May 27, 1952 H. J. PAYNTER ET AL 2,597,900

MECHANISM FOR GENTLY ENGAGING AND FEEDING FRAGILE ARTICLES

Filed Dec. 8, 1948 5 Sheets-Sheet 1

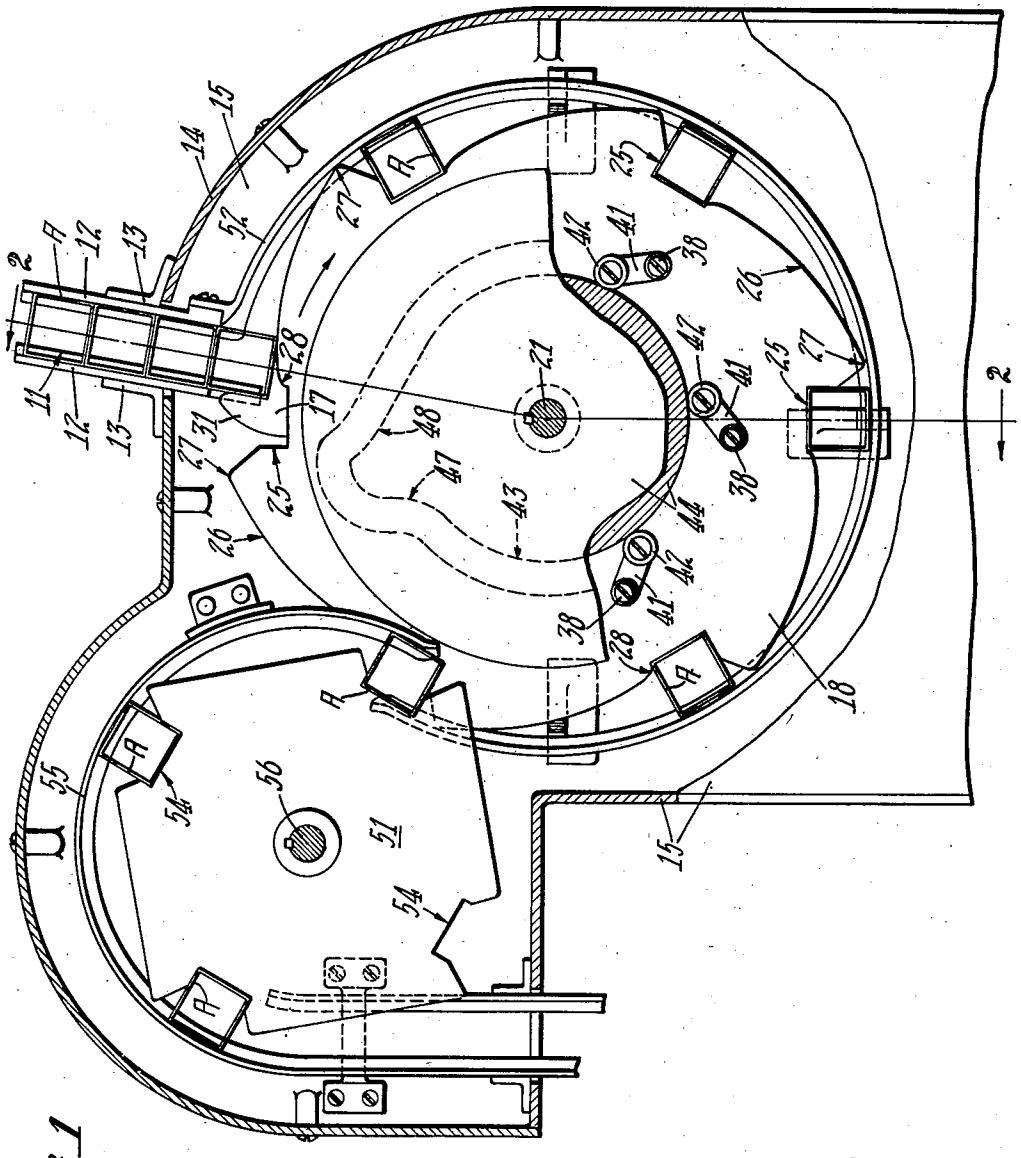


