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[54] **POLISHING METHOD AND DEVICE**
9 Claims, 2 Drawing Figs.

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[56] **References Cited**

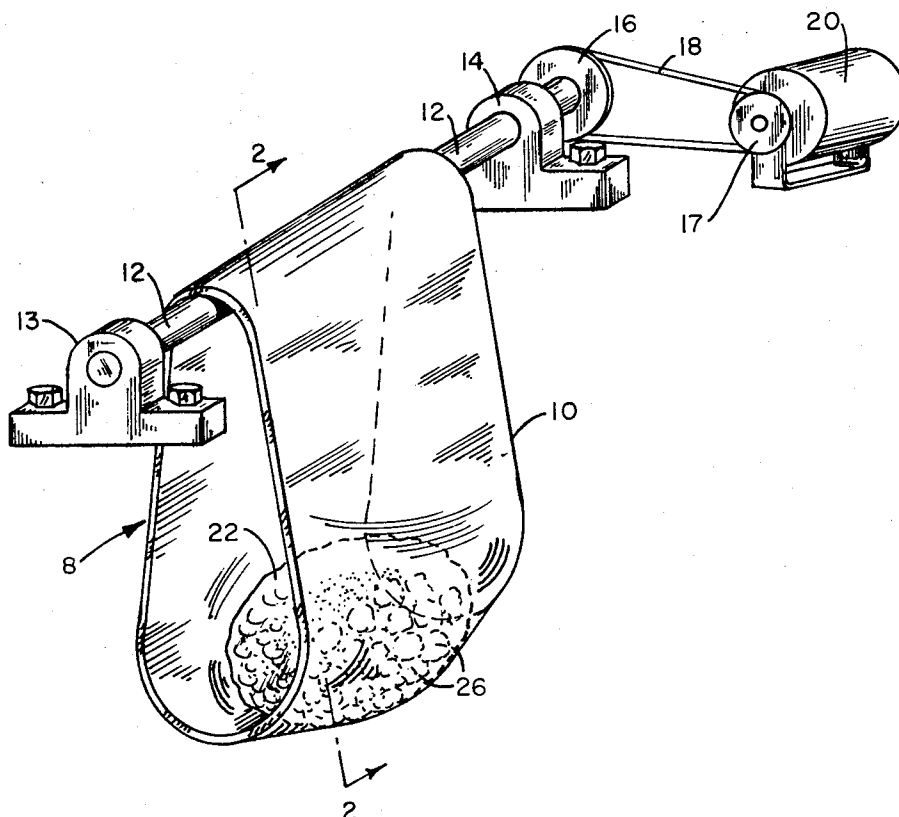
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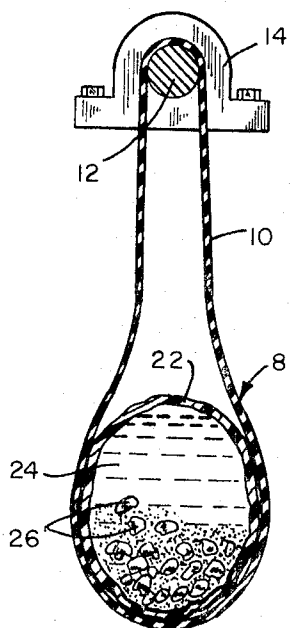
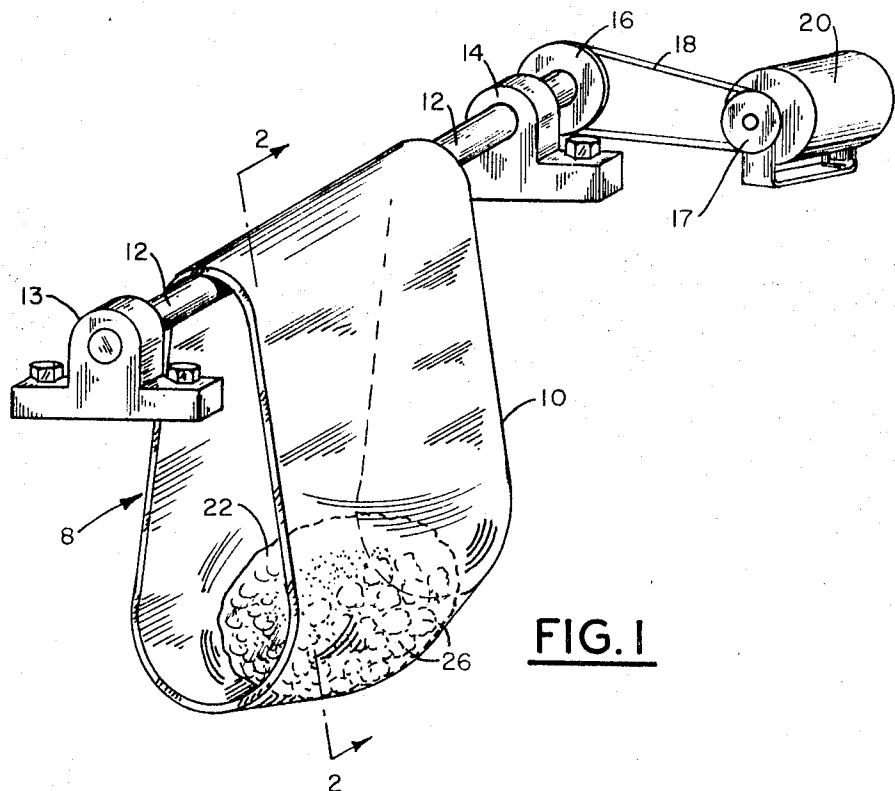
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ABSTRACT: An improved method and means for grinding and polishing articles. The items to be polished and the desired or required amount of grit-bearing grinding liquid, are sealed within a disposable, leakproof bag, and the bag and contents are then tumbled until the desired amount of polishing is effected. The disposable leakproof bag may be prepackaged as the container for a premeasured amount of grinding grit, and be of such a predetermined capacity that when filled to a prescribed level with the liquid and items to be polished, the proper proportion or ratio of liquid to grit will automatically be effected. The rotating device is preferably the inside lower end of a broad, closed belt loop gravitationally suspending from, and driven by, an overhead rotatable shaft. For finer polishing, successive stages employing increasingly finer grinding grit may be employed.





