

Sept. 25, 1934.

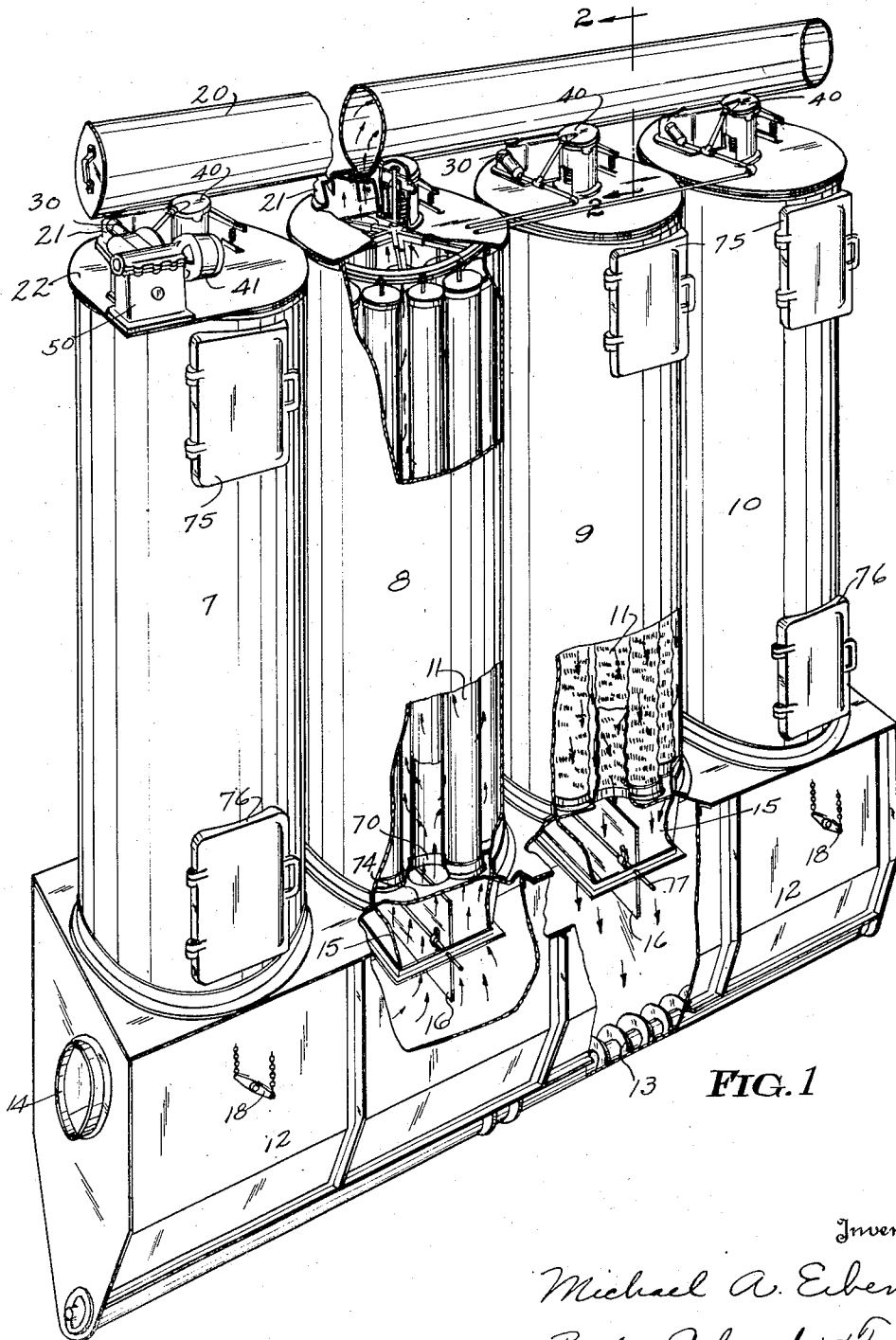
M. A. EIBEN

1,974,952

DUST COLLECTING APPARATUS

Filed Oct. 5, 1931

4 Sheets-Sheet 1



Inventor

Michael A. Eiben

By *Bates Golrick & Teare*

Attorneys

Sept. 25, 1934.

