Jan. 8, 1957 A. H. FILANDER 2,776,531

JAR-HANDLING MECHANISM FOR CAP-SETTING EQUIPMENT

Filed Nov. 7, 1952 4 Sheets-Sheet 1

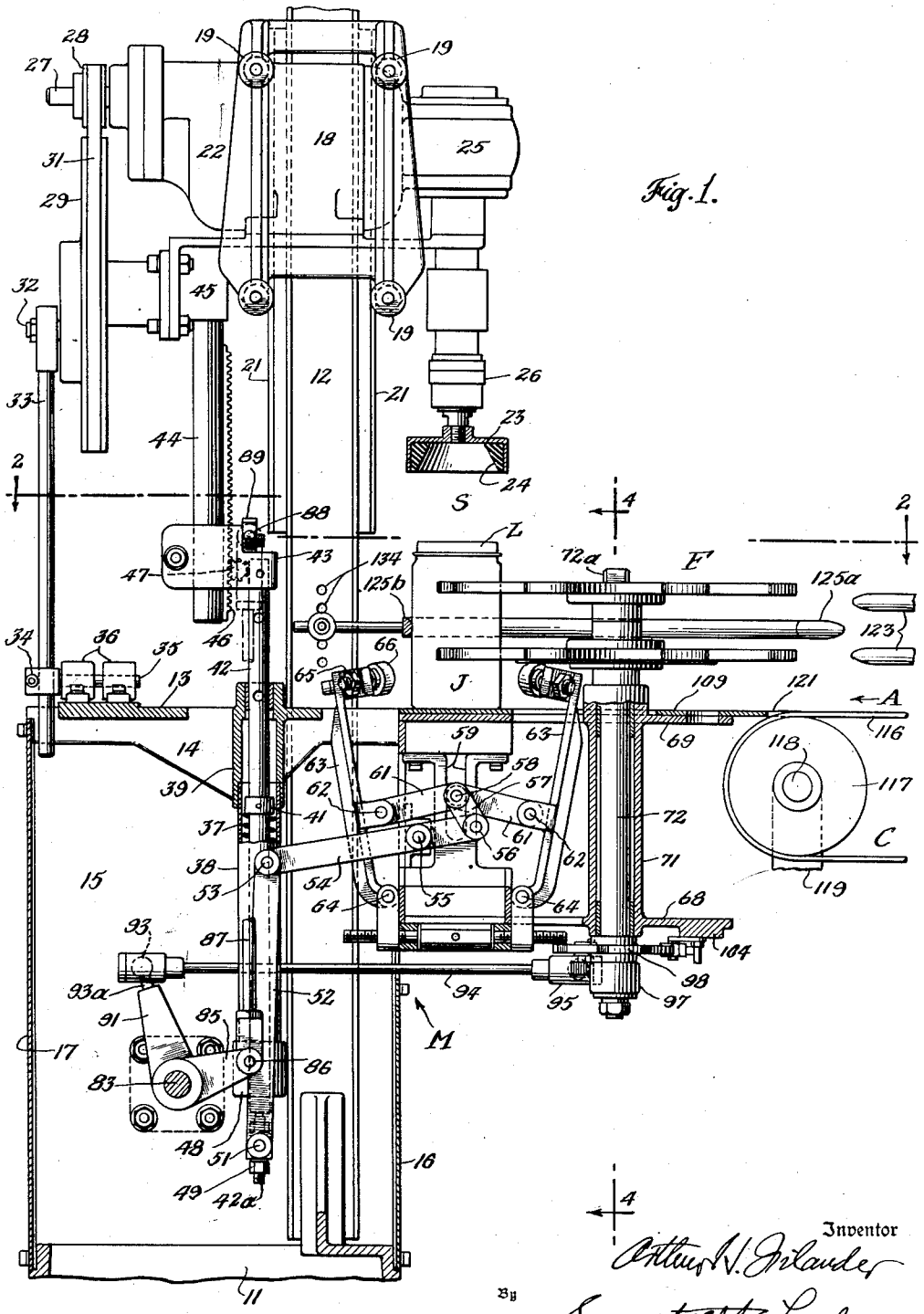


Fig. 1.

