United States Patent

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[54] **MAGAZINE CONSTRUCTION FOR PACKING CASE ERECTING MACHINE**
10 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **93/53,** 93/36, 93/93
[51] **Int. Cl.** **B31b 1/06,** B31b 1/78, B31b 1/94
[50] **Field of Search** ..... 93/36 (S), 44.1 (GTF), 52, 53, 93

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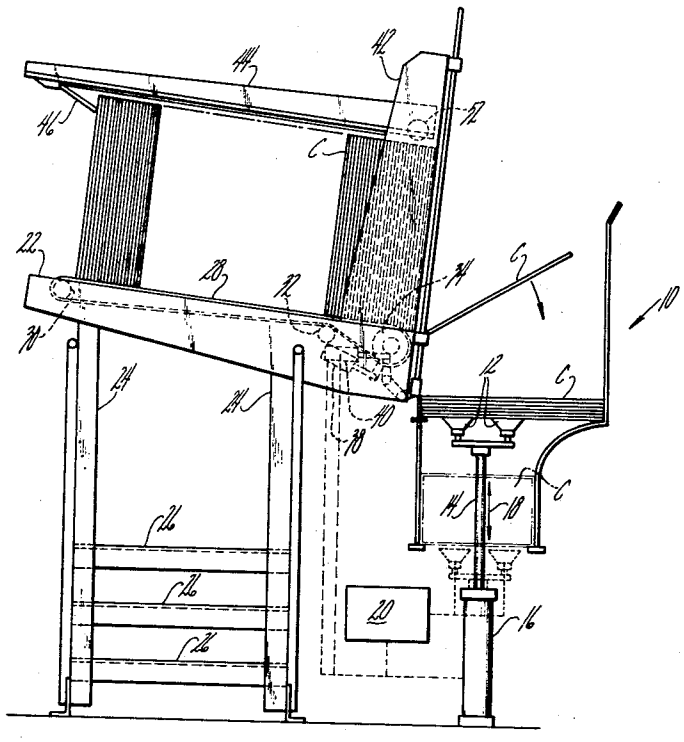
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ABSTRACT: A secondary case magazine is provided above and to one side of an upwardly open primary case magazine from which the lowermost case is cyclically withdrawn for erection. The secondary magazine is disposed generally horizontally, and holds a large number of cases in generally vertical edgewise relation. Escapement means at the exit end of the secondary magazine successively ejects each case for downward movement onto the stack of cases in the primary magazine. Means in the secondary magazine urges all of the cases therein toward said exit end, and said means operates in timed relationship with said escapement means and said means for withdrawing the lowermost case from the primary magazine.



