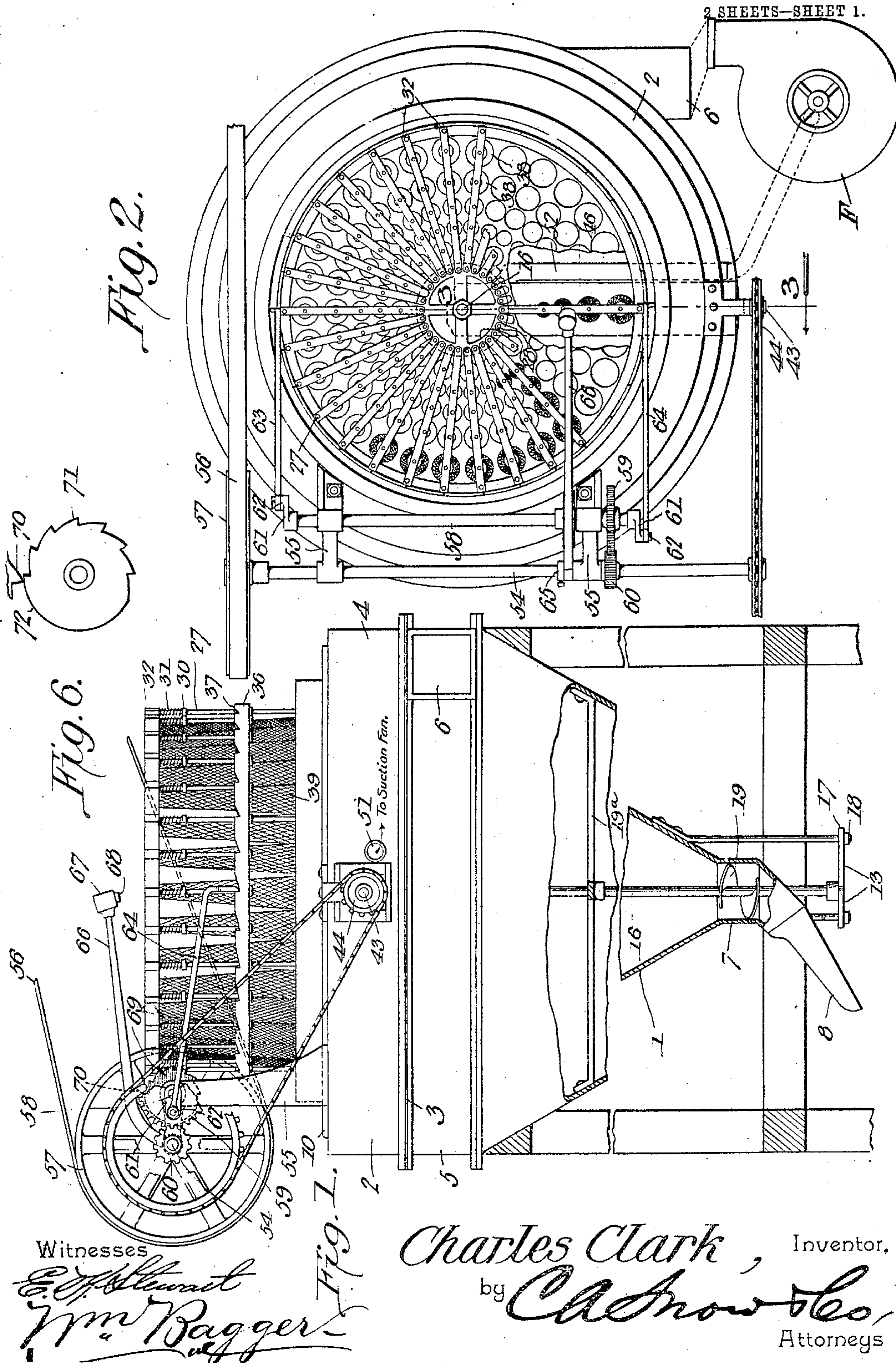


No. 802,974.

PATENTED OCT. 31, 1905.

C. CLARK.
DUST COLLECTOR.
APPLICATION FILED MAR. 20, 1905.

2 SHEETS—SHEET 1.



Witnesses

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C. CLARK.
DUST COLLECTOR.

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2 SHEETS—SHEET 2.