Fig 1

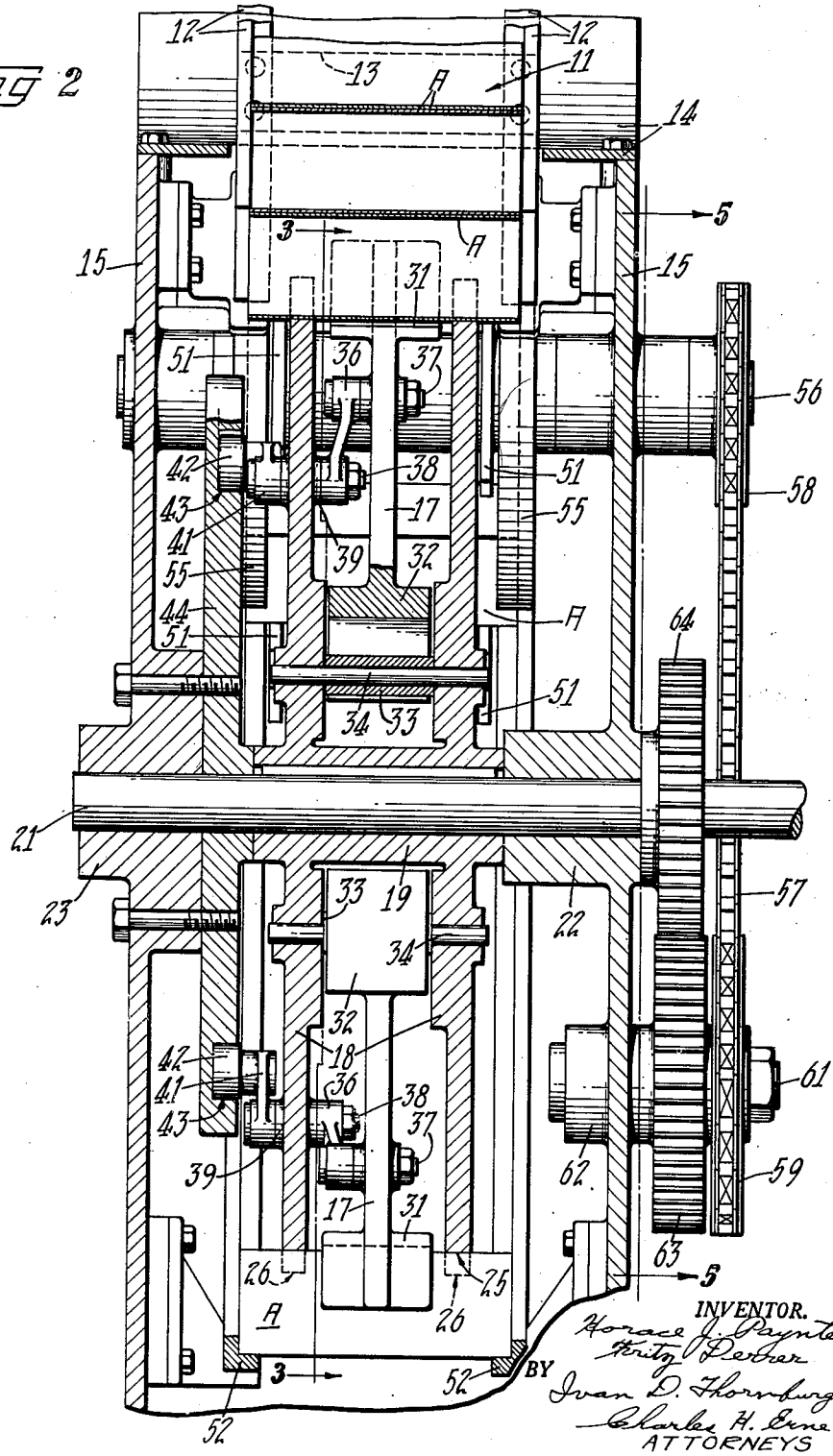
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MECHANISM FOR GENTLY ENGAGING AND FEEDING FRAGILE ARTICLES

