April 21, 1942. C. E. HAHN 2,280,522

APPARATUS FOR FEEDING CYLINDRICAL METAL SHELLS

Filed Nov. 30, 1940 3 Sheets-Sheet 1

Fig. 1.

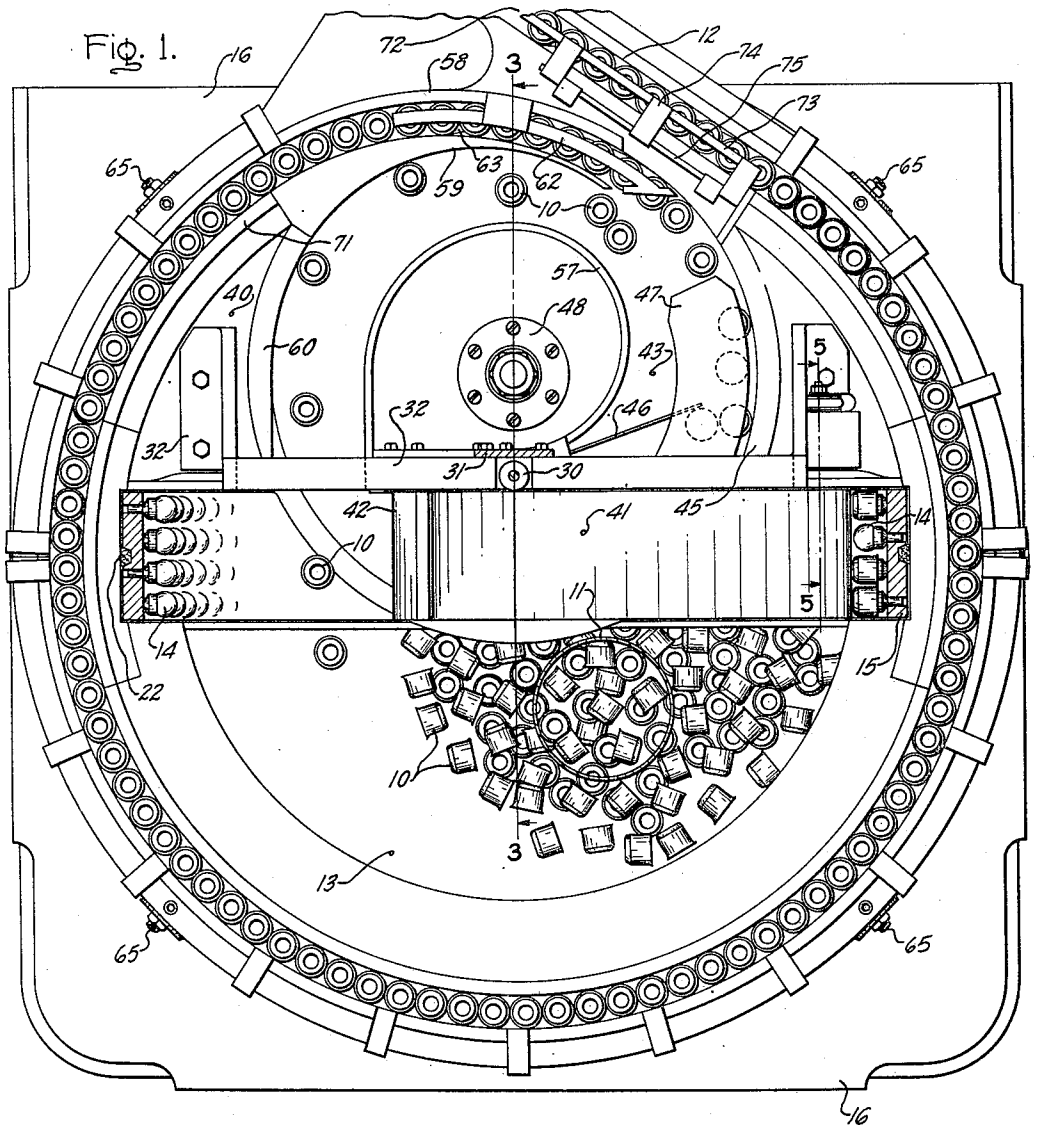
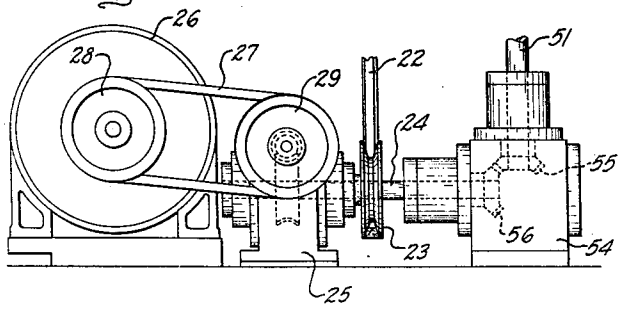


