Aug. 12, 1941. R. W. BISHEL 2,252,455

DUSTLESS GRINDER

Filed April 22, 1939

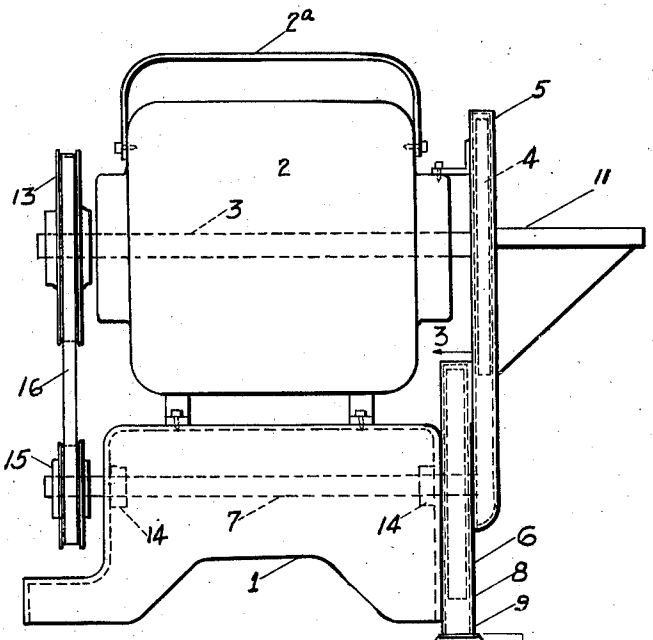


Fig-1

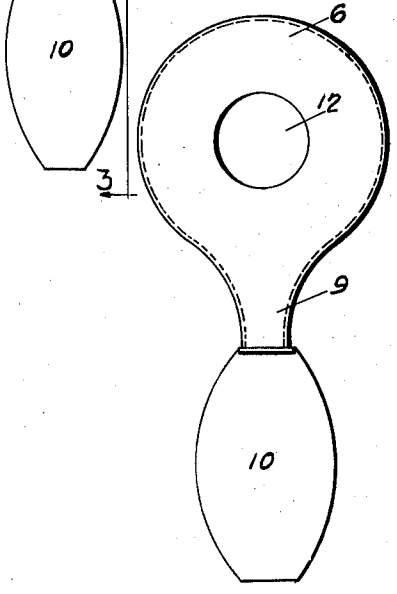


Fig-3

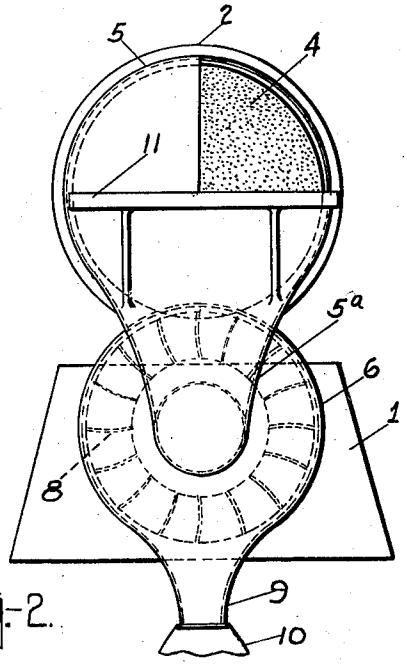


Fig-2.

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DUSTLESS GRINDER

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Application April 22, 1939, Serial No. 269,336

3 Claims. (Cl. 51—273)

My invention pertains to collection of dust thrown off by grinding wheels, and particularly in the grinding or buffing of materials which give off large quantities of very fine dust. Obviously a mechanism which successfully restrains the movement of and collects such dust will also successfully collect heavier particles of material although the converse is not true.

The dental profession in the manufacture of dentures or plates prepare a model or mold representing the conditions within the mouth of the patient and then prepare the plates upon these models. Such models are usually made of a substance, plastic when wet and which dries hard and rigid. Two such well-known substances are sold under the trade names of "artificial stone" and "plaster of Paris." Both these substances when ground upon an emery wheel give off a fine and exceedingly light weight dust which saturates the surrounding atmosphere to the discomfort and subsequent injury of the one doing the grinding.

