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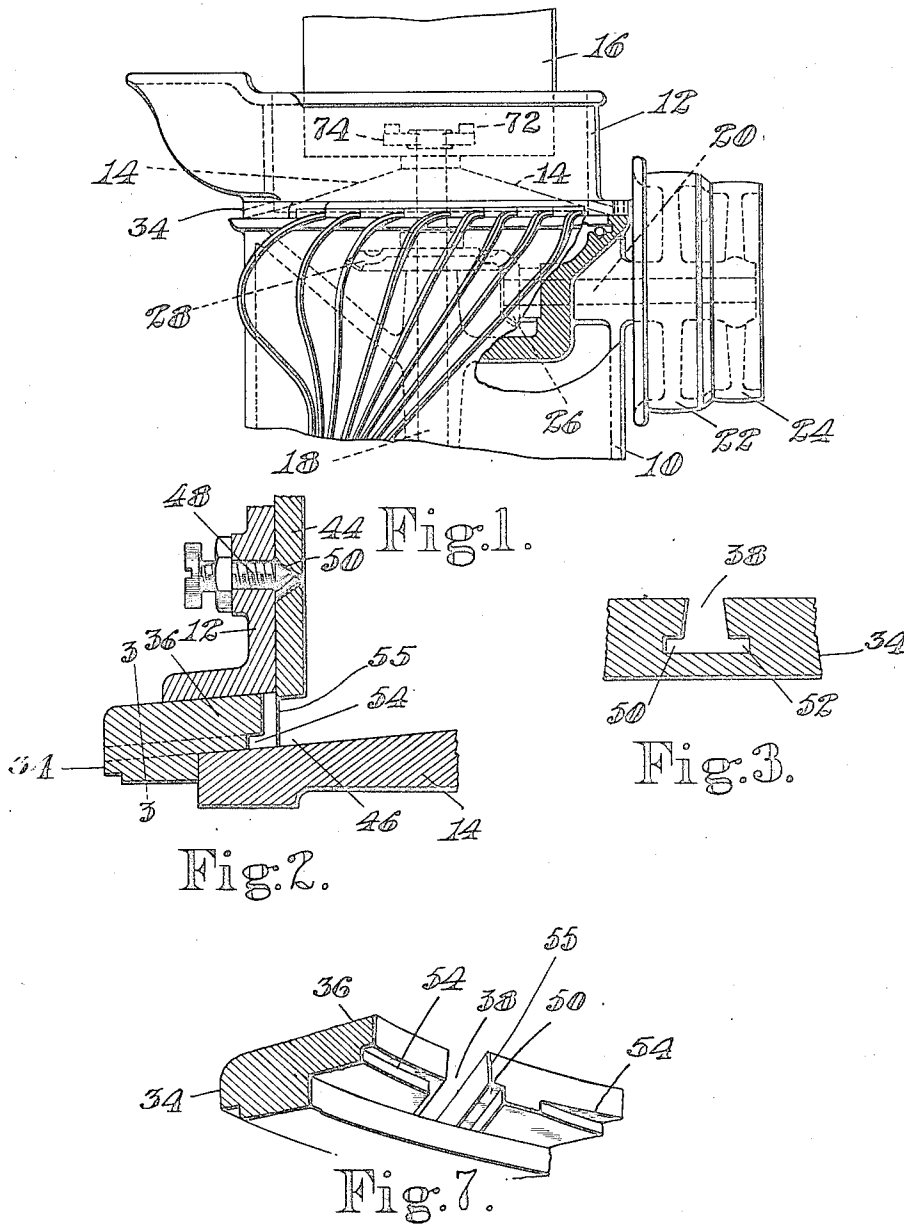
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A. BATES

MECHANISM FOR SORTING AND DELIVERING ARTICLES

Filed Feb. 27, 1919

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

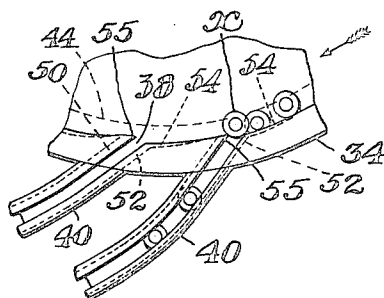


Fig. 4.

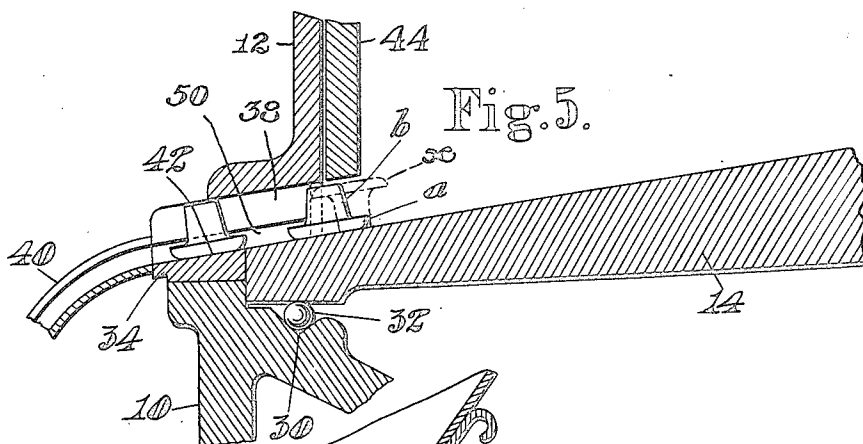


Fig. 5.

