Aug. 30, 1949. M. B. HAMMOND ET AL 2,480,238

POLISHING APPARATUS

Filed Nov. 8, 1946 2 Sheets-Sheet 1

Fig. 1.

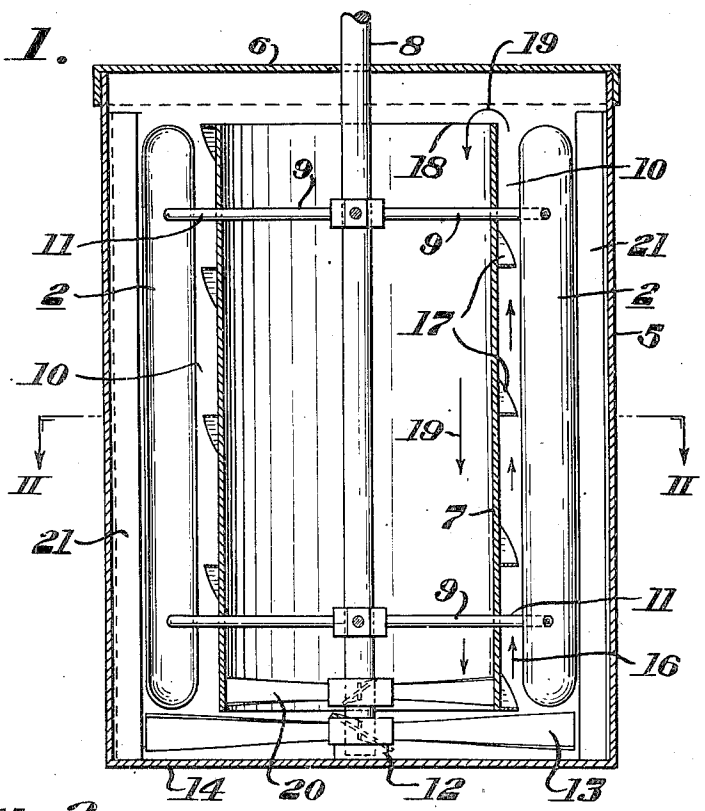

Fig. 2.

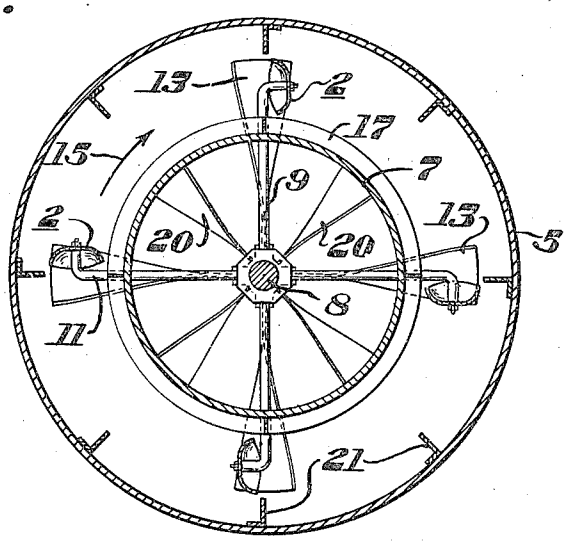

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Fig. 3.

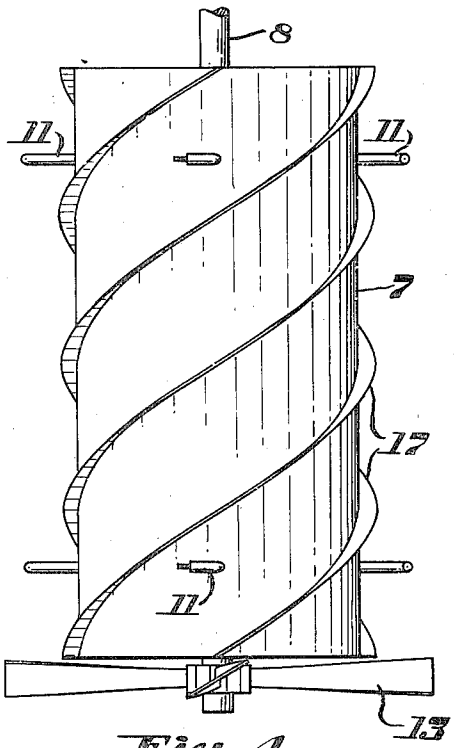


Fig. 4.