Several attempts have been made to restrain movement of this dust into the surrounding atmosphere and to collect the dust in suitable containers. Certain characteristics of this dust have heretofore prevented successful collection thereof. The dust being so fine and light in weight is readily suspending in the atmosphere and when attempts are made to collect same with a suction fan the dust packs up within the ducts conveying same to a collection receptacle and in a short time completely blocks the passage of air and consequently the dust through the ducts. Several attempts have been made to impound the dust in a moving stream of water, but this method is objectionable because of the tendency of the wetted dust to clog ordinary drain pipes and plumbing fixtures.

An object of my invention is to provide a dust collection device for grinding wheels, operating upon materials of the class described, which will successfully collect substantially all the dust formed and deliver same to a suitable receptacle.

Another object of my invention is to provide suitable control of the air stream created by the suction fan and the suspended dust to prevent clogging of the device by the dust as described supra.

A further object of my invention is to provide a compact and readily portable combined grinding wheel and dust collector which may be set up on any convenient support ready for instant use upon connection to a source of electric energy.

In the drawing forming part of this specification, Fig. 1 shows in side elevation one embodiment of the invention, Fig. 2 shows an end elevation of the same, Fig. 3 shows a section through the dust collecting device at lines 3—3 of Fig. 1.

In the drawing reference character 1 indicates a base upon which is mounted a suitable motor 2 having a rotatable shaft 3 upon which is mounted the grinding wheel 4. A suitable handle 2a mounted on the motor provides a convenient carrying means. Enclosing the grinding wheel is a hood 5 which connects with the fan hood 6 mounted on the base 1. Supported by the base and mounted on shaft 7 is a suction fan 8 disposed within the hood 6. Disposed beneath fan 8 and forming a continuation of the hood 6 is a duct 9 terminating in a dust receptacle 10 detachably connected therewith.

The hood 5, hood 6, and duct 9 form a continuous channel into which air is drawn by the suction fan 8 and discharged into the receptacle 10. The hood 5 envelopes the grinding wheel 4 and has a back wall disposed close to the wheel 4, side walls at the periphery of the wheel and a front wall connecting the side walls. In the drawing the hood 5 front wall has a suitable opening to admit the material to be moved against the face of the wheel 4 and a suitable rest 11 is preferably mounted on the hood adjacent this opening upon which the said material is supported. These hood walls are disposed close to the wheel 4 and provide a narrow opening through which the air drawn in by the fan 8 rushes with sufficient velocity to collect the dust thrown off in grinding and carry it into the hood 6. The hood 5 terminates in a depending portion 5a of progressively decreasing cross section which has a rounded bottom portion disposed substantially directly beneath the wheel 4 and in close proximity to the fan 8 within the hood 6. The fan 8 is disposed to the rear of and below the wheel 4. The hood 6 has a front wall disposed adjacent and in front of the fan 8. An aperture 12 which of substantially less cross section than that of the fan, is formed in the front wall of hood 6 and connects with the rounded bottom portion 5a of the hood 5. The lowermost portion of the rounded bottom portion of the hood 5 coincides with the periphery of the aperture 12 so that the dust laden air meets with no obstructions or sharp corners in rushing with increasing velocity through aperture 12 into fan 8. The hood 6 fits closely the fan 8 and terminates in duct 9, the upper portion of which is less in cross section than the shell at fan 8, and is disposed directly beneath the fan blades and in close proximity thereto. The discharge end of duct 9 is preferably of substantially less cross sectional area than the said upper portion thereof so that the dust laden air moves from the fan with increased velocity through the duct into the dust receptacle 10. This dust receptacle is closed excepting for an opening in one end thereof into which the discharge end of duct 9 is inserted and the receptacle is securely fastened

to the duct. The receptacle 10 may be of any suitable material, preferably cloth of sufficient close weave to permit passage of the air and retention of the dust. The size of the receptacle is many times greater than the cross sectional area of the duct 9 that the velocity of the dust laden air is greatly reduced therein thereby reducing the tendency of the air to carry the dust through the walls of the receptacle.

As shown in Fig. 1 of the drawing the motor 2 has the shaft 3 extended beyond both ends of the motor. On one end is the wheel 4 and on the other end is a drive pulley 13 fixed to the shaft to turn therewith. The fan shaft 7 preferably extends through the base 1 and is supported on spaced bearings 14 secured to the base. As shown by the drawing this base is preferably hollow in order to reduce weight and facilitate mounting of the shaft 7 and bearings 14. On the end of shaft 7 beneath the drive pulley 13 is a driven pulley 15 secured to shaft 7 to turn therewith. A belt 16 connects the pulleys 13 and 15 to drive fan 8 from the motor 2. As illustrated the entire unit is only slightly larger than the motor 1 which being only a fraction of a horsepower is relatively small in size and light in weight. The base is preferably made of aluminum to further reduce weight. Thus the unit is made compact, light in weight, and readily portable.

