

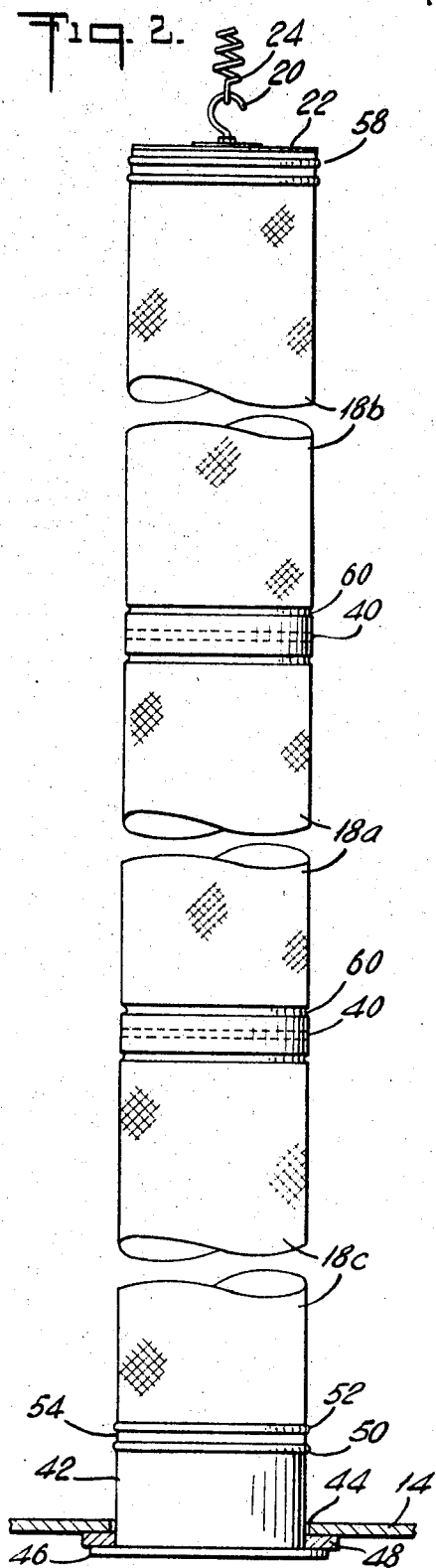
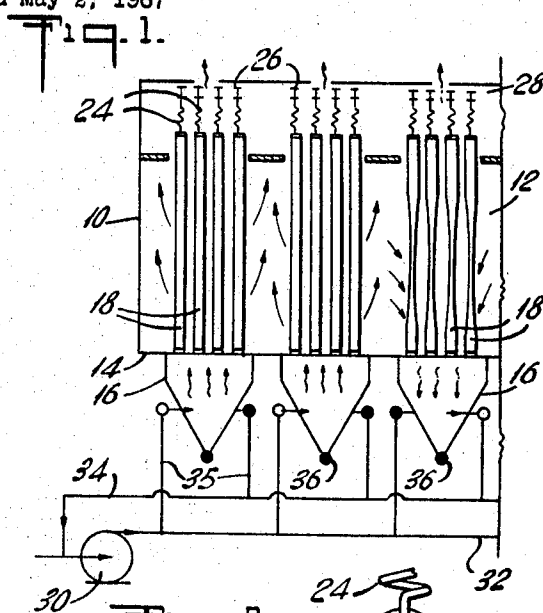
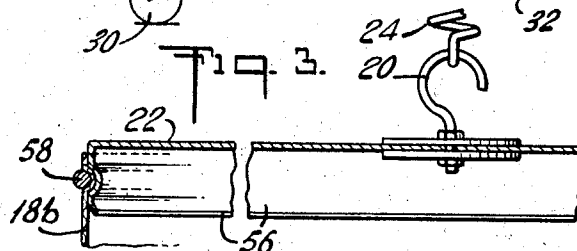
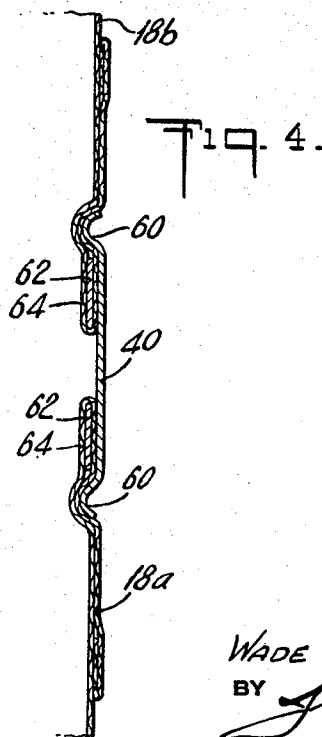
June 24, 1969

