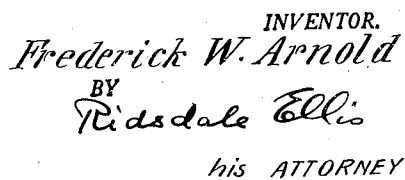


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2 Sheets-Sheet 1

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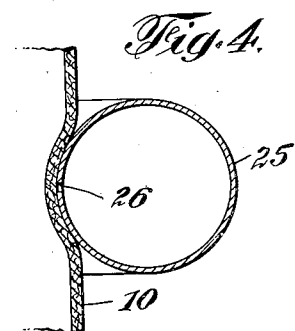
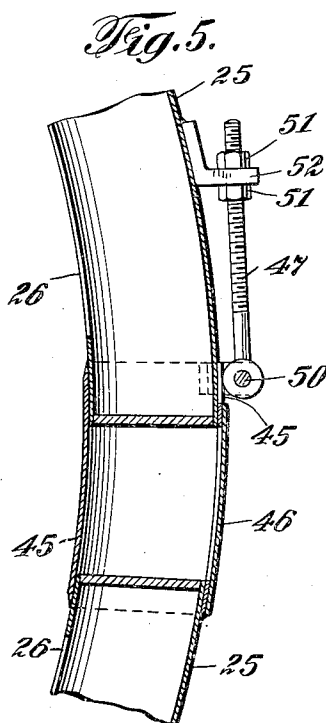
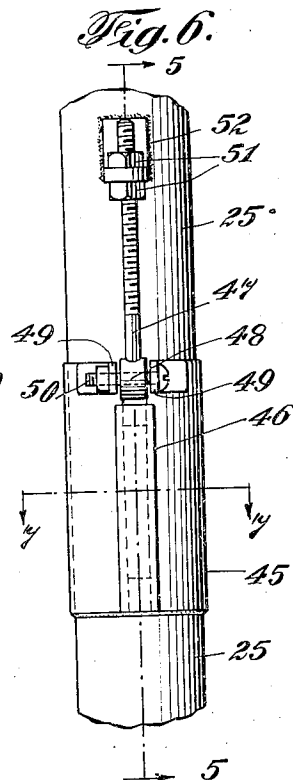
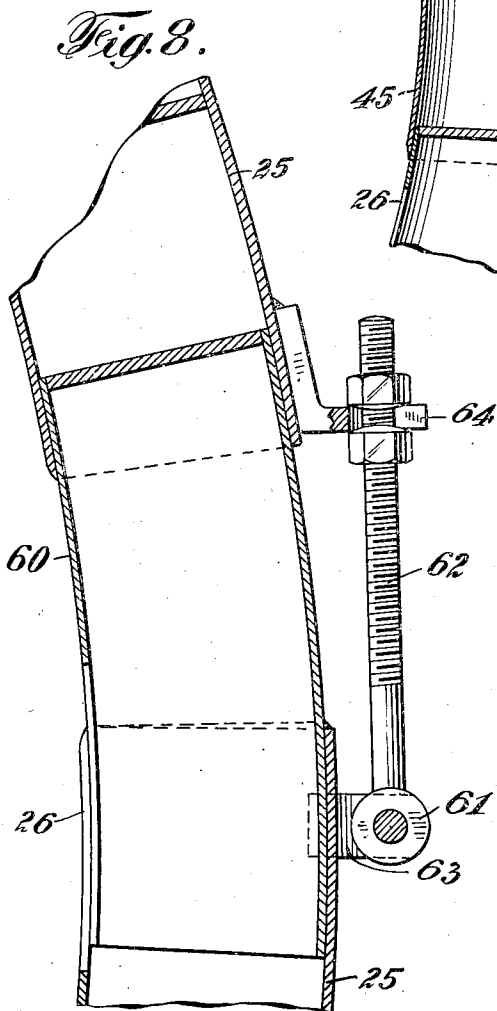
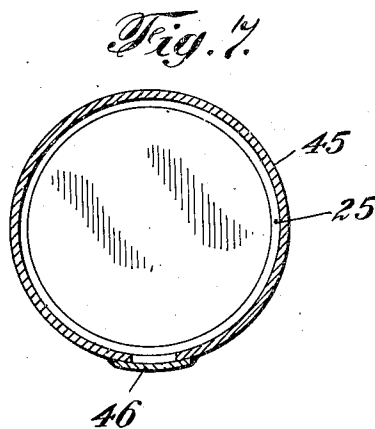
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2,476,942

CONTINUOUS BLOW RING FOR FILTERS

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2 Sheets-Sheet 2



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CONTINUOUS BLOW RING FOR FILTERS

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3 Claims. (Cl. 183—61)

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This invention relates to self-cleaning dust filters of the type in which the filter itself is a vertical tube or cylindrical bag of closely woven fabric, such as felt. The dust-laden gas, usually air, is introduced into the interior of the filter tube adjacent its upper end and the dust-free air escapes outwardly through the interstices of the felt, leaving a layer of dust on the inner surface of the tube. This layer, together with any dust which is caught in the interstices of the felt, is removed by blowing relatively high pressure air from a ring surrounding the tube through the felt from the outside. This ring has a slot around its inner periphery for the discharge of such high pressure air. To insure that the air issuing from the slot passes through the felt, the inner diameter of the cleaning air or blow ring is made less than the outer diameter of the tube when distended. The ring is reciprocated slowly up and down the filter bag so as to clean successively the whole bag. The air passing from the blow ring through the felt into the interior of the filter tube eventually escapes outwardly through the portions of the felt not in contact with the ring.

