Oct. 29, 1968 D. L. TEMPLE ETAL 3,407,719

BLAST ROOM WITH UNIFORM DOWN-DRAFT VENTILATION

Filed April 28, 1967 5 Sheets-Sheet 1

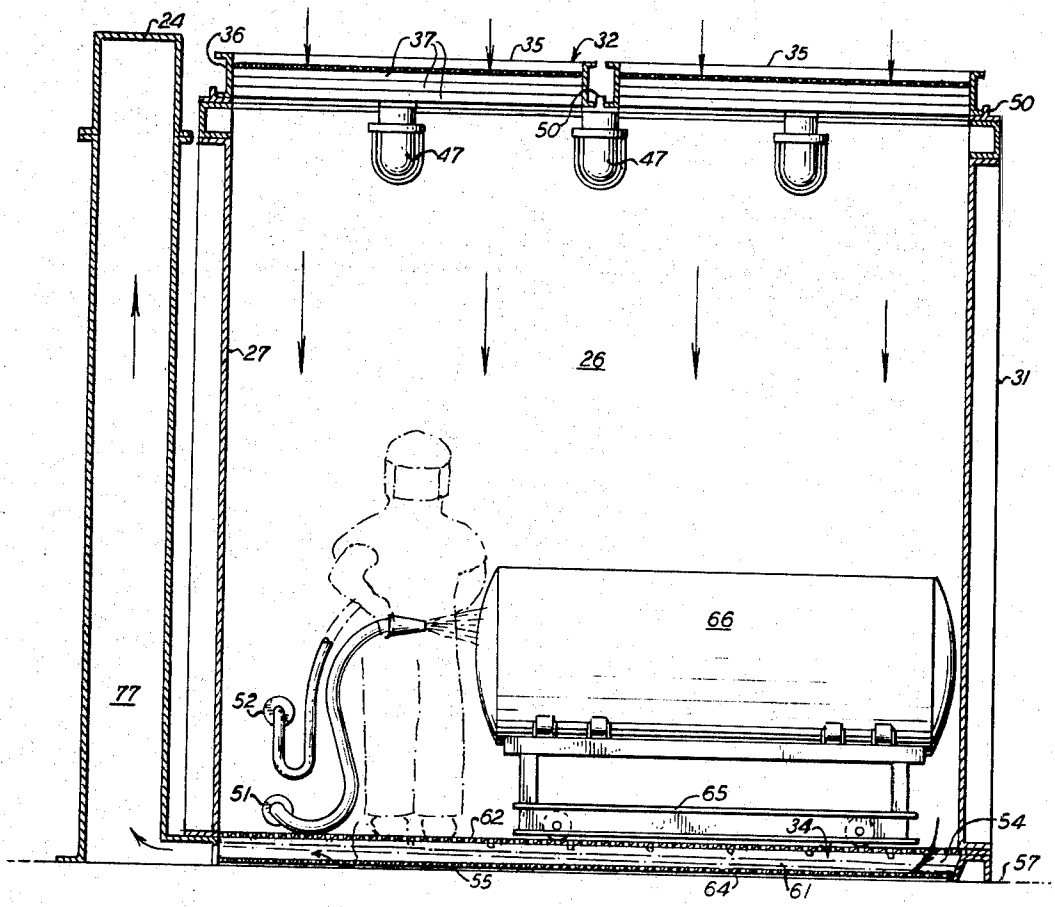


FIG. 2

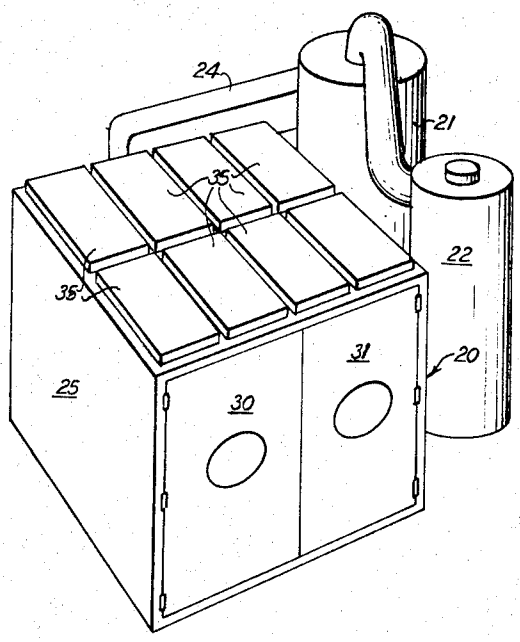


FIG. 1

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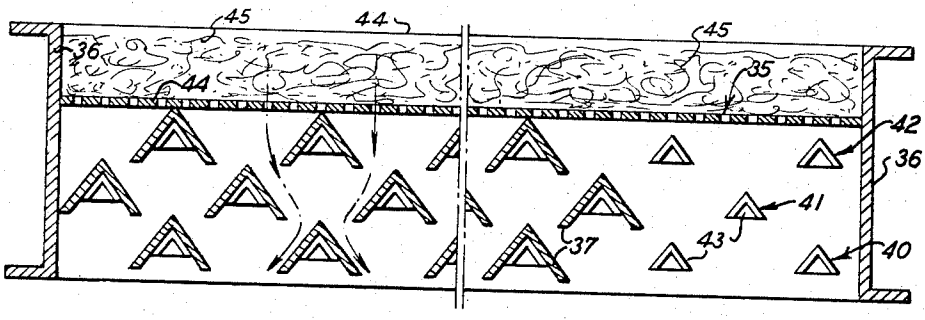