M. A. EIBEN

1,974,952

DUST COLLECTING APPARATUS

Filed Oct. 5, 1931

4 Sheets-Sheet 2

FIG. 2

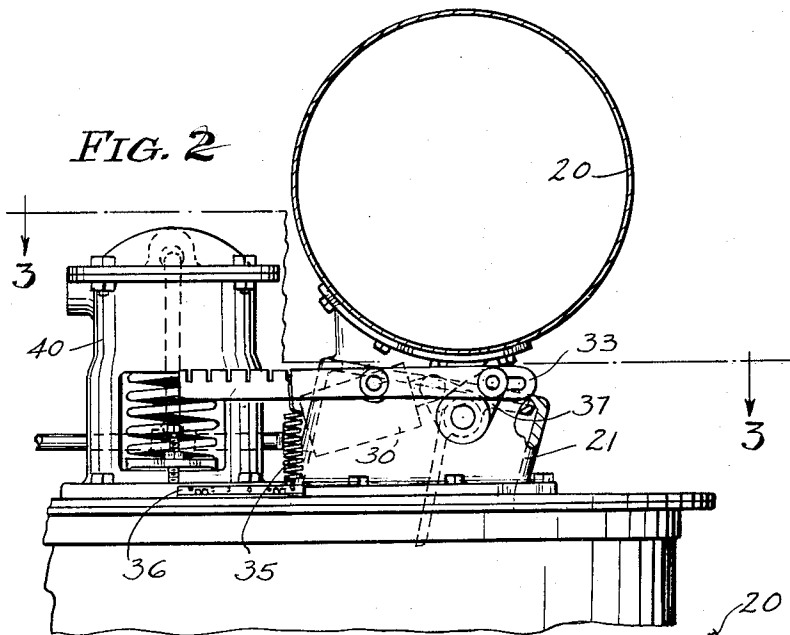


FIG. 4

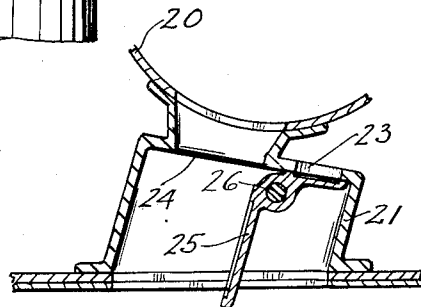


FIG. 7

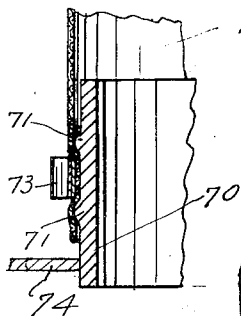


FIG. 6

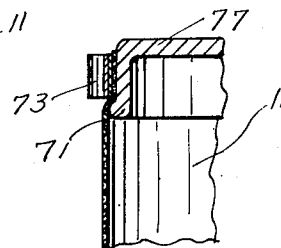
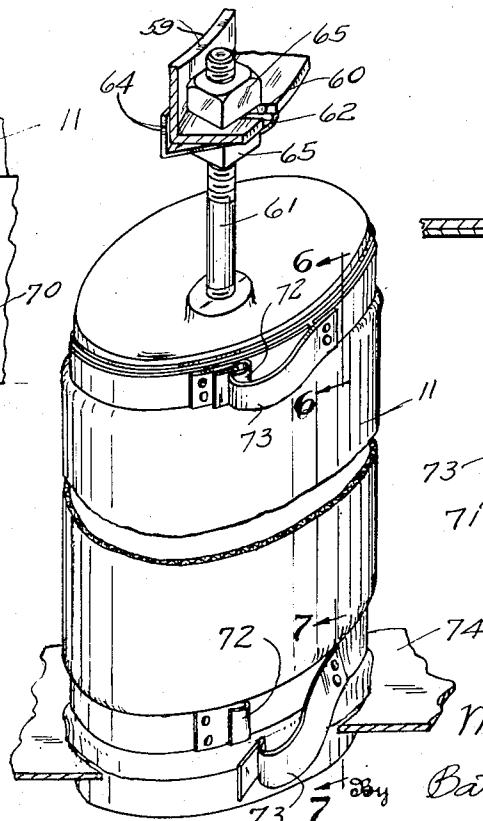


FIG. 5



Inventor

Michael A. Eiben
Bates, Golrick & Leare

Attorneys

Sept. 25, 1934.

