Jan. 13, 1953 V. F. NEKARDA 2,625,282

METHOD OF ORIENTING ARTICLES OF PREDETERMINED SHAPES

Filed March 28, 1946

Fig. 1.

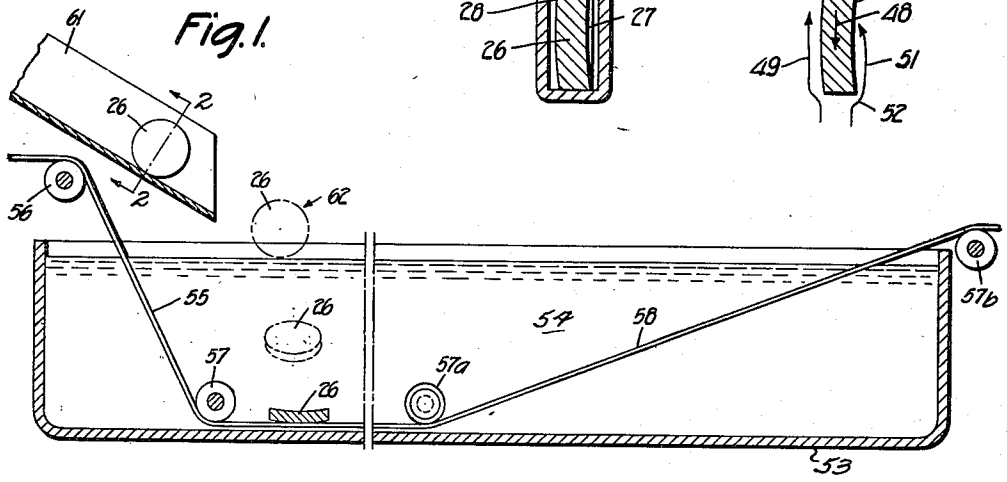


Fig. 2.

Fig. 3.

Fig. 4.

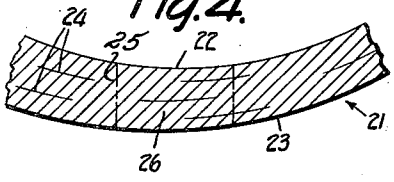


Fig. 5.

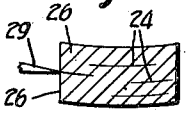


Fig. 6.

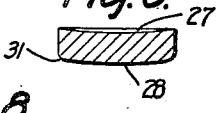


Fig. 7.

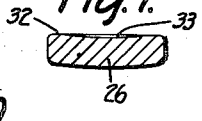


Fig. 8.

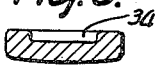


Fig. 10.



Fig. 12.

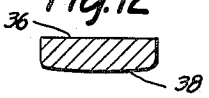


Fig. 9.

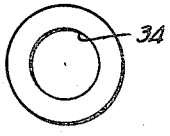


Fig. 11.

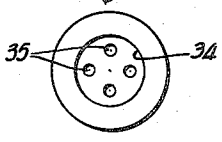


Fig. 13.

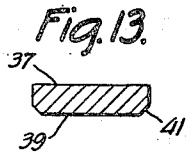


Fig. 14.

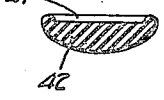
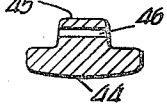


Fig. 15.



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Patented Jan. 13, 1953

2,625,282

UNITED STATES PATENT OFFICE

2,625,282

METHOD OF ORIENTING ARTICLES OF PREDETERMINED SHAPES

Victor F. Nekarda, Teaneck, N. J.

Application March 28, 1946, Serial No. 657,840

8 Claims. (Cl. 214—152)

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This invention relates to a process of orienting cylindrical bodies having their end faces different from each other and to apparatus for effecting such process. The invention has specific application to the button forming art where the blanks or partially formed buttons must be oriented for proper presentation to the different machines which in a step by step manner work the blank into the final button.

