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H. ZERLIN
METHODS OF AND MEANS FOR PRODUCING, PROCESSING
AND FOR TREATING ARTICLES

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3 Sheets-Sheet 1

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Fig. 1

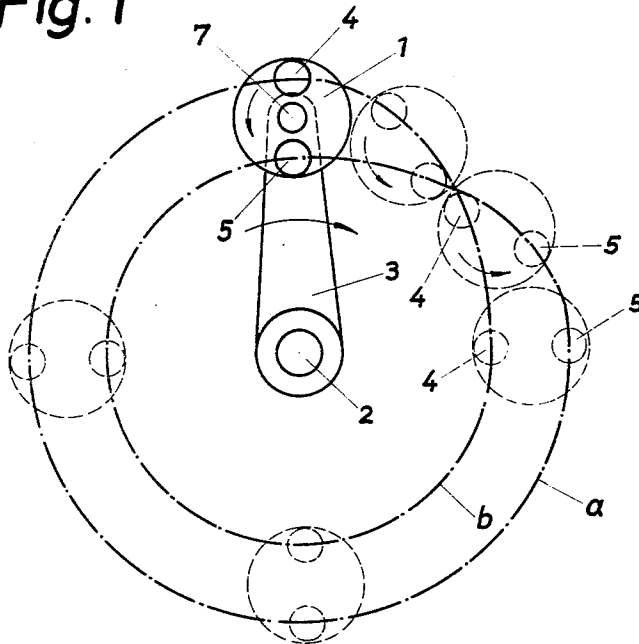
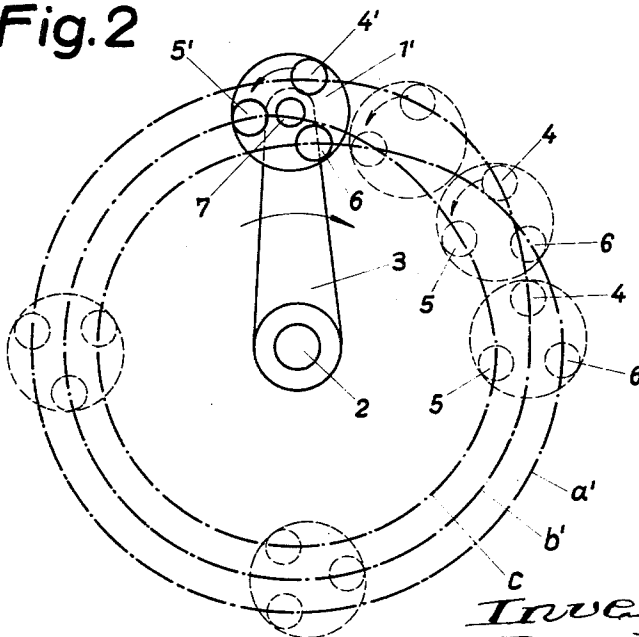


