

May 30, 1944.

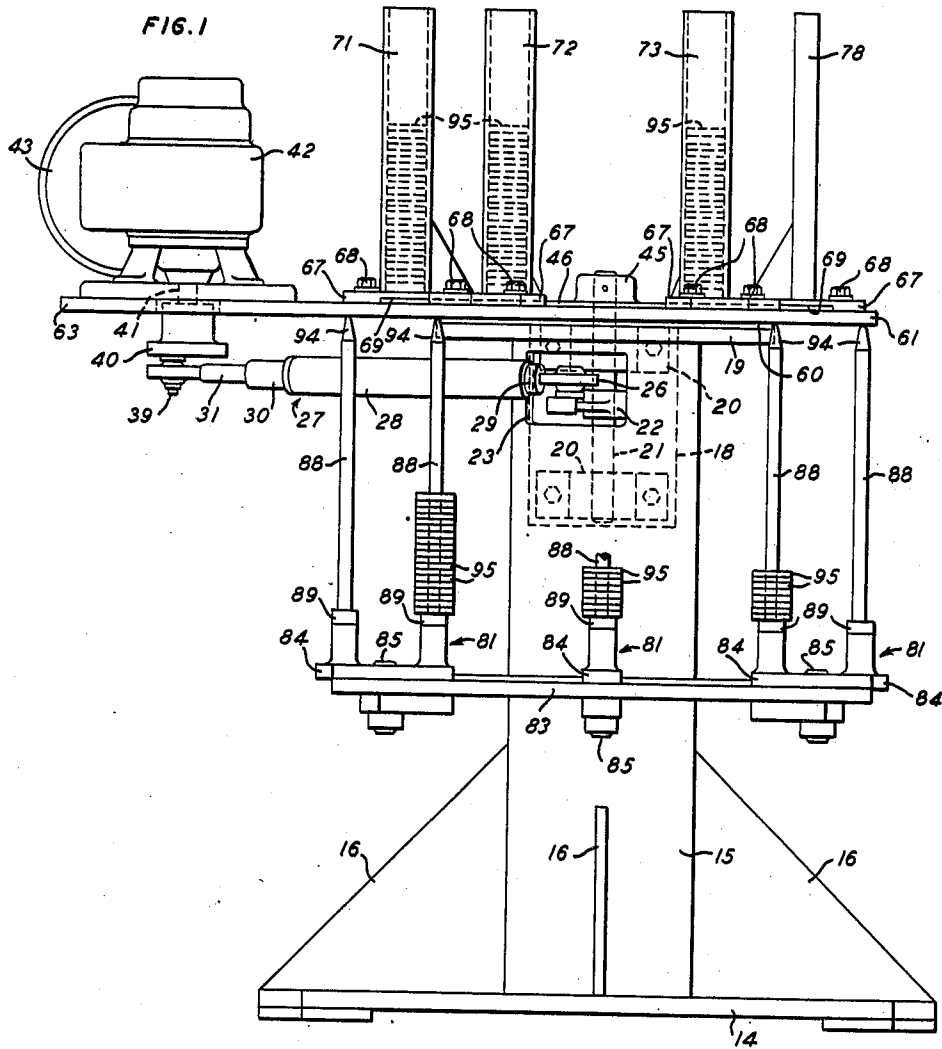
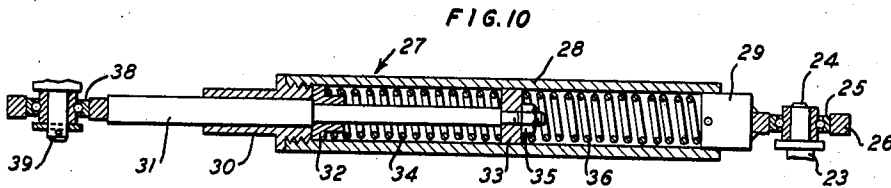
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2,350,273