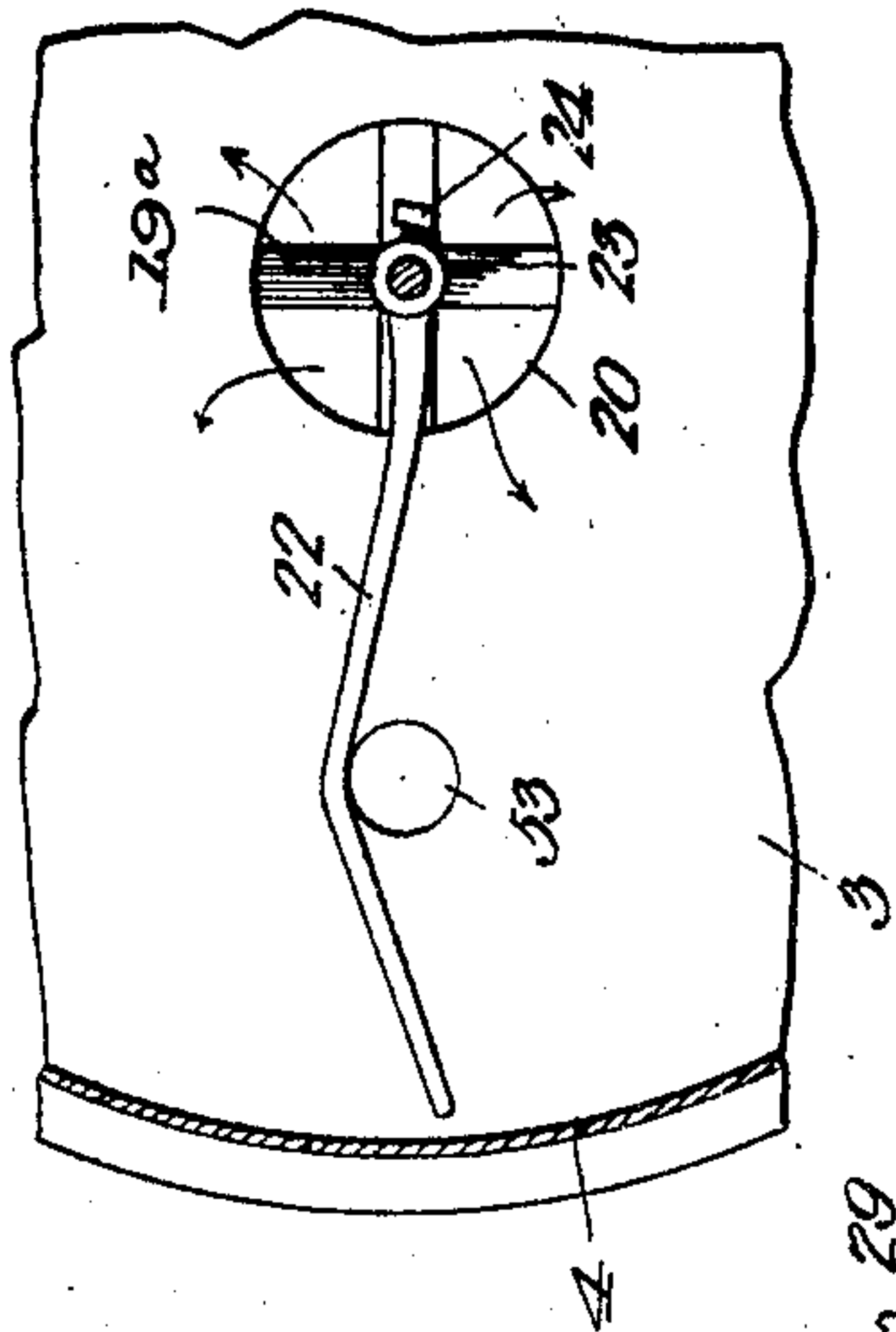


Fig. 5.

