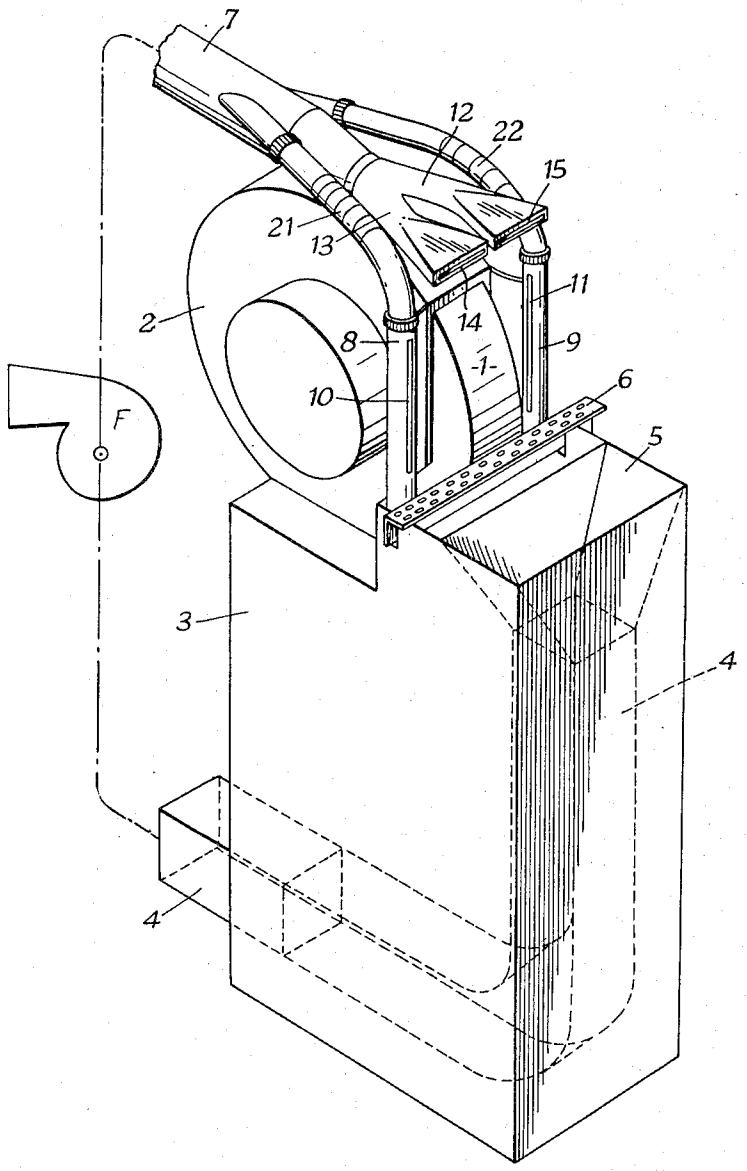
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MEANS FOR DUST EXTRACTION AND VENTILATION OF GRINDING WHEELS

Filed March 13, 1953

3 Sheets-Sheet 1

Fig. 1.