It has been found that it is highly important to get the right proportion between the diameter of the tube and that of the ring. If the diameters are too nearly the same, there is leakage of air between the outside of the filter tube and the ring. If the diameter of the tube is too large with respect to that of the ring, the tube is wrinkled and fluted around its entire periphery in the neighborhood of the ring, permitting the escape of cleaning air at the fluted portions. Also wear on the tube is increased unnecessarily.

The felt filter tubes vary in diameter considerably. This is partly the result of the practical difficulty of sewing together a sheet of felt into cylindrical form to give a tube of exactly the desired diameter. Then again, the felt bag stretches or contracts with variations in humidity. Wear also changes the dimensions of the bag. For these reasons the ring has been made discontinuous with its ends separated so that, by increasing or decreasing such separation, the inner diameter of the ring could be increased or decreased proportionately.

The separation of the ends of the blow ring leaves a gap permitting a convex vertical flute to form in the felt as the latter is pushed outwardly by the internal air pressure into such gap. This is apt to produce excessive wear along the vertical section of the filter bag registering with such gap. This is particularly the case when the filter is assembled so that its longitudinal seam registers with the gap.

The object of the present invention is to provide a blow ring whose internal diameter can be varied without presenting a gap into which the filter tube can be pushed outwardly.

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According to the present invention, therefore, the ring is discontinuous with one end in sliding telescopic engagement with the other. This sliding telescopic engagement is conveniently brought about by integrally securing to one end of the blow ring an extension of cylindrical form having an inner transverse radius of curvature equal to the outer transverse radius of curvature of the tube forming the blow ring, or vice versa.

It is difficult to provide an air-tight telescopic connection when the two parts are curved longitudinally, especially when, as in this case, externally arranged packing glands are impracticable as external projections of any kind must be avoided. For this and other reasons, it is desirable to place closures transversely across the bore of the ring near each end thereof, so that a closed chamber is produced extending nearly but not quite completely around the felt tube.

It will be evident that where such closures are used, it is not essential that either one or both of the overlapping end portion or portions extend all around the ring in a transverse plane. To prevent a gap between the ends of the blow ring into which the filter tube can be pushed outwardly, it is sufficient if such overlapping portion or portions bridge the gap only on that side of the blow ring next the felt. Hence, where the term telescopic engagement or connection is used to define the scope of this invention, it should be understood that it is to be interpreted broadly enough to include a construction in which the overlapping sliding portions bridge the gap between the ends of the blow ring only on that side of the blow ring next the felt.

Two suitable forms of construction are shown, by way of example, in the accompanying drawings, wherein:

Fig. 1 is a side elevation of a filter embodying the present invention;

Fig. 2 is a plan view of the blow ring;

Fig. 3 is a front elevation of the blow ring;

Fig. 4 is a section on the line 4—4 of Fig. 1;

Fig. 5 is a section on the line 5—5 of Fig. 6;

Fig. 6 is a front view of the blow ring adjusting mechanisms;

Fig. 7 is a section on the line 7—7 of Fig. 6; and

Fig. 8 is a sectional view similar to Fig. 5 of a modified form of construction.

The filter comprises a tube 10 of suitable filtering material, preferably felt, attached at its upper end to a downwardly extending flange on a circular closure 11. This closure is hung from a platform 12 by bolts 13. This platform, in turn, is suspended from the floor above by bolts 14.

The lower end of the tube 10 is secured to the top of a hopper 17, terminating in a discharge spout 18. The bag is held taut in a vertical direc-

tion by providing springs 19 between the heads of bolts 13 and the platform 12.

Dust-laden air is introduced into the interior of the filter tube by a blower 20 having an intake pipe 21 and a discharge pipe 22. The latter, by means of elbow 23 and vertical extension 24, carries the dust-laden air into the upper part of the filter tube, so that the incoming air with a low dust concentration is not mixed with the air in the lower part of the tube having a very high dust concentration. The air so introduced escapes outwardly through the pores of the filter leaving the dust behind on the inner surface of the filter and to some extent in the interstices in the superficial portions of the filter material. Unless such dust was periodically removed, the flow of air would get less and less and the pressure required to force it through the filter would progressively increase.

Removal of dust is accomplished by reversal of air flow. For this purpose a cleaning air or blow ring 25 is provided having an internal diameter slightly less than the external diameter of the filter tube when distended by the pressure of the dust-laden air. Along its inner periphery, this ring has a series of slots 26 for the discharge of the relatively high pressure cleaning air. This air is supplied through a flexible hose 27 from an air-pump 28 driven by motor 29.

