July 21, 1936. A. W. PAULL ET AL 2,048,138

MANUFACTURE OF COLLAPSIBLE TUBES

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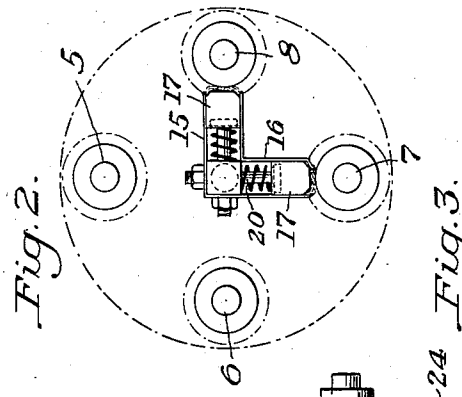


Fig. 2.

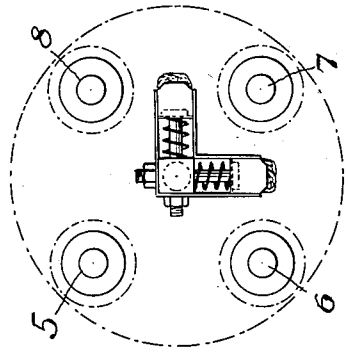


Fig. 3.

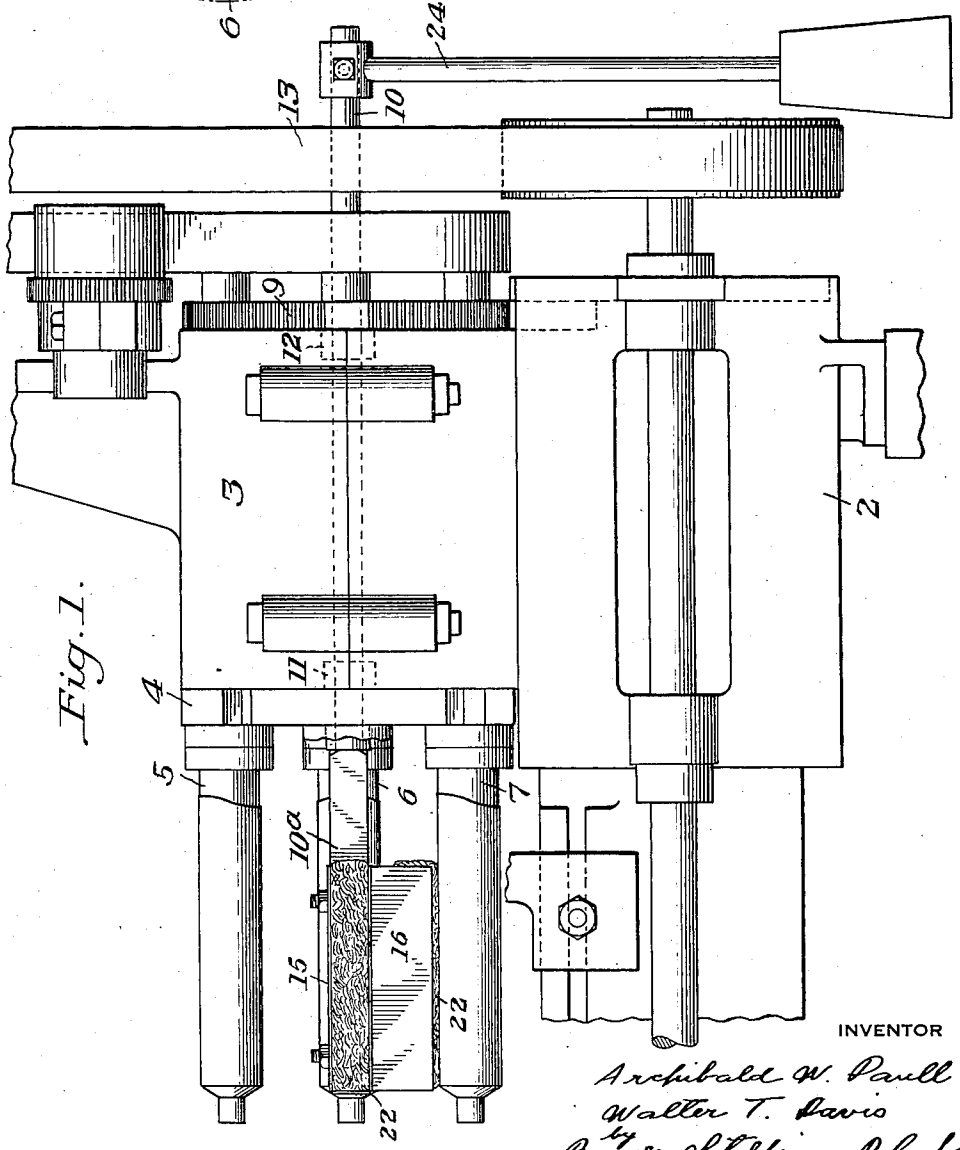


Fig. 1.