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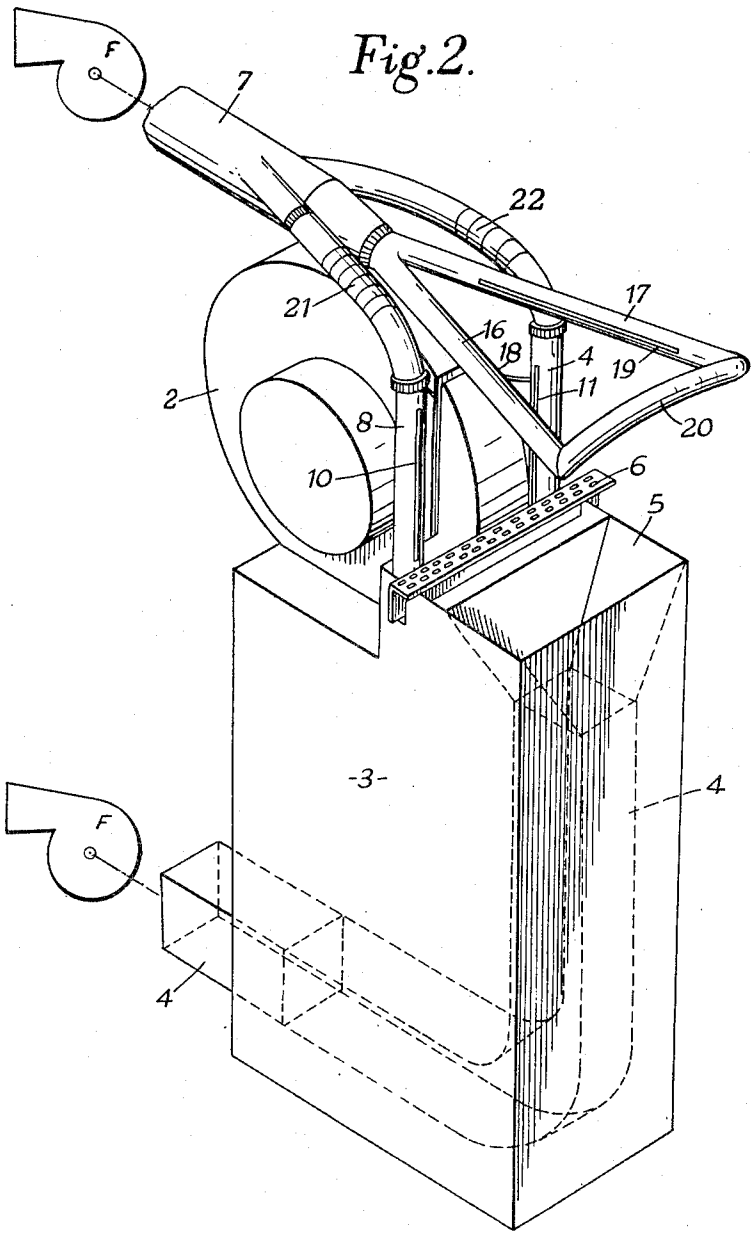
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Filed March 13, 1953

3 Sheets-Sheet 2

Fig. 2.



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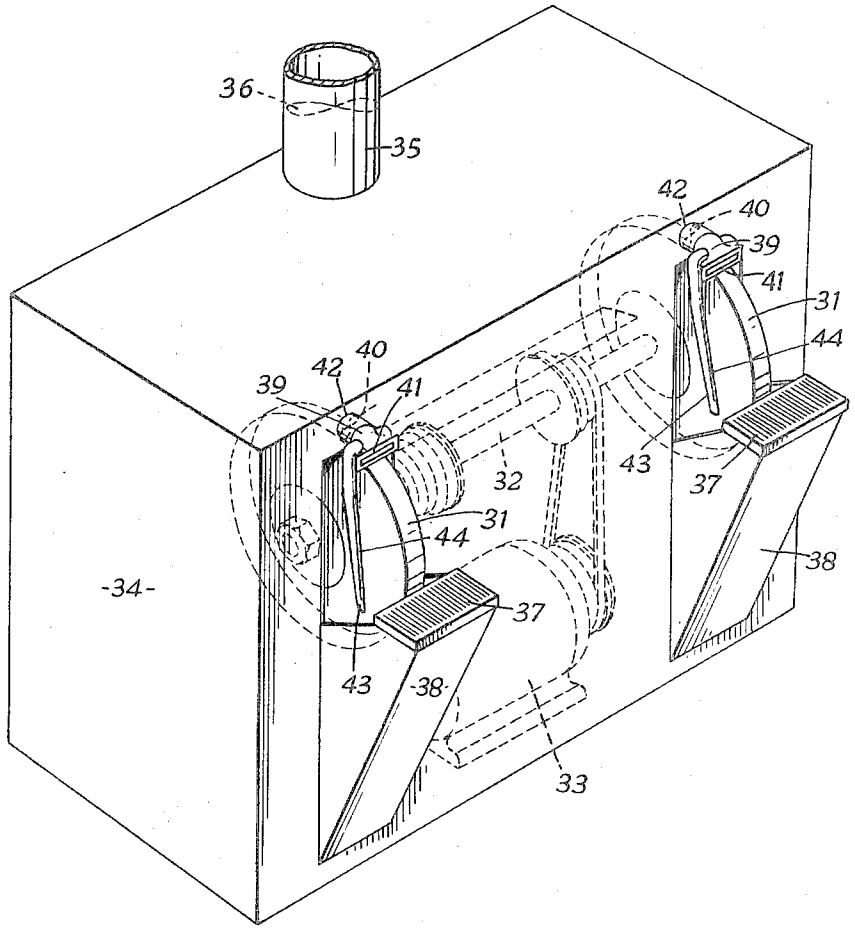
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Filed March 13, 1953

3 Sheets-Sheet 3

Fig. 3.



