United States Patent

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[72] Inventor **Edward S. Godlewski**
531 Walnut St., Des Plaines, Ill. 60616

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[54] **FEEDING MECHANISM**
9 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **271/35,** 271/41, 271/DIG. 7
[51] **Int. Cl.** **B65h 1/06,** B65h 3/06
[50] **Field of Search** ..... 271/35, 41, 19, DIG. 7

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Primary Examiner—Joseph Wegbreit
Assistant Examiner—Bruce H. Stoner, Jr.
Attorney—John J. Kowalik

ABSTRACT: A mechanism for feeding stock in batches from the bottom of a pile of stock located in a primary magazine to a secondary magazine and arranging the items shingle fashion thereupon, a timed conveyor discharging the stock one at a time from the bottom of the secondary conveyor in conjunction with a pair of serially arranged spaced parallel metering rollers which are timed to move incrementally with the conveyor to advance the bottom stock item to a pullout roller assembly, the stock items being metered by a series of retards offset along the path of travel of the item and the downstream retard forming with the second metering roller on intake nip for the bottom item being fed thereinto.

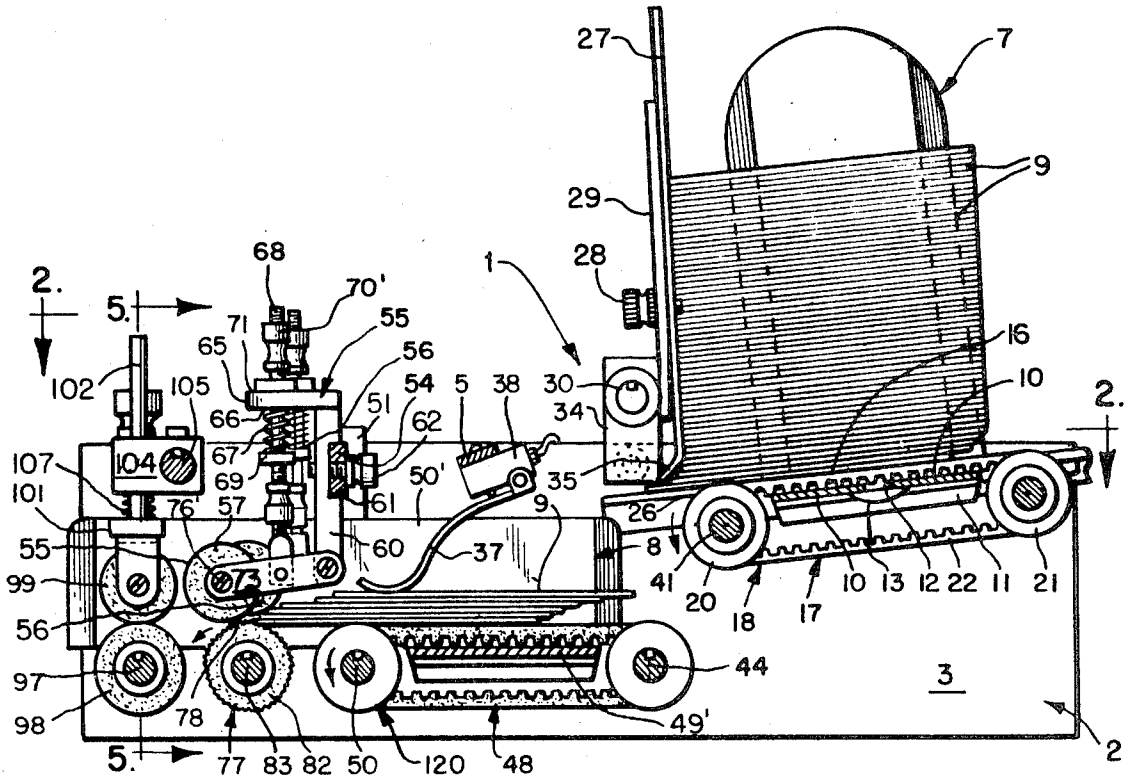
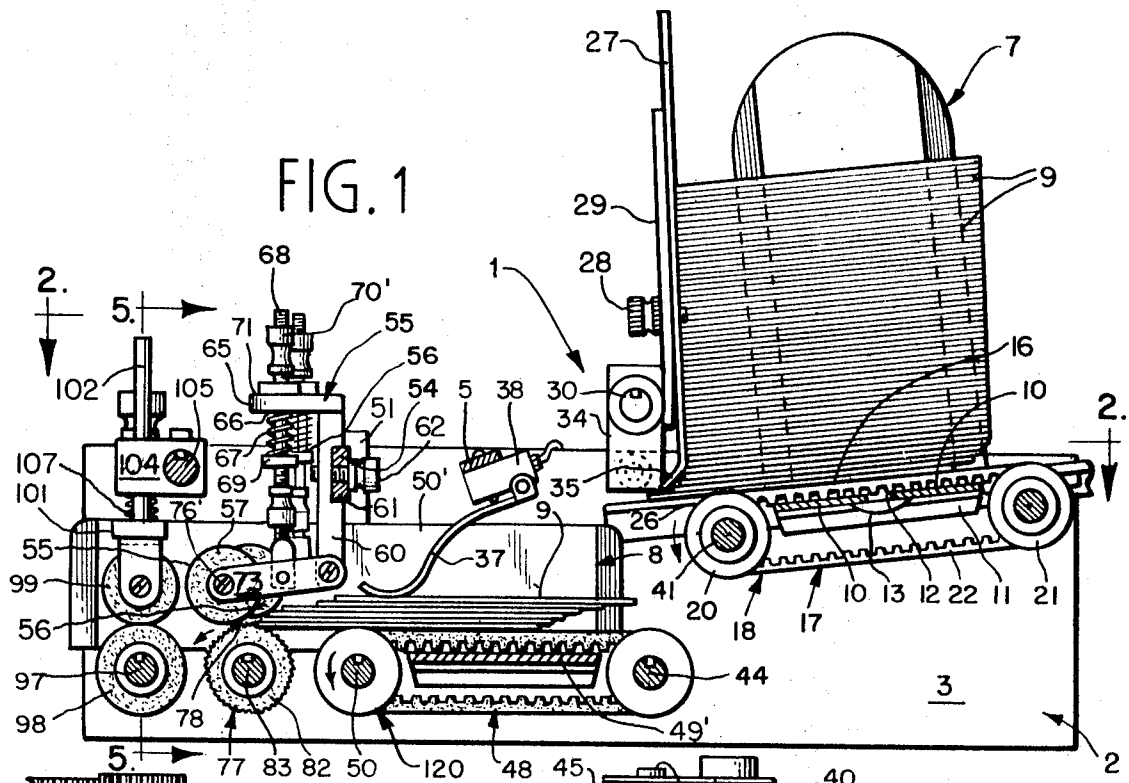