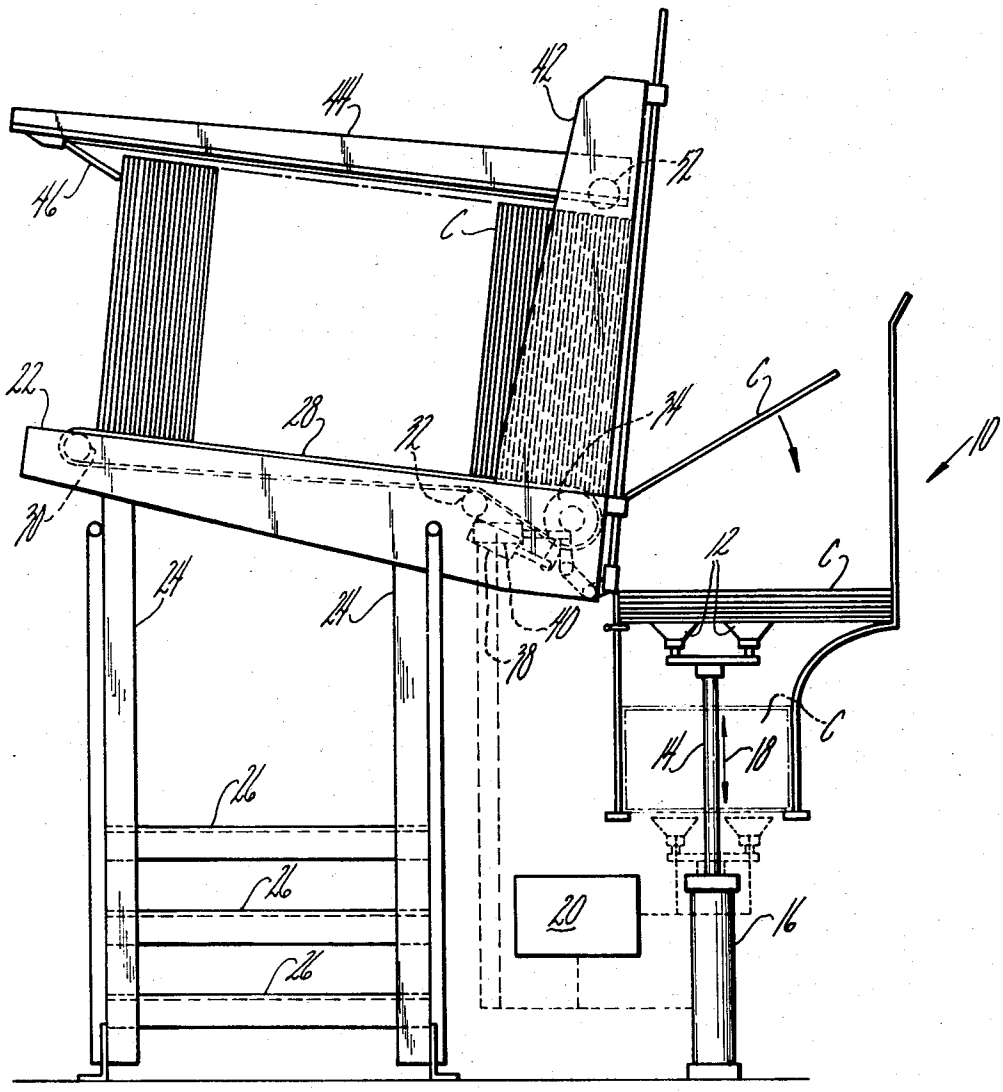


FIG. 1

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FIG. 2

