

[54] **BIN AERATOR ASSEMBLY OR UNIT**

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[73] Assignee: **Material Control, Inc., Aurora, Ill.**

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[52] U.S. Cl. .... **222/193**

[51] Int. Cl. .... **B65d 83/06**

[58] Field of Search ..... 222/193, 195, 569; 248/27, 248/75; 24/201 A

[56] **References Cited**

**UNITED STATES PATENTS**

|           |         |                 |            |
|-----------|---------|-----------------|------------|
| 2,665,035 | 1/1954  | Schemm .....    | 222/195    |
| 3,200,366 | 10/1965 | Stuart .....    | 248/27 X   |
| 3,381,925 | 5/1968  | Higuchi.....    | 24/201 A X |
| 3,689,013 | 9/1972  | Neugebauer..... | 248/27     |
| 3,746,931 | 7/1973  | Muranaka.....   | 248/27 X   |

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Attorney, Agent, or Firm—Whittemore, Hulbert & Belknap

[57] **ABSTRACT**

The device is installed from outside a wall of a bin or hopper containing pulverulent material; and as such it basically comprises an oblong diffusion unit having a stamped sheet metal body plate, a mesh diffusion

screen of truncated pyramidal cross section mounted fixedly forwardly of the plate, and a nipple extending rearwardly of the latter. Pursuant to the invention, the diffuser unit is part of an oblong kit like unit which permits the latter's quick and easy mounting to the bin wall at a rectangular wall opening which receives the unit from the outside. The unit is clamped and sealed to the wall using a sub-assembly of (a) a flat mounting plate on which said unit is backed and laterally confined; (b) an inner sealing gasket between that plate and the body plate of the unit; (c) an outer sealing gasket interposed between the mounting plate and the inner surface of the bin wall; (d) a U-shaped spring steel clamp bridge or bracket, whose legs straddle the rectangular wall opening at either side of a central opening in the bracket; and (e) a take-up and clamping nut which threads on the diffusion unit's nipple as the latter is telescoped through the hole of the bracket. In installing the diffusion unit, as preliminarily assembled to the mounting plate and sealing gaskets of the oblong kit unit, it is slipped through an enlarged rectangular oblong opening in the bin wall (but still less in both dimensions than the plate area), then brought into internally registered overlap across the wall opening, whereupon the clamp bridge or bracket is slidably applied to the rear air nipple of the unit, with said bracket transversely spanning said opening and tightly taken up by the clamping nut as applied to the nipple.