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Fig 2



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MECHANISM FOR GENTLY ENGAGING AND FEEDING FRAGILE ARTICLES

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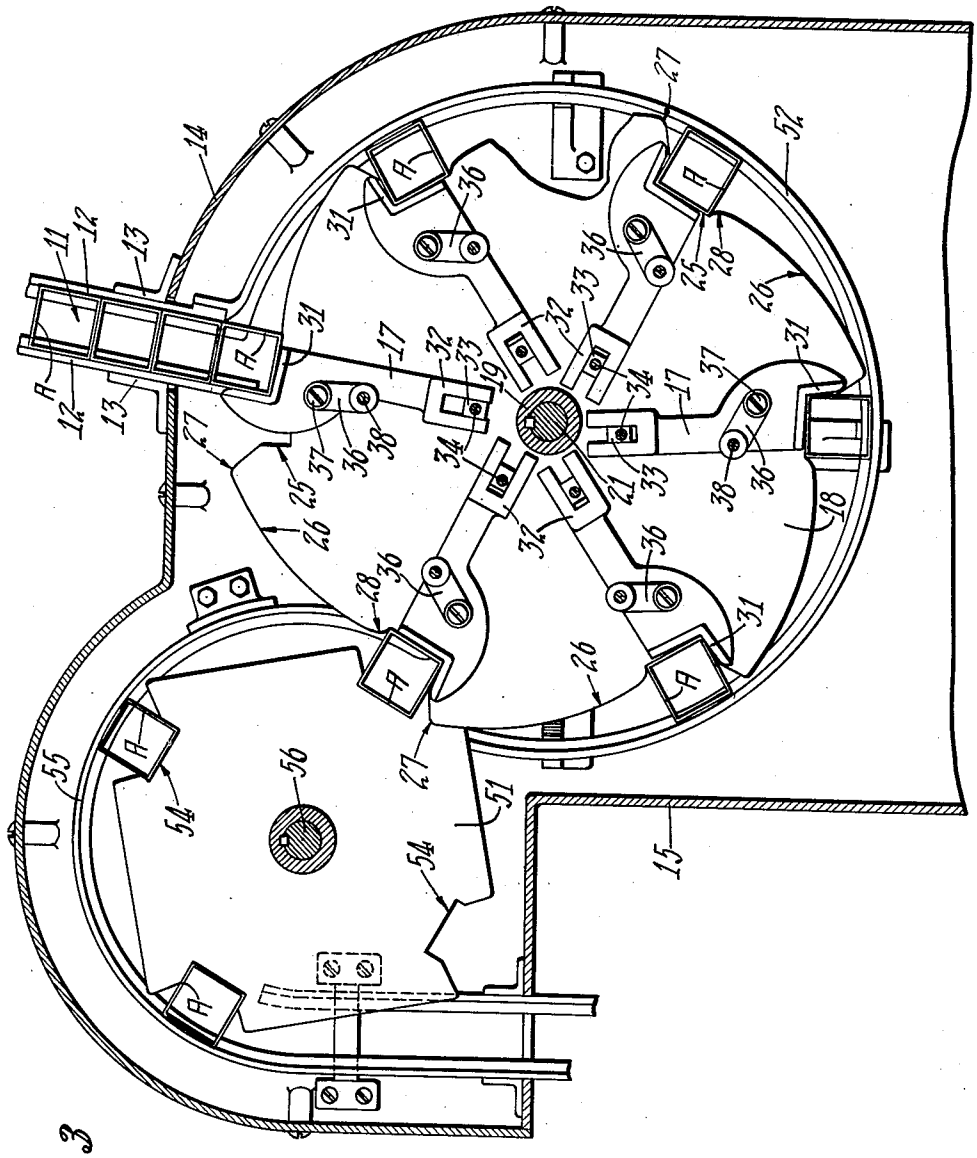