FIG. 3

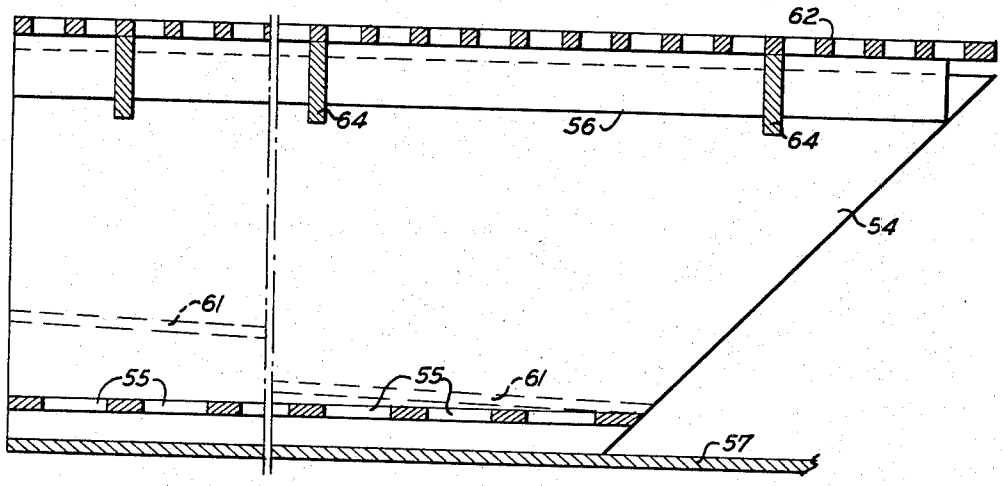


FIG. 7

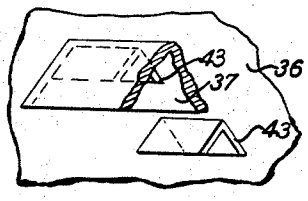


FIG. 4

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BLAST ROOM WITH UNIFORM DOWN-DRAFT VENTILATION

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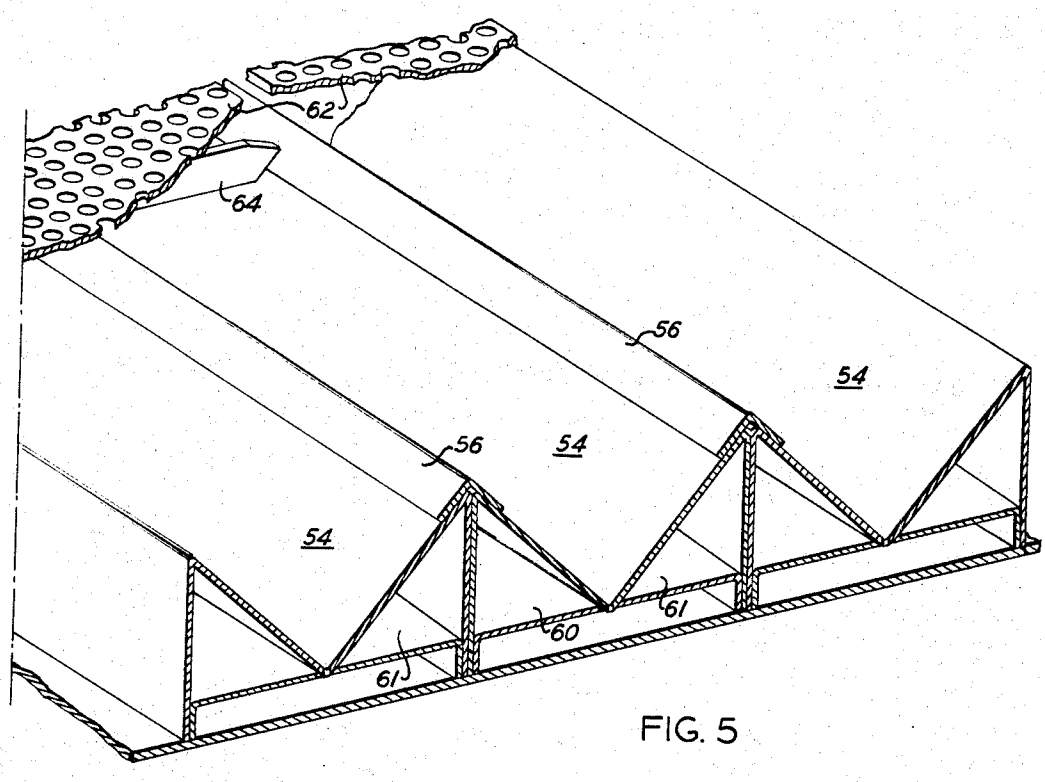