**10 Claims, 6 Drawing Figures**

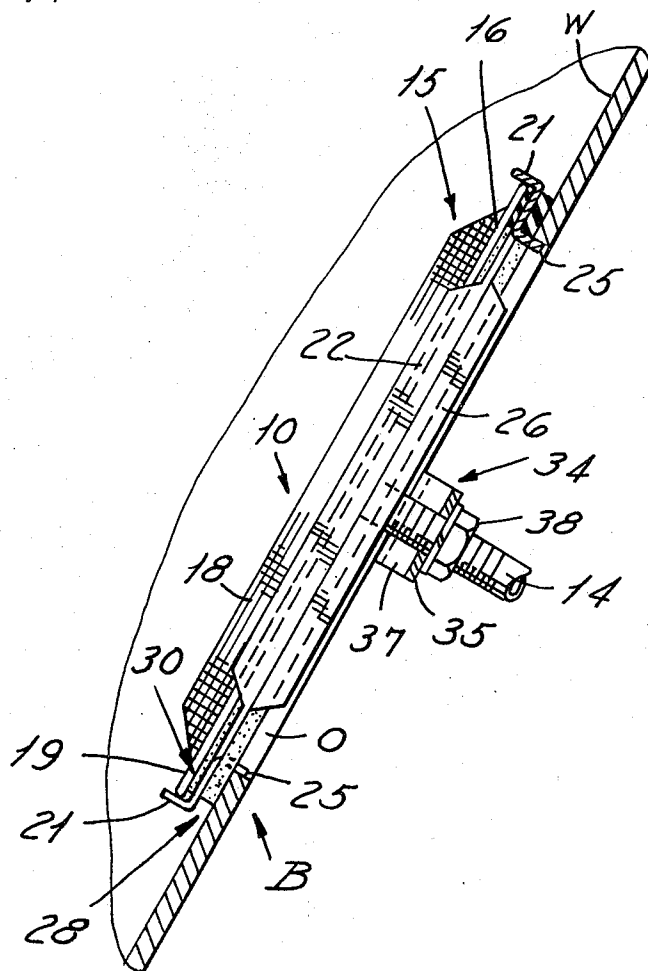


FIG.1

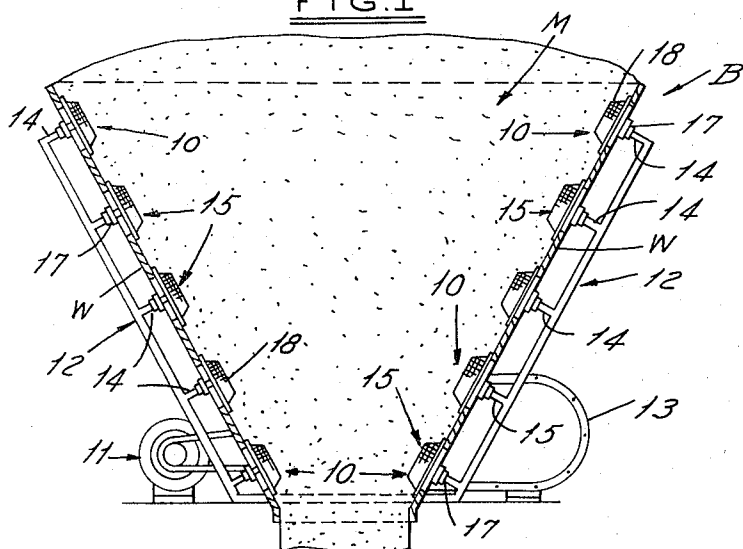


FIG. 2

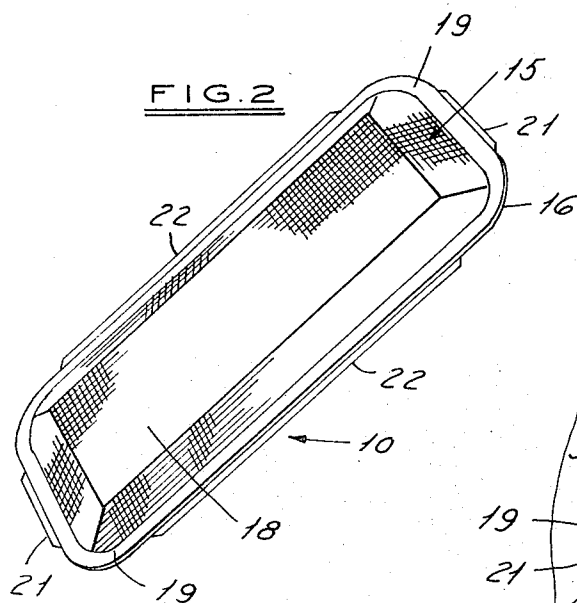
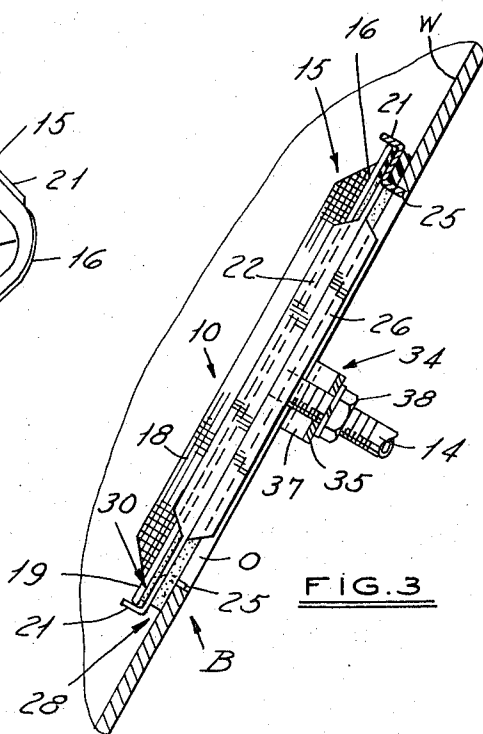