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Fig. 2.

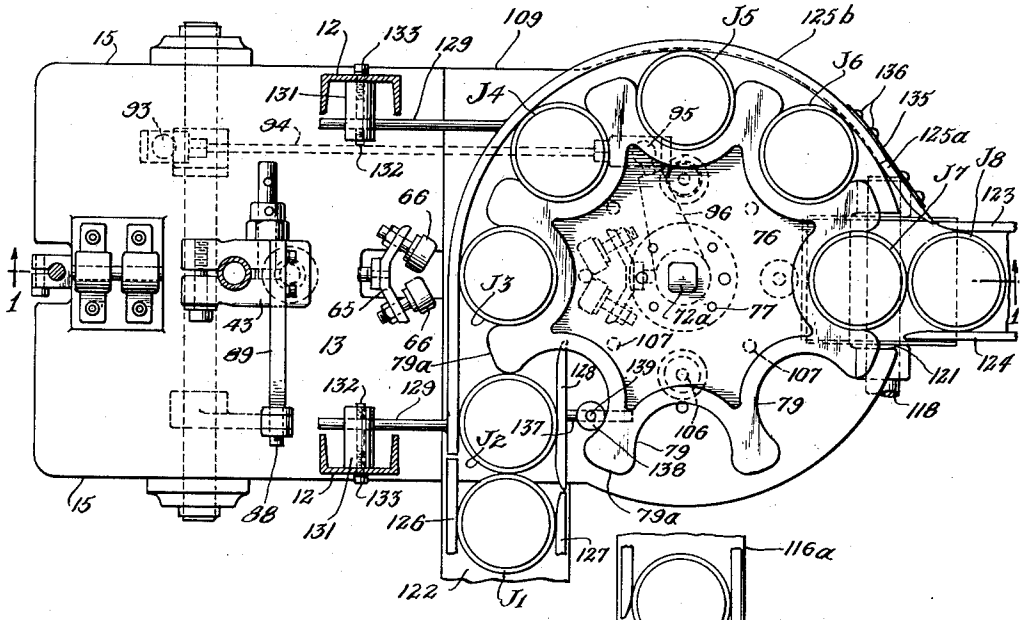
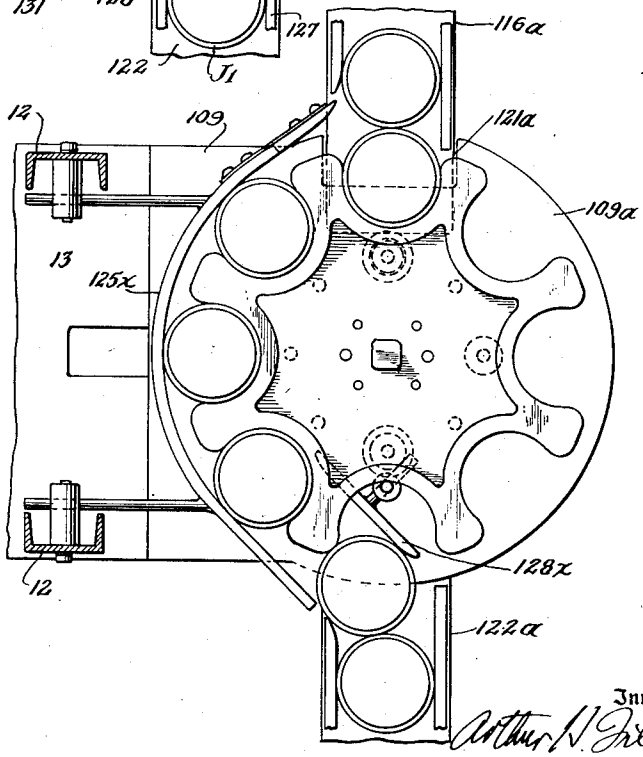


Fig. 3.