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POLISHING METHOD AND DEVICE

This invention relates to improvement in a method and device for grinding and polishing articles, and more particularly but not by way of limitation, to a process wherein the articles to be polished are sealed up with a liquid-and-grit grinding mixture in a disposable and preferably prepackaged leak-proof yieldable container, and then tumbled, preferably under pressure with said grinding mixture while so sealed in said container; and to means for effecting this process.

One of the widespread methods presently used for polishing articles, such as stones, or the like, is a liquid-and-grit method wherein the items to be polished are laced with a liquid-and-grit mixture into a rigid container or chamber such as a drum, and the items and the liquid-and-grit grinding mixture are rotated and revolved therein to achieve a polishing interplay between the items and the grinding mixture. For finer grinding, successive stages of the foregoing procedure, with each successive step utilizing increasingly finer grades of polishing grit, are employed. However, for a succeeding stage employing a finer grit, it is imperative that the coarser grit of the preceding stage be completely removed from the tumbler apparatus or drum. To achieve this removal of coarser grit, not only must the hard items themselves be removed and rinsed, but also the tumbling container or chamber itself must also be scrupulously washed, scrubbed, and thoroughly freed of all traces of the coarser grit of the preceding stage. This latter step of cleansing the tumbling container or chamber itself of the coarser grit of the preceding stages is a laborious, demanding, time-consuming, and expensive process.

In addition, the normal means for applying pressure to the grinding mixture in the liquid-and-grit polishing method to enhance the polishing interplay between the articles and the grinding mixture, is that afforded by gravity and centrifugal force upon rotation of the tumbler. It is readily apparent that additional pressures impressed upon the grinding mixture would greatly enhance the polishing action and improve the overall results.

