

- [54] **FLAT ARTICLE FEEDING DEVICE, PARTICULARLY FOR FEEDING CAN COVERS FROM AND INTO A STACK**
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- [52] U.S. Cl. **214/6 BA, 214/8.5 K, 221/222**
- [51] Int. Cl. **B65g 57/30**
- [58] Field of Search ... **214/8.5 A, 8.5 K, 8.5 R, 6 BA; 221/221, 222, 223, 241, 297**

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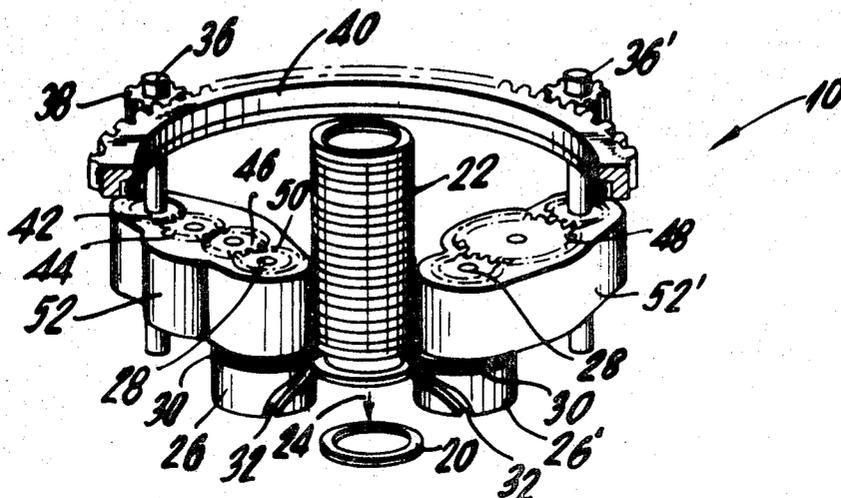
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[57] **ABSTRACT**

An article feeding device comprises means for rotatably supporting and driving a rotatable ring gear which is in rotatable meshing engagement with a plurality of circumferentially spaced planetary gears,

preferably three equally spaced gears. The planetary gears are rotatably supported within a gear box on a shaft which is carried by a plate and it is arranged within a gear box which extends inwardly from the plate and may be swung about a pivotal axis corresponding to the axis of the planetary gear shaft. The gear box carries one or more idler gears which drives between the planetary gear and a driven gear carried on an article advancing drive shaft which also carries a parting knife and a rotatable article advancing member in the form of a cam having a screw groove for advancing the articles along the groove during rotation thereof. Articles such as flat can cover of any shape are arranged in a stack in a manner such that they are urged in a direction toward the rotational feeding member, for example, by gravity in the case of a vertical stack or by mechanical feeding in the case of a horizontal stack or when the device is to be employed for the feeding of the articles into a stack rather than out of a stack. The individual gear boxes may be swung so that all extend either further inwardly to define a small circle for engagement with the article to be fed or swung outwardly to define a larger engagement circle by a simple rotatable ring member which is connected to the gear box through a connecting rod and which may be rotated to shift all of the gear boxes simultaneously. Articles of non-circular configuration may also be fed by making an adjustment of the connecting rod length in respect to each individual gear box in order to vary the inner or outer position of one of the gear boxes and the associated feeding members. Each gear box also carries one or more idler gears which may be exchanged to provide variations in rotational feeding of the article advancing shaft and also provide for counter rotation of one of the advancing members in order to ensure for example that the articles are not rotated as they are fed.