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United States Patent Office 2,763,972 Patented Sept. 25, 1956

2,763,972

MEANS FOR DUST EXTRACTION AND VENTILATION OF GRINDING WHEELS

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Application March 13, 1953, Serial No. 342,043

Claims priority, application Great Britain March 19, 1952

11 Claims. (Cl. 51—273)

This invention relates to improved grinders and more particularly to means for dust control in such machines.

In existing systems of dust control the greater portion of the grinding wheel is enclosed, where the grinder is of the pedestal type, partly in a cowl and partly in a collecting box upon which the cowl is mounted and through which the dust-laden air is drawn bv an extraction fan. Even when large volumes of air are rapidly drawn through the box or cowl in this way, however, the efficiency of dust extraction is not satisfactory, since the system fails to control the dust-laden air-streams generated by the revolution of the wheel and discharged at high velocity from the space between the top of the wheel and the cowl, and particularly the dust-laden air stream which moves with high velocity over the top of the work and up the operator's body into his breathing zone.

The improved system of the present invention comprises dust controlling and collecting means enclosing the grinding wheel, except for a sufficient working surface, to a maximum of the wear down mark on the wheel. Surrounding the exposed portion of the wheel, i. e. across the top close to the wheel where it emerges from the cowl and vertically on each side close to the sides of the wheel, there are provided slot openings to a plurality of ducts through which high-velocity, low-volume streams of air are drawn by means of a fan or fans connected to or situated in the ducts. In this way the exposed portion of the wheel is enclosed between curtains of rapidly moving air which are not penetrated by (i. e. are clear of) the currents of dust-laden air from the wheel and the grinding action. If desired, means may be provided whereby the direction in which the slot openings face can be varied, e. g. by rotation of appropriate portions of the ducts through a small angle, to suit the work in hand.

An independent extraction duct may withdrawn dust-laden air from in front of the work rest, the duct being for example expanded into a hopper placed immediately in front of the work rest. This duct may, if desired, be carried through the lower portion of the collecting box, whilst remaining independent thereof.

An important feature of the invention is the provision of means, such as generally described hereinabove, for creating a curtain or curtains of moving air between the wheel and the breathing zone of the operator, the speed of the moving air being sufficient to intercept any dust clouds moving in the direction of the breathing zone. It will be apparent that this can effectively be achieved by creating a more or less horizontal curtain of moving air at a level somewhat above the level at which the wheel emerges from its cover (and hence well below the breathing zone). The creation of a pair of vertical curtains, one on each side of the wheel, is of advantage in conjunction with the horizontal curtain.

The uppermost duct which produces the horizontal curtain of air above the wheel may be divided to form two or more divergent sub-branches, with slots facing inwardly, which, with a breast-piece connecting their

two ends form a triangle. If desired, the breast-piece may also be provided with an inwardly facing slot.

Optionally air may be drawn through the collecting box and hood.

It is of advantage that the collecting box should be of large volume and in the preferred form of the invention it is large enough to contain one or more grinding wheels and the driving mechanism suitably mounted and enclosed. It may indeed be a large chamber through a slot or slots in the front wall of which sufficient working surface of the grinding wheel or wheels protrude, suitable work rests being provided. In such a construction the upper part of the chamber takes the place of the cowl or cowls. The large volume ensures that the air in the chamber or collecting box shall be relatively quiescent so that the dust can settle. An outlet pipe at the back of the chamber or box may be connected to a chimney and/or may contain an exhaust fan.

In all forms of the invention the work rest is preferably slotted or perforated, and may be seated on a suitable extension of the collecting box.

Some embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Fig. 1 shows in perspective a pedestal grinder provided with means for creating curtains of high-velocity air between the grinding wheel and the operator.

Fig. 2 shows a variant in which a breast piece is provided.

Fig. 3 shows in perspective a two-wheel grinding unit provided with means for creating air curtains as in Figures 1 and 2, but housed in a large collecting box or chamber.