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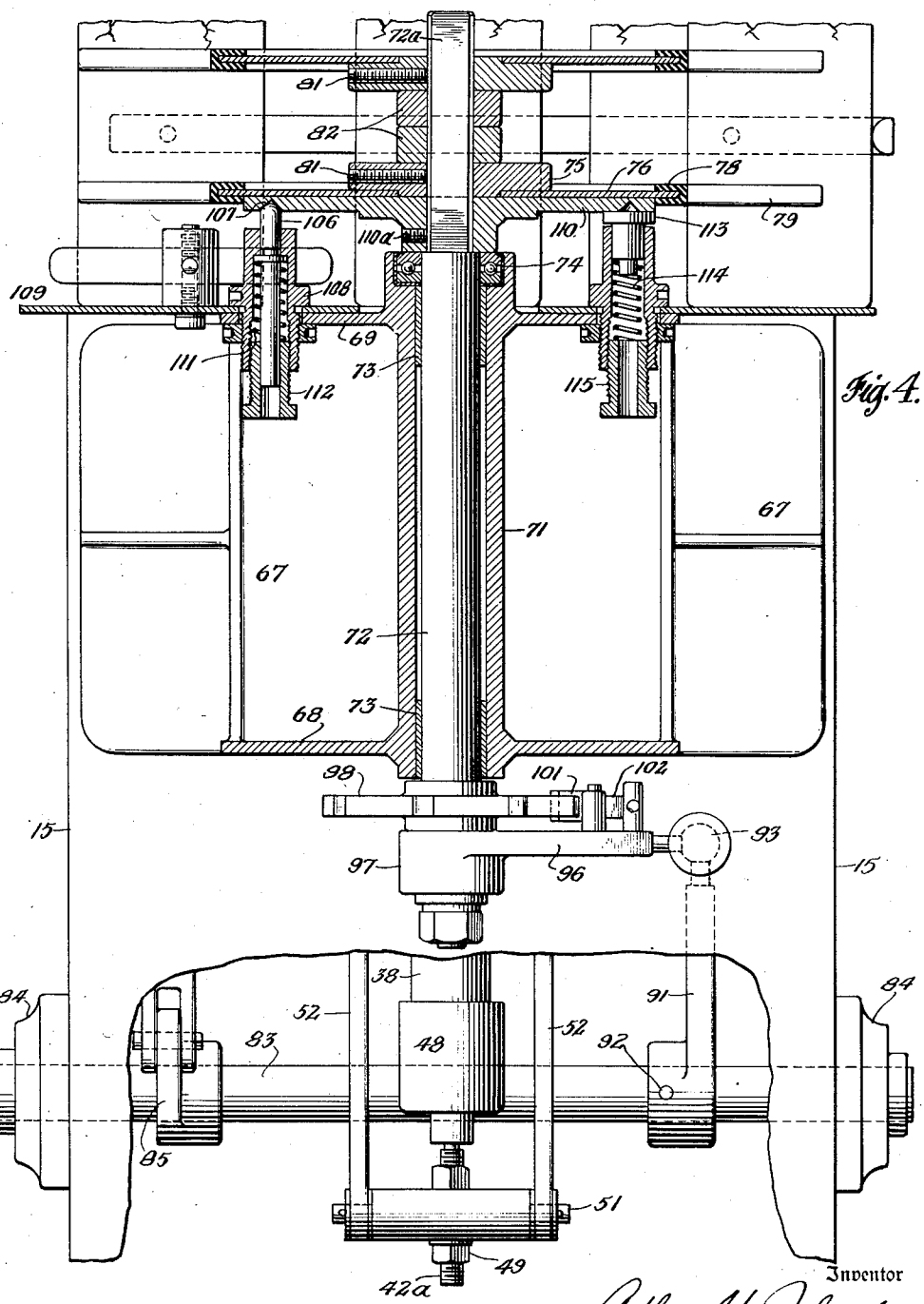


Fig. 4.