Fig. 4.



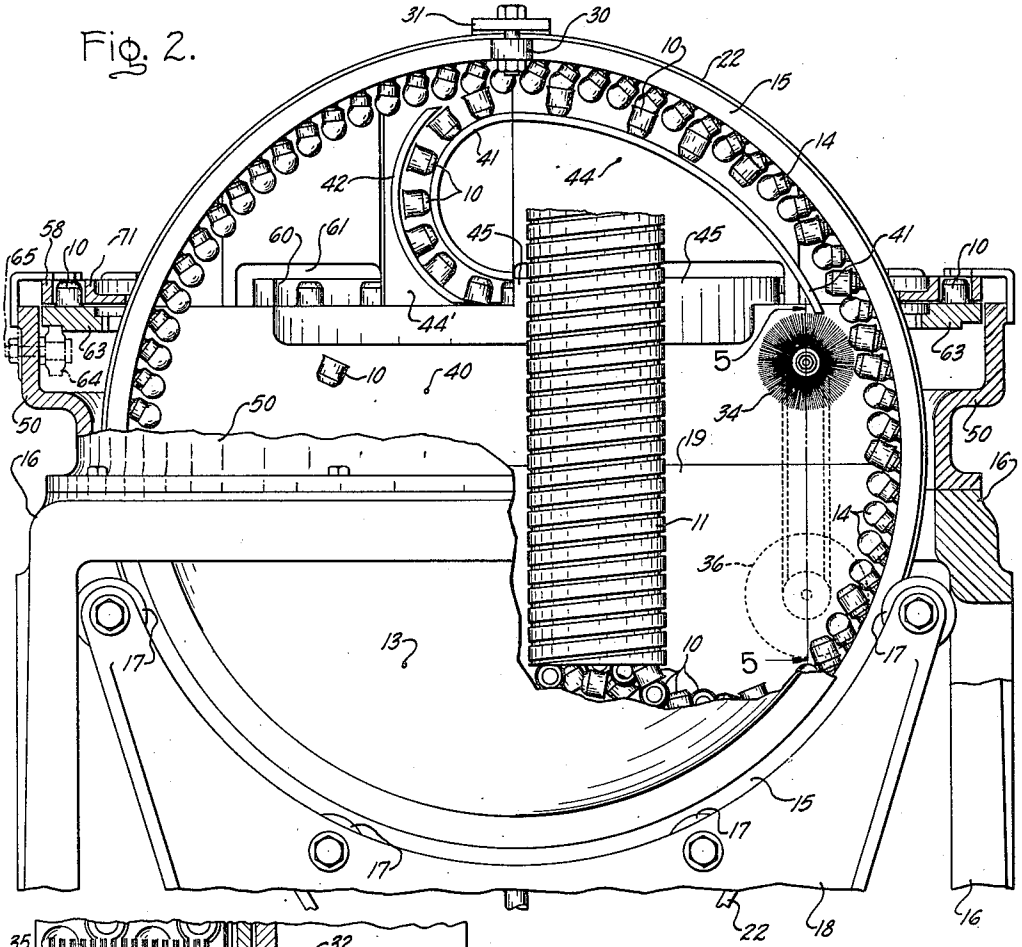
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Fig. 2.



