Jan. 31, 1967 L. B. DOCKERY 3,300,902

DRY ABRASIVE HONING DEVICE

Filed July 13, 1964 2 Sheets-Sheet 1

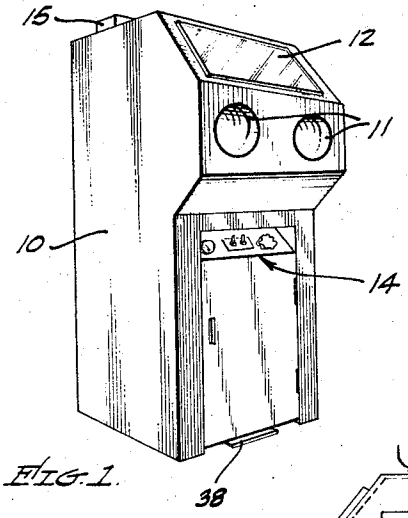

FIG. 1.

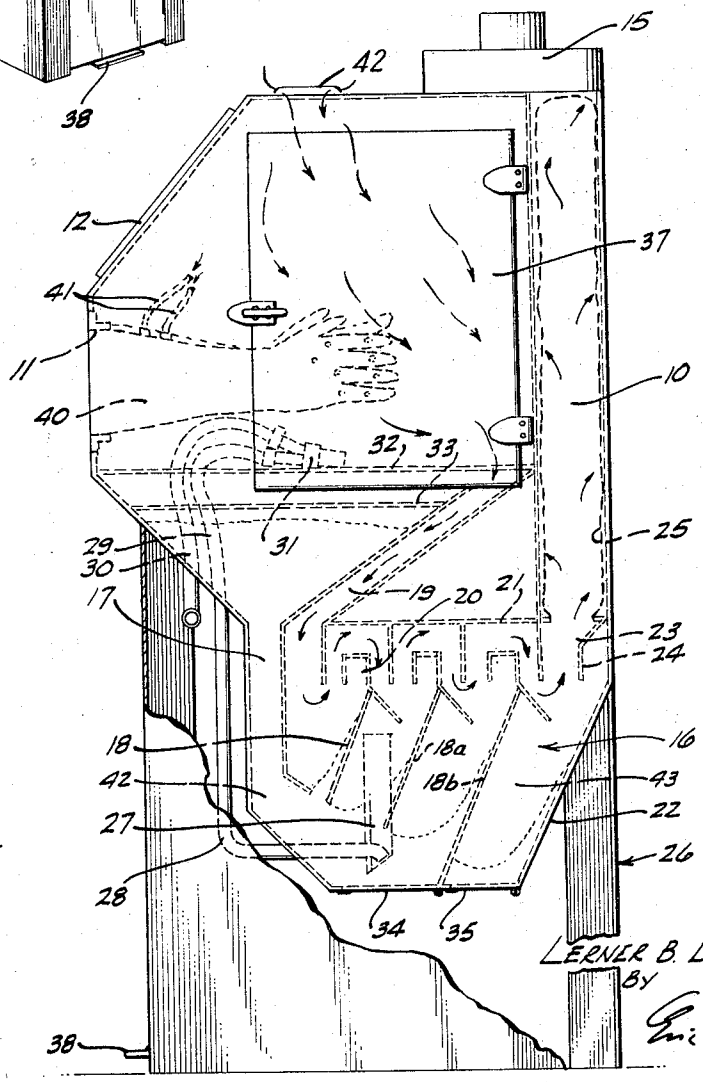

FIG. 2.