The present invention contemplates a novel method and means which overcomes the aforementioned disadvantages of the present art. The items to be polished, along with an appropriate or suitable liquid-and-grit grinding mixture, are placed and sealed up in a disposable leakproof bag or container. The bag or container is preferably constructed from an inexpensive yieldable or plastic type material such as is well known. This disposable bag is then placed in a tumbling means and tumbled for a length of time sufficient to effect the desired amount of grinding. For further stage of grinding, such as for finer polishing or finish, the bag is removed from the tumbling means, the items extracted from the bag and rinsed of grit, and the bag itself and remaining contents thrown away. The item are subsequently placed and sealed up in new disposable bag normally containing a finer liquid-and-grit polishing mix, and the new bag, when so sealed, is itself placed in the tumbling means for further tumbling resulting in a finer polishing. This process may be continued for as many stages as are deemed necessary to achieve the desired degree of polishing.

By the expedient of containing the grinding liquid sealed within a bag contemplated by the present invention, as opposed to pouring the grinding liquid freely into the tumbling chamber itself directly, the tumbling chamber remains dry and substantially free of contamination from coarse grinding grit. Thus, the demanding and expensive step of cleaning the tumbling chamber of the coarser grit of each preceding stage is eliminated, resulting in a saving which far more than offsets the slight additional cost of the disposable bags.

In addition, the present invention provides an endless or closed belt loop for receiving the sealed bag and providing the tumbling action therefor. The belt loop is supported from and driven by a rotatable shaft, and the weight of the bag pulls downwardly on the belt to maintain a close engagement of the belt around a greater portion of the outer periphery of the bag. It is readily apparent that, in addition to the vertical pressure

induced upon the grinding liquid by purely gravitational forces, there is also a substantially radially inwardly directed centripetal or squeezing pressure exerted upon the grinding liquid by purely gravitational forces, there is also a substantially radially inwardly directed centripetal or squeezing pressure exerted upon the grinding liquid by the natural tendency of the distended and bulging loaded belt to try to return the straight-hanging unloaded position thereof.

An additional timesaving step contemplated by this invention is that of prepackaging the grinding grit within the disposable tumbling bag, and providing containers or bags with a plurality of grades or sizes of grit. In addition, it is anticipated that the amount of grit contained or packaged within the container or disposable tumbling bag may be premeasured so that when the bag is filled to a predetermined level with the items to be polished and the liquid, the optimum or preselected interproportions are automatically achieved. This facet of the invention reduces the time and effort required for the pretumbling phase of the process, whether one or a plurality of stages and grits is employed.

It is important an object of this invention to provide a method and means for grinding and polishing articles in a manner substantially eliminating the necessity of cleaning the tumbling container between each succeeding stage.

An additional object of this invention is to provide a method and means for grinding and polishing articles wherein the polishing action is facilitated by increasing the efficiency of the action of the grinding liquid during tumbling by exerting additional pressures thereon.

A further object of this invention is to provide a novel method and means for grinding and polishing stone wherein the grinding liquid is contained in a manner greatly reducing undesirable slashing or spraying thereof during a polishing operation.

A still further object of the invention is to reduce in the liquid-and-grit method of polishing the time and steps necessary in the mixing, or pretumbling phase of the process.

Other and further objects and advantage features of the present invention will hereinafter more fully appear in connection with a detailed description of the drawings in which:

FIG. 1 is a perspective view of the tumbling apparatus embodying the invention.

FIG. 2 is a sectional view taken on line 2-2 of FIG. 1.

Referring to the drawings in detail, reference numeral 8 generally indicates a tumbling apparatus comprising a broad, closed or endless belt 10 suspended from an overhead rotatable shaft 12. The shaft 12 may be mounted for rotation in an suitable manner, and as shown herein the shaft 12 is supported by and journaled in spaced pillow bearings 13 and 14. Any suitable means may be provided for transmitting rotation to the shaft 12, such as a pulley wheel 16 affixed to the rotatable shaft 12 and operably connected to a second sheave or pulley 17 by means of a belt or chain 18. The second sheave 17 is keyed or otherwise secured to the drive shaft 19 of a suitable motor 20.