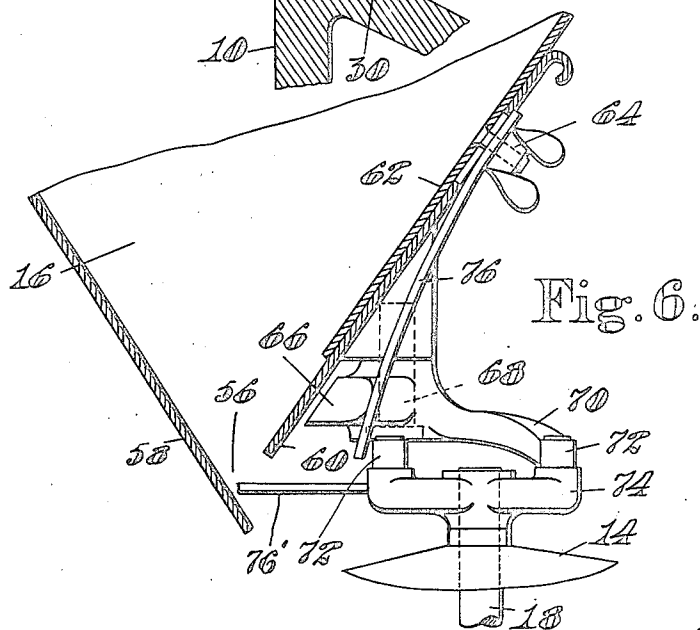


Fig. 6.

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MECHANISM FOR SORTING AND DELIVERING ARTICLES.

Application filed February 27, 1919. Serial No. 279,485.

To all whom it may concern:

Be it known that I, ARTHUR BATES, a subject of the King of England, residing at Leicester, Leicestershire, England, have invented certain Improvements in Mechanism for Sorting and Delivering Articles, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to mechanism for sorting and delivering articles of irregular shape such as eyelets, lacing-hooks, grommets, buttons, or other devices that are to be subsequently handled by automatic machinery or otherwise. Sorting-and-delivering devices of this general character are commonly provided for example, in machines for setting lacing-hooks, machines for setting eyelets, machines for attaching buttons or for mounting them on cards, and in machines for mounting lacing-hooks, grommets, or eyelets in groups on temporary carriers for stock purposes or as a preliminary step to coating them with japan or otherwise treating them. For such purposes it is desirable to sort and deliver the articles in relatively large numbers, in order to expedite the loading of the carriers on which they are mounted. On the other hand, sorting-and-delivering mechanism used in conjunction with machines for setting eyelets or machines for setting lacing-hooks do not require so great a capacity for delivering the articles because the latter are usually inserted one by one or in pairs. The sorting-and-feeding devices heretofore provided for machines that set them singly or in pairs have been adequate, so far as capacity is concerned, for that purpose.

These sorting-and-feeding devices have been borrowed from setting machines for use in conjunction with machines for mounting the articles on cards or other temporary carriers on which they are mounted in large numbers, but it has been found that their capacity to sort and deliver the articles has not been adequate for this purpose. The volume of articles placed on the cards or other temporary carriers has, consequently, been limited by and to the delivering ca-

capacity of the sorting-and-feeding mechanism, and the output has been so limited as to render the cost of the operation excessive.

My present invention provides a sorting-and-delivering mechanism of relatively great delivering capacity, although it is no more complicated than the sorting-and-delivering mechanisms of relatively small capacity heretofore provided.

In machines for depositing small articles on temporary carriers, as above explained, it is customary to provide a relatively large number of raceways arranged to conduct the articles from the sorting-and-delivering mechanism to the carriers that receive them, and the present invention, because of its capacity for a relatively great output, is especially adapted to satisfy the requirements of such a machine. Broadly stated, this result is made possible by the present invention in consequence of providing sorting mechanism that subjects the articles of a mass to successive phases of segregation and that accelerates the movement of the segregated articles both during the segregating operation and during the subsequent delivering operation of those segregated for delivery.

The present invention provides a container having a rotatable disk or table forming its bottom, the latter being constructed and arranged to cause the articles to move to its periphery in all directions equally, with the result that it will not cause any greater accumulation of articles at one point than at others. This feature enables the sorting-and-delivering mechanism to deliver articles to as many raceways as there may be, and the raceways, if distributed around the periphery of the container, will be supplied equally with articles, regardless of their location and number. The disk, as shown, has a conical article-supporting surface, and the axis is substantially vertical. The conicity of the disk causes the articles to gravitate in all directions equally, and extends to the periphery for reasons that will be explained in due course.

