CLAMP DEVICE FOR DETACHABLE FASTENING OF A SUPPORTING UNIT, FOR EXAMPLE A VENTURI TUBE UNIT, FOR A BAG IN A BAG FILTER

Inventors: Kjell Nielsen, Hovik; Finn H. Dethloff, Oslo, both of Norway
Assignee: A/S Ardal og Sunndal Verk, Oslo, Norway
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Primary Examiner—Frank W. Lutter
Assistant Examiner—Neil F. Greenblum
Attorney, Agent, or Firm—Wederoth, Lind & Ponack

ABSTRACT
A clamp device for detachable fastening of a supporting unit, for example a venturi tube unit, for a bag in bag filters with removable bags adapted, when removed, to be pulled upwardly through a hole for the supporting unit in a bag plate between the clean gas and the raw gas side of the bag filter. The supporting unit is provided with a flange adapted to press a gasket onto a marginal area around the hole in the bag plate. The clamp device is provided with a substantially U-shaped resilient clamp member having legs of such shape that they can engage the flange in four points. The ends of the legs are pivotally anchored in mountings attached to the bag plate on one side of the hole. A transverse portion of the clamp member is adapted to be releasably retained in the actuated condition of the clamp member by a locking member on the other side of the hole.

7 Claims, 2 Drawing Figures
CLAMP DEVICE FOR DETACHABLE FASTENING OF A SUPPORTING UNIT, FOR EXAMPLE A VENTURI TUBE UNIT, FOR A BAG IN A BAG FILTER

BACKGROUND OF THE INVENTION

This invention concerns a clamp device for detachable fastening of a supporting unit, for example a venturi tube unit for a bag in bag filters with replaceable bags.

In bag filters for cleaning dust-containing gases, for example powered gases in the electro-metallurgical industry, there is, as known, a great number of separate bags in order to give the filter installation the necessary capacity. The individual bags have to be removable for inspection, service and possible replacement. In practice the bags are often mounted by means of a supporting unit which is then fastened to a bag plate between the clean gas and the raw gas side in the bag filter. Such supporting units can for instance be in the form of so-called venturi tubes in bag filters of that type which are cleaned by means of periodic reversed compressed air pulses through the filter bags. In such installations the removable bags may be adapted, when removed, to be pulled upwardly through a hole for the supporting unit in the bag plate between the clean gas and the raw gas side of the bag filter, the supporting unit being provided with a flange adapted to press a gasket onto a marginal area around the hole in the bag plate.

The conventional way of fastening the supporting unit to the bag plate consists in the use of quite regular screws or bolts through the bag plate and the flange on the supporting unit. This design, however, has been found to involve great disadvantages, of which the following are most important: The gasket which provides for sealing between the supporting unit and the bag plate, may under the influence of the gas being treated, lose its elasticity and partially collapse, such that the tightening pressure and thereby the sealing effect of the gasket will be poor. Another problem with the conventional way of fastening these supporting units for bags in bag filters, is that considerable work is required for mounting and unmounting of supporting units with their corresponding bags, for example in connection with service and replacement. Mounting and tightening, or unscrewing and removing respectively, of for example four bolts for every supporting unit requires a very inconvenient technique considering the great number of bags found in larger filter installations.

SUMMARY OF THE INVENTION

The object of the present invention is thus to provide a new clamp device in replacement of the conventional fastening means in order to eliminate among others the above discussed disadvantages and deficiencies thereof.

According to the invention this is obtained with a clamp device of the above type, which includes a substantially U-shaped resilient clamp member having legs of such shape that they can engage the flange in four points. The ends of the legs are pivotably anchored in mountings attached to the bag plate on one side of the hole. A transverse portion of the clamp member is adapted to be releasably retained in the actuated condition of the clamp member by a locking member on the other side of the hole.

