United States Patent

Oberg

[15] **3,657,991**

[45] **Apr. 25, 1972**

[54] FLOOR FOR BLAST ROOM WITH UNIFORM DOWN-DRAFT VENTILATION

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[73] Assignee: **Zero Manufacturing Company,** Washington, Mo.

[22] Filed: **May 18, 1970**

[21] Appl. No.: **38,004**

Related U.S. Application Data

[62] Division of Ser. No. 725,869, May 1, 1968, which is a division of Ser. No. 634,586, Apr. 28, 1967, Pat. No. 3,407,719.

[52] **U.S. Cl.** **98/32,** 98/115, 98/31, 98/33

[51] **Int. Cl.** **F24f 13/00**

[58] **Field of Search** 98/29, 32, 33, 31, 115

[56] **References Cited**

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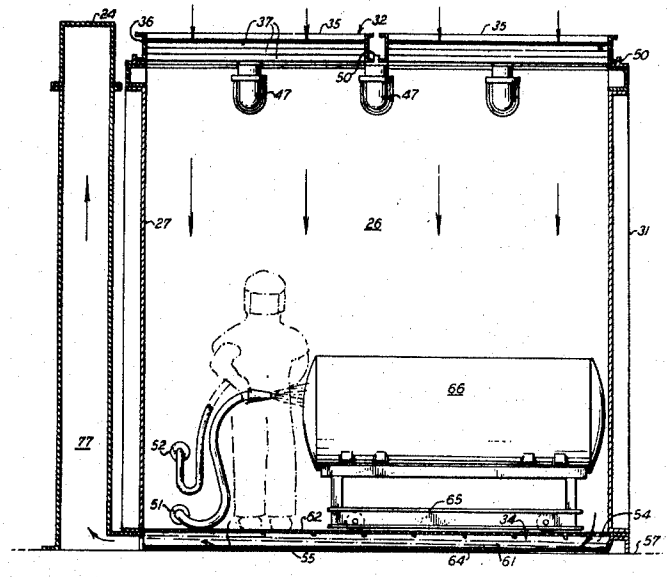
Primary Examiner—William J. Wye

Attorney—Mason, Mason & Albright

[57] **ABSTRACT**

A blast room which has air drawn through a pervious top downwardly through a perforated floor and means for separating and exhausting the air and collecting the blasting material. The top is louvered by three tiers of angle beams resting on supports and alternately disposed so that an upwardly directed air blast sufficient to lift a beam moves same to block the space between two adjacent beams in the tier above. The floor includes a perforated grating lying on detached and readily removable beams of "M" cross section having apertures in the central lower apex, there being two inclined longitudinally extending plates within the beam on either side of said apex. In one embodiment the plates extend normally from the vertical legs of the beam. In another they are vertical. In a further embodiment an inclined angle beam is inverted above the apex of the M-beam with slots disposed along the edges of the angle beam.

