Oct. 1, 1929. E. J. REICH 1,729,843

ASSEMBLING OF ELECTRIC DRY CELLS

Original Filed May 26, 1926 4 Sheets-Sheet 1

Fig. 1.

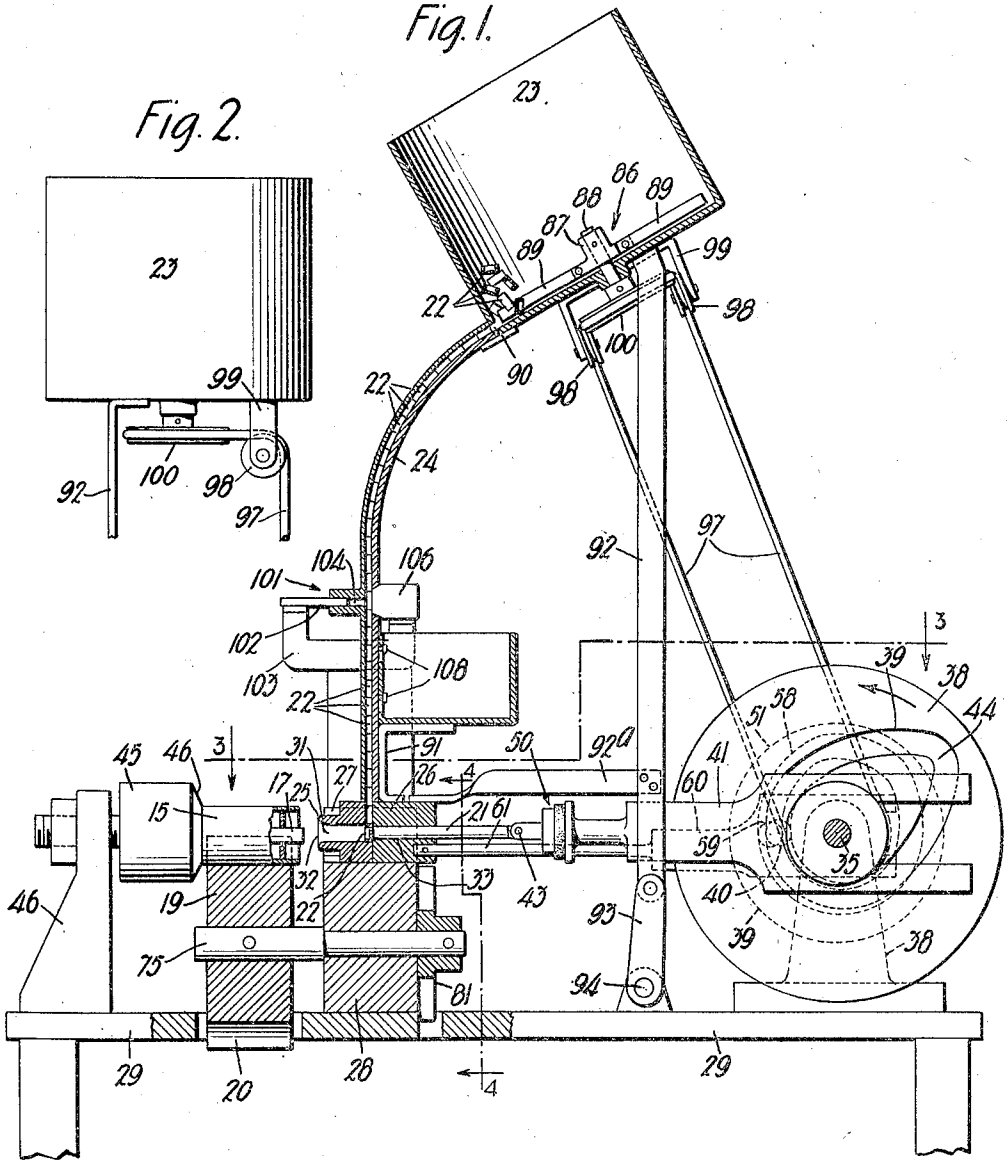


Fig. 2.