FIG. 3



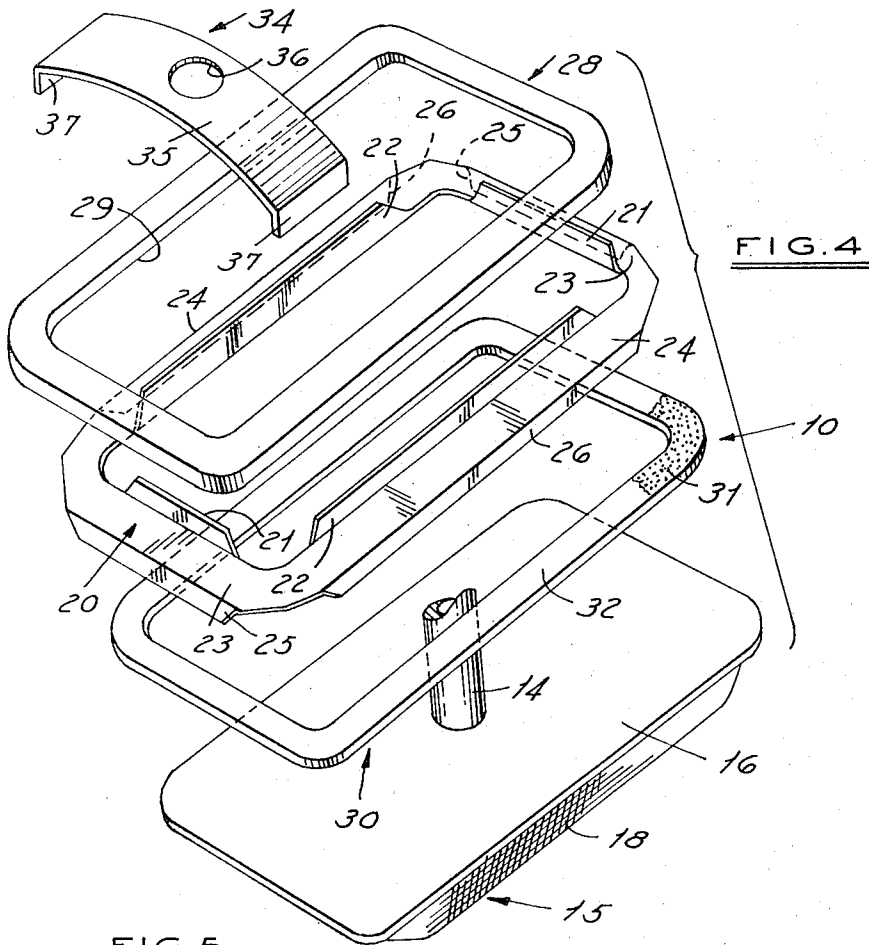


FIG. 4

FIG. 5

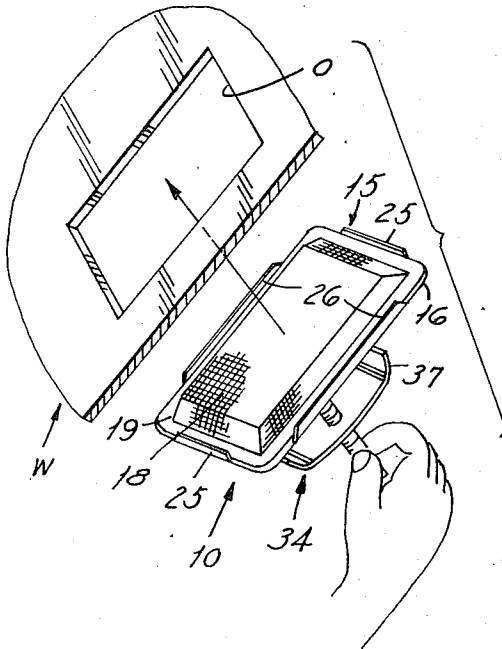
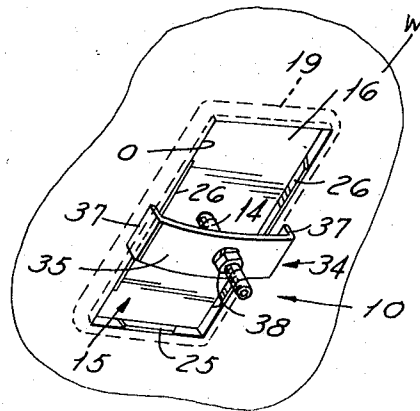


FIG. 6



## BIN AERATOR ASSEMBLY OR UNIT

## CROSS-REFERENCE TO RELATED APPLICATION

My copending application, Ser. No. 347,853, filed Apr. 4, 1973, discloses improvements in a bin aerator air diffusion unit which is by preference employed as a component of the device of the present invention.

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

The aerator mounting unit has application in the setting up and maintenance of bin installations in which it is desirable or enforced by the law that multiple aerator devices be serviced from the exterior of the bin. As in the case of my copending application identified above, the installation will handle bin contents of a wide variety, for example, lime or cement, carbon black, diatomaceous earth, many different chemicals, fly ash, cereals, etc.

## 2. Description of the Prior Art

The only related disclosure of which I am aware is that of the patent to Schemm, U.S. Pat. No. 2,665,035 of Jan. 5, 1954; but this concerns only the aerator unit, per se, the latter having no identity as a part of an installation mount, as in the present improvement.

## SUMMARY OF THE INVENTION

The mounting unit, as essentially constituted in the manner described in the Abstract, presents a low "in-bin" profile and large aerator surface, although occupying a limited area; and despite the fact that the aperturing of the bin wall is opened up somewhat to accommodate the kit's installation from the bin exterior, the aerator is tightly sealed to the bin wall. It can be quickly installed by a single workman operating outside that wall, and equally easily removed for servicing, thus completely eliminates any need to enter the bin for any purpose. The unit is also suited for use on bins having many different wall contours or configurations.