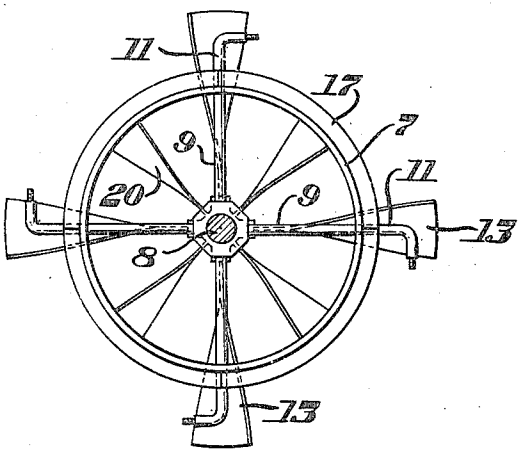
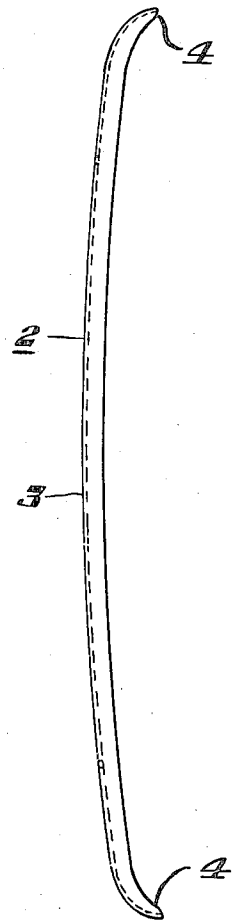


Fig. 5.



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UNITED STATES PATENT OFFICE

2,480,238

POLISHING APPARATUS

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Application November 8, 1946, Serial No. 708,754

10 Claims. (Cl. 51—7)

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This invention relates to apparatus and method for polishing articles. While the invention is applicable to polishing various articles, it is particularly suitable for polishing steel automobile bumper bars so as to provide a smooth surface thereon suitable for electroplating nickel or other metal.

In the accompanying drawings which illustrate a preferred embodiment of our invention,

Figure 1 is a vertical longitudinal section;

Figure 2 is a horizontal section taken on the line II—II of Figure 1;

Figure 3 is a side elevation of the rotatable drum;

Figure 4 is a top plan view of the rotatable drum; and

Figure 5 is a top plan view of an automobile bumper bar such as may be polished in accordance with the present invention.

Prior to our invention, automobile bumper bars have always been polished by hand before electroplating them. This polishing operation has been carried out by guiding the bar by hand and pressing it against a polishing wheel. This has been a tedious, time-consuming and costly operation. These disadvantages are overcome according to the present invention by means of which a plurality of bumper bars may be polished simultaneously and entirely automatically with the exception of placing the bumper bars into and removing them from the polishing machine. It will be understood that bumper bars, due to their relatively great length and shape, present problems in polishing which are not present in the polishing of small articles.

Referring more particularly to the accompanying drawings, the invention is suitable for polishing an automobile bumper bar of the kind shown in Figure 5. The bumper bar is designated generally by the reference numeral 2 and comprises a body portion 3 having curved ends 4. Referring now to Figures 1 through 4, the polishing apparatus comprises a vertically arranged cylindrical container 5 provided with a removable cover 6 and adapted to hold a suspension of abrasive in a liquid such as water. Inside of the container 5 and spaced therefrom is a vertical cylindrical drum 7 secured to a drive shaft 8 by arms 9. The drum is open at its top and bottom. The drive shaft 8 extends upwardly out of the container and may be driven by any suitable means not shown. A plurality of bumper bars 2 are supported vertically in the annular space 10 between the container 5 and the drum 7 by arms 11 which may be continuations of the arms 9. The

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lower end of the drive shaft 8 is supported in a bearing 12 and the upper end of the shaft is connected to any suitable driving means not shown. An impeller 13 is secured to the drive shaft 8 and is located adjacent the bottom 14 of the container 5 and below the drum 7. The blades of the impeller 13 are so pitched that upon rotation of the shaft 8 in a clockwise direction as viewed in Figure 2 and as indicated by the arrow 15 in that figure, they force the abrasive which tends to collect at the bottom of the container upwardly into the annular space 10 as indicated by the arrows designated 16.