13 Claims, 7 Drawing Figures



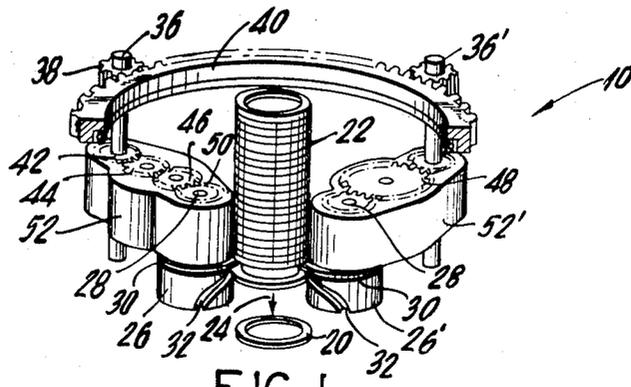


FIG. 1

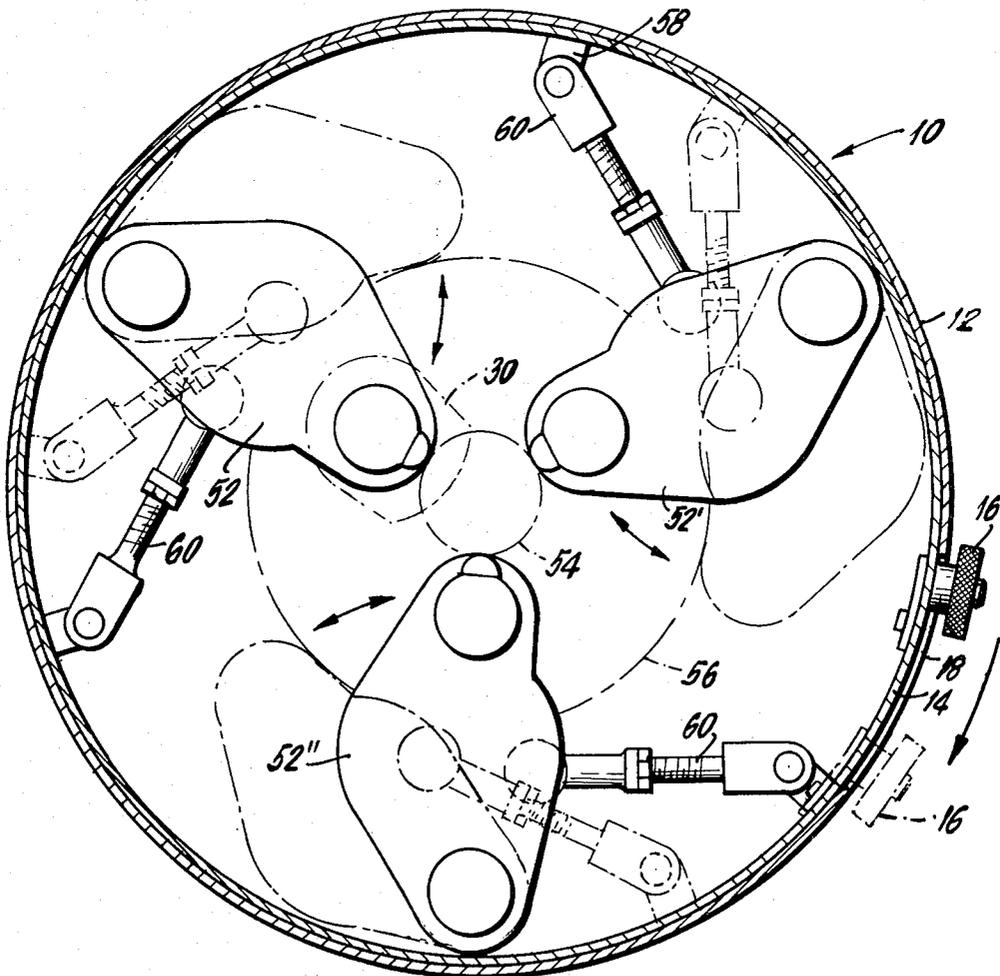


FIG. 2

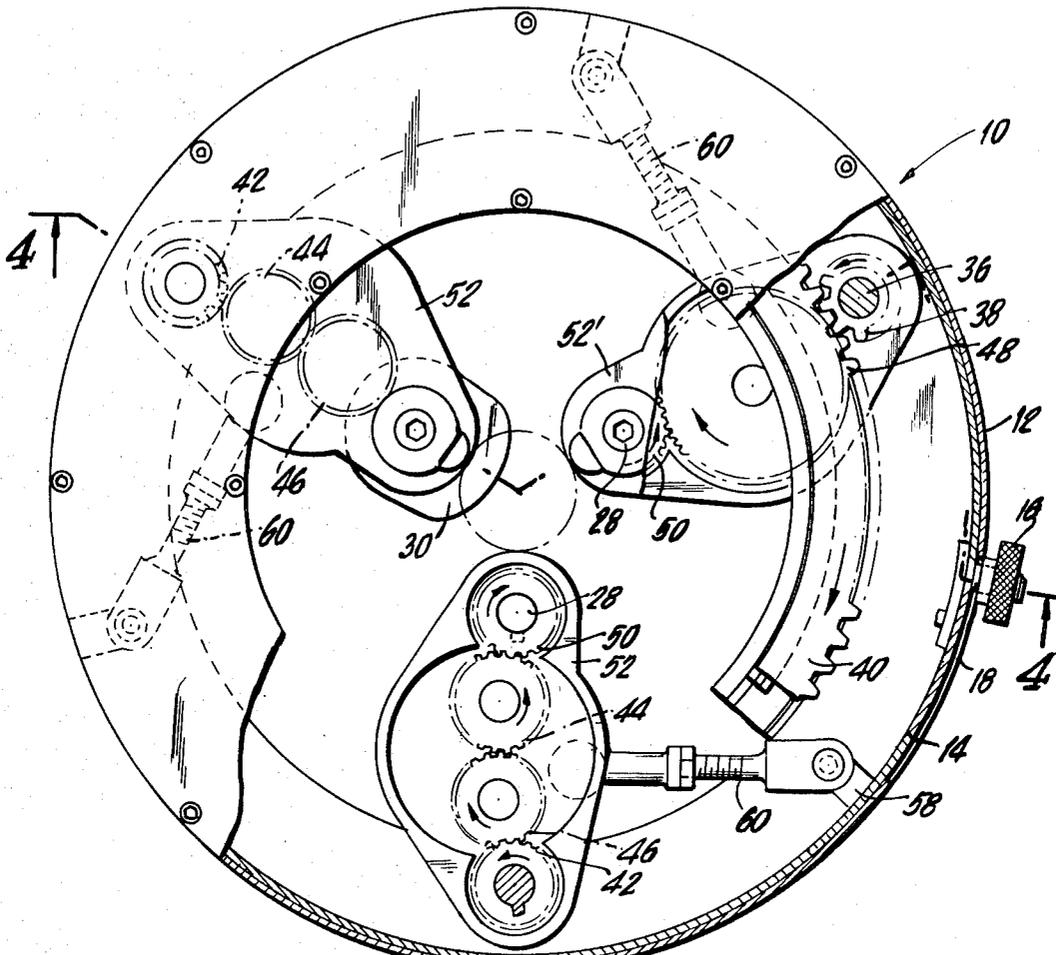


FIG. 3

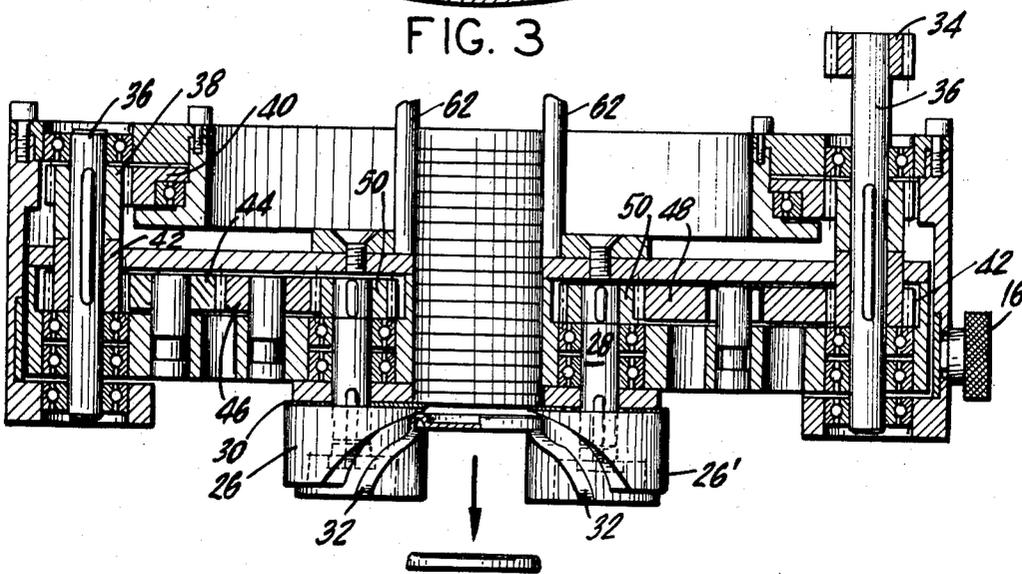