7 Claims, 11 Drawing Figures



PATENTED APR 25 1972

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SHEET 1 OF 5

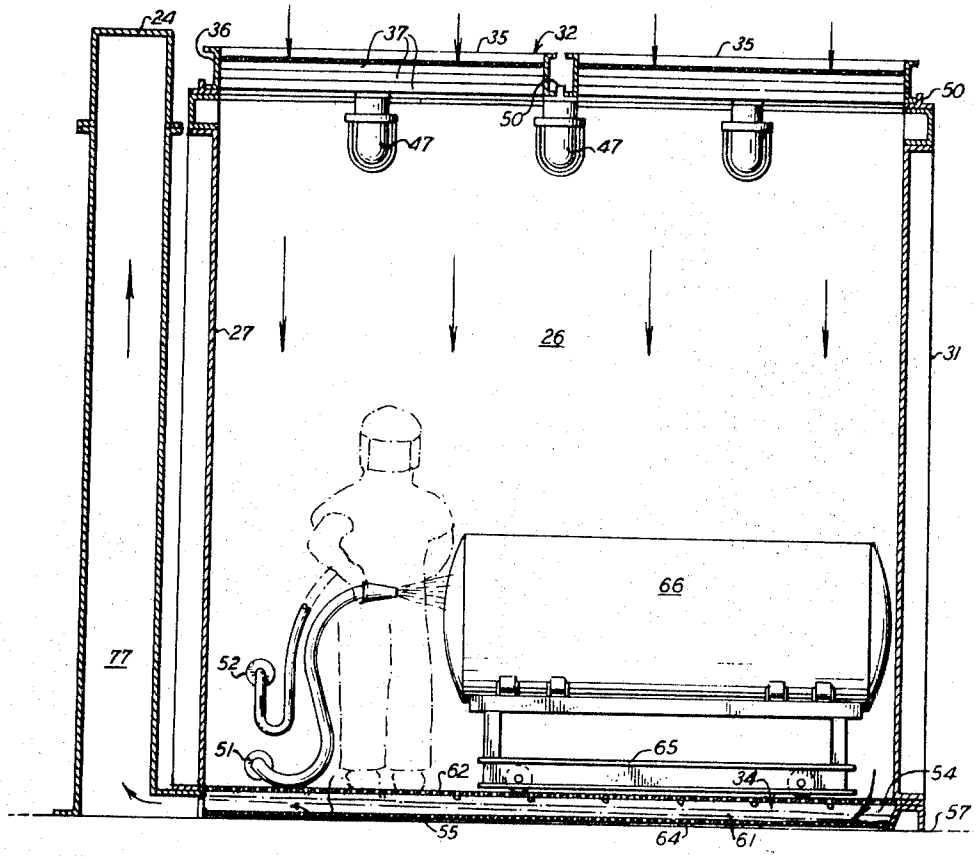


FIG. 2

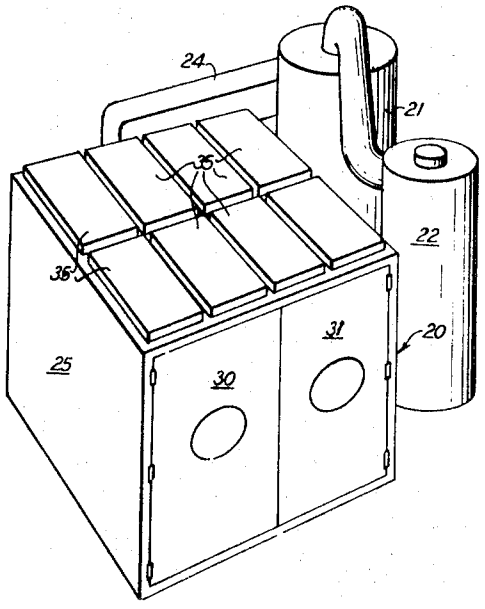


FIG. 1

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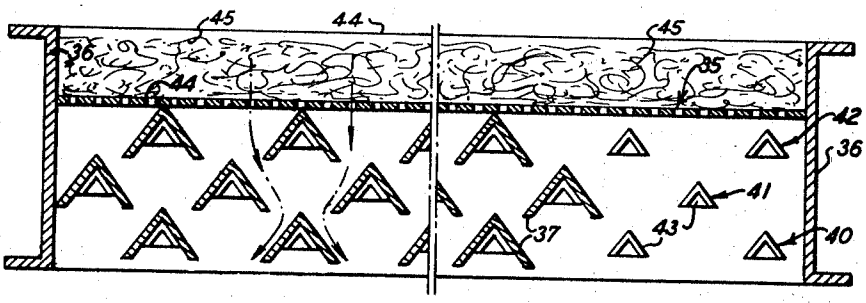