In order to aid upward movement of the abrasive in the space 10, the outside of the drum 7 is provided with helically arranged vanes 17. When the drive shaft 8 is rotated in a clockwise direction, it rotates the impeller 13, the drum 7 and the bumper bars 2. The abrasive is picked up from the bottom of the container 5 by the impeller 13 and forced upwardly into the space 10. Upward movement of the abrasive in the space 10 in contact with the bumper bars 2 is aided by the vanes 17 on the outside of the rotating drum 7. When the abrasive reaches the upper end of the annular passage 10, it overflows the upper end 18 of the drum and flows downwardly inside of the drum as indicated by the arrows 19. Thus while the vertically extending bumper bars are being rotated in a horizontal plane about the shaft 8 as an axis, they are contacted by abrasive suspended in water, the flow of the abrasive and water being upwardly in the space 10 in contact with the bumper bars and then downwardly within the drum 7.

Rotation of the impeller 13 which is provided for the purpose of picking up abrasive from the bottom of the container and forcing it upwardly into the space 10 has a tendency to force some abrasive upwardly into the interior of the drum. This tendency is overcome by providing a second impeller 20 secured to the drive shaft 8 and to the inside of the rotatable drum 7. The blades of the impeller 20 are so arranged that they force abrasive downwardly toward the bottom of the container, thereby overcoming any tendency of the impeller 13 to cause packing of abrasive at the lower end of the drum 7. It will be seen that the pitch of the blades of the impeller 20 is opposite to that of the blades of the impeller 13.

In order to further increase the turbulent flow of abrasive in the space 10, vertically extending baffles 21 are provided on the inside of the container 5. Efficient polishing action of the bumper bars is due, at least in part, to the fact that

as the bars are rotated they have close clearance with the baffles 21 and vanes 17. In other words the radius of the space 10 is occupied almost entirely by the baffles 21, the bumper bars 2 and the vanes 17. The impeller 13 and the vanes 17 impart an upward and rotational movement of the abrasive in the space 10. The turbulency and therefore the efficiency of the polishing action is increased by the provision of the baffles 21, particularly since there is only a small space between the bumper bars, the baffles and the vanes.

It will be seen from the above description that in carrying out our method of polishing bumper bars, the bars are supported in a suspension of an abrasive in a liquid. An outer confined path of flow for the abrasive is provided by the space 10 between the container 5 and drum 7. An inner confined path of flow for the abrasive is provided within the drum. The bumper bars are moved through the space 10 upon rotation of the drum 7 and drive shaft 8 and at the same time that the bars are moving in the space 10, abrasive is forced upwardly through the space 10 and into contact with the bumper bars by the impeller 13 and vanes 17, after which the abrasive flows downwardly in an inner path provided within the drum 7 and shown by the arrows 19. Thus the bumper bars are moved in a horizontal direction while supported in a confined path provided by the space 10 and at the same time abrasive is forced upwardly through that space in contact with the bumper bars and then downwardly in a path out of contact with the bumper bars. The combination of the movement of the bumper bars and the movement of the abrasive results in very efficient polishing action.

The invention is not limited to the preferred embodiment which has been given merely for purposes of illustration but may be otherwise embodied or practiced within the scope of the following claims.

We claim:

1. Apparatus for polishing articles, comprising a container adapted to hold abrasive suspended in a liquid, a rotatable drum arranged vertically within and spaced from the wall of the container, said drum being open at its top and bottom, means for rotating the drum, means for supporting and moving the article through the space between the container and drum, and means for forcing the abrasive upwardly in the space containing the article and then downwardly in the space within the drum.

2. Apparatus for polishing articles, comprising a container adapted to hold abrasive suspended in a liquid, a rotatable drum arranged vertically within and spaced from the wall of the container, said drum being open at its top and bottom, means for rotating the drum, means for supporting and moving the article through the space between the container and drum, an impeller adjacent the bottom of the container, said impeller arranged to force the abrasive upwardly in the space containing the article, and means located within the drum and arranged to force abrasive downwardly toward the bottom of the container.