In addition to utilizing the force of gravity incidental to the conicity of the rotary disk, centrifugal force is utilized to expedite the feeding of the articles from the container to the raceways, the latter force be-

ing compounded, as it were, with the force of gravity. Gravity alone would cause the articles to move to the periphery of the disk, and centrifugal force alone would have the same effect, but the friction of the articles on the surface of the disk causes the articles to move around the axis of the disk, although the latter movement is not so rapid as that of the disk. The resultant tendency on the part of the articles is to move nearly tangentially to a circle of less diameter than that of the disk, and this tendency of the articles to follow tangential courses is utilized to expedite the passage of the articles from the container by forming outlet channels arranged to extend in the lines along which the articles tend to move.

In sorting and feeding articles for any of the purposes hereinbefore mentioned, it is, of course, desirable, and in most cases necessary, to deliver only those articles that lie in a predetermined position, so that the articles may all lie in said predetermined position in the raceways. The present invention accordingly provides improved means for controlling the articles in the container so that only those articles that lie in one predetermined position will be permitted to enter the outlet channels while all such articles as lie in any position other than the correct position, although otherwise in registration with the outlet channels, will be quickly rejected and removed from registration in order to clear the way rapidly for succeeding articles that do lie in the desired position.

In accordance with the aforesaid principle of subjecting the articles to successive phases of segregation the invention provides means for subjecting to a second phase of segregation only those articles that have undergone the first phase. In the present instance this means is shown in a form that begins the second phase before the articles reach the receiving ends of the outlet channels. The second phase is completed, however, as each article moves into registration with the outlet channel, with the result that if it is in the one predetermined position for delivery it will pass through the channel, and if not it will be returned to the mass to undergo another process of segregation de novo.

Another feature of the invention consists in means for assuming partial control of the correctly positioned articles before the latter enter the receiving ends of the outlet channels. For purposes of illustration the present invention is shown as being embodied in a machine for sorting and delivering eyelets, and the preliminary control, above mentioned, is exercised directly upon the flanges that are formed at one end of the eyelets. Once an eyelet has been taken under partial control, as just described, it is

not so susceptible to being disarranged as though such partial control were not exercised, and this feature of the invention contributes to increase the output of the feeding mechanism.

Another feature of the invention consists in means for preventing articles from being superimposed one upon another after segregation has begun. This means, in the present instance, is represented as being embodied in the means that effects the first phase of segregation, and is effective not only as to the articles undergoing the first phase, but also as to those of the second phase.

Another feature of the invention consists in improved means for supplying articles to the sorting-and-delivering mechanism in proportion to the rate of delivery from the latter, rather than to deposit an excessively great mass of articles in the container at one time.

Other features of the invention than those already outlined are shown by the accompanying drawings, and are hereinafter described and claimed.

Of the accompanying drawings, in which the present invention is represented as being embodied in a machine for sorting and delivering eyelets automatically to a plurality of raceways,—

Fig. 1 represents an elevation partly in section of the machine as a whole, omitting the mechanism for receiving the eyelets from the lower ends of the raceways;

Fig. 2 represents a sectional view on a larger scale and in a vertical plane, including the rotatable disk that forms the bottom of the container, the rim in which the outlet channels are formed, and the adjustable guard that effects the first phase of segregation and prevents the mass of eyelets from bearing upon the tops of the eyelets that lie under it;

Fig. 3 represents a sectional view through the structure intersected by line 3—3 of Fig. 2;

Fig. 4 represents a top plan view on a smaller scale of the elements included in Fig. 2, showing an incorrectly positioned eyelet of the first phase being segregated from the correctly positioned eyelets;

Fig. 5 represents a sectional view similar to Fig. 2 excepting that the plane of the section is coincident with one of the outlet channels;

Fig. 6 represents a sectional view in a vertical plane including the lower portion of the reservoir that discharges articles into the sorting-and-delivering mechanism; and

Fig. 7 represents a perspective view, from underneath, of the elements that cause the second phase of segregation of the articles.

Referring to the mechanism as shown by the drawings the machine comprises a base

10, a casing 12 for enclosing a mass of articles to be sorted and fed, a rotatable disk or table 14 forming the bottom of the container, a reservoir 16 arranged to discharge the articles into the container 12, and other elements and details of construction that will be described in due course. The disk 14 is circular and for this reason the casing 12 is preferably given an annular form. The base 10 is of annular form to conform to the casing. The disk 14 is arranged to rotate about a vertical axis and is affixed to a vertical shaft 18 mounted in suitable bearings provided by the base. A drive shaft 20, also mounted in a bearing in the base, is provided with pulleys 22 and 24, one of which is preferably affixed to it and the other preferably loose. The tight pulley is intended to be driven by a belt to rotate the shaft 20, and the latter is connected to the shaft 18 by beveled gears 26 and 28. Fig. 5 shows the base 10 as being provided with a ball-race 30 in which a series of anti-friction balls 32 are arranged to support the marginal portion of the disk 14, this arrangement of supporting means serving to maintain the desired degree of accuracy of registration between the upper surface of the disk and the outlet channels hereinafter described, and being especially desirable for a disk of relatively large diameter.

