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2,182,952

AIR CONDITIONED BUFFING AND POLISHING SYSTEM

Filed April 30, 1938

2 Sheets-Sheet 1

FIG. 1.

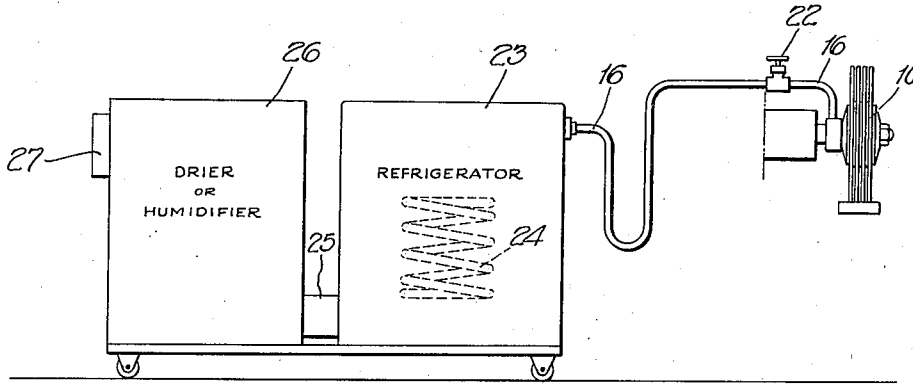


FIG. 2.

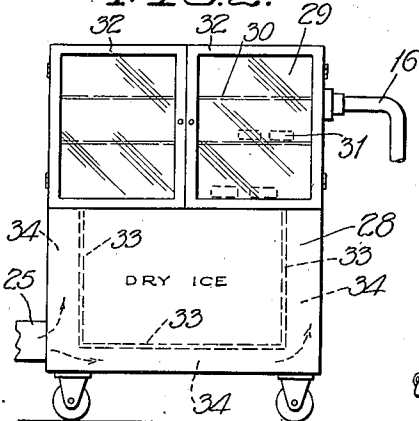


FIG. 3.

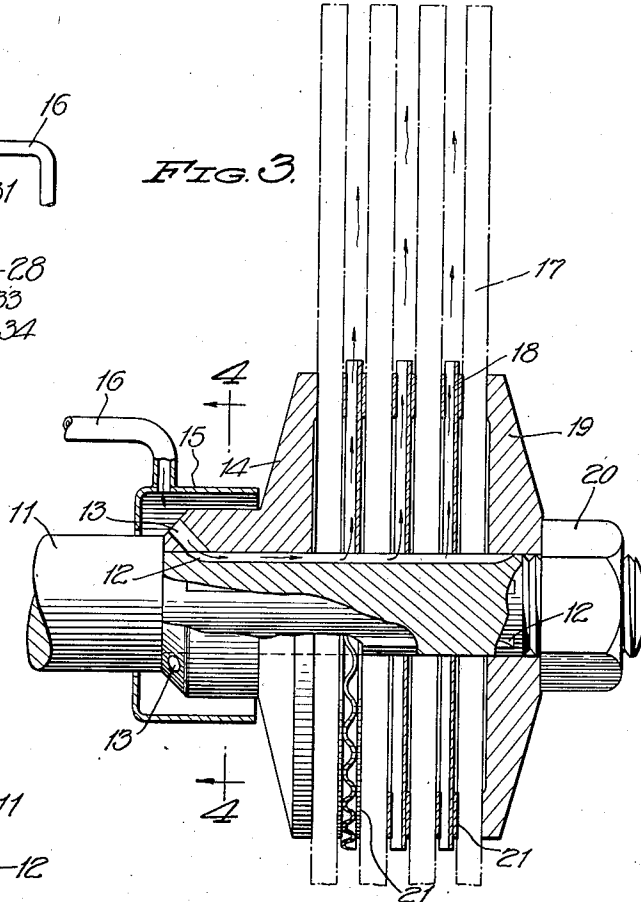
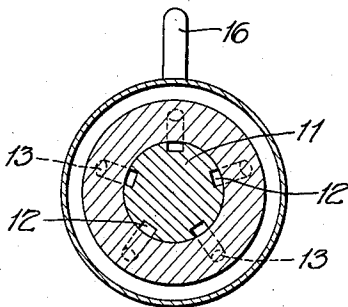


FIG. 4.



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AIR CONDITIONED BUFFING AND POLISH-
ING SYSTEM

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Application April 30, 1938, Serial No. 205,158

1 Claim. (Cl. 51—266)

This invention relates to the buffing and polishing of materials or objects, and has for its objects to increase production, to economize in supplies and materials used in buffing and polishing, and to improve the character of the work. Other objects and advantages will be apparent to those skilled in the art.

The terms "buffing" and "polishing" are not strictly synonymous in the art, but the principles of the present invention are applicable to both of these operations, and to simplify the description the terms "buffing" and "buff" will be employed to include either of these fields of work, except where a distinction between buffing and polishing, or buffs and polishing wheels, is clearly intended.