Fig. 2



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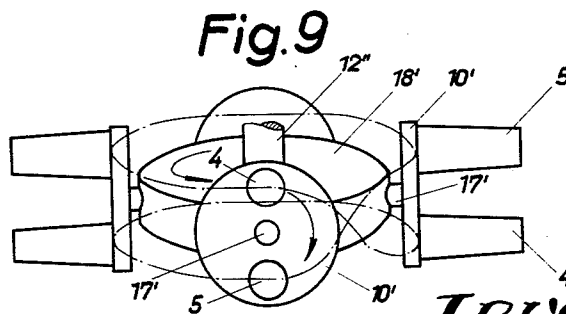
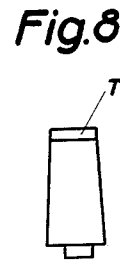
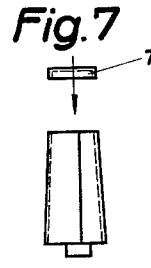
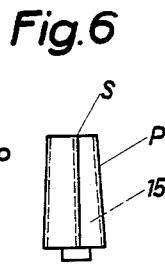
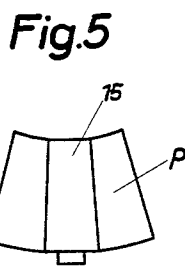
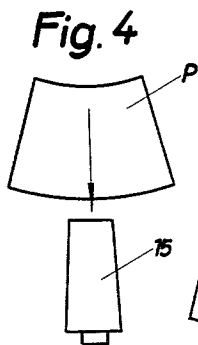
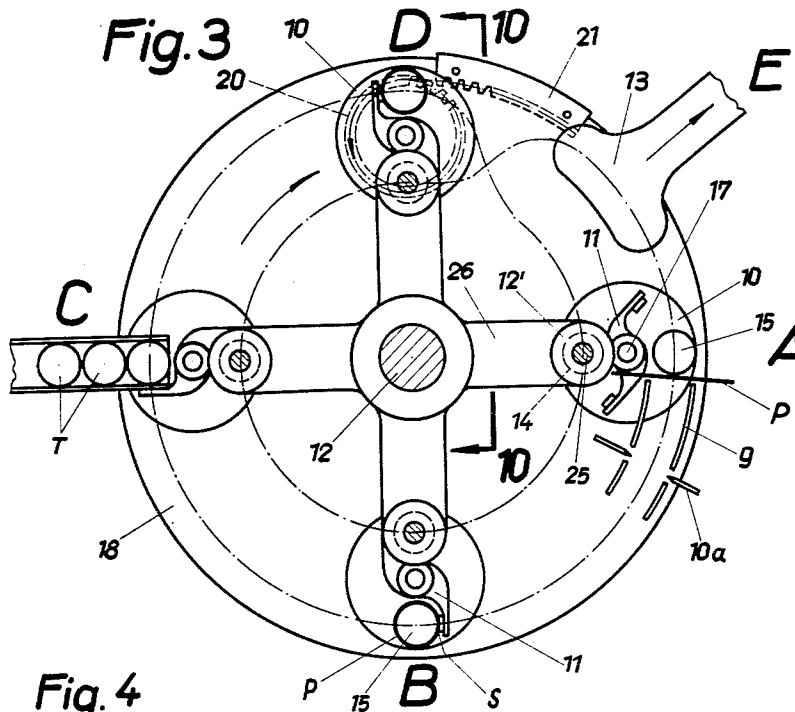
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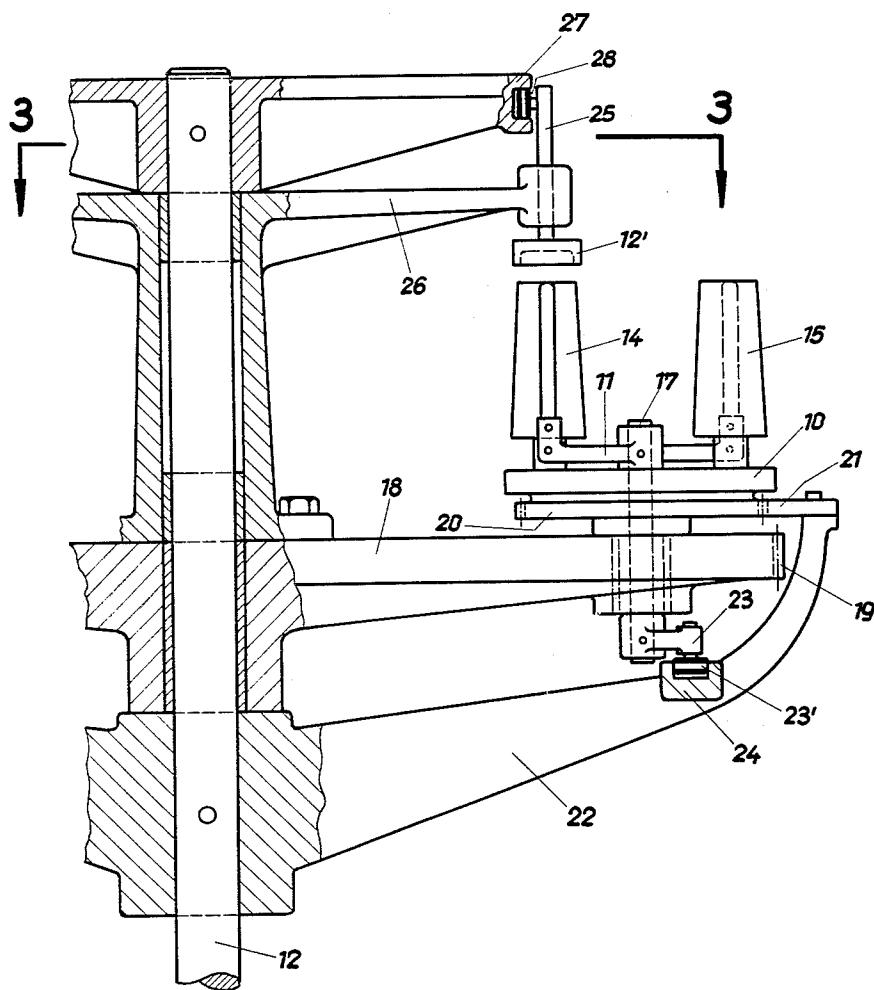
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Fig. 10