Fig 3

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MECHANISM FOR GENTLY ENGAGING AND FEEDING FRAGILE ARTICLES

Filed Dec. 8, 1948 5 Sheets-Sheet 4

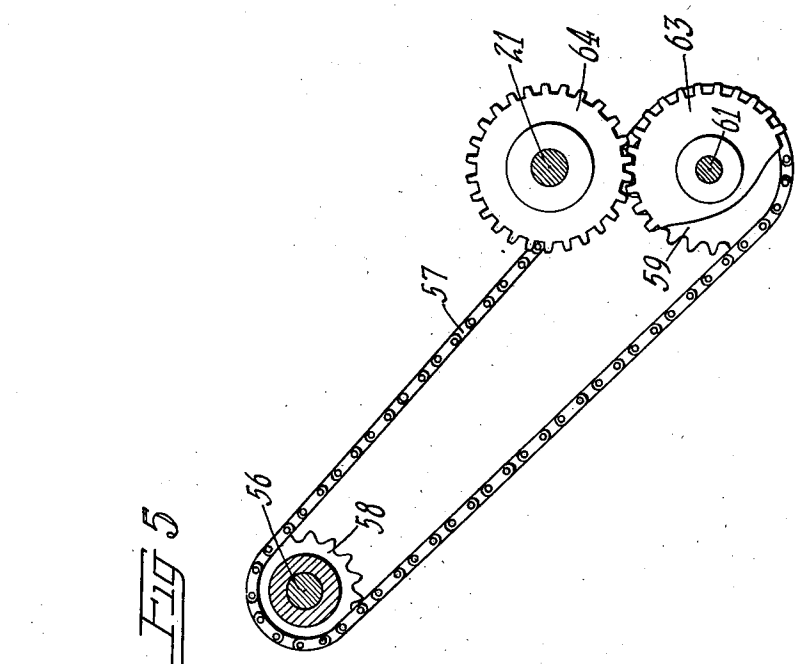


Fig 5

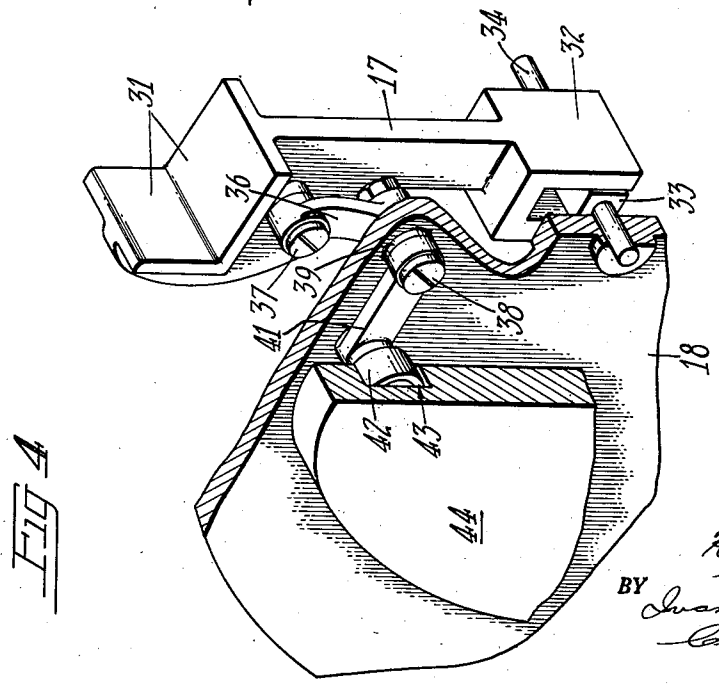


Fig 4

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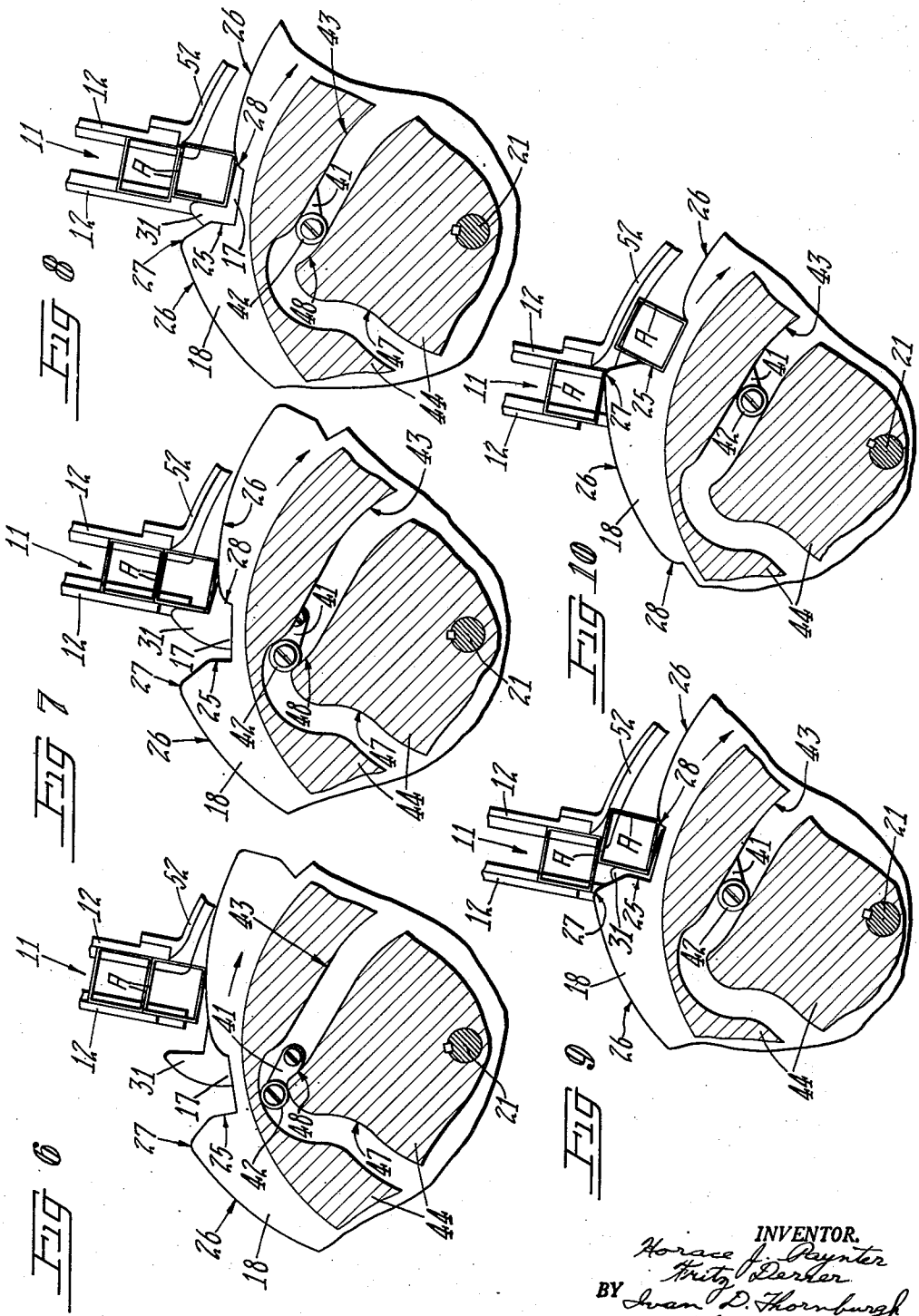


Fig 8

Fig 7

Fig 6

Fig 10

Fig 9

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MECHANISM FOR GENTLY ENGAGING AND FEEDING FRAGILE ARTICLES

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11 Claims. (Cl. 214—8.5)

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The present invention relates to a mechanism for feeding fragile articles such as container bodies from a stack of such articles and has particular reference to devices for and a method of softening the impact between the feeding elements and the articles during removal of the articles from the stack.

