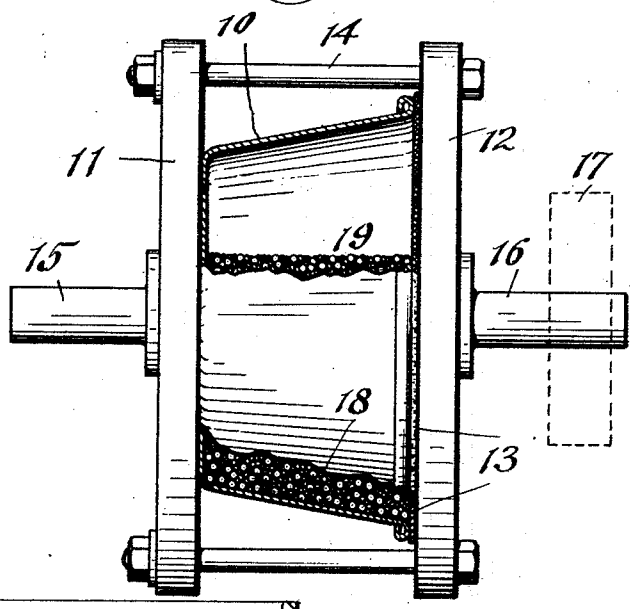
March 29, 1932. A. L. FABENS 1,851,932

METHOD OF FINISHING METALWARE

Filed June 27, 1925

Fig. 1.



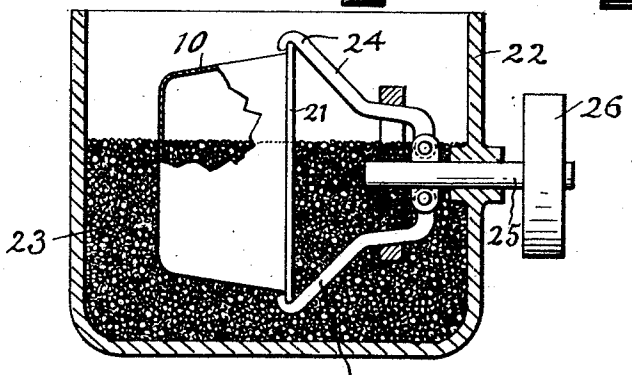


Fig. 3.

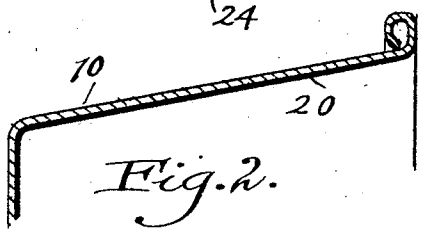


Fig. 2.

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UNITED STATES PATENT OFFICE

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METHOD OF FINISHING METALWARE

Application filed June 27, 1925. Serial No. 40,123.

This invention relates to an improved method of producing the surface finish of metalware.

In the manufacture of aluminum ware, and particularly aluminum cooking utensils which are stamped or spun from sheet metal, it has been the usual practice to polish the exterior surface by buffing the same, and to finish the interior surface by employing thereon, what is known as a scratch brush, or abrading material, such as emery cloth which removes the skin or surface metal and provides a "scratched" or "Sunray" finish, as distinguished from a polished finish. The removal of the skin, or surface metal, has the effect of exposing the softer metal and leaving the surface comparatively rough and subject to contamination and very difficult to clean. The primary purpose of thus finishing the interior has been to make the article more attractive, from the sales standpoint, at the expense of sacrificing the desirable characteristics inherent in the natural skin or surface metal.

It is one of the objects of this invention to produce a finish that will avoid the removal of the skin or surface metal and, at the same time, provide a smooth and hardened surface that will be of uniform character and more attractive in appearance than the "scratched" finish.

It is a further object of the invention to provide a more sanitary utensil that will have better wearing qualities and a surface that will be less easily scratched or marred in the usual handling operations prior to reaching the ultimate consumer.

Other objects of the invention and the features of novelty will be apparent from the following description taken in connection with the accompanying drawings, in which, Fig. 1 is an elevation of a simple form of apparatus for carrying out my improved method, certain parts being broken away; Fig. 2 is a section through the wall of a utensil, which has been finished in accordance with my invention, for the purpose of indicating the portion of the article that is treated; and Fig. 3 is a sectional view showing a modified form of apparatus by which both the interior and exterior of the utensil may be finished.

In a general way, the method comprises the mounting of the article on a suitable support in such manner that it may be continuously rotated and to confine in contact with the surface or surfaces to be finished, a mass of steel balls of different sizes which, when the article is rotated, tumble and roll upon the surface against which the balls bear and act to condense and harden the surface and at the same time to produce a uniformly bright and attractive polished surface.

The use of small balls in combination with the large ones has the effect of separating the larger balls so that they cannot form a regular arrangement as this would be detrimental, owing to the fact that the balls would tend to remain in a regular formation and produce lines or grooves. The small balls fill the interstices between the larger balls.

The balls should be thoroughly cleansed, so that they are free from foreign material before being used and a sufficient amount of a cleansing solution should be used with the balls to practically submerge the latter, a cleansing solution consisting of two ounces of burnishing soap per gallon of water, having been found satisfactory. The solution also serves as a lubricant, thereby facilitating and assisting the movement of the utensil through the mass of balls. The rotation of the fixture should be at such speed as will give the surface of the utensil a velocity from 540 to 620 feet per minute, slower speeds requiring considerably longer time for the operation. It has been my experience that the utensil should be rotated for about 15 to 20 minutes, under conditions named, in order to produce the desired effects.