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2,931,276

METHODS OF AND MEANS FOR PRODUCING, PROCESSING, AND FOR TREATING ARTICLES

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7 Claims. (Cl. 93—39.1)

This invention relates to methods of and means for producing, processing and for treating articles.

More particularly, the invention is directed to methods of and means for producing, processing and for treating containers of paper or similar materials wherein the blank from which the container is made or the container per se moves in closed predetermined paths into sequential cooperation with means arranged along the paths for performing the necessary operations on the blank or the container per se.

It has been customary in the manufacture and treatment of articles, such as the manufacture, filling and closing of containers of paper and the like to move such articles in predetermined paths and the tools for effecting the various manipulative steps are arranged along the paths. If the article holders move forward continuously the tools follow the article holders or if intermittent, the stationary tools perform the desired functions during the temporary stopping of the article holders.

The multiplicity of the operations to be performed and the spacial distribution of the various tools along the work path of necessity requires a long travel path for the article holders and hence the articles per se. Such an arrangement, aside from the technical problems involved in the provision of drive means for operating the various tools, also consumes considerable space which is undesirable. The same disadvantages are present to an even greater degree in equipment having several closed paths along which the article holders and articles move. In addition, the use of several paths necessitates the provision of structural means by which the article holders and articles may be transferred from one path to the next succeeding path.

To overcome the above and other objectionable characteristics is an important object of the invention, and the invention broadly comprises moving the article supports and consequently the articles sequentially along at least two substantially concentric paths located in a plane approximately common to all paths and into cooperative relationship with tool means strategically located respecting the paths for performing the necessary operations on the articles.

To accomplish the foregoing and other important objects and advantages, there is provided an apparatus including at least two supporting means carrying at least two article holders, with each supporting means being transferable from one path to the succeeding path without the necessity of changing an article holder whereby the same article holder moves the article successively through the several paths by imparting a relative movement to the supporting means in the zone or area of transfer of the supporting means from one path to the succeeding path, and tool means positioned at the proper stations along the respective paths for performing the requisite manipulative operations on the articles.

More specifically, the apparatus comprises a turntable, a plurality of supporting means rotatably mounted on the turntable for movement about an axis parallel to

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the rotational axis of the turntable in the area of transfer of the supporting means from one path to the next path, at least two article holders or mandrels on each supporting means, and tool means fixedly positioned at spaced intervals along the paths for cooperation with the mandrels for effecting the desired operations.

The invention further comprehends the concept of effecting the relative rotation between the mandrel supporting means and the turntable about an axis perpendicular to the rotational axis of the turntable.

While the paths of movement of the mandrel supporting means are preferably circular and are disposed substantially equidistant from each other, such paths may include arcuate and straight sections which also form closed circuits spaced equidistantly.

Various other objects and advantages of the invention will be apparent from the following description, and reference being made to the attached drawings, in which:

Fig. 1 is a diagrammatic illustration of the invention in which an article support provided with two article holders or mandrels moves successively through two paths or circuits.

Fig. 2 is a view similar to Fig. 1 and in which an article support provided with three article holders moves successively through three paths.

Fig. 3 is a plan view of an apparatus for producing paper containers in which two pairs of diametrically opposed article supports, with each support having two holders or mandrels are caused to move along two paths or circuits.

Figs. 4 to 8 schematically represent the steps of producing the container, and

Fig. 9 is an elevational view showing the article supports mounted for rotation about axes perpendicular to the axis of the turntable.

Fig. 10 is a diagrammatic view of the drive and control of the individual elements of the machine shown in Fig. 3.

