Oct. 11, 1932. C. H. BILLMAN 1,882,541

SAND BLAST APPARATUS

Filed Dec. 23, 1929 3 Sheets-Sheet 1

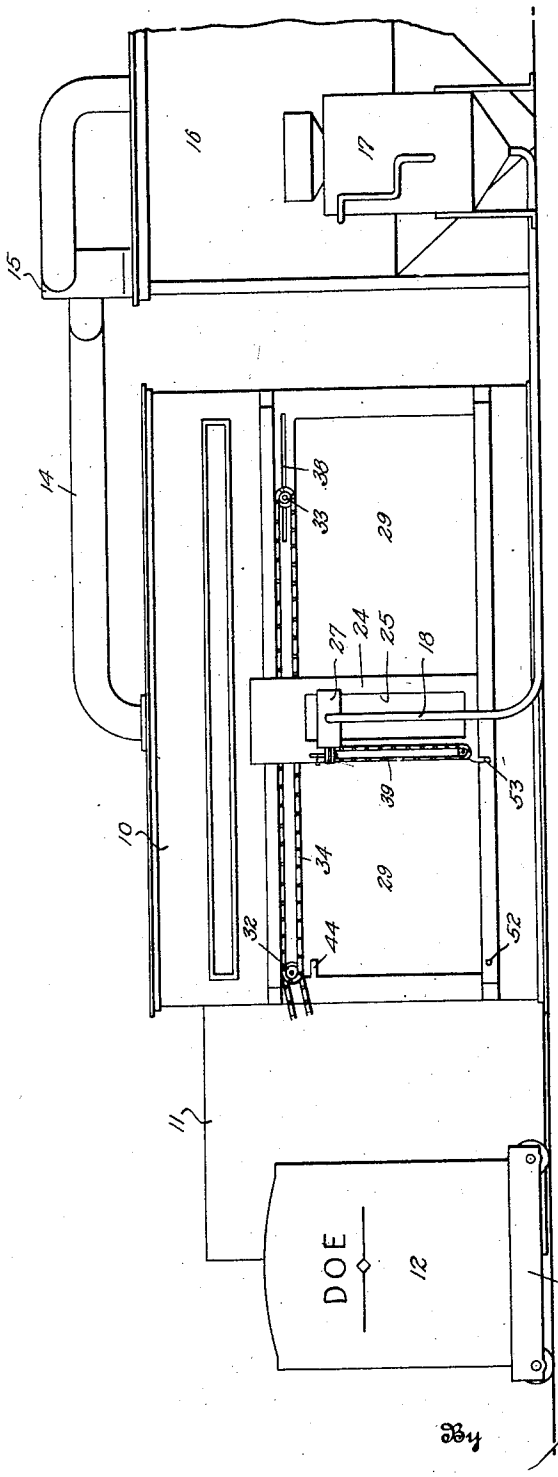


Fig. 1.