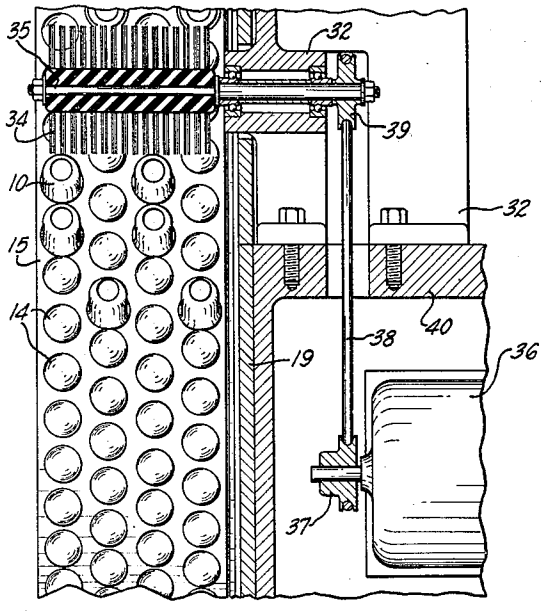


Fig. 5.

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Fig. 3.

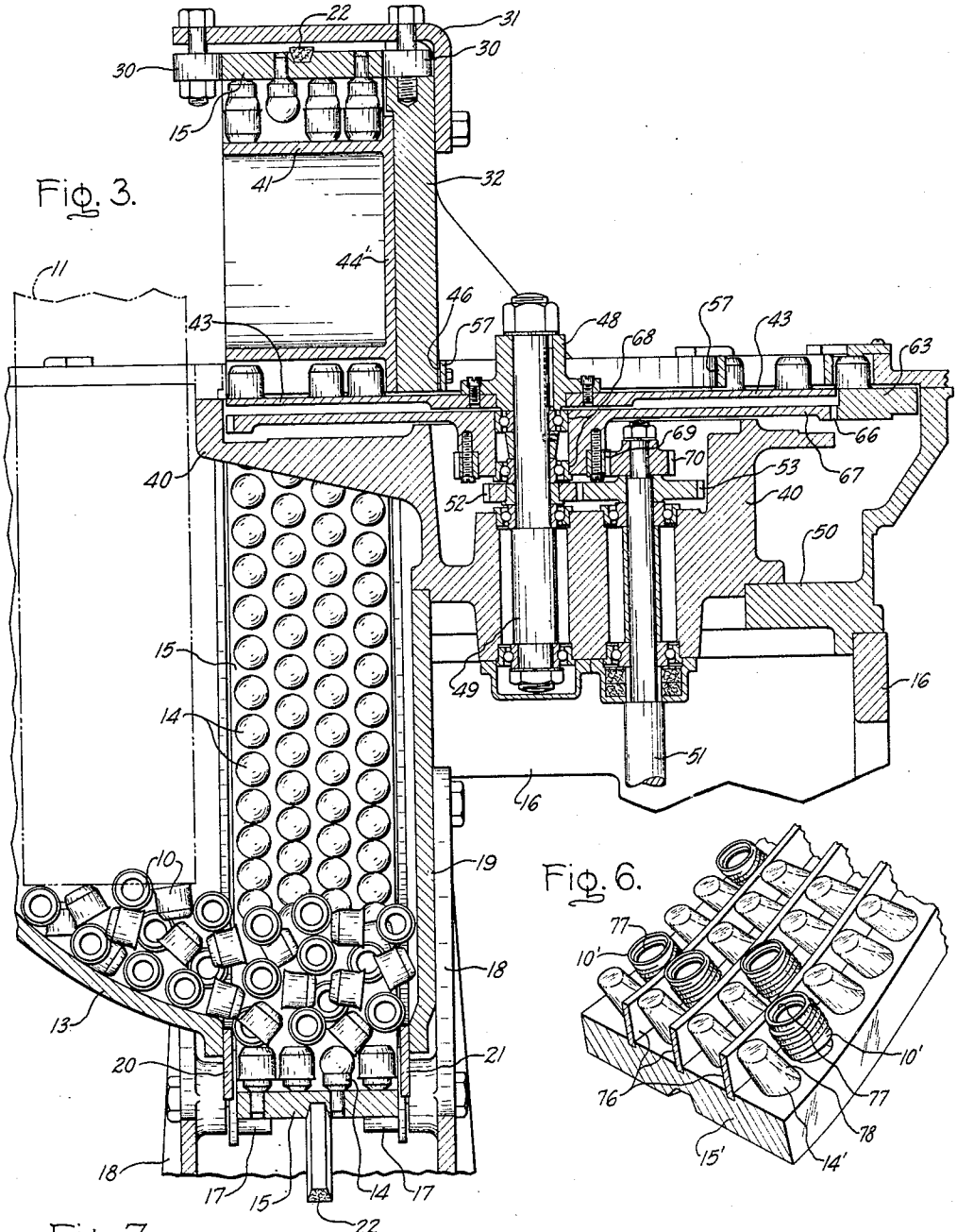
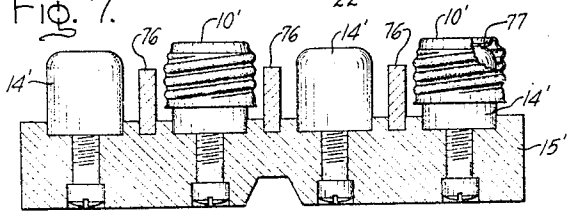