A ring or barrier 34 is affixed to the base 10 in contiguous relation to the periphery of the disk, and is provided with a flange portion 36 arranged to overlap the marginal portion of the disk as shown best by Fig. 2. This ring is provided with outlet channels 38 through which the correctly positioned eyelets may be delivered, the overlying flange portion 36 serving to keep the disk seated upon the balls 32, and having other functions hereinafter described. This showing of the invention includes raceways 40, the receiving ends of which are arranged to receive eyelets that are discharged through the channels 38. There may be as many channels and raceways as desired, and they may be distributed at any desired points along the periphery of the disk without affecting the uniformity of discharge of eyelets from the container. The outlet channels 38 extend through the entire width of the ring 34 including the overlapping flange portion 36, the marginal portion of the disk serving as the bottom of the channels where the latter intersect the flange portion, and the eyelet-supporting surfaces 42 formed in the outer portion of the ring being arranged to lie substantially in flush relation with the upper surface of the disk so that the eyelets may pass from the disk to the stationary supporting surfaces without encountering any obstruction.

An essential characteristic of the disk 14 is that the marginal portion of its upper

surface is conical, although, for the best results, it is desirable to have substantially all of said surface conical. In the present instance this surface of the disk is shown as being conical throughout, excepting that its hub eliminates the apex. The reason for giving conicity to the marginal portion of the disk is to utilize the force of gravity to maintain a tendency on the part of the eyelets to move to the periphery of the disk. Inasmuch as the marginal portion of the supporting surface is conical and the axis of the disk is arranged to extend vertically, the tendency of the eyelets to gravitate toward the periphery of the disk will be uniform at all radii, and the eyelets will not, therefore, tend to accumulate at one side of the container any more than at another. Is is due to this uniformity in the tendency of the eyelets to gravitate in all directions away from the axis that the outlet channels may be arranged at various points along the periphery with uniform rate of delivery of eyelets to the several raceways.

The eyelet-supporting surfaces 42 of the ring, and the overlying flange 36, are preferably inclined in accordance with the conicity of the disk 14, as shown. The depth of the flange 36 is slightly greater than the depth of the largest article to be fed through the channels, and the channels extend throughout the entire depth of the flange. The casing 12 is arranged to rest upon the ring 34, and its inner surface is preferably of slightly smaller diameter than the internal diameter of the flange, the difference in diameter being preferably about equal to one-half the diameter of the eyelets. An annular adjustable guard 44 is arranged inside the casing, and is supported at a suitable distance above the disk to control the eyelets so that only those eyelets that stand on end will be permitted to pass under it. The usual proportions of an eyelet are such that the external diameter of the flange *a* at one end of the barrel *b* is substantially greater than the length of the eyelet, and in accordance with this condition the guard 44, if adjusted to a height that will leave a space or depth channel 46 between it and the disk of no greater depth than the length of the eyelet plus the necessary clearance, will prevent all eyelets lying on their sides or otherwise than on their ends from entering this depth channel 46. This guard, therefore, constitutes means for effecting initial segregation of the eyelets, the result of which is that the only eyelets permitted to separate themselves from the mass will be those that lie with their ends on the disk.

It will, of course, happen that some of those eyelets of the first phase of segregation will lie with their flanges on the disk, while others will lie with the small end of

their barrels on the disk. It is an object of the present invention to deliver only those eyelets that lie with one predetermined end uppermost, that end, in the present instance, being the small end of the barrel. A further segregation is accomplished by other means, hereinafter described, by which only those eyelets that lie with their small ends uppermost will be permitted to pass out through the channels 38, the remaining eyelets of the first phase of segregation, that is, those lying with their flanges uppermost, will be rejected and precipitated toward the axis of the disk far enough to clear the guard 44 so that they may have an opportunity to be righted.

Any suitable means may be provided for determining the adjustment of the guard 44 relatively to the disk, Fig. 2 including one form of adjusting device adequate for this purpose. This adjusting device comprises a screw 48 having threaded connection with the casing 12, and an inclined surface 50 formed in the guard 44. For convenience of manufacture the inclined surface 50 may be formed by boring or reaming a conical hole in the guard, and the inner end of the screw is preferably given the shape of a cone to afford smooth bearing on the surface 50. The result of turning the screw inwardly will be to raise the guard, and conversely, the result of turning it outwardly will be to permit the guard to descend. Although the drawings show only one such adjusting device there would preferably be two or possibly three disposed equidistantly about the periphery of the casing. The lower end of the guard is shown as being beveled to conform to the conicity of the disk 14, the channel 46 being, therefore, of uniform depth throughout its width.

Fig. 3 shows the preferred cross-sectional shape of one of the channels 38. This shape conforms, in general, to the shape of the eyelet and is characterized by laterally extending grooves 50 and 52 corresponding to the flange of the eyelet.