ARTICLE HANDLING MACHINE

Filed June 4, 1942

3 Sheets-Sheet 1



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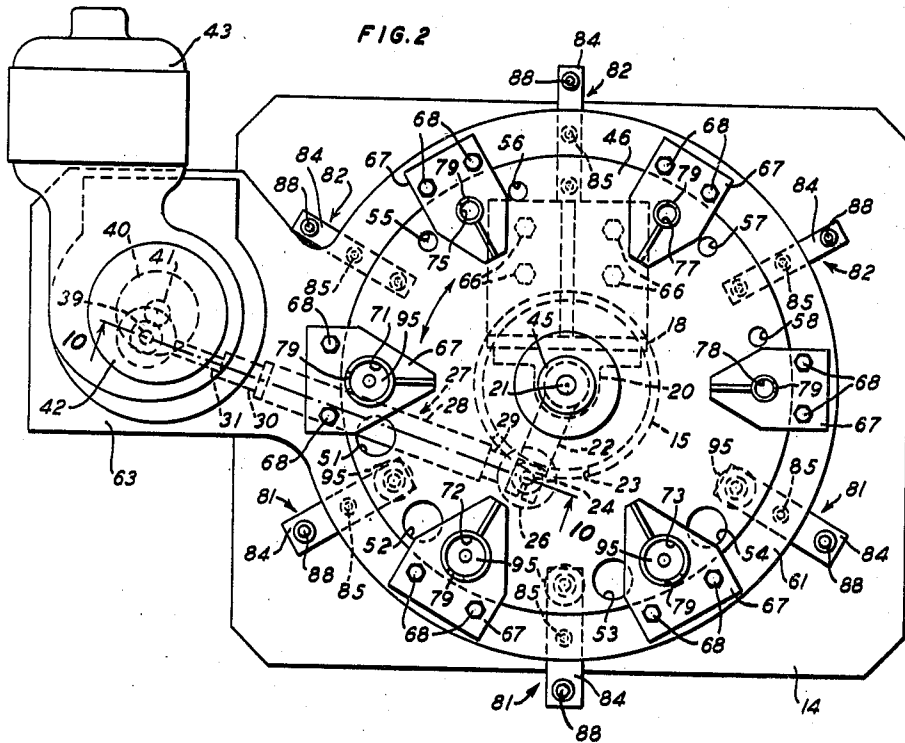
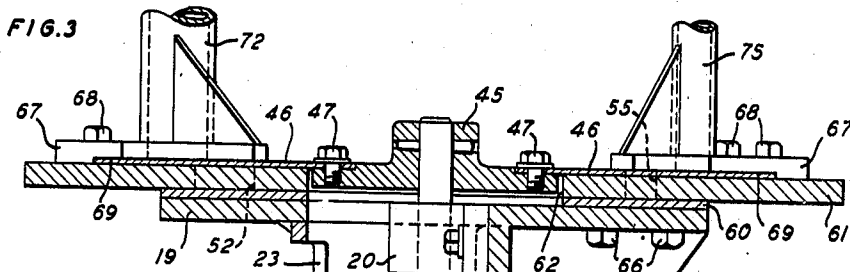
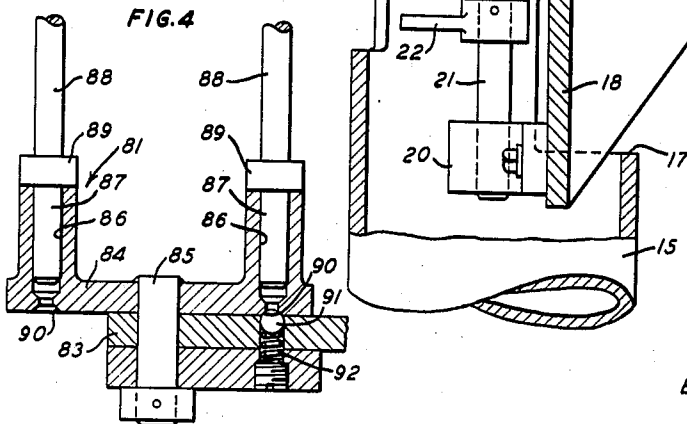
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ARTICLE HANDLING MACHINE