Fig. 6.

Fig. 7.



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UNITED STATES PATENT OFFICE

2,280,522

APPARATUS FOR FEEDING CYLINDRICAL METAL SHELLS

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Application November 30, 1940, Serial No. 368,027

15 Claims. (Cl. 198—29)

My invention relates to apparatus for feeding hollow metal blanks and more particularly to apparatus for feeding the open-ended cylindrical shells of lamp bases.

The metal shells of lamp bases are formed in apparatus separated from all other base-making apparatus and must be transferred to said apparatus in some manner. The usual procedure is to transfer a considerable number of the metal shells at a time and to feed the shells from a pile in which they lie in haphazard or disarranged fashion.

One object of my invention is to provide apparatus for automatically feeding the open-ended cylindrical metal shells of lamp bases in a satisfactory manner.

Another object of my invention is to provide apparatus for feeding base shells at a very high rate of speed in a manner easily coordinated with the operations of other base-making apparatus.

Other objects and advantages of the apparatus of my invention will appear in the detailed description which follows of apparatus shown in the drawings.

In the drawings Fig. 1 is a plan view of the apparatus comprising my invention with the upper half of the selector ring removed; Fig. 2 is a side elevation thereof with the near side of the feed channel and adjacent portion of the frame of the apparatus removed; Fig. 3 is a vertical section through the apparatus along line 3—3 of Fig. 1; Fig. 4 is a side elevation of the driving means for said apparatus; Fig. 5 is a vertical section along line 5—5 of Figs. 1 and 2 showing the shell clearing brush; Fig. 6 is a perspective view of a portion of modified selector ring of my invention; and Fig. 7 is a section through said selector ring.

The object of the apparatus shown in the drawing is to feed the metal base shells 10 introduced into the apparatus by pipe 11 to base-making apparatus (not shown) connected to the end of the channel 12. The feeding apparatus supplies the shells 10 to the channel 12 at a very rapid rate and in the ordinary instance passes said shells 10 through said channel 12 to the base-making apparatus in a continuous stream. The speed and manner of feeding the shells 10 permits the feeding apparatus to be readily used in combination with shell screw-threading apparatus of the type disclosed in application Serial No. 244,414, filed December 7, 1938, by Hahn and Boyer and assigned to the assignee of the present invention.

The pipe 11 conducting the shells 10 to the feeding apparatus extends down into the open top of the hopper 13 to a predetermined position (as shown in Figs. 1, 2 and 3) and allows said shells 10 to flow into the hopper 13 until a pile is formed which blocks up the end thereof. The end of the pipe 11 is positioned so as to permit only a limited number of shells 10 to collect in the hopper 13 at any one time and permits the shells 10 to flow thereto automatically as they are needed. The fullest advantage of this construction can be received by attaching the upper end of the pipe 11 to a large storage hopper mounted above the apparatus since the discharge of shell 10 from the pipe 11 is completely automatic. The hopper 13 provides the means of advancing the shells 10 to the pins 14 on the inner surface of the ring or carrier 15 which is mounted adjacent the edge thereof and limits the movement of the shells 10 to a restricted group of said pins 14 at the lower extremity of said ring 15. The hopper 13 is mounted on the generally rectangular frame 16 of the apparatus which surrounds the lower portion thereof whereas the ring 15 is a movable member and is mounted on four rollers 17 on each of two vertically disposed arms 18 of said frame 16. The shells 10 are caused to travel toward the pins 14 by the sloping bottom of the hopper 13 which terminates just above the tops of the pins 14 and are confined to the surface provided by said pins 14 by the plate 19 which extends over the opening in the far side of said ring 15. The outer edges of the hopper 13 and the plate 19 do not coincide with the inner edge of the ring 15 and the arcuate plates 20 and 21 respectively are attached thereto to close the space between them.

