Jan. 12, 1943. R. RUEMELIN, JR., ET AL. 2,308,310

FILTER BAG ATTACHING MEANS FOR DUST ARRESTING APPARATUS

Filed May 7, 1942

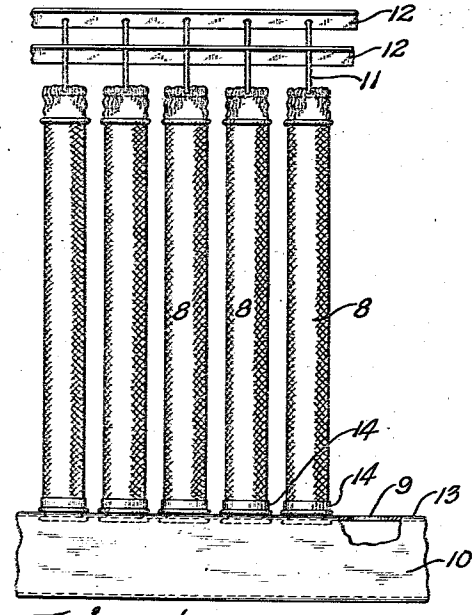


Fig. 1.

Fig. 3.

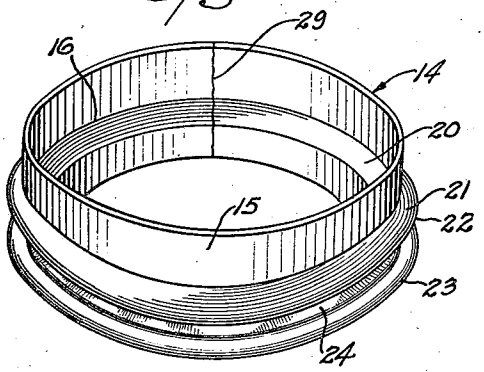
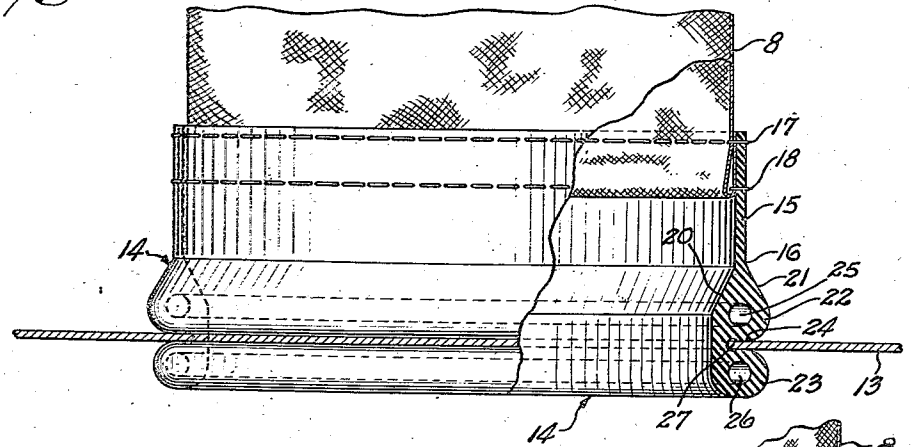


Fig. 2.



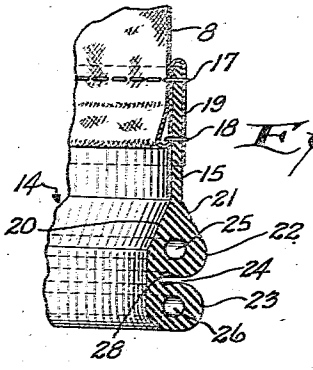


Fig. 4.

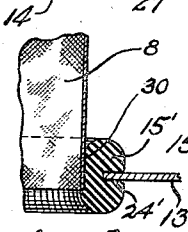


Fig. 5.

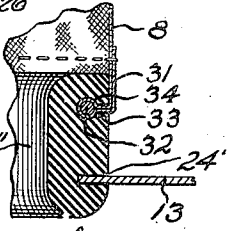


Fig. 6.

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Patented Jan. 12, 1943 2,308,310

UNITED STATES PATENT OFFICE

2,308,310

FILTER BAG ATTACHING MEANS FOR DUST ARRESTING APPARATUS

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Application May 7, 1942, Serial No. 442,108

8 Claims. (Cl. 285—25)

This invention relates to improvements in filter bag attaching means for dust arresting apparatus.