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Filed Nov. 7, 1952 4 Sheets-Sheet 4

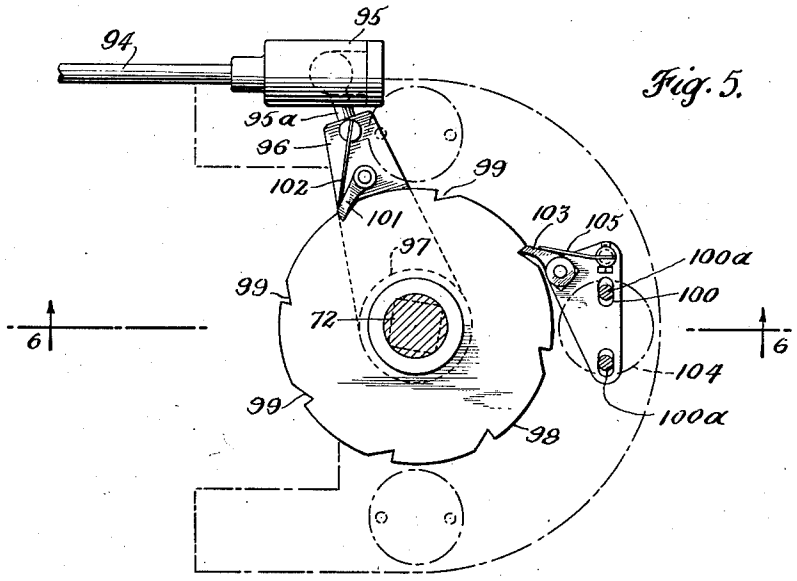


Fig. 5.

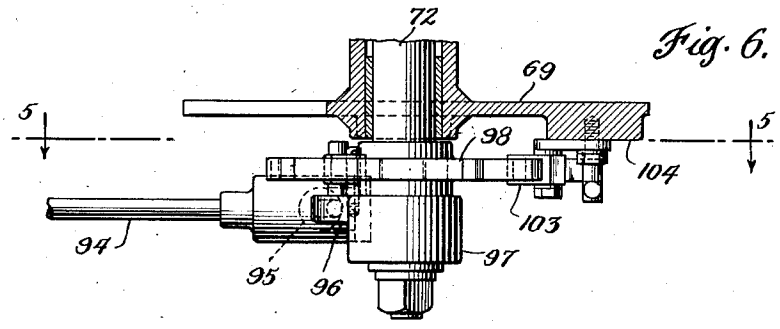


Fig. 6.

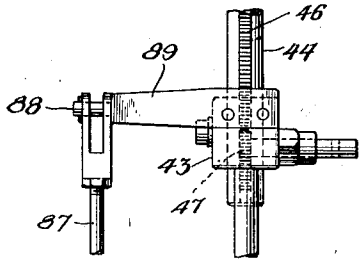


Fig. 7.

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United States Patent Office 2,776,531 Patented Jan. 8, 1957

2,776,531

JAR-HANDLING MECHANISM FOR CAP-SETTING EQUIPMENT

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Application November 7, 1952, Serial No. 319,392

2 Claims. (Cl. 53—317)

This invention relates to jar-handling mechanism, particularly adapted for use in capping machines or cap-setting equipment of the type having an automatic cap-setting or tightening device operative at a location or station at which jars or the like undergo a period of dwell during the cap-setting operation. The invention is an improvement upon the equipment shown in my pending application No. 264,495, filed January 2, 1952, now U. S. Patent No. 2,656,084, entitled Jar-Handling Equipment for Capping Machines.

A major object of the invention is to improve the handling of the jars being capped.