FIG. 4

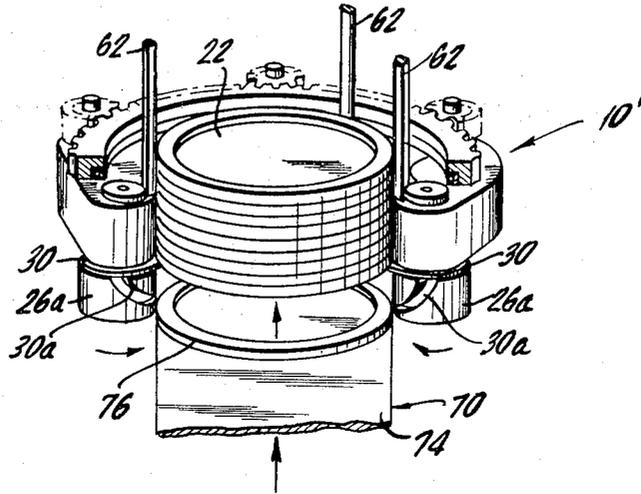


FIG. 5

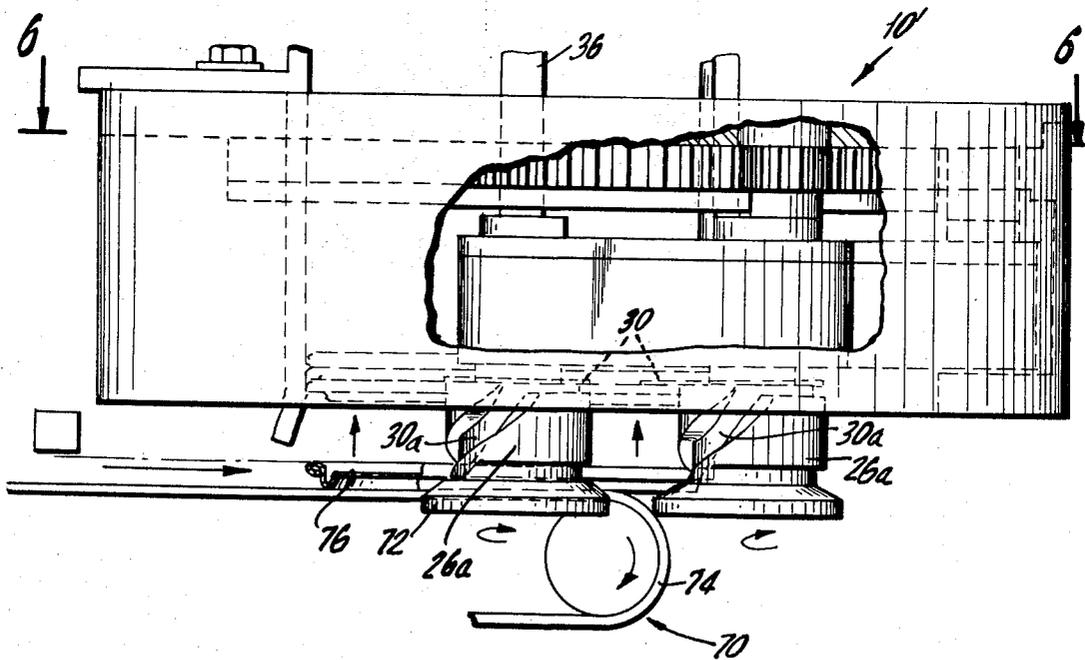


FIG. 7

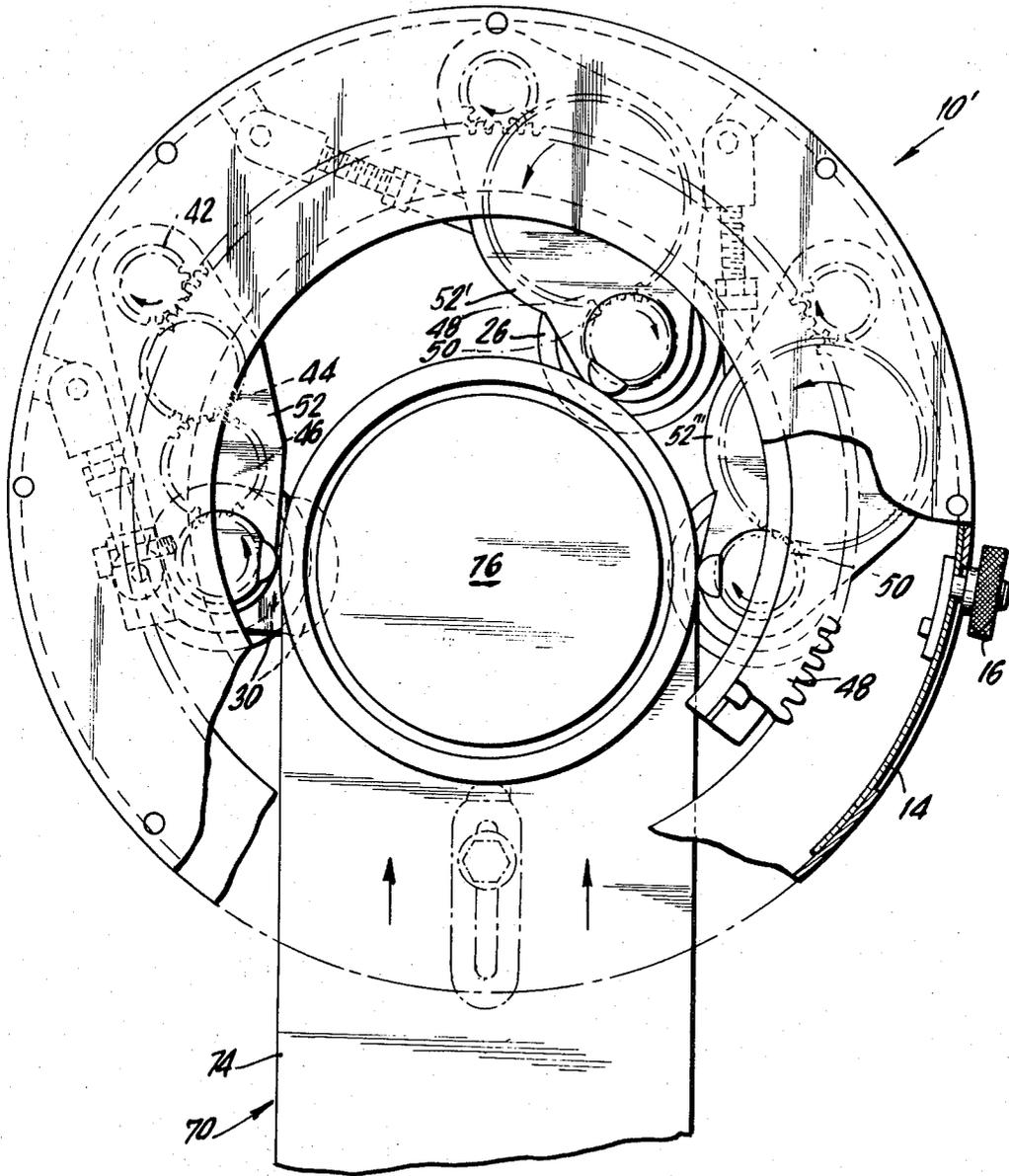


FIG. 6

FLAT ARTICLE FEEDING DEVICE, PARTICULARLY FOR FEEDING CAN COVERS FROM AND INTO A STACK

SUMMARY OF THE INVENTION

This invention relates in general to article feeding devices, and in particular, to a new and useful adjustable device for feeding substantially flat articles such as can covers and which includes simply adjustable means for accommodating covers of various size and for regulating the speed of advance and rotational engagement of the articles by an article feeding or advancing member.