An object of the invention is the provision of a mechanism for and a method of feeding fragile articles from a stack wherein initial engagement of an article to be removed from the stack is effected slowly and gently so that distortion, breakage or other damage to the article is prevented.

Another object is the provision of such a feeding mechanism and method wherein an initially engaged article may be gradually accelerated to a speed equal to that of a main feeding element for continued feeding by the main feeding element.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a side view of one form of feeding mechanism for carrying out the method steps of the instant invention, with parts broken away;

Fig. 2 is an enlarged transverse sectional view taken substantially along the line 2—2 in Fig. 1, with parts broken away;

Fig. 3 is a reduced scale longitudinal section taken substantially along the broken line 3—3 in Fig. 2 with parts broken away;

Fig. 4 is an enlarged perspective detail, with parts broken away and parts shown in section;

Fig. 5 is a reduced scale sectional view taken substantially along the line 5—5 in Fig. 2, with part broken away; and

Figs. 6 to 10 inclusive are enlarged schematic views showing certain of the parts of the mechanism in different positions for feeding articles from a stack.

As a preferred and exemplary embodiment of the invention the drawings illustrate a feeding mechanism for feeding container bodies A (Fig. 1) individually and in timed order from the bottom of a stack of such bodies, for further advancement in timed order as an incident in the fabrication of a container. The container bodies A preferably are made of fibre material and are rectangular in shape with both ends open. Such a container body is exceedingly fragile and must

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be handled carefully until reenforced by the application of its end members in a subsequent operation.

In the mechanism the stack of bodies A is disposed in an upright position in a magazine 11 (Figs. 1, 2 and 3) defined by a plurality of upright guide rails 12 secured to brackets 13 bolted to a cover portion 14 of a pair of side frames 15 which constitute the main frame of the mechanism. The ends of the magazine are open for replenishing the stack from the top and for feeding the container bodies from the bottom of the stack.

The container bodies A are fed from the bottom of the magazine 11 individually by a plurality of feeding elements or fingers 17 (see Figs. 2 and 3) which are radially disposed between and rotate with a pair of spaced and parallel rotatable conveyors or advancing turrets 18 located in a vertical position under the magazine. The turrets are formed on a common hub 19 which is mounted on and keyed to a continuously rotatable drive shaft 21 journaled in bearings 22, 23 formed in the side frames 15. The drive shaft 21 may be rotated in any suitable manner in a clockwise direction as viewed in Figs. 1 and 3.

The outer peripheries of the turret 18 are formed with a plurality of spaced and transversely aligned advancing pockets 25 for receiving the bodies from the feeding fingers 17 and for advancing them in timed order to a suitable place of deposit. Between these pockets the peripheries of the turrets are formed with curved support edges 26 for supporting and gradually lowering the stack of bodies during the removal of the lowermost body in the stack by the feeding fingers 17. For this purpose the support edges 26 recede from a high point 27 adjacent the following edge of each pocket to a low point 28 adjacent the leading edge of the next following or subsequent pocket.

There is one feeding finger 17 for each aligned set of pockets 25 in the turrets 18. The outer end of each finger 17 is formed with an L shaped or substantially right angular jaw 31 (see also Fig. 4) for engaging and feeding the lowermost container body A from the magazine 11. The inner ends of the feeding fingers 17 are formed with a slotted slide member or yoke 32 which straddles and is radially movable on a guide block 33 freely mounted on a stationary rod 34 fixed in and extending through the spaced turrets 18 adjacent the drive shaft 21. The yoke 32 and the guide block 33 occupy substantially the entire space between the turrets 18 so as to properly guide each

of the feeding fingers 17. With such a mounting the feed fingers are free to shift radially and to also rock angularly on the rods 34.

Provision is made for shifting each of the feed fingers 17, as mentioned above, under controlled action, as they rotate with the turrets 18 past the magazine 11 to soften the impact of the fingers against the container body A during removal of the body from the magazine. For this purpose each feed finger 17 is provided with an actuating arm 36 (Figs. 2, 3 and 4). One end of each arm 36 is mounted on a pivot pin 37 carried in its associated finger 17 intermediate the ends of the finger. The opposite end of each arm 36 is secured to a short pivot shaft 38 carried in a bearing 39 formed in one of the turrets 18. Beyond the bearing 39, on the outside of the turret 18, the pivot shaft 38 is secured to a cam arm 41 (see also Fig. 1) which carries a cam roller 42 which operates in a cam groove 43 of a stationary face cam 44. The cam surrounds the drive shaft 21 and is bolted to the inner face of the drive shaft bearing 23.