More specifically, the invention contemplates a more positive and reliable feeding of the jars to and from the cap-setting station, regardless of variations in the types, sizes, heights, weights and shapes of jars handled, in a manner to retain all the advantages of the equipment shown in my aforesaid pending application, but with the further advantages just mentioned, together with other advantages which will hereinafter appear or which may be incident to the invention.

Still more specifically, the invention contemplates the accomplishment of the foregoing by an equipment which in general separates the functions of conveying the loosely-capped jars to the machine and feeding the individual jars to the cap-setting station in the machine. To this end, the invention contemplates improvements in the construction and operative interrelation of two or more of the conveying, feeding, guiding, gripping, braking, and other features of the equipment.

Still further, the invention contemplates the improvement of the flexibility, accuracy and reliability of the various adjustments required in such equipment, such as adjustments of the feeder stroke, of the jar-receiving device as to types and sizes of jars to be handled, of the height at which said device engages jars, of the location horizontally and vertically of the jar-guiding means, and of the action of the braking mechanism, etc.

How the foregoing, together with other objects and advantages of the invention are secured will be apparent from the following description taken together with the accompanying drawings.

Figure 1 is a sectional elevational view taken on the line 1—1 of Figure 2, showing cap-setting equipment incorporating the present preferred embodiment of my improved jar-handling mechanism;

Figure 2 is a plan section taken on the line 2—2 of Figure 1;

Figure 3 is a plan section similar to Figure 2 but showing an adaptation of the invention;

Figure 4 is an enlarged vertical section taken on the line 4—4 of Figure 1;

Figure 5 is a plan section taken on the line 5—5 of Figure 6 illustrating a drive for the rotary feed mechanism utilized in the preferred embodiment;

Figure 6 is a cross-section taken on the line 6—6 of of Figure 5; and

Figure 7 is a fragmentary elevation of a detail of the mechanism.

In Figure 1 I have illustrated the major parts of the cap-setting machine M, together with the discharge end of a continuous belt conveyor C (for delivering a series of bottles or jars) which conveyor may be integrated with the cap-setting machine proper or may be separate therefrom, although of course in the latter case it must be so mounted as to normally occupy a predetermined relationship to the jar-feeding apparatus F which feeds the jars one-by-one to the cap-setting station S of the machine M.

The machine M comprises in general a base 11, main upright frame members 12, and a plate-like cross-frame 13 having reinforcing ribbing 14, side wall structures 15, 15, front coverplate 16 and rear coverplate 17.

The cap-setting assembly comprises a carriage 18, incorporating wheels or rollers 19, adapted to ride vertically on trackways 21 which are fixed to the frame structure 12. The motor 22 on the carriage is adapted to rotate the cap-setting head 23 (with its conical liner of rubber or the like 24) through the intermediation of a gear box 25 and an adjustable torque-limiting clutch 26.

On the back of the machine, a shaft 27 driven by motor 22 carries a pulley 28 which drives a larger wheel or pulley 29 as by means of a belt 31; the wheel 29 in turn having an eccentric crank 32 on which is pivoted the upper end of a rod 33 which at its lower end is fixed by bracket 34 to a rock-shaft 35 rockably mounted in bearings 36 which are carried by the frame structure 13. By means of this latter series of elements, the rotation of the motor 22 causes the whole cap-setting assembly to ride up-and-down on the rails or tracks 21.

At least a portion of the weight of the cap-setting assembly is taken by the spring 37 disposed in the tubular casing 38 fixed in the tubular boss 39 of the frame structure, by means of the collar 41 fixed on the vertically reciprocable shaft 42, the upper end of which is fixed in a bracket 43, normally fixed in turn to a shaft 44 secured to the bracket 45 of the carriage 18, although relative adjustments between the rods or shafts 42 and 44 may be secured by means of the rack-and-pinion assembly 46 and 47.