It is the object of the invention to provide a process of and means for orienting button blanks and the like whereby the same corresponding faces of the respective blanks will be turned in a quick and expeditious manner and without the employment of manual exertion.

According to the invention, a fluid body is used to orient the blank or partially formed button. The blank or button will have opposite end faces of different contour, there being one face of greater concavity or of less convexity than the other or with one face flat and the other concave or convex. This difference in the shape of the faces causes an unbalance and upturning of the blank as it passes through the orienting medium and the blank always comes to rest in the bottom of a container for the medium with its more concave or less convex face up. The blank is caused to enter the orienting medium preferably in an edgewise fashion and preferably with a spinning motion in order to insure the desired effect. The spinning motion may be imparted to the blank by any means, as by rolling it down an inclined channel retained over the surface of the orienting medium. This is the procedure when the fluid is of less specific gravity than the blank. If a medium of greater specific gravity such as mercury is used a slightly different procedure would be effected since the blanks are injected into the bottom of the liquid and allowed to come to rest at the top thereof. Any means may be used for extracting the oriented bodies from the liquid. One such means may take the form of a conveyor as shown. The conveyor on which the oriented blanks may be received will elevate the blanks from the medium and deliver them to the machine which performs a working operation upon them. Several operations must be performed upon the blank before the final button is formed. Each of the operations require a separate machine and for each machine the blanks must be oriented. Thus, between the different stages of operation, the blanks are oriented by the present process and apparatus.

For a better understanding of the invention, reference may be had to the following detailed

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description taken in connection with the accompanying drawing, in which

Fig. 1 is a cross-sectional view, in elevation, of the apparatus employed in carrying out the present process;

Fig. 2 is a cross-sectional view of the channel for directing the button blank into the orienting medium, the view being taken along the line 2—2 of Fig. 1;

Fig. 3 is a cross-sectional view of a button blank arranged on edge and with arrows indicating the application of the fluid upon the end faces and the direction of movement of the blank;

Fig. 4 is an enlarged cross-sectional view showing how the button blanks are cut from a shell;

Fig. 5 is a cross-sectional view illustrating how the cut blank is split in half to form two blanks;

Figs. 6, 7, 8, 9, 10 and 11 are cross-sectional and plan views of the button blank in different stages of the forming process;

Figs. 12 and 13 are cross-sectional views of button blanks having one straight face and one convex or beveled face;

Fig. 14 is a cross-sectional view of a molded plastic type button, and

Fig. 15 is a cross-sectional view of a button where the thread hole extends laterally through the shank on the button.

The buttons, upon which my process has most application, are generally made from shells 21 of either the univalvular or the bivalvular variety. The inner surface 22 of the shell, in addition to being of the nacreous formation, is of concave shape while the outer surface 23 of the shell is relatively rough, bark-like, non-nacreous and of convex shape. The body of the shell is usually formed of laminations as indicated by the lines 24.

From this shell, there is cut with a tubular saw as indicated at 25, Fig. 4, a cylindrical blank 26 which will have a concave surface 27 and a convex surface 28. These surface contours are that of the shell and the blank will have laminations. If the cut has been made from the thick portion of the shell, it may be desired to split the blank with a knife or chisel 29 into two blanks in the manner illustrated in Fig. 5.

The concaved surface of the blank will become the patterned or visible face of the button and convex surface will become the rounded or beveled back face of the button. The blank is first rounded or beveled on the back thereof as indicated at 31, Fig. 6. In the next step, the sharp upper edge is flattened as indicated at 32 sometimes leaving a small concavature 33 in the top

faces of the blank, Fig. 7. An opening 34 is next provided in the flattened face 32, side, Figs. 8 to 11, and in the bottom of this opening there are drilled holes 35 through which the button threads are extended to retain the button on the garment.

These operations just described are generally done by grinding or machining after placing the blank in a chuck with the selected face uppermost. The chuck with the blank revolves beneath a revolving grinding wheel or relative to a machining tool to effect the different operations upon the blank.