In the regular order of operation of the apparatus, the ring 15 is turned in a counter-clockwise direction (Fig. 2) in the vertical plane in which it is located so that the pins 14 are carried from left to right through the piled shells 10. The movement of the ring 15 presents each pin 14 in turn to the shells 10 which turn and rotate until the end thereof having the larger opening therein is carried over an end of a pin 14 and the shell 10 slips completely onto said pin 14. The partially closed end of the shell 10 is then uppermost since it has an opening therein too small to pass over the pin 14 and the shell 10 which is held in the substantially upright position of said pin 14 is properly orientated. The pins 14 are nested so closely on the inner surface of the ring 15 that the shells 10 must slip over the end thereof in order to be carried along therewith. In this particular instance, the pins 14 have round heads and extend obliquely from the ring 15 so that they may pick up the shells more readily and are

arranged in a plurality of alternately spaced peripheral rows in order that they may pick up the desired number of shells 10. The means of rotating the ring 15 is provided in the belt 22 which extends up and over the top of said ring 15 and down under the pulley 23 (Fig. 4) of the driving means for the apparatus. The pulley 23 is mounted on the shaft 24 of the speed reducer 25 which is coupled to the electric motor 26 through the belt 27 and pulleys 28 and 29. The selector ring 15 is kept in proper alignment with the edge of the hopper 13 by the flanges on the rollers 17 and by the rollers 30 on the bar 31 extending from the stationary bracket 32.

On occasion, however, a shell 10 is carried from the pile which is not correctly positioned on the pins 14 and is brought into engagement with the rotating brush 34 which endeavors to push it completely onto said pin 14 or to disengage it therefrom. The brush 34 is made from fine wire and cannot injure the shell 10 if it still persists in sticking to the pins 14. As shown in Fig. 5, the brush 34 is mounted on the spindle 35 carried by the bearings held by the bracket 32 and is rotated in a clockwise direction (Fig. 2) by an electric motor 36 which is coupled thereto by pulley 37, belt 38 and pulley 39. The bracket 32 is attached to the upper portion of a larger bracket 40 which rests on the upper surface of the frame 16 and which provides the support for motor 36 and adjacent portions of the apparatus on the opposite side of the ring 15 from hopper 13. Should a shell 10 still project out beyond the end of the pins 14 abnormally after passing the brush 34, it will strike the end of the partition 41 and be forced from the ring 15.

The pins 14 are all inserted in the selector ring 15 at such an angle that there is no tendency for the shells 10 to slip therefrom until they have moved above the partition 41 whereupon said partition prevents them from moving therefrom. When the pins 14 are directly over the center of the ring 15, the partition 41 carries the full weight of the shells 10 and the pins 14 serve only to move said shells 10 along. Directly beyond the said center, the partition 41 curves down and back and a second partition 42 extends along the side of the first forming a passage down which the shells 10 travel by their own weight. The purpose of the passage is to invert the shells 10 so that the partially closed end is uppermost and to conduct said shells 10 to the upper surface of the counter-clockwise rotating disc 43 which advances them from here on. Only the back edge of the passage is closed, and if it should be blocked for any reason, the shells 10 will build up until a wedge is formed which directs the excess shells 10 out the open forward edge thereof where they fall into the open mouth of the hopper 13. The portion of the partition following the curvature of the ring 15 is attached to the panel 44 on bracket 32 which closes off the back face of the adjacent portion of the passage whereas the remainder of the partition 41, all of partition 42 and the panel 44' closing off the remainder of the passage are provided by a single metal casting attached to the bracket 32 as shown in Fig. 3.