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Fig. 4.

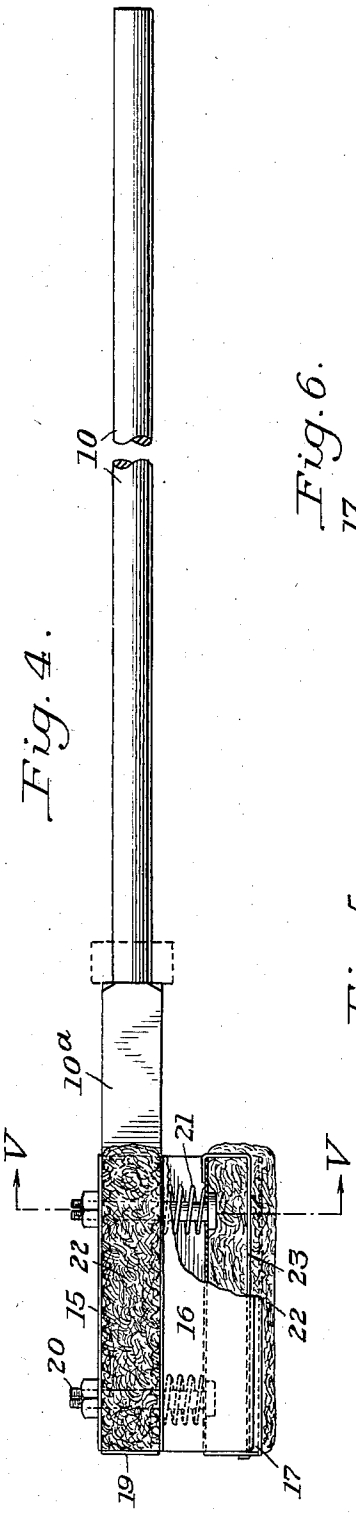


Fig. 6.

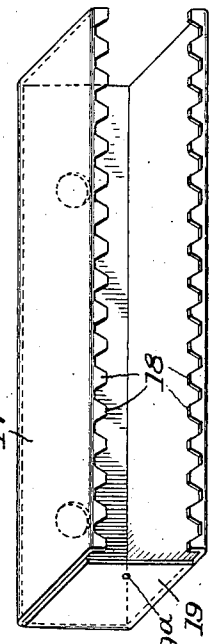


Fig. 7.

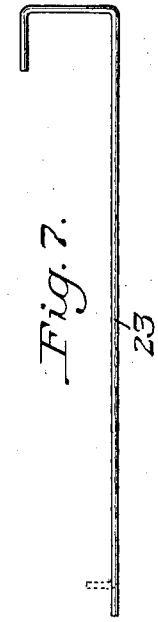
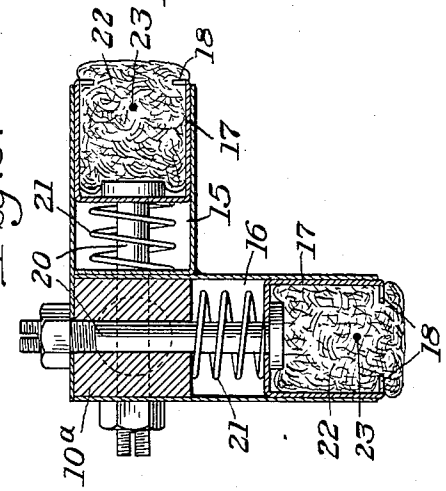


Fig. 5.



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UNITED STATES PATENT OFFICE

2,048,138

MANUFACTURE OF COLLAPSIBLE TUBES

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Application August 8, 1935, Serial No. 35,292

10 Claims. (Cl. 29—38)

This invention relates to the manufacture of collapsible tubes, and more particularly to the cleaning and preparing of the surface of the tubes after they have been formed, to receive the decorative coating which is to be applied to the tubes.