FIG. 3

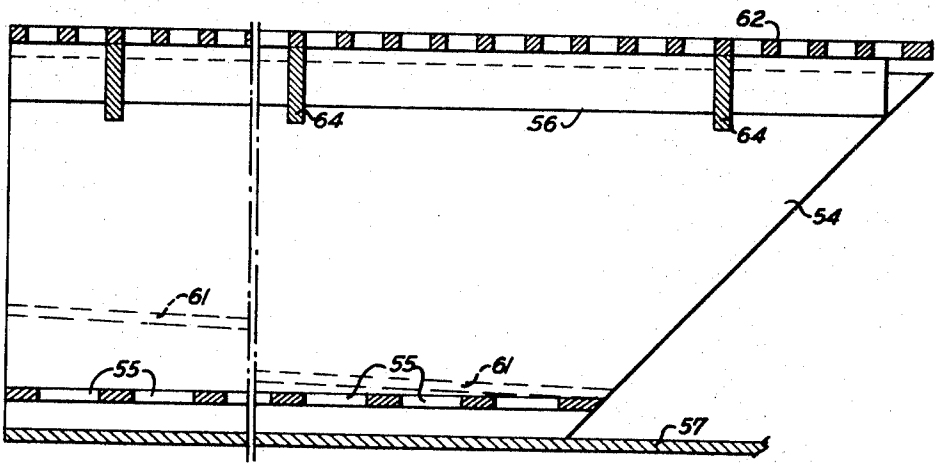


FIG. 7

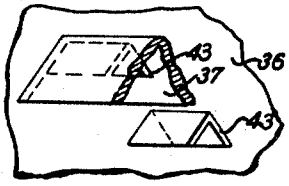


FIG. 4

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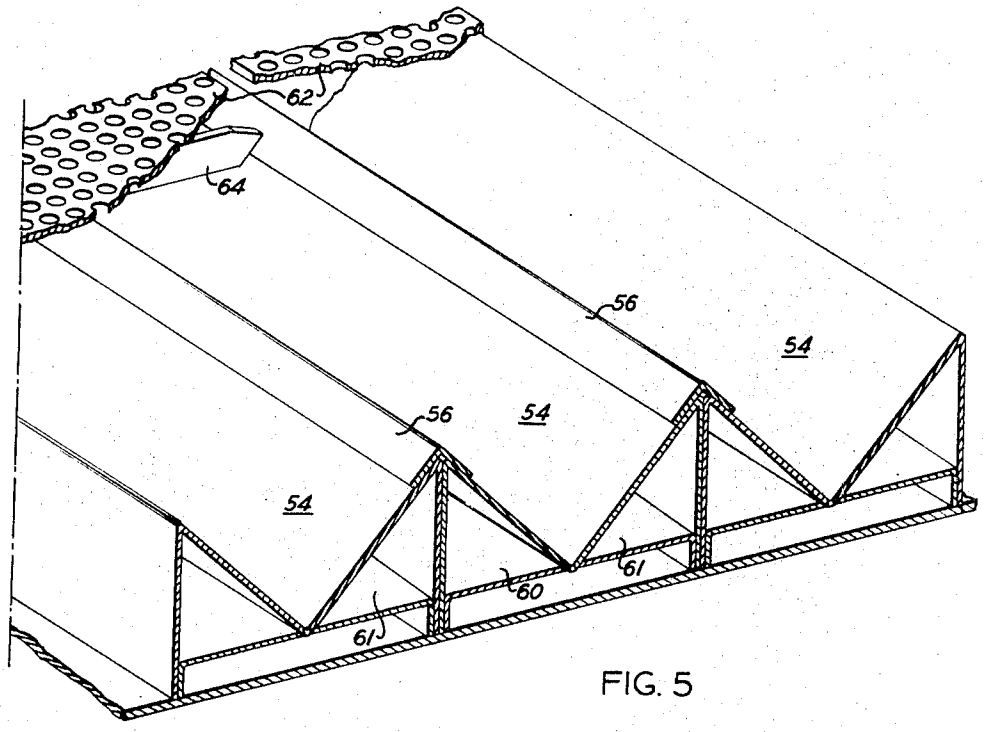