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ASSEMBLING OF ELECTRIC DRY CELLS

Original Filed May 26, 1926 4 Sheets-Sheet 2

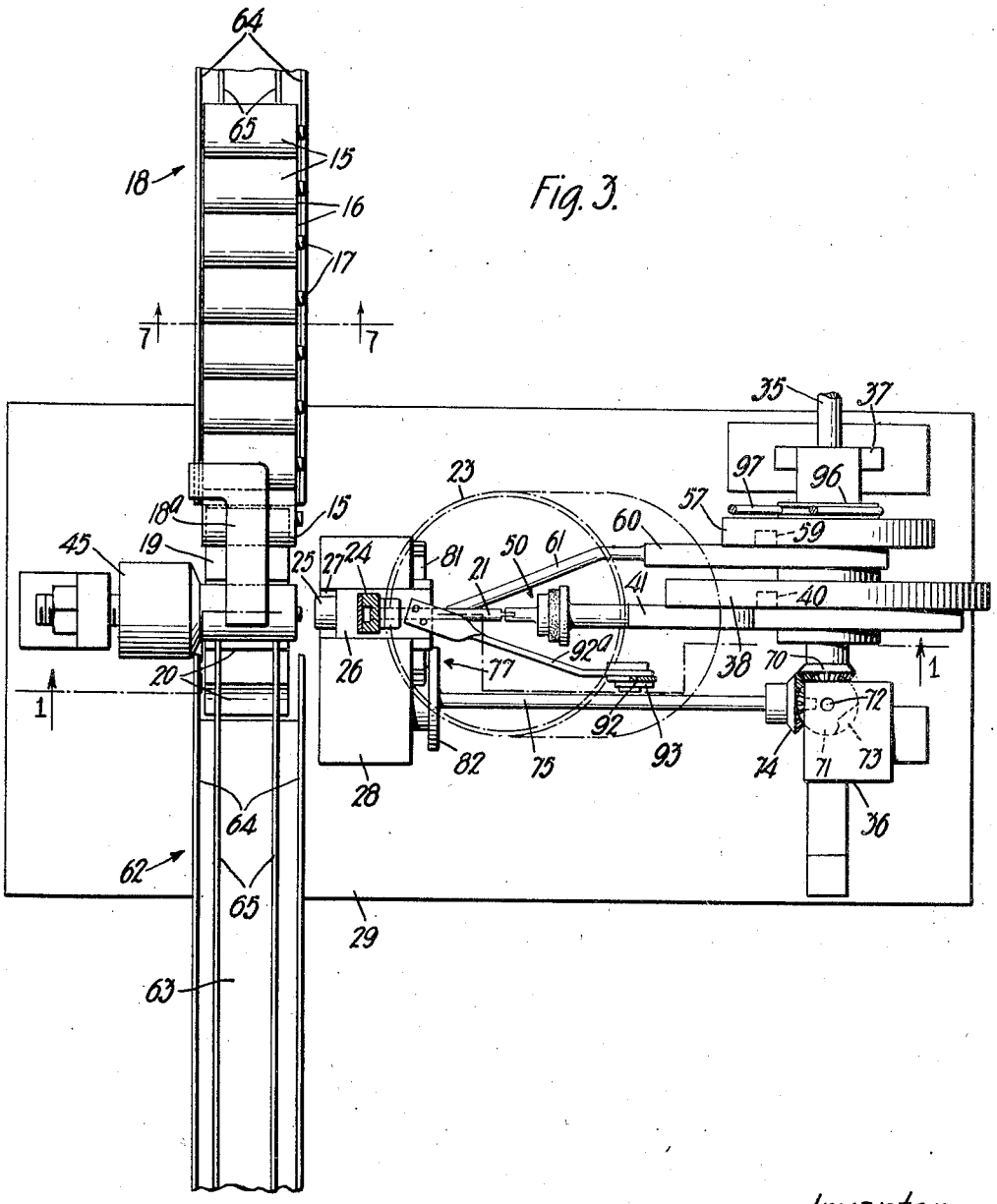


Fig. 3.

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ASSEMBLING OF ELECTRIC DRY CELLS

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Fig. 4.