It has been stated that the eyelets that are first segregated from the mass undergo a second process of segregation in order to deliver only those that lie with their flanges in contact with the disk. This second process of segregation begins before the eyelets are carried into registration with the outlet channels, and for this purpose the bottom part of the overlying flange 36 is provided with grooves 54 arranged to receive the flanges of those eyelets of the first phase of segregation that lie with their flanges in contact with the disk. Fig. 4 shows the grooves 54 leading to the outlet channels and, more specifically, to the grooves 52 of the said channels. Of those eyelets that are permitted to enter the depth channel 46, as shown by Fig. 5, those that lie with their

flanges in contact with the disk are enabled to move further from the axis of the disk than those whose smaller ends are in contact with the disk. Fig. 5 shows, in broken lines, an eyelet α lying with its small end on the disk and its flange bearing against the internal surface of the flange 36, serving to maintain it nearer the axis of the disk than the eyelet whose flange is on the disk and in the groove 54. This groove affords clearance for the flange of the latter eyelet so that the barrel may bear against the internal surface of the flange 36. The grooves 54 not only begin the second phase of segregation, but serve to steady the correctly positioned eyelets so that they will not be liable to be displaced from their path of approach to the outlet channels. This immunity from displacement is supplemental to that afforded by the guard 44 which prevents other eyelets from lying on top of those in the channel 46. The eyelets in the latter channel are, therefore, comparatively free to advance into registration with the outlet channels inasmuch as they do not encounter any hindrance from above. When the flange of a correctly positioned eyelet in the channel 46 has entered the groove 54, it is almost a certainty, if not quite a certainty, that it will enter the outlet channel correctly and be discharged rapidly. The groove 54 guides the flange of the eyelet into the groove 52 of the outlet channel and the groove 52 forms a continuation of groove 54 although it extends in another direction.

Referring to the eyelet α indicated in Figs. 4 and 5, and shown as lying with its flange at its upper end, there are no grooves in the outlet channels arranged to receive the flange at this distance above the disk 14, and consequently all eyelets that lie in this position will be rejected by the outlet channels. As such eyelets are moved into line with the channels their flanges strike abutments 55, and they are precipitated toward the axis of the disk by said abutments. The result of this action is that such eyelets are thrown out of depth channel 46 and they pass out of the field of control of the guard 44 so that they have an opportunity to be inverted as they approach the next succeeding outlet channel. In the event that other eyelets are agitated by those thrown inwardly by the abutments 55, such agitation serves to promote the first phase of segregation as to those eyelets that lie near enough to the depth channel 46 to enter it. The abutments 55 are illustrated as corners formed on the overlying flange 36.

The effect of centrifugal force due to rotation of the disk 14 is taken into account for the purpose of expediting the discharge of eyelets through the outlet channels, this force, compounding with the force of grav-

ity due to the conicity of the disk, causing the eyelets to tend to traverse a path tangential to a circle of smaller diameter than the periphery of the disk. The outlet channels are, therefore, arranged to extend in lines parallel to the direction of normal tendency of the eyelets, the tangential relation of the channels being shown by Fig. 4. As shown by Figs. 2 and 5, the marginal portion of the disk forms the bottom of the receiving ends of the outlet channels, in consequence of which the eyelets continue to be supported by the moving disk after they have entered the receiving ends of the channels. The force of gravity due to conicity of the disk and the centrifugal force due to rotation of the disk, therefore, continue to propel the eyelets away from the axis of rotation after the eyelets have entered the outlet channels, and the discharge of the eyelets from the container is, therefore, accomplished with relatively great speed. This feature not only hastens the discharge of the eyelets that are in position to be discharged, but it rapidly clears the way for succeeding eyelets that have been segregated and are about to enter the receiving ends of the outlet channels.

The eyelet reservoir 16 discharges eyelets through an opening in its bottom and is arranged to discharge them into the container. As shown by Fig. 6, the cross-sectional shape of the lower part of the reservoir is substantially V-shaped, and the discharge opening is indicated at 56. This opening is formed by two walls 58 and 60, the latter of which is preferably adjustable edgewise to vary the area of the opening so that the eyelets may be discharged in proportion to the feeding of eyelets from the container. The adjustable section 60 of the reservoir is held against the non-adjustable wall 62 by a clamp nut 64.

The invention includes an agitator arranged to co-act with the reservoir to maintain the discharge of eyelets to the maximum degree determined by the size of the discharge opening. This agitator, in the present instance, comprises an oscillatory member 66 mounted upon a pivot member 68 and arranged to strike one of the walls of the reservoir near the discharge opening. In the present instance the member 66 is arranged to strike the adjustable section 60. The striker is provided with an arm 70 and the latter is arranged to be displaced periodically by anti-friction rolls 72 mounted upon a continuously rotating carrier 74. In the present instance the carrier 74 is affixed to the shaft 18 that carries the disk 14, the carrier being mounted above the mass of eyelets in the container. A spring 76 is arranged to act upon the striker to impart the effective movement to the latter. As the carrier 74 rotates, the rolls 72, alternately,

turns the striker about its axis in opposition to the applied force of the spring, and the relation of the striker to the rolls 72 is such that the arm 70 escapes from the rolls after having been displaced sufficiently to enable the spring 76 to cause a sharp impact against the reservoir. The eyelets in the lower part of the reservoir are thus agitated without being engaged, and possibly damaged, by the agitator.