FIG. 5

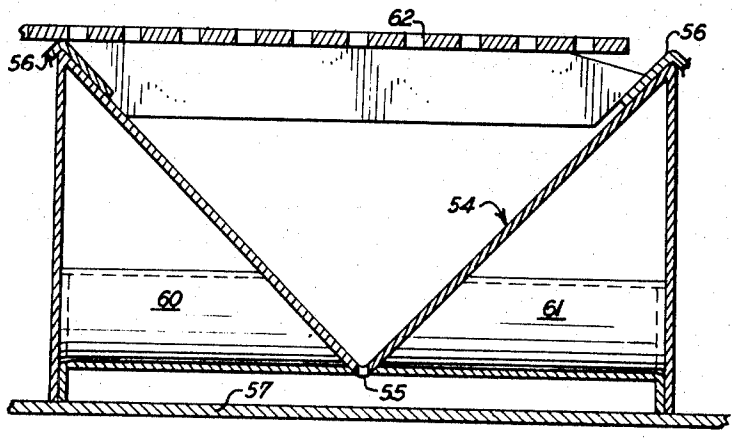


FIG. 6

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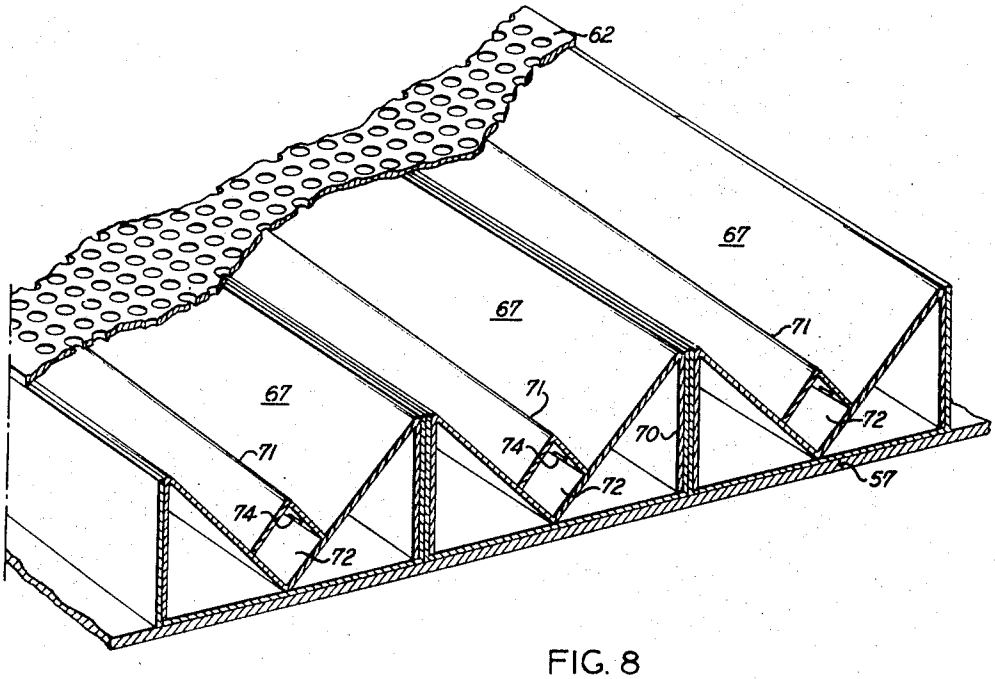