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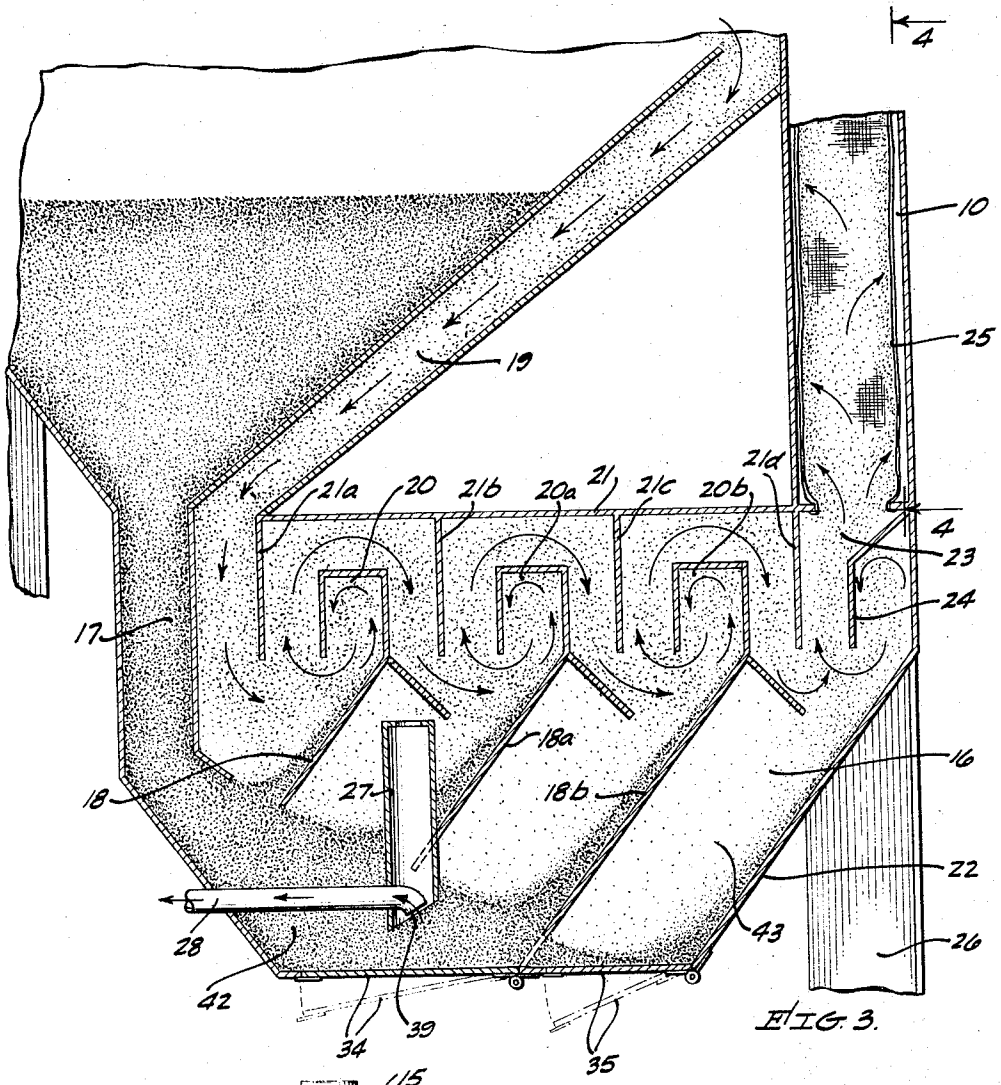

FIG. 3.

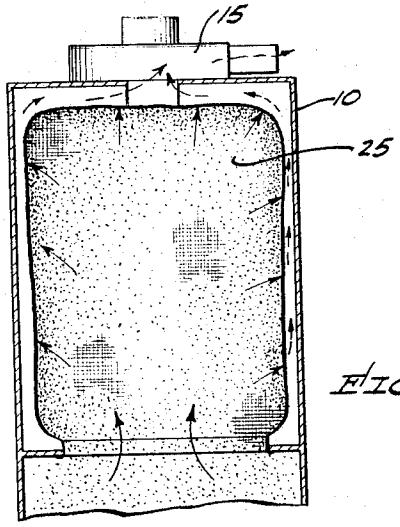

FIG. 4.