In order further to insure the maximum rate of discharge of eyelets through the opening 56, the invention provides a member 76' arranged to sweep across the opening to dislodge whatever eyelets might become clogged in the opening. In the present instance the member 76' is carried by carrier 74 so that it sweeps across the opening once for each revolution of the carrier. This member, as shown, is disposed at a sufficient distance below the adjustable wall 60 to operate without interfering with the wall when the latter is adjusted to regulate the width of the opening to the minimum degree that will permit eyelets to be discharged at all.

In consequence of providing the reservoir with means adapted to determine the maximum rate of discharge of eyelets therefrom, and in consequence of arranging the agitator 66 and the member 76 to be operated at a constant rate relatively to the rate of operation of the sorting-and-feeding mechanism, a substantially constant volume of eyelets in the container may be maintained. This correlation of the rate of operation of the primary feeding means and of the sorting-and-delivering mechanism contributes to insure a relatively rapid rate of sorting and delivering because it avoids the clogging of eyelets in the container that might otherwise be caused by an excessive quantity of eyelets therein. On the other hand, the sorting-and-delivering mechanism will not exhaust the mass of eyelets in the container, provided the adjustable wall 60 of the reservoir is adjusted correctly, because the operation of the primary feeding means will be maintained commensurate with the rate of delivery from the container.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a machine for sorting and delivering fasteners, means for containing a mass of indiscriminately arranged fasteners, said means having an outlet port at the bottom and comprising relatively movable elements constructed and arranged to engage the fasteners in the mass and thereby to execute successive phases of segregation as to each fastener before the latter can enter the outlet port, so that only those fasteners that lie in a certain predetermined position may enter the port.

2. In a machine for sorting and delivering fasteners, means for containing a mass of indiscriminately arranged fasteners, said means having an outlet port and comprising relatively movable elements constructed and arranged to engage the fasteners in the mass and thereby to segregate from the mass those fasteners that lie in certain predetermined positions and to engage the fasteners so segregated and thereby to execute another phase of segregation so that only those fasteners that lie in one of said predetermined positions may enter said port.

3. In a machine for sorting and delivering articles of irregular shape, a movable table to support a mass of indiscriminately arranged articles, means arranged to co-act with said table to segregate from the mass those articles that lie in certain predetermined positions, and stationary means arranged to co-act with said table to segregate from those lying in said positions those that lie in one of said positions.

4. In a machine for sorting and delivering articles of irregular shape, a rotary table to support a mass of indiscriminately arranged articles, means arranged to co-act with one area of said table to segregate from the mass those articles that lie in certain predetermined positions, and means arranged to co-act with another area of the table and relatively to which the table is movable to segregate from those lying in said positions those that lie in one of said positions.

5. In a machine for sorting and delivering articles of irregular shape, a movable table to support a mass of indiscriminately arranged articles, means arranged to segregate from the mass a plurality of groups of those articles that lie in certain predetermined positions, and means arranged to conduct from the table only those articles of the segregated groups that lie in one of said positions.

6. In a machine for sorting and delivering articles of irregular shape, a movable table to support a mass of indiscriminately arranged articles, means arranged to segregate from the mass a plurality of groups of those articles that lie in certain predetermined positions, means arranged to segregate from said segregated groups respectively those articles that lie in one of said positions, and means arranged to conduct from the table at various points only those articles of the second phase of segregation that lie in the one position specified.

7. In a machine for separating eyelets, a container for a mass of indiscriminately arranged eyelets, said container comprising relatively movable elements arranged to segregate from the mass those eyelets that stand on end, said container also comprising means arranged to segregate from those that

stand on end those that stand on a predetermined end.

8. In a machine for separating eyelets, a container for a mass of indiscriminately arranged eyelets, said container comprising relatively movable elements arranged to segregate from the mass those eyelets that lie with their axes extending in a predetermined relation to the container, the latter also comprising means arranged to segregate from those eyelets of the first phase of segregation those whose flanges are similarly disposed.

9. In a machine for separating eyelets, a container for a mass of indiscriminately arranged eyelets, said container comprising a movable eyelet-supporting table, means arranged to segregate from the mass of eyelets those that stand on end on the table and stationary means arranged to segregate from those that stand on end on the table those whose flanges are similarly disposed in relation to the table.

10. In a machine for separating articles from a mass of indiscriminately arranged articles, chamber-forming means arranged to segregate from the mass those articles that lie on the bottom of the chamber in either of two predetermined positions, means arranged to segregate from those articles of the first phase of segregation that remain on the bottom of the chamber those that lie in one of said predetermined positions, and means arranged to aggregate with the mass those articles of the second phase that lie in the other one of said predetermined positions.

11. In a machine for separating eyelets from a mass of indiscriminately arranged eyelets, a container comprising a movable table for supporting such mass, and stationary means having a plurality of outlet ports, said means being formed and arranged to segregate from the mass those eyelets that stand on end on the table and to segregate from those eyelets so segregated from the mass, and guide them to said outlets, those eyelets that stand in a certain position on the table according to whether their flanges are at their upper or lower end.

12. In a machine for sorting and delivering articles of irregular shape, a container for a mass of indiscriminately arranged articles, said container comprising a movable bottom for supporting said mass and also comprising means above said bottom for confining the mass on said bottom, said means having an outlet port for such of said articles as lie in a predetermined position, said means being constructed and arranged to effect successive phases of segregation of the articles before the latter reach the entrance to said port, so that those articles of the first phase of segregation that lie in said pre-

determined position may be segregated from the other articles of said first phase before entering said port.