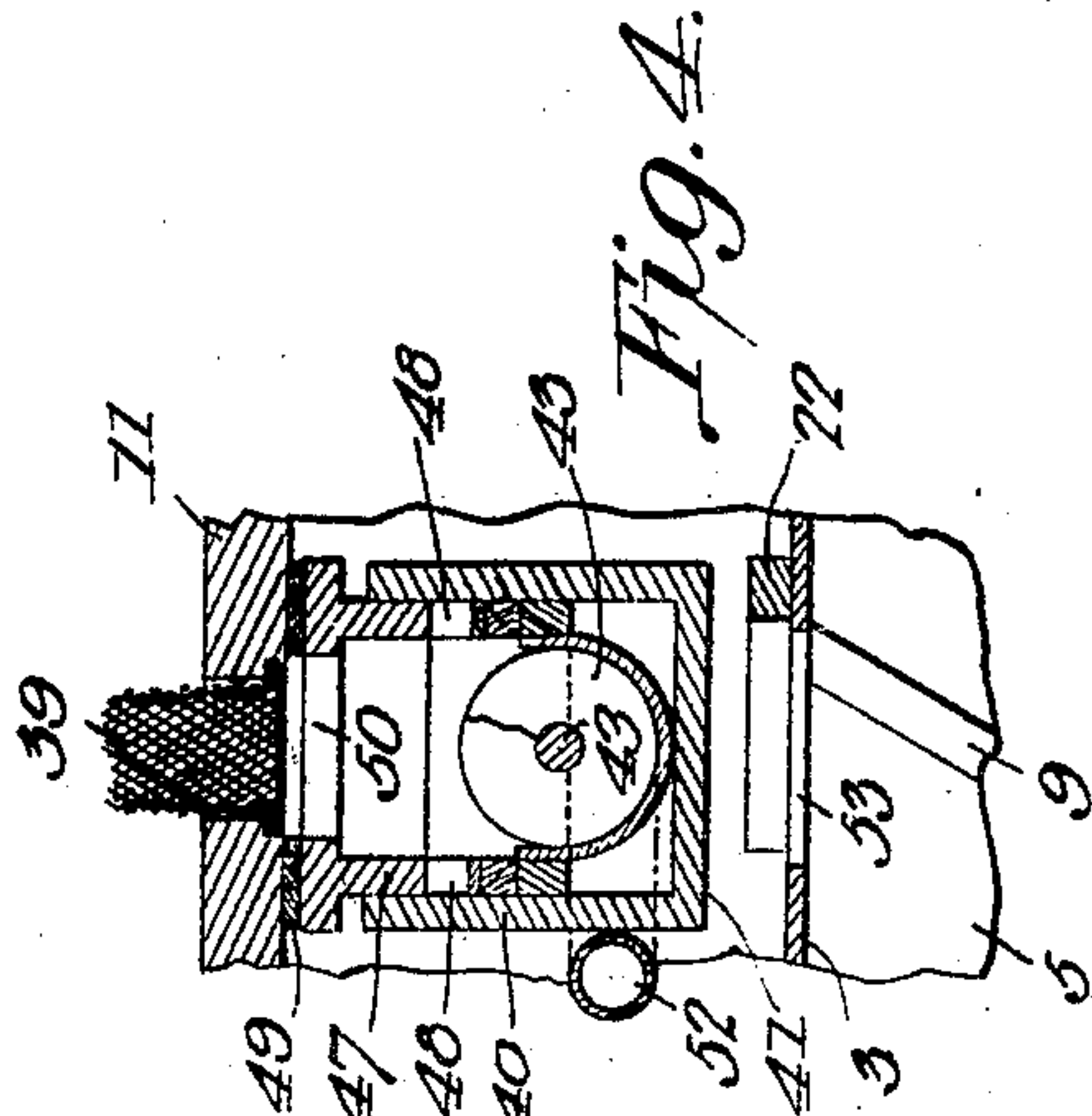


Fig. 4.

