May 12, 1942. L. S. LINDEROTH, JR 2,282,365

SHOE MACHINERY

Filed May 5, 1939 3 Sheets-Sheet 1

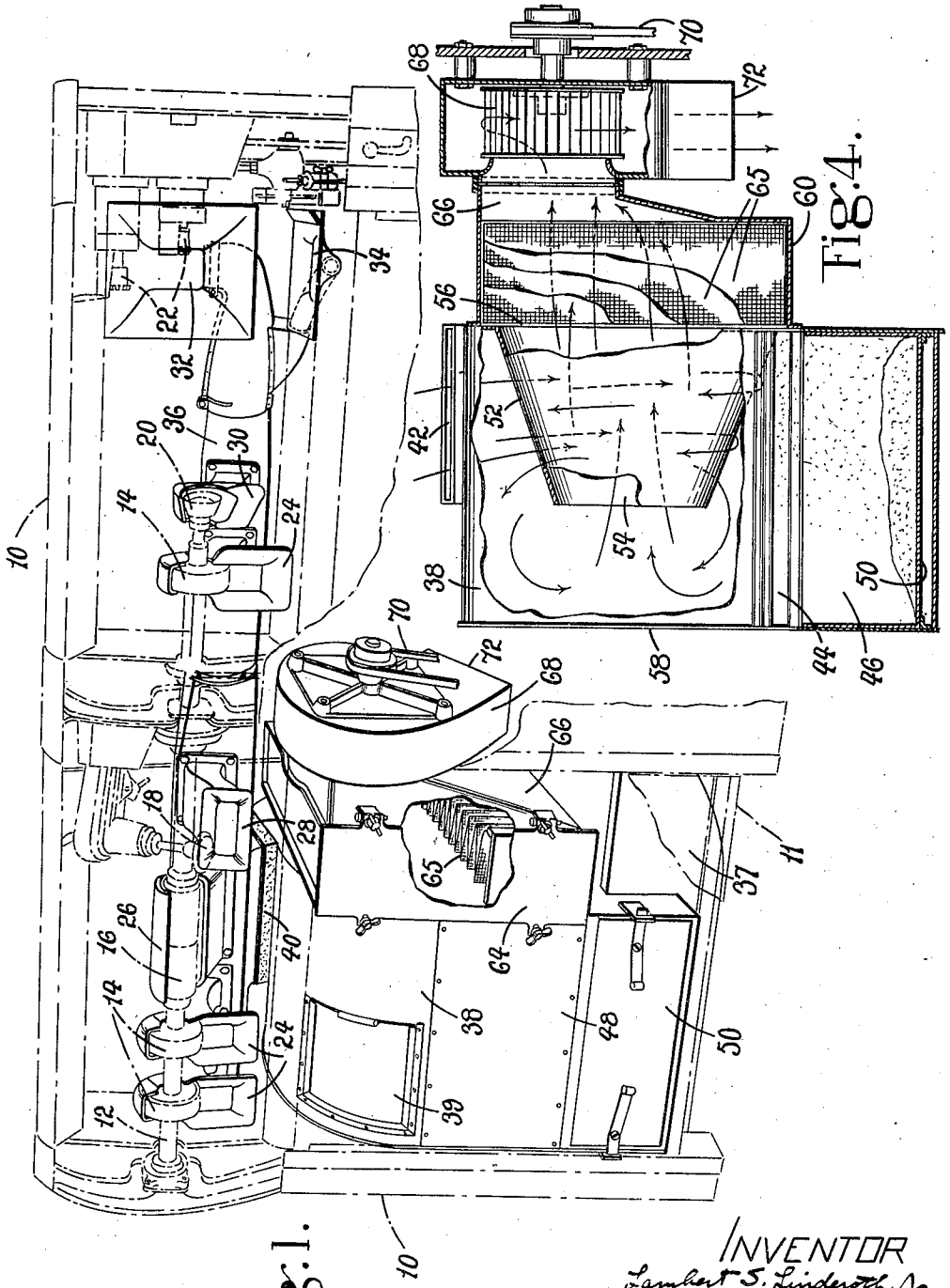


Fig. 1.

Fig. 4.