When carrying out these operations the selection of the face of the blank to be worked upon has been done manually by the operator and has depended upon his sight and sense of touch. Once the selection has been made and the operator has placed the blanks upon a revolving feeder disc the grinding operation thereafter is carried out automatically without further demand of the operator. Thus, the major need for the operator has been to select and orient the buttons. This function of selecting and orienting the faces to present the proper face to the grinding tool is of paramount importance because if the wrong face is presented, the blank is damaged, and effort wasted.

Then again after the shaping operations the blanks must be oriented for drilling operations. Since the button material is frangible, the drilling is done from the patterned side toward the back so that any fracture which may have occurred upon the drill passing through the button bottom is hidden when the button is sewed to the garment. Thus, it is important that the buttons be properly oriented for the drilling operation.

After the buttons are drilled, they are polished and then they are graded. For this grading operation, the operator must view both patterned face and the back, necessitating that buttons be manually turned. The viewing of two different faces on a belt is confusing and tiresome to the operator. By mechanism which would orient the button to present only the patterned faces at one time and only the back faces at another time, the work of grading will be greatly facilitated and speeded up.

The blanks as shown in Figs. 12, 13, 14 and the shank type as shown in Fig. 15 are subjected to substantially the same operations as the above sew through type button and must likewise be oriented between the operations. The buttons of Figs. 12 and 13 have flat top faces 36, 37 but have different shaped bottom faces 38, 39. The face 38 is convexed while the face 39 is flat with a rounded or beveled edge 41. The button of Fig. 14 has a decidedly convex face 42 and a hollowed face 47. This latter button is made from plastic. The shank type button of Fig. 15 has a slightly convex face 44 and a back face including a shank 45 with a transversely drilled hole 46.

It is well known that a square ended body upon being submerged in a liquid encounters considerable resistance at its leading edge and is frictionally retarded along its hull. By comparison, a body of tear drop shape, rounded on its nose or leading edge encounters minimum resistance. In addition, there is generated along its tapered hull a squeezing pressure which presses the body forward. It is thus apparent that the ease with which a free body moves through a liquid depends both on the shape of the leading edge and the shape of the hull or sides. A body with merely a rounded nose and straight sides will move with greater ease through the liquid than the square ended body but with less ease than the tear drop body with tapered sides.

If now a rudder be added to this rounded nose and straight sided body and angled to the left, the flow of fluid over one side of the body encounters the vane and veers the body to left. By the use of the vane the contours of the sides of the body have, in effect, been changed. One side is made concave while the other side is made convex.

Instead of providing a rudder to obtain this effect, the same effect is had if one of the sides is concaved and the rudder in effect incorporated in a fixed position within the body. Such shaped body is found in the blank 26 as taken from the shell and the forces acting thereon are illustrated in Fig. 3. The body then turns in a direction about the concaved side and as indicated by the arrow 47 is deflected from the initial direction of movement as indicated by the arrow 48. The direction of flow of fluid over the slightly convex face of the blank 26 is substantially parallel to the face surface as indicated by the arrow 49 whereas the flow upon the concave face as indicated by the arrow 51 is such as to effect the turning movement upon the blank 26. With the flow of the latter, a compression bulge is built up at 52 and upon encountering the concave face 27, which is the vane incorporated in the body, a pressure is built up at the meeting point therewith which pushes or veers the body in the direction 47. An unbalanced condition is thus produced between the left and right sides of the leading edge. As the body passes downwardly in the liquid, it finally comes to rest on the bottom of a vessel 53 with the concave face up as shown in Fig. 1, or upon a conveyor belt 55 adapted to enter the vessel over vertically spaced rollers 56, 57 and pass along the bottom of the vessel and fashioned by stub rollers 57*a* which extend only on the side edges of the belt 55 to form with roller 57*b* an incline 58 of proper angle to bring the body 26 out of the liquid without inverting it. Such is the effect when the blank has been passed edgewise into a fluid of less specific gravity than that of the blank. If the body was passed to a fluid of higher specific gravity than the body, the body would be lifted to the surface and would not need to be conveyed from the bottom of the vessel containing the fluid but merely skimmed from the top thereof.