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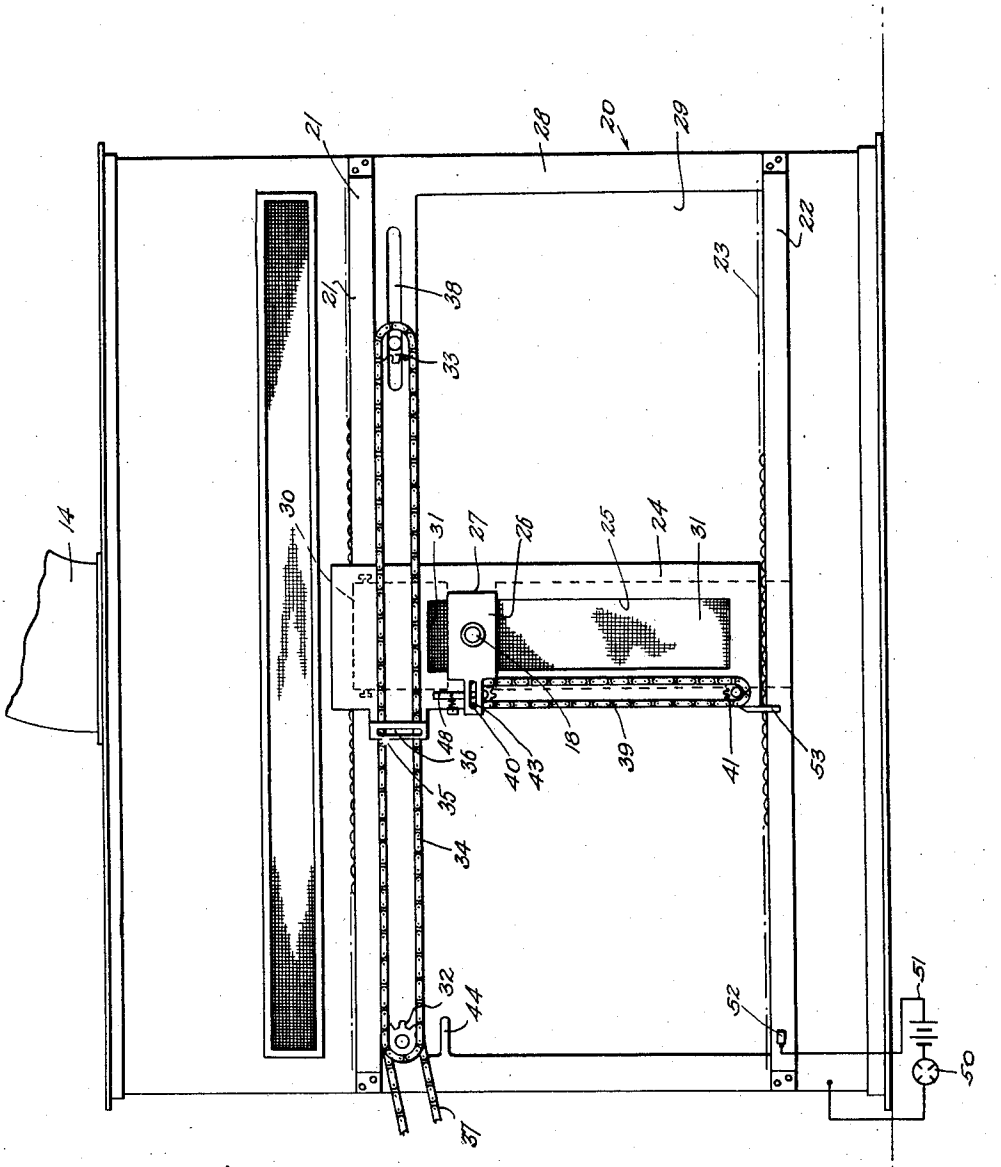


Fig. 2.

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SAND BLAST APPARATUS

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Fig. 3.

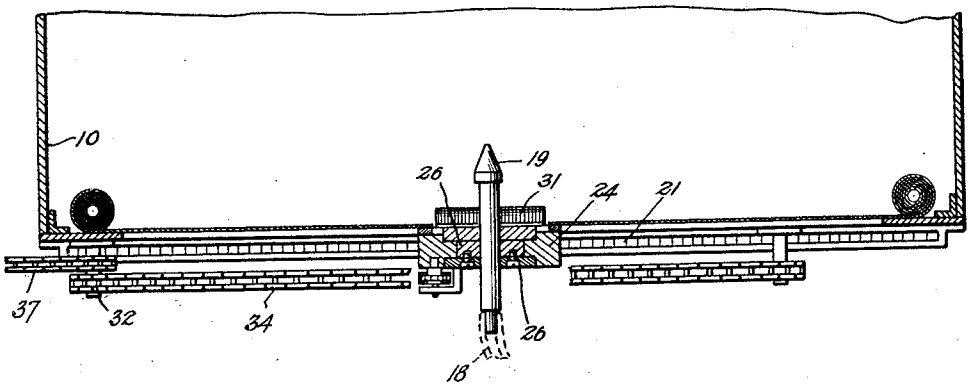
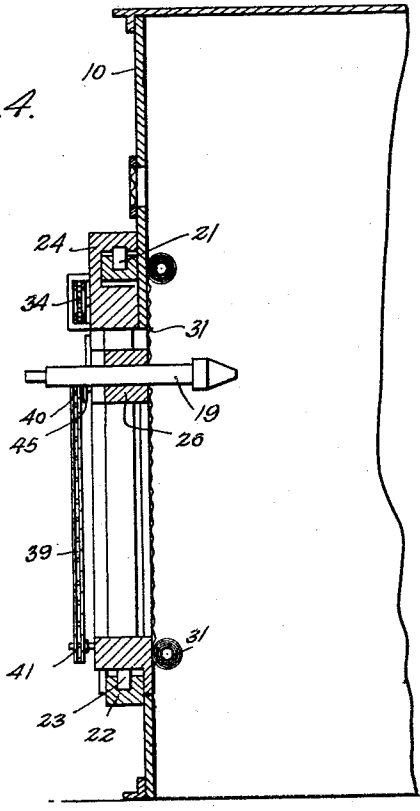


