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METHOD OF AND APPARATUS FOR HANDLING ARTICLES

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2 Sheets-Sheet 1

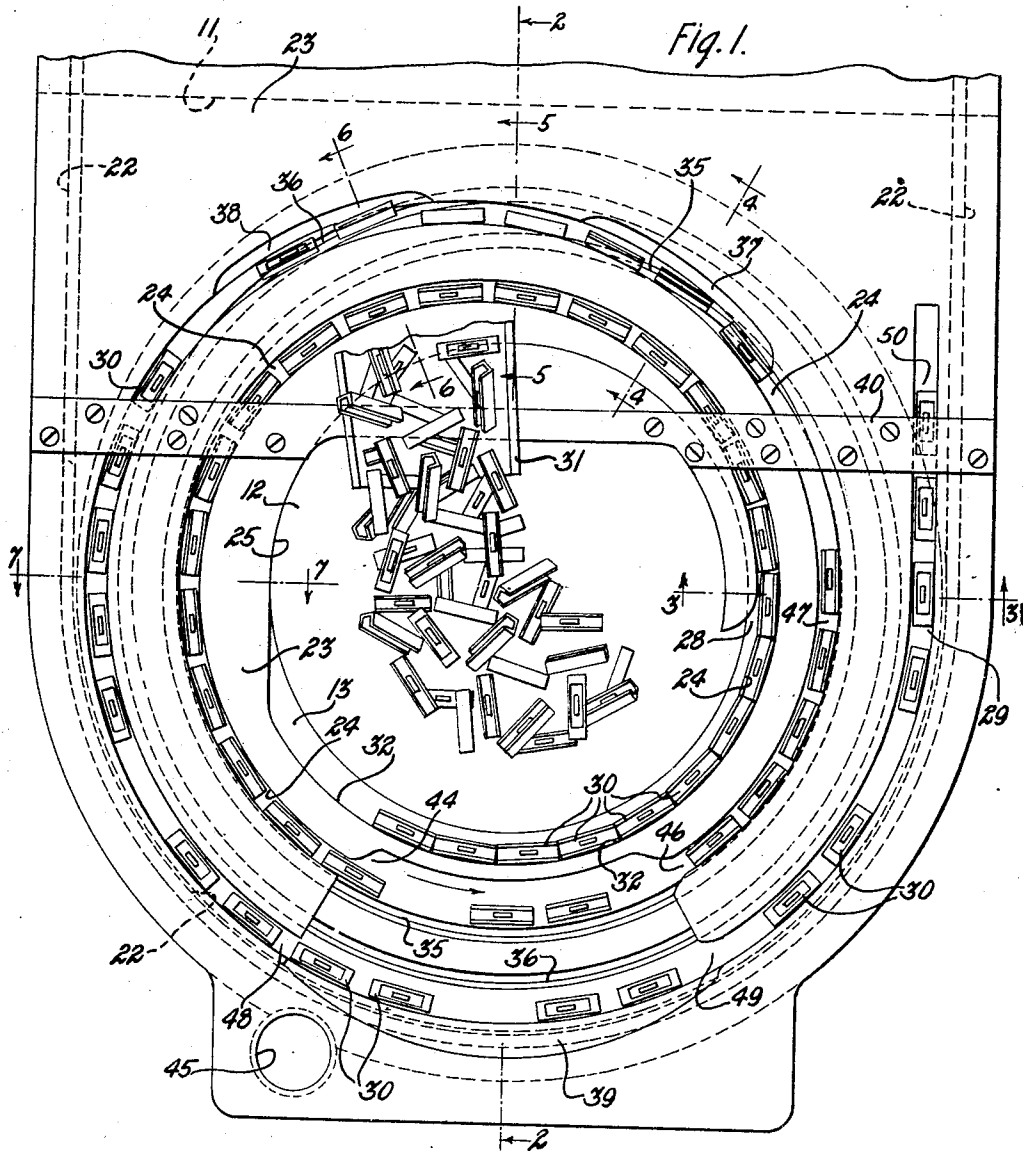
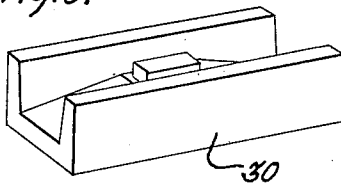


Fig. 8.