13. In a machine for separating and feeding articles, a container for a mass of indiscriminately arranged articles comprising a rotatable bottom having a concentric rim and a conical article-supporting surface extending to said rim to discharge the articles from the latter, and means constructed and arranged to conduct the articles from said rim in a direction away from the axis, all parts of the perimeter of said surface being in a plane at right angles to the axis to maintain constant register with said means as the bottom rotates.

14. In a machine for separating and feeding articles, a container for a mass of indiscriminately arranged articles, said container including a rotatable bottom having a circular periphery and a conical article-supporting surface extending to its periphery, and means arranged to guide the articles in serial arrangement from said conical surface at said periphery.

15. In a machine for separating and feeding articles, a container for a mass of indiscriminately arranged articles, said container including a rotary article-supporting table and stationary means overlapping the margin of the table, said stationary means being formed to segregate a group of articles from the mass and having a channel arranged to guide certain predetermined articles of said group from the table, said margin forming the bottom of the channel in the overlapping portion of said means.

16. In a machine for sorting and delivering fasteners, means for containing a mass of indiscriminately arranged fasteners, said means having a horizontal series of outlet ports and comprising relatively movable elements constructed and arranged to engage the fasteners and thereby to effect primary and final phases of segregation of fasteners before the latter enter said outlet ports, so that only those fasteners that lie in a certain predetermined position are permitted to enter said ports.

17. In a machine for sorting and delivering fasteners, means for containing a mass of indiscriminately arranged fasteners, said means having a series of stationary outlet ports each inclined to promote egress of the fasteners by gravitation, said means comprising stationary and movable elements constructed and arranged to engage the mass of fasteners and thereby to effect successive phases of segregation before the fasteners enter said ports, so that only those that lie in a certain predetermined position are permitted to enter the ports.

18. In a machine for sorting and delivering fasteners, means for containing a mass of indiscriminately arranged fasteners, said

means comprising relatively movable elements forming the bottom and sides of an outlet port and being constructed and arranged to engage the fasteners in the mass and thereby to effect successive phases of segregation before the fasteners enter the port, so that only those fasteners that lie in a certain predetermined position are permitted to enter the port.

19. In a machine for separating articles from a mass of indiscriminately arranged articles, a container comprising a rotatable table having a smooth surface arranged to support the mass, and stationary annular means arranged to maintain the mass on the table, a portion of said stationary annular means being formed and arranged to segregate a group of articles from the mass and to segregate from said group those articles that lie in a predetermined position, said means having an outlet channel for conducting those articles so segregated, said channel extending in a direction toward which the articles tend naturally to move in consequence of the centrifugal force set up in them by rotation of the table.

20. In a machine for separating articles from a mass of indiscriminately arranged articles, a container comprising a rotatable table arranged to support the mass, and stationary annular means arranged to maintain the mass on the table, a portion of said stationary annular means being formed and arranged to segregate from the mass those articles that lie in a predetermined position, said means having an outlet channel the bottom of which is formed by the marginal portion of said table, said marginal portion being inclined and said channel being arranged to compound the force of gravity and the centrifugal force set up by rotation of the table to propel the segregated articles through said channel.

21. In a machine for separating articles from a mass of indiscriminately arranged articles, a container comprising a rotatable table arranged to support the mass, and stationary annular means arranged to maintain the mass on the table, a portion of said stationary annular means being formed and arranged to segregate from the mass those articles that lie in a predetermined position, said means having an outlet channel the bottom of which is formed by the marginal portion of said table, said marginal portion being inclined to cause the force of gravity to propel the segregated articles through the channel.

22. In a machine for separating articles from a mass of articles, a container comprising a circular article-supporting table arranged to rotate about a substantially vertical axis and stationary annular means arranged to maintain a mass of articles over the table, said stationary means having an

outlet channel the bottom of which is formed by the margin of the table, said margin being conical to cause the articles to be propelled through the channel by the force of gravity.

23. In a machine of the character described, a container for a mass of articles, said container including a circular rotary table having a conical article-supporting margin, said table being rotatable about a substantially vertical axis, and stationary annular means overlying said margin and having a plurality of outlet channels the bottoms of which are formed by said margin, said channels being arranged to extend tangentially to a circle of less diameter than the table.

24. In a machine for separating articles from a mass of indiscriminately arranged articles, a container for the mass comprising a rotatable table arranged to rotate about a substantially vertical axis and having a conical article-supporting surface, means arranged over and spaced from said surface to form a depth channel to receive and segregate some of the articles from the mass, and means arranged to segregate from those articles occupying said depth channel the articles that lie in a predetermined position, the latter said means having an outlet channel the bottom of which is formed by said conical surface, said channel being formed and arranged to conduct only those segregated articles that lie in said predetermined position.

25. In a machine of the character described, a circular rotary table arranged to rotate about a vertical axis and having a conical article-supporting margin, a raceway arranged with its receiving end contiguous to the periphery of said table, and a stationary barrier arranged to overlie said margin and having a channel to conduct articles to said raceway, the bottom of said channel being formed by said conical margin.