Fig. 4.



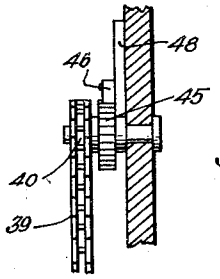


Fig. 6.

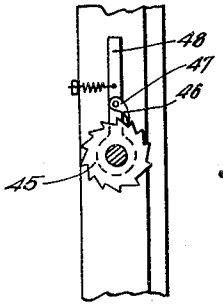


Fig. 5

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UNITED STATES PATENT OFFICE

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SAND BLAST APPARATUS

Application filed December 23, 1929. Serial No. 416,047.

This invention relates to improvements in sand blast apparatus, and more particularly to apparatus of this type primarily adapted for use in lettering, designing or producing inscriptions on monumental work, although it is understood that equipment of this type is not necessarily restricted to such use and may be utilized for wood, metal, tile and like work.

The object of the invention is the provision of means in connection with a sand blast apparatus for automatically operating the sand blast nozzle to cause the latter to traverse the entire area of the work to be occupied by the inscription or to be otherwise effected by the sand blast whereby, once the machine is set in operation, it will continue to operate without further attention of the operator until the cutting or brading effect of the sand blast has progressed to the desired degree.

A further object of the invention is the provision of a power operated sand blast nozzle carrier which will cause the nozzle to traverse the work in progression over the entire area thereof at a uniform speed to insure uniform cutting effect of the sand blast at every point of the area subjected thereto.

A further object of the invention is the provision of an automatic nozzle operating mechanism wherein the nozzle is maintained in a fixed angular position with relation to the work and also at the proper distance therefrom so as to insure continuous operation of the arrangement with the nozzle in the position to afford the maximum efficiency thereof.

A still further object of the invention is the provision of a mechanical sand blast nozzle carrier which may be applied to existing types of blast rooms by the simple expedient of substituting the improved carrier for the conventional front wall of the room in use.

A still further object of the invention consists of the provision of an indicating device combined with the power operated mechanical carrier for indicating interruption in the operation of the latter.

With the foregoing and other objects in view, the invention consists in the novel construction and arrangement of parts as will be hereinafter more fully described in connection with the accompanying drawings, wherein an approved embodiment of the invention is illustrated and in which:

Figure 1 is a diagrammatic elevation of the complete apparatus, showing the air and sand mixing device and hose connecting the latter with the nozzle extending into the blast room, the latter having the invention applied thereto.

Figure 2 is an enlarged front elevation of the improved mechanical sand blast nozzle carrier.

Figure 3 is a horizontal section on the line 3—3 of Figure 2.

Figure 4 is a vertical sectional view on the line 4—4 of Figure 2.

Figure 5 is an enlarged front elevation of a portion of the operating mechanism for effecting one of the traversing movements of the nozzle.

Figure 6 is a vertical sectional view of Figure 5.