Dust arresting devices as commonly constructed include a collecting box into which the dust-laden air is blown, and a plurality of filter bags having their lower ends communicating with openings in the top wall of said box. During use, the heavy particles of matter in the air readily settle in the collector box, and the finer particles of dust pass up into the filter bags and are deposited on the inner side of the cloth. This dust within the bags is periodically shaken down into the collector box, usually by a mechanical shaking device.

It has, heretofore, been common practice to clamp the lower ends of the filter bags around collars which surround the top openings in the collector box and which project upwardly therefrom, and these collars, being numerous and close together, render the task of cleaning the top side of the collector box very difficult. The spaces between collars are narrow and relatively inaccessible, and the dust can not be swept into the collector box openings because the collars interfere. This clamping method also renders the task of removing the bags relatively difficult. In addition, the formation of the top wall of the collector box with collars materially increases the expense of manufacture.

It is, therefore, one of the objects of the present invention to provide in a dust arresting apparatus, improved means for readily removably connecting the lower ends of the filter bags to the openings in the top wall of the collector box, said means eliminating the necessity of having upwardly projecting collars on the collector box, eliminating the necessity of clamps, reducing manufacturing costs, and rendering the openings flush with the top wall of the collector box whereby dust on said wall may be quickly swept into the openings when the lower ends of the bags are disconnected.

A further object of the invention is to provide filter bag attaching means wherein the cloth of the filter bags is maintained out of contact with the marginal edges of the openings of the collector box so that the possibility of frictional wear on the lower ends of the bags is eliminated. In prior attempts to improve upon the methods of attaching filter bags, a resilient metal band has been sewed within a loop formed on the lower end of a filter bag. This, however, caused the cloth of the filter bag to be pulled against the marginal edge of the opening and whenever the filter bag was agitated there would be friction of the metal against the cloth. Wear would eventually result with consequent leakage and escape of dust.

A further object of the invention is to provide for use in apparatus having a horizontal wall formed with openings therein, preformed tubular members of rubber or the like connected to the lower ends of the filter bags, each member having at least one external bead formed of the same material as the member itself and engageable with the material forming the marginal edge of the opening to removably connect the lower end of the filter bag in registration with the opening while providing for a tight seal, or each member having an external annular groove for reception of said marginal edge.

A more specific object of the invention is to provide a construction as above described wherein the external annular groove of the preformed tubular member is preferably formed between spaced external beads, said beads being engageable above and below the material forming the marginal edge of an opening and preventing vertical movement of the filter bag in both directions while at the same time forming an effective seal.

A further object of the invention is to provide an attachment member for connection with the lower end of a filter bag wherein the member is formed of rubber which is sufficiently stiff to normally maintain itself in circular form but which may nevertheless be deformed to permit disengagement of the integral beads or annular groove on the member from the edge of an opening in the collector box.

With the above and other objects in view, the invention consists of the improved filter bag attachment means, and all its parts and combinations as set forth in the claims, and all equivalents thereof.

In the accompanying drawing illustrating preferred embodiments of the invention, in which the same reference numerals designate the same parts in all of the views,

Fig. 1 is a side view of a portion of a dust arrester showing a series of filter bags extending upwardly from a dust collector box;

Fig. 2 is a fragmentary view on an enlarged scale showing the lower end of a filter bag connected to a collector box opening, part of the lower end of the filter bag and attaching means being broken away and shown in section;

Fig. 3 is a perspective view of one of the improved attaching members alone;

Fig. 4 is a fragmentary vertical sectional view

showing the attaching member and a portion of a filter bag and illustrating a modification; and

Figs. 5 and 6 and views similar to Fig. 4 illustrating additional modifications.

Referring more particularly to the drawing, the numeral 8 designates tubular filter bags formed of suitable textile material, specially woven for use in dust arresters. A multiplicity of such bags are usually employed and arranged in rows extending in two directions. The lower ends of the filter bags are connected in registration with openings 9 formed in the top wall of a collector box 10. The upper ends of the bags are connected by hooks 11 with horizontal frame members 12. During operation of the dust arrester reciprocating motion is applied to the frames 12, by use of any suitable mechanism, to shake the upper ends of the filter bags. This causes fine particles of dust which have been deposited on the inner walls of the filter bags to fall back into the collector box 10, it being understood that in this type of device the dust-laden air is blown into the collector box with the heavier particles being immediately deposited in said box and with the lighter particles being carried up into the filter bags and being deposited on the inner walls thereof while the air passes through the material of the bags.