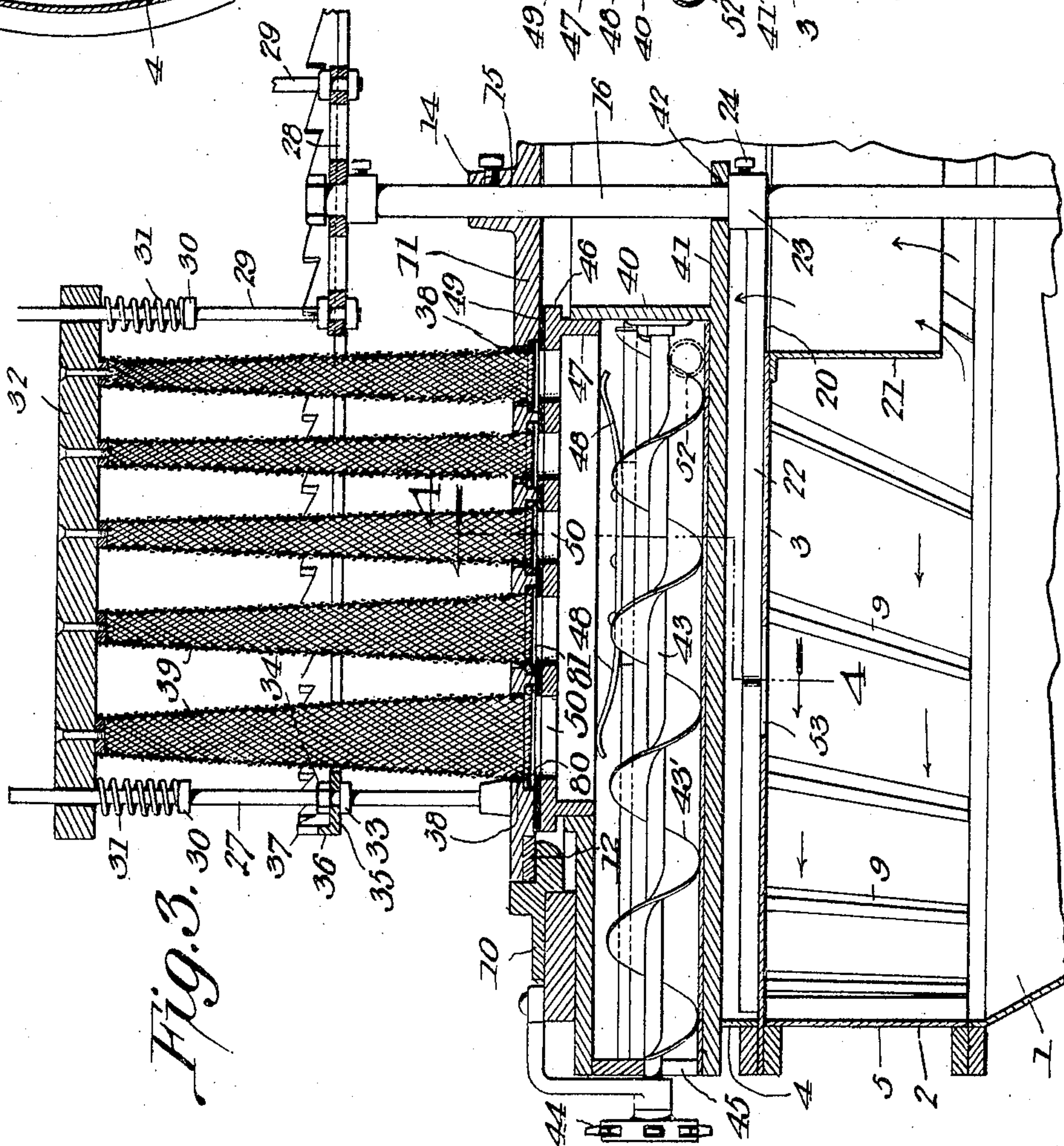


Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES CLARK, OF TORONTO, CANADA, ASSIGNOR OF ONE-HALF TO
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DUST-COLLECTOR.

No. 802,974.

Specification of Letters Patent.

Patented Oct. 31, 1905.

Application filed March 20, 1905. Serial No. 251,118.

To all whom it may concern:

Be it known that I, CHARLES CLARK, a subject of the King of England, residing at Toronto, in the Province of Ontario and Dominion of Canada, have invented a new and useful Dust-Collector, of which the following is a specification.

This invention relates to dust-collectors; and one object of the invention is to combine in a single structure mechanism for separating from dust-laden air by gravitation such particles of dust as may be sufficiently heavy in themselves to settle of their own accord and afterward separating from the partially-purified air by filtration such particles as are not sufficiently heavy to settle of their own accord.

Other objects of the invention are to simplify and improve the construction and operation of this class of devices; and with these and other ends in view, which will readily appear as the nature of the invention is better understood, the said invention consists in the improved construction and novel arrangement and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of embodiment of the invention, it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that the right is reserved to any changes, alterations, and modifications to which recourse may be had within the scope of the invention and without departing from the spirit or sacrificing the efficiency of the same.

In said drawings, Figure 1 is a side elevation of a machine constructed in accordance with the principles of the invention. Fig. 2 is a top plan view with parts removed for the purpose of exposing the subjacent construction. Fig. 3 is a sectional detail view, enlarged, taken on the plane indicated by the line 3 3 in Fig. 2. Fig. 4 is a sectional detail view taken on the line 4 4 in Fig. 3. Fig. 5 is a detail plan view of the intermediate diaphragm, showing the sweep for removing accumulations of dust from the latter. Fig. 6 is a detail view of the hammer-actuating cam.

Corresponding parts in the several figures are indicated throughout by similar characters of reference.

In carrying this invention into practical op-

eration a casing is employed consisting, essentially, of a funnel-shaped body 1 and a cylindrical upper portion 2, which is divided by a diaphragm 3 into upper and lower compartments 4 5, the latter of which is provided with a tangentially-disposed inlet 6 for the dust-laden air. The lower portion of the funnel-shaped body of the casing has an outlet, including a cylindrical portion 7 and a spout 8. The dust-laden air is conveyed into the casing by means commonly used in this class of machinery, but not illustrated in the drawings, inasmuch as it forms no part of the present invention, but which may be generally understood as including a blast-fan discharging into the casing through the tangential inlet 6, whereby the air admitted into the casing will be caused to whirl around rapidly within said casing, thus causing the heavier dust particles to be thrown outward toward the walls of the casing and to move gradually in a downward direction upon the inclined walls of the latter until they escape through the outlet at the lower end of the casing. In the cylindrical compartment 5, which constitutes the upper part of the casing and which directly receives the influx of air, are disposed a plurality of inclined slats or deflectors 9, as seen in Fig. 3 of the drawings, which intercept the heaviest dust particles and cause them to gravitate downwardly. The top of the casing includes an annulus 10, supporting for rotation a disk 11, between which and the upper edge of the casing is interposed a packing 12, of felt or other suitable material, forming a practically air-tight joint. The disk 11 has a central aperture 15, surrounded by a collar 14, whereby it is secured near the upper end of a shaft 16, the lower end of which extends through the outlet at the lower end of the casing and is stepped in a bearing 17, supported by the casing, said step or bearing being provided with radiating arms 13, engaging supporting-rods having nuts 18, whereby the said shaft may be minutely adjusted. Said shaft carries within the cylindrical portion 7 of the outlet a spiral conveyer 19, which while it assists the outflow of the dust collected in the casing also to some extent hinders the exit of air in a downward direction from said casing. A bridge 19^a, forming an auxiliary support for the shaft 16, is suitably secured in the conical or funnel shaped casing 1. For the passage of air in an upward

direction from the body of the casing the diaphragm 3 is provided with a central aperture 20, guarded by a downwardly-extending circumferential flange 21. The shaft 16 carries
 5 directly above the diaphragm 3 an angular arm or sweep 22, which is secured upon said shaft by means of a hub or collar 23, having a set-screw 24.