The operation of installment involves no operations of welding, drilling, tapping or the like; and the mounting unit is repeatedly reusable, even if a substitution for a damaged aerator unit component becomes in order. Its cost is very small and packaging prior to use is very compact.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a more or less schematic view of a storage bin or hopper filled with pulverulent material, on the walls of which bin aerator mounting units according to the improvement are installed in multiple, the view also indicating typical air flow means connected between a compressor and manifolded to the aerators;

FIG. 2 is a front perspective view of the aerator mounting unit;

FIG. 3 is a fragmentary view of the device in side elevation as mounted to a bin wall, being partially broken away and in section in a plane at 90° to the wall;

FIG. 4 is an exploded perspective view showing essential components of the unit; and

FIGS. 5 and 6 are fragmentary and somewhat schematic perspective views illustrating progressive steps in the installing of the device on a bin wall.

## DESCRIPTION OF A PREFERRED EMBODIMENT

FIG. 1 of the drawings schematically shows a bin B

containing pulverulent material M to be aerated, which bin is defined by a downwardly tapered wall structure W of an open bottom nature, being optionally either frustoconical or frusto-pyramidal in section. Multiple aerator mounting units 10 are employed in accordance with the invention, these units being fixedly installed in a regular, equally spaced relationship to one another to bridge elongated rectangular openings O (FIGS. 3 and 5) pre-formed for the installation purpose in wall W.