In Fig. 1 of the drawing the drive pulley 13 is on the opposite end of motor shaft 3 from wheel 4. Obviously shaft 3 at wheel 4 end, may be made of sufficient length to have pulley 13 mounted thereon. In this modification the motor 2 would be shifted to the left and pulley 15 mounted on shaft 7 beneath pulley 13 and adjacent fan 8. The base 1 would then have suitable openings in the top thereof to admit passage of belt 16 around pulleys 13 and 15 in their new locations. With pulleys 13 and 15 removed from the left side of motor and base a wheel 4, guard 5, shell 6 and fan 8 could be mounted at the left side of base 1 to duplicate those parts now at the right side of the base.

Upon reference to Fig. 2 of the drawing several important features of my invention are apparent. The hood 5 forms an air duct having its greatest cross sectional area at the wheel 4 and least cross sectional area where it joins aperture 12 in the fan hood 6. This variation in cross sectional area causes the dust laden air to move from wheel 4 to fan 8 with a progressively increasing velocity thereby preventing deposit of the dust on the sides of hood 5. Upon the dust laden air entering fan hood 6 the action of the fan 8 prevents deposit of dust at the fan and the path of the discharging air is again one of progressively decreasing area through duct 9 into dust receptacle 10. The cross sectional area of receptacle 10 is of greatly increased area over that of the duct 9 thus abruptly reducing the velocity of the dust laden air permitting settling of the dust and preventing the escaping air from forcing the dust through the sides of the receptacle 10.

Throughout the drawing and specifications I have illustrated one form of my invention and in fact a preferred form for certain types of use. It will be obvious to those skilled in the art to which this invention pertains that many changes in the forms of construction and arrangement of parts from that shown in the drawing may be made without departing from the spirit of the invention as set forth in the specifications and described in the claims. It is to be understood, therefore, that I do not limit myself to the exact form of the invention disclosed except as made necessary by the scope of the appended claims.

I claim:

1. In a grinding mechanism of the character described, in combination, a grinding wheel, a hood enclosing a portion of the grinding wheel in close relation thereto and terminating in a bottom aperture adjacent the lower peripheral portion of said wheel, a suction fan disposed below said grinding wheel, a fan chamber closely enclosing the fan and having vertically spaced inlet and outlet apertures therein to provide for unobstructed passage of air currents set in motion by said fan, a relatively short dust duct of progressively decreasing cross sectional area connecting said wheel hood aperture with the fan chamber inlet aperture, said dust duct extending substantially vertically from said wheel hood aperture to said fan chamber and having substantially smooth inner walls providing unobstructed passage of the air currents set in motion by said fan.

2. In a grinding mechanism of the character described, in combination, a grinding wheel, a hood enclosing a portion of the grinding wheel in close relation thereto and terminating in a bottom aperture adjacent the lower peripheral portion of said wheel, a suction fan disposed below said grinding wheel, a fan chamber enclosing the fan and having vertically spaced inlet and outlet apertures therein to provide a passageway for air currents set in motion by said fan, a dust duct of progressively decreasing cross sectional area connecting said wheel hood aperture with the fan chamber inlet aperture, said dust duct extending substantially in a straight line from said wheel hood aperture to said fan chamber and having substantially smooth unobstructed inner walls providing a passageway from the grinding wheel to the fan chamber inlet aperture for the air currents set in motion by said fan, an outlet duct of progressively decreasing cross sectional area connected with said fan chamber outlet aperture and having the small end of said latter duct opening into a dust receptacle.

3. In a grinding mechanism of the character described, in combination, a grinding wheel, a hood enclosing a portion of said wheel and terminating in a relatively wide aperture extending transversely and above the lower peripheral edge of the wheel, a short dust duct of progressively decreasing cross sectional area extending downwardly from said wheel hood aperture with the small end of the duct in spaced relation to said grinding wheel, a suction fan disposed below said wheel, a fan chamber enclosing said fan and provided with a front wall, an inlet aperture in said fan chamber front wall connecting the interiors of said fan chamber and small end of said dust duct to provide a smooth unobstructed continuous passageway for air currents through said dust duct into said fan chamber, an outlet in said fan chamber and a dust receptacle communicating with said outlet.

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