FIG. 1



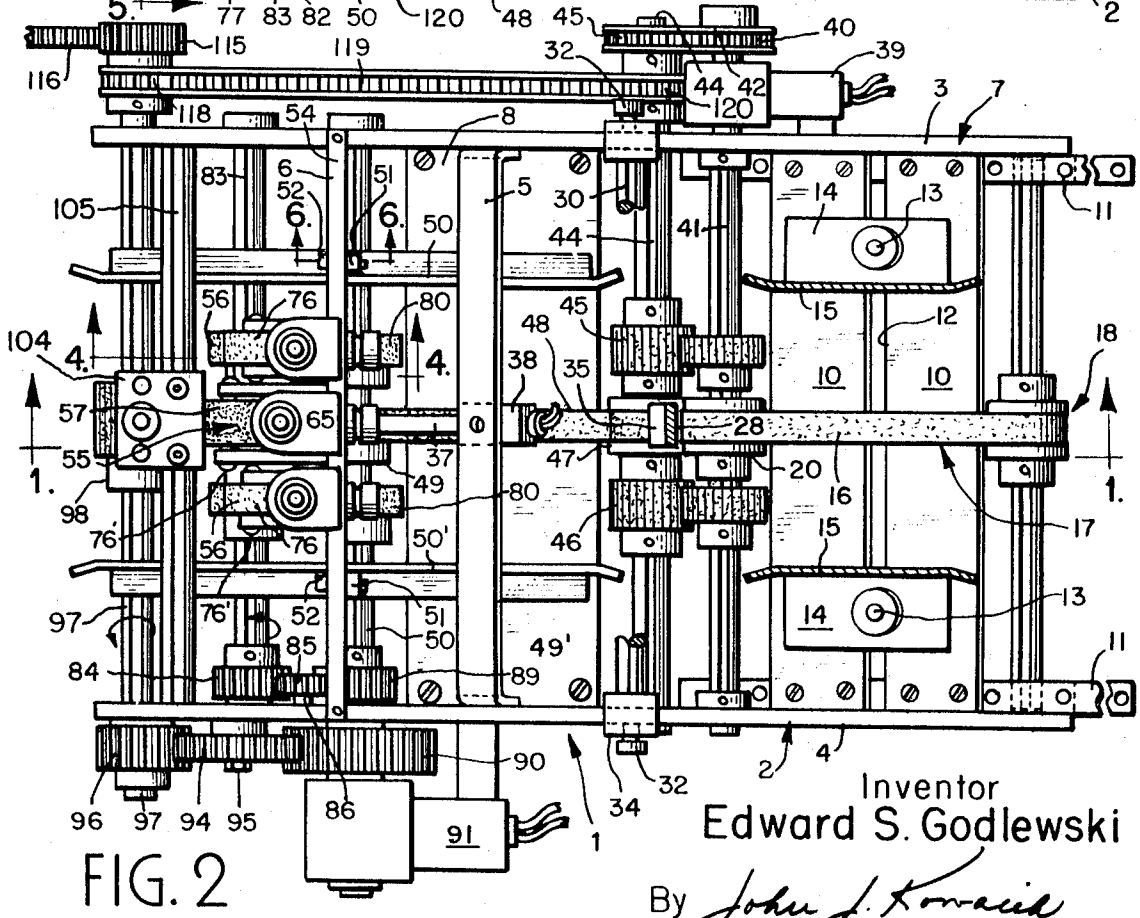


FIG. 2

Inventor
Edward S. Godlewski

By John J. Kowalik
Attorney

FIG. 3

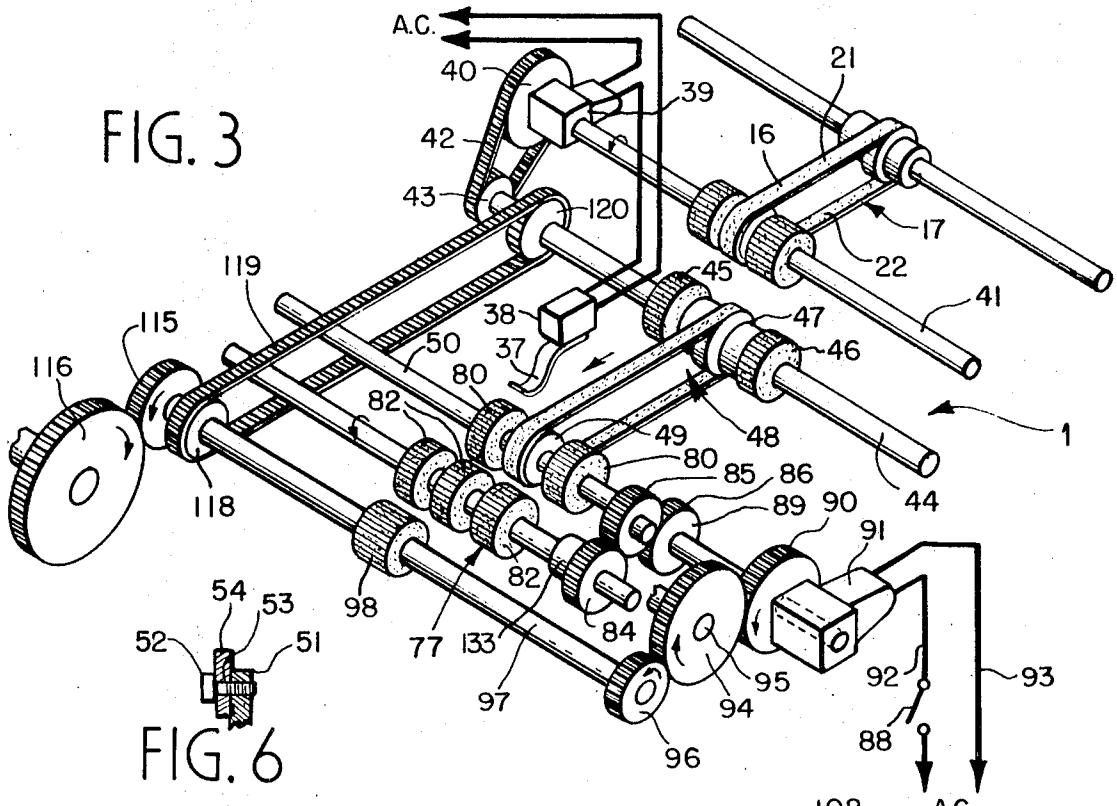


FIG. 6

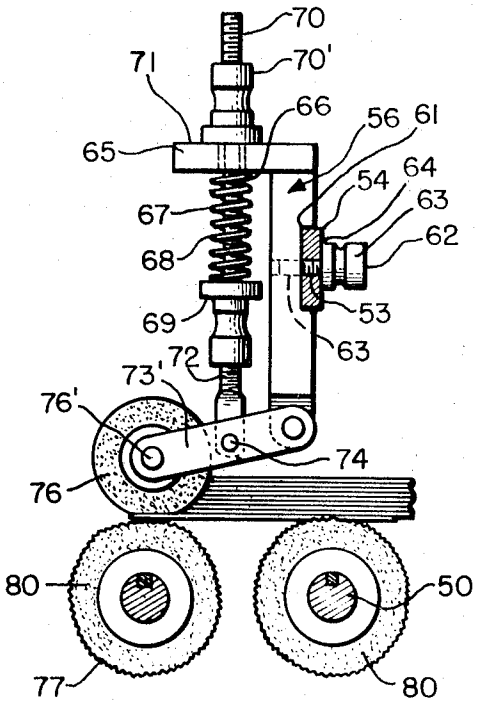


FIG. 4

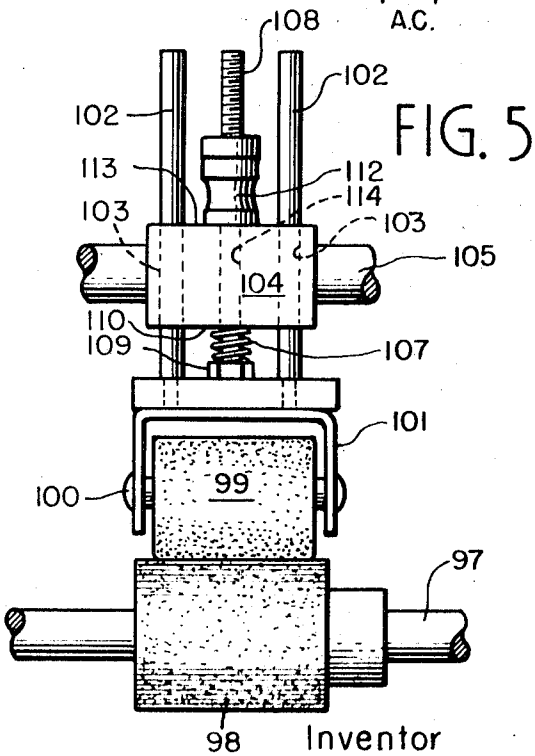


FIG. 5

Inventor
Edward S. Godlewski
By John J. Konecki
Attorney

FEEDING MECHANISM

DISCUSSION OF THE PRIOR ART

In prior art devices a single magazine has been used with a metering gate arranged to form with the bottom of the magazine a metering slot of a vertical dimension for issuing the bottom item. This mechanism presupposes that each such item, such as a sheet of paper is absolutely flat. Any bend or curl in the edge frustrates the operation. Items, such as stuffed envelopes, must be jogged to bring all of the material in the envelope to one end. If any envelope is not properly prepared, two envelopes will issue one which has a thin end and one with a thick end. These problems have continuously plagued the industry until the advent of the instant invention.

