disk comprising an annular series of segmental dust-collecting chambers 9, segregated from each other by the partitions 13, but all communicating at their inner open ends with the central cylindrical space 23, the walls of which are constituted wholly by the series of parallel rings 12, 14, and 15, all securely bound together in a single rotary body.

In its operation the machine is light running, thoroughly effective, and practically noiseless, and by adding to the number of annular dust-collecting sections or disks the capacity of the machine may be increased to any required extent.

The segmental form of the dust-collecting chambers 9, with their open and smaller ends in direct communication with the central air-inlet space or chamber 23, as shown in Fig. 3, will afford the best possible opportunity for expansion of the dust-laden air in entering and filling said chambers, while the converging inner ends of the radial partitions 13, separating said segmental chambers, permit the shield 46 to more effectually cut off the uppermost chambers, and thus facilitate discharge of dust to the valved trough in said shield.

What I claim as my invention is—

1. In a rotary dust-collector, the combination of a series of parallel and spaced-apart annular dust-collecting sections, each comprising a number of segmental chambers having porous side walls and inclosing a central horizontally-arranged cylindrical space with which said chambers communicate, means for introducing dust-laden air into said cylindrical space and thence into the several dust-collecting chambers, a screw conveyer mounted in the upper portion of the said central cylindrical space below the uppermost segmental chambers, means for vertically rotating the annular dust-collecting sections in a body, and automatically-actuated knockers suspended between and adjacent to the uppermost chambers of the several annular dust-collecting sections, substantially as described.

2. In a rotary dust-collector, the combination of a series of annular and parallel dust-collecting sections connected in one vertically-rotary body and with annular spaces intermediate said sections, a number of segmental dust-collecting chambers formed in each of said annular sections, each of said segmental chambers being closed at its outer end and open at its inner end and provided with porous side walls, the inner open ends of said segmental chambers being in communication with a horizontally-arranged central cylindrical space around which the several annular sections are revolved, a duct or conduit communicating with one end of said central cylindrical space to convey dust-laden air into the same, a conveyer-trough supported longitudinally in the upper portion of said central cylindrical space and having its ends projecting beyond the same, a screw conveyer mounted in said trough and having the ends of its shaft projecting beyond the ends of the trough, a driving-pulley on one end of said shaft, rollers on which the body of annular dust-collecting sections is supported, sprocket-gearing from the conveyer-shaft to the shafts of said rollers, and a series of vibratory knockers suspended in the upper portions of the annular spaces between the uppermost dust-collecting chambers, substantially as described.

3. In a rotary dust-collector, the combination of a series of annular dust-collecting sections, each comprising a number of segmental dust-collecting chambers having inner open

ends and closed at their outer ends and provided with porous side walls, the said annular sections being spaced apart with intervening annular spaces between them, a central cylindrical space or chamber with which the inner ends of the several segmental dust-collecting chambers communicate, a series of spring-supported vibratory knockers suspended in the annular spaces between and adjacent to the uppermost segmental chambers of the several annular sections, means for automatically actuating the said knockers from the rotary body of dust-collecting sections, a duct or conduit for conducting dust-laden air into one end of said central cylindrical chamber and thence into the several segmental chambers, a screw conveyer located in the upper portion of said central cylindrical space, a cut-off shield intermediate the upper side of said conveyer and the inner ends of the uppermost chambers in the several dust-collecting sections, the said cut-off shield being provided with a central longitudinal trough having in one side a valve provided with a lever-arm, and a pin carried on one of the annular dust-collecting sections to come in contact with said lever-arm and open the said valve to permit the discharge of dust into the conveyer, substantially as described.

4. In a rotary dust-collector, the combination of a spaced-apart series of parallel annular dust-collecting sections, each comprising a number of segmental dust-collecting chambers having porous side walls, the said chambers being closed at their outer ends and open at their inner ends, a central cylindrical space or chamber communicating with the inner open ends of said chambers, a conveyer-trough supported longitudinally in the upper portion of said central space and provided with a discharge spout or chute at one end, a screw conveyer mounted in said trough, a segmental or concavo-convex cut-off shield adjustably supported by the conveyer-trough and arranged intermediate the upper side of the conveyer and the lower or innermost open ends of the uppermost segmental chambers in the several annular dust-collecting sections, the said cut-off shield being provided with a central longitudinal trough having one side stationary and the other side hinged or formed as a valve, a lever-arm on one end of said trough-valve, a pin carried by one of the rotary annular dust-collecting sections to actuate said lever-arm for opening said valve to cause a discharge of dust into the conveyer, and a series of spring-supported vibratory knockers suspended between and adjacent to the porous walls of the several uppermost segmental dust-collecting chambers and adapted to be automatically operated at intervals for causing the discharge of dust from said chambers into the cut-off trough and thence into the conveyer, substantially as described.

5. In a rotary dust-collector, the combination of a series of spaced-apart and parallel disk-shaped dust-collecting sections each comprising an annular series of segmental chambers segregated from each other and open at their inner ends, the said chambers being closed at their outer ends and provided with porous side walls, series of rings connected with the inner ends of said disk-shaped sections and spacing the same apart to provide annular spaces between the several disks or sections, a central horizontally-arranged and cylindrical air-inlet chamber having its walls constituted by the inner ends of the segmental chambers and connected spacing-rings, a conveyer mounted in the upper portion of the said cylindrical air-inlet chamber to receive dust from the uppermost segmental chambers of the several disks or sections and carry it out of the machine, means for cutting off the access of air to the several segmental chambers in succession as they are rotated vertically to an uppermost position, and automatically-actuated vibratory knockers suspended adjacent to the porous side walls of the uppermost segmental chambers, substantially as described.

6. In a rotary dust-collector, the combination of a series of hollow disk-shaped dust-collecting sections composed of concentric rings and radial partitions forming in each of said sections an annular series of segmental chambers that are closed at their outer ends and open at their inner ends, series of rings connected with and intermediate the inner ends of said hollow disks or sections to space the same apart and provide annular spaces between the segmental chambers of adjoining sections, the said chambers being provided with porous-cloth walls facing said annular spaces, vibratory knockers suspended in said annular spaces and adjacent to the cloth walls of said chambers, a central and horizontally-arranged cylindrical air-inlet chamber having its walls constituted by the inner ends of the segmental chambers and the said rings that space apart the several disks or sections, the said disks being arranged to rotate in a vertical plane, and a conveyer mounted in said air-inlet chamber to receive dust from the segmental chambers and carry it out of the machine, substantially as described.

7. In a rotary dust-collector, the combination of the end standards provided with circular heads, a series of rotary and spaced-apart disk-shaped sections mounted between the said circular heads and each comprising an annular series of segmental dust-collecting chambers that are open at their inner ends and closed at their outer ends and provided with porous side walls, spring-standards carrying a longitudinally-movable bar having spring-supported knockers suspended therefrom in proximity to the uppermost chambers in the several disks or sections, a cam-bearing on the longitudinally-movable bar, series of pins carried on one of the disk-

sections to come in contact with said bearing at intervals and thereby move the spring-supported bar longitudinally to vibrate the knockers, a central cylindrical air-inlet chamber communicating with the segmental dust-collecting chambers, and a dust-conveyer located in said central chamber to carry dust out of the machine, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN E. MITCHELL.

Witnesses:
JAMES L. NORRIS,
THOS. A. GREEN.