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3 Sheets-Sheet 2



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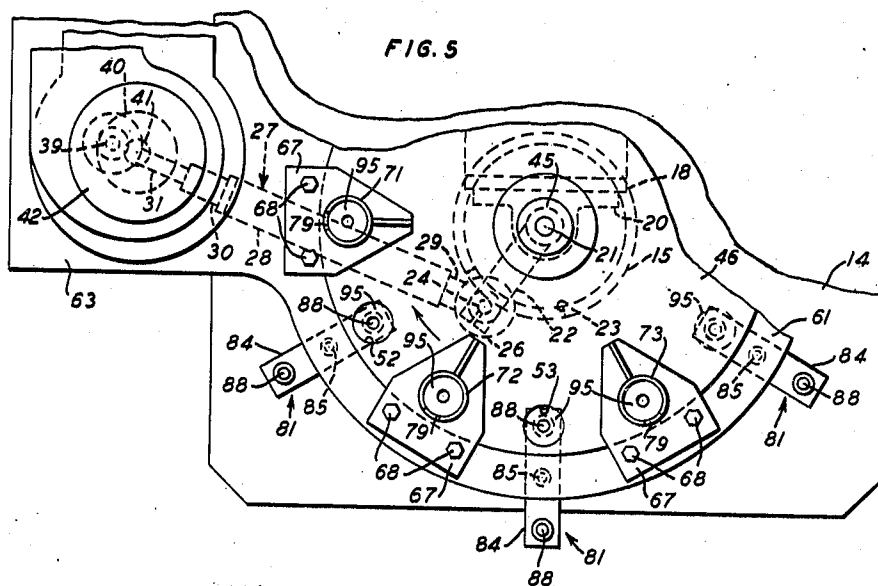
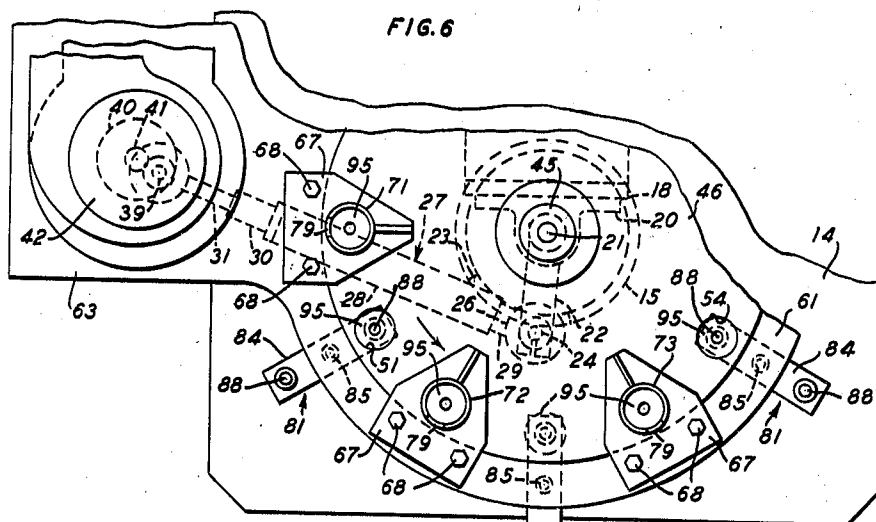
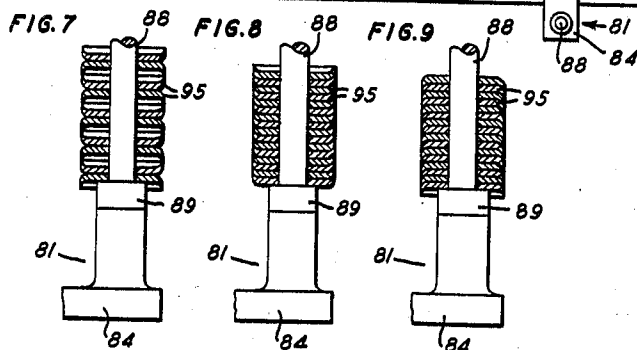
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ARTICLE HANDLING MACHINE

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3 Sheets-Sheet 3



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2,350,273

ARTICLE HANDLING MACHINE

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4 Claims. (Cl. 214—6)

This invention relates to article handling machines, and more particularly to machines for sorting and matching articles.