The disk 11 is provided, near the periphery
 10 thereof, with a plurality of uprights 27, spaced equal distances apart. Supported for rotation at the upper extremity of the shaft 16 is a wheel 28, upon the rim or periphery of which a plurality of uprights 29 are mounted,
 15 corresponding in number to the uprights 27 and like the latter spaced equal distances apart. The uprights 27 and 29 are provided near their upper ends with collars or flanges 30, upon which are supported coiled cushion-
 20 springs 31, which in turn support radial bars 32, extending from the inner uprights 29 to the outer uprights 27. The outer uprights 27 are provided with clamping-nuts 33 34, between which is clamped a ring or annulus 35,
 25 having at its outer edge an upwardly-extending flange 36, provided with ratchet-teeth 37, which are engaged by pawls, as will be presently more fully described, whereby rotary
 30 motion is imparted to the ring 35 and related parts, including the uprights 27 29, the wheel 28, the disk 11, and the radial bars 32.

The disk 11 is provided with a plurality of apertures 38, which are disposed in radial series and in registry with the radial bars 32.
 35 The latter serve as supports for tapering filtering-bags 39, of textile or other suitable material, the upper ends of said bags being suitably supported from the bars 32 and the lower
 40 ends of said bags being suitably connected with the apertures 38 in the disk 11. The arrangement is preferably such that the filtering-bags will normally be kept practically
 45 taut by the action of the bars 32, being forced upwardly by the springs 31. No limitation is made to any particular method of mounting
 50 the filtering-bags; but it is to be understood that a construction is preferred which will admit of said bags being conveniently detached for the purpose of cleaning the same or substituting fresh ones in their places.

Within the upper compartment 4 of the casing is supported a radially-disposed conveyer-
 box 40, the inner end of which may be provided with a bracket extension 41, having an
 55 aperture 42, loosely engaging the shaft 16 and supported upon the collar 23, carrying the sweep 22. Bearings are provided for a shaft 43, disposed for rotation within the box 30 and carrying a spiral conveyer 43'. One end of
 60 the shaft 43 extends through the front end of the box and is provided with a sprocket-wheel 44, adapted to receive motion from a suitable source of power, the box 40 being provided at its outer end with an outlet 45. The conveyer-box 40 is provided with a lid 46, hav-

ing a downwardly-extending flange 47, fitted closely within the box in such a manner as to admit of a limited vertical movement of the lid, which latter is normally forced in an upward direction by means of a suitably-disposed spring or springs 48. The lid 46, which
 70 is thus forced upwardly against the under side of the disk 11, is provided with a packing-surface 49, of felt or other suitable material, whereby a close joint is formed between
 75 said lid and the under side of the disk, and the lid 46 is provided with a series of perforations 50, adapted to register with the radially-disposed perforations 38 in the disk.

Connected with one side of the conveyer-
 80 box 40 and extending to an outlet 51 in the side of the casing-compartment 4 is a reverse air-pipe or suction-pipe 52, which is extended to a suction-fan, preferably to the eye of the fan, whereby the dust-laden air is conveyed
 85 to the device. By this means a suction is created through the row of filtering-bags, which are in alinement with the conveyer-box and which are being cleaned while air is being
 90 blown through all the remaining filtering-bags of the device.

The bottom of the conveyer-box 40 is supported a sufficient distance above the diaphragm 3 to admit of the free movement over
 95 said diaphragm of the radial arm or sweep 22, and said diaphragm is provided with a suitably-located aperture 53, through which the dust gathered by the sweep 22 in its passage over the diaphragm may be returned to the lower part of the casing.

For the purpose of imparting movement to the ring 35 and its related parts mechanism is employed including a shaft 54, journaled upon
 100 brackets 55, which are suitably supported by the casing, said shaft receiving motion from
 105 the source of power by means of a belt 56, engaging a band-wheel 57 upon said shaft. It is from said shaft that motion may be conveniently transmitted to the chain-wheel 44 upon the conveyer-shaft 43. The brackets 55
 110 also support a counter-shaft 58, having a spur-wheel 59 meshing with a pinion 60 upon the shaft 54, whereby the said counter-shaft is driven. The counter-shaft 58 is provided at
 115 the ends thereof with cranks 61, extending in diametrically opposite directions, and said cranks are provided with wrist-pins 62, upon which are pivotally mounted pawls or dogs
 120 63 64, engaging the ratchet-teeth 37 of the ring 35 and upon which one of said pawls 63 exercises a pushing action, while the other pawl 64 exercises a pulling action. The distance between the teeth 37 is made of a length equal to the throw of the cranks 61.
 125 By this arrangement it will be seen that during one half of the rotation of the shaft 58 the pawls 63 64 will move idly over the teeth 37, while during the other half of the rotation of said shaft the toothed ring 35 will be moved to the extent of one tooth. The teeth 37 be- 130