M. A. EIBEN

1,974,952

DUST COLLECTING APPARATUS

Filed Oct. 5, 1931

4 Sheets-Sheet 3

FIG. 3

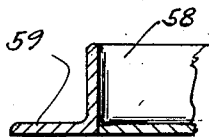
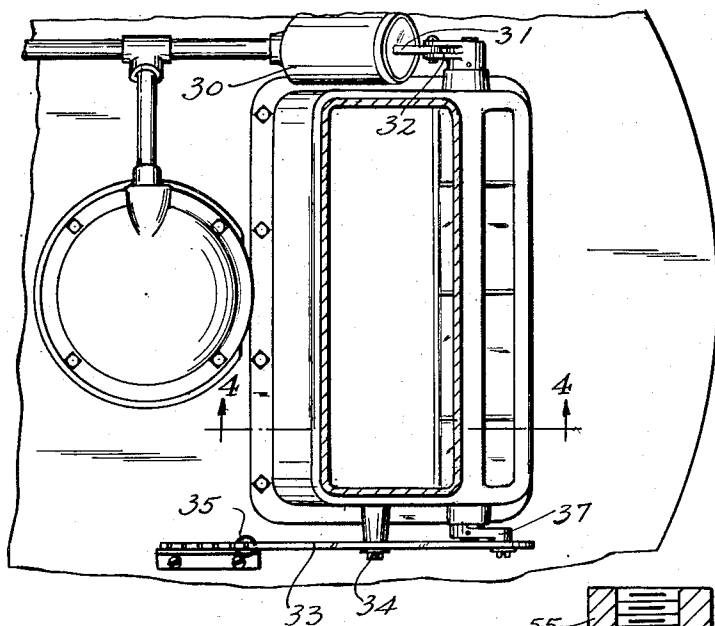