3. Apparatus for polishing articles, comprising a container adapted to hold abrasive suspended in a liquid, a rotatable drum arranged vertically within and spaced from the wall of the container, said drum being open at its top and bottom, means for rotating the drum, means for supporting and moving the article through the space between the container and drum, an impeller adjacent the bottom of the container, said impeller

arranged to force the abrasive upwardly in the space containing the article, and a second impeller, said second impeller being located in said drum and arranged to force abrasive downwardly toward the bottom of the container.

4. Apparatus for polishing articles, comprising a container adapted to hold abrasive suspended in a liquid, a rotatable drum within and spaced from the wall of the container means for rotating the drum, means for supporting and moving the article through the space between the container and drum, means adjacent the bottom of the container for forcing the abrasive upwardly in the space containing the article and then downwardly in the space within the drum, and vanes on the outside of the drum arranged to aid in forcing the abrasive upwardly in the space containing the article.

5. Apparatus for polishing articles, comprising a container adapted to hold abrasive suspended in a liquid, a rotatable drum within and spaced from the wall of the container, means for rotating the drum, means for supporting and moving the articles through the space between the container and drum, means adjacent the bottom of the container for forcing the abrasive upwardly in the space containing the article and then downwardly in the space within the drum, vanes on the outside of the drum arranged to aid in forcing the abrasive upwardly in the space containing the article, and baffles on the container extending into the space between the container and drum for increasing the turbulent flow of abrasive in said space.

6. Apparatus for polishing automobile bumper bars, comprising a container adapted to hold abrasive suspended in a liquid, a rotatable drum arranged vertically within and spaced from the container, a drive shaft for supporting and rotating the drum, said drum being open at its top and bottom, means for supporting a bumper bar in the space between the container and drum, said bumper bar supporting means being rotatable with the drum, and an impeller adjacent the bottom of the container arranged to force the abrasive upwardly in the space containing the article and then downwardly in the space within the drum.

7. Apparatus for polishing automobile bumper bars, comprising a container adapted to hold abrasive suspended in a liquid, a rotatable drum arranged vertically within and spaced from the container, a drive shaft for supporting and rotating the drum, said drum being open at its top and bottom, means for supporting a bumper bar vertically in the space between the container and drum, said bumper bar supporting means being rotatable with the drum, and an impeller adjacent the bottom of the container arranged to force the abrasive upwardly in the space containing the article and then downwardly in the space within the drum.

8. Apparatus for polishing automobile bumper bars, comprising a container adapted to hold abrasive suspended in a liquid, a rotatable drum arranged vertically within and spaced from the container, a drive shaft for supporting and rotating the drum, said drum being open at its top and bottom, means for supporting a bumper bar vertically in the space between the container and drum, said bumper bar supporting means being rotatable with the drum, an impeller adjacent the bottom of the container arranged to force the abrasive upwardly in the space containing the article and then downwardly in the space

within the drum, and a second impeller, said second impeller being located in said drum and preventing the abrasive from entering the lower end of the drum.

9. Apparatus for polishing automobile bumper bars, comprising a container adapted to hold abrasive suspended in a liquid, a rotatable drum arranged vertically within and spaced from the container, a drive shaft for supporting and rotating the drum, said drum being open at its top and bottom, means for supporting a bumper bar vertically in the space between the container and drum, said bumper bar supporting means being rotatable with the drum, an impeller adjacent the bottom of the container arranged to force the abrasive upwardly in the space containing the article and then downwardly in the space within the drum, vanes on the outside of the drum arranged to aid in forcing the abrasive upwardly in the space containing the article, and baffles on the container extending into the space between the container and drum for increasing the turbulent flow of abrasive in said space.

10. Apparatus for polishing automobile bumper bars, comprising a vertical cylindrical container adapted to hold abrasive suspended in a liquid, said container having a height greater than the length of the bumper bar, a rotatable cylindrical vertical drum within and spaced from the container, said drum being open at its top and bottom, a drive shaft for supporting and rotating the drum, means for supporting a plurality of bumper bars vertically in the space between the container and drum, an impeller adjacent the bottom of the container, said impeller arranged to force the abrasive upwardly in the space containing the bumper bar and then downwardly in the space within the drum, vanes on the outside of the drum arranged to aid in forcing the abrasive upwardly in the space containing the bumper bar, and baffles on the container extending into the space between the container and drum for increasing the turbulent flow of abrasive in said space, the bumper bars in their rotation having close clearance with said vanes and baffles.

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