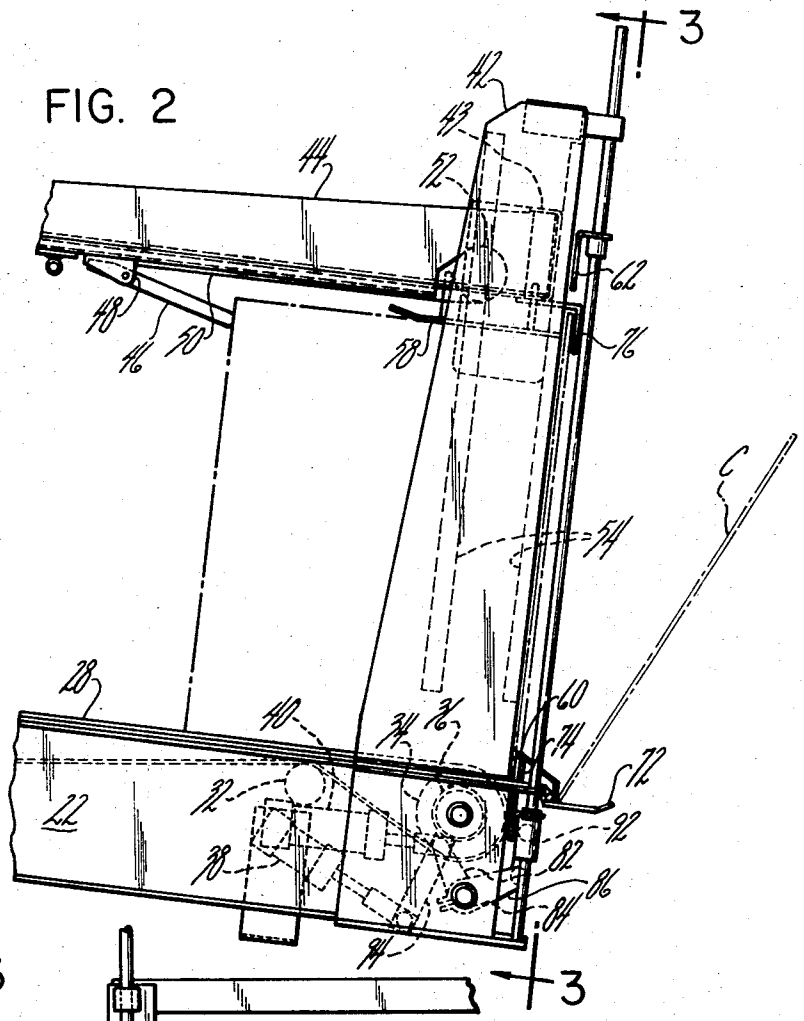
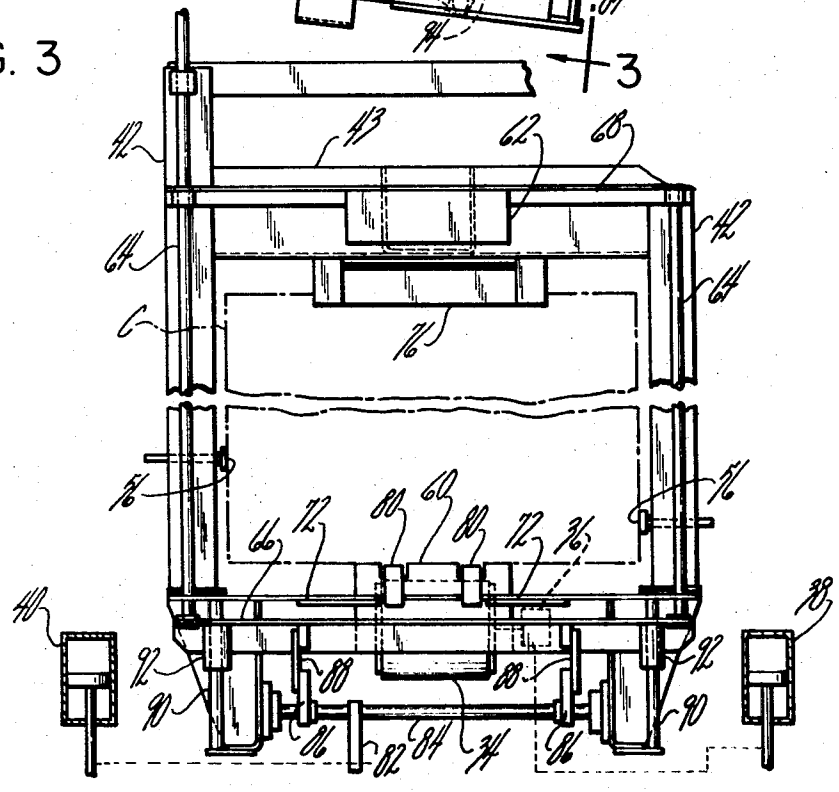