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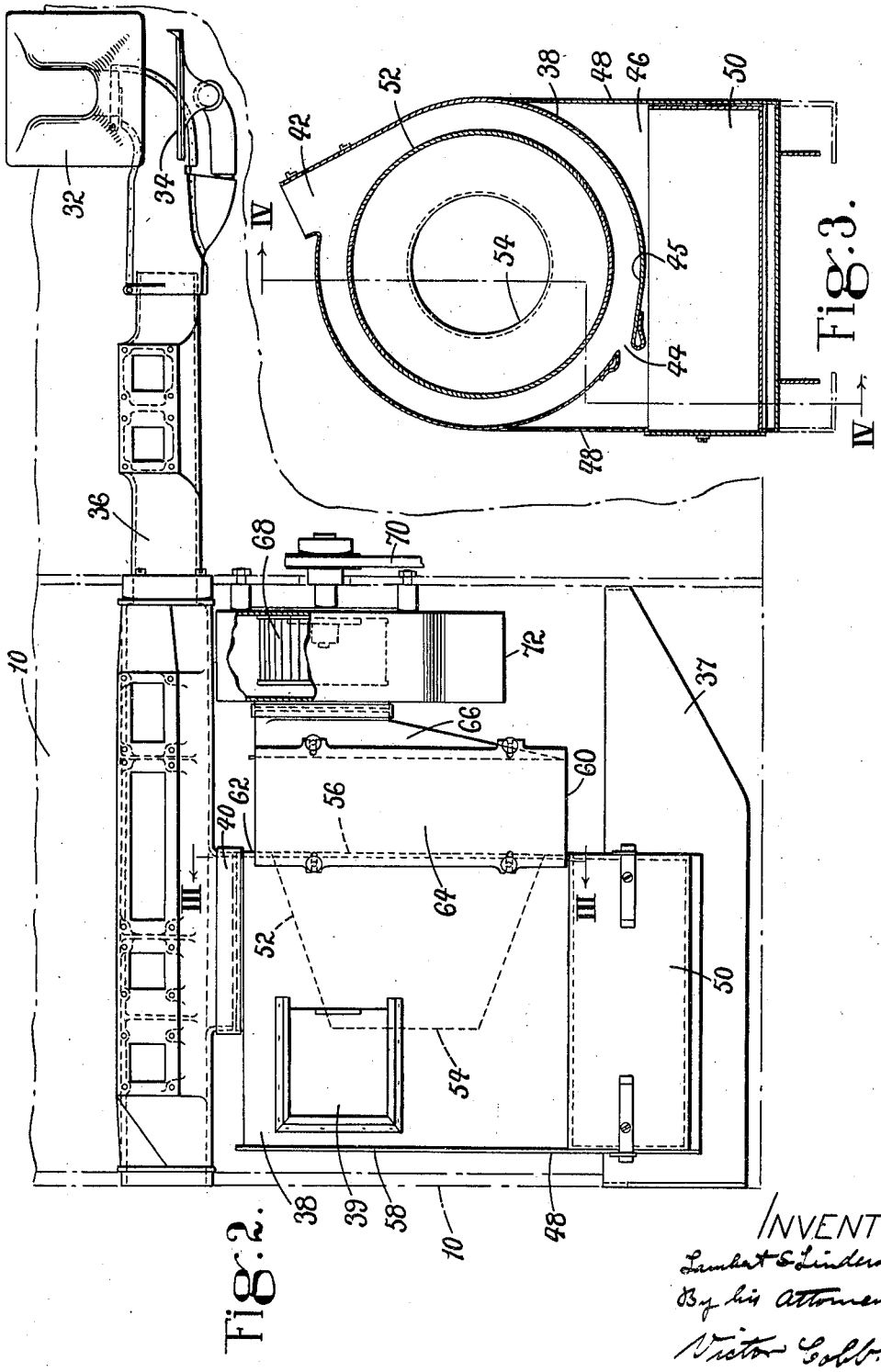


Fig. 3.

Fig. 2.