In the communication arts electrical units, such as rectifiers or resistors including copper oxide discs, are sometimes employed. The discs in these electrical units are usually punched out of sheet stock, leaving one face of each disc with a rounded edge and the other with a projecting fin. In processing the discs to oxidize them, their relative positions during the oxidizing periods are of most importance due to the fact that one face of each disc must be heavily oxidized while the other face is kept substantially free of oxide. To accomplish this result the faces with the rounded edges are placed together to eliminate or minimize the oxidation thereof while the other faces are spaced by their fins to permit the forming of heavy oxide coatings thereon. After oxidizing the discs they are to be stacked with their oxidized faces lying in the same direction for assembly.

An object of the invention is to provide an article handling machine, and more particularly one which is simple in structure and highly efficient in operation, to simultaneously match and sort different groups of articles.

With this and other objects in view, the invention comprises magazines for articles, receiving members disposed at selected positions relative to the magazines and means movable relative to the magazines and the members to cause positioning of the articles from the magazines onto selected members in varied orders.

Other objects and advantages will be apparent from the following detailed description when taken in conjunction with the accompanying drawings, wherein

Fig. 1 is a front elevational view of the machine;

Fig. 2 is a top plan view of the machine;

Fig. 3 is a fragmentary vertical sectional view of a portion of the machine;

Fig. 4 is a fragmentary detail view illustrating one of the units for supporting the receiving members;

Fig. 5 is a fragmentary top plan view of the machine showing the actuating mechanism in one extreme position;

Fig. 6 is a fragmentary top plan view of the machine showing the actuating mechanism in the other extreme position;

Fig. 7 is a fragmentary detail view of one of the article receiving members illustrating one

of the results of the machine in positioning the articles thereon;

Figs. 8 and 9 respectively illustrate other receiving members which receive the articles from a magazine in which they are assembled as illustrated in Fig. 7 and sorted on the members illustrated in these figures, and

Fig. 10 is a longitudinal sectional view of the flexible connecting arm in the actuating mechanism, this view being taken substantially along the line 10—10 of Fig. 2.

Referring now to the drawings, attention is first directed to Fig. 1, which illustrates a base 14 having a vertically extending cylindrical support 15 with reinforcing ribs 16. At the upper end of the support 15, a portion is cut away, as at 17, to receive a vertical bracket 18 of a supporting table 19. The table 19 rests upon the upper end of the support 15 and is secured thereto by any suitable means, such as welding. The bracket 18, as illustrated in Fig. 3, is disposed vertically in the support 15 and has bearings 20, mounted at spaced positions thereon, for rotatably supporting a shaft 21.

Considering first the means for actuating the shaft, it will be noted that a lever 22 is fixedly mounted thereon between the bearings 20, as illustrated in Fig. 3. The outer end of the lever extends through an aperture 23 in the support 15 and has a stub shaft 24 (Fig. 10) which supports a bearing 25 disposed in an end member 26 of a flexible connecting rod unit indicated generally at 27. The unit 27 includes a cylindrical member 28, in one end of which a plug 29 is fixedly mounted, the latter supporting the member 26. The opposite end of the cylindrical member is partially closed by a threaded member 30, which is centrally apertured to receive a rod 31 with reduced portions extending into the member 28 and through collars 32 and 33 respectively, a spring 34 being disposed between the collars is mounted on the innermost reduced portion of rod 31 to hold the collar 33 in place. Another spring 36 is disposed in the cylindrical member 28 between the plug 29 and the collar 33, and serves to balance the force of the spring 34 and function therewith in normally maintaining the unit 27 of a given length and adapt the unit for variation in length for a purpose hereinafter described. The outer end of the rod 31 supports a bearing 38 which is mounted upon a stub shaft 39, the latter being eccentrically mounted upon a disc or wheel 40. The wheel 40 is mounted upon an output shaft 41 of a speed reducing unit 42, the latter being driven by a

motor 43. The detailed structure of the unit and its connection with the motor are not believed necessary for a complete understanding of the operating mechanism.