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3,300,902

DRY ABRASIVE HONING DEVICE

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7 Claims. (Cl. 51—8)

My invention relates to improvements in dry abrasive honing device, and particularly to its application using a plural cyclone separator; and the objects of my invention are, first, to provide a honing device operated on a low air volume and velocity cycle separator, second, to provide a dry abrasive honing device having a separator using clean abrasive particles and assuring thereby consistent high quality in the honing process, third, to provide a device permitting the changing of abrasives and removal of dust in an efficient manner and using a ventilated system enclosed in a sealed cabinet to prevent external emission of particles, dust or debris, fourth, to provide a device permitting a selected combination of air pressure and abrasives or particles to provide an infinite variety of finishing processes including the cleaning, peening, polishing, buffing and deburring of materials.

Additional objects, together with further advantages derived in utilizing the present invention will become apparent from the following detailed description thereof taken together with the accompanying drawing forming part of the specification, in which—

FIGURE 1 is a view in perspective of my dry abrasive honing device;

FIGURE 2 is a side elevational view of my device partially broken away and in section, and showing a portion of my device in transparency;

FIGURE 3 is an enlarged cross-sectional view of the separator portion of my device; and

FIGURE 4 is a cross-sectional view of the envelope-type dust collector bag of my device taken on line 4—4 of FIGURE 3.

Similar numerals refer to similar parts throughout the several views.

My invention relates to the improvement in dry abrasive honing device and particularly its application to a device using a plural cyclone separator, installed in a sealed cabinet as shown in the accompanying drawing.

Generally the device comprises a cabinet **10** having a working chamber provided with openings **11** for the introduction of hands and arms and a glass covered viewing opening **12** positioned above the openings provided for the arms and hands of the operator.

Operating controls **14** are provided below the working chamber on the front side of the cabinet and an exhaust blower **15** is provided at the top rear portion of the cabinet.

The separator **16** of my device is positioned below the working chamber.

A filler tube **17** is provided in the front portion of the separator extending downwardly along the front wall of the cabinet into the storage reservoir of the separator.

A plurality of inverted L-shaped stationary baffleplates **18**, **18***a*, **18***b* are installed at substantially a 45° angle in spaced relation to each other transversely to said cabinet.

A chute **19** extends diagonally through the top portion of the separator from the floor of the working chamber into the separator.

A plurality of inverted U-shaped channels **20**, **20***a*, **20***b* are installed transversely in said cabinet, one leg of each channel being integrally connected to the vertex of one of the inverted L-shaped stationary baffleplates **18**, **18***a*, **18***b*.

A horizontal plate **21** is installed in spaced relation to and above the channels **20**, **20***a*, **20***b* and extends from the rear of the separator to the chute **19**.

A plurality of vertical louvers **21***a*, **21***b*, **21***c*, **21***d* are integrally connected to the plate **21** and extend at right angle downwardly therefrom for a predetermined distance, so positioned as to form a passage between such vertical louvers and the channels **20**, **20***a*, **20***b*.

The separator rear wall **22** is sloped downwardly at approximately a 45° angle parallel to the long leg of the inverted L-shaped stationary baffleplates **18**, **18***a* **18***b* and at a level even with the vertex of said baffleplates, extends vertically upwards to form the rear wall of the cabinet.

The air exhaust duct **23** is provided at the rear of the cabinet **10** and is formed between an extension of a vertical louver **21***d* and the upright extension of the separator rear wall **22** having a reduced diameter formed by a dividing wall **24** extending into said air exhaust duct **23** at a level horizontal with the top portion of the U-shaped channel **20***b*.

An envelope-type dust collector bag **25** is positioned in the top portion of the air exhaust duct **23** above the level of the plate **21**.

The lower portion **26** of the cabinet is in vertical alignment with the upper extension of the separator rear wall **22**.

The blower **15** is positioned at the top of the air exhaust duct **23** above the envelope-type dust collector bag **25**.