ing disposed in registry with the radial bars 32, which support the series of filtering-bags, and the latter being disposed to coincide with the openings 50 in the top of the conveyer-box, it follows that at each rotation of the counter-shaft 58 a fresh row of filtering-bags is moved forward into alinement with the openings in the lid of the conveyer-box and that this forward movement is accomplished during one half of the period occupied by the rotation of the shaft, the filtering-bags and all the parts directly connected therewith being suffered to remain stationary during the other half of the period occupied by the rotation of said shaft.

Loosely mounted upon the shaft 54 and prevented from lateral movement thereon by means of a collar 65 is an arm 66, carrying at its free end a hammer-head including a socketed casting 67, in which is seated a cushion 68 of rubber or other suitable material. The arm 66 is made of such a length that when its head is permitted to descend it will strike the bar 32 which at the time is disposed above the openings 50 in the lid of the conveyer-box and which supports the filtering-bags which at the time are in registry with said openings. For the purpose of operating the hammer a cam-wheel 69 is provided, said wheel being mounted upon the counter-shaft 58 directly beneath the hammer-arm 66, which latter is provided with a beveled lug 70, adapted to be engaged by said cam-wheel. The periphery of the latter has a plurality of teeth 71 and a blank projection 72, which latter is disposed to engage the projection 70 upon the hammer-arm and retain the latter in a raised and inactive position while the ring 35, with its related parts, is being actuated by the pawls connected with the counter-shaft, while during the period that the ring 35, with its related parts, remains stationary the hammer-arm 66 will be actuated by the beveled teeth 71 of the cam-wheel, so as to cause a number of blows to be delivered in rapid succession upon the filter-bag-supporting bar 32 which at the time is in registry with the conveyer-box. The teeth 71 have been shown as occupying rather more than one-half the perimeter of the cam-wheel 69, the consequence being that the bar 32 will receive one blow slightly before the filtering-bags supported thereby pass into exact registry with the apertures 50 and another blow at the time it is beginning to move onward to carry said filtering-bags out of registry with the apertures 50. It has been found that the efficiency of the operation of the machine is thereby increased.

From the foregoing description, in connection with the drawings hereto annexed, the operation and advantages of this invention will be readily understood by those skilled in the art to which it appertains. When the machine is in operation, the dust-laden air on entering the casing whirls around in the lat-

ter, causing the heavier particles of dust to settle and to be guided in a downward direction to the outlet, where the exit thereof is facilitated by the spiral conveyer 19, while the outward passage of the air is blocked by the presence of said conveyer. The presence of the inclined slats or deflectors 9 will facilitate the settling of the heavier particles. The air, still dust-laden, but free from the heavier particles, finds an upward exit through the central aperture 20 in the diaphragm 3, the flange 21 serving as a guard to prevent the heavier particles from following the upward current. The latter seeking an outlet is forced through the filtering-bags 39, upon the inner walls of which the dust particles held in suspension by the upward current will become deposited, while the purified air escapes through the pores of the filtering fabric. A portion of the dust, however, will settle upon the upper side of the diaphragm 3 and will be returned by the action of the sweep 22, through the aperture 4, to the lower compartment of the casing. In the meantime the ratchet-ring 35 and its related parts, including the filtering-bags, is being intermittently rotated, and the bars 32, supporting the bags, which are temporarily in register with the apertures 50 in the lid of the conveyer-box, will be subjected to blows from the hammer, said bars being yieldably supported by the springs 31, so that the bags connected therewith will be thoroughly shaken and agitated, the dust being thus dislodged from the inner walls of said bags and permitted to drop into the conveyer-box below. The filtering-bags being made tapering, as shown and described, will permit the dust to gravitate through the apertures 50 without sliding in contact with the walls of said bags, and the operation of freeing the latter from the adhering dust will thus be greatly facilitated and its efficiency enhanced. The cleansing of the filtering-bags or the removal of dust from the interior of said bags will likewise be greatly assisted by the inward suction through said filtering-bags which is created by the reverse air-current set up through the pipe 52. The dust on passing into the box 40 is carried to the outlet of said box by the spiral conveyer within the latter.

