METAL TREATING APPARATUS

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The present invention relates to a device for treating articles and is particularly adapted for pickling and washing metallic articles such as small arms ammunition components.

An object of the invention is the provision of an improved drum for treating metal articles. A further object is to provide a drum for pickling, washing or otherwise treating metal cups, drawn pieces or cartridge cases, the drum being designed to enhance the free and uniform rate of movement of the articles through it.

These and other objects, features and advantages of the invention will be described more fully in the following description of the invention, an embodiment thereof being shown in the drawing, in which:

Fig. 1 is a side elevation, partly in section, of the improved drum of this invention including fragmentary portions of similar drums secured at opposite ends thereof.

Fig. 2 is a fragmentary plan view of the inside wall of the drum including a portion of the helix.

In general, cartridge cases are manufactured by punching and drawing brass blanks from sheet stock. In the drawing or working of the brass, the metal work hardens and the resistance to further working or drawing increases. Consequently, it is customary to anneal the drawn articles or components between successive draws to restore the normal properties of the metal. The anneal is carried out in a suitable furnace through which the articles are conveyed in quantity, surface oxidation inevitably occurring adjacent the furnace exit. The oxide or scale must be removed before the components are passed on to the next operation, and this is generally done by conveying the components through a dilute solution of sulphuric acid, known as a pickling bath, after which the components are rinsed and then neutralized or lubricated by immersion in a soap solution.

Apparatus for conveying the annealed components through the pickling, rinsing and lubricating baths has comprised, heretofore, a series of perforated cones or drums arranged to rotate in tandem, that is to say, all turning together on a common longitudinal substantially horizontal axis, the large or entrance end of each cone, with the exception of the first cone, being securely fastened to the small delivery end of the preceding cone as indicated in Fig. 1. Each cone is adapted to be supported by rollers over a receptacle (not shown) containing or adapted to contain an appropriate bath liquid, the relationship between each cone and its bath being such that only a limited portion of the lower side of each cone is immersed in the bath, as indicated by the liquid level line in Fig. 1. A spiral flange is formed on the inner wall of each cone and provides a channel or passage for the components by which they are advanced from the forward end of the cone through the liquid bath and discharged from the rear end of the cone into the forward end of the next succeeding cone. It has been customary to deliver the annealed components directly from the furnace into the entrance end of the first cone, the latter being the pickling drum. The pickling drum conveys the components through a dilute solution of sulphuric acid and from thence to the next succeeding pair of cones which convey the components through a rinsing bath. From the rinsing bath, the components are conveyed into the last cone where the components are immersed in a soap solution to further neutralize any acid thereon and to provide a thin lubricating coating on each component.

The foregoing description is simply for the purpose of teaching a proposed use of the improved drum of this invention. A more detailed description of apparatus for similar purposes may be found in the prior art, as, for example, the Needham patent, No. 1,383,419, July 5, 1921.

It will be understood, however, that the suggested use of the improved drum of this invention is not a limitation thereof and that it may have other uses and embody modifications all within the scope of the appended claims.

The drum shown in Fig. 1 comprises a substantially symmetrical conical member 10 having a relatively large entrance end 11 and a small exit or delivery end 12, both the entrance end 11 and exit end 12 being shown bolted to the adjacent ends of similar cones. The shell or wall 10 of the drum is perforated for a portion of its length and is provided on its inside with a continuous spiral flange or helix 13 formed integral with the wall 10, the successive convolutions of the helix being substantially equally spaced throughout the length of the cone.

In the present embodiment, the pitch p of the helix is substantially six and one-half inches which has been found to be especially suitable for enhancing the freedom of movement of the components through the passage or channel 14 formed between successive convolutions of the helix.

As shown in the drawing, the first convolution 13' of the helix is not complete but extends substantially half way around the inside of the drum and is spaced from the wall 10' at the entrance
end 11 of the drum, a distance which is not less than the width p of the channel 14. In accordance with this construction, the width of the helix channel 14 is substantially uniform throughout its entire length and hence the possibility of components being jammed between the wall of the drum and the first convolution 12' of the spiral at the entrance end of the drum is precluded.

The drum 10 is also provided with means to prevent articles from becoming jammed or wedged in the channel 14 of the helix as they are advanced therethrough. To this end an annular rib 15 is formed on the inner wall of the drum substantially midway of each pair of convolutions of the channel 14. As shown, the rib 15 is continuous in length and has a smoothly rounded profile 15'. The rib 15 is of such height that components disposed thereon will be held up off of and make an angle with respect to the bottom of the channel 14. As a consequence, it is impossible for two components to nest end to end, see Figs. 1 and 2, and hence to become wedged crosswise between the convolutions of the spiral.

Moreover, those components which lie crosswise of the channel make substantially point contact at their opposite ends with the rib 15 and the bottom of the channel 14 respectively or with the rib and the adjacent flange or convolution of the spiral as shown in Fig. 1. The components are thereby supported in a comparatively unattainable condition, and hence are susceptible to greater agitation, more thorough tumbling and more rapid advancement through the drum than has been the case when the components were allowed to lie flat and become jammed on the bottom of the channel. Fig. 1 also illustrates one component lying with its longitudinal axis substantially parallel to the longitudinal axis of the channel and a second component extending transversely of the channel and supported precariously on the rib 15. Again there is no possibility of components so disposed becoming wedged between the parallel flanges of the spiral. The width of the channel 14 is determined in part by the geometry of the components and is such that, in the event two components extending longitudinally in the channel substantially side by side, as shown in Fig. 2, the component adjacent to the center of the channel will contact the relatively large radius r at the intersection of the bottom of the rib 15 and the bottom of channel 14. Articles so disposed cannot wedge or jam between the flange of the channel and the rib 15 and the flank of the spiral, in all positions that the components may momentarily assume while being advanced through the spiral, no jamming or binding of the components is possible.

The drum is adapted to be rotated on its longitudinal axis in a well known manner and by well known means such as described in the aforementioned patent, and hence all components in the drum will be advanced freely and at a substantially uniform rate through the drum. The improved performance of the drum is especially manifest when such requirements as critical immersion periods and quantity production schedules are to be achieved.

What is claimed is:

1. A device for conveying articles through a bath comprising a conical perforated drum rotatable on its longitudinal axis in a substantially horizontal plane, said drum having a spiral internal flange by which articles deposited in said drum are gradually advanced therethrough, and an annular rib on the inner wall of said drum, said rib being arranged parallel to and intermediate successive convolutions of said spiral to prevent articles from wedging therebetween.

2. A device for conveying articles through a bath, the combination with a conical perforated drum rotatable on its longitudinal axis in a substantially horizontal plane and having an entrance end; of a spiral internal flange in said drum, said spiral comprising substantially equally spaced convolutions arranged to gradually advance articles through said drum, and an incomplete convolution at the entrance end of said drum arranged to provide a space between the beginning of said spiral and the adjacent wall of said drum of a width not less than the distance between successive convolutions of said spiral to prevent articles from jamming at the entrance end of said drum; and an annular rib on the inner wall of said drum, said rib being arranged parallel to and midway of successive convolutions of said spiral to prevent articles from wedging between successive convolutions of said spiral.

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