The vertical reciprocations of the cap-setting assembly must be coordinated with the gripping of the individual jars J which latter must be held against turning when the cap-setting head 23 descends to tighten up the screw cap L. For this purpose, the vertically reciprocating rod 42 has a bottom extension 42*a* protruding through a closure cap 48 of the spring-housing tube 38; and said rod extension 42*a* is adjustably and pivotally connected at 49, 51 with links 52 (see also Fig. 4) the upper ends of which are pivoted at 53 to rocking levers 54 mounted on the fixed pivot 55 with linkage 57 which in turn carries a pivot 58 mounted in guides 59 for bodily vertical reciprocation therein parallel to the axis of the pivot 58.

To the pivot 58 are coupled the links 61 pivoted respectively at 62, 62 to the gripper arms 63, 63 which have fixed pivotal mountings 64 at their lower ends and carry gripper heads 65 at their upper ends, each head having a pair of adjustable gripper buttons of rubber or the like 66.

As so far described, the cap-setting assembly and most of the parts of the jar-gripping apparatus are in structure and function similar to the corresponding parts of my aforementioned pending application to which reference may be had for a more detailed description thereof and of the various adjustments which may be necessary or desirable in connection therewith.

The jar-feeding apparatus F must be coordinated with the mechanism above described, as to location and function. Thus a bracket casting or the like, shown in Figures 1 and 4, comprises a main reinforced plate structure

67 fixed to the front of the machine, a base plate 68, a top plate 69 and a central vertical bracing tube 71 in which is mounted a rotary feeder shaft 72 by means of sleeve bearings 73, 73 and thrust bearing assembly 74.

The squared upper end 72*a* of shaft 72 carries a pair of peripherally pocketed feeder disks, each comprising a hub 75 apertured to fit the squared end of the drive-shaft, a disk plate 76 which may be riveted to said hub (as shown for example at 77 in Fig. 2) which is of a sprocket-like shape, and a rubber rim 78 fixed to said plate and to form at the periphery a series of cushioned pockets or indentations 79 (adapted to receive and transport jars), the number, size and shape of said indentations depending upon the size and shape of the jars being handled. The two feeder disks are assembled on their drive-shaft in relatively vertically spaced relationship (as shown in Fig. 4) and may be tightened thereon by means of set-screws 81, and the spacing between them may be adjusted by means of one or more replaceable spacing collars 82, so that the feeder disk assembly may be of different overall vertical heights to suit the varying heights of different jars being handled. The adjustments for diameter and shape of the jars are made by substitution of feeder disks having different peripheral pockets.

The feeder drive and its coordination with the cap-setting assembly are accomplished as follows: between the side frame plates 15 there extends a rock-shaft 83 mounted in bearings at 84, 84. This shaft is rocked by means of an arm 85 fixed thereon and pivotally connected at 86 to the lower end of a push-pull rod 87, the upper end of which is pivoted at 88 (Figs. 1, 2 and 7) to a drive arm 89 fastened to the bracket 43 which rides up-and-down with the vertical rod 44 of the capping assembly.

The rocking of cross-shaft 83 is communicated to the feeder shaft 72 and from there converted to a step-by-step unidirectional rotation, by means of the following parts: arm 91 fixed as by a pin or set-screw 92 on the shaft 83 has a ball joint connection 93 connecting with rod 94 which, in turn, has a ball joint connection 95 with a lever 96 formed with a mounting collar 97 freely rotatable on the lower end of feeder shaft 72. Just above these parts is a ratchet wheel 98 (see also Fig. 4) having teeth 99 disposed at intervals therearound, the number and angular spacing of the teeth corresponding with the number and angular spacing of the pairs of jar-receiving pockets formed in the pair of feeder disks. It will be understood that when a different jar-feeding disk assembly (having a different number of pockets) is substituted for the one shown in the drawings, a correspondingly different ratchet disk 98 will be substituted in the feeder drive.