SUMMARY OF THE INVENTION

This invention is directed to a bottom feed mechanism which issues stock item-by-item regardless of the relative thicknesses of the adjacent superposed items.

A general object of the invention is to provide a novel feeder which has a retard assembly superposed with the metering roller and which for certain applications can be adjusted to provide at least a pair of retards one ahead of the other in intercepting relation to stock items being delivered thereto and which function to fan the items and the downstream retard engaging the lowest item and the upstream retard temporarily engaging the next item above the bottom item and releasing such next item to drop onto the conveyor therebelow as soon as the lowermost item is withdrawn.

A more specific object is to provide a novel feeding mechanism which comprises primary and a secondary magazines and means for feeding items from the primary magazine in blocks and means for feeding items individually from the bottom of the blocks of stock in the secondary magazine.

A further object is to provide a novel bottom feeder which will feed individual intermixed items of different thickness from the bottom of the stack regardless of the texture thereof.

Another object is to provide a novel control for feeding items in blocks from one magazine to another in accordance with predetermined requirements.

A further object is to provide a novel metering roller assembly which comprises a pair of rollers one of which drives a conveyor underposed with respect to a magazine and is sequentially actuated to advance an item to a second roller driven with the first roller for a predetermined time to enter a feed roller which is driven for a longer time, the second roller incorporating a one-way clutch so as to enable it to rotate while drive is interrupted thereto to facilitate withdrawal of the item therefrom by the pullout roller assembly.

These and other objects and advantages inherent in and encompassed by the invention will become more readily apparent from the specifications and the drawings, wherein:

FIG. 1 is a sectional view of my novel feeding mechanism taken substantially on line 1—1 of FIG. 2 with parts removed and parts shown in section to the illustration; wall

FIG. 2 is a top plan view of the feeding mechanism;

FIG. 3 is a perspective view of the roller mechanism and drive therefor;

FIG. 4 is an enlarged cross-sectional view taken substantially on line 4—4 of FIG. 2;

FIG. 5 is an enlarged side elevation view of the pull out roller assembly taken essentially on line 5—5 of FIG. 1, and

FIG. 6 is an enlarged section taken substantially on line 6—6 of FIG. 2.

DESCRIPTION OF THE INVENTION

The novel bottom feeder generally designated 1 comprises a framework broadly indicated 2 which includes a pair of laterally spaced vertical sidewalls 3 and 4 and intervening interconnecting braces 5 and 6.

Primary and secondary hoppers or magazines 7 and 8 are mounted between the sidewalls 3 and 4. The primary

magazine is adapted to carry a large quantity of stock items 9, 9. Bottom transverse plates 10, 10 are provided which at their lateral edges are seated upon the slides or supports 11, 11. The pair of plates 10, 10 define a transverse slot 12 therebetween which admit adjusting bolts 13, 13 therethrough, the bolts extending through horizontal flanges 14, 14 which are part of upright guides 15, 15 and secure them in laterally adjusted positions equal to the width of the stock 9 positioned therebetween.

Intermediate the guides 15, 15 there is disposed the top run 16 of an endless belt 17 of a conveyor generally designated 18. The belt 17 is trained about a drive shaft pulley 20 and an idler pulley 21. The belt has its top run 16 running above plates 10 and its return run 22 below the plates.