Referring to Fig. 1 of the drawings, in which I have shown apparatus for polishing the interior of a hollow article, 10 indicates a pan or other piece of hollow metal ware which is stamped or spun from a sheet, in the usual manner, and mounted between two plates or discs 11 and 12, which may be made of wood or other suitable material. Over the open side or top of the pan 10 there is placed a sheet of rubber or other suitable material 13,

which serves as a gasket, this gasket being clamped against the rim of the pan by means of the bolts 14 which connect the discs 11 and 12. The discs 11 and 12 are provided with trunnions 15 and 16, respectively, which are in alignment and may be mounted in suitable bearing brackets, or otherwise held, so that the fixture may be rotated about the axis of the trunnions. At 17 I have indicated diagrammatically, a pulley for rotating the fixture, but any other suitable means may be employed for this purpose.

Before the pan 10 is placed in the fixture, it is partially filled with steel balls which are indicated at 18, these balls being preferably of different sizes and promiscuously arranged so that when the fixture is rotated, they will act throughout the entire inner surface without forming tracks or grooves. I have found it desirable to fill the pan 10 with balls to slightly above the axis of rotation, and that balls from 1/8" to 3/8" in diameter give satisfactory results. When the fixture is mounted the balls arrange themselves in the pan 10 to about the level indicated at 19 and as the fixture rotates, the balls roll around on the inner surface of the pan and also have a tumbling action which has the effect of hammering the inner surface by minute blows. The purpose in having a relatively large mass of balls is to impose a substantial load on the balls, which are in contact with the surface of the utensil, so that the pressure will have the effect of rolling down any irregularities in the surface and produce a uniformly smooth surface.

The heavy line 20, in Fig. 2, represents the surface that is treated and a careful examination of the article after treatment disclosed the fact that the surface metal is considerably hardened or condensed and rolled out to a uniformly smooth and bright finish which is more attractive than the scratched finishes heretofore used and has none of the objectionable features of the latter.

In Fig. 3 of the drawings, I have illustrated a modification of the invention by which a piece of hollow ware may be polished upon the outside or upon both the inside and outside. In this modification, means is provided for rotatably supporting a pan 21 or other article within a suitable container 22 which is partially filled with steel balls 23 of various sizes corresponding to the balls 18 shown in Fig. 1. The pan is held by suitable grippers 24, carried by the inner end of a horizontal shaft 25 journaled in a wall of the container 22 and having upon the outside of the container a pulley 26 by which it may be driven. The grippers 24 may be of any suitable form for securing the pan against relative rotation with respect to the shaft. The container 22 is preferably filled with balls to a level slightly above the shaft 25 and sufficient cleansing solution, containing burnishing soap, is added to substantially submerge the balls. The shaft 25 and pan 21 are rotated at a speed such that the speed of movement of the peripheral portions of the pan traveling through the mass of balls is from 540 to 620 feet per minute. The mass of balls 23, within the pan, acts upon the inner surface thereof in a manner similar to the balls 18 within the pan 10 and a corresponding polishing effect is produced by the balls acting upon the outside surface.

While I have illustrated and described very simple and elemental apparatus for practising my improved method, I contemplate the use of special machinery for carrying out the method as a continuous operation in commercial production and in my application Serial No. 40,122 filed June 27, 1925, I have disclosed one form of apparatus for thus practising the method on a commercial scale.

Having thus described my invention, I claim:

1. The herein described method of producing a hardened and bright surface on an article of metal ware stamped or spun from sheet metal which consists in supporting in contact with the surface of said article a mass of relatively hard balls of different sizes and promiscuous arrangement, and moving said article continuously and uniformly with respect to said mass of balls to cause the balls contiguous to said surface to move progressively over said surface and to constantly change their relative arrangement, whereby surface irregularities are rolled down and the surface metal compacted.

2. The herein described method of producing a hardened and bright surface on wares stamped or spun from relatively soft sheet metal which consists in running against said surface, for a sufficient time to act uniformly thereon and produce the desired effect, a mass of relatively hard balls of different sizes and promiscuous arrangement which are forcibly pressed against said surface and permitted to constantly change their relative arrangement.

3. The herein described method of producing a hardened and bright surface on wares stamped or spun from relatively soft sheet metal which consists in running against said surface, for a sufficient time to act uniformly thereon and produce the desired effect, a mass of relatively hard balls of different sizes and promiscuous arrangement which are forcibly pressed against said surface and permitted to constantly change their relative arrangement, and the balls being submerged in a cleansing and lubricating solution.

4. The herein described method of producing a hardened and bright surface on the interior of an article stamped or spun from sheet metal which consists in rotating the article with a mass of relatively hard balls of different sizes and promiscuous ar-

rangement therein, the rotation of the article effecting movement of the balls on said surface, the quantity of said balls being sufficient to provide the necessary weight to force the balls which contact with said surface thereagainst with sufficient pressure to roll down surface irregularities and compact the surface metal.

5. The herein described method of producing a hardened and bright surface on the interior of an article stamped or spun from relatively soft sheet metal which consists in rotating the article with a mass of relatively hard balls of different sizes and promiscuous arrangement therein, the rotation of the article effecting movement of the balls on said surface, the quantity of said balls being sufficient to provide the necessary weight to force the balls which contact with said surface thereagainst with sufficient pressure to roll down surface irregularities and compact the surface metal, and there being a cleansing and lubricating solution containing burnishing soap in the mass of balls to act on said surface simultaneously with the action of the balls.

In testimony whereof, I hereunto affix my signature.

ANDREW L. FABENS.