The rocking of the cross-shaft 83 and thus the reciprocations of the rod 94 and of the arm 96 will be transmitted to the ratchet disk 98 by means of the pivoted pawl 101 which is carried on said arm and is urged by spring 102 against the edge of the ratchet disk 98. A second pawl 103 is pivoted on a fixed boss 104 of the base plate 68 in a position to engage the teeth of the ratchet disk 98 and is so disposed as to prevent undesired back-lash of the latter. Any necessary adjustment of the pawl 103 is secured by means of the slotted mounting bracket 100 and the locking screws 100*a*. The spring 105 urges the pawl 103 against the edge of disk 98.

The proportions and geometry of the feeder driving parts as hereinabove described are such that at each stroke of rod 94 the arm 96 moves (to the right in Fig. 5) sufficiently so that pawl 101 clears the next notch 99 and on the return stroke moves it to the position of the parts as seen in this figure, and preferably such that the stroke to the right is about one-third more than the angular spacing between notches, so that a slightly extended time interval will be provided to permit the capping head to rise clear of the lid and the jar-grippers to release the jar before the pawl engages the notch on its working stroke. Adjustments of the stroke can of course be secured in various ways, as by example having the shank 95*a* of the ball joint 95 screw-threadedly adjustable in-and-out of the end of lever 96. A similar adjustment can be made by means of the shank 93*a* and lever 91 (Fig. 1). Very accurate configuration and adjustment of these parts is not however essential (according to the preferred embodiment of the invention), since I have provided (as seen in Fig. 4) a spring-pressed latch 106 engageable in notches 107 which as seen in Figure 2 are accurately centered with reference to the jar pockets of the feeder disks. The notches 107 are formed in the bottom surface of the member 110 fixed on the extension of shaft 72 by means of the set-screw 110*a*.

The stem of the latch device is mounted on a tubular housing 108 extending down through the deck plate 109 and the supporting plate 69, and is urged upwardly by a spring 111, the pressure of which is adjustable by a threaded sleeve member 112.

In order to prevent the disk assembly from overriding, or carrying a jar past the cap-setting station (when the machine is being rapidly operated at high speed), and/or to guard against unintentional angular displacement of disk position, I have provided a flat-surfaced brake-shoe 113 adapted to bear upon the bottom surface of the member 110. This brake may be urged upwardly by means of the spring 114 which is adjustable by the threaded sleeve 115.

From the foregoing description, it will be clear that the step-by-step rotation of the feeder assembly is so coordinated with the operation of the jar-grippers 66 and of the cap-setting head 23 that a jar J will be brought into the position shown in Figure 1 when the grippers are open and the head is in raised position. When the rotating head comes down to tighten the cap L the grippers 66 will grasp and hold the jar tightly; and at this time the drive rod 94 for the ratchet will be operating on its return stroke and the first portion (non-effective portion) of its working stroke, during which the latch 106, 107 will be holding the disk assembly stationary.

Should any minor differences exist between jar position as determined by the feeder and jar position as determined by the grippers 66, the rubber edging on the feeder disks will accommodate the discrepancy.

In Figure 2 I have illustrated a series of jars in their progress through the machine, and these jars are designated respectively by numbered suffixes; i. e., from J1 to J8 inclusive. Jar J3 is at the cap-setting station; jars J1 and J2 are in process of being discharged from the machine; jars J4 to J7 are in process of being carried around from the receiving side of the machine to the cap-setting station. Jar J8 is in process of being delivered from the conveyor to the feeder.

The conveyor C preferably comprises an endless belt 116, the upper pass of which is moved, preferably continuously, in the direction of the arrow A, as by power driven rotation of the wheel or roller 117 which is mounted by shaft 118 on a bracket 119 which may be separately supported or may be supported on the base 11 or some other fixed part of the machine. The roller 117 lies close to a recess 121 formed at the edge of the deck plate 109, and the top of the roller is preferably so disposed that the top surface of belt 116 is substantially even with the top surface of deck plate 109, with the belt commencing to pass downwardly over the roller closely adjacent to the inner edge of the recess 121. The jars are thus constrained to pass smoothly from the belt to the deck plate, where they are engaged, and separated one-by-one from the advancing series of jars which are being delivered in a rectilinear path by the conveyor, and thence moved by the pockets of the feeder disks in an intermittent fashion, first from the position of jar J7 to the position of jar J6, and thence on around to the position of jar J3.