A controlled vacuum suction tube **27** is positioned vertically below the vertex of the baffleplate **18**, located adjacent to the filler tube **17**, and extends a predetermined distance downwardly below the normal level of abrasive material stored in the separator.

The controlled vacuum suction tube **27** is closed at the top by an orifice and has a slanted opening at the bottom. The size of the orifice and the slanted angle of the bottom opening of the tube is determined by the size of the separator, the air working pressure of the separator and the volume of abrasives used by the device.

An abrasive pickup tube **28** extends horizontally into the controlled vacuum suction tube **27** near the bottom thereof, and the opening of the abrasive pickup tube **28** is slanted downwardly within the controlled vacuum suction tube **27** and is centered in the slanted opening located in the bottom of the vacuum suction tube **27** and terminates at the same angle as the slanted angle of the controlled vacuum suction tube.

The other end of the abrasive pickup tube extends upwardly towards the working chamber of the device, where it is connected through an abrasive feed hose **29** to the abrasive feed valve **31**.

A compressed air supply is conducted through a suitable air pressure hose **30** into the abrasive feed valve **31** where the abrasive, conducted by the abrasive feed hose **29**, is injected into the air stream.

The floor of the working chamber consists of a horizontal grate **32** extending from the front to the rear of the working cabinet.

A screen **33** is positioned below the grate **32** and parallel thereto, to receive the abrasives and other particles deposited upon the grate **32** during the working process.

The floor of the separator is comprised of a forward door **34** and a rear door **35** through which abrasives may be removed from the separator.

The working chamber is made accessible by a side opening and working chamber door **37** provided at the level of the working chamber on the side of the cabinet **10**.

The abrasive feed valve **31** is controlled by a lever **38** located at the bottom of the front of the cabinet **10**.

Abrasive resistant gloves **40**, having openings in the finger portions thereof, extend through the openings **11**

in the front of the cabinet **10** and a separate air supply is conducted through an air supply hose **41** to each glove for cooling purposes, the air stream entering each glove **40** through the air supply hose **41**, and is discharged through the openings in the fingers of the respective glove.

A suitable vent opening **42** is positioned on the top of the cabinet above the working chamber.

In operation, the abrasive selected by the operator is introduced into the filler tube **17** to a level below the screen **33**. The lower level of the abrasive will slant downwardly in the bottom portion of the separator as shown in FIGURE 3 of the drawing. The part to be worked upon is then placed upon the grate **32** and power is supplied to the blower **15**. An air current is created through the vent **42** across the working chamber and through the chute, following a path between the channels **20**, **20***a*, **20***b* and the compartment formed by the horizontal plate **21** and the vertical louvers **21***a*, **21***b*, **21***c*, **21***d*, and the air current then enters the envelope-type dust collector bag **25** through the narrowed passage formed between the vertical louver **21***d* located nearest the back of the cabinet and the dividing wall **24** extending into the air exhaust duct **23** from where it is expelled through the blower **15** to the outside air.

The arrangement of the horizontal plate, vertical louvers, channels and stationary baffleplates creates a swirling motion of the air current within each U-shaped channel before entering the passage created by the outside of the channel and the adjacent vertical louvers and horizontal plate. Specifically after leaving the chute **19** the air current will enter the first channel **20** in a swirling motion and leaving the inside of the channel will enter the passage created by the outside of the channel **20**, and the vertical louver **21***a*, will then pass between the outside of the channel and the horizontal plate **21** and descend the passage created by the outside of the channel **20** and the adjacent vertical louver **21***b*. The air current will then be deflected by the short leg of the stationary baffleplate **18** and enter the second channel **20***a*, in a swirling motion, and will then enter the passage created by the outside of said channel **20***a*, and the adjacent vertical louver **21***b*, pass through the passage created by the outside of the channel and the horizontal plate **21** and descend through the passage created by the outside of the channel and the adjacent vertical louver **21***c* where it will be deflected by the short leg of the stationary baffleplate **18***a*, and striking the long leg of the stationary baffleplate **18***b* will be deflected into the inside of the channel **20***b* in a swirling motion. The air stream will then leave the interior of channel **20***b* and enter the passage created by the outside of the channel **20***b*, and the adjacent vertical louver **21***c*, and passing through the passage created by the outside of said channel and the horizontal plate **21**, will then descend in the passage created by the outside of the channel **20***b*, and the adjacent vertical louver **21***d* whereupon it will be deflected by the short leg of the stationary baffleplate **18***b* into a space created by the extension of the separator **22**, and the dividing wall **24**, extending into the air exhaust duct **23**, in a swirling motion and leaving said space, will enter the passage created by the dividing wall **24**, and the adjacent vertical louver **21***d*, and ascend through the air exhaust duct **23**, entering the envelope-type dust collector bag **25**, and pass through the blower **15** into the outside air.