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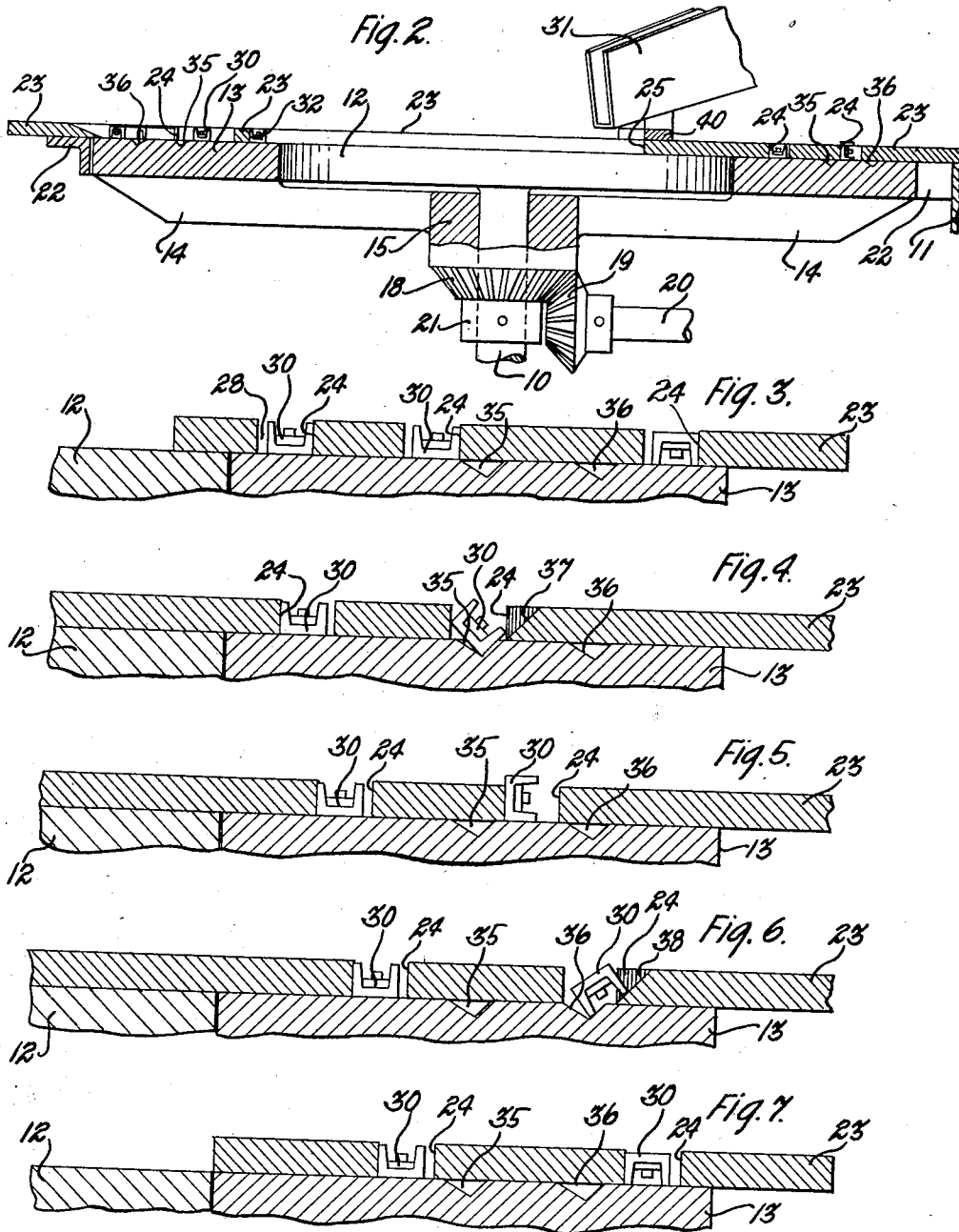
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR HANDLING ARTICLES

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This invention relates to methods of and apparatus for handling articles, and more particularly to methods of and apparatus for predeterminedly positioning articles for inspection purposes.