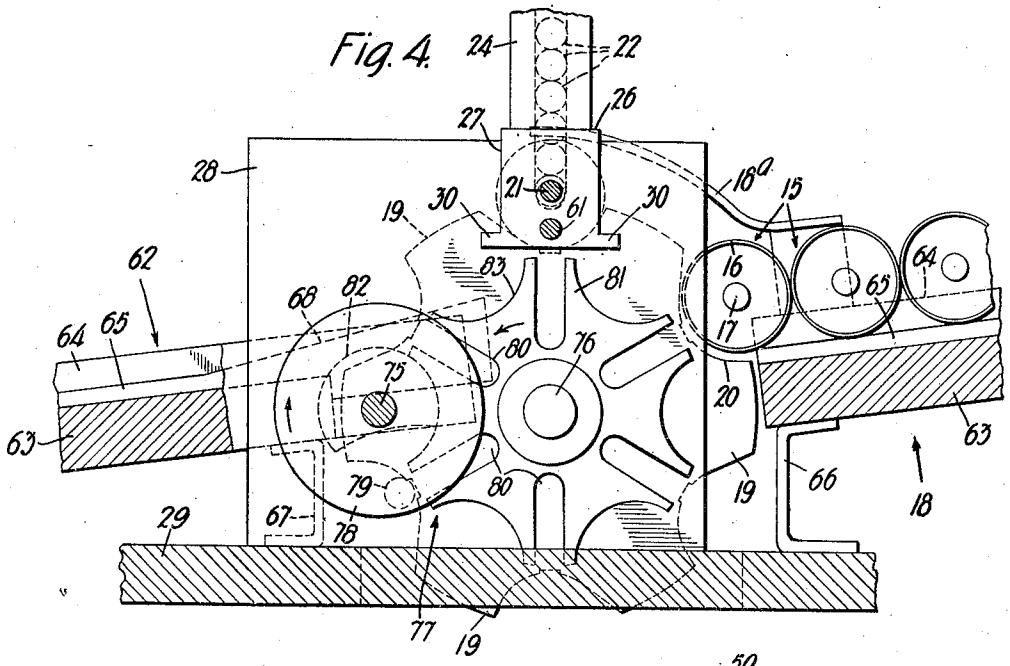


Fig. 6.

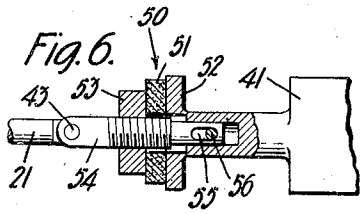


Fig. 5.

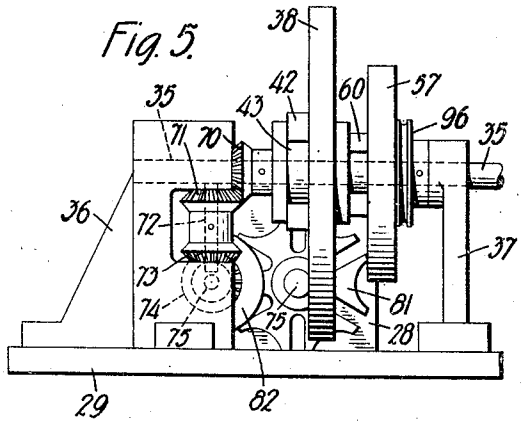
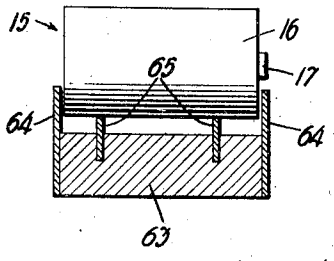


Fig. 7.



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Oct. 1, 1929. E. J. REICH 1,729,843

ASSEMBLING OF ELECTRIC DRY CELLS

Original Filed May 26, 1926 4 Sheets-Sheet 4

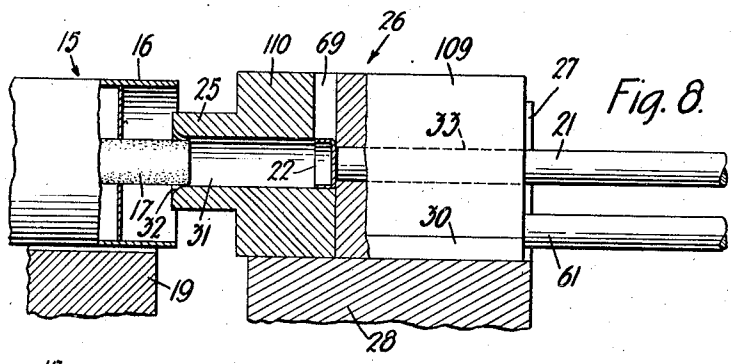


Fig. 8.

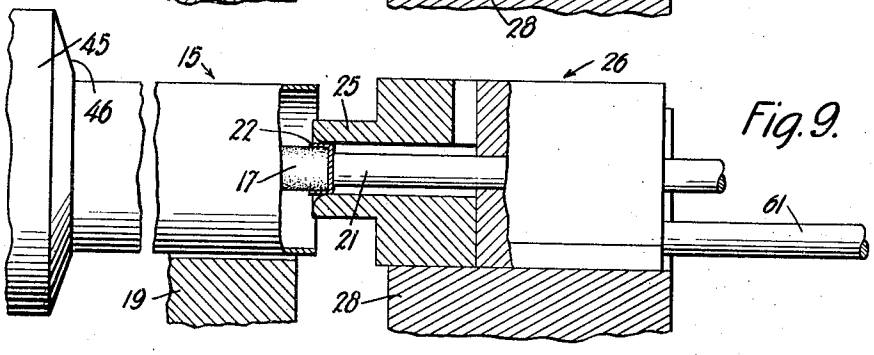


Fig. 9.