The heat developed by friction in buffing operations causes a temperature rise in the work piece, the buffing composition and the buff itself. In many buffing operations the temperature rise imposes a limit on the speed of production, the economical use of supplies or equipment, or the quality of the work done. Some materials which might otherwise be buffed to advantage, are of such low melting point or softening point that they cannot be satisfactorily buffed with ordinary equipment in common use. These and other disadvantages or limitations in the buffing art are largely eliminated by the present invention, in accordance with which the buff is supplied with refrigerated air or other gas to prevent or limit the temperature rise incident to the buffing operation. The principles of the invention may readily be applied in such a way as to bring about a temperature reduction in the article considerably below room temperature, so that objects normally too soft at room temperature to withstand buffing may be hardened sufficiently to enable them to be buffed. This may be done, for example, by precooling the work before buffing, or by cooling the work during buffing, or by both of these expedients. Precooling the work piece may also be employed to advantage in the case of materials other than those of low melting point, and especially where high thermal conductivity and specific heat of the material tend to reduce the local temperature rise at the surface being buffed. Likewise, fats, greases, oils, waxes and similar supplies, which are normally liquid or too soft to be advantageously employed in buffing compositions or wheel dressings under ordinary conditions, may be congealed upon the buff to adapt them for use in buffing.

Another preconditioning feature of the invention is the preconditioning of the air or other gas

supplied to the buff, in respect to its moisture content, or its chemical constituents or composition. Examples of such uses of the invention are the increase or decrease in the moisture content or humidity of the air or gas, the modification of its ability to support combustion, as by the use of carbon dioxide in partial or complete substitution for the normal atmospheric air, or the introduction of a chemically acting gas where special effects are desired.

Several embodiments of the invention are illustrated by way of example in the accompanying drawings.

Figure 1 represents diagrammatically a buffing system comprising the buffing wheel assembly in conjunction with means for drying or humidifying, and refrigerating air and supplying it to the buff.

Figure 2 represents diagrammatically in front elevation a type of refrigerating cabinet somewhat different from that shown in Figure 1, and including a shelf compartment for precooling pieces of work to be buffed.

Figure 3 is a side elevation with parts in central vertical section, illustrating a type of ventilated buff assembly which may be employed in carrying out some forms of the invention.

Figure 4 is a transverse section thereof on the line 4—4 of Figure 3.

Figure 5 is a diagrammatic end elevation of a buff enclosed in a hood provided with an air or gas inlet.

Figure 6 is a side elevation thereof with the hood in vertical section on the line 6—6 of Figure 5.

Figure 7 is an end elevation, with parts broken away, showing a hooded buff having an enclosed chamber through which the work passes while being buffed.

Figure 8 is a top plan view, showing diagrammatically the application of some of the features of the invention to automatic machinery.

Referring more specifically to the drawings, in Figure 1 the buff assembly is indicated at 10. This buff may be of the ventilated type, such as shown in the U. S. patent to Zucker, No. 1,573,961. We have illustrated, for example, in Figures 3 and 4, a ventilated buff in which the buffing spindle 11 has distributed around its periphery a number of longitudinally extending surface grooves or channels 12 to which access of air is provided by a corresponding series of ports 13 formed in the hub portion of the inner flange 14. A hood 15 is supported by any suitable means so as to surround the ports 13, with-

out touching the spindle or flange. An air pipe or conduit 16 leads into the space enclosed by the hood 15. The buff sections 17, alternating with spacers 18, are assembled on the spindle 11 between the inner flange 14 and an outer flange 19, which latter is secured by the usual nut 20 on the threaded outer end of the spindle 11. The spacers 18 which intervene between each pair of buff sections 17 may be of any suitable type admitting of the flow of air outward between the sections 17. They are diagrammatically shown in Figure 3 as corrugated discs in which each corrugation is radially disposed about the center, and flat rings 21 are welded or otherwise secured near the outer periphery to prevent closure of the radial air passages by displacement of the buff sections into the corrugations. Other types of ventilated buffs may be employed.

Referring again to Figure 1, the air conduit 16 is provided with a hand valve 22, to control or adjust the admission of air coming from the refrigerator unit 23. The refrigerator unit herein illustrated may be of any suitable type, the coil 24 representing by way of example a brine coil or the cooling coil of an electric refrigerator. The refrigerator unit 23 communicates by way of a passage or conduit 25 with a dryer unit 26 into which air enters under pressure or suction by way of the intake 27. The dryer may be of any type, supplied for example with calcium chloride or other drying medium. The unit 26 may be supplied with moistening equipment instead of drying medium, when humidifying is desired. The refrigerator unit 23 may be replaced by a somewhat different type of unit as that illustrated, for example, in Figure 2, which comprises the dry ice tank 28 over which is provided a cabinet 29 furnished with shelves 30 on which work pieces 31 may be placed for precooling, prior to being subjected to buffing. The hinged doors 32 normally keep the cabinet closed. A wall 33 may be provided in the dry ice tank 28 to maintain an open passageway 34 by which the dry air entering through the connection 25 has access to the cabinet space 29.