There is shown in Fig. 1, the movement principle for an apparatus in which there are two paths *a* and *b* and through which paths, a supporting means 1 for the article being produced or treated is adapted to move successively. It will be seen that the supporting means 1 is rotatably mounted at 7 on one end of a lever 3, which lever is mounted for rotation at its other end as depicted at 2 so that the supporting means 1 turns on axis parallel to that of the lever 3.

The supporting means 1 is also provided with two article holders or mandrels 4 and 5 and the arrangement is such that after the mandrel 4 has travelled through outer path *a*, and the mandrel 5 through inner path *b*, the supporting means 1 has a relative rotational movement imparted thereto from the position shown in full lines, whereby the mandrel 4 together with its article is transferred from the path *a* to the path *b* or from the outer path to the inner path. Simultaneously, the mandrel 5 and its article is displaced from the inner path *b* to the outer path *a*.

In other words, by virtue of the present invention, it will be appreciated that the article being produced or treated moves through a closed path or circuit to permit various manipulative steps to be performed thereon and thereafter is transferred in toto from its initial path to a succeeding or following path approximately concentric to the first path in which succeeding path the further manipulative operations are performed so that when such article leaves the succeeding path it is in its finished or final condition.

In Figure 2 the same basic principle is employed except that instead of two predetermined paths of movement *a* and *b*, there is provided three paths or circuits *a'*, *b'* and *c*, which as can be seen are approximately con-

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centric respecting each other. In such a situation, supporting means 1' carries three article holders or mandrels 4', 5' and 6 spaced at equal intervals on the supporting means. The holders or mandrels run successively through the several paths or circuits from the full line position illustrated Figure 2 and after the mandrel 4' has moved through path a', mandrel 5' through path b' or the intermediate path and mandrel 6 through path or circuit c, the supporting means 1 has imparted thereto its relative rotational movement whereby mandrel 4' is transferred from path a' to intermediate path b', mandrel 5' from path b' to the inner path or circuit c and mandrel 6' from the inner path c to the outer path or circuit a'.

Consequently, in each of the aforementioned embodiments, it is manifest that the article holder or mandrel after completing its travel through one of said paths, during which travel certain operations are performed thereon is automatically moved from such path to the next path for additional manipulative procedures. In both situations, the supporting means for the article mandrels is rotatable about an axis parallel to the axis of the means for imparting movement to the supporting means and the transfer of the mandrel from one path of movement to the other is entirely automatic.

With reference now to Figure 3, there is shown an apparatus for accomplishing the principle of movement described in connection with Figure 1, and such apparatus is used primarily in conjunction with the production of a paper container of frusto-conical configuration. The apparatus comprises a turntable 18 carried by a shaft 12 and to which shaft suitable drive means is operatively coupled for imparting continuous rotation to the turntable, and mounted on the table are two pairs of diametrically opposed supporting means 10, and each supporting means 10 is rotatable about an axis 17 relative to the turntable and the axis of rotation 17 of each supporting means is parallel to the axis of rotation 12 of the turntable, for a purpose to be later more fully described. Each supporting means 10 carries a pair of container holders or mandrels 14 and 15 respectively with such holders' or mandrels' periphery being diametrically opposed and of frusto-conical outline. In addition, each axis or shaft 17 supports a pressure lever 11, having leg portions thereof cooperable with the respective holders or mandrels 14 and 15.

Located about the turntable 18 and above such turntable are a plurality of operating stations A, B, C, D and E and at each of said stations means being provided to perform a particular operation. In the vicinity of station A, a blank P of the desired shape for forming the wall of the container is positioned from above in front of the mandrel 15 as is shown schematically in Figures 4 and 5. Upon rotation of the turntable 18 in the direction shown by the arrow, and consequently the supporting means 10, the blank P is folded about the mandrel 15 by virtue of the movement of the mandrel through a folding channel 9 fixedly positioned above the turntable 18. In advance of the channel 9 is located a folding tool means 10a, which functions to fold the blank to provide a container body having an overlapping longitudinal seam S. Immediately following the formation of the container wall, the pressure lever 11 engages the seam S (as at station B) in order to secure such longitudinal seam. Upon further movement of the turntable 18, the mandrel 15 arrives at station C and at this point a closure T is delivered and deposited on the upper open end of the container body.