FIG. 8

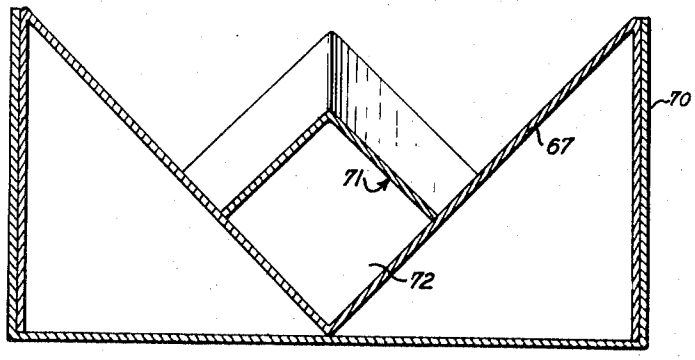


FIG. 9

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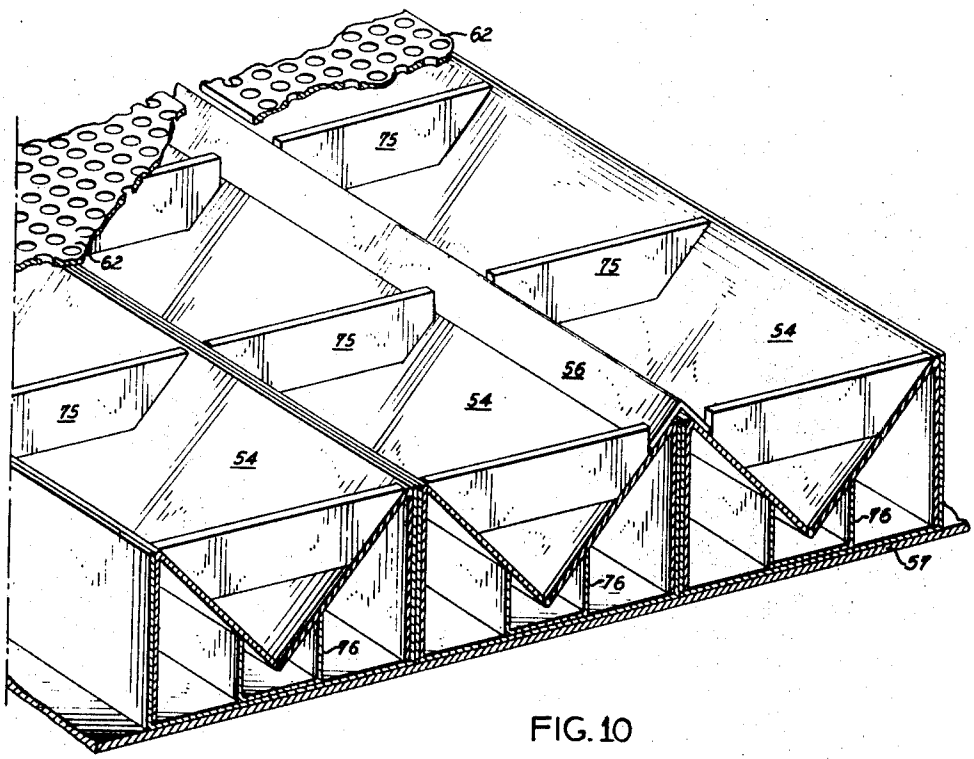


FIG. 10

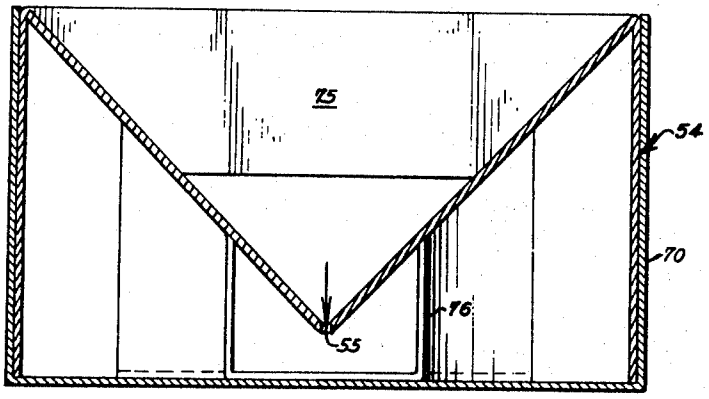


FIG. 11

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FLOOR FOR BLAST ROOM WITH UNIFORM DOWN-DRAFT VENTILATION

CROSS REFERENCE TO RELATED APPLICATION

This invention relates to a floor for a blast room with uniform down-draft ventilation and is a divisional application of application Ser. No. 725,869, filed May 1, 1968, which, in turn, is a divisional application of application Ser. No. 634,586 filed Apr. 28, 1967, now U.S. Pat. No. 3,407,719.

BACKGROUND OF THE INVENTION

This invention relates to an enclosed blast room for a fine particle blast system. More particularly, it relates to an improved blast room of modular unit construction having a one-way type louvered roof and floor components which are readily removable for cleaning or other purposes.