At the present time many devices are known for the feeding of articles into and out of stacks. For example, it is known to employ a rotatable cam member having a groove which progresses axially along the member and which provides or defines an engagement recesses for engagement of a container, cover or the like for moving containers or covers out of stacking engagement with one or more other covers. A disadvantage in the construction of such devices is that adjustments to accommodate containers or articles of various sizes are difficult to make and they usually require a major disassembly of the operating parts. In addition, after the changes are made in most instances, it is necessary to retune the operating devices so that the articles may be fed into association with one or more other operating devices. The prior art devices which include rotatable feeding means have a further disadvantage that they tend to also rotate the article being fed and it is difficult if not impossible to change the rotatable speed and hence the advancing speed of the article.

In accordance with the present invention, there is provided a simply constructed article feeding device which comprises a mounting ring for a plurality of drive gear boxes which are pivotally mounted on the ring so as to extend inwardly therefrom and which include a rotatable article advancing device at the inner ends which are engageable with the articles to be fed to advance them in an axial direction. All of the gear boxes include an outer gear which is driven from a single rotatable ring and intermediate gearing which may be easily changed in order to provide a change in speed and rotational direction of the article advancing means which is carried on the inner rotatable drive shaft. The gear boxes are interconnected by a connecting rod which is carried on a rotatable ring which may be shifted for the purposes of simultaneously moving all of the article advancing members either inwardly or outwardly. Three symmetrically arranged gear boxes are advantageously provided and they are mounted on a common ring or wall portion so that they may be moved inwardly and outwardly together upon rotation of the ring. The control ring is connected to the gear boxes by a connecting rod which may be adjusted as to length in order to vary the position of any one of the plurality of gear boxes which are employed. In this way, feeding devices which are not necessarily circular may be accomplished.

Accordingly, it is an object of the invention to provide an improved article feeding device which includes a rotatable feed member such as a cam having an advancing groove defined thereon which provides an engagement recess for engagement of articles and for moving them axially and wherein the gear boxes are

mounted for combined inner and outer adjustment or selective adjustment for accommodating various sizes and shapes of the articles to be fed.

A further object of the invention is to provide an article feeding device particularly for feeding can covers which includes a rotatable feeding member having a spiral groove defined along its length and which is arranged together with three similar members around the periphery of the article in an adjustable manner and which further includes means for separating the articles which are being fed and separately advancing each one successively.

A further object of the invention is to provide a feeding device for feeding articles either into or out of a vertical stack or for feeding the articles in any selected direction and which is simple in design, rugged in construction, and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there are illustrated and described preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a partial perspective view of a portion of the operating mechanism for a downstacker feeding device constructed in accordance with the invention;

FIG. 2 is an enlarged horizontal sectional view of the device indicated in FIG. 1;

FIG. 3 is a view similar to FIG. 2 with portions of the housing being broken away;

FIG. 4 is a section taken along the line 4—4 of FIG. 3;

FIG. 5 is a view similar to FIG. 1 of an upstacker feeding device of another embodiment of the invention;

FIG. 7 is an enlarged partial side elevational view and partial sectional view of the device indicated in FIG. 5; and

FIG. 6 is an enlarged horizontal sectional view taken along the line 6—6 of FIG. 7.

GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in particular, the invention embodied therein comprises in FIGS. 1 to 4 a downstacker generally designated 10 which includes an outer cylindrical casing 12 and an inner cylindrical casing wall or ring member 14 which is rotatable relatively thereto. An adjustment knob or engagement member 16 is affixed to the inner wall member 14 and it extends through a slot 18 of the housing 12 and the rotation of the inner wall 14 relative to the housing 12 is limited by the extent of the movement of the engagement member 16 in the associated slot. The end position of the engagement member 16 is indicated in dotted lines.