FIG. 5

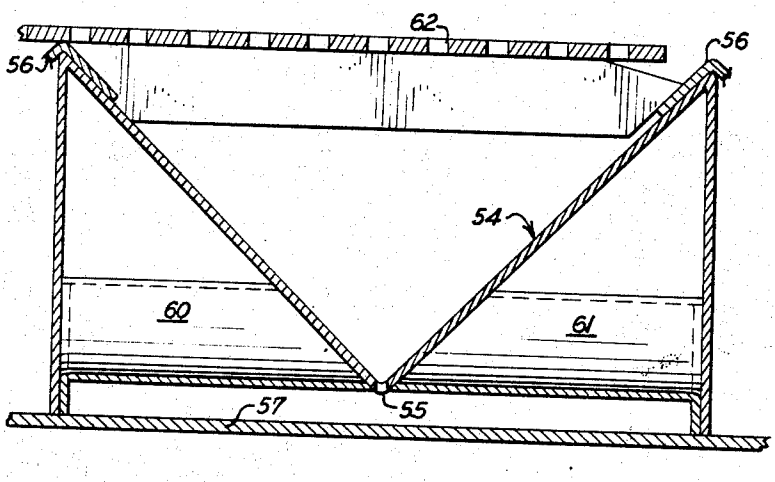


FIG. 6

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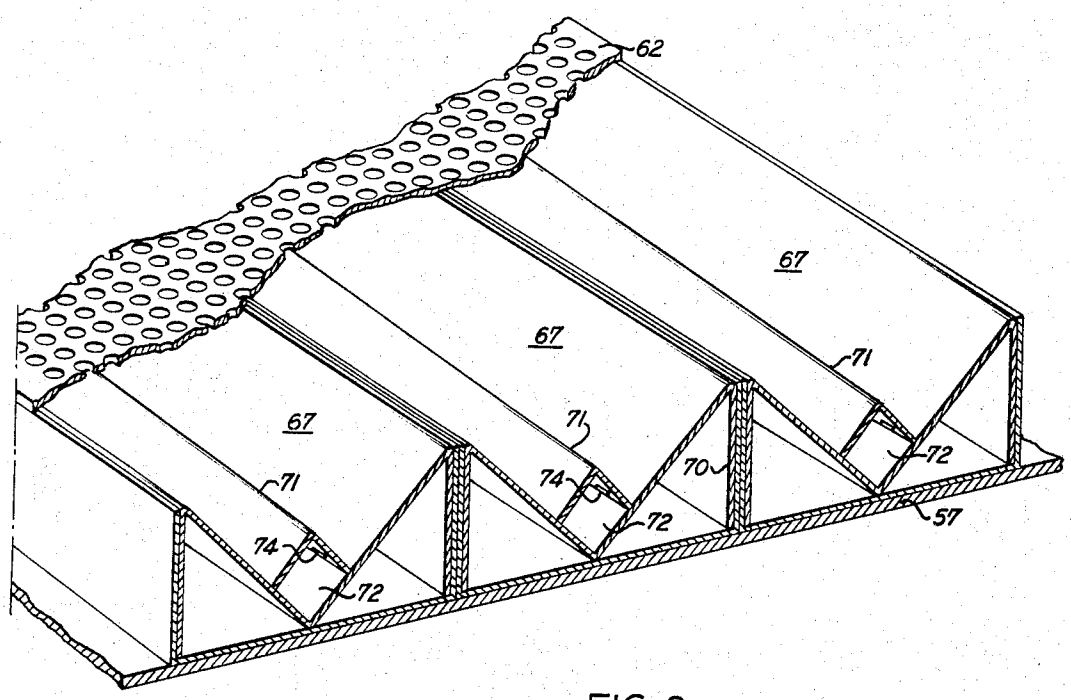


