

PATENT SPECIFICATION

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(54) IMPROVEMENTS RELATING TO MACHINES FOR BLAST CLEANING VERTICAL AND NEAR-VERTICAL SURFACES /

(71) We, WORLDWIDE BLAST CLEANING LIMITED, a Company duly organised under the Commonwealth of the Bahamas, of Post Office Box N-7788, Nassau, Bahamas, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to machines for blast cleaning a vertical or near-vertical surface, for example the shell plates of storage tanks, the side plates of ships and the like, the invention having particular reference to a machine of the kind comprising means for projecting a stream of abrasive material, for example abrasive grit, sand, or steel shot, at an inclined angle on to the surface to be treated and means for collecting and returning to the projecting means the spent abrasive rebounding from the surface.

A particular problem which arises in blast cleaning a vertical surface is the need to ensure that all rebounding abrasive material and foreign matter removed by the abrasive material is carried away from the treated zone, as any such material or matter retained in or falling back into the zone will block off abrasive material being thrown by the projecting means and will also contaminate the treated surface. The present invention provides an improved machine to overcome this problem by an arrangement in which the rebounding abrasive material tends to fall away from the treated zone rather than towards it and in which the passage of the rebounding abrasive material away from the treated zone is maintained at such a speed as will ensure that all the rebounding abrasive material is carried to a reclaim zone.

According to this invention there is provided a machine for blast cleaning a vertical or near vertical surface comprising an enclosure having a side opening adapted to confront a surface to be treated, a centrifugal blast wheel adapted to receive abrasive material from a storage hopper and to project a stream of abrasive material in a

downwardly inclined direction on to the surface zone exposed through the side opening, and a conduit into which abrasive material rebounds in a downwardly inclined direction from the surface and by which the abrasive material is returned to an abrasive material reclaim zone, and wherein means are provided for maintaining a flow of air through the conduit which progressively decreases in cross sectional area in a direction away from the surface zone.

An embodiment of the invention will now be described by way of example, with reference to the drawing, the single Figure of which is a diagrammatic vertical section.

Referring to the drawing, a machine comprises a frame or enclosure provided at one side with an opening 11 adapted in use to confront a surface S to be treated, the machine having wheels or rollers 12 engageable with the surfaces to facilitate smooth traverse of the machine upon it. Located within the machine is a downwardly inclined duct 13 leading from a centrifugal blast wheel 14 to a blast surface zone 15 of the surface S immediately adjacent the opening 11, the blast wheel being driven by a motor 16 and receiving abrasive material from a storage hopper 17 via a short trunk 18 which may, if desired, have means (not shown) for controlling the rate of return flow of abrasive material to the blast wheel 14. The opening 11 is provided around its periphery with resilient sealing means 19 which engage the surface S and prevent escape of abrasive material from the enclosure at the blast zone, the sealing means at the side and lower edges of the opening being in the form of rubber strip, whilst the sealing means at the upper side of the opening is in the form of a brush-type sealing strip 19a for a purpose hereafter explained. The blast wheel 14 delivers a continuous stream of abrasive material down the duct 13, through the opening 11 and on to the exposed blast zone 15 of the surface S at an angle of approximately 60° to the surface, the abrasive material rebounding from the surface at approximately the same angle and also in a downwardly inclined direction into

a conduit 20 which curves rearwardly and then upwardly to deliver the spent abrasive material and foreign matter removed from the treated surface to a reclaim zone.

- 5 The passage of the spent abrasive material away from the blast zone 15 and through the conduit 20 is considerably enhanced by the provision of a flow of air through the conduit in the same direction. This is preferably effected by connecting the upper end of the conduit 20 to a source of suction created in this instance by an extractor fan 21, the air to establish this flow being sucked into the space adjacent the blast zone through the brush-type sealing strip 19a. The downward projection of the abrasive material has the advantage that gravity tends to maintain and increase the velocity of the abrasive material both towards and away from the blast zone, but it is also desirable to keep the abrasive material moving as far as possible at a substantially constant speed in its passage through the conduit 20, and this is achieved by admitting air to the enclosure through the opening provided by the strip 19a, being an opening of pre-determined or controlled size, and by the reducing cross sectional area of the conduit 20 in the direction of air flow, whereby the velocity of the air flow in the conduit progressively increases towards the upper end. Such increased velocity brings the suspended abrasive material into a tighter mass whereby the rate of travel of the stream is maintained at a level to ensure that the machine works at its maximum efficiency with the minimum of wear.

An enclosure 22 above the storage hopper defines a reclaim zone, the upper end of the conduit 20 discharging into this enclosure. It is to be noted that the reducing cross section of the conduit 20 ceases at about the top level of the hopper 17; the conduit thereafter progressively increasing in cross section as shown at 20a to reduce the speed of the abrasive material at the point of entry to the enclosure 22. The further expansion of the air as it enters the enclosure causes the entrained abrasive material to sink into the storage hopper whilst the foreign matter is carried on over a baffle 23 where heavier particles are directed into a channel 24 and past an airlock (not shown) to a disposal point. The dust and lighter particles are carried

on upwards with the air around a second baffle 25 to an air outlet embodying a dust collector and the extractor fan 21. The baffles 23, 25 are preferably angularly adjustable so that they can be set to provide maximum separation of the entrained particles.

WHAT WE CLAIM IS:-

1. A machine for blast cleaning a vertical or near vertical surface comprising an enclosure having a side opening adapted to confront a surface to be treated, a centrifugal blast wheel adapted to receive abrasive material from a storage hopper and to project a stream of abrasive material in a downwardly inclined direction on to the surface zone exposed through the side opening, and a conduit into which abrasive material rebounds in a downwardly inclined direction from the surface and by which the abrasive material is returned to an abrasive material reclaim zone, and wherein means are provided for maintaining a flow of air through the conduit which progressively decreases in cross sectional area in a direction away from the surface zone.

2. A machine as claimed in claim 1, including sealing means around the side opening, part of the sealing means providing an opening through which air is caused to flow across the surface zone and into the conduit.

3. A machine according to claim 1 or claim 2, including an enclosure above the hopper and defining the reclaim zone, the conduit including a portion of progressively increasing cross sectional area leading into the enclosure.

4. A machine according to claim 3, wherein the enclosure has baffles operable to separate entrained material from the air stream.

5. A machine according to claim 4, wherein the baffles are angularly adjustable.

6. A machine for blast cleaning a vertical or near vertical surface constructed and arranged substantially as herein described and shown in the drawing.

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2. A machine as claimed in claim 1, including sealing means around the side opening, part of the sealing means providing an opening through which air is caused to flow across the surface zone and into the conduit.

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