Collapsible tubes, such as those commonly used for toothpaste and various toilet preparations, usually carry a decorative coating of a specially prepared paint or enamel. Those engaged in the manufacture of the preparations to be put into the tubes require a high degree of perfection in the character of the decorative coating which is applied to the tubes, and tubes which are not properly decorated not only are refused but may be a source of loss of a customer to the manufacturer of the tubes which are deficient in this respect.

As is well known, these tubes are formed in an extruding press. After they have been formed, numerous operations are performed upon them, such as the threading of the neck, the trimming of the extruded blanks to uniform length, the trimming of the neck end of the tube and the application of the cap to the tube. These steps are usually performed on an automatic trimming and capping machine prior to the application of the coating to the tube. Thus when a tube has been prepared ready to receive a coating, it represents an article, the manufacture of which has been substantially completed. It has been found, however, that a number of the tubes when they are put on the coating machine, have some surface characteristic usually in small areas where the paint will not properly spread or adhere. This may be due to the presence of lubricant inasmuch as some lubricant is used on the original blanks to improve the extrusion of the tube, or it may be due to some kind of hardening or glazing of the surface of the metal of which the tubes are formed, resulting from the extrusion of the metal, or it may be due to the presence of grease from the fingers of persons who are called upon to handle the tubes in the forming and trimming of them. Whatever the nature of this surface imperfection, it results in the frequent production of tubes over which the coating will not properly spread. The presence of this imperfection on the surface, of course, cannot be detected until the tube has been coated, and by that time the steps and the materials which enter into the manufacture of the completed tube have all been performed and used. Moreover, close inspection has to be maintained to make sure that no tubes having imperfect coatings will be shipped.

The purpose of the present invention is to provide for the surfacing of all tubes after they have been extruded and before they have been coated, to avoid the presence of surface defects to which the coating material will not adhere, and thereby reduce the number of tubes which have to be discarded by reason of imperfect coating and also assure of all of the tubes having a superior coating. The extruded tubes are very soft and fragile and the performance of any surfacing operation on the tubes is ordinarily difficult. According to the present invention, however, the tubes have the surface thereof prepared for receiving the coating by revolving the tube while supported on a rigid mandrel in contact with a mild abrasive surface, such as steel wool. This mild abrasive surfacing of the tube eliminates in most cases those conditions on the surface of the tube which resist the application of the coating and form on the tube a surface which will readily "take" the coating. Moreover, according to the present invention, the means for so surfacing the tubes is preferably built into the automatic trimming and capping machine and is so arranged that the step of surfacing is done in conjunction with the other functions of the machine and without delaying the production of the machine. Moreover, the invention is accomplished without any substantial modification of existing machines.

The invention may be readily understood by reference to the accompanying drawings, in which—

Figure 1 represents a side elevation of that portion of an automatic trimming and capping machine to which the present invention relates, and showing our invention applied thereto;

Figure 2 shows an end view of the surfacing device embodying our invention, the several spindles or mandrels of the revolving head of the machine being shown and the mandrels being represented in the position which they occupy at the time the surfacing operation is being performed;

Figure 3 is a view similar to Figure 2 showing the position of the parts at the time the turret head carrying the several mandrels is moving from one station to the next;

Figure 4 is a side elevation of the steel wool holder shown in the preceding figures;

Figure 5 is a transverse section in the plane of line V—V of Figure 4;

Figure 6 represents one of the removable clips in which the mass of steel wool is held; and

Figure 7 merely shows a retaining wire used for holding the mass of steel wool in place on the clip of Figure 6.

Referring to the drawings, 2 designates the frame of an automatic machine for trimming and capping collapsible tubes. Machines of this general character are well known in the art, and the particular machine here shown is of the general type disclosed in Davis Patent No. 1,678,463, dated July 24, 1928. The machine is provided with head stock 3 in which is a rotatable turret 4. The face of this turret is provided with a plurality of mandrels 5, 6, 7, and 8. A planetary gearing, indicated generally at 9, serves to rotate the individual spindles about their own axes as the spindles or mandrels are carried around to the different positions or stations by the rotation of the turret. As shown in said Davis patent, and as well known in the art, an intermittent gear action is provided whereby each spindle is progressively brought through a succession of stations and rotated at each station while the rotation of the turret is temporarily interrupted. For instance, at one station the tube is applied to the spindle while the turret is at rest. In a succeeding station, the tube is cut to length, the neck is threaded and the neck end of the tube is trimmed. At the third station, in the particular machine described, a cap is applied to the threaded neck of the tube, and in a fourth station the tube is removed from the mandrel.