Referring to the drawings in detail, and particularly to the diagrammatic representation of the apparatus in Figure 1, the numeral 10 indicates a room in which the work undergoing treatment is located and which, as usual, is provided with an entrance opening and a door 11 therefor. The work 12 supported on a wheel-mounted truck 13 is transported to the interior or compartment 10, and as usual in the operation of apparatus of this type, the surface of the work which is subjected to the sand blast is covered with a layer of material which is impervious to the cutting effect of the sand and which is stenciled to expose an area of the work so as to produce the desired inscription or design thereon. The sand accumulated within and entrained by the air currents in the room 10 is carried through a pipe 14 and draft producing blower 15 to the sand reservoir 16. A preferred type of mixing device 17 is connected as usual with the reservoir 16 and is equipped with the sand blast hose 18 carrying the nozzle 19 which extends into the room 10 through the front wall of the latter for causing the sand blast to impinge upon the work 12.

The parts of the apparatus above described are known in the art and the invention consists in the provision of a mechanically operated nozzle carrier which is applied to the front wall of the room 10 and automatically operates the nozzle 19 to cause the latter to traverse the entire area of the work 12 to be affected by the sand blast, thus accomplishing automatically and without the attention of an operator, the work which has previously been done entirely by hand at the expenditure of considerable time and work and with less efficiency than is obtained according to the present invention.

In applying the invention to use, the front wall of the room 10 is removed entirely or in part and is replaced by an open frame 20 bolted or otherwise secured in position to the portions of the contiguous room walls.

The frame 20 is provided with superposed horizontal guides or tracks 21 and 22, which are preferably provided with ball or roller bearings 23 to reduce frictional resistance of the moving parts to a minimum. The terminal flanges of a main carriage 24 is mounted to travel back and forth horizontally along the guides 21, and is provided with a vertically elongated opening 25 receiving the supplemental carriage 26, the lateral flanged portions 27 of which embrace and are mounted for vertical sliding movement in the opening 25. As a matter of convenience, the carriages 24 and 26 will be hereinafter referred to as the main carriage and sub-carriage, respectively.

Spring actuated rollers 28 are mounted in vertical positions at the opposite sides of the frame 20 and are attached to one end of curtain-like screens 29, which latter are adapted to be rolled upon the rollers when the latter are rotated under the influence of the spring actuating means. The adjacent edges of the screens 29 are attached to the vertical edges of the main carriage 24, and as the latter moves back and forth across the open frame 20, the two curtains 29 are moved therewith to close the front of the room 10 and prevent the escape of sand therefrom. The top and bottom of the main carriage 24 is provided with similar rollers 30 to which the screens 31 are attached at their outer ends, the adjacent ends of the last mentioned curtains being attached to the sub-carriage 26 for maintaining the opening 25 in closed condition and preventing the loss or escape of sand therethrough.

Sprocket wheels 32 and 33 are located at the upper part of the frame 20 and support a horizontally disposed chain 34, which is provided at one point in its length with a projection or pin 35 permanently engaged in a slot 36 formed in the adjacent portion of the main frame 24, the slot 36 being of sufficient length vertically to accommodate the varying elevation of the pin 35 as the latter moves with the chain 34. The chain 34 is continuously moved during the operation of the carrier from a suitable motor through a power transmitting device 37, and incident to the travel of the chain, the pin 35 engaging in the slot 36 causes the carriage 24 to traverse the open front of the frame 20 from side to side. The wheel 33 at the side of the frame 20 opposite the driving connection 37 is mounted for adjustment in a slot 38, whereby the position of the supporting wheel 33 may be varied to accommodate chains 34 of different length for a purpose which will hereinafter appear.

An actuating chain 39 for the sub-frame 26 is mounted upon upper and lower sprocket wheels 40 and 41, which are rotatably mounted on the main carriage 24 adjacent the top and bottom of the opening 25 therein. The chain 39 is provided with a pin 42 engaging in a horizontal slot 43 provided in one of the side flanges 27 of the sub-carriage 26, whereby during intermittent motion of the chain 39, the sub-carriage is reciprocated vertically through the opening 25.