This invention has been found particularly useful in the inspection of protector blocks of the type used in open space cutouts, commonly employed in telephone systems as a means for protecting other apparatus against abnormal current surges. Such a protector block comprises an apertured block of non-conductive material, such as porcelain, and a conducting electrode of carbon inserted within the aperture of the block, this carbon insert being secured in position by means of suitable bonding or cementing material. Before subjecting the blocks to a series of gaging and circuit tests to eliminate such blocks that do not meet certain requirements the blocks are subjected to a visual inspection, the operator rejecting such blocks that are obviously defective as to appearance or structure.

The primary objects of this invention are to provide an improved method of and apparatus for effectively and efficiently advancing articles in predetermined arrangement before an operator to successively expose surfaces thereof for visual inspection.

In order to attain these and other objects in accordance with the general features of this invention, an apparatus by means of which the improved method may be practiced for positioning articles to be visually inspected, such as protector blocks, is provided which comprises a conveyor plate upon which the blocks are predeterminedly positioned by the operator, the plate being provided with a pair of spaced concentric continuous V-shaped grooves in its upper surface. These grooves cooperating with a spiral way formed in a stationary guide plate serve to convey the blocks carried by the conveyor plate past the operator for visual inspection in two opposed positions. Specifically, this feature is accomplished by having the spiral way so formed that it lies across each of the grooves in the conveyor plate at separated portions thereof, other portions of which do not lie across the

grooves. In the rotation of the plate the blocks are conveyed thereby, during which they are laterally displaced upon the plate by the spiral way and toward the operator who visually inspects predetermined surfaces thereof in their advancement. During the next revolution of the plate the spiral way guides the blocks first across the inner V-shaped groove, during which the blocks are turned 90° and finally across the outer V-shaped groove during which they are turned another 90°, thereafter they are moved past the operator who visually inspects other predetermined surfaces thereof and finally the blocks which have not been removed from the plate on account of defects observed visually by the operator are directed away from the apparatus.

These and other objects will be more apparent from the following detailed description when considered in connection with the accompanying drawings, wherein

Fig. 1 is a fragmentary plan view of an apparatus embodying the features of this invention;

Fig. 2 is a horizontal section on the line 2—2 thereof;

Figs. 3 to 7, inclusive, are enlarged fragmentary sections taken progressively around the spiral way on the lines 3—3 to 7—7, inclusive, of Fig. 1, illustrating various positions of the protector blocks upon the conveyor plate during the operation of the apparatus, and

Fig. 8 is a perspective view of a protector block adapted to be handled by the apparatus disclosed in Figs. 1 to 7, inclusive.

Referring now to the drawings in detail wherein like reference numerals designate similar parts throughout the several views, and particularly to Fig. 2, a stud shaft 10, the lower end of which (not shown) is suitably fixed to a main supporting framework 11, shown fragmentarily at the right hand side of Fig. 2, is provided at its upper end with a circular plate 12. Surrounding the plate 12 and closely fitting about the periphery thereof is an annular article conveying plate 13, the upper surfaces of the plates 12 and 13 being on a common plane. The con-

veyor plate 13 is rotatably mounted upon the shaft 10 by means of a plurality of radial ribs 14 and an axial bearing portion 15 supported on the shaft. The lower surface of the bearing portion 15 is provided with a bevel gear 18 which meshes with a bevel pinion 19 fixed to a drive shaft 20 which may be connected to a suitable source of power, for instance an electric motor (not shown).

10 The lower surface of the gear 18 rests upon a collar 21 pinned to the stud shaft. Thus it will be apparent that upon imparting rotary motion to the shaft 20 the annular conveyor plate 13 will be caused to rotate around the stationary plate 12 attached to the stud shaft 10, the direction of rotation being counter-clockwise as indicated by the arrow in Fig. 1. Fixed to the framework 11 is a U-shaped support 22 formed of angle iron

15 which closely surrounds the conveyor plate 13 at the lower and left hand portions thereof, as viewed in Figs. 1 and 2, respectively, the upper surface of the support lying substantially in the same plane as the plates 12 and 13.