Hence as the turrests 18 rotate, they carry the feed fingers 17 with them around a circular path of travel and cause the cam rollers 42 to traverse the cam groove 43. The cam groove 43 for its major portion is concentric with the turret drive shaft 21. As a cam roller 42 traverses this concentric portion of the cam it holds its associated feed finger 17 in a normal position with its feeding jaw 31 in substantial transverse alignment with the advancing pockets 25 of the turrets 18 as shown in the majority of the pockets in Fig. 3. In this relation the feed jaws travel with the pockets 25 at the uniform rate of speed of the turrets 18.

However, as an empty pocket 25 approaches the magazine 11 (see Fig. 3) to receive and advance a container body A, the speed of travel of the feed jaw 31 is greatly accelerated and the jaw is thus thrust forward in advance of its associated pocket 25 to a position best shown in Fig. 6. This acceleration of the feed jaw 31 is brought about by the cam roller 42 traversing an outwardly curved portion 47 (see also Fig. 1) of the cam groove 43. The feed jaw effects this forward thrust while being propelled by the turret 18 to which it is connected by way of its actuating arm 36 and its yoke 32.

The forward thrust of the feeding jaw 31 terminates just before the jaw engages the lowermost container body A in the magazine and in a predetermined relation to the body as shown in Fig. 6. At the termination of this forward thrust and as the feeding finger 17 continues to move forward with the turret 18 at its uniform rate of advancement, the feeding jaw immediately starts a receding or decelerating movement away from the container body and toward the pocket 25. At first this decelerating action is rapid but less than the rate of travel of the forward moving pocket 25. As the decelerating action continues, the rate of deceleration of the feeding jaw is reduced to effect a slowing of the jaw. This is brought about by an inwardly curved portion 48 of the cam groove 43 and forms a continuation of the outwardly curved portion 47 (see Fig. 7). This inwardly curved portion 48 of the cam groove merges into the concentric major portion of the groove.

The result of this forward thrust of the feeding jaw 31 and its immediate rapid decelerated action while traveling forward with the turrets 18 is to substantially nullify or greatly reduce momentarily the forward travel of the feeding jaw immediately before contact of the jaw with the body so that upon contact the jaw will be traveling very slowly and will therefore engage the body gently and start its removal from the magazine slowly and gently. This contact of the jaw with the body is made during the first or rapidly decelerating portion of the cycle of operation as the cam roller 42 begins its travel along the sharply inclined section of the cam groove portion 48 as best shown in Fig. 7.

As the cam roller 42 continues to traverse the less inclined section of the cam groove portion 48 it gradually reduces or slows the rate of deceleration of the feed jaw 31. This permits the jaw 31 to gradually accelerate the rate of speed of the container body A being removed from the bottom of the magazine. However the rate of acceleration of the body is less than the constant or uniform speed of travel of the pocket 25.

Hence the pocket 25 gradually catches up with the feed jaw 31 and its body A and just as the accelerating rate of travel of the body reaches or nearly reaches the uniform travel of the pocket, the pocket receives the body from the jaw and thereafter continued advancement of the body is effected by the turrets 18 at their uniform rate of travel.

In this manner the transfer of the body from the feeding jaw 31 to the turret advancing pockets 25 is effected gently and without damage to the fragile body. This gradual acceleration of the body during its removal from the magazine 11 and its transfer to the turret pockets 25 is clearly shown in Figs. 8, 9 and 10.

During the gradual removal of a container body A from the magazine 11, it is supported adjacent one corner by the feed jaw 31. Its opposite or leading corner is supported on the receding support edges 26 of the turrets 18 as best shown in Fig. 7. Since the turrets rotate at a uniform speed which is faster than the forward accelerating movement of the body, the leading corner of the body slides along the receding support edges 26 and the body is thus lowered gradually and gently into the pockets 25 of the turrets (see Figs. 8, 9 and 10). Due to the manner in which the feeding finger 17 is mounted between the turrets 18, the finger and the jaw 31 formed thereon move radially under the control of the cam roller 42 and this permits the jaw to lower its supported side of the body in time with that portion of the body supported on the turret edges 26.

As the lowermost body in the stack moves outwardly and downwardly for reception in the turret pockets 25, the stack moves down in the magazine, still supported by the lowermost body as best shown in Figs. 7, 8 and 9 until the high point 27 of the receding support edges 26 of the turrets pass under the magazine as shown in Fig. 9. With this high point 27 of the turrets in place under the magazine, the support of the stack is transferred to the support edges 26 as best shown in Fig. 10 when the lowermost body is completely clear of the stack. The body thus supported on the turret edges 26 now becomes the lowermost body and is lowered with the remainder of the stack as the turrets rotate to position this body for a subsequent removal from the magazine by the next approaching pocket 25 and its feeding jaw 31.