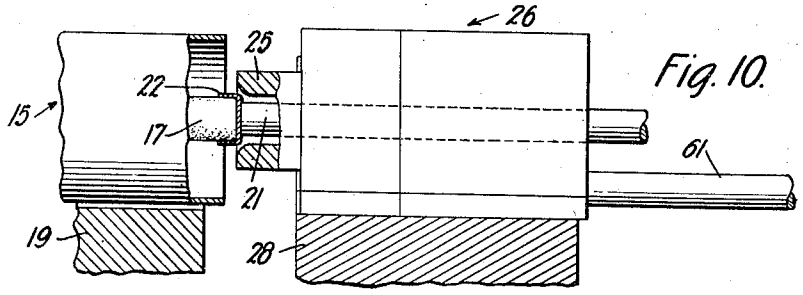


Fig. 10.

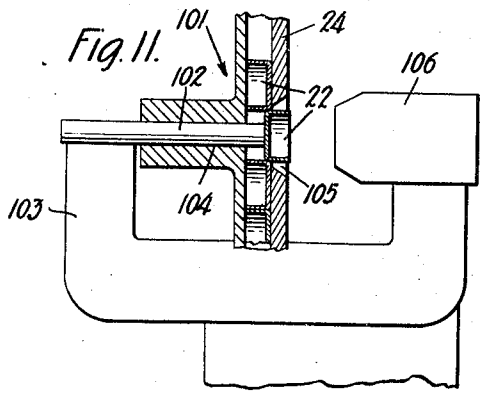


Fig. 11.

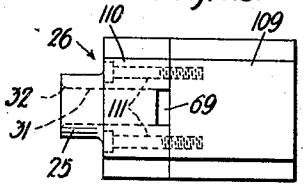


Fig. 12.

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Patented Oct. 1, 1929 1,729,843

UNITED STATES PATENT OFFICE

EDWIN J. REICH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NATIONAL CARBON COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

ASSEMBLING OF ELECTRIC DRY CELLS

Application filed May 26, 1926, Serial No. 111,818. Renewed August 21, 1929.

This invention relates to new and useful improvements in method and means to facilitate the assembling of electric dry cells. More particularly the invention relates to improvements in machines for applying circular elements to the cells and is herein illustrated as applying metallic caps to the ends of carbon electrodes of dry cells.

In practice difficulty has been experienced in applying the caps to the carbon electrodes of dry cells in assembled or partially assembled condition because electrodes are usually off center with respect to the can or container electrode of the dry cell.

An object of this invention is to overcome the above mentioned difficulty. To this end there is provided means, including a locator, which embraces the carbon electrode of each cell to center it with respect to a cap which it is desired to press thereon; the carbon being held centered while the cap is forced over its end by suitable means including a plunger or ram rod. After the capping operation, the locator and the plunger return to their normal position preparatory to capping another carbon electrode.

The caps in being forced over the carbon electrodes are expanded slightly and this expansion causes some of them to stick in the locator. It is desirable, however, to free the cap from the locator before the latter starts on its return to normal. To this end, in the present invention, the applying plunger, which is operated by suitable mechanism, is held against the cap while the locator is drawn away from the cap by means connected to actuate the locator. After the release of the locator from the cap, said locator and the plunger return together to normal position.

Another feature of the invention relates to means including a chute to conduct the caps to the plunger in a vertical position and one above the other so that the weight of the succeeding caps bear on the cap in front of the plunger to keep it from accidentally falling over on its side in front of the plunger.

Another feature of the invention relates to means for ejecting from the chute those caps which enter it with the wrong side towards the carbon electrodes.

Heretofore, capping machines have been provided with belt or chain conveyor mechanism to convey the cells vertically to the capping mechanism. Many such conveyor mechanisms are not only complicated but also limit the output of the machine to about sixty cells per minute, the limited number of operations being due to the necessary starting and stopping of the conveyor mechanism at each capping operation.

A further feature of the present invention relates to simplified conveyor means whereby the output is increased to about 120 cells per minute. The conveyor of this invention includes a chute slightly inclined to the horizontal so that the cells, which are cylindrical, may roll down the chute. A turret is provided in the chute and is located at the capping means. The turret is intermittently operated and is timed with relation to the plunger actuating mechanism and the locator operating mechanism so that after capping of a cell said cell is passed on down the chute and another one is brought to capping position. While this is taking place, the locator and plunger are being returned to normal.

The carbon electrodes are not always set accurately to the same depth in the cells. Accordingly, provision is made in the present invention to compensate for such variations in the plunger mechanism. To this end, resilient means is provided between the cap applying plunger and the actuating mechanism therefor. In order more clearly to set forth the nature of the present invention, a preferred embodiment thereof will be described.