Heretofore it has been common practice to form the upper wall 13 of the collector box with upstanding collars surrounding the openings 9 and to clamp the lower ends of the filter bags around said collars. After a substantial period of use a relatively large amount of dust is deposited on the top wall 13 of the filter box exteriorly of the filter bag. Where collars were employed this dust would lodge in the narrow spaces between the collars. It was therefore necessary to periodically disconnect the lower ends of the bags and remove the dust deposited on top of the wall 13. Naturally this dust could not be swept into the openings 9 because the collars heretofore used interfered. It has heretofore been suggested to secure a resilient metal band within a loop formed at the lower end of the filter bag and to have this band expand beneath the marginal edge of an opening such as the opening 9. This type of arrangement did not prevent downward shifting movement of the filter bag and, furthermore, there was wear on the cloth adjacent the edge of the opening, which eventually resulted in leakage.

With the present invention no collars are employed, and when it is necessary to clean the top wall 13 of the collector box the lower ends of the filter bags are disconnected and the dust is swept directly into the openings 9, which, being merely holes stamped into the metal 13, are flush with the top surface of the wall 13. Also, with the present invention an entirely new method for connecting the bags is utilized in such a manner that the cloth of the filter bag does not come in contact with the marginal edge of the opening. Thus no wear on the filter bag at this point can occur.

With the present invention there is utilized a tubular attachment member 14 which is formed of rubber or like material. The rubber has sufficient stiffness to normally maintain itself in the circular form, but is nevertheless sufficiently flexible to permit deformation for the purpose of disconnecting the member from one of the openings 9.

The tubular attachment member 14 has its upper portion 15 in the form of a collar of uniform thickness from the top to the point 16. This collar is connected by stitching 17 and 18 with the lower end of the filter bag. In the form of connection shown in Fig. 2 the lower end of the bag is doubled back to provide double thickness where the stitching occurs. In the arrangement of Fig. 4 the material at the lower end of the bag is not only doubled back but also downwardly on the outside of the collar portion 15, as at 19. Various other methods of connecting the lower end of the bag to the collar portion 15 may be employed.

From the point 16 down, the material of the attachment member 14 is of increased thickness, and there is an internal taper 20 extending from the part of maximum thickness to the collar part 15. On the outside the material angles outwardly as at 21 to merge with a top bead 22. Spaced below the top bead 22 is a bottom bead 23, there being a groove 24 therebetween. The beads 22 and 23 are preferably hollowed out, as at 25 and 26. While the use of beads is preferred, the groove 24 may be formed in a thickened lower portion without definite bead formations.

In use, the attachment member 14 is manually deformed to permit insertion of the lower bead 23 through the opening 9. The beads are then permitted to expand, with the result that the marginal edge 27 of the opening is received within the groove 24. The diameter at the inner portion of the groove 24, as at 28, is slightly greater than the diameter of the hole 9, so that when the attachment member 14 springs back to normal condition the inner portion 28 of the groove will press tightly against the metal edge 27. In addition the spacing at 24 (Fig. 4) is normally slightly less than the thickness of the metal 13 so that when the member is in the operative position of Fig. 2 the beads tend to press tightly against the upper and lower surfaces of the wall 13. Thus there is a three-point seal.

The attachment member 14 is preferably preformed with the groove 23 and with the beads thereon. It is preferably made by an extruding process wherein the cross-sectional contour is formed in an elongated strip. The strip is then cut off in desired lengths and the ends of each length are vulcanized together, as at 29, to form rings of the desired diameter. It is also possible to mold the members of Fig. 3 in final shape and size without the seams 29.

While in the preferred form of the invention it is preferred to have a lower bead 23 and an upper bead 22, it is obvious that the upper bead or both beads may be omitted as far as the broader aspects of the invention are concerned. The broad aspect of the invention comprises formation of attachment members with an annular groove 24 or slit or with one or more preformed beads from material such as rubber which can be readily deformed but which nevertheless maintains itself in the assembled position in such a way as to provide an effective seal.