A disposable leakproof bag 22 is removably disposed within the lower open end of the closed belt loop 10. The bag 22 is preferably constructed of a suitable inexpensive plastic material as is well known and is particularly designed for strength to resist tearing. The disposable leakproof bag 22 is sealable in any suitable manner, such as the application of heat, or a binding agent (not shown) to contain a liquid-and-grit grinding mixture 24 of any conventional type and suitable proportion, and the article 26 to be ground and polished.

In the process for polishing stone or the like, using the above-described device, the stones 26 to be polished are sealed within a disposable leakproof bag 22, along with a desired mixture of liquid and grit 24. The disposable leakproof bag 22 may be of any type, although the inexpensive plastic variety is preferred. The liquid and grit may be of any conventional type and proportion and is the immediate grinding and polishing agent. In normal use, a coarser rather than a finer grit will be used for the earlier stages, and the liquid may be water or water based.

After the stones 26 and the liquid-and-grit grinding mix have been sealed within the disposable leakproof bag 22, the bag and contents are then placed in the lower end of the closed belt loop 10. The belt 10 hangs or is suspended from the overhead rotatable shaft 12. The belt 10 is continuously moved or revolved in any suitable manner during the grinding operation. For example, as shown herein an electric motor 20, transmits rotation to the pulley or sheave 17 and to the belt or chain 18 which rotates the pulley wheel 16. The wheel 16 is rigidly affixed to the overhead rotatable shaft 12 and thus transmits rotation thereto. The rotation of the overhead rotatable shaft 12 causes the closed belt loop 10 to rotate, as is well known, and the rotation of the closed belt loop 10 in turn cause the disposable leakproof bag 22 contained in the lower end of said closed belt loop to tumble about, whereby the polishing interplay is brought about between the liquid-and-grit grinding mixture 24 and the stones to be polished 26, both previously sealed up in the disposable leakproof bag 22.

After the desired amount of grinding has taken place, the disposable leakproof bag 22 is removed from the closed belt loop 10, and the stones 26 removed from the disposable leakproof bag 22. The stones 26 and thoroughly washed and rinsed of all grit clinging thereto, and the disposable leakproof bag 22, till containing the bulk of the liquid-and-grit grinding mixture 24, is simply discarded.

After the stones 26 have been rinsed of the grit of the preceding stage, they may then be placed in a second disposable leakproof bag 22, which contains a 26 liquid and a finer grinding grit, and sealed therein as hereinbefore set forth. This second disposable leakproof bag containing the stones 26 and a finer liquid-and-grit grinding mixture 24 is then itself placed in the closed belt loop 10 for the second stage of rotational tumbling as hereinbefore set forth, after which the stones 26 may again subsequently removed and washed of grit, and if desired may subsequently be placed in a third disposable leakproof bag 22 containing an even finer liquid-and-grit polishing mixture 24, for a third stage of rotational tumbling and polishing in the closed belt 10. The process may be repeated for as many stages as are necessary to effect the desired degree of polishing.

As particularly shown in FIG. 2, it will be apparent that during the tumbling stage or stages of the process herein described, the lower end of the closed belt loop 10 bearing or supporting disposable leakproof bag 22 and contents thereof is distended and bulged unnaturally outward by the spatial displacement from the disposable leakproof bag 22. The closed belt loop 10 has a natural tendency, however, to try to return to the unloaded free hanging position thereof when loaded with the disposable leakproof bag 22. This natural tendency of the loaded belt loop 10 to try to return to a straighter and narrower free-hanging unloaded position has the effect of impressing upon the liquid-and-grit mixture 24 in the disposable leakproof bag 22 an inwardly directed lateral and centripetal pressure. It will be apparent that this additional pressure enhances the grinding and polishing interplay between the liquid-and-grit mixture 24 and the stones 26 to be polished, thereby increasing the efficiency of the whole operation.