At the time the shells 10 drop onto the disc 43, they are in four columns corresponding to those of the pins 14 of the selector ring 15 but the high rotative speed of the disc 43 causes them to be thrown outward from the center thereof and into engagement with the guide bar 45 which causes them to be arranged into a single column. If too many shells 10 are placed on the disc 43 to permit them to be arranged in a single column, the excess shells 10 will be carried forward with said disc 43 and be brought into engagement with the stationary spring finger 46 which holds them back until they can move into the column. A plate 47 covers a portion of the path traversed by the shells 10 to prevent them from climbing over each other and upsetting while they are being arranged. As shown in Fig. 3, disc 43 is fastened to a hub 48 on the upper end of the shaft 49 which is mounted in bearings held by bracket 40 and is driven through said shaft 49 which is connected to shaft 51 through the intermeshing gears 52 and 53. The shaft 51 is held in bearings in the bracket 40 which is mounted in the central opening in bracket 50 and extends downward to the driving means shown in Fig. 4 which provides bearings in the gear case 54 for holding said end and the bevel gears 55 and 56 for connecting it to the driven shaft 24. The finger 46 is attached to the bracket 32 in combination with a second guide bar 57 which extends completely around the hub 48 and which keeps the shells 10 from striking said hub 48 at any point.

The column of shells 10 advanced beyond the finger 46 follows along the guide bar 45 and enters the channel formed by the continuation 58 of said bar 45 and the segment 59. It is not possible for all of the shells 10 fed along the disc 43 to enter the channel since the selector ring 15 and associated parts of the apparatus must be operated at a greater speed than the shells 10 are fed from the apparatus as they advance the shells 10 at an irregular rate. The shells 10 which cannot enter the channel are usually forced around the preceding shells 10 toward the hub 48 by rotation of the disc 43 and are carried on around by it. The segment 59 and the guide bar 60 prevent these shells 10 from being thrown from the disc 43 at this time and direct them toward the opening 61 (Fig. 2) in bracket 32 which permits them to fall back into the hopper 13 and be picked up again by the selector ring 15 when needed. In instances when no shells 10 are being fed from the apparatus and they are not moving through the channel, all of the shells 10 received on the disc 43 are returned to the hopper 13.

A bar 62 is mounted directly over the shells 10 at the entrance of the channel to keep the shells 10 from being disarranged and interfering with the feeding operations. The pressure of the incoming shells 10 is comparatively small and only forces the shells 10 onto a moving circular ring 63 (Figs. 2 and 3 particularly) extending completely around the disc 43, the selector ring 15 and the hopper 13. The ring 63 is mounted on four equidistantly spaced rollers 64 like that indicated in Fig. 2 which are mounted on pins 65 carried by the frame and which support and position said ring 63 in the manner shown. The bar 62 only extends over the first few shells 10 on the ring 63 as the pushing force generated by the disc 43 is then almost completely dissipated and the shells 10 no longer have any tendency to climb over one another. The ring 63 is turned in a counter-clockwise direction (Fig. 1) at a uniform rate of speed determined by the ratios of the gears of the means shown in Fig. 3 coupling it to driven shaft 51. As shown in this figure, the inner face of the ring 63 has gear teeth 66 which mesh with the spur gear 67 mounted on the ball bearings 68 carried by the driving shaft 49 for the disc 43 and a second ring gear 69 mounted on the hub of gear 67 meshes with the

gear 70 on the upper end of the driven shaft 51. After the shells 10 are carried past the segment 59, they are kept in the circular channel circuiting the apparatus by other segments to the bar 58 and other bar segments 71 appropriately spaced from each other. Finally when the channel begins to overlap, the bar 58 and bar segments 71 straighten out and lead the shells 10 to a discharge location 72. The channel is preferably continued in the threading apparatus as shown in the apparatus disclosed in application Serial No. 244,414 hereinbefore referred to until the shells 10 are conducted to the point of use. The channel, however, leaves the path of movement of the ring 63 and the shells 10 must push each other along. A movable bar 73 is mounted over the latter portion of the channel to keep the shells 10 from climbing over each other and interfering with their regular order of movement. The bar 73 is attached to arms 74 pivoted on the pin 75 and can be raised to give access to the shells 10.