FIG. 9

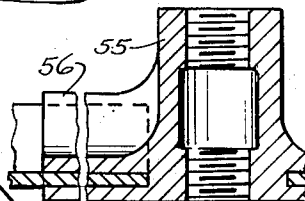


FIG. 10

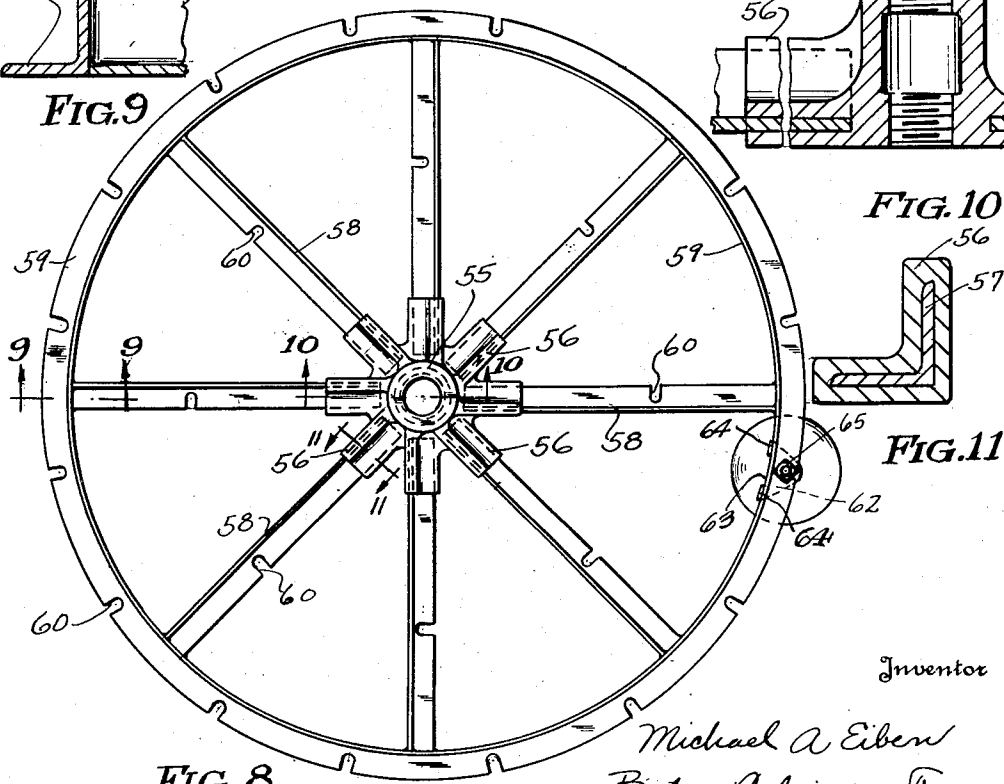


FIG. 8

FIG. 11

Inventor

Michael A Eiben
Bates, Golrick & Teare

Attorneys

Sept. 25, 1934.