In the drawings, Fig. 1 is a sectional side elevation taken on the line 1—1 of Fig. 3.

Fig. 2 is an elevation of the hopper.

Fig. 3 is a top plan view of the machine in section, the section being taken on the line 3—3 of Fig. 1.

Fig. 4 is an elevation in section showing the means including a turret for carrying the cells to and away from the capping means, the section being taken on the line 4—4 of Fig. 1.

Fig. 5 is an elevation showing the locator actuating mechanism, the plunger actuating

mechanism, and the connection to the turret.

Fig. 6 is a view, in section, illustrating the resilient means associated with the cap applying plunger.

Fig. 7 is a cross-section of the chute taken on the line 7—7 of Fig. 3.

Fig. 8 is a diagrammatic view in section showing the first step in the sequence of operations from the normal position in Fig. 1, namely, that of centering the carbon electrodes with respect to the cap.

Fig. 9 is a view similar to Fig. 8 and shows the cap pushed over the end of the pencil by the plunger.

Fig. 10 shows the plunger holding the cap while the locator has returned sufficiently to normal to free itself from the cap.

Fig. 11 is an elevation, partly in section, illustrating the ejection of a cap from the chute, which cap has descended the chute with the wrong side towards the carbon pencil.

Fig. 12 is a top plan view of the locator carrying slide showing its construction.

The dry cells 15, which comprise cans 16 and carbon electrodes or pencils 17, may be supplied horizontally to a chute 18 in any convenient manner. The chute is inclined so that the cells, which are cylindrical, roll down in it toward a turret 19. (Figs. 3 and 4), which turret is provided with depressions or pockets 20 to form receptacles for the cells. These pockets as shown in Fig. 4 are so formed on one side as to conform to the shape of the dry seal and support the same and on the other side are cut away in order to allow free and speedy discharge of the cell from the turret to the discharge chute. The turret 19 is operated by means hereinafter described and rotates intermittently to carry the cells individually to a position approximately in alignment with cap applying means including a plunger 21. A guard 18^A, which may be secured to the chute 18 (Figs. 3 and 4) extends over the turret to keep the cell in the depression 20 while it is being carried to the capping means.

Metallic caps 22, each having an open side so that they may be applied to the ends of the carbon electrodes 17 of the cells, are fed from any suitable source of supply which may include a hopper 23 (Fig. 1) and through a chute 24 to deliver the caps in a vertical position in the path of the plunger 21.

The carbons 17 are usually slightly out of center in the cans 16 and consequently the electrodes of the various cells, as they are brought to the capping mechanism, vary in position with relation to the caps to be applied. Accordingly, there is provided means including a locator 25 by which the carbon electrodes of each cell may be centered or positioned with respect to the cap, irrespective of the off center position of the electrode in the can, so that the cap may readily be applied to the electrode.

The locator 25 is formed at one end of a slide 26 reciprocable towards and away from the carbon electrodes 17 in a slot 27 (Figs. 1 and 4) of a bracket 28 secured to a base plate 29. The slide 26 is provided with flanges 30 to guide it in the slot 27. The locator is provided with an aperture 31 having a flaring end 32 so that as the locator is moved from the position in Fig. 1 towards the carbon electrode, by means hereinafter described, the pencil is embraced by the flaring end 32 to guide the carbon electrode into the aperture 31 and thus center it with reference to the cap 22 to be applied as shown in Fig. 8, which cap is located at the end of the aperture 31.

After the carbon electrode has been centered as in Fig. 8, the cap 22 is advanced toward the carbon electrode and forced over its end as indicated in Fig. 9 by the plunger 21, said plunger is reciprocated by mechanism hereinafter described and is guided in an aperture 33 in the slide 26, which aperture is in alignment with the aperture 31.

To operate the locator slide 26, there may be provided a main shaft 35 (Figs. 1, 3 and 5) supported in bearing brackets 36 and 37 secured to the base plate 29. The shaft 35 may be driven in any suitable manner and has secured thereto a cam disc 38 which has in one of its sides a cam groove 39 (Fig. 1). A follower 40 rides in the groove 39 and is secured to a forked element 41 which straddles a hub 42 (Fig. 5) of the cam disc 38 and is pivotally connected to the plunger 21 by a pin 43. As the cam disc is rotated in a counter-clockwise direction in Fig. 1, the plunger is moved towards the carbon electrode 17 until the high part 44 of the cam groove 39 reaches the follower 40, after which the plunger 21 is returned to normal by the cam slot 39.