In accordance with the invention, a plurality of articles such as can covers 20 are fed for example from a vertical stack 22 in an axial direction as indicated by the arrow 24 in FIG. 1. While in the embodiment illus-

trated the can covers 20 are fed downwardly from a vertical stack, it should be appreciated that they may be fed even horizontally with the inventive device or at any angle and when; the force of gravity is not in effect to urge them into engagement with the feeding mechanism suitable means such as springs (not shown) are provided. The feeding mechanism includes a plurality of rotating article advancing means or grooved cams 26 arranged around the periphery of the article. In FIG. 1, only two such cams 26 are indicated but the preferred operating mechanism includes three as indicated in FIGS. 2 to 4. The cams 26 are contained on a rotatable article drive shaft 28 along with a respective separating device or parting knives 30, which is movable between the foremost article and the remainder of articles in the stack during each feeding cycle. The weight of the stack 22 is supported by the parting knife as the separated foremost article becomes engaged in a spiral groove 32 of the associated cooperating cams 26 to move the foremost cap 20 away from the stack.

Each cam 26 is driven by engagement of a gear 34 as indicated in FIG. 4 with a driving gear (not shown), to rotate a drive shaft 36 for each of the rotatable article advancing means 26. Each shaft 36 also carries a gear 38 which meshes with and rotates a ring gear 40. The drive can be through a single shaft 36 to the ring gear 40 which rotates the remaining shafts 36 at a synchronous speed.

Each drive shaft 36 carries a drive gear 42 which drives either through two idler gears 44 and 46 or a single idler gear 48 to rotate a gear 50 affixed to the article advancing cam drive shaft 28 to cause its rotation. In accordance with a feature of the invention as indicated in FIG. 1, the article advancing cams 26 which are driven from the two idler gears 44 and 46 rotate in a different direction of rotation than the article advancing cam 26' which is driven from only the single idler gear 48. The gears 44, 46 and 48 are interchangeable and an adjustment of this nature permits even feeding of the articles from the stack 22 without their rotation.

In accordance with a further feature of the invention, each article advancing device 26 is carried on a swivable gear box housing 52 which has an inner end which is pivotal on the drive shaft 36 and an outer end which carries the article advancing device 26 and the separating knife 30 which may be swung inwardly and outwardly about a curve having a radius extending outwardly from the drive shaft 36. In this manner the device may be employed to feed articles which vary in diameter from the small diameter 54 to the large diameter 56, as shown in dotted lines in FIG. 2. The end positions of the gear box housing are also indicated in FIG. 2. All of the individual housings 52 may be swung together to simultaneously change their engagement with the articles to be fed by shifting the engagement member 16 from the solid line to the dotted line position or vice versa. This causes rotation of the inner wall 14 relative to the housing and this inner wall carries a bracket 58 which mounts one end of a connecting rod or adjustment member 60 having an opposite end which is pivoted to the associated housing 52. All of the connecting rods 60 are connected to the inner wall 14 in this matter so that they are shifted together between the dotted line and the solid line positions indicated in FIG. 2. In accordance with a further feature each of the

connecting rods 60 are formed as a turn-buckle and they may be adjusted as to length in order to provide a further variation of the setting of each of the housings 52 individually. This feature enables the feeding of articles which are not necessarily circular.

As shown in FIG. 4, guide members 62 may be mounted in the housing for facilitating the guiding of the articles in their associated stack 22.

In the embodiment indicated in FIGS. 5, 6 and 7 similar parts are similarly designated in the arrangement of the invention for use as upstacking device, generally designated 10'. In this arrangement means such as a conveyor generally designated 70 are provided for moving each cap 20 in succession into engagement with the article advancing means or cam 26a each of which has engagement means or grooves 30a which extend in an opposite direction from that indicated in the other embodiment in order to move each cap 20 upwardly into the vertical stack 22 rather than downwardly. Each cam 26a also includes a flared lower end 72 which is located to engage each cover 76 from below the feed path defined by conveyor belt 74 and to support and direct the cap upwardly in grooves 30a, 30a, and 30a. The apparatus also includes an additional gear box housing 52 and associated parts as shown in FIG. 6. In other respects the operating mechanism of the embodiment of FIGS. 5 to 7 is the same.