Step by step, movement is imparted to the chain 39 during horizontal movement of the main carriage 24 by a lever and ratchet mechanism illustrated in detail in Figures 5 and 6, which cooperates with a trip arm 44 arranged on the frame 20 at a point adjacent one of the limits of movement of the main frame. The mechanism consists of a ratchet wheel 45, fixed to the sprocket wheel 40 and engaged by a pawl 46 pivoted at 47 to a lever 48 which latter is mounted on the axis of the wheel 40 for rotary movement independently of the latter.

The end of the lever 48 opposite the pawl 46 is extended and engageable with the trip arm 44, whereby during each horizontal reciprocation of the main carriage 24, the chain 39 together with the sub-carriage 26 is advanced one step, the lever 48 being returned to initial position under the influence of a spring 49.

A visible or audible indicating device 50 is provided in connection with the nozzle carrier and is connected on the one hand with a source of electric energy 51, and on the other hand with the frame 20 constructed of metal or other conducting material. The opposite pole of the source of energy 51 is connected with a contact member 52, which is insulated from the frame 20 and engageable by a spring contact member 53 carried by the main frame 24 so that at each stroke of said carriage, the circuit of the indicating device is closed and by the intermittent operation of said device, the attendant of the machine is informed as to the operation thereof.

In use, the work 12 is provided with the desired stencil and located within the blast room 10 in accordance with the usual procedure for operating with the known man-

ually controlled nozzle. Having set the blower 15 and mixing device 17 in operation, the chain 34 is set in motion by power supplied through the chain 37, and the main carriage 24 carrying the nozzle 19 therewith is caused to traverse the surface of the work 12 located within the room, the pin 35 working in the vertical slot 36. At the completion of each stroke of the main frame 24, the lever 48 engages the trip arm 44 oscillating the wheel 40 and advancing the chain 39 together with the sub-carriage 26 one step. In this manner, the nozzle is caused to traverse the work in horizontal planes and at the completion of each horizontal stroke the nozzle is shifted in position vertically, either upwardly or downwardly according to the position of the pin 42 with relation to the sprocket wheels 40 and 41. The operation of the nozzle carrier is entirely automatic and continuous, requiring no attention whatever, while the intermittent operation of the indicating device 50 provides means whereby the attendant is periodically informed on the operation of the machine. By removing either or both of the chains 34 and 39, and substituting chains of greater or less length, the extent of movement of the respective carriages may be varied according to the different sizes of the work to be operated upon.

While I have here shown and described, a practical embodiment of the invention, it will be understood that the same is susceptible of various structural modifications, and the substitution of mechanical equivalents for the specific devices herein disclosed without departing from the spirit and scope of the invention as defined in the appended claims. For instance, the position of the frame 20 supporting the mechanical sand blast nozzle carrier may be disposed in various positions other than the one illustrated in the accompanying drawings, to adapt it for use in connection with work of varying shapes and dimensions. It will also be understood that the chains operating the main and sub-carriages may be replaced by a worm or other drive arrangement, which will operate in the same manner to effect the work traversing movement of the nozzle.

The device as above described, and as actually built and operated, is applicable only as an improvement in sand blast apparatus. It will be remembered, however, that various other industries and arts make use of a nozzle for the application of paints, varnishes, lacquers, metals and other materials to a wide variety of surfaces, and for a number of purposes. It will be further understood that the substitution of nozzles for the use of other materials in place of the sand nozzle, and the employment of the device for other purposes than that described above, as for instance, the application of protective coatings to any class of articles, does not depart from the spirit of the invention.

What is claimed is:

1. In combination, an open frame, a nozzle movable in said frame, power operated means supporting the nozzle and operable to cause the latter to traverse a circuitous path, movable screen elements connected with the nozzle and moving therewith to normally close the open frame, and means for taking up the slack in the screen members during movement of the nozzle.