25 Positioned above the conveyor plate 13 with a slight sliding clearance therebetween is a plate 23 which is secured to the U-shaped support 22, the plate being provided with a spiral scroll article guideway 24. The plate 23 is formed with a substantially central aperture 25 which exposes the greater portion of the upper surface of the stationary plate 12, the purpose of which will be made

30 apparent shortly. The spiral way 24 may be considered to start at 28, winding in a counter-clockwise direction outside of the stationary plate 12 and ending at 29 (Fig. 1), the conveyor plate 13 positioned therebelow providing a traveling support for articles 30, in the present instance protector blocks. A supply of promiscuously arranged protector blocks 30 are fed by gravity down a chute 31 and onto the upper surface of the stationary

35 plate 12 from which the operator predeterminedly positions them in the narrow longitudinal surfaces thereof directed upwardly as clearly shown in Figs. 1 and 2, arranging them in train formation against a vertical wall 32 of the plate 23 at the lower portion of the aperture 25, as viewed in Fig. 1, and upon the rotating conveyor plate 13, whereupon they are conveyed into the way 24 at 28. The upper half of the way 24, as viewed

40 in Fig. 1, is spirally formed, while the lower half is concentrically arranged, with the result that during the time the blocks 30 are being conveyed around the rearward half of the plate 23, they are also laterally displaced upon the conveyor plate 13 and toward the periphery thereof, and during their movement around the forward half no relative movement occurs between the conveyor plate

45 and the blocks.

50 The conveyor plate 13 has formed in its upper surface a pair of spaced concentric continuous V-shaped grooves or depressions 35 and 36, the inclined surfaces forming each groove being on slightly different angles, as clearly shown in Figs. 3 to 7, inclusive, the inner surfaces of each groove with respect to the axis of the plate 13 being slightly less inclined than the outer surfaces thereof. The vertical wall of the way 24 at two points along the upper half thereof is beveled as shown at 37 and 38 and also at 39 along its lower half, the purpose of which will become apparent hereinafter in the description of operation of the apparatus. A brace or reinforcing bar 40 is provided for holding the scroll portions of the plate 23 in predetermined relation and is secured at its outer ends to the U-shaped support 22, the bar also may form a support for the discharge end of the chute 31 as clearly shown in Fig. 2.

55 In the operation of the apparatus the protector blocks are deposited promiscuously on the upper surface of the stationary plate 12 by gravity from the chute 31, the chute being supplied from a suitable source (not shown) and counter-clockwise rotation is imparted to the conveyor plate 13 in the manner hereinbefore described. The operator then proceeds, as hereinbefore described, to position the blocks 30 with their narrow longitudinal edges directed upwardly and with the sides of the blocks against the vertical wall 32 of the plate 23 and upon the rotating conveyor plate 13 in train formation. After entering the guide way 24 at 28 (Fig. 3) the blocks 30 are gradually laterally displaced in an outward direction upon the conveyor plate 13, leaving the way 24 at the point 44 where they enter an enlargement of the way directly below the point at which they are mounted upon the conveyor plate and are then subjected to the scrutiny of the operator who removes any of them that have defects perceptible by sight upon the surfaces thereof which are exposed and drops them into an aperture 45 in the plate 23 where they are directed to a receptacle (not shown). The operator in scrutinizing the blocks as just described continues to position other blocks as hereinbefore described against the vertical wall 32 of the plate 23, relying on his sense of feel for properly positioning them. The blocks 30 not removed on account of visual defects travel across the enlargement of the way 24 and enter it again at 46, no relative movement between the conveyor plate 13 and the blocks occurring until the point 47 is reached, whereupon the blocks are gradually laterally displaced again upon the plate 13 by the spiral way 24, which crosses the V-shaped grooves 35 and 36 of the plate 13 at separated points, as clearly shown in Figs. 1, 4 and 6. As the blocks are conveyed along the way 24, referring particularly to Fig. 4, and simultaneously later-

ally displaced on the plate 23, they finally drop into the inner groove 35, assuming the position shown in Fig. 4. In the continued travel of the blocks 30 they are lifted from the groove 35, assuming the position shown in Fig. 5, resting on a side surface thereof, having been rotated 90° from their initial position upon the plate 13. Thereafter the blocks 30 reach the point where the way 24 crosses the outer groove 36, into which the blocks are moved, assuming the position shown in Fig. 6, and finally they are lifted therefrom by the engagement of the blocks with the wall of the spiral way as the blocks are advanced therealong by the conveyor plate 13 and assume the position shown in Fig. 7, which illustrates the block completely overturned from its initial position upon the plate 13, thus exposing other surfaces thereof. The blocks 30 thereafter leave the way 24 at 48 and travel across the enlargement thereof directly below their previous line of travel between the points 44 and 46. During this latter travel across the enlargement of the way 24 the blocks 30 are again subjected to the scrutiny of the operator for visual defects, the operator removing such ones that do not meet the required standards and dropping them into the aperture 45. Each block 30 is thus subjected upon opposite portions to the scrutiny of the operator and those not rejected in the last visual examination enter the way 24 again at 49 and are directed thereby until they pass from the conveyor plate 13 at a point 50 where they may slide into a receptacle (not shown) positioned below the plate 23, or be received by a suitable magazing apparatus (not indicated).