M. A. EIBEN

1,974,952

DUST COLLECTING APPARATUS

Filed Oct. 5, 1931

4 Sheets-Sheet 4

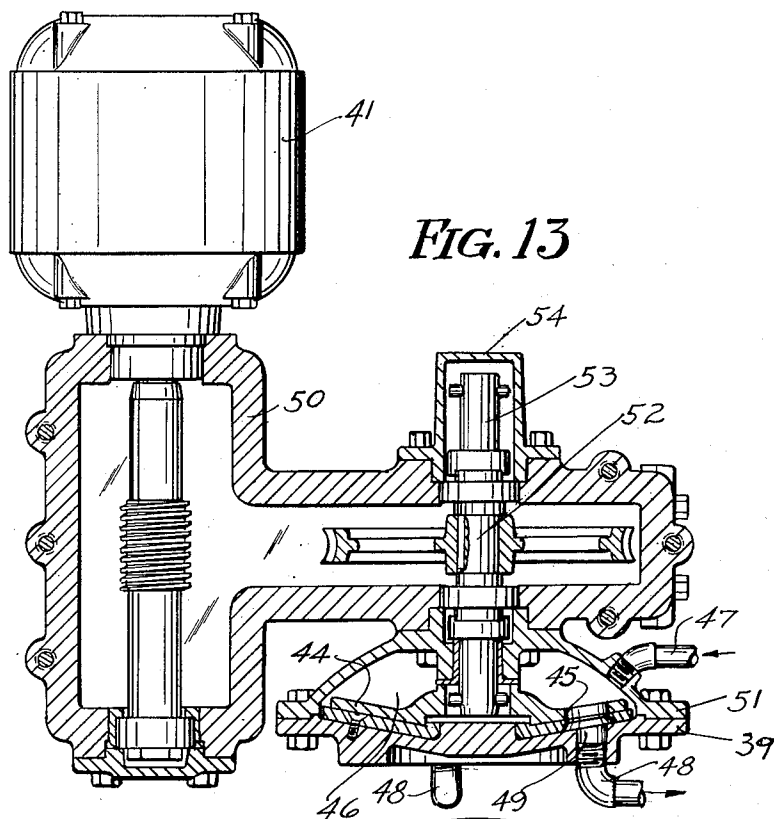


FIG. 13

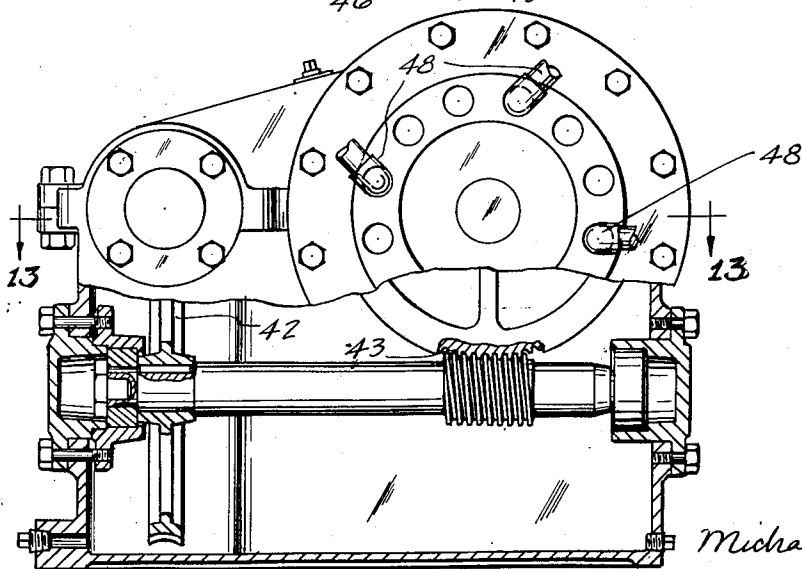


FIG. 12

Inventor

Michael A. Eiben

By Bates, Gubrick & Teare

Attorneys

UNITED STATES PATENT OFFICE

1,974,952

DUST COLLECTING APPARATUS

Michael A. Eiben, Cleveland, Ohio

Application October 5, 1931, Serial No. 566,826

4 Claims. (Cl. 183—51)

This invention relates to apparatus for removing solids from gases and is particularly applicable to that class of devices known as dust collectors. Heretofore, dust collectors were made by arranging the collecting units in groups and connecting them at the bottom to a dust pipe manifold, and at the top to a clean air pipe manifold. Separate and independent conduits then connected the units to the respective manifolds. This arrangement had certain operating disadvantages, in that the dust laden air pipes could be connected to the dust manifold only at the end thereof. Furthermore, the elbows increased the friction of the air through the pipes and cause it to enter the filter bags at a sharp angle. This made them wear out in a relatively short period of time.

Another practice in this art is to reverse the movement of air through the units periodically at the same time to shake the bags so as to clean them thoroughly and cause all of the particles held thereby, to fall at the bottom of the hopper. Accordingly, each unit had an independent hopper, from which the solid particles could be withdrawn. Furthermore, at the initiation of the reversal of air movement, it has been necessary to open a valve so as to bring the unit into communication with the atmosphere, and at the same time, close the vacuum line between the unit and the fan. It has also been the practice to utilize compressed air for operating the valve and the result has been that the valves would be slammed against their seats and frequently broken. Furthermore, each unit had an independent timing mechanism, which necessitated considerable duplication of parts, and materially increased the cost of installation. In addition, considerable difficulty arose during the shaking operation in maintaining the bags in proper spaced relationship, and yet enabling them to be readily and quickly removed for replacement purposes.

One of the objects of the present invention is to materially increase the efficiency of operation of the dust collector, to reduce the cost of installation, to minimize breakage of the parts, and to facilitate the inspection and replacement of the bags.

A preferred means for carrying out my invention is illustrated in the drawings, wherein Fig. 1 is a perspective view of a dust collector embodying my invention; Fig. 2 is a section taken on the line 2—2 of Fig. 1; Fig. 3 is a section taken on the line 3—3 of Fig. 2; Fig. 4 is a section taken on the line 4—4 of Fig. 3; Fig. 5 is a perspective view of the filter unit showing its relation to the sup-

porting devices therefor; Figs. 6 and 7 are sections taken on the correspondingly numbered lines in Fig. 5; Fig. 8 is a top plan view of one of the filter bag supports; Figs. 9, 10 and 11 are sections taken on the correspondingly numbered lines in Fig. 8; Fig. 12 is an elevation partly in section of the distributing device, and Fig. 13 is a section taken on the line 13—13 of Fig. 12.

A dust collector embodying my invention is illustrated as having four filtering compartments or units 7, 8, 9 and 10, each of which contains filter bags 11. The units are mounted upon a common hopper 12, at the base of which a conveyor 13 may be provided for removing the collected dust. The openings for the dust pipe may be provided at any part of the common hopper, although I have only illustrated one opening 14 in the end thereof.

Each unit or housing has an auxiliary hopper 15, which extends into the main hopper and terminates short of the bottom thereof. Each auxiliary hopper is provided with a damper 16, by means of which, the passageway therethrough may be selectively closed to permit replacement of the bags, without interrupting the flow of air through the remaining compartments. To this end, the shaft 17 of each damper extends outwardly beyond the main hopper, and is provided with an arm 18 by means of which the shaft may be turned.