The turret 4 of the machine is generally cylindrical, the interior of the cylindrical turret being hollow. According to the present invention, a shaft 10 is passed through the turret and is supported in bearings 11 and 12 at opposite ends of the turret. One end of this shaft projects out beyond the driving belt 13 for the machine while the other end of the shaft, which is square and which is designated 10*a*, is positioned at the center of the several mandrels or spindles 5, 6, 7, and 8. Secured to the square portion 10*a* of the shaft are two guide elements 15 and 16, these elements being of like construction but being positioned at right angles to each other. Each guide element has spaced apart side plates. Each guide element is provided with a sheet metal clip or holder 17, the holder being substantially U or channel-shaped and having the free edges thereof turned inwardly and serrated as indicated at 18 in Figure 6. The holder 17 is closed at one end as indicated by the portion 19 in Figure 6, while the other end of the holder is open to facilitate the insertion of a mass of steel wool into the holder or clip. A pair of bolts 20 serves to slidably hold each holder 17 in its guide element 15—16, and compression springs 21 serve to yieldably urge the holders outwardly away from the shaft 10.

In Figures 4 and 5 we have designated a mass of mild abrasive material, preferably steel wool, as being supported in each of these resiliently supported holders 17, the steel wool being designated 22. The mass of steel wool projects beyond the outer faces of the guides 15—16 and of the holders 17. For positively holding the steel wool in place, a wire 23 passes longitudinally through the mass of steel wool. One end of this wire passes through the hole 19*a* in the end plate 19 of the clip or holder and is bent downwardly against the outside of this plate as shown in Figure 4 and as indicated in dotted lines in Figure 7. The other end of this wire is in the form of a hook which hooks in under the bottom of the holder 17.

The two clips or holders 17 are substantially coextensive with the length of the tube to be processed, and the exposed surface of the mass of steel wool is also of such length. Normally the guide 15 is in such position that the steel wool supported by it will bear against the surface of a tube supported on a mandrel when the mandrel is in the position of the mandrel 8 in Figure 2, while the steel wool in the member 16 will engage the surface of a tube on a mandrel when the mandrel is in the position or station occupied by the mandrel 7 in Figure 2.

Hanging from the outer end of the shaft 10 is a weighted arm 24. This arm serves to keep the shaft 10 from rotating with the turret. At the same time, it allows the shaft 10 to rock through a limited arc, as indicated by the dotted lines in Figures 2 and 3, when each succeeding mandrel moves into the position occupied by the mandrels 7 and 8 in Figure 2. In other words, assuming the head to be rotating in a clockwise direction, the mandrel 8 in Figure 3 and the mandrel 7 are both moving to a position where they will contact with the mass of steel wool in the respective holders. The masses of steel wool are resiliently urged outward by the springs 21. The turret revolves with considerable speed. When the mandrels 7 and 8 come into engagement with the respective masses of steel wool, there is considerable impact, tending to rotate the shaft 10. The weight 24, therefore, allows the shaft 10 to rotate through a slight arc at and following this impact, so that the steel wool holders are caused to sweep back and forth over the tube before coming to rest in the position shown in Figure 2. It will, of course, be appreciated that tubes, being supported on the mandrels, are being revolved at high speed about their own axes while they are in contact with the masses of steel wool.

By having two masses of steel wool in two holders extending in different directions, each tube is given two surfacing treatments, one at each of the two stations, thus assuring adequate surfacing of every tube.

A single charge of steel wool in each holder will serve to process several thousand tubes, and it is only necessary from time to time to recharge the holders with fresh masses of steel wool. Instead of using steel wool, it will, of course, be apparent that other mildly abrasive material can be brought against the surface of the tube to effect the same result. Steel wool, however, is particularly desirable because no grit or shavings are deposited on the surface of the tube, and because the scoring action is very mild.