3
42
43
44
72
62
48
46
50
58
76
C
54
28
40
34
36
60
74
72
22
32
92
38
82
86
84
94
3

FIG. 3


42
43
62
68
42
64
64
C
76
76
76
66
72
80
60
80
72
36
40
38
92
92
90
90
88
88
86
82
84
34
86

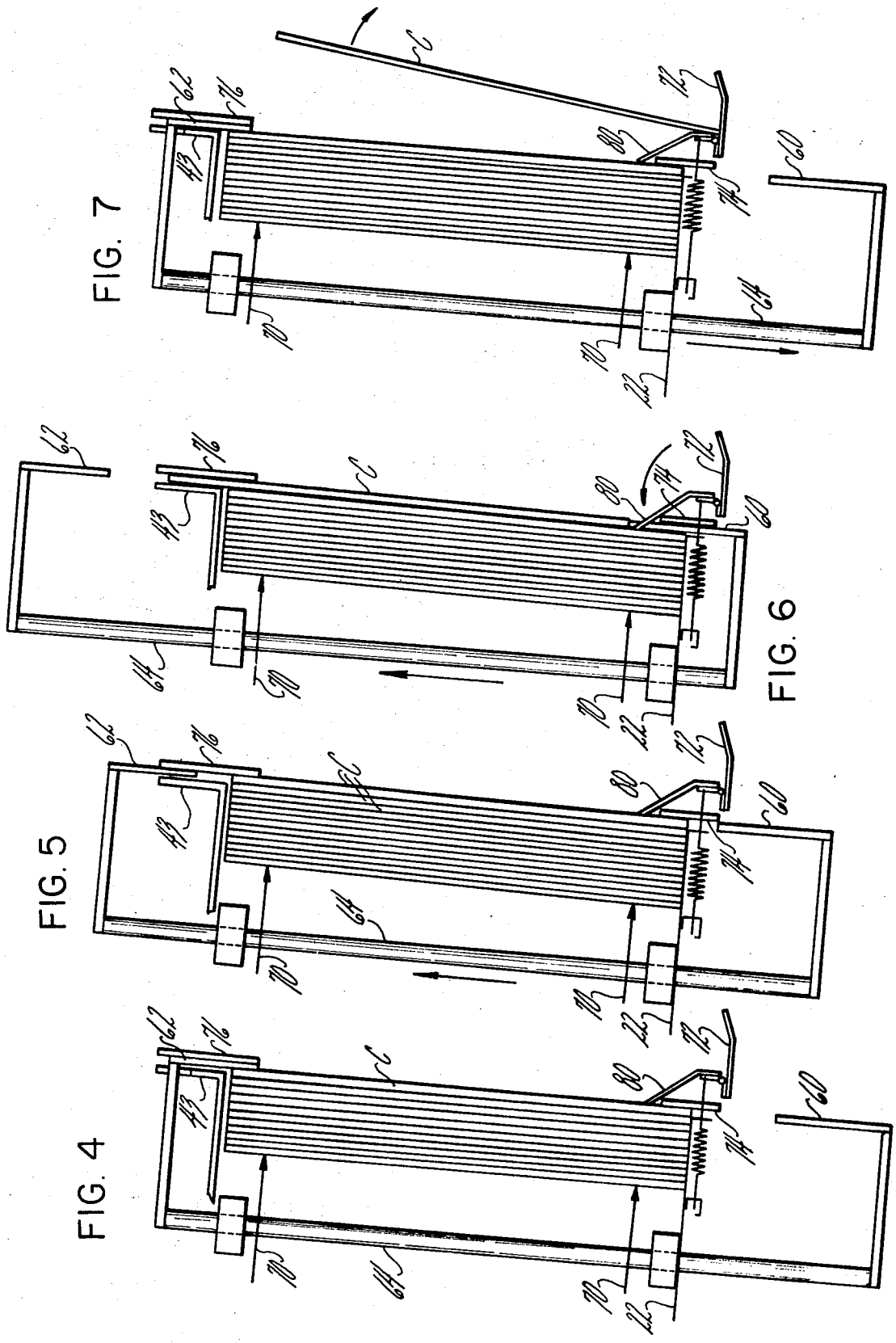


FIG. 7

FIG. 6

FIG. 5

FIG. 4

MAGAZINE CONSTRUCTION FOR PACKING CASE ERECTING MACHINE

SUMMARY OF INVENTION

This invention relates to machines for erecting packing cases, and deals more particularly with a magazine construction so arranged as to store large numbers of cases in their flat folded condition.

A general object of the present invention is to provide a magazine construction for storing a large number of flat folded cases or similarly arranged blanks, wherein these cases or blanks can be sequentially withdrawn from the downstream end either for erection or gluing up.

Another general object of the present invention is to provide a magazine construction of the foregoing character for use with a primary magazine wherein a relatively small number of cases are stored, whereby a conventional mechanism for withdrawing the lowermost case from the primary magazine is not adversely effected by weight of the total number of cases in both magazines.

A more specific object of the present invention is to provide a magazine construction which permits the lowermost case in a vertical stack of flat folded cases in the primary magazine to be cyclically withdrawn by a conventional mechanism, an auxiliary or secondary case magazine being arranged to automatically replenish the cases so withdrawn from the primary magazine to maintain a predetermined number of flat folded cases in said primary magazine.

A still further specific object of the present invention is to provide an auxiliary or secondary case magazine for replenishing cases withdrawn from a primary upwardly open magazine, which secondary case magazine is capable of storing a large number of cases in stacked edgewise relationship, said edgewise cases in said secondary magazine being so located that their weight does not bear against the conventional mechanism for withdrawing the lowermost case from said primary magazine.