From the foregoing it will be apparent that the present invention provide a novel method and means for grinding or polishing stones or the like. A prepackaged disposable container having a predetermined quantity of grinding grit is provided for receiving the stone or articles to be polished. A suitable liquid may be added to the stones and grinding grit in the container subsequent to which the container may be sealed to preclude leakage of fluid therefrom. The sealed container and contents are placed in tumbling device, preferably a loose hanging rotatable structure, whereby the bag and content are jostled and tumbled to effect a grinding or polishing operation. A plurality of successive stages may be provided to achieve the final or desired results with each step including depositing of articles to be ground within a container having successively finer grinding grit prepackaged together. Subsequent to each polishing step or stage, the bag and grinding grit mixture contained therein may be discarded. The novel grinding or polish-

ing method and means is simple and efficient in operation.

Whereas the present invention has been described in particular relation to the drawings attached hereto, it should be understood that other and further modifications, apart from those shown or suggested herein, may be made within the spirit and scope of this invention.

What I claim is:

1. A tumbling apparatus for use in the fluid grinding method of polishing articles, comprising in combination a disposable yieldable leakproof container containing a prepackaged quantity of grinding grit and for receiving the articles therein, a vertically-hanging closed belt loop for removably supporting the filled container, a rotatable shaft having a diameter smaller than the cross-sectional dimension of the filled container for supporting the closed belt loop, and a mean operably connected to the shaft for transmitting rotation thereto to revolve the closed belt loop for tumbling the container and contents thereof.

2. An improved process for grinding and polishing articles, comprising the steps of placing the articles to be polished and a fluid grinding mixture in a disposable leakproof container, sealing said filled container, tumbling said sealed container an contents a sufficient length of time to effect a desired degree of grinding and polishing, wherein the step of tumbling comprises subsequent steps of terminating the tumbling when an intermediate degree of polishing has been effected, removing the intermediately polished articles from the leakproof container, cleansing the articles of the grinding mix, disposing of the disposable container and its residual contents, placing the cleansed intermediately polished articles and a second grinding mixture in a second disposable leakproof container, sealing said filled second disposable leakproof container, tumbling said second sealed disposable leakproof container and contents a sufficient length of time to effect a second desired degree of grinding and polishing, and repeating the process through a sufficient number of stages as necessary to achieve the ultimate desired degree of polishing.

3. An improved process for grinding and polishing articles, comprising the steps of placing the articles to be polished and a fluid grinding mixture in a disposable leakproof container, sealing said filled container, tumbling said sealed container and contents a sufficient length of time to effect a desired degree of grinding and polishing, wherein the placing of the articles and the grinding mix in the disposable leakproof container includes the steps of prepackaging a premeasured amount of grinding grit in the disposable leakproof container, opening the said prepackaged disposable leakproof container, placing said articles in said prepackaged container, and adding liquid to the contents of the container prior to the sealing thereof.

4. An improved process for grinding and polishing articles as described in claim 2, wherein the grinding mixture comprises a liquid and grinding grit combination.

5. An improved process for grinding and polishing articles as described in claim 4 wherein the grit used in the sequential grinding stages is of a successively finer size to provide increasingly finer polishing.

6. An improved process for grinding and polishing articles as described in claim 5 wherein the liquid is water.

7. An improved process for grinding and polishing articles as described in claim 5, wherein the liquid is essentially water based.

8. An improved process for grinding and polishing articles as set forth in claim 3 herein a predetermined quantity of liquid is added to the contents of the container to provide an optimum ratio between the liquid and the premeasured grit.

9. A tumbling apparatus for use in the grinding fluid method of polishing as described in claim 1, wherein the sides of the vertically hanging belt loop are distended by the weight and size of the filled, yieldable container supported therein, said distended sides providing an inward squeeze against the container to impress a centripetal pressure against the contents of the yieldable container.