It will be understood that the circulation of air or other gas through the apparatus described may be entirely induced by the rotation of the buff or by pressure, and that the air or gas is preconditioned to be different from the ambient atmosphere of the buffing room.

Instead of the type of air connection leading to the buffing unit, as shown in Figure 3, a modification, such as illustrated in Figures 5 and 6, may be employed. In this form of the invention, the air pipe 16 enters a hood 35 which encloses the buff unit 10 and is provided with a hinged cover 36 normally closed by latches 37. The buff unit 10 may be of the ordinary type or of the ventilated type such as the construction already described in connection with Figures 3 and 4 so that air is drawn through the spindle into the spaces between the buff sections, as well as being distributed outside of the buff unit within the enclosing hood. Figure 5 illustrates a conveyor 38 carrying the work pieces 39 through the buffing operation.

In Figure 7, the air or gas pipe 16 leads into a hood 40 provided with a hinged cover 41, which may be similar to that illustrated in Figures 5 and 6. The hood 40 encloses the buff unit 42 which may be similar to those described in connection with Figures 5 and 6. The lower part of the hood 40 extends a suitable distance along the direction of travel of a conveyor 43 to form

the extensions 44 and 45 which have swing or drop doors 46, 47. This construction provides a precooling space 48 into which the work pieces 49 are carried by the conveyor 43 on their way to passage through the buffing operation. Preconditioned air or other gas may be delivered locally or directly into this cooling space 48 by way of the pipe 16^a and withdrawn by way of the pipe 16^b. It will be obvious that the drop doors 46, 47 open and close automatically as the work pieces pass through. Since the space 48 may be substantially closed off from the outside air, by suitable design of the walls, this construction provides an approximately closed work chamber and may advantageously be employed where it is desired to subject the work piece to special gases other than normal atmospheric air. The withdrawal of gases by way of the pipe 16^b may be under suction so as to maintain the pressure within the space or chamber 48 somewhat below atmospheric pressure and thereby minimize the escape of the special gas into the atmosphere, while at the same time reducing any tendency of the gas to pass into the space immediately surrounding the buff.

In Figure 8 we have illustrated one form in which the invention may be applied to automatic buffing machines. It will be understood that the details of the buffing machine per se form no part of our present invention, and that many types are familiar to those skilled in the art. The type we have chosen for diagrammatic illustration is assumed to be that in which a revolving automatic indexing head 50 is provided with work holders or chucks 51 distributed around the axis and carrying the work pieces 52 under the buff 53, where the work holders revolve. The machine is loaded and unloaded at the position where the unoccupied chuck is illustrated in the drawings. In applying our invention to such a machine, the indexing head 50 is provided in the present example with a circumferential series of cams 54 on a plane above that of the work holders 52. The cams 54 intermittently operate against a roller 55 to open a valve 56 in the air conduit 57 which leads into a hood 58 enclosing a buff unit such as already illustrated and described, or of any other suitable type. The cams 54 and the valve mechanism described are so positioned that the valve 56 automatically opens as the work piece approaches the buffing station, and closes as the work piece leaves the buffing station. In this way, the supply of refrigerated or otherwise preconditioned air or gas flows only while the work piece is being buffed.

The use of refrigerated air, and especially when it is supplied under pressure, enhances the cooling effect beyond that obtained by ordinary ventilation of the buff. This improvement is due not only to the lower temperature of the air but also to its greater density due to its lower temperature and its higher pressure. The relative humidity of the air is naturally increased due to the reduction in temperature. This improves the wearing quality of cloth buffs and a number of other materials used in buffing and polishing. The ability to use lower melting point compositions represents an economy, as such compositions are, as a rule, much cheaper than the higher melting point compositions. Furthermore, the composition will adhere better to the wheel and the wheel may be operated at higher speed without fear of burning. Any tendency of the work to oxidize, which would prevent adherence of a subsequent plate, is considerably reduced by the reduced tem-

perature, and may be further reduced by the partial or complete substitution of the atmospheric air by carbon dioxide (for example, from dry ice), or other gases having less tendency to oxidize the work. Some materials, such as low melting metals and alloys and plastics, take a better finish cold than hot. Glue on faced wheels will have less tendency to soften and lose its grip on the abrasive when operated in the refrigerated environment.

In the foregoing description of certain embodiments of the invention, it is believed that those skilled in the art will derive sufficient information to enable them to apply the invention in many ways, in addition to those specifically shown and described. Cloth wheels, various types of wheel brushes, polishing wheels of wood, felt, canvas, and in fact any of the usual materials em-

ployed, either faced with glue and emery or other composition, or unfaced, may be employed within the principles of the invention.

We claim:

Apparatus of the character described, comprising in combination a buffing unit, means for carrying work pieces successively into and out of buffing position with respect to said buffing unit, means for providing and supplying to said buffing unit a preconditioned atmosphere, control means for turning on and shutting off the supply of preconditioned atmosphere, and means coordinated with the movement of said carrying means for actuating said control means as each work piece enters and leaves the buffing position.

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