Fig. 1 shows a grinding wheel **1** partly enclosed in a cowl **2** over a collecting box **3** through which passes a lower exhaust duct **4**, ending in a hopper **5** extending the full width of the collecting box **3** and from the front of the latter to the work-rest **6**. An upper exhaust duct **7** is provided with two side-branches, **8**, **9**, having vertical slots **10**, **11**. The upper duct **7** also serves a pair of horizontal sub-branches **12**, **13**, provided with slots **14**, **15**. As shown diagrammatically, ducts **4** and **7** are both connected to the intake of a single exhaust fan indicated at F.

In Fig. 2, in which corresponding parts bear the same numbers as in Fig. 1, the upper duct serves two sub-branches **16**, **17**, provided with slots **18**, **19** on their inner faces, and joined at their ends by a breast piece **20**, some 8 inches in front of the grinding surface of the wheel **1**. The breast piece **20** will usually be concave when viewed from the operator's position. In the particular arrangement shown, each of ducts **4** and **7** is connected to a separate exhaust fan F.

In each case it is convenient to have flexible connecting tubes **21**, **22** to connect the vertical pieces **8**, **9** to the branch pipes of the duct **7**; this permits of the adjustment of the sub-branches (**12**, **13** in Fig. 1; **16**, **17** in Fig. 2) to any desired angle with the horizontal.

Fig. 3 shows a pair of grinding wheels **31**, **31**, mounted on a countershaft **32** rotated by an electric motor **33**. The whole, except for a sufficient portion of the wheels for working purposes, is enclosed in a large exhaust chamber **34** provided with an exit pipe **35** which contains an exhaust fan **36** (or is connected to a suitable chimney) for the maintenance of reduced pressure in the chamber **34**. The work rests **37**, **37** are supported on extensions **38**, **38** of the exhaust chamber **34** which encloses lower portions of the wheels **31**, **31**, without, however, approaching them closely. Close to each wheel where it emerges from the chamber **34** is an air-extracting duct **39** provided with a fan **40** and opening into the chamber **34**. The rear opening of the duct **39** directs a high-veloc-

ity, low-volume stream of air towards the periphery of the wheel 31 within the chamber 34. The front portion of duct 39 lying outside the chamber 34 carries a slot-shaped nozzle 41 rather longer than the thickness of the wheel 31, and is provided with two branches 43 disposed vertically on either side of the wheel 31. These branches 43 have slot-shaped lengthwise openings 44 which create side curtains of high-velocity, low-volume air-streams, whilst a similar horizontal air-stream created by nozzle 41 completes the protection of the operator.

If desired, ducts with funnel inlets, situated similarly to duct 4 in Figs. 1 and 2, may be added to the unit shown in Fig. 3. Such ducts may be provided with exhaust fans and/or may lead into the exhaust chamber 34.

A single exhaust chamber of sufficient size can serve for any desired number of grinding units. It may be external to the grinding room itself, with one wall in common provided with panels which can be replaced with 2-wheel grinding units as required. Each unit may have its own driving motor, or may be driven by belting from a common shaft within the chamber.

In all forms of the invention described a high-velocity air curtain is created between the dust generation point and the breathing level of the operator, and in the form of the invention illustrated in Fig. 2 the body of the operator, pressed against the breast-piece 20, effectively seals off the dust-contaminated area.

In operation the heavy dust is thrown by the action of the wheel and the peripheral air streams into the collecting box where the velocity decreases and allows the dust to settle by gravitation, and the light air-borne dust is collected by the system of extraction air curtains. As is evident, the separate air-exhausting system which provides these air curtains is isolated on the low pressure side from the space within the enclosing means (e. g. cowl) by which the wheel is surrounded.

I claim:

1. In combination a grinding wheel housed, except for a sufficient working portion, in a relatively large chamber, means for maintaining the air in the chamber at less than atmospheric pressure, a work rest, means for withdrawing dust-laden air from the vicinity of the work rest, and a plurality of air-extracting ducts with slot-shaped intake openings so disposed as to create curtains of high-velocity, low-volume air currents above and on each side of the exposed portion of the wheel, the said ducts being arranged to discharge the dust-laden air into the said chamber.

2. In combination a grinding wheel housed, except for a sufficient working portion, in a relatively large chamber, means for maintaining the air in the chamber at less than atmospheric pressure, a work rest, means for withdrawing dust-laden air from the vicinity of the work rest, and a plurality of air-extracting ducts with slot-shaped intake openings so disposed as to create curtains of high-velocity, low-volume air currents above and on each side of the exposed portion of the wheel, the said ducts being arranged to discharge the dust-laden air into the said chamber in the direction of the unexposed portion of the wheel.