When the supporting means 10 has been moved to station D by virtue of the rotational movement of turntable 18, the supporting means 10 per se is rotated in the direction of the arrow, or in a direction opposite to the direction of rotation of the turntable, whereupon the mandrel 15 is transferred from the outer flow path to the inner flow path and the mandrel 14 from the inner flow path to the outer flow path. Furthermore, on the inner

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path, a forming and pressing tool component 12' is positioned on the upper end of the mandrel and seals the closure member to the wall of the container. After completely passing through the inner path, the tool component 12' releases the mandrel 15 at the station D, which mandrel is again transferred to the outer path by virtue of the rotational movement imparted to the supporting means 10 and at station E, the complete container is removed from the mandrel 15 by a jet of compressed air or the like. The completed container is then moved from the apparatus by way of a channel or the like 13.

Following this step, the mandrel 15 is again moved to station A where the foregoing cycle of operations is again accomplished.

Figure 10 illustrates a diagrammatic view of the drive and control of the individual elements of the machine shown in Figure 3. Turn-table 18 is rotatably mounted on stationary shaft 12. Turn-table 18 on its periphery is provided with teeth being engaged by a drive gear (not shown) thus causing a continuous rotation of said turntable. Gearwheel 20 is connected to supporting means 10 and is engaged by segmented gear 21 of station D. This segmented gear 21 causes the relative rotation of supporting means 10 between stations D and E. Segmented gear 21 is supported by supporting arm 22 which in turn is fixed to shaft 12.

The control of movement of pressure levers 11 is obtained by axis 17 which is mounted oscillating in supporting means 10. At the lower end of axis 17 a lever 23 is mounted. Roller 23' of which engages stationary cam-track 24. Thereby pressure levers 11 are controlled via lever 23 and axis 17.

Pressing tool component 12' with guide bar 25 is movable up and down in frame 26 which in turn is fixed to turn-table 18 and rotates with same. The up and down movement of pressing tool component 12' is effected by stationary cam-track 27 in connection with roller 28 of guide bar 25.

With respect to the form of apparatus shown in Figure 9, and in which form the same reference numerals are used as in the case of Figure 3, except the same are primed. It will be seen that the supporting means 10' are mounted for relative rotation respecting the turntable 18' about axes 17', which axes are perpendicular to the axis of rotation 12'' of the turntable 18'. In this assembly, there are provided two predetermined paths, which are disposed one above the other and in the area of which the desired operational steps may be performed.

What I claim is:

1. A method for producing, processing, and/or treating paper containers comprising supporting at least two container blanks for movement along at least two substantially concentric paths, moving the blanks so that the blanks pass through the inner and outer paths respectively, imparting a relative movement to the blanks following their passage through the paths whereby the blank moving along the outer path is transferred to the inner path and the blank moving along the inner path is simultaneously transferred to the outer path, and subjecting the blanks to the desired operative steps during their movement through the paths for forming the containers.

2. An apparatus for producing, processing and/or treating paper containers comprising a pair of substantially concentric paths, at least two container blank holders, means mounting the holders so that one holder moves through the outer path and the other holder moves through the inner path, further means operative to impart a relative movement to the means mounting the holders to transfer the holder from the outer path to the inner path and simultaneously transfer the other holder from the inner path to the outer path and tool means positioned along said concentric paths cooperative with the blank upon each holder for forming the containers.

3. An apparatus as claimed in claim 2, in which each

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path is substantially circular and equidistantly spaced from each other.

4. An apparatus as claimed in claim 2, wherein each path includes interconnected arcuate and straight sections spaced equidistantly from each other.

5. An apparatus for producing, processing and/or treating paper containers, comprising a primary support rotatable respecting at least two substantially concentric paths, supporting means carried by the primary support, at least two container blank holders on the supporting means so that on rotation of the primary support one holder moves along the outer path and the other holder along the inner path, tool means positioned in the paths of movement of the holders to coact with the blanks thereon to perform the desired operations on the blanks, and means to impart movement to the supporting means relative to

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the primary support after the supporting means has traversed the paths to transfer simultaneously the holder from the outer path to the inner path, and the holder from the inner path to the outer path.

6. An apparatus as claimed in claim 5, in which the axis of movement of the supporting means is parallel to the axis of rotation of the primary support.

7. An apparatus as claimed in claim 5, in which the axis of movement of the supporting means is perpendicular to the axis of rotation of the primary support.

References Cited in the file of this patent

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