As shown in FIG. 1, bin B is typically serviced with air by a motor-compressor unit 11 and manifold piping 12 externally paralleling the slope of the bin wall W, which is pressurized at low pressure by a supply line 13 from compressor 11. Individual nipple fitting 14, one for each aerator mounting unit 10, take off from the manifold lines 12 to supply the necessary air; such fittings or nipples being similarly designated 14 in FIGS. 3-6, more particularly illustrating the structural improvement and method, to which reference should now be made.

The aerator mounting unit 10 comprises a basic aerator unit 15 of the general sort shown in my above-identified application, including a generally flat body plate 16, typically of cadmium plated steel, which is centrally apertured to receive the nipple 14, the latter projecting well to the rear of plate 16 and having a standard coupling 17 (FIG. 1 only) for releasably connecting the aerator to the air line of the system.

To the extent pertinent to the present disclosure, the unit 10 is completed by a foraminate diffusion screen 18 of elongated rectangular shape and shallow truncated pyramidal cross section both transversely and longitudinally, which screen is marginally clamped onto the back plate 16 by a 180° bent flanging 19 of said plate. As indicated above, it is contemplated that the unit 10 shall incorporate in its aerator unit 15 the advantageous features shown in my above-identified copending application.

As best illustrated in FIG. 4, the unit 10 comprises a special adaptor-type mounting plate 20 in the form of a sheet metal stamping in an annular frame-like contour, which plate is provided with pairs of opposed, rearwardly struck 90° flange tabs 21, 21 and 22, 22. These are respectively located at the midpoints of opposed frame ends 23 and sides 24 of plate 20, terminating somewhat short of the ends of the respective parts 23, 24.

Mounting plate 20 is also shaped to provide pairs of opposed, oppositely bent flange tabs or ears 25, 25, 26, 26 which extend forwardly of the respective plate parts 23, 24, also being of less than the full length of said parts. The pairs 25, 26 are centered respectively in register with the oppositely flanged tab pairs 21, 22.

The pairs of forward tabs 25 and 26 serve as locators, between which pairs the body plate 16 of the aerator device or unit is confined (per FIGS. 3 and 4), while the oppositely flanged tab or ear pairs 21, 22 also serve as locating and restraining elements by which the unit is registered in a wall opening and held against angular shift therein.

Another part of unit 10 is a rear annular compressible gasket 28 of relatively dense foam rubber and of elongated rectangular or oblong shape, whose rectangular opening 29 is dimensioned to fit reasonably closely about the pairs of rear locator flange tabs 21, 22 of plate 20; and gasket 28 is, in completing the assembly of parts prior to their mounting to bin wall W,

strongly secured adhesively to the end and side legs 23, 24 of the adaptor mounting frame 20. To this end, it is contemplated that the gasket 28, (as hereinafter constituted in the manner of a second or forward gasket 30) will be coated, but on its forward surface only, with a known pressure-sensitive latex-type cement. This is prior to an assembly of the gaskets 28 and 30 to the adaptor plate 20, up to which time each gasket coating is masked by a peelable protective sheet, removed of course before application of the gasket to said adaptor. Rear gasket 28 is typically three-sixteenth inches in thickness. FIG. 4 shows the forward gasket 30, of the same composition as gasket 28, to be of lesser thickness, for example one-sixteenth inch. It is contoured to fit with substantial edge clearance between the forwardly struck pairs of flange formations 25, 26 on adaptor 20; and gasket 30 carries the latex adhesive, designated 31, on both of its surfaces, the cement being masked before unit 10 is fully assembled by a strippable protective sheet 32.

FIG. 3 shows the mounting unit or assembly as being operatively installed on bin wall W, at and in bridging or spanning relation to an opening O in that wall, with the aid of another component of the unit. This, again referring to FIG. 5, is in the form of a spring steel clamp bracket 34 in a generally U-shaped outline, which is mildly bowed or arced convexly along its cross part 35. The latter is provided with a central opening 36 at its midpoint; and the length of the bow is sufficiently great that, per FIG. 6, the terminal legs 37 of bracket 34 will be engageable with the outer side of bin wall W at the opposite more elongated sides of the wall's opening O. In this finally mounted or installed condition of unit 10, the threaded air nipple or fitting 14 of aerator unit 15 extends through bracket opening 36 and receives a nut 38 which, when taken up tightly against crosspiece 35 of the resilient clamp bracket, holds the aerator tightly across wall opening O, with a very effective air-tight seal of the aerator, adaptor plate and gasket assembly to the bin wall.