FIG. 8

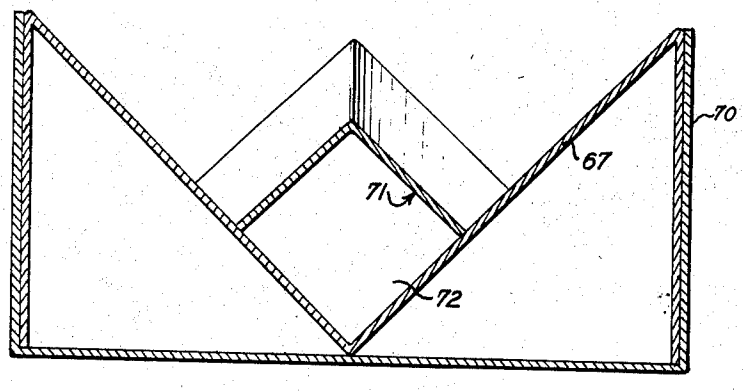


FIG. 9

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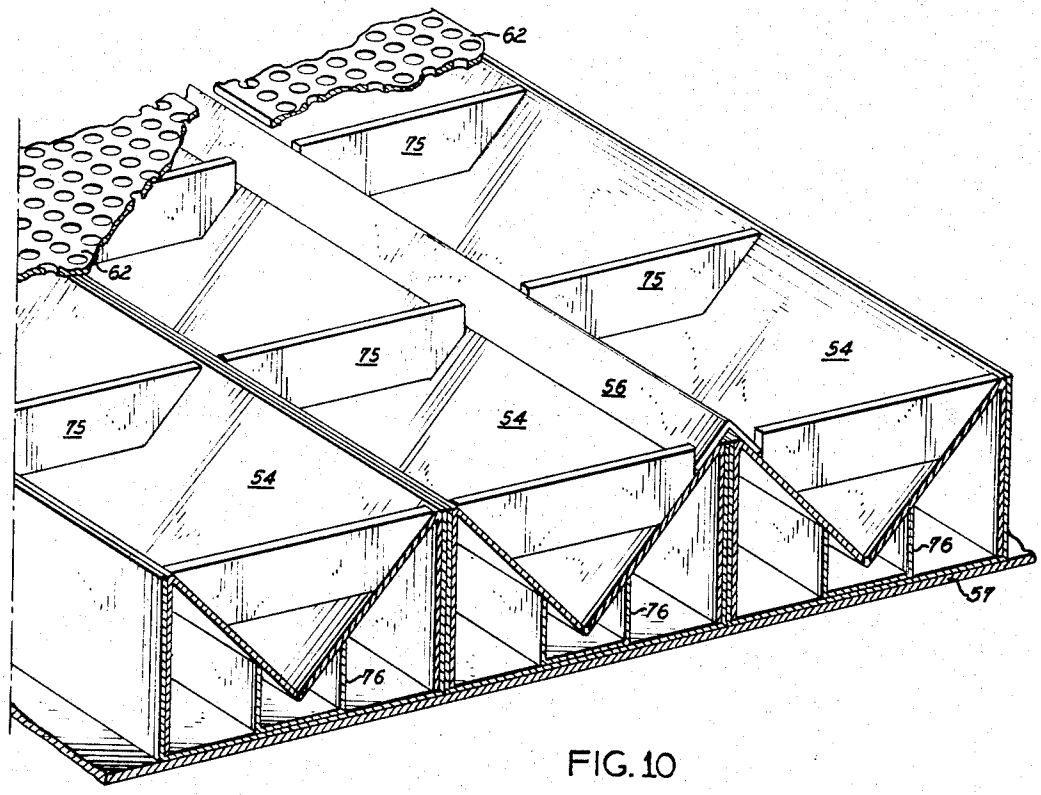


FIG. 10

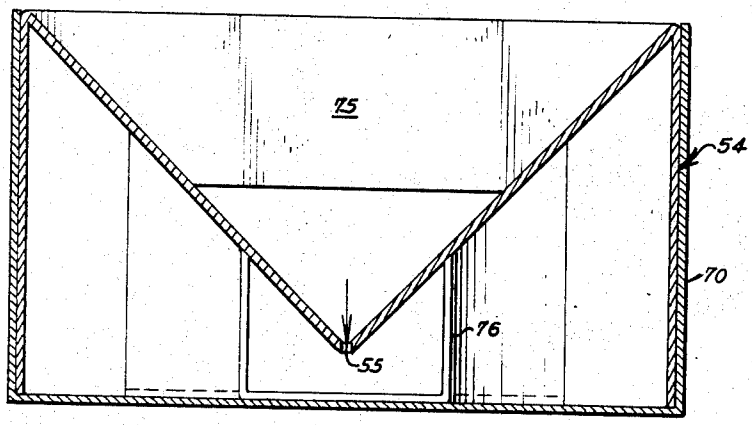


FIG. 11

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3,407,719

BLAST ROOM WITH UNIFORM DOWN-DRAFT VENTILATION

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Filed Apr. 28, 1967, Ser. No. 634,586
7 Claims. (Cl. 98—32)