A container body A upon being received in a pocket 25 of the turrets 18 is advanced along a curved path of travel toward a transfer wheel comprising a pair of integral spaced and parallel

discs 51 (Figs. 1 and 3). Curved guide rails 52 disposed adjacent the turrets 18 guide the bodies and retain them in their pockets 25 as they are advanced.

The transfer wheel discs 51 are formed with spaced pockets 54 for receiving the moving bodies from the advancing turrets 18 and for conveying them in timed relation to any suitable place of deposit for a subsequent operation. A curved guide rail 55 disposed adjacent the outer periphery of the transfer wheel discs guides the bodies and retains them in their pockets 54 as they advance with the wheel.

The transfer wheel discs 51 rotate continuously in time with the advancing turrets 18. For this purpose the wheel discs are mounted on and keyed to a shaft 56 which is journaled in suitable bearings formed in the mechanism side frames 15. The shaft is driven in the proper direction and at the proper speed by an endless drive chain 57 (Figs. 2 and 5) which operates over a sprocket 58 mounted on the shaft 56. The chain is driven by a sprocket 59 which rotates on an idler pin 61 carried in a boss 62 formed in one of the side frames 15. The sprocket 59 in turn is driven by a gear 63 which is formed integrally with the sprocket and which meshes with a gear 64 mounted on and driven by the main drive shaft 21.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction, and arrangement of parts of the apparatus mentioned herein and in the steps and their order of accomplishment of the process described herein, without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the apparatus and process hereinbefore described being merely a preferred embodiment thereof.

We claim:

1. In a mechanism for feeding fragile articles from a stack, the combination of a magazine for holding the stack of articles, feeding means movable past said magazine for engaging and removing an article therefrom, actuating means for imparting a variable forward movement to said feeding means to advance the feeding means slowly into engagement with the article to be removed and after engagement increasing the movement of said feeding means to advance the article at an accelerated predetermined speed, and article advancing means carrying said feeding means freely mounted thereon, said advancing means being movable at said predetermined speed for receiving said article and continuing its movement for subsequent treatment.

2. In a mechanism for feeding fragile articles from a stack, the combination of a magazine for holding the stack of articles, article advancing means movable past said magazine, feeding means carried by and movable with said advancing means for initially engaging and removing an article from said magazine and for delivering it to said advancing means, and actuating means connected with said feeding means for shifting said feeding means relative to said advancing means for moving said feeding means slowly and gently into engagement with the article to be removed from said magazine and for accelerating the rate of movement of said article to the speed of said advancing means for removing the article from the magazine and for delivering it gently to said advancing means.

3. In a mechanism for feeding fragile articles from a stack, the combination of a magazine for holding the stack of articles, article advancing means movable at a constant speed of travel past said magazine, feeding means freely mounted on said advancing means and movable relative thereto for engaging and removing an article from said magazine and for delivering it to said advancing means, and actuating means for shifting said feeding means relative to said advancing means for moving said feeding means slowly and gently into engagement with the article to be removed from said magazine and for accelerating the rate of movement of said article to the speed of said advancing means for removing the article from the magazine and for delivering it gently to said advancing means.

4. In a mechanism for feeding fragile articles from a stack, the combination of a magazine for holding the stack of articles, article advancing means movable at a constant speed of travel past said magazine, feeding means freely mounted on said advancing means and movable relative thereto for engaging and removing an article from said magazine and for delivering it to said advancing means, and actuating means operable against said feeding means and thrusting said feeding means in advance of said advancing means and returning said feeding means toward said advancing means in an initial rapid decelerating action immediately followed by a gradual decelerating action for effecting initial engagement of the article to be removed by said feeding means slowly and gently to protect said article against damage and for accelerating the movement of said engaged article to the speed of said advancing means for removing the article from the magazine and for delivering it gently to said advancing means.

5. In a mechanism for feeding fragile articles from a stack, the combination of a magazine for holding the stack of articles, an article advancing turret having an article receiving pocket, said turret being rotatable at a constant speed adjacent said magazine, a feeding finger freely mounted on said turret and movable therewith, said feeding finger having a feed jaw normally disposed adjacent said turret pocket and movable relative thereto for engaging and removing an article from said magazine and for delivering it into said pocket, and jaw actuating means operable against said feed finger and thrusting said feed jaw in advance of said turret pocket and returning said feed jaw toward said pocket in an initial rapid decelerating action immediately followed by a gradual decelerating action for effecting initial engagement of the article to be removed by said feed jaw slowly and gently to protect said article against damage and for thereafter accelerating the movement of said engaged article to the speed of said turret for removing the article from the magazine and for delivering it gently into said turret pocket for further advancement.