Fine particle blasting has enjoyed wide acceptance in the last several years, especially since the advent of dry glass bead peening and reclaim systems which effectively separate the blasting particles from dust and debris arising from the blasting operation. The glass bead particles range in size between 0.0005–0.026 inches diameter with diameters of 0.0035–0.0059 inches being popular for most applications. In recent years room-sized glass bead blasting chambers have made their appearance. Examples of such rooms are disclosed in U.S. Pats. Nos. 2,912,918 and 3,026,789 issued Nov. 17, 1959, and Mar. 27, 1962, to W. H. Mead. Prior to this, rooms for abrasive blast systems such as disclosed in U.S. Pat. No. 2,292,665 of Aug. 11, 1942, to C. B. Schneible, were well-known and contemporary glass bead blast rooms have been adaptations of these systems. However, the abrasive blast systems largely utilized sand, shot or grit blasting materials which were relatively large and usually expendable. Glass beads and alumina oxides, however, present major packing and conveying problems in such a system. With known systems there is a tendency for overloading the sump and clogging, particularly in the floor area and when moisture is present. When such occurs, the lack of accessibility for cleaning is a major problem.

In addition, current roof structures either give insufficient protection against misdirected air blasts penetrating the roof, thus defeating the very purpose of the rooms, or they constitute an undue air restriction which adversely affects the static pressure of the system, makes a larger blower necessary, and reduces the efficiency of the unit.

SUMMARY OF THE INVENTION

The invention is directed to the structural units of the roof and floor which, in the case of the roof, is unique in that it is sufficiently opened to provide an improved air flow in comparison with current roofs for similar installations and will automatically close in response to a misdirected air stream somewhat in the same fashion as louvers, thereby preventing dust from escaping into the surrounding atmosphere. Since the individual beams of the roof are not welded or otherwise fastened to the supporting structure, the roof can be installed with less expense and also more easily cleaned or dismantled or both.

The floor construction includes characteristics which provide a clog-resistant duct for the evacuation of air, blasting material and debris unless undue moisture is introduced. In such event, the floor beams which are not welded or otherwise fastened to the foundation plate or to each other can easily be lifted and cleaned. As with the roof, the floor can be quickly installed. The compact and inherently strong trusslike construction of the floor beams permits a reduction in floor height and eliminates the requirement for much of the supporting structure which might otherwise be necessary.

The primary object of the invention is to provide the above advantages by the structure as disclosed and claimed. However, other objects; adaptabilities and capabilities will be appreciated by those skilled in the art to which the subject matter of the invention pertains, reference being had to the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic perspective view of a blast room in accordance with the invention;

FIG. 2 is a cross-sectional view of the blast room;

FIG. 3 is a cross-sectional view of a roof segment of the blast room;

FIG. 4 is a fragmentary exploded perspective view showing two roof angle beam supporting means;

FIG. 5 is a fragmentary perspective view of the floor design of the blast room;

FIG. 6 is a front sectional view of a floor beam shown in FIG. 5;

FIG. 7 is a side sectional view of a floor beam shown in FIG. 5;

FIG. 8 is a fragmentary perspective view of a further embodiment of the floor design of the blast room;

FIG. 9 is a front sectional view of a beam shown in FIG. 8 with the apertures 74 omitted;

FIG. 10 is a fragmentary perspective view of a still further embodiment of the floor design of the blast room; and

FIG. 11 is a front sectional view of a beam shown in FIG. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a blast room with conventional components comprising a separator and reclaim system 21 and a dry filter 22. The separator and reclaim system 21 is connected to the exhaust from the pick-up snout 77 of blast room 20 by an exhaust conduit 24. The separator and reclaim system 21, the dry filter 22, and the exhaust conduit 24, all being conventional and known in the field to which the invention pertains, do not require a detailed description for an understanding and use of the invention by a person skilled in the art.

The blast room 20, as shown in FIGS. 1 and 2, comprises the chamber enclosed by sidewalls 25 and 26, a back wall 27, and a front consisting of doors 30 and 31. These elements are also conventional and need not be described in detail for an understanding by a person skilled in the art.

The roof of the blast room 20 is designated generally 32, and the floor is designated generally 34.