3. In combination, a grinding wheel mounted upon a collecting box and otherwise surrounded, except for a sufficient working surface, by a cowl, a work rest, means for withdrawing dust-laden air from the vicinity of the work rest through said cowl and a plurality of air-extracting ducts isolated from the space within the cowl and each having a slot-shaped intake opening, at least one of said openings being disposed horizontally and sufficiently above the point where the wheel emerges from the cowl to be clear of the high velocity layer of air carried round by the wheel while at least two others of said openings are disposed vertically one on each side of the exposed part of the wheel periphery so as to create, respectively, at least one substantially horizontal curtain of high-velocity low-volume air current at a short distance above the level at which the wheel emerges from its cover, and a substantially vertical similar curtain on each side of the emergent wheel.

4. In combination a grinding wheel mounted upon a collecting box and otherwise surrounded, except for a sufficient working surface, by a cowl, a work rest, a high speed air stream generator, and a plurality of extraction ducts extending from the low pressure side of the said generator and each terminating in a slot-shaped opening located clear of the layer of high speed air carried round by the wheel and so disposed as to create at least one substantially horizontal curtain of high-velocity, low-volume air current at a short distance above the level at which the wheel emerges from its cowl, and a substantially vertical similar curtain on each side of the emergent wheel, the dust-laden air drawn through the ducts being discharged behind the emergent portion of the wheel.

5. A pedestal grinder comprising a casing, a grinding wheel located in the top of said casing, an opening in the front wall of said casing through which a portion of the periphery of said wheel protrudes, a work rest located adjacent the exposed portion of the wheel periphery, a high speed air flow generator isolated, on at least its low pressure side, from the space within the casing, and ducting leading from the said low pressure side of the generator to a first elongated dust intake opening in front of and below the work rest and a second elongated dust intake opening extending parallel to the wheel axis and located adjacent the point of emergence of the wheel from the casing but clear of the layer of high velocity air carried round by the wheel, said second intake opening serving to create a high velocity low volume curtain of air between the operator and the wheel.

6. In combination, a suitably mounted grinding wheel surrounded, except for a sufficient working surface, by appropriate enclosing means, an air-exhausting system comprising a duct on the low pressure side of said system isolated from the space within said enclosing means, said duct having at least one elongated air intake opening disposed generally horizontally a short distance above the uppermost part of said working surface of the wheel, and means for withdrawing air through said intake opening to establish a high-velocity low-volume curtain of air externally of said enclosing means between the operator's breathing zone and said wheel and clear of the layer of high velocity air carried round by the wheel.

7. The combination set forth in claim 6 wherein said air-exhaust system further includes ducts isolated from the space within said enclosing means on either side of the exposed part of the wheel having elongated air intake openings disposed substantially vertically so as to create a substantially vertical curtain of high-velocity low-volume air current on each side of the exposed part of the wheel.

8. The combination set forth in claim 6 which further includes separate means for withdrawing dust-laden air from a location adjacent said working surface.

9. The combination set forth in claim 6 which further includes a work rest and separate means for withdrawing dust-laden air from the vicinity of said work rest, said exhaust duct comprising a pair of convergent elongated air intake members extending from the position of the operator's body to a point above the point of emergence of the wheel from its enclosing means.

10. The method of dust extraction for grinders which comprises the establishment, between the exposed portion of the wheel periphery and the breathing zone of the operator, of a fast-moving low-volume air curtain having a lateral spread sufficient to trap particles of dust moving upwards between the operator's body and the wheel, and physically isolated throughout its low pressure circuit from the chamber within which the shielded part of the wheel is located.

11. The method of dust extraction for grinders which comprises establishing, in the space between the exposed portion of the wheel periphery and the operator's body,

at least three high-velocity low-volume air curtains, each moving from the operator towards the wheel and each physically isolated throughout the low pressure portion of the total flow circuit from the chamber in which the shielded part of the wheel is housed, one of said curtains being established in a plane tangential to the wheel periphery and transversely between the wheel and the breathing zone of the operator, while two other curtains are established in generally vertical planes one on each side of the exposed portion of the wheel and of a height, at the intake aperture, approximately equal to the height of the exposed portion of the wheel above the work-rest.

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