Returning now to the shaft 21, it will be noted, by viewing Fig. 3, that a hub member 45 is mounted upon the upper end of the shaft. The hub member has a sorting element 46 secured thereto by means of screws 47, the element being centrally apertured to receive the hub member. The sorting element has article receiving apertures 51, 52, 53, 54, 55, 56, 57 and 58 therein at predetermined spaced positions adjacent the periphery thereof.

The table 19 provides an annular support for members 60 and 61, the member 60 being annular in general contour and equal in outer diameter to the outer diameter of the table 19, with a central aperture of the same diameter as that of the member 61. The member 61 is centrally apertured, at 62, to receive the hub member 45 (Fig. 3). The member 61, however, although being annular in general contour, has an integral portion 63 projecting outwardly, as illustrated in Figs. 1, 2, 5 and 6, to support the unit 42 and the motor 43. The members 60 and 61 are rigidly mounted upon the table 19 by means of screws 66.

A plurality of supporting brackets 67 disposed at substantially equal spaced positions about the member 61, are rigidly mounted upon the member by the aid of screws 68 and have portions 69 spaced from the member 61 to allow free movement of the sorting element 46. The brackets 67, as will be observed by viewing Fig. 2, may be of different sizes depending upon the size of the magazine each bracket supports. Otherwise, they are substantially identical in structure and it has not been thought necessary to separately describe them. For example, the brackets 67 adjacent the apertures 51 to 54 inclusive of the element 46 are slightly larger than the other group of brackets, in that this embodiment discloses a single structure adapted to sort and match various sizes of articles simultaneously. The larger group of brackets 67, that is those adjacent the apertures 51 to 54 inclusive, supports magazines 71, 72, and 73, respectively, while the other brackets support magazines 75, 77 and 78. The magazines are all cylindrical in general contour, the magazines in each group being of the same size but different in size from those of the other group, and each magazine is provided with a vertical slot 79 so that the operator may view the articles therein and determine the contents of the magazines. The supporting brackets 67 directly beneath the magazines are apertured, the apertures therein being equal to the inner diameters of their respective magazines so that articles in the magazines may drop singly in the associated apertures of the element 46 when positioned therebeneath, the member 61 limiting the escapement of the articles from the magazines to one article for each magazine.

A plurality of receiving units 81 is disposed at equally spaced positions with respect to the magazines 71, 72 and 73, other receiving units 82 being disposed at spaced positions with respect to the magazines 75, 77 and 78. The units in these two groups are identical in structure except for the variation in size of certain of the portions thereof for receiving articles of different sizes. Attention is directed to Fig. 4, which illustrates in detail one of the units, a description of this unit being, it is believed, sufficient for all of the

units. This unit includes a U-shaped element 84 pivotally mounted, at 85, upon a stationary supporting member 83, the vertical legs of the element being apertured, as at 86, to receive the lower ends 87 of receiving members 88. Collars 89, interposed between the upper and lower portions of the members 88, are formed to rest upon the upper edges of the leg portion of the element and to serve as resting portions for articles when disposed thereon. Recesses 90 are formed in the element 84 in alignment with the apertures 86 and are adapted to singly receive the ball member which, through the force of a spring 92, serves to lock the unit 81 in either one of the two positions to position either member 88 for receiving articles from its respective apertures of the element 46. Fig. 1 illustrates the upper ends 94 of the members 88 as being conical in shape to readily receive the articles.

Attention is now directed to Figs. 7, 8 and 9. The article, indicated at 95, is in the present embodiment a copper disc which is punched from sheet stock to provide one face thereof with a rounded edge and the other with a projecting fin, the article having a central aperture of a size sufficient for the free movement of the article on any of the members 88. To further distinguish between the faces of the article, the one with the projecting fin may be called the front face and the one with the rounded edge the back face. The articles illustrated in these figures are to become parts of electrical units and it is necessary that they be passed through an oxidizing process before being assembled in their respective units. To condition the articles for the said process, it is preferred to place them in alternate positions as illustrated in Fig. 7, to position the faces with the rounded edges together to seal each other against oxidation and position the faces with the fins as shown so that they will be spaced from each other to receive an oxidized coating. However, for the assembly of the articles in units it is necessary that the articles be disposed in stacked formation, with like faces thereof in the same direction. Therefore, with the present machine, articles may be taken from a stack and matched in pairs (Fig. 7) upon a single member, and at the same time articles which have been so matched may be disposed in one of the magazines and sorted so that the upturned articles will be disposed upon one receiving member and downturned articles on another.

