

June 19, 1934.

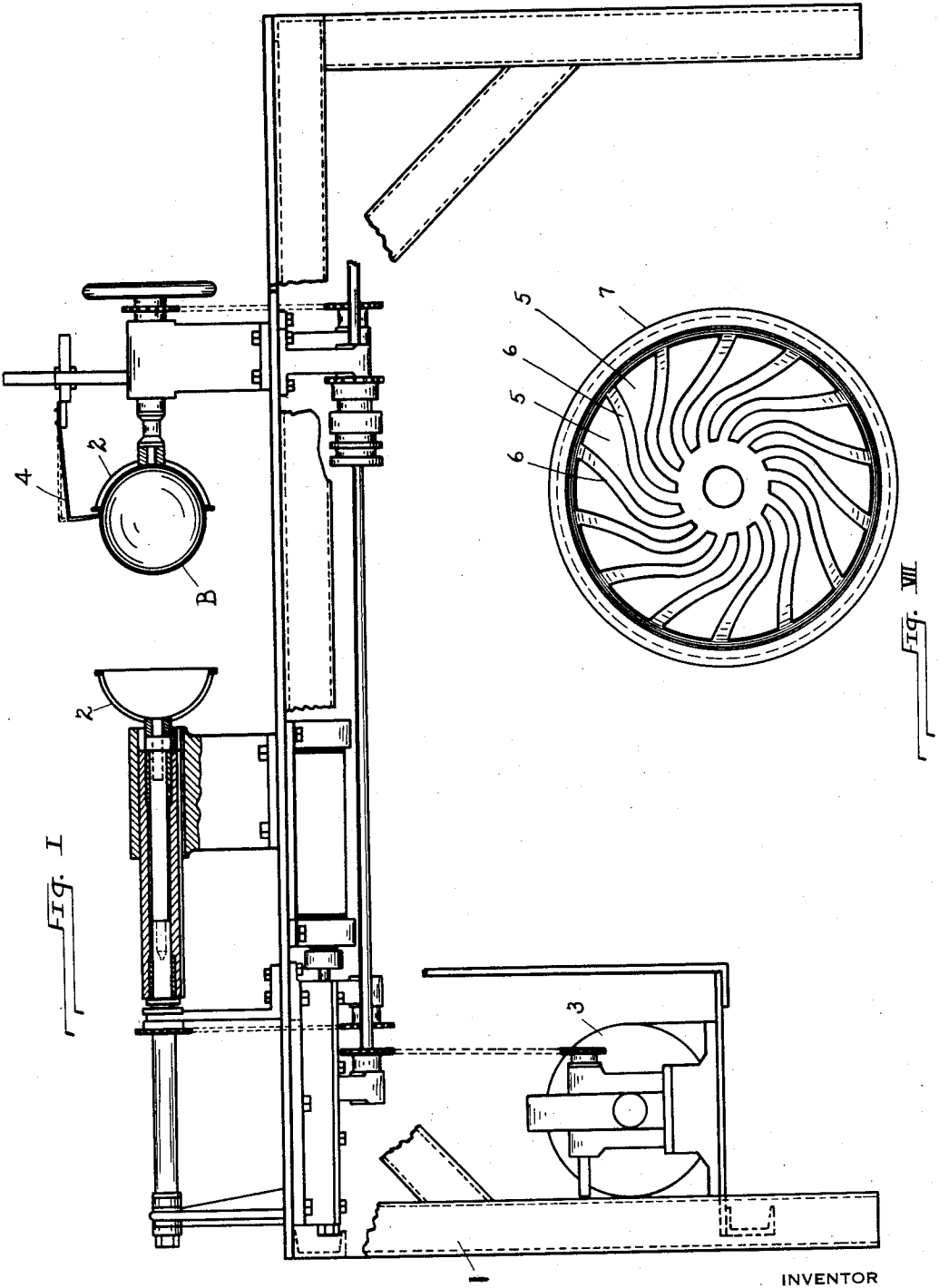
W. E. HUMPHREY

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DECORATION OF ELASTIC ARTICLES