This action will result upon any shaped body where there is an unbalance between the opposite sides of the leading edge or a difference in contour of the opposite faces. As above described, the blank goes through several stages before the button is perfected. In each of these stages the contour upon the opposite faces is different and such as to effect an unbalance of the blank when presented in an edgewise manner to the orienting medium. Thus at any time between the working operations the partly formed button may be readily reoriented for the proper presentation to the next machine.

It sometimes happens that the blank or the partly processed button has concave and convex faces which are not concentric with a central axis or the axis parallel to the leading edge. This variation in no way changes the behavior of the blank in moving through the fluid. However, in order to mitigate the effect of this eccentricity and so that the orientation of the body will be effected more quickly, a spin or rotation of the

body about its central axis is given as it enters the fluid.

This spinning effect is given to the body as it enters the fluid by any appropriate means which in the form shown comprises a channel **61** positioned at an angle to the top surface of the orienting medium **54** down which the body **26** is rolled and conditioned for entry into the medium. The body enters the medium on edge as illustrated at **62** and the turning or orientation is effected during its passage through the liquid until it finally comes to rest on the conveyor **55** with the concave side up. If the liquid is of greater specific gravity than the body, as may be in the case of mercury, means would be improvised to enter the body at the bottom of the liquid.

It should now be understood that the essences of the present process comprise the freeing of the body in a fluid medium, the kind of fluid is immaterial. Any kind may be used. To free the oriented body from the liquid the body may be removed or elevated from the liquid while keeping it in the oriented position or the liquid can be removed from the oriented bodies leaving the bodies in place where they came to rest.

I have described what I believe to be the best embodiments of my invention. I do not wish, however, to be confined to the embodiments shown, but what I desire to cover by Letters Patent is set forth in the appended claims.

I claim:

1. The process of orienting an object of predetermined shape having a pair of opposed faces of different but of predetermined contours transverse to an axis thereof, which comprises introducing said object into a body of liquid having a specific gravity less than the average specific gravity of said object and freeing said object for free movement in said liquid while its axis extends substantially horizontally, whereby said object sinks as a free body in said liquid and is turned by the variations in liquid pressures created hydrodynamically by the free movement of said object in said liquid until it assumes a position of stability or equilibrium with a predetermined one of said faces oriented upwardly, arresting the free movement of said object in said liquid while in stable oriented position, and withdrawing said object from said liquid while so oriented.

2. The method of orienting a plurality of similar objects of predetermined shape, each having a pair of opposed faces of different but of

predetermined contours transverse to an axis thereof and having a peripheral surface between said opposed faces symmetrical with respect to said axis, which comprises immersing said objects in a body of liquid having a specific gravity less than the average specific gravity of said object and freeing said objects for free movement in said liquid while their axes extend substantially horizontally, whereby said objects sink as free bodies in said liquid and are turned by the variations in liquid pressures created hydrodynamically by the free movements of said objects in said liquid until they assume similar positions of stability or equilibrium with corresponding faces of the objects oriented upwardly, arresting the free movements of said objects in said liquid while in stable oriented position, and withdrawing said objects from said liquid while so oriented.

3. The process as described in claim 1, in which the object is spun about said axis as it is immersed in said liquid.

4. The process as described in claim 1, in which the object has a circular peripheral surface and is rolled on said surface down an incline in order to spin said object as it enters said liquid from the free surface thereof.

5. The process as described in claim 1, in which the object is a garment button or button blank.

6. The process as described in claim 1, in which the object is made to settle in said liquid and to rest on a conveyor belt in said liquid after being properly oriented.

7. The process as described in claim 1, in which the object has a cylindrical peripheral surface which is greater in diameter than the height of said object, whereby said object is substantially of disc-like shape.

8. The process as described in claim 1, in which the object is immersed in said body of liquid with its peripheral surface foremost.

VICTOR F. NEKARDA.

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