By utilizing a main hopper with independent auxiliary hoppers, dust laden air is forced to enter the housing longitudinally and thereby, to flow axially of the bags. With the previous type of apparatus, when the unit is connected by an elbow to the dust pipe, the air is impinged at an angle against the lower part of each filter bag, thus causing it to wear out so that a replacement is required at the end of approximately three months. Under the present arrangement, the life of the bags has been extended to about one year. Furthermore, the dust pipes may be readily connected into the main hopper, regardless of the angle at which they approach the dust collector, and the blast gates which heretofore have been required in connection with the units may be eliminated.

The top of the units are shown as having a clear air pipe 20, which is in the nature of a manifold, and is connected to the respective units through a housing 21. Such housing is shaped to engage the outer part of the air pipe and to be bolted or otherwise suitably fastened onto the top plate 22 of the associated unit. Each housing also has an opening 23, which communicates

with the atmosphere, and such opening, as well as the opening 24, which leads into the air pipe is adapted to be selectively controlled by a valve 25. This valve preferably comprises an L-shaped member, one arm of which is adapted to close the opening 23, and the other arm of which is adapted to close the opening 24. The valve is mounted upon a pivot 26, and provision is made for automatically operating the valve at stated intervals whereby the reversal of air movement through the units may be accomplished.

The mechanism, which I employ, for operating the damper, preferably comprises an air operated plunger, which is mounted in the cylinder 30 and which is operatively connected by a link 31 to an arm 32, which in turn is rigidly attached to an extension of the valve pivot on one end of the housing 21. The opposite end of the pivot shaft also extends through the housing, and is connected to a mechanism, which yieldingly opposes the movement of the damper, and thereby avoids slamming thereof, whenever it is actuated by the plunger in the cylinder 30. Such mechanism includes a lever 33, which is pivoted at 34 to the housing, and is connected by a spring 35 to the top plate, preferably through the instrumentality of an angle bar 36. The opposite end of the lever is connected through a pin and slot connection to an arm 37, which in turn is rigidly mounted on the damper shaft.

In the arrangement illustrated, the tension of the spring 35 tends to hold the damper in such position that the atmospheric opening is closed, and the air pipe opening is open. At such time, air flows upwardly through the unit and outwardly through the bags. Whenever, the reversal of operation is desired, however, air is admitted into the cylinder 30, and then the valve is swung about its pivot to close the opening 24, and open the passageway 23. At such time, clear air is drawn downwardly through the unit and inwardly through the bags, as is shown in Fig. 1 in unit 9. During such reversal of air movement, the bags are shaken by an operating mechanism, which is indicated in general at 40 on the top of each unit.

To reverse the direction of air movement, I utilize a simple, compact mechanism which is mounted on the top plate of one unit, and which is adapted to operate a timing mechanism for controlling the flow of air to the valves and bag operating mechanism for the respective units. The preferred arrangement includes an electric motor 41, which operates through a two stage reduction gearing 42 and 43 respectively, to rotate a disc 44. Such disc is provided with passageways 45 and are mounted within a chamber 46, which is in communication with a source of air supply through a conduit 47 and with the work performing mechanism cylinders 30 and 40 through a conduit 48. Suitable passageways or ports 49 then serve to place the air supply conduit in communication with the work performing conduit, whenever the disc is rotated to a point where the ports are in registration with the conduit 48. The disc thereby acts as a valve, which controls the valve and bag shaking mechanism at the desired intervals.

The timing mechanism, which I employ may thus be contained in a compact, relatively small housing 50. The housing 50 is shown as having a casing 51 attached only on one side thereof, although the shaft 52 is illustrated as extending through the walls of the housing 50 and projecting laterally from both sides thereof. In the

form shown, the extension 53 is closed by a cap 54, but such cap may be removed and replaced by another casing 51, with an enclosed ported disc and associated pipe connections, so as to increase the extent to which one motor may be used for directing the flow of air to a larger number of filter units. In practice, the casing 51 is provided with a number of discharge conduits 48 corresponding to the number of filter units that are serviced by the distributing device. Accordingly, in the form illustrated, there would be four such passageways used, although the cover plate 39 may be provided with a larger number of openings. Those which are not in use are then suitably plugged.