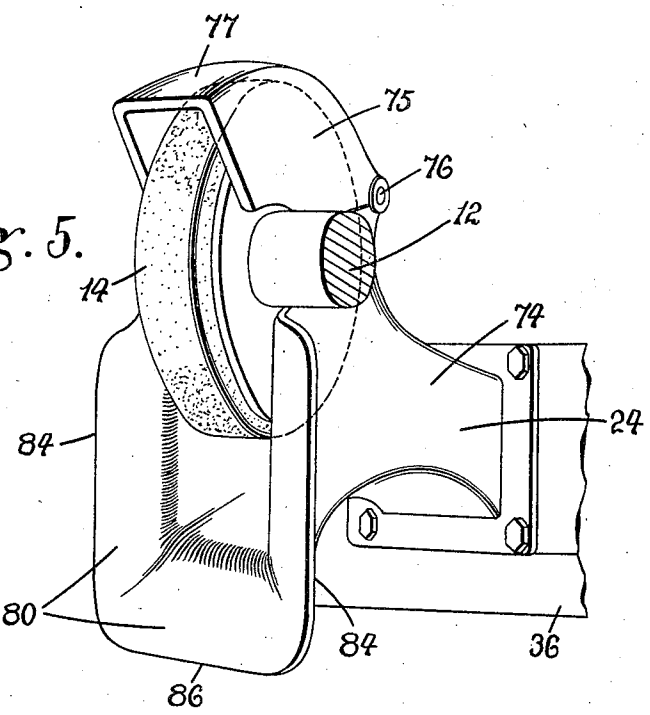
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Fig. 5.



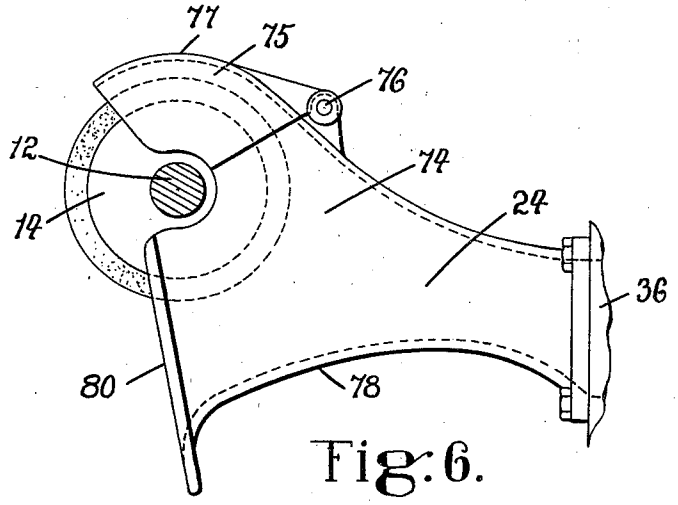


Fig. 6.

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2,282,365

UNITED STATES PATENT OFFICE

2,282,365

SHOE MACHINERY

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Application May 5, 1939, Serial No. 271,965

6 Claims. (Cl. 51—273)

This invention relates to dust hoods, and is herein illustrated and described as embodied in a dust collecting system suitable for use in a shoe machine of the type known as repair outfits which are equipped with various buffing, scouring and trimming tools. Such a machine is disclosed in an application for United States Letters Patent, Serial No. 248,801, filed December 31, 1938, in the name of Frederick A. Prahl, Jr. The operation of the various tools above mentioned gives rise to considerable quantities of dust and chips, which must be continuously removed from the locality of operation. Such removal is usually accomplished by a suction draft apparatus having dust hoods associated with the tools. It is ordinarily impracticable and nearly everywhere forbidden by law to conduct dust-laden air from the dust hoods through long lines of piping and then to discharge it into the atmosphere outside of the building. The usual practice is to filter the dust from the air in which it has been entrained, and then to discharge the cleaned air into the room. It is desirable that a system of this character be compact, that the cleaned air which is returned to the atmosphere be substantially free of dust and that the power requirements be a minimum.

It is an object of the present invention to provide a dust hood capable of contributing to the efficiency and compactness of a dust collecting system of a type which, for example, may conveniently be used in a shoe repair machine.

In accordance with a feature of the invention, the mouths of the several illustrated dust hoods are each provided with an outwardly flared portion terminating in a flange which extends about the lower portion of the rotary tool and closely adjacent thereto on opposite sides. This flange prevents air from leaking forwardly around the inlet end of the hood and thereby lessening the force of the draft by aerodynamically constricting the inlet passage of the hood. The flange also directs the incoming air in such a manner as to insure higher velocities in front of the hood at the locality of maximum generation of dust.

These and other features of the invention will be described as embodied in an illustrative apparatus and pointed out in the appended claims.