Although the blocks 30 may be initially positioned by the operator in contiguous relation upon the conveyor plate 13 and travel in this manner to the point 28, it will be apparent, due to the spiral way 24 receding toward the periphery of the conveyor plate 13, that the blocks will thereafter become separated. Thus the visual inspection of the blocks as they travel across the enlargement of the way 24 where they are scrutinized by the operator is greatly facilitated.

Although the invention as herein illustrated and described is particularly well adapted for use in connection with the visual inspection of protector blocks, it should be understood that the novel features thereof are capable of other applications and should be limited only by the scope of the appended claims.

What is claimed is:

1. A method of handling articles, which consists in predeterminedly positioning a plurality of articles in a predetermined plane spiral path in contiguous relation with each other, continuously advancing the articles

therealong in a direction away from the axis of the path and during their advancement successively inverting them by a series of successive steps in a direction substantially at right angles to their line of advance.

2. In apparatus for handling articles, means for positioning an article laterally, means for advancing a positioned article, and means for guiding the article during its advancement along a predetermined plane path, the advancing means cooperating with the guiding means during the advance of the article for varying its position from the original position in a direction at an angle to its line of advance.

3. In apparatus for handling articles, means for advancing a positioned article, and means for guiding the article during its advancement along a predetermined plane path, the advancing means cooperating with the guiding means during the advance of the article for causing it to be inverted from the original position.

4. In an apparatus for handling articles, rotatable means having a plane article receiving surface for advancing an article positioned thereon, means for spirally guiding the article upon the surface contemporaneously with its advancement, the rotatable means provided with a depression in its plane surface with which the article is associated during its spiral travel for varying its position from the original position in a direction at an angle to its line of advance, and means for actuating the article advancing means.

5. In an apparatus for handling articles, rotatable means having a plane article receiving surface for advancing an article predeterminedly positioned thereon, stationary means provided with a plane spiral way for guiding the article upon the surface contemporaneously with its advancement, the rotatable means provided with a continuous depression in its plane surface into which the article is first moved and then removed therefrom during its spiral travel for varying its position from the original position in a direction at an angle to its line of advance, and means for actuating the article advancing means.

6. In an apparatus for handling articles, a rotatable annular member having a plane upper article receiving surface for advancing an article positioned thereon, a stationary article supply holding member having a surface on a plane with the article receiving surface of the annular member and closely fitting the inner periphery thereof, means for causing the article to travel in a spiral path upon the annular surface contemporaneously with its advancement, the annular member provided with a depression in its plane surface with which the article is associated during its spiral travel for causing it to be inverted from the original position, and

means for actuating the article advancing member.

7. In apparatus for handling articles, a rotatable member having a plane article receiving surface for continuously advancing a plurality of articles predeterminedly positioned thereon in contiguous relation with each other, means for causing the articles to travel in a predetermined path upon the plane surface contemporaneously with their advancement, the path being such that the articles are separated as they are advanced, the plane surface provided with a plurality of continuous depressions one within the other with which the articles are associated successively during their travel for causing them to be inverted in a direction substantially at right angles to their line of advance, and means for actuating the article advancing member.

8. In an apparatus for handling articles, a rotatable member having a plane article receiving surface for advancing an article positioned thereon, the surface provided with circular concentric depressions, means for causing the article to travel in a spiral path upon the plane surface and into association with the depressions for varying its position from the original position, and means for actuating the article advancing means.

9. In an apparatus for handling articles, means for advancing a positioned article, and means for guiding the article during its advancement a plurality of times past a predetermined point and along different plane paths, the advancing means cooperating with the guiding means during the advance of the article for varying its position between several of the different paths from the original position.

In witness whereof, I hereunto subscribe my name this 25th day of January, A. D. 1928.

LAWRENCE IMMANUEL DENNISON.