26. In a machine of the character described, a circular rotary table arranged to rotate about a vertical axis and having a continuous conical article-supporting margin, a fixed barrier arranged above and in contiguous relation to said margin and having a channel through which the articles may pass in serial arrangement while being supported by said margin, and a raceway arranged with its receiving end in registration with said channel.

27. In a machine of the character described, a circular rotary table arranged to rotate about a vertical axis and having a conical article-supporting surface forming its margin, a fixed ring arranged to overlie said margin in contiguous and concentric relation thereto, said ring having a non-radial channel arranged to guide the articles in a series along said conical article-supporting

surface to the periphery of said table, and a raceway arranged with its receiving end in registration with said channel.

28. In a machine of the character described, a stationary element and a rotary element arranged to form a receptacle for articles to be delivered, the rotary element being arranged to form the bottom of such receptacle and being rotatable about a vertical axis, said fixed element having a channel through which the articles may pass from the receptacle, said rotary element having a conical margin arranged to cause the articles to gravitate through said channel and to support them in the channel.

29. In a machine of the character described, a receptacle for articles, comprising a stationary annular wall structure arranged with its axis extending vertically, and a rotary element arranged to form the bottom of the receptacle, said wall structure overlying the margin of said rotatable element and having a channel contiguous to the latter for the escape of articles, one by one, from the receptacle, the article-supporting surface of said margin being conical to cause gravitation of the articles through the channel.

30. In a machine of the character described, a receptacle for articles, comprising an annular structure arranged with its axis extending vertically, a circular member arranged to form the bottom of the receptacle, and having an article-supporting surface at its margin, said circular member being rotary relatively to said annular structure, the latter overlying the margin of said circular member and having a channel contiguous to and above said margin for the escape of articles, one by one, from the receptacle, the article-supporting surface of said margin being conical to cause gravitation of the articles through said channel, and a guard arranged over said circular member and spaced therefrom to form a depth channel to receive the articles supported by said circular member, said guard being arranged to prevent the articles from lying one on top of another in said depth channel.

31. In a machine of the character described, a receptacle for a mass of indiscriminately arranged articles, comprising an annular upstanding wall structure having an even, regular lower edge, a rotary table arranged in concentric relation to said wall structure, the margin of said table having a conical article-supporting surface and arranged to underlie said lower edge but being spaced from the latter to form a segmental channel for the passage of articles from the receptacle, and a barrier arranged to form the outer wall of said channel, said barrier having a channel to conduct the articles from the first said channel.

32. In a machine of the character described, a receptacle for a mass of indis-

criminally arranged articles, comprising a circular rotary table having an article-supporting margin, stationary means overlying said margin to confine the articles on said margin, and a guard supported over said margin to form, conjointly with the latter, a depth channel for articles lying on the margin, said guard being adjustable toward and from the table to vary the depth of said channel, said means having an outlet channel constructed and arranged to guide in serial arrangement the articles that pass under said guard in a predetermined position and to reject those that pass under the guard in another position.

33. In a machine of the character described, a receptacle for articles to be fed, a reservoir arranged above said receptacle and having a discharge opening arranged to discharge articles into said receptacle, and driven means arranged to sweep across said opening under the latter to dislodge articles in the opening.

34. In a machine of the character described, a receptacle for articles to be fed, a reservoir arranged above said receptacle and having a restricted discharge opening arranged to discharge articles into said receptacle, and driven means arranged to strike said reservoir periodically to dislodge articles clogged in said opening.

35. In a machine of the character described, a receptacle for articles to be fed, a reservoir arranged above said receptacle and having a discharge opening arranged to discharge articles into said receptacle, a rotary driven member, means carried by said driven member to sweep across said opening to dislodge articles therein, and means arranged to be moved and released alternately by said driven member, the latter said means being arranged normally to strike the reser-

voir, when released, to agitate the articles in the reservoir.

36. In a machine of the character described, a receptacle for articles to be fed, means including a driven member for feeding the articles from said receptacle, a reservoir for articles, said reservoir having a discharge opening arranged to discharge the articles into said receptacle, means carried by said driven member and arranged to sweep across said opening to dislodge articles in the latter, means arranged normally to strike said reservoir to agitate the articles therein, and means carried by said driven member to retract and release said striking means.

37. In a machine for sorting and delivering articles, a movable table to support a mass of indiscriminately arranged articles, and means arranged to co-act with said table to segregate from the mass a plurality of groups and to segregate from said groups those articles that lie in a certain predetermined position on the table.

38. In a machine for sorting and delivering articles of irregular shape, movable means arranged to support a mass of indiscriminately arranged articles, means arranged to co-act with said movable means to segregate from the mass those articles that lie in certain predetermined positions, means having an outlet port for articles lying in one of said positions, and means arranged to co-act with said movable means to segregate from the first-segregated articles lying in said predetermined positions those that lie in the specified one of said positions before they enter said port and guide them to said port.

In testimony whereof I have signed my name to this specification.

ARTHUR BATES.