Referring now to the accompanying drawings,

Fig. 1 is a perspective view of the improved dust collecting system;

Fig. 2 is a front elevation of the collecting system with the dust hoods removed;

Fig. 3 is a vertical sectional view taken on the line III—III of Fig. 2;

Fig. 4 is a vertical sectional view taken on the line IV—IV of Fig. 3;

Fig. 5 is a perspective view of one of the dust hoods shown in Fig. 1; and

Fig. 6 is an end elevation of the dust hood shown in Fig. 5.

The improved dust hoods are shown in the drawings in association with a portion of the shoe repair machine disclosed in the above-mentioned application Serial No. 248,801. The frame and housing of the machine are shown herein in broken lines and together they constitute a cabinet-like structure indicated by the reference numeral **10**. The lower portion of the cabinet-like structure **10** is normally closed by a plurality of removable front panels **11**, one of which is fragmentarily shown in Fig. 1. Journaled in bearings carried by the frame **10** is a shaft **12** upon which are mounted three heel scouring wheels **14**, a bottom scouring roll **16**, a shank buffing tool **18**, and a heel breast scouring tool **20**. The machine is also provided with a pair of edge trimming tools **22**. Associated with each of the heel scouring wheels **14** is a dust hood **24**. The bottom scouring roll **16**, the shank buffing tool **18** and the heel breast scouring tool **20** are provided with dust hoods **26**, **28** and **30**, respectively. A large draft opening **32** is provided in a rear wall of the machine casing in back of the edge trimming tools **22** to collect the dust resulting from the operation of these tools, while a draft opening **34** is provided in a shelf beneath the edge trimming tools to collect chips. All of the above-mentioned dust hoods and draft openings lead into a suction manifold **36** which extends lengthwise of the machine or parallel to the axis of the shaft **12**. This manifold is designed to have a cross sectional area at any point along its length corresponding to the volume of air flowing past that point.

Below the manifold **36** and directly connected thereto is an apparatus for separating the heavier particles of dust from the current of air in which they are entrained. This apparatus is housed within a compartment of the cabinet-like casing **10** and is supported by a bracket **37** carried thereby. It comprises a substantially cylindrical casing **38** having its axis substantially parallel to that of the shaft **12**. Access to the interior of the casing may be had through a sliding panel **39**. A connection **40** leads downwardly and also rearwardly from the manifold **36** into an inlet opening **42** (Figs. 3 and 4) of the casing **38**. The inlet opening **42** is located at the upper portion of the casing rearwardly of the cen-

ter line thereof to receive a current of air which is directed tangentially into the casing. It extends somewhat over half the length of the casing from a point beginning at the right hand end thereof. In the lower portion of the casing and extending substantially the full length thereof is a slot 44 (Figs. 3 and 4) through which particles of dust may pass. This slot is positioned forwardly of the vertical center line of the casing and is substantially diametrically opposite the inlet 42. The cylindrical wall of the casing is flattened at the locality indicated by the reference numeral 45 to enable the dust to pass tangentially through the slot 44. Beneath the casing 38 is a closed receptacle 46 into which the dust slot 44 opens. The receptacle 46 has front, rear, and end walls 48 which are secured in air-tight relation to the exterior of the casing 38. The lower portion of the receptacle 46 contains an air-tight drawer 50 which may be removed and emptied to dispose of the dust which accumulates therein, said drawer being easily accessible from the front of the machine upon removal of the panel 11.

Within the casing 38 and coaxial therewith is an open-ended frusto-conical baffle 52 which serves also as an exit conduit, having a small receiving end 54 within the casing and having a large discharge end 56 at the right hand end of the casing, as seen in Fig. 3. The baffle 52 like the inlet opening 42 extends somewhat over half the length of the casing; the length of the baffle in general should be from one half to two thirds the length of the casing and the length of the inlet opening 42 should be substantially equal to that of the baffle. The left hand end of the casing is closed by a wall 58 (Figs. 2 and 4) and the large end of the baffle 52 opens into a filter chamber 60 secured against the right hand end of the casing 38. The right hand end of the casing 38 surrounding the large end of the baffle 52 is sealed by an end wall 62. In the illustrated machine the walls 58 and 62 are continuous with the left and right end walls 48 respectively of the receptacle 46. The filter chamber is provided with a removable panel 64 and contains a filter 65 of the type disclosed in United States Letters Patent No. 2,050,508, granted August 11, 1936, upon the application of Richard Strindberg. Fig. 1, for the purpose of clearer illustration, shows the upper portion of the filter 65 as cut away. This filter may be removed from time to time through the opening normally closed by the panel 64 for purposes of cleaning. A passageway 66 leads from the right hand side of the filter chamber 60 to the intake of a fan 68 driven from any suitable source of power through a belt 70. The fan 68 creates the necessary suction for drawing air through the entire dust collecting system and exhausts the clean air through an opening 72 into the atmosphere. The casing, the filter and the fan are spaced close to each other, not only for compactness, but to reduce to a minimum the length of the path travelled by the air in its passage through the system.