An abutment 45 to counteract the pressure of the plunger 21, is adjustably supported on a bracket 46 secured to the base plate 29. The abutment is substantially in alignment with the plunger 21 and is tapered slightly at 47 to prevent collision with corners of the cells 15 as they are carried to their capping position by the turret 19.

The carbon electrodes are not always set to the same depth in the various cells; in other words they may extend from the cans 16 to varying heights. Consequently, provision is made to enable the plunger 21 to be arrested by the electrodes sooner or later according to the various extents that they protrude from the cans of the cell, and thus prevent undue pressure on the carbon electrodes which might otherwise result in crushing the carbon electrodes. To this end, there may be provided in the plunger connection, including the forked element 41, a resilient device 50 which may yield slightly while

capping a carbon electrode which extends beyond the normal distance out of the can. One form of the resilient device 50 which may be used is illustrated in Fig. 6 and includes an elastic washer 51 disposed between a flange 52 of the forked element 41 and a nut 53 adjustably supported on a stem 54 connected to the plunger 21. The stem 54 is provided at one end with an elongated slot 55 to embrace a pin 56 in the forked element 41. Thus when the plunger 21 is arrested before the element 41 has completed its capping motion, the flange 52 squeezes the resilient device 50 against the nut 53, the latter having been arrested with the plunger 21 by the carbon electrode 17. While the resilient element is being squeezed or compressed, the pin 56 advances in the slot 55. It will be understood that the slot 55 is closed to embrace the pin 56 and thus maintain the connection between the plunger 21 and the forked element 41. The plunger 21 is pivotably connected to the forked element 41 to avoid binding of the plunger in the slide 26 which would otherwise result if the slide were slightly out of parallelism with the direction of movement of the forked element 41.

To operate the locator slide 26, the main shaft 35 has secured thereto another cam disc 57 (Figs. 1, 3 and 5) having a cam groove 58 in which groove there rides a follower 59 secured to the side of a forked portion 60 of a thrust rod 61 connected to the locator slide 26 to move the latter first towards the carbon electrode 17 to center it, while the cam disc 57 rotates, and then return the slide to normal position (Fig. 1).

Each cell, after capping, is carried from the capping position by the turret 19 while another cell with an uncapped carbon electrode is brought to the capping position. The capped cells are delivered from the turret to a chute 62 by which they may be conducted to any suitable receptacle (not shown).

The chutes 18 and 62 are each composed of a floor 63 (Fig. 7) and side walls 64 by which the cells are guided. To prevent skewing of the cells 15 and consequent jamming in the chute which would result by rolling directly on the floor 63, rails 65 are provided on which the cells roll. These rails also reduce the friction to a minimum which results in the cells rolling more freely. The chutes 18 and 62 are suitably supported by means including brackets 66 and 67 (Fig. 4) secured to the base plate 29. The rails 65 of the chute 62 are provided with cams 68 (Fig. 4) to assist in removing the cells from the depressions 20 of the turret while the turret is rotating and early enough to keep the turret from striking the cell a damaging blow.

The caps 22 while being forced over the end of the carbon electrodes 17 expand slightly and occasionally they stick in the locator 25 which, if not guarded against, results in displacement of the cell relatively to the chute 62 and interferes with its delivery to said chute. To prevent such objectional displacement of the cells, the cam slots 39 and 58, which determine the movements of the plunger 21 and the locator 25, are so shaped and timed with respect to each other that the plunger 21 remains in its operated position for a short time while the locator 25 starts its return to normal (Fig. 10). After the locator 25 has returned sufficiently to free itself from the cap 22, the plunger also starts to return to normal.

When the plunger 21 reaches its normal position, the next cap 22 drops from an aperture 69 which is in alignment with the cap chute 24, into the aperture 31 and immediately in front of the plunger 21. The cap is kept from falling over accidentally in the aperture 31 by the caps in the chute 24 which is vertically disposed so that the weight of the caps in the chute bear down on the one in the aperture 31.

To intermittently actuate the cell feeding turret 19, there may be secured to the main shaft 35 a bevel gear 70 (Figs. 3 and 5) which meshes with a bevel gear 71 to drive a counter-shaft 72 supported in the bracket 36. The counter-shaft has secured thereto another bevel gear 73 meshing with a bevel gear 74 to drive a horizontal shaft 75 supported in the brackets 28 and 36. The turret 19 is secured to a shaft 76 (Fig. 1) rotatably supported in the bracket 28. Connection is made from the shaft 75 to the turret shaft 76 by means composing an intermittent gearing or a Geneva stop and lock movement (Fig. 4) which includes a wheel 78 secured to the shaft 75. Said wheel is provided with a tooth 79 which, as said wheel rotates, acts in notches 80 of a wheel 81, secured to the turret shaft 76 to turn said wheel and the turret 19 therewith through the angular distance of one notch for every revolution of the wheel 78, to thus carry one of the cells from the chute 18 to the capping mechanism. The driving wheel 78 is provided with a locking element 82 which enters hollows 83 of the driven wheel 81 to prevent accidental turning thereof, while the capping operation is taking place, and until the tooth 79 enters the nearest top notch 80 of the wheel 81. The locking element 82 is cut away at 84 to permit movement of the wheel 81 while the tooth 79 acts in the notches 80.