By reason of the method herein described, all of the tubes take the coating more effectively and the number of defective tubes produced by reason of the fact that some tubes are imperfectly coated, has been very considerably reduced. The apparatus for surfacing the tubes, being located at the center of the turret, does not occupy any space required for any of the other mechanisms on the tube trimming and capping machine, and it does not require any alteration in the general construction or arrangement of the machine. The provision of the counterweighted arm 24 on the shaft effectively serves to hold the shaft and the surfacing units against any considerable degree of rotation. However, it does allow the shaft 10 to rock or yield just sufficiently to cause the surfacing pads

to sweep back and forth over the operating stations of the mandrel under the successive impact of the spindles as the turret rotates. This arrangement further serves to relieve the shock of impact of the moving spindles with the tubes thereon and the abrasive pads.

After the tubes have been processed in the manner just described, they are transferred to a coating machine where the coating is applied in the usual way but with more satisfactory results.

While we have specifically shown and described one preferred embodiment of our invention, it will be understood that various changes and modifications may be made within the contemplation of our invention and under the scope of the following claims.

We claim:

1. The combination with a collapsible tube machine having a plurality of spindles which are successively moved to different stations and wherein the spindles are rotated in moving from one station to another, of an abrasive pad in the path of travel of the spindle positioned to bear against the surface of the tube supported on the spindle.

2. The combination with a collapsible tube machine having a plurality of spindles which are successively moved to different stations and wherein the spindles are rotated in moving from one station to another, of an abrasive pad in the path of travel of the spindle positioned to bear against the surface of the tube supported on the spindle, said pad having a normal operative position adjacent one of the regular stations of the spindle.

3. The combination with a collapsible tube machine having a plurality of spindles which are successively moved to different stations and wherein the spindles are rotated in moving from one station to another, of an abrasive pad in the path of travel of the spindle positioned to bear against the surface of the tube supported on the spindle, said pad having a normal operative position adjacent one of the regular stations of the spindle and being supported for oscillation back and forth across the spindle.

4. The combination with a collapsible tube machine having a plurality of spindles which are successively moved to different stations and wherein the spindles are rotated in moving from one station to another, of an abrasive pad in the path of travel of the spindle positioned to bear against the surface of the tube supported on the spindle, said pad having a normal operative position adjacent one of the regular stations of the spindle and being supported for oscillation back and forth across the spindle, said pad being supported in such manner that oscillation thereof is effected by impact between the tube on the spindle and the abrasive pad.

5. The combination with a tube machine having a plurality of spindles and means for moving the spindles successively past a number of stations, a rock shaft associated with said machine, a holder projecting radially from said rock shaft, an abrasive pad in said holder and positioned by the holder to contact with the surface of tubes on the spindles at one station in the path of movement of the spindles, and means for damping the free oscillation of said shaft by the impact of the spindles with the abrasive pad.

6. The combination with a tube machine having a plurality of spindles and means for moving the spindles successively past a number of stations, a rock shaft associated with said machine, a holder projecting radially from said rock shaft, an abrasive pad in said holder and positioned by the holder to contact with the surface of tubes on the spindles at one station in the path of movement of the spindles, and means for damping the free oscillation of said shaft by the impact of the spindles with the abrasive pad, said means comprising a weight arm hung from the rock shaft.

7. The combination with a tube trimming and capping machine having a turret with a plurality of spindles and means for rotating the spindles and the turret, of a rock shaft passing axially through the turret and having a radially extending holder thereon, an abrasive pad supported in the holder in position to bear against the surface of a tube on the spindles as the spindles are successively brought to predetermined relation with the pad, and means for preventing rotation of the shaft with the turret.

8. The combination with a tube trimming and capping machine having a turret with a plurality of spindles and means for rotating the spindles and the turret, of a rock shaft passing axially through the turret and having a radially extending holder thereon, an abrasive pad supported in the holder in position to bear against the surface of a tube on the spindles as the spindles are successively brought to predetermined relation with the pad, and means for preventing rotation of the shaft with the turret, said means allowing a limited oscillating movement of the rock shaft.

9. A machine for preparing collapsible tubes for coating, comprising a rotatable spindle member arranged to receive a tube and support it against deformation, a surfacing member having an abrasive pad, one of said members being movable into and out of cooperating position with the other.

10. A machine for preparing collapsible tubes for coating, comprising a rotatable spindle member arranged to receive a tube and support it against deformation, a deformable abrasive pad resiliently supported to yieldably engage a tube on said spindle, means for bringing the spindle and pad into cooperating engagement, and means to rotate the spindle when the spindle and pad are in cooperating engagement.

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