The supports 11 and the primary magazine is inclined toward the secondary magazine 8 and the delivery end 26 is controlled by a metering plate or gate 27 which is adjustably secured by a bolt 28 operating in a vertical slot (not shown) to a front plate 29 of the magazine 7, said plate being 29 being pivotally or tiltably mounted on a horizontal axis via a shaft 30 which is secured by bolts 32, 32 to the mounting blocks 34, 34 which are secured to the sideplates 3 and 4. The lower end portion 35 of metering plate 27 is angled downwardly outwardly and serves to fan the items 9 as these are discharged in batches shingle fashion into the secondary magazine 8 as best seen in FIG. 1 until the level raises the arm 37 and trips the switch 38, mounted on brace 5, which controls an electric clutch 39 which connects a driving sprocket 40 mounted on drive shaft 41 which is connected to the driving pulley 20.

Sprocket 40 is connected by chain 42 to a sprocket 43 which is connected to a shaft 44 journaled in bearings in sidewalls 3 and 4. Shaft 44 carries a pair of axially slit rollers 45, 46 of elastomer material such as polyeurathane. A freewheeling idler pulley 47 is journaled on shaft 44 and serves as a support for a conveyor belt 48 trained thereabout, said belt 48 being trained about a drive pulley 49 connected to a drive shaft 50 journaled in bearings in the sidewalls 3 and 4.

The belt 48 has its top run trained over the bottom plate 49' of the secondary or metering hopper 8 and which carries a pair of laterally adjustable guide plates 50', 50' which are provided with threaded bosses 51 for receiving the bolts 52 which are slidable in a slot 53 in a mounting cross brace 54 connected at opposite ends to sides 3 and 4.

The brace 54 mounts a center retard assembly 55 and a pair of flanking roller assemblies 56, 56 which may function either as retards or as guide rollers and are in advance of the retard roller 57 of assembly 55 with respect to the direction of movement of the stock items 9 as seen in FIG. 1.

The retard assembly 55 comprises a mounting block 60 which is notched at 61 to complementally receive the mounting bar 54 to which it is secured by a bolt 62 which extends through slot 53 and is threaded as at 63 into the block 60 and has a head 63' bearing against side 64 of the bar.

The upper end of the block 60 is provided with a horizontal abutment 65 which serves as a seat at 66 for the upper end of a compression spring 67 which is sleeved on an adjusting bolt 68 upon which is threaded a compression nut 69 providing a seat for the lower end of spring 67. The upper end portion 70 of bolt 68 has a stop nut threaded 70' thereon which engages the top side 71 of the abutment 65. The lower end 72 of bolt 68 is pivoted to an arm 73 at 74 intermediate its ends and arm 73 is pivoted at one end at 75 to the lower end of block 60 and at its other end is secured as by a transverse bolt 76' to an annular retard disc 57 of elastomer material such as polyeurathane, the disc being nonrotatable but adapted to be turned after wear upon loosening of bolt 76'.

The disc 57 is adjusted toward the metering roller assembly 77 to provide a proper intake nip 78 for a single item 9 as best seen in FIG. 1.

The other roller-retard assemblies 56, 56 and the parts thereof are in essence constructed identical to the assembly 55 and mounted to bar 54 and are identically numbered. However, the arms 73' which correspond to arm 73 are shorter and

thus as best seen in FIGS. 1 and 2 and their discs 76 are in advance of disc 57. In certain applications these discs 76 are adjusted to rotate about their individual axis of bolts 76'. Where more than one item feeds through as when the items are of uneven thickness from end to end then one or both of the discs 76 are locked against rotation and serve as a retard. These discs 76 when acting as retards function not only to fan the items as seen in FIG. 4 but also to hold the items 9 above the lowermost item 9 from entering the nip 78. The lowermost item 9 slides under those above in the small pile in the auxiliary hopper and is assisted into the nip 78 by the conveyor assembly of radially slit rollers 80, 80 of elastomer material of rubber or synthetic plastic as the previous rollers connected to shaft 50, and by the belt conveyor 48.

The metering roller assembly 77 comprises in addition to the rollers 82, 82 made of elastomer material synthetic or rubber, a drive shaft 83 which is connected to rollers 82, shaft 83 being journaled in bearings in the side frames 3 and 4 and having a spur gear 84 connected thereto meshing with a counter or reversing gear 85 journaled on stub shaft 86 mounted on side frame 4, gear 85 meshing with gear 89 connected to the shaft 50 which is periodically connected and disconnected to a driving spur gear 90 thereon by an electrical synchroning clutch 91 which is connected by leads 92, 93 to a switch 88 serving signal source on the receiving mechanism such as, for example, an imprinter.