Operation of the abrasive feed valve when working upon a product placed upon the grate **32** will cause the abrasive particles to drop upon the screen **33**, and a plurality of the particles will be carried into the chute **19**, and following the air stream the largest particles of the abrasive will be deposited upon the long leg of the first stationary baffleplate **18** and slide into the reservoir at the bottom of the separator, the air current carrying smaller particles to the long leg of the next stationary baffleplate **18***a*, and depositing the largest particles then present into said reservoir and the residue of the abrasive is then carried by the air current against the long leg of the succeeding stationary baffleplate **18***b* depositing the larger particles then present into the reservoir, while the fine particles still remaining in the air stream will be carried into the space created by the rear wall of the cabinet and the dividing wall **24**, and will then be deposited in the separate reservoir created by the separator rear wall **22**, the long leg of the stationary baffleplate **18***b*, and the rear door **35**, from where these small unusable particles may be removed through said door.

During operation, air is supplied to the interior of the abrasive resistant gloves **40**, through a separate air supply conducted through an air supply hose **41**, and leaving through the openings provided in each glove, assuring thereby a continuous cooling of the hands and arms of the operator.

The pickup of the abrasives from the reservoir located on the floor of the separator is accomplished by the creation of a controlled vacuum in the controlled vacuum suction tube **27**, causing abrasives to be sucked into the abrasive pickup tube **28**, from where the abrasives are conducted to the abrasive feed valve **31**. The exact negative air pressure required to accomplish a continuous effective flow of the abrasive through the abrasive pickup tube, is controlled by the size of the opening in the top of the controlled vacuum suction tube **27**, and the angle of slant used at the bottom of the vacuum suction tube **27**.

It is understood that various forms of my invention may be used or utilized embodying the principles of my invention, without departing from the spirit of my invention.

I claim:

1. A dry abrasive honing device comprising a cabinet having a working chamber in the top portion and a separator in the lower portion positioned below the working chamber and having a front wall, a rear wall and a floor; a filler tube extending downwardly along the front wall to the floor; a chute extending diagonally across the separator adjacent to the filler tube; a plurality of inverted L-shaped stationary baffleplates installed at substantially a 45° angle in spaced relation to each other transversely to said cabinet in said separator; a plurality of inverted U-shaped channels installed transversely in said separator, one leg of each channel being integrally connected to one of the L-shaped stationary baffleplates at the vertex thereof; a horizontal plate installed in spaced relation to and above said channels and extending from the rear wall of the cabinet to the chute; a plurality of vertical louvers integrally connected to said plate in spaced relation to each other and extending downwardly therefrom for a predetermined distance so as to form a passage between such vertical louvers and the channels; a separator rear wall sloped downwardly at approximately a 45° angle parallel to the long leg of the inverted L-shaped stationary baffleplates and at a level even with the vertex of said baffleplates and extending vertically upwards to form the rear wall of the cabinet; an air exhaust duct provided at the rear of the cabinet and formed between an extension of a vertical louver and the upright extension of the separator rear wall, having a reduced diameter formed by a dividing wall extending into said air exhaust duct at a level horizontal with the top portion of the U-shaped channel; an envelope-type dust collector bag positioned in the top portion of the air exhaust duct above the level of the horizontal plate; a blower positioned at the top of the air exhaust duct above the envelope-type dust collector bag; a controlled vacuum suction tube positioned vertically below the vertex of the baffleplate located nearest the filler tube and extending a predetermined distance downwardly, said controlled vacuum suction tube having an orifice at the top thereof and a slanted opening at the bottom, the size of the orifice and the slanted angle of the bottom opening of the tube being determined by the size of the separator, the air working pressure of the separator and the volume of abrasives used by the device; an abrasive pickup tube extending horizontally into said