Consider now the operation of the machine. To simplify the description thereof, it is suggested that attention be given to only one half of the machine, this half including the magazines 71, 72 and 73 and the units 81. A clear understanding of this half of the machine will be sufficient for the entire machine, as the same operations may take place in the other half of the machine including the magazines 75, 77 and 78 and their respective units 82.

Consider first the magazines 71 and 72 with their unit 81 and the apertures 51 and 52 in the element 46. By placing a stack of articles 95 in the magazine 71, so that the fin edges thereof project upwardly as illustrated in Fig. 8, and by placing another stack of the articles in the magazine 72 so that the fin edges thereof project downwardly (Fig. 9), the operation of the machine will result in the stacking of these articles in matched pairs (Fig. 7) on a member 88 of the unit 81 positioned in the path of the apertures 51 and 52. During the operation of the motor 43 and its unit 42, the wheel 40 will be rotated

to cause the eccentric shaft 39 to travel in a path sufficient to cause the connecting unit 27 to oscillate the element 46, through the lever 23 and the shaft 21. The oscillation of the element 46 will move the aperture 51 therein between two positions, one registering with the magazine 71 and the other registering with an aperture in the member 61 in alignment with the adjacent receiving member 88. In a like manner, the oscillation of the element 46 moves the aperture 52 between two positions, one in registration with the magazine 72 and the other in registration with the aperture in the member 61 in alignment with the same receiving member 88. As illustrated in Fig. 2, the element 46 is at approximately the center of its movement clockwise and at the end of its movement in this direction (Fig. 5), the aperture 51 will register with the magazine 71, where it will receive the lowermost article therein. The aperture 52 at this time registers with the member 88 therebeneath but as there is no article in the aperture 52 the aperture will have to move into registration with the magazine 72 on the return stroke (Fig. 6) to receive its first article. The aperture 51 with its first article is moved into registration with the member 88 therebeneath and has dropped its article onto the member. Thus with the repeated oscillation of the element 46, an article is first selected from the magazine 71 and placed upon the member 88, at which time an article is being received from the magazine 72, and upon the return stroke this article is placed upon the member 88, the element continuing to alternately take articles from the two magazines and position them upon the member to thus stack the articles in the manner illustrated in Fig. 7. To further illustrate these movements of the element 46, attention is directed to Figs. 5 and 6, Fig. 5 illustrating the end of one oscillatory movement where the aperture 51 is in registration with its magazine 71 and the aperture 52 is in registration with the magazine 72.

Considering now the magazine 73 and the receiving units 81 disposed upon each side thereof, let it be assumed that a stack of the articles, as illustrated in Fig. 7, is disposed in the magazine 73. During the oscillatory movement of the element 46, the apertures 53 and 54 will alternately register with the magazine and with their respective receiving members 88. Thus the alternate articles in the magazine are taken therefrom and placed upon the receiving members upon each side thereof. As a result, the articles which are disposed with their fin edges alternately facing opposite directions are removed singly from the magazine and alternately stacked upon receiving members 88, the articles on each receiving member having their fin edges extending in like directions as illustrated in Figs. 8 and 9. If the receiving members 88 should become filled with the articles during the operation of the machine, the operator may readily rotate the units 81 to swing a filled receiving member out of the receiving position and to swing an empty receiving member into position. After this has been accomplished the filled members 88 may be readily removed from the units and other empty members disposed therein. This permits removal of the sorted articles without stopping the operation of the machine.