From FIG. 1 it will be noted that the roof 32 comprises some eight modules 35. FIG. 3 shows a cross section of a typical module 35 which includes a framework 36. Supported within the module 35 by the framework 36 are three tiers of angle beams designated 37. These angle beams 37 lie on tent-shaped supports 43 (see FIG. 4) which are spot welded or otherwise fastened to the framework 36. Corresponding supports 43 are situated at both ends of the framework 36 so that each angle beam 37 spans a pair of the supports 43 located at the end of the framework 36. The angle beams 37 are composed of a thin gage metal (their thickness being exaggerated in the drawings) and are not secured to the supports 43 in the sense that they can be lifted freely from such supports. FIG. 4 illustrates an end of an angle beam 37 on support 43, and a further support 43 without its angle beams in a lower tier. If a blast is inadvertently directed upwardly to impinge upon one of the angle beams 37 of tier 40, such angle beam is raised thereby into the space between the adjacent angle beams 37 directly above in tier 41. In the same manner a blast hitting an angle beam in tier 41 moves it into the corresponding spaces between the adjacent angle beams 37 next above in tier 42. As a result, substantially no portion of the blast is permitted to escape through the roof 32. A grating 44 is laid across the upper portion of the beams 37 of tier 42, as shown in FIG. 3, which prevents the upward displacement of tier 42.

If desired, a loosely packed fibrous material mat 45 may be included within the framework 36 of each module 35 above the grate 44. Spanish moss is a satisfactory fibrous material for this purpose.

Protected lights 47 are secured to roof beams 50 which also function to receive and support the modules 35. As necessary and desired, utility inlets such as inlet 51 for blasting material and inlet 52 for fresh air supply to the operator are provided in the blast room 20.

In a blast room designed in accordance with the invention, air is drawn vertically downward through the roof **32** into the floor **34** at a rate of about 55 feet per minute. This compares with a rate of about 40 feet per minute in known practical designs. One reason that a relatively high air flow rate can be achieved without unduly raising the static pressure in the blast room **20** lies in the design of the roof **32** as set forth above. However, of equal importance to the efficient and effective operation of the blast room **20** is a floor structure whereby the air laden with spent blasting material and other debris is continuously removed from the blast room **20** during blasting operations.

FIGS. **5**, **6** and **7** show a preferred floor design embodiment. In this embodiment, floor beams **54**, having an M-shaped cross section, are laid side by side across the foundation plate **57**. The upper "V" of the M-shaped beams forms a hopper and at the lower apex of such hopper there are a plurality of slots **55** of sufficient size to permit the continuous exhaustion from the blast room of air, blasting material and the debris resulting from the blasting operation. It has been found that slots ⅛ inch or 1/16 inch by ½ inch disposed longitudinally with respect to floor beams **54** are spaced a quarter of an inch apart are satisfactory. Angle irons **56** span adjacent pairs of the floor beams **54** and provide immediate support for floor gratings **62** which may have braces **64** affixed thereto. If desired, an angle iron **56** may be left exposed, as illustrated in FIG. **5**, whereby it also functions as a track to receive a wheeled work-supporting means such as dolly **65** as shown in FIG. **2**. The dolly **65** is shown in FIG. **2** supporting a work piece **66** being subjected to blasting treatment. Secured on either side of the slots **55** within the lower portion of the floor beam **54** are right and left air divider plates **60** and **61**. These are securely fastened within the beam by welding or other appropriate means and are inclined relative to the longitudinal length of the beam so that, as seen in FIGS. **2** and **7**, there is substantially more space between the foundation plate **57** and the air divider plates **60** and **61** on the left-hand portion of the floor beams, where air discharges into pick-up snout **77**, than on the right-hand portion. It is preferably that the inclination be sufficient so that the velocity of the air moving horizontally to the left, as seen in FIG. **2**, under the air divider plates **60** and **61** is substantially uniform and similarly, air is drawn into the slots **55** at a substantially uniform velocity irrespective of their specific location in the blast room **20**. It is preferred that the floor beam be bevelled inwardly on the right end side, as seen in profile in FIGS. **2** and **7**.

The angle irons **56** are not secured to the floor beams **54** which in turn are not secured to the foundation plate **57**. Thus to remove the floor beams **54** or any particular floor beam, all that is necessary is to lift and remove the associated floor grating **62**, pick up and lay aside the angle irons **56**, and lift out the floor beams **54**, as desired.

It will be noted that the floor of this embodiment is a rib type floor supported by what is essentially a truss-like structure in the floor beams. The floor is compact in that it takes up little room, and floor assemblies can be added or deleted as required by the size of the particular blast room, or as otherwise may be desired for cleaning purposes.