The hopper 23 which may supply the caps 22 to the chute 24 may be secured to the upper end of the said chute in any convenient manner. The hopper is provided with an agitator 86 including a body part 87 secured to a rotatable shaft 88; said body part having resilient arms 89 which curve outwardly therefrom and extend to the cylindrical wall of the hopper. As the agitator is rotated by means

hereinafter described, the arms brush the caps against an aperture 90 in the wall of the hopper and thus the caps find their way into the chute 24.

The chute 24 is secured to the locator slide 26 by a bracket 91, so as to move therewith to keep the chute in alignment with the aperture 69 in the slide 26. The chute is also secured to the hopper, consequently, the hopper travels back and forth with the slide 26. To relieve the chute 24 of the weight of the hopper, there is provided a frame including a vertical bar 92 (Fig. 1) which at its upper end is secured to the hopper, and a horizontal bar 92a connecting the bar 92 with the slide 26 to steady the bar 92. The arm 92 is supported at its lower end by a guide arm 93 pivoted at 94 on the base plate 29.

To drive the agitator 86 of the hopper 23, there may be secured to the main shaft 35 a pulley 96 which drives a belt 97 extending upwardly from said pulley and over two guide rollers 98 supported on bracket 99 secured to the floor of the hopper 23. The belt extends from the rollers 98 (Fig. 2) to a pulley 100 secured to the shaft 88 to drive the latter and thus rotate the agitator in the hopper. It will be understood that there is sufficient slack in the belt to enable the hopper to move back and forth with the chute 24 and slide 26.

The caps 22 find their way into the chute 24 endwise and may pass down the chute with their open sides extending in opposite directions, in other words, with their open sides towards or away from the carbon electrodes. Provision is made to prevent the caps from passing to the plunger 21 except with the open side facing the carbon electrode. To this end there is provided an ejector device 101, Figs. 1 and 11, which ejects all of the caps from the chute which pass down said chute with their closed side facing the carbon electrode. The ejector device 101 may include a stationary plunger 102 secured to a fixed bracket 103; the plunger extending through an aperture 104 in one side of the chute. When the chute is carried with the locator slide 26 towards the electrode 17, the plunger 102 enters the chute 24. If the cap in the path of the said plunger has its closed end towards the electrode, the plunger engages the closed side of the cap to push the cap from the chute through an aperture 105 in the other side of the chute 24, as illustrated in Fig. 11. If the cap in the path of the plunger 102 is positioned with its open side towards the carbon electrode, the plunger moves into the cap and leaves it undisturbed in the chute 24 so that it may pass on down the chute to its capping position. The caps in passing down the chute may become disarranged or out of alignment as they come to the aperture 105. This is corrected by a plug 106, which is also supported on the bracket 103, and enters the aperture 105 on the return stroke of the chute 24 to push the dislodged cap back into its correct position in the chute.

The ejected caps may be caught in a receptacle 107. Said receptacle is detachably supported on the chute 24 by headed studs 108 for convenience in dumping the cap caught thereby back into the hopper.

The locator slide 26 may be constructed of two pieces 109 and 110 (Fig. 12) for the purpose of machining the slot 69. Said pieces are held together by screws 111.

What I claim is:

1. In a machine for applying caps to carbon electrodes of dry cells, the combination of a locator having an aperture therein to engage one end of a carbon electrode to center it with respect to the aperture, means to hold a cap in alignment with said aperture, capping means to push the cap through the aperture over the end of the carbon electrode, and means to hold the capping means against the electride while the locator is withdrawn to free the locator from the electrode.

2. In a machine for applying metallic caps to fragile electrodes, the combination of a support to locate the electrode approximately in its capping position, a movable cap holder, comprising a locator to engage the end of the electrode to center said electrode with respect to the cap, a cap supply chute attached to said cap holder, a plunger to force the cap from its holder over the end of said electrode, and an abutment against which the electrode may be pressed while the cap is being pushed over the electrode.