The structure of the connecting unit 27 is of importance, it being noted that this unit has flexible features, the collar 33 being disposed between the springs 34 and 36 which normally po-

sition the collar midway in the cylindrical member 28, and during normal operation of the machine the unit 27 will serve as a rigid connecting link. However, should any of the articles become jammed between their respective magazines and the associated apertures in the element 46, the motor 43 and its unit may continue operation without causing actuation of the element 46 and without injury to any of the parts. What takes place in this instance is the compression of either the spring 34 or the spring 36 during the movement of the rod 31 and its collar 33. Which spring will be compressed depends upon which portion of the cycle the incident occurs in. If at the portion shown in Fig. 5 it will be spring 36, but if it occurs at the portion shown in Fig. 6 it will be spring 34. It is important that if one article interferes with the operation of the element 46, the element be prevented from operation during the complete cycle to eliminate the possibility of inaccurate matching and sorting of the articles. Therefore, the springs 34 and 36 perform another function in applying suitable force to hold the element 46 against operation during the return movement of the rod 31, and at the end of this movement the article which has caused jamming of the element will be freed and allowed to drop in its respective aperture in the element. There is sufficient clearance, between the articles and the walls of their respective magazines, that such an occasion should never arise, but there may be an exception and through the function of the connecting rod or unit 27, any damage to the machine is eliminated and any inaccurate sorting of the articles is prevented.

It is, therefore, apparent that a plurality of operations may be performed simultaneously by the machine illustrated. During the removal of articles from two magazines and assembling them in matched pairs upon a receiving member at certain positions on the machine to prepare these articles for the process, other groups of articles, positioned in the same manner, which have been processed may be separated and sorted on other receiving members. Furthermore, at the same time articles of different sizes may receive the same sorting and matching treatment at other positions on the machine. Thus with this machine one operator in charge of an oxidizing unit may, in addition to controlling the unit, match articles through the aid of the machine for the unit and at the same time sort similarly matched articles ready to be assembled in electrical units.

Although specific improvements of the invention have been shown and described it will be understood that they are but illustrative and that various modifications may be made therein without departing from the scope and spirit of this invention as defined by the appended claims.

What is claimed is:

1. A machine for handling articles comprising a table having an aperture therein for the passing of articles therethrough, an element disposed beneath the table in alignment with the aperture therein, magazines, for supplies of articles, disposed equal distances at opposite sides of the aperture in the table, a transfer member, having an aperture therein for each magazine, mounted for oscillatory movement on the table, and means to cause repeated oscillating cycles of the transfer member to cause the apertures therein to be alternately moved into registration with their magazines and the aperture in the table to alter-

nately transfer articles from their magazines to the element through the table aperture.

2. A machine for handling articles comprising a table having an aperture therein for the passing of articles therethrough, elements adapted to singly receive the articles from the aperture in the table, a support for the elements mounted for movement of the elements singly into alignment with the said aperture, magazines, for supplies of articles, disposed equal distances at opposite sides of the aperture in the table, a transfer member, having an aperture therein for each magazine, mounted for oscillatory movement on the table, and means to cause repeated oscillating cycles of the transfer member to cause the apertures therein to be alternately moved into registration with their magazines and the aperture in the table to alternately transfer articles from their magazines to the element through the table aperture.

3. A machine for handling articles comprising a table having an aperture therein for the passing of articles therethrough, elements adapted to singly receive the articles from the aperture in the table, a support for the elements mounted for movement of the elements singly into alignment with the said aperture, means to latch the support to maintain any selected element in alignment with the said aperture, magazines, for supplies of articles, disposed equal distances at opposite sides of the aperture in the table, a transfer member, having an aperture therein for each magazine,

mounted for oscillatory movement on the table, and means to cause repeated oscillating cycles of the transfer member to cause the apertures therein to be alternately moved into registration with their magazines and the aperture in the table to alternately transfer articles from their magazines to the element through the table aperture.

4. A machine for handling articles comprising a table having an aperture therein for the passing of articles therethrough, an element disposed beneath the table in alignment with the aperture therein, magazines, for supplies of articles, disposed equal distances at opposite sides of the aperture in the table, a transfer member, having an aperture therein for each magazine, mounted for movement through repeated oscillating cycles to cause the apertures therein to be alternately moved into registration with their magazines and the aperture in the table to alternately transfer articles from their magazines to the element through the table aperture, a continuously operable power means, and means operatively connecting the power means to the transfer member including an arm, adapted to normally assist in moving the transfer member through its repeated cycles, expansible and contractible to allow continuous operation of the power means should the transfer member be stopped at any position in the said cycle.

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