The above described dust separating apparatus is not claimed herein, but is disclosed and claimed in a co-pending application for Letters Patent of the United States, Serial No. 392,430, filed May 8, 1941, in my name as a continuation in part of the present application.

The construction of one of the dust hoods 24 is shown in detail in Figs. 5 and 6. It will be observed that the heel scouring wheel 14 is positioned partly within the inlet end of the dust hood. The dust hood has a pair of flat parallel lateral walls 74, one of which appears in Figs. 5 and 6. These walls are spaced from the end faces of the scouring wheel 14 with only a reasonable clearance. The dust hood has an upper portion 75 hinged upon a pintle 76 to provide access to the wheel 14 for the purpose of replacing the abrasive cover thereof. The portion 75 has lateral walls which are continuous with the walls 74, and has a top wall 77 which is close to the periphery of the wheel, with allowance for clearance. The hood 24 has a lower wall 78 which is spaced a considerable distance below the periphery of the wheel 14 to provide an inlet passage for air.

The walls 74 and 78 flare outwardly at the mouth or inlet end in a smooth curve to form a flange 80 the outer extremity of which is flat. This flat portion of the flange 80 lies in a plane substantially parallel to the axis of the wheel 14 and intersects the wheel forwardly of the axis. The flange 80 begins at a point adjacent to one end face of the wheel 14 at a less radial distance from the axis of the wheel than the periphery of the wheel and extends around the above-mentioned air inlet passage to a corresponding point adjacent to the opposite end face of the wheel. It will be observed that the flange 80 has a pair of lateral edges 84 (Fig. 5) which are parallel to the lateral walls 74 and a lower edge 86 which is substantially perpendicular to the edges 84. As shown in Fig. 5, the plane of the flange 80 is substantially normal to the direction of the air inlet passage. It has been found that the flange 80 is important in preventing air from leaking around the edges of the hood and by reason of its sudden change in direction reducing the effective cross-sectional area of the inlet passage, thereby diminishing the volume of air drawn into the hood. The flange also causes substantially all of the incoming air to be drawn from in front of the hood, and in such a manner as to insure the air current having a maximum velocity directly in front of the hood and below the tool, at which locality the dust arising from the operation of the tool will be most effectively caught. The hood 30 is similar to the hood 24 except for its being designed to fit a frusto-conical wheel rather than a cylindrical wheel.

In the operation of the system the fan 68 creates a suction at the openings of the various dust hoods to draw into the manifold 36 air laden with dust arising from the operation of the tools. This air is then delivered tangentially through the opening 42 into the casing 38 and whirls about the axis of the casing in an annular passageway defined by the baffle 52 and the wall of the casing. Gravity and centrifugal force cause the heavier particles of dust to be thrown against the curved wall of the casing until they pass tangentially through the slot 44 into the dust drawer 50. The air with the finer particles of dust entrained therein passes into the small open end 54 of the baffle or conduit 52 and through the conduit 52 into the filter chamber 60. Substantially all the remaining fine dust in the air is removed by the filter and the clean air is returned to the atmosphere by the fan 68. The air retains a considerable amount of its rotary movement about the axis of the casing while passing through the baffle 52. Such rotary move-

ment causes some of the entrained dust particles to be thrown against the inner wall of the baffle and eventually to be directed to the edge and corner portions of the filter out of the direct path of the air current, thereby enabling the entire area of the filter to be utilized to better advantage by preventing premature clogging.