ABSTRACT OF THE DISCLOSURE

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.

Background of the invention

This invention relates to an enclosed blast room for a fine particle 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 .0005–.026 inch diameter with diameters of .0035–.0059" 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 Patent 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 Patent 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 designs either give insufficient protection against misdirected air blasts penetrating the roof, thus defeating the very purpose of the rooms or constitute an undue air restriction thus adversely affecting the static pressure of the system which, in turn, makes a larger blower necessary and has a negative influence upon 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 desription of the drawings

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

FIGURE 2 is a cross sectional view of the blast room;

FIGURE 3 is a cross sectional view of a roof segment of the blast room;

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

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

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

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

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

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

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

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

Description of the preferred embodiments

FIGURE 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 FIGURES 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 FIGURE 1 it will be noted that the roof **32** comprises some eight modules **35**. FIGURE 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 FIGURE 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. FIGURE 4 illustrates an end of an angle beam **37** on support **43**, and a further support **43** without its angle beam 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 FIGURE 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 fifty-five feet per minute. This compares with a rate of about forty 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 on 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 ladened with spent blasting material and other debris is continuously removed from the blast room **20** during blasting operations.

FIGURES 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" or 1/16" by ½" disposed longitudinally with respect to floor beams **54** and 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 FIGURE 5, whereby it also functions as a track to receive a wheeled work-supporting means such as dolly **65** as shown in FIGURE 2. The dolly **65** is shown in FIGURE 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 FIGURES 2 and 7, there is substantially more space between the foundation plate **57** on one hand and on the other 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 preferable that the inclination be sufficient so that the velocity of the air moving horizontally to the left, as seen in FIGURE 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 **54** be bevelled inwardly on the right end side, as seen in profile in FIGURES 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.

FIGURES 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 FIGURES 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 relation, 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.

While we have described preferred embodiments of our 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 our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. A roof (32) for a blast room (20) which comprises:
supporting structure (36),
a first plurality (40) of angle beams (37) substantially of an inverted V cross-section horizontally disposed in a parallel side by side spaced relationship across said supporting structure,
a second similarly disposed plurality (41) of angle beams spaced above and parallel to said first plurality, the beams of said second plurality being disposed above the spaces between the adjacent beams of said first plurality, the beams of said first plurality being free from connections to said supporting structure and liftable therefrom whereby a blast of air directed upwardly and impinging upon one of said beams of said first plurality tends to lift such beam into a position which closes the proximate space immediately above such beam which is between the beams of said second plurality.

2. A roof in accordance with claim 1 wherein fibrous material (45) is disposed above said second plurality.

3. A roof in accordance with claim 1 wherein there is a third similarly disposed plurality (42) of angle beams spaced above and parallel to said second plurality, the beams of said third plurality being disposed above the spaces between the adjacent beams of said second plurality, the beams of said second plurality being free from connections to said supporting structure whereby a blast of air directed upwardly and impinging upon one of said beams of said second plurality tends to lift such beam into a position which closes the proximate space immediately above such beam which is between beams of said second plurality.

4. A roof in accordance with claim 3 wherein fibrous material is disposed above said third plurality.

5. A roof in accordance with claim 4 wherein a grating is disposed between said fibrous material and a grating carried by said third plurality.

6. A roof in accordance with claim 3 wherein the beams of said third plurality are free from connections to said supporting structure whereby said beams of said third plurality are liftably removable therefrom.

7. A blast room (20) comprising:
a casing providing a chamber,
a roof (32) of said casing including louvered means covering a substantial portion of said roof (37) to permit the intake of air into said chamber, an opening in said roof above said louvered means, said louvered means being movable by air directed upwardly against same whereby said louvered means closes said opening and the escape of air upwardly through said roof is substantially prevented,
a floor portion (34) of said casing being apertured to permit the escape of air,
means providing a chamber below said floor,
a suction conduit (77) communicating with said lower chamber and with a source of suction, and
means for collecting blasting substances passing through said floor.

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