3. In a machine for applying metallic caps to the ends of electrodes, the combination of a slide, said slide having an aperture therein, a locator on said slide at one end of said aperture, slide operating means, a plunger carried by said slide and in alignment with said aperture, said slide having a cap delivering aperture at right angles to the first mentioned aperture through which the caps may be delivered one at a time to the first mentioned aperture, the slide operating means being effective to move the locator over the end of the electrode to center the latter with respect to the cap in the first mentioned aperture, plunger operating mechanism to advance the cap through the first mentioned aperture and force it over the end of the electrode, and an abutment against which the electrode bears to counteract the action of the plunger, the plunger operating means and the slide operating means being timed with respect to each other so that the electrode is held by the plunger while the slide moves away from the electrode to free itself therefrom.

4. In a machine for applying metallic caps to the ends of electrodes, the combination of a horizontal slide, having a horizontal aperture therein and a vertical aperture communicating with the horizontal aperture, a vertical chute in alignment with the vertical aperture

and attached to said slide to deliver caps to the horizontal aperture and to bring the weight of the caps to bear on the cap which is in the horizontal aperture to keep it from falling over, a locator on said slide to guide the electrode into the horizontal aperture, and means to operate said plunger to advance the cap along said aperture and to apply it to said electrode.

5. In a machine for applying metallic caps to the carbon electrodes of dry cells, the combination of horizontally disposed capping means, means to guide the cells in horizontal position to the capping means, intermittent means to arrest each cell at the capping means, and delivery means comprising a conveyor chute having a plurality of narrow cell supporting rails at the bottom thereof to which each cell is transferred by the intermittent means after its electrode has been capped.

6. In a dry cell electrode capping machine, a frame, a sildable cap guide mounted on said frame, a cap hopper located above said guide, a cap chute interconnecting said cap guide and cap hopper, means for attaching said chute to said guide, a vertical bar attached to said hopper for supporting the same, a second bar interconnecting said first bar and said guide and a pivoted guide arm attached to said frame for supporting said vertical bar.

7. In a conveyor system for round objects, a vertically operable turret, pockets in said turret whereby said objects may be received and carried by said turret, a chute associated with one side of said turret and rails in the bottom of the chute, said rails having an inclined cam-like section adjacent said turret whereby said objects are aided in quickly passing from said turret to said chute.

8. In a conveyor system for round objects, an inclined conveyor chute having a plurality of rails in the bottom thereof, a vertically operable turret having one side thereof associated with the lower end of said chute, pockets in said turret whereby said objects may be received and carried by said turret, a second chute associated with the other side of said turret, and rails in the bottom thereof, said rails having an inclined cam-like section adjacent said turret whereby said objects are aided in quickly passing from said turret to said chute.

9. In a conveyor system for round objects, a vertically operable turret, pockets in said turret whereby objects may be received and carried by said turret, one side of said pockets having a shape conforming to the shape of said objects and the other side of said pockets having a cutaway portion, a discharge chute associated with said turret, and rails in the bottom of said chute, said rails having an inclined cam-like section adjacent said turret whereby said objects are aided in quickly passing from said turret to said chute.

10. A sorting mechanism for cup shaped objects comprising a chute having walls forming a passageway therebetween, for receiving said objects, there being a pair of holes in the said walls communicating with said passageway, a non resilient plunger positioned in one of said holes, and means for intermittently thrusting said plunger partially across said passageway whereby undesired objects are forced out of said chute through the other of said holes.

11. In a sorting mechanism for cup shaped objects, a chute having a front wall and a back wall, for receiving objects some having their open side facing the front wall and others having their open side facing the back wall, each of the said front and back walls of the chute having an opening therein, means successively to position said objects in line with said openings, a reciprocating plunger, means for operating said plunger synchronously with said first mentioned means, for entering one of said openings and thrusting said other objects through the other of said openings.

12. A sorting mechanism for cup shaped objects comprising a chute having walls forming a passageway therebetween for receiving said objects, said walls having two opposed holes therein communicating with said passageway, a plunger positioned in one of said holes and a plug in the other of said holes, means for intermittently reciprocating said plunger in said one of said holes for thrusting undesired objects out through the other of said holes and means interconnecting said plunger and said plug whereby said plug is reciprocated in step with said plunger.

13. In a conveyor system for round objects, a rotating turret, pockets in said turret adapted to receive and carry said objects from one position to another position where they are to be operated upon, a chute associated with one side of the turret, said chute having side walls for preventing lateral displacements of said objects while moving, and a pair of relatively thin rails for supporting said objects with a minimum of friction while moving.

14. In a machine of the character described, reciprocating means for capping a cell, an adjustable anvil adapted to engage the bottom of said cell, a slidable member for forcing a cap onto the center electrode of the cell, and means including an adjusting screw and a resilient buffer member in the path of said slidable member.

In testimony whereof, I have signed my name to this specification, this 24 day of May, 1926.

EDWIN J. REICH.