An advantage of the above-described dust collecting system resides in its compactness, enabling the dust separating apparatus and fan to be housed in a relatively small compartment. Although the volume of air passing through the machine is relatively large, considering the small size of the separating apparatus, the power required for effective separation is not excessive and is well within the limits imposed by practical considerations in the shoe repair trade. A relatively small amount of power is required to draw air through hoods of the character above described because the flanges of these hoods have the effect, for reasons already stated, of increasing the area of the inlet passage of the hoods while insuring a maximum velocity of the air at the locality where it is most desired. Some of the power thus saved at the hoods may be utilized in the separating apparatus which, being of small dimensions, calls for a greater expenditure of power to draw air through it than would be required if it were larger. However, the separating apparatus itself requires less power than its compactness might lead one to expect. The preliminary separation of the heavier particles of dust enables a minimum area of filtering material to be employed. The arrangement of the frusto-conical baffle in the cylindrical casing provides for separation of these heavier particles in a minimum of space while at the same time enabling the otherwise waste space at the corners of the filter chamber to be utilized. The frusto-conical shape of the baffle **52** is important inasmuch as it provides an annular passage of sufficient cross-sectional area for the air entering the casing while at the same time it delivers air over a larger area and at a lower velocity than if it were cylindrical. The various features of the machine all cooperate to permit the separating apparatus to be housed therein without materially increasing its dimensions or the required power to an extent commercially prohibitive.

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

1. In combination with a rotary abrading tool, a dust hood having lateral walls which are spaced closely to the end faces of said tool with allowance for reasonable clearance, said hood having also a bottom wall spaced from the periphery of said tool to provide a passage for incoming air, said walls being arranged to form a mouth into which said tool extends, and said hood being provided at its mouth with an outwardly flared extension of said walls terminating in an outwardly turned flange which extends continuously about the lower portion of the rotary tool and about said air inlet passage.

2. In combination with a rotary abrading tool, a dust hood having an air inlet end and an end adapted for connection to a suction system, said hood terminating at said inlet end in an outwardly extending flange which lies in a plane parallel to the axis of said tool and which intersects said tool, said hood having lateral walls which are spaced closely to the end faces of said tool with allowance for reasonable clearance, said hood having also a bottom wall spaced from the periphery of said tool to provide a passage for the incoming air, and said flange being continuous around said passage except at the locality occupied by said tool.

3. In combination with a rotary abrading tool, a dust hood having an air inlet end and an end adapted for connection to a suction system, said hood terminating at said inlet end in a flange which lies in a plane parallel to the axis of said tool and which intersects said tool, said hood having at its inlet end portion a pair of parallel lateral walls between which said tool is located, said walls being closely spaced to the end faces of said tool with allowance for reasonable clearance, said hood having also at its inlet end portion a bottom wall spaced from the periphery of said tool to provide a passage for the incoming air, said flange being continuous around said passage except at the locality occupied by said tool, and said walls at the inlet end portion of said hood flaring smoothly outwardly into said flange.

4. In combination with a rotary abrading tool, a dust hood having an air inlet end and an end adapted for connection to a suction system, said abrading tool being positioned at and partly within said inlet end with a minimum clearance between the end faces of the tool and the hood, said hood having at the inlet end portion a top wall spaced closely to the periphery of said tool with allowance for clearance and a bottom wall spaced from the periphery of said tool to provide a passage for incoming air, said hood at said inlet end flaring smoothly into an outwardly turned flange which extends downwardly from a point adjacent to one end face of the tool around said passage for incoming air and then upwardly to a point adjacent to the opposite end face of the tool.

5. In combination with a rotary abrading tool, a dust hood having an air inlet end and an end adapted for connection to a suction system, said hood having at its inlet end portion a pair of parallel lateral walls between which said tool is located, said walls being closely spaced to the end faces of said tool with allowance for reasonable clearance, said hood having also at its inlet end portion a bottom wall spaced from the periphery of said tool to provide a passage for the incoming air, said hood at its inlet end flaring outwardly to form a flange which is continuous around said passage except at the locality occupied by said tool, said flange terminating in a pair of edges which are parallel to each other and to said lateral walls and in an edge joining said parallel edges.

6. A dust hood having a mouth into which a rotary abrading tool may extend, said mouth comprising a pair of lateral walls adapted to be spaced closely to the end faces of said tool with allowance for reasonable clearance, and comprising also a bottom wall adapted to be spaced from the periphery of said tool to provide an air inlet passage below the tool, said walls having outwardly flared portions terminating in an outwardly turned flange which extends continuously around the locality to be occupied by the lower portion of the abrading tool and about said air inlet passage, said flange lying in a plane substantially normal to the direction of said inlet passage.

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