Filed Aug. 23, 1933

2 Sheets-Sheet 1



INVENTOR

Walter E. Humphrey
by Christy Christy and Wharton
his attorneys

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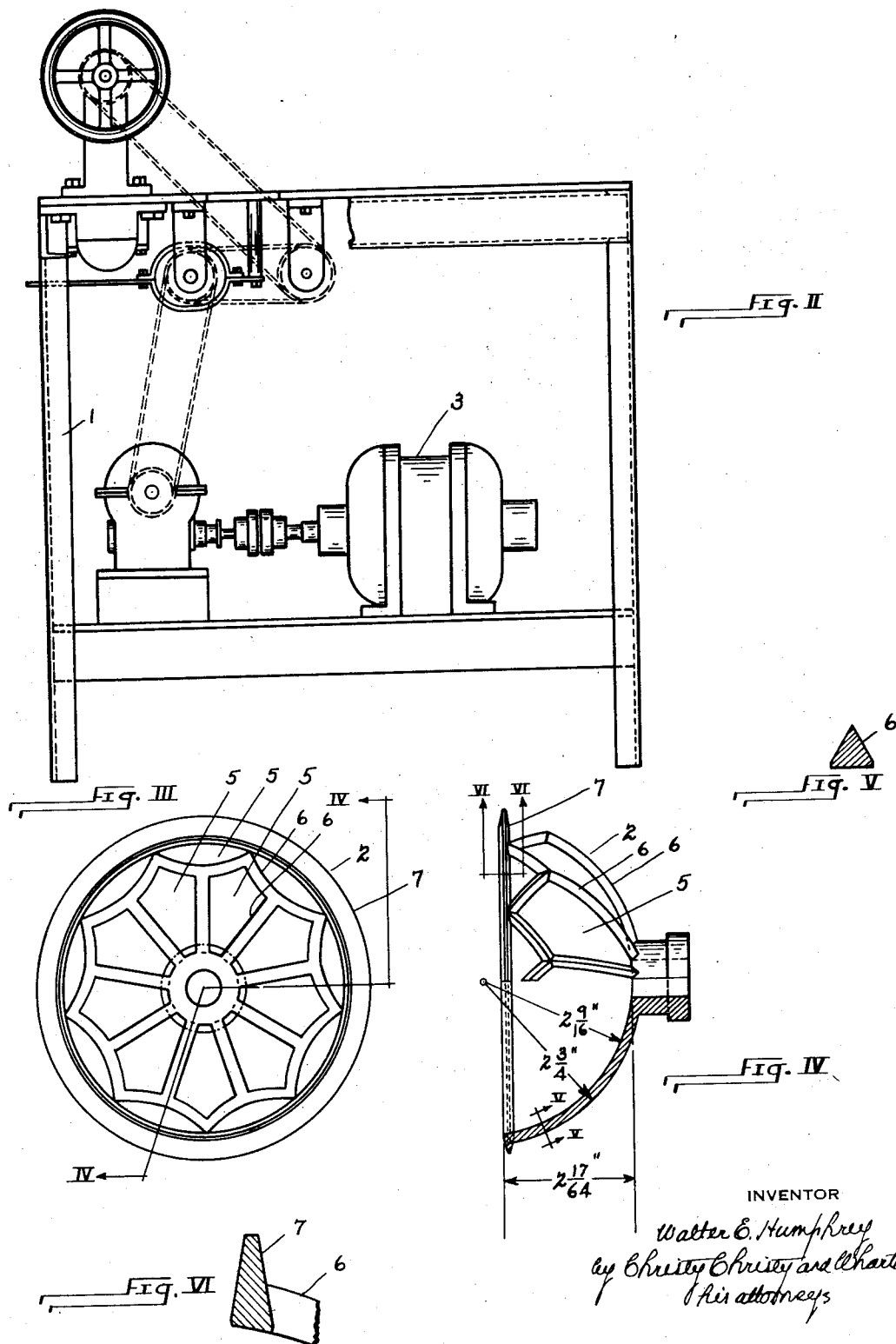
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UNITED STATES PATENT OFFICE

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DECORATION OF ELASTIC ARTICLES

Walter E. Humphrey, Jeannette, Pa., assignor to
Pennsylvania Rubber Company, a corporation
of Pennsylvania

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3 Claims. (Cl. 101—114)

This invention relates to the decoration of the surfaces of elastic articles such as hollow rubber balls, and consists in stencil apparatus adapted to receive and to sustain the article to be decorated, in such manner that decoration may be applied to the exposed surface areas with precision, with sharpness of definition, and at such speed and with such economy as to render the operation commercially practicable. Invention lies also in the method performed in the operation of the apparatus.

Apparatus embodying the invention and adapted to the decorating of hollow rubber balls, called toy balls or play balls, are illustrated in the accompanying drawings. Fig. I is a view in side elevation (details in section) and Fig. II a view in end elevation of the assembled machine. Figs. III, IV, V, and VI illustrate in detail one of a pair of identical cup members that together constitute the stencil itself. Fig. III is a view in rear elevation of this cup member; Fig. IV a view partly in side elevation and partly in section, on the line IV—IV, Fig. III; and Figs. V and VI are views in section and to larger scale, on the planes indicated by the lines V—V and VI—VI, respectively, Fig. IV. Fig. VII is a view, corresponding in other respects to Fig. III, but bearing a specifically different pattern.

In a suitable frame 1 two cups 2, 2 are mounted, mouth to mouth, on a common, horizontally disposed axis. These two cups are capable of relative movement in the direction of such common axis; and to this end it ordinarily will suffice that one of the cups be so mounted in the frame as to admit of such movement, while the other is stationary in the frame. The cups, within the range of such relative movement, are adapted to receive, to close upon, and to engage a ball B introduced between them, in the manner and with the effect to be hereinafter more fully described. The two cups are rotatably mounted in the frame, and means are provided (consisting of a motor 3 and driving connections such as those shown in the drawings) for imparting to the cups when closed upon a ball simultaneous and synchronous rotation.

A resilient finger 4 may be moved by the manual power of an attendant against spring tension from the dotted-line to the full-line position shown in Fig. I. It serves to hold a ball in seated position in one of the cups until the companion cup advances and closes upon it.