FIGS. **8** and **9** show modified floor design. The same reference numerals have been used for parts similar to those previously described. In this embodiment, the floor beam **67** also has an M-shaped cross section. However, the central lower apex of the beam **67** is on the same level as the lower edges of the outer legs. A floor beam housing **70** receives the floor beam **67** and, if desired, may be secured thereto whereby a strong, truss-like structure is formed. Within the V-portion of the floor beam **67** is received an inclined angle beam **71**. The conveying duct **72** thus formed increases in size in the direction of the movement of air therein. Air is drawn uniformly into the duct **72** through a plurality of slot-like passages **74** of sufficient size for that purpose. As in the prior embodiment, the various components are laid one upon the other so that the floor grating **62** is readily removable from the underlying supporting structure, the inclined angle beam **71** can be lifted from position for cleaning and, if desired, the floor beams **67** either with or separately from the floor beam housings **70**, can be lifted and removed from the foundation plate **57**.

A still further embodiment of the floor design is shown in FIGS. **10** and **11**. Again the same reference numerals have been used for similar parts previously shown and described. The foundation plate **57** supports floor beam housings **70** in a side-to-side relationship, each of which receives floor beams **54** of M-shaped cross section. The central lower apex of the beam **54** has a plurality of slots **55**. Beam braces **75** may be secured to the floor beams **54** or to the gratings **62**. In this particular embodiment, however, it is preferred that they be secured to the beams **54**. Space is provided between selected beam braces **75** for the receipt of angle irons **56** which function as rails for dolly **65** or the like. A tapered air duct which is U-shaped in cross section lies under the slots **55**. It increases in size in the direction of air carried therethrough to equalize the air velocity through the slots **55** and to provide the necessary space for conveying the blasting media to the pickup snout **77** of the blast room **20** and eventually to the reclaim system. As with the previous floor embodiments, the individual components can be removed merely by lifting same so as to provide ready accessibility for cleaning or other purposes.

Although I have described preferred embodiments of my invention, it is to be understood that it is capable of other adaptations and modifications within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. As a component of a floor in a blast room, a trough member which comprises:
   - a beam of M-shaped cross section, (**54**, **67**), the intermediate sides which slope towards the central apex of said M-beam defining at least in part sides of hopper means to receive blasting substances,
   - plate means (**60**, **61**, **71**, **76**) extending from each of said sloping intermediate sides, said plate means and said sloping intermediate sides in combination defining at least in part a converging duct to receive blasting substances from said hopper means, and
   - passageways (**55**, **74**) leading from the lower portion of said hopper means into said converting duct.

2. A trough member in accordance with claim **1** wherein said plate means comprises a pair of plates (**60**, **61**) connecting the vertical sides of said M-beam with said intermediate sides, said vertical sides resting on a foundation plate, said converging duct being defined by said foundation plate and said vertical sides together with said intermediate sides and said pair of plates.

3. A trough member in accordance with claim **1** wherein said plate means comprises an angle beam (**71**) inverted over the central apex of said M-beam whereby the upper sides of said angle beam and the outside portions of said intermediate sides define said hopper means and the lower sides of said angle beam together with said intermediate sides of said M-beam beneath said angle beam define said converging duct, said passageways (**74**) disposed along the lower edges of said angle beam.

4. A trough member in accordance with claim **1** wherein said plate means comprise a pair of plates (**76**) extending downwardly from said intermediate sides of said M-beam.

5. A trough member in accordance with claim **4** wherein a further plate is integral with said pair of plates, said further plate together with said pair of plates having a U-shaped cross section.

6. As a component of a floor in a blast room, a trough member comprising:
   - a beam of M-shaped cross section, a plurality of apertures through said beam along its central apex,
   - a pair of plates secured within said M-beam with one on each side of said M-beam's central apex, said plates being

inclined relative to the length of said M-beam whereby they are secured relatively nearer said apertures at the lower thereof end than at the higher.

7. A structure in accordance with claim 6 wherein the central apex of said M-beam lies substantially higher than the bottom edges of the parallel sides of said M-beam.

* * * * *