controlled vacuum suction tube near the bottom thereof and having an opening slanted downwardly within the controlled vacuum suction tube and centered in the slanted opening located in the bottom thereof and terminating at the same angle as the slanted angle of the controlled vacuum suction tube, the other end of said tube extending upwardly towards the working chamber; and means to conduct a compressed air supply and abrasives supplied by the abrasive pickup tube to the working chamber.

2. A dry abrasive honing device having a separator including a controlled vacuum suction tube having a top portion and an orifice provided in said top portion and a bottom portion formed by a slanted opening, the size of the orifice and the slanted angle of the bottom portion being determined by the size of the separator, the air working pressure of the separator and the volume of abrasives used by the device, and an abrasive pickup tube extending horizontally into the controlled vacuum suction tube near the bottom portion thereof and being slanted downwardly with the controlled vacuum suction tube and being centered in the slanted opening located in the bottom portion of the vacuum suction tube and terminating at the same angle as the slanted angle of the controlled vacuum suction tube.

3. In a dry abrasive honing device, a housing including a working chamber and a separator positioned below said working chamber, said separator having a front wall, a rear wall and side walls; a plurality of inverted L-shaped stationary baffleplates positioned transversely between said front wall and rear wall in spaced relation to each other and extending from one side wall to the other side wall; a plurality of inverted U-shaped channels installed above said baffleplates and extending transversely between said front wall and rear wall from one side wall to the other side wall, one leg of each channel being integrally connected to one of the inverted L-shaped stationary baffleplates; a horizontal plate positioned in spaced relation to and above said channels and affixed to the rear wall of the separator; and a plurality of vertical louvers integrally connected to said horizontal plate in spaced relation to each other and extending downwardly therefrom for a predetermined distance so as to form a passage between such louvers and the channels.

4. In a dry abrasive honing device having a separator, tubular means positioned vertically in said separator and having an orifice at the top and a slanted opening at the bottom thereof, and tubular means extending into said first named tubular means near the bottom thereof and

having a slanted opening extending in the same plane as the slanted opening of the first named tubular means.

5. In a dry abrasive honing device having a separator, tubular means positioned vertically inside separator and having an orifice at the top and a slanted opening at the bottom thereof, and tubular means extending into said first named tubular means near the bottom thereof being slanted downwardly and having an opening slanted in the same plane as the slanted opening of the first named tubular means.

6. In a dry abrasive honing device having a working chamber and a separator positioned below said working chamber, a plurality of inverted L-shaped stationary baffleplates positioned in said separator in spaced relation to each other, a plurality of inverted U-shaped channels positioned above said baffleplates each having one leg in contact with one baffleplate near the vertex thereof, and means positioned above said baffleplates and between said baffleplates forming a passage between said means and said baffleplates and said channels.

7. In a dry abrasive honing device having a working chamber and a separator having a dry abrasive reservoir, mechanical means forming a dry abrasive passage way and depositing the dry abrasive in the reservoir and tubular means cooperating with said mechanical means removing said dry abrasive from said reservoir in controlled quantity, said tubular means comprising pipe means positioned vertically in said separator and extending into said reservoir and having an orifice at the top and a slanted opening at the bottom thereof, and tubular means extending into said pipe means near the the bottom thereof and having an end centered within the slanted opening of the pipe means and having an end slated in the same plane as said slanted opening of said pipe means.

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