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3,451,197

BAGHOUSE APPARATUS

Filed May 2, 1967



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BAGHOUSE APPARATUS

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Filed May 2, 1967, Ser. No. 635,608

Int. Cl. B01d 29/24

U.S. Cl. 55—341

2 Claims

ABSTRACT OF THE DISCLOSURE

A baghouse for cleaning dust-laden gases in which vertically elongated tubular filter bags are each formed by a number of releasably connected vertically aligned sections which are individually replaceable when damaged from within the bag or filter chamber. The bag section connecting means also serve to oppose the collapse of the bags when the gas flow through the bags is reversed for cleaning purposes.

This invention relates to the construction and support of vertically elongated tubular filter bags formed of a gas-pervious dust-arresting flexible heat resistant fabric, such as silicone-treated fiber glass, adapted to be arranged in spaced relation in the filter chamber of a baghouse for filtering dust particles from a dust-laden gas flowing into one end of the bags from an adjacent dirty gas inlet chamber and outwardly through the peripheral walls of the bags, on the inner surface of which the separated dust accumulates in a cake.

In accordance with known practice and as disclosed in my joint application with Robert H. Walpole, Ser. No. 251,185, filed Jan. 14, 1963, now U.S. Patent No. 3,333,403, the bags are periodically cleaned in groups by a flow-back of clean gas or air through the bags to break up and remove the accumulated dust cake from the inner surface of the bags, from which the dust drops through the lower end of the bags into a subjacent dust collecting hopper. With the reversed gas flow the major portion of each bag tends to collapse into an X-shaped cross-section which would choke off the reverse gas flow to such an extent that the dust cannot fall freely during the cleaning cycle and may be re-entrained. To prevent such collapse of the bags, and yet permit sufficient flexing of the bags to break up the dust cake on the inside surface, each bag is provided with a series of vertically spaced internal metallic rings carried by an axial cable or rod and arranged to hold the bag in an uncollapsed position during the reverse gas flow cleaning cycle.

The use of anticollapse bag-holding rings has been recognized as resulting in substantially lower pressure drop through the bags, longer bag life, and more effective cleaning. In an effort to eliminate the labor required to separately install such bag-holding ring assemblies, metal rings have been sewn into the bags at vertically spaced locations. This is feasible with small diameter bags, for example, 6" O.D., but considered impracticable in the large diameter and long bags normally used. Such bags are usually on the order of thirty feet in length and twelve to eighteen inches in diameter, for example, and are relatively expensive.

It is essential for effective gas cleaning that the filter bags be maintained intact while in use. In the event a bag is holed by abrasion, mechanical action or chemical attack, it must be replaced. Even a relatively small hole in a thirty foot fiberglass bag may require replacement and discarding of the entire bag. Since the bag lengths and diameters vary considerably in different installations, the bags are usually manufactured to order, requiring the maintenance of a substantial bag inventory at the place of use to avoid delays in replacement.

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The general object of my invention is the provision of a filter bag construction which permits the simultaneous installation of the bags and bagholding ring means. A further and more specific object is the provision of bag holding ring means which also permit the bag to be manufactured in readily replaceable tubular sections, most of which are of a predetermined standard length and diameter.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For an understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention

Of the drawings:

FIG. 1 is a diagrammatic sectional elevation of a conventional baghouse showing two groups of bags in normal filtering operation and a third group of bags undergoing cleaning;

FIG. 2 is a broken elevation partly in section of a filter bag constructed in accordance with the invention;

FIG. 3 is a fragmentary sectional view of the bag top and closure cap; and

FIG. 4 is an enlarged sectional elevation of one of the connecting couplings and associated bag section ends.