The blow ring is reciprocated up and down the filter tube by means of two chains 32 arranged on diametrically opposite sides of the filter tube. These chains pass over pairs of sprocket wheels 33 and 34. The sprockets 33 are driven continuously in unison through a worm reduction gear by motor 29.

The blow tube is connected to each chain 32 by two chain lengths 36 and 37, each connected at one end to a pin 38 on the blow ring and at their other ends to pins 39 and 40 projecting laterally from the sprocket chain. These chain lengths 36 and 37 are longer than the diameter of the sprocket wheels 33 so that, at the end of the upward movement of the blow ring, when the pins 39 and 40 pass over the tops of the sprocket wheels 33, the pins 38 are below the bottoms of such sprockets.

At the end of its downward movement, the blow ring rests on the top of the hopper 17 before the pins 38 strike the sprockets 34.

One of the most important features of the invention is the operative relationship between the blow ring and the filter bag. As shown in Fig. 1, it will be noted that as the internal diameter of the ring is less than the external diameter of the filter tube when distended, the ring produces a concavo-convex portion in the felt as shown in detail in Fig. 4.

This has two important effects. First, it prevents the high pressure cleaning air escaping laterally without going through the felt and performing its cleaning function. Another important effect is that the bending of the felt into concavo-convex form tends to open up the interstices on the inner wall of the filter as well as crack off the layer of dust deposited on the inner surface of the felt. This bending and opening of the pores in the felt greatly aids the cleaning of the filter.

If the ring is too small in diameter, it produces longitudinal creasing or fluting of the filter tube all around its periphery. This interferes with proper contact between the ring and the filter tube as well as increasing wear unnecessarily. If the ring is too large, much of the cleaning air

will escape laterally and bending of the felt will be too slight to give really good results.

To enable the circumference of the blow ring to be adjusted to suit the dimensions of the particular filter tube with which it cooperates, the blow ring is made discontinuous. If a gap is left between the two adjacent ends of the ring, the felt will be pushed outwardly into such gap, causing fluting or wrinkling with consequent heavy wear along the tube opposite and adjacent to this gap.

To avoid this difficulty and, at the same time, permit the circumference of the blow ring to be adjusted, the ring is designed so that one end is in sliding telescopic engagement with the other.

Two forms of telescopic connection are illustrated in the drawings. The first, that shown in Figs. 5, 6 and 7, comprises a sleeve 45 having an internal diameter equal to or slightly greater than the external diameter of the blow ring. As shown, this sleeve is formed from a length of the same tube which is used for making the blow ring. This length is slit longitudinally and then spread circumferentially and a strip 46 soldered or welded over the gap so formed. The lower end of the sleeve, as shown in Figs. 5 and 6, is soldered or welded onto one end of the blow ring. The upper end of the sleeve slides over the other end of the blow ring.

Adjustment is secured by a bolt 47 having an eye 48 at one end located between a pair of lugs 49 soldered to the end of the sleeve 45 and pivotally secured to such lugs by a bolt 50. The other end of the bolt 47 which is threaded for the nuts 51 is passed through a lug 52 soldered to the blow ring.

In the modification shown in Fig. 8, the bridging sleeve 60 is designed to fit inside of the ends of the blow ring. The sleeve may be formed from a length of the same tube which is used in making the blow ring. Such length is slit longitudinally and enough metal removed so that, when the edges are brought together and soldered, its diameter has been reduced sufficiently to permit it to enter the ends of the blow ring.

The eye 61 of the adjusting bolt 62 is pivotally secured to lugs 63 soldered onto the lower end of the blow ring. The threaded end of the bolt passes through a lug 64 soldered onto the upper end of the blow ring.

I claim:

1. A self-cleaning dust filter of the type having a circular cleaning-air ring adapted to be reciprocated up and down the outside of a vertical filter tube, the inner diameter of the ring being less than the outer diameter of the tube when distended, in which the ring is discontinuous with one end in sliding telescopic engagement with the other, and means for varying the degree of overlap of such ends to change the inner circumference of the ring.

2. A self-cleaning dust filter of the type having a circular cleaning-air ring adapted to be reciprocated up and down the outside of a vertical filter tube, the inner diameter of the ring being less than the outer diameter of the tube when distended, in which the ring is discontinuous and provided adjacent its ends with transverse partitions separated circumferentially to form a closed annular chamber nearly surrounding the filter tube and also provided with a part projecting beyond the partition in one end toward and overlapping a portion of the other of said ends to bridge the gap between such ends on the side facing the filter tube, and means for varying the de-

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gree of overlap to change the inner circumference of the ring.

3. A self-cleaning dust filter of the type having a circular cleaning-air ring adapted to be reciprocated up and down the outside of a vertical filter tube, the inner diameter of the ring being less than the outer diameter of the tube when distended, in which the ring is discontinuous and formed of two parts, a long one extending almost wholly around the filter tube and a short one extending only a short distance around the filter tube and having a radius of curvature equal to the radius of curvature of the surface of the long part with which it is in engagement, such short part being secured at one end to one end of the long part and having its other end in slidable telescopic relation to the other end of the long

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part to bridge the gap between the two ends of the long part, and means for varying the degree of overlap of such ends to change the inner circumference of the ring.

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