The shell feeding apparatus can be used to feed base shells having different forms. In such instances, the pins on the inner surface of the selector ring may be spaced differently so that the shells will pass over said pins and yet not become wedged therebetween. If a shell 10' having screw threads therein like that shown in Figs. 6 and 7, for instance, is to be fed, each peripheral row of pins 14', as shown in the portions of the modified selector ring 15' shown in said figures, is spaced a greater distance from the adjoining pins 14' so as to allow for the greater effective thickness thereof. Each peripheral row of pins 14' must then be separated by a partition or other blocking means 76 in order to fill up the space between alternate pins 14' of the adjacent rows thereof and prevent the shells 10' from wedging into the unusually large space therebetween. The partitions 76 are ring-shaped and are attached directly to the selector ring 15' so as to turn therewith.

It is also preferred that the pins 14' be shaped differently in the modification of my apparatus shown in Figs. 6 and 7 in order that all tendency of the shells 10' to catch on each other be eliminated. The screw threads and the re-entrant portion 77 at the end of these particular shells 10' make it desirable to provide substantially cylindrical pins 14' having rounded upper corners and a very smooth surface. The pins 14' are set on the ring 15' at an angle so that they are inclined toward the direction of movement thereof as in the prior instance and differ from a cylindrical shape only in the angularity (ten degrees) of the curvature on the side 78. The angularity of the side of the pins 14' gives them a tapered appearance and permits an incorrectly positioned shell 10' to slide off said pin 14' without catching onto a shell 10' on the next lower pin 14'.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a plurality of movable pins corresponding in size to the opening in the shells and arranged, at a given point in their travel, in an upright position, means for confining a plurality of disarranged shells in a pile on the top of said pins at the said given point in their travel, means for moving said pins sideward to displace the shells and urge the open end thereof to pass over the ends of said pins so that they are orientated and held by the said pins and for moving said pins to an inverted position at a second location to cause the shells to drop therefrom, and means for receiving and conducting said shells from said location.

2. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells extending inwardly from the surface of said ring, means for confining a plurality of disarranged shells on top of the pins at the lower extremity of the ring, means for rotating the ring to cause the pins to displace the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, and means for receiving and conducting said shells away from the ring.

3. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells extending inwardly from the surface of said ring, a stationary hopper mounted against the lower portion of one edge of said ring for confining the shells on the tops of the pins and supporting an overflow of the pile of disarranged shells formed thereon, means for rotating the ring to cause the pins to displace the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, and means for receiving and conducting said shells away from the ring.

4. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells extending inwardly from the surface of said ring, means for confining a plurality of disarranged shells on top of the pins at the lower extremity of the ring, means for rotating the ring to cause the pins to displace the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, and means forming the top, bottom and one side of a passage for receiving and conducting the required shells away from the ring and permitting the excess shells to be forced out the open side of the passage, and means for receiving and conducting said shells away from the ring.

5. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells extending inwardly from the surface of said ring, means for confining a plurality of disarranged shells on top of the pins at the lower extremity of the ring, means for rotating the ring to cause the pins to displace the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, a rotatable brush mounted within the opening in the ring adjacent the path of movement of the pins for dislodging any shell improperly positioned on said pins, and means for

receiving and conducting the shells dropping from the inverted pins away from the ring.

6. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells mounted in very closely arranged transverse and peripheral rows and extending inwardly from the surface of said ring, means for confining a plurality of disarranged shells on top of the pins at the lower extremity of the ring, means for rotating the ring to cause the pins to displace the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, and means for receiving and conducting said shells away from the ring.

7. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells mounted in very closely arranged transverse and peripheral rows and extending inwardly from the surface of said ring, means for confining a plurality of disarranged shells on top of the pins at the lower extremity of the ring, blocking means between each peripheral row of pins to prevent the shells from wedging between said pins, means for rotating the ring to cause the pins to displace the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, and means for receiving and conducting said shells away from the ring.

8. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells extending obliquely inwardly from the surface of the ring, means for confining a plurality of disarranged shells on top of the pins at the lower extremity of the ring, means for rotating the ring in the direction of the angular deviation of said pins to cause the pins to displace the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, and means for receiving and conducting said shells away from the ring.

9. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells extending obliquely inwardly from the surface of the ring, said pins being tapered in radial direction, means for confining a plurality of disarranged shells on top of the pins at the lower extremity of the ring, means for rotating the ring in the direction of the angular deviation of said pins to cause the pins to displace the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, and means for receiving and conducting said shells away from the ring.

10. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells mounted in very closely arranged transverse and peripheral rows and extending inwardly from the surface of said ring, means for confining a plurality of disarranged shells on top of the pins at the lower extremity of the ring, means for rotating the ring to cause the pins to displace the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, a rotatable disc mounted in horizontal position adjacent the ring, means for receiving the shells dropped from the pins and conducting them to the upper surface of the disc, means forming a channel for conducting said shells in a single column from the apparatus having the mouth thereof adjacent the periphery of said disc, and means for rotating the said disc to cause said shells to be rearranged and conducted into the open mouth of said channel.

11. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells extending inwardly from the surface of said ring, means for confining a plurality of disarranged shells on top of the pins at the lower extremity of the ring, means for rotating the ring to cause the pins to displace the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, means forming a channel adapted to conduct said shells from the apparatus, means for receiving the shells dropped from the pins and introducing them into said channel, and means providing a movable bottom for said channel for moving them therethrough.

12. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells extending inwardly from the surface of said ring, a stationary hopper mounted against the lower portion of one edge of said ring for confining the shells on the tops of the pins and supporting an overflow of the pile of disarranged shells formed thereon, means for rotating the ring to cause the pins to displace the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, means below the upper portion of the ring for forming the top and bottom of a passage for receiving and conducting the shells away from said ring, and means closing off the side of the passage opposite that over the hopper to cause the excess shells presented thereto to be forced out the open side and fall into said hopper.

13. Apparatus for feeding cylindrical metal shells having an opening in one end comprising a rotatable ring mounted in a vertical plane, a plurality of pins corresponding in size to the opening in the shells extending inwardly from the surface of said ring, a stationary hopper mounted against the lower portion of one edge of said ring for confining the shells on the tops of the pins and supporting the overflow of the pile of disarranged shells formed thereon, means for rotating the ring to cause the pins to dis-

place the shells so as to urge the open ends thereof to pass over the ends of said pins and be definitely orientated thereby and to move said pins to an inverted position so as to cause the shells to drop therefrom, a rotatable disc mounted in a horizontal position adjacent the open top of the hopper, means for receiving the shells dropped from the pins and conducting them to the upper surface of the disc, means forming a channel for conducting said shells from the apparatus having the mouth thereof adjacent the periphery of said disc, means for rotating the said disc to cause said shells to be rearranged and conducted into the open mouth of the channel, and means about the periphery of said disc for keeping any excess shells on the disc until they are opposite the hopper and can be discharged into said hopper.

14. Apparatus for feeding cylindrical shells having an opening in one end comprising a plurality of movable pins corresponding in size to the openings in the shells and arranged, at a given point in their travel, in an upright position, said pins being arranged close together in a plurality of relatively fixed rows, means for confining a plurality of disarranged shells in a pile on top of said pins at the said given point in their travel, means for moving said pins sideward to displace the shells and urge the open ends thereof to pass over the ends of said pins and for further moving said pins to an inverted position at a second location to cause the shells to drop therefrom, and means for receiving and conducting said shells away from said location.

15. Apparatus for feeding cylindrical shells having an opening in one end comprising a carrier member having a plurality of rows of pins projecting from its surface and corresponding in size to the openings in the shells, said carrier being arranged to move said pins through a curved path so that at a given point in their travel they are arranged in upright position and at a second point in their travel they are arranged in inverted position, means for confining a plurality of disarranged shells in a pile on top of said pins at the first said given point in their travel, means for moving said carrier to carry the pins sideways so as to displace the shells and urge the open ends thereof to pass over the ends of the pins and to further carry said pins to said second point of their travel to cause the shells to drop therefrom, and means for receiving and conducting said shells from said second point.

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