In addition to solving the above problems the clamp device according to this invention involves an additional significant advantage. This advantage has to do with the fact that the clamp device makes it possible to reduce the requirements as to the rigidity or stiffness of the bag plate. In this connection it should be noted that during the actual cleaning pulse there will be a pressure shock which causes the bag plate to move if the same is not very rigid. Therefore, conventional screw or bolt fastening of the supporting unit has a tendency to cause the supporting unit to loosen. The clamp device according to the present invention, however, is not influenced by these movements.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following description an embodiment of the clamp device according to the invention will be explained in more detail with reference to the drawings, in which:

FIG. 1 is a side view, with portions broken away, of the device, and
FIG. 2 is a plan view of the device.

DETAILED DESCRIPTION OF THE INVENTION

The arrangement in the drawings is shown with the conventional structural elements such as the bag plate 9 between the clean gas and raw gas side in the bag filter, a partly sketched bag 7 which hangs from a supporting unit 4, here shown in the form of a venturi tube unit of the type used in filters with cleaning of the filter bags by means of reverse flow or pulses of compressed air. The supporting unit 4 is provided with a flange 6 which is adapted to press a gasket 10 onto the upper side of the bag plate 9. The contour of the flanges 6' and 6" of adjacent supporting units is indicated on both sides of the supporting unit 4 shown.

For the supporting unit 4 with corresponding filter bag 7 there is in the bag plate 9 provided a hole 8 being of such dimensions that the supporting unit with filter bag removed therefrom, can be pulled vertically upwardly through the hole for inspection, service or replacement. During operation of the filter it is of great importance that the gasket 10 forms a tight seal between the supporting unit 4 and the bag plate 9.

The specific clamp device illustrated in the drawings essentially consists of three main parts. In the first place there is a clamp member 1 made for example of spring steel and formed substantially in a U-shape as shown in FIG. 2. A second main part is a locking member in the form of a hook-like element or strap 2 adapted to retain the resilient clamp member 1 in actuated condition in order to fix the supporting unit 4 as shown in the drawing. Thirdly, there are provided mountings 14, 15, 16 and 17 for pivotably anchoring both the clamp member 1 and the strap element 2.

The mountings 14, 15, 16 and 17 are fastened to the bag plate 9 by screw or weld connection. Seem in the vertical plane each mounting is U-shaped and the outer upright part is provided with a bore for the protrusions 31 and 32, respectively, formed at an angle on the end of each leg 11 and 12, respectively, of the clamp member. It will be understood that the clamp member 1 in a simple way can be mounted in the mountings 14 and 15 by pressing the legs 11 and 12 towards each other and inserting the protrusions in the above mentioned bores in the mountings.
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Each pair of mountings, for example 14 and 15, has a double or combined function, since they also serve to anchor a strap element 3 for the supporting unit of the adjacent bag to the left of the supporting unit 4 as viewed in the drawings. In a corresponding way, on the right side of the supporting unit 4 as shown in the drawings, the mountings 16 and 17 in addition to anchoring strap element 2 also support the protrusions of the clamp member for the adjacent supporting unit to the right.

It is obvious that the mountings shown can be shaped in different ways, including combined in pairs such that for example the two separate mountings 14 and 15 actually constitute an integrated part.

As shown specifically in FIG. 1, the legs 11 and 12 of the clamp member are formed in a slight or flattened W-shape seen in the vertical plane, so that the legs of the clamp member when in the actuated condition press against the flange 6 in four points 11a and 11b, 12a and 12b, respectively. Thereby, an even pressure over the whole sealing area of the gasket 10 is obtained and this pressure is maintained even if the gasket should slightly collapse or lose its elasticity. The transverse portion 33 of the clamp member is substantially straight and is adapted to fit into a hook 22 on the strap element 2, this hook being directed downwardly in the assembled position. This strap element is pivotable about an axis 21 and has an extended flap 19 directed generally upwardly for convenient and simple operation when a filter bag 7 is to be mounted or removed.