The spur gear 90 meshes with a reversing gear 94 journaled on stub shaft 95 carried on frame member 4, the gear 94 meshing with gear 96 connected to a shaft 97 journaled in bearings on frames 34, shaft 97 being connected to a roller 98 and providing a continuously running pullout roller assembly. The roller 97 cooperates with an opposing cooperating free-running roller 99 journaled on shaft 100 carried from an invested U-shaped yoke 101 which has a pair of vertical guide rods 102, 102 slidable in vertical opening 103, 103 in a support block 104 adjustably secured to a supporting traverse bar 105 carried at opposite ends on side frames 3 and 4.

The roller 99 is spring biased downwardly by a compression spring 107 which is sleeved on an adjusting bolt 108 and seats at its lower end against the adjusting nut 109 threaded on bolt 108 and at its upper end against the underside 110 of the block 104. The downward movement of the roller 99 is controlled by a nut 112 threaded on bolt 108 and seated against the top side 113 of the block, bolt 108 extending through vertical opening 114 in block 104.

The pullout roller shaft 97 has a gear 115 connected thereto meshing with gear 116 which is connected to any source of power such as an electric motor or any suitable power shaft of the receiving unit as will be known to those skilled in the art.

Shaft 97 has a sprocket 118 driving a chain 119 which drives a sprocket 120 connected to shaft 44 which is continuously driven, it being understood that the rollers 45, 46 carried thereby serve as transition conveying means for transferring the items dropped thereupon from the upper or principal hopper when when the electrical clutch 39 connects the sprocket 40 with shaft 41 when demand is made by the switch 38 when the level of the pile of stock items in the secondary hopper drops below a predetermined minimum height.

It will be observed that by providing two hoppers the load on the metered hopper is controlled. In order to move the bottom item in the metered hopper the conveyor belt 48 must move with the first metering roller assembly 20 including the shaft 50 and rollers 80, 80 of elastomer material thereon and also the second metering roller assembly 77, which is connected by one-way clutch 133 to gear 84, must move sufficient distance to move the item to the pullout rollers. Movement of the metering rollers 82 and belt 48 is controlled in phased sequence with demand requirements of the receiving mechanism or by closing the switch 88 in the circuit of the electrically energized lines 92, 93. The roller assembly 82 will overrun the gear 84 when drive is stopped by the pullout roller assembly 98, 99 pulling out the item 9 which at the moment is entered therebetween.

Having described a preferred embodiment other modifications will be suggested within the purview of the invention and the mere description is not intended to be per se limiting in any sense.

What is claimed is:

1. In a feeder, a primary hopper adapted to be filled with a high stack of stock items, a secondary hopper for loading with a small stack of such items, cooperative means in both hoppers for delivering items unidirectionally from the bottom of the high stack in the primary hopper and imbricately arranging the items in the small stack and delivering such small stack as a unit to a discharge of the secondary hopper, metering roller means for pulling the items from the bottom of the stack in the secondary hopper, supplementary means cooperatively arranged with said metering roller means for further imbricately arranging said items so that each item is offset forwardly from the one above in the secondary hopper and the bottom item alone feeds into the metering means, a pullout roller assembly in receiving relation to said metering roller assembly, means for driving part of said cooperative means in the secondary hopper and said metering roller assembly for transferring the bottom items from the secondary hopper to the metering roller assembly and thereby to the pullout roller assembly, and means operative between the driving means and said metering roller assembly accommodating overrunning thereby of the drive means at a time beyond the termination of the drive to the metering means to permit the pullout roller assembly to complete pullout of the item from the metering roller assembly.

2. The invention according to claim 1 and said retard means comprising a cylindrical element, means mounting said element for yieldable vertical movement, and at least one roller segment rotatable on an axis transverse of the direction of movement of the items and disposed in advance of the retard and having a peripheral contour engaging the ends of the items and arranging them in eschelon with each item offset farther away than the item below from the retard means.