What is claimed is:

1. A device for feeding articles, comprising a housing, an inner wall member rotatable within said housing, a plurality of drive assemblies having portions pivotally supported within and by said housing and adjustably positionable outer portions extending centrally inwardly of said housing, adjustable connecting member pivotally connected between said inner wall and each of said drive assemblies, means for rotating said inner wall to shift said connecting members and said assemblies to move said outer portions of each inwardly and outwardly in accordance with the amount and direction of rotation of said inner wall whereby to provide accommodation for variations of the size of the article to be engaged, each of said drive assemblies including a driving gear, a driven shaft having a driven gear, a cam drive shaft, a cam drive gear on said cam drive shaft, gear means in association with said cam drive shaft for transmitting motion from said driven shaft to said cam drive shaft, a rotatable cam member secured to said cam drive shaft, an axially progressing article-advancing engagement surface defined on the surface of said cam member, a separating member disposed on said cam drive shaft directly above said cam member and being rotatable with said cam member to become interposed between the foremost article and the articles therebehind to separate the foremost articles in succession from the remainder and a rigid drive means engageable with said drive assemblies for rotating in unison said cam members.

2. A device, according to claim 1, including means associated with said cam members to engage between a foremost article and a vertical stack of the articles and to support the vertical stack while said cam members are moving the foremost article away from said stack.

3. A device, according to claim 1, including means for delivering a plurality of articles in succession to said cam members, and means associated with said cam

members to support each article after it is advanced into a stack.

4. Apparatus for continuously feeding articles comprising a mounting member; a rigid member rotatable relative to said mounting member; a plurality of drive assemblies having outer portions pivotally supported on said mounting member and its inner portions extending inwardly; means connecting said drive assemblies to said rotatable member, said rotatable member serving to shift said drive assemblies in unison either inwardly or outwardly to accommodate the particular size of the articles fed; a drive gear and at least one idler gear mounted on each of said drive assemblies; a rotatable article-advancing member supported by each of said drive assemblies at their inner portions, said article-advancing members, together with said drive assemblies, being shiftable inwardly or outwardly so that they engage each article in succession around a portion of its periphery; a separate drive shaft for mounting and rotating each of said article-advancing members for advancing the articles in an axial direction; and a rigid gear drive means engageable with said drive assemblies for rotating said article-advancing members.

5. Apparatus of claim 4 wherein said connecting means is adjustable to accommodate non-circular articles.

6. Apparatus of claim 4 wherein there are three equally spaced drive assemblies disposed in the horizontal plane, two of said drive assemblies include a driving gear and two idler gears and the remaining drive assembly includes one driving gear and one idler gear so that two article-advancing members rotate in one direction and the remaining one rotates in the opposite direction.

7. Apparatus of claim 1 wherein each of said article-advancing engagement surfaces include an axially extending spiral groove defined thereon for engaging the

articles; said apparatus also including a parting knife rigidly secured to the upper surface of each of said cam members, said parting knife being movable between the foremost article and the articles therebehind to support the remaining articles when the foremost article enters the spiral groove of said cam members.

8. Apparatus of claim 1 including means for conveying the articles to said cam members and flared means at the lower portion of said cam members positioned to engage the articles as they are moved by said conveying means and to raise the articles so that they engage said article-advancing engagement surfaces of said cam members.

9. Apparatus of claim 8 wherein each of said article-advancing engagement surfaces includes an axially extending spiral groove defined thereon for engaging the articles.

10. Apparatus of claim 9 including parting knives rotatable with said cam members and being movable between the foremost article and the articles therebehind to separate said articles.

11. Apparatus of claim 1 wherein there are three drive assemblies in two of which, said gear means includes a pair of gears operatively engaged with said corresponding cam drive gears and driven gears for rotating said pair of corresponding cam drive shafts in one direction, and in the third drive assembly, said gear means includes one gear engaged with said corresponding cam drive gear and driven gear for rotating said other cam drive shaft in the opposite direction.

12. Apparatus of claim 1 wherein said rigid drive means is a ring gear.

13. Apparatus of claim 4 wherein there are three drive assemblies at least one of which includes a driving gear and two idler gears, and at least one of which includes one driving gear and one idler gear.

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