As an aid for mounting and unmounting the above clamp members, there can be used an auxiliary or mounting clamp member 41 (indicated with dotted lines in FIG. 1) which can also be generally U-shaped, but with a smaller spacing between the legs than in the clamp member 1, and adapted to be inserted in bores 18 provided above the anchoring bores for the strap elements in the inner upright parts of the mountings 14, 15 and 16, 17, respectively. Such bore 18 is indicated in the mounting 15 in FIG. 2. This auxiliary clamp member (not shown in FIG. 2) can be used to press down the above mentioned clamp members by engaging the transverse portion 33 thereof.

By suitably shaping the clamp members 1 described, these may also be used directly as auxiliary clamp members, such that a particularly shaped auxiliary clamp member will be superfluous.

Experts in this field will realize that the clamp device according to the present invention represents a very advantageous solution to the problems discussed in the introductory part of this description, as this solution allows quick mounting and removing of the bags in a bag filter, and at the same time a sufficient sealing between the supporting unit and the bag plate always is achieved, even if the gasket during operation should deteriorate.

What is claimed is:

1. A clamp device for clamping a supporting unit, such as a venturi tube unit, for supporting a bag of a bag filter in an air filter installation, such installation including a bag plate, an opening through said bag plate, said supporting unit extending through said opening and having a flange adapted to press a gasket onto a marginal area around said opening; said clamp device comprising:

   a substantially U-shaped clamping member having a pair of legs and a transverse portion joining first ends of each of said legs, each of said legs having two contact means thereon adapted to be pressed downwardly against said flange of said supporting unit for pressing said flange against said gasket;

   mounting means attached to said bag plate adjacent one side of said opening for selectively pivotally anchoring second ends of each of said legs of said clamping member;

   locking member means, pivotally mounted with respect to said bag plate adjacent said opening at a position thereof opposite the position of said mounting means, for selectively releasably retaining said transverse portion of said clamping member and for pressing said two contact means of each of said legs downwardly onto said flange at four points around said opening; and

   the surface of said flange against which said contact means of said legs press being planar, and said contact means being positioned on said legs such that said four points are equally spaced about said opening.

2. A clamp device as claimed in claim 1, wherein each of said legs has, as viewed in a longitudinal plane substantially perpendicular to the plane of said clamping member, a flattened W-shaped form, and said contact means of each of said legs comprise the two lowermost points of said W-shaped legs.

3. A clamp device as claimed in claim 1, wherein said locking member means comprises a hook-like element pivotally mounted about a horizontal axis.

4. A clamp device as claimed in claim 1, further comprising an auxiliary clamp member mounted to extend across said supporting unit to press downwardly on said transverse portion of said clamping member.

5. A plurality of clamp devices as claimed in claim 1, for use in an air filter installation which includes a plurality of bag filters and associated supporting units extending through a plurality of openings in said bag plate, wherein said mounting means comprises a mounting attached to said bag plate between each two adjacent of said openings, each mounting having means for anchoring the second ends of the legs of the clamping member of one of said two adjacent openings and means for supporting the locking member means of the other of said two adjacent openings.

6. A plurality of clamp devices as claimed in claim 5, wherein each of said mountings comprises four upwardly extending straps, the two outermost of said straps having holes therein constituting said anchoring means for said second ends of said legs of said clamping member of said one of said two adjacent openings, and the two innermost of said straps supporting a horizontal axis constituting said supporting means for said locking member means of said other of said two adjacent openings.

7. A plurality of clamp devices as claimed in claim 6, each further comprising an auxiliary clamp member supported at opposite ends thereof in holes in said innermost straps of said mountings and pressing downwardly against said transverse portion of said clamping member.

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,830,043
DATED : August 20, 1974
INVENTOR(S) : Kjell NIELSEN and Finn H. DETHLOFF

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Page 1, insert the following Foreign Application Priority Data:
-- July 14, 1971 Norway..........2691/71 --.

Signed and Sealed this

Twenty-fourth Day of January 1978

[SEAL]

Attest:

RUTH C. MASON
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