The attachment of these members to the lower ends of the bags is a simple operation which can be carried out on a sewing machine, and the thread 17 and 18 passing through the relatively tough rubber at 15 provides for a strong connection. Furthermore by having the upstanding collar 15, the material of the filter bags 8 does not come in contact with the marginal edge 27 of the opening 9. Thus there is no wear on the filter bag cloth. All wear will be within the groove 24 formed of rubber, and this rubber is capable of withstanding the minor amount of

frictional wear to which it is subjected for an indefinite period.

In the modifications of Figs. 5 and 6 the rings may be formed with projecting rubber collar portions 15' and 15'' respectively which are of the same thickness as the portion therebelow and there are external annular slits or grooves 24' and 24'' respectively corresponding in function to the grooves 24 of the form of Fig. 2. In the form of Fig. 5 the lower edge of the fabric is vulcanized to an annular portion of the rubber ring on either the inside as at 30, or on the outside. In the form of invention of Fig. 6 the lower end of the filter bag 8 is formed with a loop 31. A cord or other reinforcement 32 within the loop provides a circular enlargement which may be pressed into a yielding external annular groove 33 in the rubber collar and into a communicating circular enlargement 34 of the groove. Thus the lower end of the filter bag may be detachably connected to the collar.

Various other changes and modifications may be made without departing from the spirit of the invention, and all of such changes are contemplated as may come within the scope of the claims.

What we claim is:

1. Attachment means for connecting an end of a tubular filter bag to a receptacle having an opening comprising, a tubular member formed of rubber, there being an external preformed groove in said member for reception of the marginal edge of said opening to form a yielding seal between said member and said marginal edge when said member is in normal condition, said member being disengageable from said marginal edge by manual compression of the rubber, and said member having a tubular portion of rubber projecting above the opening for connection with the lower end of the filter bag.

2. Attachment means for connecting an end of a tubular filter bag to a receptacle having an opening comprising, a tubular member formed of rubber, an external annular bead formed integral with said member having a periphery of greater normal diameter than the diameter of the opening for engagement below the marginal edge of said opening to form a yielding seal between said member and said marginal edge when said member is in normal condition, said member being disengageable from said marginal edge by manual deformation of the member and bead, and said member having a tubular rubber portion projecting above the opening for connection with the lower end of the filter bag.

3. Attachment means for connecting an end of a tubular filter bag to a receptacle having an opening comprising, a tubular member formed of yieldingly deformable material and having two preformed external annular beads formed integral with said member, one above the other in longitudinally spaced relation, said beads having an external periphery which is normally of greater diameter than the diameter of the opening in the receptacle, and said beads and member being deformable to permit insertion of the lower bead through said opening, and said tubular member having a tubular portion for connection with the lower end of the filter bag, whereby the lower end of said bag may be removably connected to the receptacle in registration with the opening, with one bead below and one bead above the material forming the marginal edge of said opening to positively prevent movement of the secured end of the bag in either longitudinal direction while so attached.

4. As a new article of manufacture, an attachment member for connecting an end of a tubular filter bag to a receptacle having an opening comprising, a rubber ring having integral attaching means for yielding engagement with the marginal edge of the opening and having an integral upstanding portion for connection with the lower end of the filter bag.

5. As a new article of manufacture, an attachment member for connecting an end of a tubular filter bag to a receptacle having an opening comprising, a rubber ring having an external annular groove for the reception of the marginal edge of the opening and having an integral upstanding portion for connection with the lower end of the filter bag.

6. As a new article of manufacture, an attachment member for connecting an end of a tubular filter bag to a receptacle having an opening comprising, a ring of yieldingly deformable material having an external annular groove for the reception of the marginal edge of the opening and having an annular portion for connection with the lower end of the filter bag.

7. As a new article of manufacture, an attachment member for connecting a reinforced end of a tubular filter bag to a receptacle having an opening comprising, a rubber ring having integral attaching means for yielding engagement with the marginal edge of the opening and having an upstanding portion formed with an annular groove having yielding walls for detachably receiving the reinforced lower end of the bag.

8. Attachment means for connecting an end of a tubular filter bag to a receptacle having an opening comprising, a tubular member formed of yieldingly deformable material, there being an external preformed groove in said member for reception of the marginal edge of said opening to form a yielding seal between said member and said marginal edge when said member is in normal condition, said member being disengageable from said marginal edge by manual compression of the tubular member, and said member having a tubular portion for connection with the lower end of the filter bag.

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