Among the important features of the invention may be named the vertically-slidable lid of the conveyer-box having the packing-surface 69, which contacts with the disk 11, thus forming a perfectly tight joint between the interior of the conveyer-box and the compartment 4 of the casing, inasmuch as any leakage of air into the conveyer-box would seriously interfere with the successful operation of the device. The tightness of this joint may be maintained by slightly lowering the shaft 16 as the packing-surface 49 wears away, this being readily accomplished by proper adjustment of the nuts 18, which are

included in the construction of the step constituting the bearing for the lower end of said shaft. The integrity of the packing is likewise in a great measure preserved by the peculiar means employed for operating the ring 35 and its related parts, said means including the oppositely-disposed pawls 63 64, whereby an even strain is exercised upon the diametrically opposite sides of the disk 11, thereby avoiding any tendency to disrupt or dislodge the packing 49, which is preferably composed of felt or other similar material, which is more or less liable to injury unless special precautions are taken to insure its preservation. By this general construction the interior of the conveyer-box is perfectly separated from the main casing of the machine into which the dust-laden air is forced and from which it escapes through the filtering-bags which are not in registry with the conveyer-box. Through the bags which are in registry with the conveyer-box a suction is created by means of the pipe 52, through which is set up a reverse air-current, as hereinbefore described, which is effective to assist in removing from the pores of the filtering-bags which are being cleaned, the accumulated dust, the gravitating portion of which is disposed of by the conveyer within the box while the floating particles are returned through the pipe 52 to the fan, whereby the dust-laden air is supplied to the machine.

It will be observed that the lower ends of the filtering-bags are connected with the rotary supporting-disk in such a manner that their lower edges will be supported some distance above the under side of the disk, the lower edges of the bags being thus protected against wear resulting from sliding contact of the edges of said bags with the upper side of the lid of the conveyer-box. This connection may be effected in various ways. In the drawings the lower ends of the bags have been shown provided with rings 80, fitted in shouldered recesses 81 at the lower ends of the apertures in the disk; but I do not wish to be understood as limiting myself to this or to any particular means for connecting the lower ends of the filtering-bags with the disk. The upper ends of the filtering-bags may be connected with the supporting-bars in any suitable convenient manner, it being understood, of course, that said upper ends may be permanently closed.

This improved machine, as will be seen, is simple in construction and automatic in operation.

Having thus described the invention, what is claimed is—

1. In a dust-collector, a settling-chamber, a horizontal air-chamber disposed above and centrally communicating with the settling-chamber for the reception of partly-purified air, filtering means connected with said air-chamber; and filter-cleaning means including

a casing isolated from the air-chamber and communicating with a portion of the filters, and means for setting up suction within said casing.

2. In a dust-collector, a settling-chamber, a horizontal air-chamber disposed above and centrally communicating with the settling-chamber for the reception of partly-purified air, filtering means connected with said air-chamber; and filter-cleaning means including a casing isolated from the air-chamber and communicating with a portion of the filters, conveyer means within the casing, and means for setting up suction within the casing.

3. In a dust-collector, a settling-chamber, a horizontal air-chamber disposed above and centrally communicating with the settling-chamber for the reception of partly-purified air, filters constituting an outlet for air from the air-chamber, and filter-cleaning means including a box within which suction is maintained; said box being isolated from the air-chamber and adapted to communicate with some of the filters.

4. In a dust-collector, a tapering settling-chamber, a horizontal air-chamber disposed above and centrally communicating with the settling-chamber for the reception of partly-purified air, filters constituting an outlet for air from the air-chamber, and filter-cleaning means including a conveyer-box within which suction is maintained; said box being isolated from the air-chamber and adapted to communicate with some of the filters.

5. In a dust-collector, a settling-chamber, a horizontal air-chamber disposed above and centrally communicating with the settling-chamber for the reception of partly-purified air, filters constituting an air-outlet from the air-chamber, and filter-cleaning means including a box within which suction is maintained, and means for agitating the filters; said box being isolated from the air-chamber and adapted to communicate with the filters which are being operated upon by the agitating means.

6. In a dust-collector, a settling-chamber, a horizontal air-chamber disposed above and centrally communicating with the settling-chamber through a central aperture surrounded by a downward-extending guard-flange, a top for said air-chamber supported for rotation, filtering means connected with said top and disposed in radial series, a conveyer-box disposed radially in the air-chamber, and means for intermittently rotating the top of the air-chamber to bring the series of filtering means successively into registry with the conveyer-box.

7. In a device of the class described, a settling-chamber having means for the admittance therein of dust-laden air, a superimposed air-chamber, a top for said air-chamber consisting of a disk supported for rotation, air-filtering bags connected with said disk in radial series, and communicating with the air-

chamber through apertures in the disk a conveyer-box disposed radially in the air-chamber and having a vertically-movable spring-supported lid provided with openings adapted for registry with the successive series of filtering-bags, packing material between the box-lid and the under surface of the disk and connected with the box-lid, and means for adjusting the supporting means of the rotary disk to compensate for wear upon the packing.

8. A settling-chamber having means for the admittance therein of dust-laden air, a superimposed air-chamber, a top for said air-chamber consisting of a disk supported for rotation, filtering-bags connected with said disk in radial series, the lower ends of said bags being supported above the under side of the disk in communication with the air-chamber, a conveyer-box disposed radially in the air-chamber and having a vertically-movable lid bearing against the under side of the disk and provided with apertures adapted for registry with the lower ends of the filtering-guides, and means for intermittently rotating the disk.