In the drawings, FIG. 1 illustrates one type of baghouse in which filter bags of my invention are adapted for use. The baghouse 10 has a filter chamber 12, the bottom of which is defined by a horizontal tube sheet 14 opening to a series of subjacent gas-tight hoppers 16 arranged to sequentially receive the dust collected by spaced groups of flexible filter bags 18 of the character described arranged in the filter chamber. The bags are supported under tension by hooks 20 connected to metal caps 22 releasably closing the upper ends of the bags and coiled tension springs 24 depending from stationary supports 26 arranged in a plenum chamber 28 above the filter chamber 12. The hoppers 16 are connected in parallel to a fan 30 through supply and return ducts 32 and 34 respectively, and valved branch connections 35 operable to maintain either a positive pressure or suction in the individual hoppers 16. A sealed screw feeder 36 is arranged in the bottom of each hopper to remove the deposited dust. As indicated by the arrows in FIG. 1, the first two groups of bags can receive dust-laden gas at their lower ends from the fan 30 and subjacent hoppers 16, the gas flowing upwardly in and outwardly through the bags, while the third group of bags will be undergoing a cleaning cycle in which clean gas is drawn inwardly and downwardly through the bags from the filter chamber 12 by the suction created by closing the branch connection from the duct 32 and opening the branch connection to the return duct 34 which is connected to the dirty gas inlet side of the fan 30. The corresponding screw feeder 36 is simultaneously operated to remove the dust accumulating in the hopper. This general arrangement and mode of operation are well known to those skilled in this art.

In accordance with my invention, and as shown in FIGS. 2-4, each bag is composed of one or more vertically aligned intermediate sections 18^a of a predetermined standard length and diameter and shorter upper and lower end sections 18^b and 18^c releasably connected thereto by metallic couplings 40, preferably of light gauge stainless steel. For example, the intermediate sections may be six feet in length and each end section approximately three feet. A thirty-foot bag could thus be formed by four such intermediate sections and two end sections, any one of which can be readily replaced while the bag is in posi-

tion by unhooking the bag from the corresponding tension spring, disconnecting the damaged section, and substituting a corresponding undamaged section. A substantial reduction in the inventory of spare bag sections for each baghouse is thus permissible.

As shown in FIG. 2, each bag is connected to a lower thimble 42 positioned in and projecting upwardly from a corresponding opening 44 in the lower tube plate 14. A circumferential flange 46 and gas sealing gasket 48 limit the upward movement of the thimble in the tube plate. A flexible bead 50 on the lower end of the bag section 18^c fits over a bead 52 on the upper end of the thimble and the overlapping parts secured by a circumferential clamp 54 in a well-known way.

Similarly, as shown in FIG. 3, the beaded upper end of the top bag section 18^b fits over an internally beaded circumferential flange 56 depending from the closure cap 22 and is releasably secured thereto by a circular clamp 58.

The intermediate bag sections 18^a are detachably connected to one another and to the free ends of the bag sections 18^b and 18^c by the coupling members 40. The couplings are of rigid cylindrical form with a pair of internal beads 60 at opposite ends thereof and spaced apart sufficiently to accommodate in vertically spaced relation resiliently flexible metallic snap rings 62 sewn into cuffs 64 at the ends of the bag sections to be connected. The bag sections are connected by inserting the cuffed bag ends inside the coupling and allowing each snap ring to snap into place in edge abutting relation with the adjacent portion of the corresponding internal bead 60 so as to restrain axial movement tending to separate the parts. With the bag sections so connected and assembly, the cap hook 20 is connected to the tension spring 24 to apply the desired tension to the bag. When any section of the bag is damaged in use and requires replacement, the foregoing steps are reversed to remove the damaged section and a new bag section of similar construction substituted by a workman from within the filter chamber.

When such a sectional bag construction is subjected to a gas flow inwardly through the bag wall as occurs in the periodic cleaning cycles, the vertically spaced rigid couplings 40 and associated snap rings 62 cooperate in opposing collapse of the bags and thus obstructing the cleaning operation.

What is claimed is:

1. In a baghouse for cleaning a dust-laden gas, a filter chamber having a lower apertured tube plate, a group of vertically elongated tubular filter bags of gas-pervious dust-arresting fabric, thimbles positioned in said tube plate apertures, means for releasably connecting the lower end of each bag to a corresponding thimble, and means for applying a tension at the upper end of each bag, the improvement which comprises each said bag being formed a plurality of separate vertically aligned individually replaceable end and intermediate sections, and means for releasably connecting the adjacent ends of adjacent bag sections and opposing the collapse of said bag on a gas flow inwardly therethrough, said connecting means including a rigid cylindrical metallic coupling having vertically spaced internal beads formed therein, said bag sections having snap rings in at least one end thereof adjacent the coupling, and releasably positioned within said coupling, each snap ring being in abutting axial movement restraining relation with a corresponding internal bead.

2. The combination according to claim 1 in which the bag is formed of a plurality of interconnected intermediate sections of a predetermined standard length and diameter and end sections of similar diameter and substantially lesser length.

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U.S. Cl. X.R.

55—381; 285—321