Turning now to the construction of the cups in detail, they are so shaped that, in closing together, they slightly crush the elastic article

which lies between them and force it into snug surface-to-surface contact with the inner faces of the cups. When thereafter the cups are caused to separate, the article, resuming its proper shape, frees itself from such surface-to-surface contact, and, as the space between the cups widens, falls free of their support. The articles being spherical balls, each of the cups is approximately hemispherical. The slight departure from truly hemispherical shape lies in the fact that the depth of the cup is slightly less than half the diameter at its mouth, and when the two cups are closed together the diameter of the chamber formed by and within the cups is less on the horizontal axis than on a transverse axis. One dimension is less than and the other somewhat greater than the normal diameter of the ball. Specifically, the cups of Figs. III and VII, designed to receive 5-inch balls, are 2 17/64 inches deep and 5 1/8 inches wide.

The cups are formed, advantageously, as steel castings. They are formed as shells with continuous walls, and after formation are cut away in part, in order to expose parts of the surface of the enclosed ball over areas which form a desired pattern. Thus the cups become stencils. The cups might be cast with orifices in their walls, but in any case the cast article is carefully machined, and brought to minutely accurate shape. The inner surfaces of the cup are smooth and true; the orifices 5 are accurately cut and are sharp-edged; and the bars 6 or "mullions" that divide the orifices and form the rim 7 are advantageously shaped, as shown in Figs. V and VI, outwardly tapering. Consequently the orifices or "windows" flare from the inner surfaces of the cups outwardly. As a practical matter, the pattern will advantageously be such that the rim 7 of the cup is continuous. As the two cups of a pair close together upon the ball they preferably do not come to abutment, but stand apart at an interval. This interval constitutes, in effect, yet another orifice or "window" in the so-constituted stencil; its opposite edges are outwardly flaring (as may be perceived on consideration of Fig. VI); and the stencil pattern thus includes a continuous equatorial band.

In operation, the machine parts being in the relative positions indicated in Fig. I, a ball B is manually introduced into the cup 2 on the right; the finger 4 is manually depressed to the full-line position, engaging the ball and holding it temporarily in place in the cup. The companion cup 2 is then caused to advance from left to right and to close upon the ball. As it so closes

upon the ball, the finger 4 is released, to return under spring tension to its normal dotted-line position. As the cup on the left advances, it crushes slightly the ball B, now in place between the cups; causes the elastic ball to become slightly lenticular in shape; and brings the outer surface of the ball, under compression, into snug contact with the inner surfaces of the cups throughout all the extent of those surfaces. And in this connection it is well that the designer consider with care the dimensions of the cup given in Fig. VII. The inner curved surface is shaped on a center of curvature that lies beyond and outside of the plane of the rim of the cup; and the radius of curvature ($2 \frac{9}{16}$ inches) is so related to the radius of the ball ($2 \frac{8}{16}$ inches) and the space interval between the cups when in closed positions is such as to bring about the surface-to-surface contact under compression of ball within cup that has been described.

The cup assembly is in the organization of the machine rotatable; and, when the cups have in the manner and with the effect described closed upon a ball, the assembly is set in rotation. Then, by brush, or by spray, or otherwise, the exposed surfaces of the ball are subjected to the decorating step. In the specific operation contemplated in this machine, a quick-drying paint of suitable composition and color is sprayed upon the rotating cups and their burden.

When the spraying-on of paint has been completed, the spray or sprays are checked; and after a further interval sufficient to insure the drying of the paint to proper degree, the cups (rotation having been intermitted) are opened. Thereupon the ball by its own elasticity, resuming its proper spherical shape, frees itself from the cup surfaces, and as the cups draw apart, falls free. It may be received as it falls on the finger-tips of an attendant, and placed, without rubbing, upon a suitable rack, where drying may proceed.

The decorated ball then is ready either to receive a surface coating of lacquer or to be packaged for the market.

It is manifest that the operation herein described may be performed, not only upon balls of all diameters, but upon elastic articles generally of convex surface contour.

I claim as my invention:

1. The method herein described of decorating an elastic ball which consists in subjecting it to diametrically directed externally applied pressure against a concave stencil having a curvature of greater radius than the normal convexity of the ball, and by such pressure deforming the ball to surface-to-surface contact with the stencil, applying to the surface of the so deformed ball and through the openings of the stencil the desired decoration, and then relieving the ball of deforming pressure and allowing it under its inherent elasticity, resuming normal shape, to free itself from contact with the stencil surface.

2. Apparatus for decorating rubber balls including a pair of coaxially mounted cup-shaped stencils mounted for relative translational movement in right-line course upon their common axis, the said cups being shaped interiorly to a sphere of greater radius than the balls to be decorated, and being less than a complete sphere in their aggregate extent.

3. Apparatus for decorating rubber balls including a pair of co-axially mounted cup-shaped stencils mounted for relative translational movement in right-line course upon their common axis, and for rotation upon their common axis, the said cups being shaped interiorly to a sphere of greater radius than the balls to be decorated and being less than a complete sphere in their aggregate extent.

WALTER E. HUMPHREY.

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