9. In a device of the class described, a settling-chamber, a superimposed air-chamber communicating therewith, a top for said air-chamber consisting of a disk supported for rotation, spring-supported bars connected with and supported radially above said disk, tapering filtering-bags supported by said bars and connected at their lower wide ends with apertures in the disk, a conveyer-box within the air-chamber having openings adapted for registry with successive series of filtering-bags, means for intermittently rotating the disk to bring the series of bags successively into registry with the conveyer-box, and means for striking the spring-supported bars while supported temporarily in registry with the conveyer-box.

10. In a device of the class described, a settling-chamber, a superimposed air-chamber communicating therewith, a top for said air-chamber consisting of a disk supported for rotation, a conveyer-box within said casing having an apertured lid, suitably-supported filtering-bags connected with the rotary disk in radial series, means for intermittently rotating the disk to support the bags in registry with the openings in the lid of the conveyer-box, means for agitating the bags when thus supported, an outlet at the outer end of the conveyer-box, a pipe for the passage of a reverse air-current connected with the inner end of said box and means for establishing a reverse air-current in said pipe.

11. In a dust-collector, a disk supported for rotation upon a vertical shaft, a wheel connected rotatably with said shaft, uprights upon said disk and wheel, spring-supported radial bars mounted upon said uprights, tapering filtering-bags supported from said bars and connected at their lower wide ends with radial series of apertures in the disk, means

for supplying air to the filtering-bags, a ring having a ratchet-toothed flange connected with the uprights rising from the disk, and diametrically opposite pawls engaging said ratchet-teeth, one of said pawls being of the pull and the other of the push variety.

12. In a dust-collector, a disk supported for rotation and having radial series of apertures, a wheel supported for rotation above and concentric with said disk, uprights supported by said wheel and disk, flexibly-cushioned radial bars supported by said uprights, means for intermittently rotating the disk and related parts, air-filtering bags of tapering shape connected at their upper narrow ends with the radial bars and at their lower wide ends with the apertures of the disk, means for supplying air to the filtering-bags, and means for imparting to one of said bars, in the interim between the movements of the disk, a rapid succession of blows.

13. In a dust-collector, a settling-chamber, a superimposed air-chamber, a top for said chamber consisting of a disk supported for rotation, a bottom for said chamber consisting of a diaphragm having a centrally-disposed air-inlet, filtering devices connected in radial series with the rotary top, a conveyer-box disposed radially in the air-chamber and supported above the bottom of the latter, said bottom being provided with a dust-outlet, and a sweep connected for rotation with the supporting means of the rotary top.

14. In a dust-collector, a disk supported for rotation, radially-disposed bars connected with and supported above said disk, tapering filtering-bags supported by said bars and connected with apertures in the disk, means for intermittently rotating the disk to bring the series of bags successively into registry with a series of dust-exit apertures, a pivotally-mounted hammer supported above the bag-supporting bar which is temporarily in registry with the exit-apertures, the handle of said hammer being provided with a beveled lug, a cam supported for rotation beneath and in contact with the hammer-handle, said cam being provided at its periphery with a plurality of short beveled teeth and with a single relatively long projection, and means whereby said cam will be caused to make one rotation to each step or movement made by the filter-carrying disk; the operation being timed to cause the hammer to be supported stationary by the long projection of the cam during the greater period of the time when the disk is in motion.

15. A dust-collector including a tapering settling-chamber, a superimposed air-chamber communicating with the settling-chamber through a central aperture, a top for the air-chamber consisting of a disk supported for rotation said disk having radial series of apertures, filtering-bags supported by means connected with said disk and having connec-

tion at their lower ends with the apertures therein, and a conveyer-box disposed within the air-chamber and adapted to receive the material discharged from successive series of filtering-bags.

16. A dust-collector including a tapering settling-chamber, a superimposed air-chamber communicating with the settling-chamber through a central aperture, a top for the air-chamber consisting of a disk supported for rotation and having radial series of apertures, filtering-bags supported by means connected with said disk and having connection at their lower ends with the apertures therein, a conveyer-box disposed within the air-chamber and adapted to receive the material discharged from successive series of filtering-bags, said box being supported above the bottom of the air-chamber which is provided with an aperture between the center and the periphery thereof, and a radial sweep connected for rotation with the supporting means of the rotary disk, said sweep being in engagement with the bottom of the air-chamber.

17. In a dust-collector, a tapering settling-chamber having a tangential air-inlet, a superimposed air-chamber communicating with the settling-chamber through a central aperture, a downward-extending flange surrounding said aperture, a top for the air-chamber consisting of a disk supported for rotation, filtering means connected with said disk, a conveyer-box within the air-chamber, means for intermittently rotating the disk, means for discharging material deposited upon the filtering means into the conveyer-box, and means for returning material settling upon the bottom of the air-chamber to the settling-chamber through an aperture in the bottom of said chamber.

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

CHARLES CLARK.

Witnesses:

LIONEL ALEXANDER,
MARGARET D. McCaul.