3. A feeder having a hopper, means disposed to deliver blocks of stock items into the hopper and imbricately arrange them in a pile therein, metering means at the delivery end of the hopper, means terminating adjacent to said metering means for discharging the items from the bottom of the pile into the metering means, said metering means comprising an intermittently running roller assembly rotatable on a substantially horizontal axis, a yieldably mounted retard comprising a cylinder of elastomer material forming a nip with the roller assembly, an adjustable spring-biased auxiliary wheel assembly having an axis of rotation disposed before the axis of rotation of the roller assembly, and positioned between the end of said discharging means and said roller assembly and superposed with respect to said roller assembly in position to engage the adjacent edges of the imbricately arranged items and operative to further arrange the items in said imbricate arrangement at the metering roller assembly and operative to sweep over each successive item at the bottom of the stack and advance the same into said nip.

4. The invention according to claim 3 and means for locking the metering wheel from rotation so as to function as a retard at the option of the operator.

5. A mechanism for feeding stock items from the bottom of a pile comprising first and second communicatively arranged magazines wherein a high pile of stock items are loaded in said first magazine, conveying means on the bottom of said second magazine, means for feeding a quantity of items from the bottom of the pile in the first magazine in a predetermined direction into the second magazine to form a small stack of items of predetermined height therein on said conveying means and attendant to the movements of said conveying means arranging the items imbricately in the second magazine, said conveying means disposed to move the imbricately arranged stack in the aforesaid direction to a delivery end thereof, arranging means at said delivery end of said conveying means disposed in intercepting relation to the

adjacent end of the stack for further arranging the items shingle fashion so that each item from the bottom to the top of the stack is projected at its delivery end slightly ahead of the item thereabove, metering means for discharging successive items from the bottom of the stack for delivery to associated mechanism and comprising a metering roller assembly disposed at the delivery end of said second magazine, means for intermittently driving said metering means in predetermined sequence, pullout roller means disposed to receive items from said metering means, means for driving said pullout roller means for a period longer than that at which said metering means is driven, and said means for driving the metering roller assembly including a one-way clutch whereby said assembly is freely rotatable upon discontinuation of drive thereto while an item is being pulled therefrom by the pullout roller means.

6. A mechanism for feeding stock items from the bottom of a pile comprising first and second communicatively arranged magazines wherein a high pile of stock items are loaded in said first magazine, conveying means on the bottom of the second magazine, means for feeding a quantity of items from the bottom of the pile in the first magazine in a predetermined direction into the second magazine to form a small stack of items of predetermined height therein on said conveying means and attendant to the movements of said conveying means arranging the items imbricately in the second magazine, said conveying means disposed to move the imbricately arranged stack in the aforesaid direction to a delivery end thereof, arranging means at said delivery end of said conveying means disposed in intercepting relation to the adjacent end of the stack for further arranging the items shingle fashion so that each item from the bottom to the top of the stack is projected at its delivery end slightly ahead of the item thereabove, metering means for discharging successive items from the bottom of the stack for delivery to associated mechanism and comprising a metering roller assembly arranged serially at the delivery end of the conveying means, and said arranging means comprising downwardly yieldably biased retard means above the metering roller assembly and defining an intake nip therewith substantially in horizontal alignment therewith, and at least one downwardly biased adjustable roller segment mounted for rotation on an axis generally parallel with the metering roller assembly and disposed ahead of the retard means toward said conveying means and positionable at selected elevations with respect to the upper portion of said conveying means and serving to engage said items in said arrangement as the stack on the conveying means is moved thereby toward said metering means.

7. The invention according to claim 6 and means for locking said roller segment against rotation so as to function as a retard.

8. The invention according to claim 6 and a second roller segment rotatable on an axis coaxial with the first-mentioned roller segment, and said rollers disposed in laterally displaced relation to said retard means.

9. The invention according to claim 8 and said retard means comprising a cylindrical element of elastomer material and said roller segments being of elastomer material.