6. In a mechanism for feeding fragile articles from a stack, the combination of a magazine for holding the stack of articles, an article advancing turret having a plurality of article receiving pockets spaced around its periphery, said turret being rotatable at a constant speed adjacent said magazine, a plurality of feeding fingers freely mounted on and movable with said turret and located one adjacent each pocket, said feeding fingers having a feed jaw normally disposed adjacent said turret pockets and movable relative

thereto for engaging and removing articles in succession and in timed order from said magazine and for delivering them into said pockets, and jaw actuating means operable against said feed fingers and thrusting said feed jaws in advance of said turret pockets and returning said feed jaws toward said pockets in an initial rapid decelerating action immediately followed by a gradual decelerating action for effecting initial engagement of the article to be removed by a said feed jaw slowly and gently to protect said article against damage and for thereafter accelerating the movement of said engaged article to the speed of said turret for removing the article from the magazine and for delivering it gently into said turret pocket for further advancement.

7. In a mechanism for feeding fragile articles from a stack, the combination of a magazine for holding the stack of articles, an article advancing turret having an article receiving pocket, said turret being rotatable at a constant speed adjacent said magazine, a feeding finger freely mounted on said turret and equipped with a feed jaw normally disposed adjacent said turret pocket and having radial and angular movement relative thereto for engaging and removing an article from said magazine and for delivering it into said pocket, said feeding finger having a yoke and pin connecting with said turret for guiding said jaw in a radial direction, an actuating arm pivotally connected with said finger and with said turret for moving said finger and its feed jaw in an angular direction, a cam arm connected with said actuating arm and carrying a cam roller, and a stationary actuating cam having a cam groove for said cam roller, said cam controlling the actuation of said finger and thrusting said feed jaw in advance of said turret pocket and returning said feed jaw toward said pocket in an initial rapid decelerating action immediately followed by a gradual decelerating action for effecting initial engagement of the article to be removed by said feed jaw slowly and gently to protect said article against damage and for thereafter accelerating the movement of said engaged article to the speed of said turret for removing the article from the magazine and for delivering it gently into said turret pocket for further advancement.

8. In a mechanism for feeding fragile articles from a stack, the combination of a magazine for holding the stack of articles, an article advancing turret disposed below said magazine and being rotatable at a constant speed, said turret having a plurality of article receiving pockets spaced around its periphery and having support edges extending between said pockets, said support edges receding from a leading pocket toward a following pocket for supporting the stack of articles as the lowermost article in the stack is removed therefrom and for lowering the lowermost article into its pocket in time with the rotation of said turret, feeding means movable with said turret for initially engaging and removing said lowermost article from said magazine and for delivering it into a pocket of said turret, said feeding means having a supporting element cooperating with said turret support edges for supporting said lowermost article during removal of the article from the magazine and its delivery into said turret pocket, and actuating means for shifting said feeding means relative to said turret pockets for moving said feeding means slowly

and gently into engagement with said lowermost article and for thereafter gradually accelerating the rate of movement of said article to the speed of said turret for gently removing the article from the magazine and for gently delivering it into a said turret pocket for advancement with said turret.

9. In a mechanism for feeding fragile articles from a stack, the combination of a magazine for holding the stack of articles, article lowering means for gradually lowering into feeding position the lowermost article in the stack, feeding means movable past said magazine for engaging and removing the positioned article therefrom, actuating means for moving said feeding means slowly into engagement with the positioned article to be removed, said actuating means thereafter increasing the movement of said feeding means to advance the engaged article at an accelerated predetermined speed, and article advancing means carrying said article lowering means thereon and being movable at said predetermined speed for receiving said article and continuing its movement for subsequent treatment.

10. In a mechanism for feeding fragile articles from a stack, the combination of a magazine for holding the stack of articles, feeding means movable past said magazine for engaging and removing an article therefrom, actuating means for moving said feeding means slowly into engagement with the article to be removed, said actuating means thereafter controlling the movement of said feeding means to advance the article at an accelerated predetermined speed, article advancing means movable at said predetermined speed for receiving said article and continuing its movement for subsequent treatment, and means on said article advancing means and engageable under the stack of articles for supporting the stack during removal of the lowermost article therefrom and for gradually lowering into feeding position for subsequent removal the article next above the article being removed.

11. In a mechanism for feeding fragile articles from a stack, the combination of a magazine for holding the stack of articles, feeding means movable past said magazine for engaging and removing an article therefrom, actuating means for moving said feeding means slowly into engagement with the article to be removed, said actuating means thereafter controlling the movement of said feeding means to advance the article at an accelerated predetermined speed, article advancing means movable at said predetermined speed and carrying said feeding means for receiving said article from said feeding means and continuing its movement for subsequent treatment, and means for discharging the advanced article from said advancing means.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,886,378	Dearsley	Nov. 8, 1932
1,920,563	Jahne	Aug. 1, 1933
1,985,897	Huntar	Jan. 1, 1935
2,007,981	Nordquist	July 16, 1935