After the cap-setting operation, the capping head 23 rises, the grippers 66 open, and the extending portions or peripheral knobs 79*a* of the feeder disks, push the jars

one-by-one to the position of jar J2, from whence they are forced outwardly onto a discharge conveyor or table 122, as shown by the jar J1.

In order to assure proper guidance of the jars, and retention thereof in the receiving pockets of the disks, I provide guiding rails 123, 124 adjacent the discharge end of conveyor C; and an outer peripheral guide rail assembly 125*a* and 125*b*, extending around the feeder disks from the zone of receipt of the jars to the zone of discharge thereof, at which latter zone the guiding function is taken up by the guides 126, 127 adjacent or on the table 122. A combined guide and discharging device is shown at 128 in Figure 2.

The guide member 125*b* may be horizontally adjusted relative to the feeder disk by means of the rods 129 which are adjustable lengthwise in the sleeves 131 and held in adjusted position by means of the screws 132. Vertical adjustment is secured by moving the members 131 upwardly or downward, and fixing them by set-screws 133 in different holes 134 located at various heights in the frame members 12. The guide member 125*a* is mounted to yield to the passing jars (when necessary) by means of the spring strap member 135 and fastening screws 136, and differently shaped guide bars 125*a* may be substituted as required. The horizontal adjustments of the guides are primarly to accommodate different sized jars and the vertical adjustments are to assure disposition of the peripheral guide closely adjacent to the vertical position of the center of gravity of the jars being handled.

The guide 128 serves the additional function of aiding in discharging the jars from the feeder disk pockets after the jars pass the cap-setting station. The necessary horizontal and angular adjustments of the member 128 are secured by means of rod 137, mounting sleeve 138 and tightenable screw device 139.

It will be seen from Figure 3 that by substituting a different deck plate 109*a* having an aperture 121 at a different peripheral location, the machine may be readily adapted to handle jars taken from a conveyor line to a discharge line which are in alignment with each other (instead of at right angles with each other as in Fig. 2). Here the delivery conveyor is shown at 116*a* and the discharge conveyor (or table) at 122*a*. The extent and configuration of the peripheral guide 125*x* must be correspondingly altered; and so must the location and angle of adjustment of the combined guiding and discharging device 128*x*.

From the foregoing description, the construction and

operation of the preferred embodiment of the present invention will now be apparent. It will further be evident that without great maufacturing accuracy—and thus at a minimum of cost—I have made it possible to provide a jar-handling mechanism characterized by great accuracy and reliability in operation; capable of high-speed work, and flexibility adapted to a wide variety of jars and of disposition of the machine to the delivery and discharging lines in the packing plant.

I claim:

1. In cap-setting equipment having a station at which jars or the like undergo a period of dwell during the cap-setting operation, jar-handling mechanism comprising intermittently-acting jar-gripping apparatus adapted to engage and hold a jar at said station as against turning during the setting operation, continuously-acting jar-conveying apparatus for simultaneously advancing a plurality of jars toward said station, and a step-by-step jar-feeding apparatus having a device for accepting a jar from said conveying apparatus and moving the jar away therefrom, and means for moving said device with a jar to said station, said conveying apparatus being constructed to advance said plurality of jars in a generally rectilinear path and said device for accepting a jar being mounted for rotary movement, the means for moving said device including an intermittently-acting drive therefor, and said intermittently-acting drive and said intermittently-acting jar-gripping apparatus having coordinating means constructed to synchronize their actions.

2. The mechanism of claim 1 wherein said rotary jar-feeding apparatus has a brake operative to arrest the rotary motion of the jar-receiving device when a jar is at said station.

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