2. In combination, an open frame, a carriage device including two parts mounted for relative movement in different planes, a blast nozzle carried by one of said parts, means connected with one of the carriage parts to cause the latter to traverse the open frame in one direction, and means operated incident to movement of the first mentioned carriage part to cause the intermittent movement of the other carriage part through a closed circuitous path.

3. In combination, an open frame, a carriage device including two parts mounted for relative movement in different planes, a blast nozzle carried by one of said parts, means connected with one of the carriage parts to cause the latter to traverse the open frame in one direction, means operated incident to movement of the first mentioned carriage part to cause the intermittent movement of the other carriage part through a closed circuitous path, and means for varying the extent of movement of the respective carrier parts.

4. In combination, an open frame, a carriage device including two parts mounted for relative movement in different planes, a blast nozzle carried by one of the parts of said device, a power operated endless drive member connected with one of said parts to cause the latter to traverse the open frame in one plane, and means operated incident to movement of the first mentioned carriage part to cause intermittent movement of the other carriage part through a closed circuitous path.

5. In combination, an open frame, a carriage device including two parts mounted for relative movement in different planes, a blast nozzle carried by one of the parts of said device, a power operated endless drive member connected with one of said parts to cause the latter to traverse the open frame in one plane, and means operated incident to movement of the first mentioned carriage part to cause intermittent movement of the other carriage part through a closed circuitous path, said last mentioned means also including an endless member.

6. In combination, a blast nozzle, supporting means therefor mounted for rectilinear movement in each of two angularly related directions, means for continuously moving

the supporting means in one of such directions, and means for intermittently moving the supporting means in the other of such directions.

7. In combination, a blast nozzle, supporting means therefor capable of movement in each of two angularly related planes, means for continuously moving the supporting means in one of such planes, and means for intermittently moving the supporting means in the other of such planes, the intermittently moving means being effective at one limit of movement of the supporting means under the continuously moving means.

8. In combination, a blast nozzle, a supporting frame therefor, means for moving the frame continuously in one plane in opposite directions, and means controlled by the continuously moving means for moving the frame intermittently in the same plane but in a direction at an angle to the direction of movement first mentioned.

9. In combination, a blast nozzle, a carriage for the nozzle made up of two parts, means cooperating with one of said parts for continuously moving both said parts in one rectilinear plane, and means connected with the other of said parts for intermittently moving said latter part alone in a rectilinear plane angularly related to the first mentioned plane.

10. In combination, an open frame, a carriage guided for movement longitudinally of the frame, means for continuously moving the carriage with respect to the frame, a blast nozzle, a nozzle-carrying element movable relative to the carriage in a direction at right angles to the carriage movement, and means for imparting movement to said element independently of and intermittently with respect to the carriage movement.

11. In combination, an open frame, a carriage guided for movement longitudinally of the frame, means for continuously moving the carriage with respect to the frame, a blast nozzle, a nozzle-carrying element movable vertically of the carriage, and means for moving the element with respect to the carriage when the carriage has reached a limit position with respect to the frame.

12. In combination, an open frame, an open carriage movable longitudinally of the frame, a nozzle, a nozzle-carrying part movable in the open carriage, means for continuously moving the carriage in the frame, means for intermittently moving the nozzle-carrying part of the carriage, means for maintaining the frame beyond the carriage closed during movement of the carriage, and means for maintaining the open carriage beyond the nozzle-carrying part closed during movement of such part.

13. In combination, an open frame, a carriage guided longitudinally of the frame, means for moving the carriage lengthwise the frame in both directions, a blast nozzle, a nozzle-supporting element movable vertically of the carriage, means for imparting predetermined movement to the nozzle-supporting element, said means being actuated by the carriage operating means at one limit position of the carriage.

14. In combination, an open frame, a carriage guided for movement longitudinally of the frame, an endless chain for compelling reciprocating movement of the carriage in the frame, a blast nozzle, an element supported for movement in the carriage and carrying the nozzle, a chain for operating the element, and means operative at one limit movement of the carriage for actuating the element operating chain.

In testimony whereof I affix my signature.

CARL H. BILLMAN.