To support the bags rigidly in the unit whereby they may be shaken without engaging each other, and at the same time to permit ready replacement of them, I provide a bag supporting member, which is suspended at the upper part of each unit by the bag shaking mechanism 40. In the arrangement illustrated, such support comprises a ring having a hub 55, which has radially extending arms 56, each of which has a slot 57 extending longitudinally thereof, and into which spokes 58 may be slid. The outer ends of the spokes are then suitably secured, as by welding, to a rim 59. The spokes and rim preferably comprise angle bars, each of which is slotted, as at 60, adjacent the axis of the suspended bag. Slots open inwardly from the horizontal flanges of the angle bars, so that a fastening bolt 61 may be quickly slid out of the retaining bar, whenever desired. To hold the bolt more securely in position, I provide a sheet metal clip 62, which has an opening 63 for receiving the bolt 61, and which has spaced flanges 64, which engage the back of the bar, and thereby prevent it from moving with reference thereto so long as the locking nuts 65 are maintained in tight position. An advantage of the removable clip is that the nuts need not be removed from the bag supporting bolts, but need only be loosened, whereupon the bolts and the retaining clips may be slid out of the slots. This facilitates the removal of the bolts over devices wherein it has been necessary to remove the nuts completely, and then slide the bolt through a circular opening in the supporting member. In the last named case, the bag is apt to drop, for there is only a comparatively small space in which the operator may work to remove the bag.

To facilitate the attachment and replacement of the bags, I provide a collar 70, which fits into the lower end of the bag, and has spaced annular ribs 71 thereon. The collar extends a short distance into the bag so that the cloth covers the ribs. I then hold the cloth on the collar by means of a single strip of spring steel, which is formed in the shape of a band, one end of which has a shoulder 72, and the other end of which has a shoulder 73. The strip is adapted to be extended around the cloth between the ribs and to be locked by forcing the shoulder 73 over the shoulder 72. This arrangement, thus enables the collars at the bottom of the unit to be fastened onto a spacing plate 74, whereby the operator may quickly remove or replace the bags through an inspection door 75. At the same time, access may be had to the top bands through an inspection door 76. The top collar 77 shows part of a cap, and is held by a band in the same manner as the lower collar.

The improvements, which I have illustrated and described, possess valuable operating advan-

tages in connection with the operation of a dust collector. Furthermore, they materially increase the life of the bags and facilitate the replacement thereof. In addition, they minimize the friction losses of air through the unit, and accomplish the manipulation of the mechanism for reversing the air flow, in a simple and expeditious manner.

I claim:—

1. A dust collector, a filter bag, a support therefor, said support having a horizontally extending portion, said portion having a slot extending inwardly from a marginal edge thereof, a removable apertured clip adapted to engage said support, the aperture in the clip being adapted to register with the slot, and means extending through the aperture and slot for locking the clip to the support, and for suspending the bag therefrom.

2. In a dust collector, a plurality of filter bags, a supporting member having slots disposed therein, removable clips having openings in registration with the slots, and having shoulders for engaging the member, and means attached to the bags and extending through the openings and slots for locking all of said parts together.

3. In a dust collector, the combination with a filter casing, of a plurality of vertically extending filter bags therein, means supported by the top of the casing for suspending the bags in vertical spaced relationship, said means comprising a member having interconnected bars, said bars having a horizontally disposed portion provided with slots that extend inwardly from the marginal edges thereof, clips having openings in registration with the slots, and having spaced shoulders thereon engaging the bars, bolts extending through the openings and slots, and means connecting the bolts to the bags.

4. In a dust collector, a filter bag, a support therefor, means for connecting the bag to the support, said means comprising a slotted bar and an apertured clip, interlocking shoulders on the clip and bar, and means extending through the slot and aperture of the clip for locking the clip and the bag against movement with reference to the bar.

MICHAEL A. EIBEN.

30	105
35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150