In making the assembly, said wall W has the opening O cut therein in an appropriate rectangular size, for example 2½ inches wide by 6¾ inches long for a typically proportioned aerator 15.

FIGS. 5 and 6 illustrate a typical sequence thereafter of installing the unit 10 from the outside of the bin.

With nut 38 backed off, the installer (or servicer) grasps the end of nipple 14 and proceeds to insert the assembly of aerator and gasket-clad mounting or adaptor plate through the opening 20, having oriented this assembly in such manner that its narrow plate dimension will readily pass between the longer side dimensions of opening O. Having so inserted the aerator and kit adaptor, he then rotates the latter 90° on the axis of nipple 14, thereby orienting the unit's shorter and longer dimensions in register with the corresponding dimensions of the wall opening. Holding the structure against the inner bin wall by pulling on nipple 14, the operator arranges clamp bracket 34 to span the opening, and takes up nut 38 sufficiently tightly to flex the clamp somewhat, hence complete the mount of the aerator to wall W. Of course, a removal for repair or replacement of the aerator 15 is done by a reversal of the above operation. A complete mounting of the structure

on the wall, including the preliminary assembly of gasket and plate components, is possible in less than 2 minutes, and a foolproof mount is assured, inasmuch as the height of the adaptor plate flanges, ears or tabs 25, 26 is such, per FIGS. 3 and 6, that they telescope within the wall opening, hence prevent rotation of the adaptor within the bin following a proper installation. Similarly, the corresponding opposite formations 21 and 22 block any possible tendency of gasket 28 to slew relative to adaptor plate 20.

What is claimed is:

1. A unit for removably mounting an aerator device on a material-enclosing bin wall at an aperture in said wall and from the exterior of the latter, which device includes a plate part spanning and in sealed relation to the aperture; said unit comprising a mounting plate of annular outline and external dimension approximating in size and shape that of said plate part, and being apertured to receive another part of said device which passes through the wall aperture, and mounting bracket means externally engageable with said enclosing bin wall and spanning the aperture thereof, said mounting bracket means coacting with said other part of the device in releasably clamping the latter to said wall.

2. The unit of claim 1, in which said unit further includes annular sealing gasket means engageable between said wall and said plate part of the device to seal the latter at the wall aperture.

3. The unit of claim 2, in which said annular gasket means includes one gasket engaging said plate part and another gasket to be disposed between said mounting plate of the unit and the enclosing bin wall.

4. The unit of claim 3, in which said gaskets, mounting plate and plate part of the device are adhesively held together in assembly.

5. The unit of claim 1, in which said bracket means comprises a U-shaped bracket straddling the wall aperture and having an opening in a straddling portion thereof to receive said other part of the device.

6. The unit of claim 2, in which said mounting part is a U-shaped bracket straddling the wall aperture and having an opening in a straddling portion thereof to receive said other part of the device.

7. The unit of claim 5, in which said other part is an externally threaded nipple-like element received in the opening of said bracket and threadedly engaged releasably by a nut element adapted to exert clamping force on the bracket externally of the latter.

8. The unit of claim 6, in which said other part is an externally threaded nipple-like element received in the opening of said bracket and threadedly engaged releasably by a nut element adapted to exert clamping force on the bracket externally of the latter.

9. The unit of claim 1, in which said annular mounting plate has transversely projecting flange means by which said plate part of the device is located at the external outline of the mounting plate.

10. The unit of claim 2, in which said mounting plate has transversely projecting flange means by which said plate part of the device is located at the external outline of the mounting plate, and by which said annular gasket means is also positioned relative to the plate part and mounting plate outlines.

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