The drawings show a preferred embodiment of the invention and such embodiment will be described, but it will be understood that various changes may be made from the construction disclosed, and that the drawings and description are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a side elevational view of a magazine construction incorporating the present invention, with a conventional mechanism for withdrawing the lowermost case from a primary upwardly open magazine being shown in schematic fashion.

FIG. 2 is a detailed view of the exit end of the secondary or auxiliary magazine shown in FIG. 1.

FIG. 3 is an end view taken along the line 3–3 of FIG. 2 showing the exit end of said secondary magazine, with portions of the operating mechanism being indicated schematically thereon.

FIGS. 4, 5, 6, and 7 indicate schematically the sequence of operation of the escapement means provided at the exit end of the secondary case magazine shown in FIGS. 2 and 3.

DETAILED DESCRIPTION

Turning now to the drawings in greater detail, FIG. 1 shows in pertinent part a portion of a machine for erecting packing cases from the flat to an open or erected position for loading. The reader is referred to my prior copending application entitled "Machine For Erecting Cases and Positioning Them For Loading," filed Feb. 13, 1967, under Ser. No. 615,778, now U.S. Pat. No. 3,412,652 issued Nov. 26, 1968 for a more complete description of one possible machine of the type with which the magazine construction of the present invention might be adapted for use. As described therein, an upwardly open case magazine, of the type shown generally at 10 in FIG. 1, may be provided for storing a stack of flat folded cases one above the other. In accordance with the disclosure in the aforementioned patent application, means is provided for cyclically withdrawing the lowermost case from the magazine 10 and erecting the case so withdrawn as indicated by the rectangularly shaped case C shown in broken lines in FIG. 1. Vacuum means 12 is provided at the upper end of a piston rod 14, comprising the movable portion of a vertically disposed actuator 16, for movement in the direction indicated by the arrow 18. Control means is provided, as indicated generally at 20, for controlling the vertical reciprocations of the vacuum means 12, and for controlling the vacuum at the case engageable vacuum cups for achieving continuous operation of said case withdrawing means. It will be appreciated by those skilled in the art that the mechanism just described comprises only one of several mechanisms which might be used for withdrawing the lowermost case from a case magazine of the type indicated generally at 10 in FIG. 1. For example, means might be provided for stripping the lowermost case horizontally from said magazine 10 without departing from the scope of the present invention.

In accordance with the present invention, a secondary case magazine is provided above and to one side of the upwardly open magazine 10 for storing a large number of flat folded cases in generally vertical orientation with their lowermost edges resting upon a table portion 22 of the magazine frame. The table portion 22 is preferably inclined slightly with respect to the horizontal as shown and is supported on four legs 24, 24 so as to locate the exit end of the secondary case magazine slightly above and to one side of the upwardly open magazine 10. A plurality of generally horizontal steps 26, 26 may be provided between pairs of said legs 24, 24 in order to facilitate loading of cases in the secondary case magazine.

Means is provided in the secondary magazine for urging all of the cases therein toward the exit end, and as shown said means includes an endless conveyor belt 28 having an upper run for engaging the lower side edges of said folded cases so as to move said cases toward the right and toward the exit end of the secondary magazine. The conveyor belt 28 is entrained over drums 30, 32 and 34, the latter of which is driven through an intermittently operated clutch 36, best shown in FIG. 3. The clutch 36 is cyclically operated by means of an actuator 38, which actuator receives a pulse each time that the mechanism for removing a case from the primary case magazine is retracted. Since the latter operates automatically through the control mechanism, indicated generally at 20 in FIG. 1, it will be apparent that the actuator 38 also operates automatically and in timed relationship with the means for withdrawing cases from the magazine 10. A second actuator 40 is similarly pulsed in timed relationship with operation of the means for withdrawing the lowermost case in the primary magazine 10 and its function will be described in greater detail hereinbelow.

Referring now more particularly to the construction of the auxiliary or secondary case magazine, the lower generally horizontal wall thereof is defined by the table portion 22 and the belt 28 against which the lower side edges of the flat folded cases C, C rest while contained in this magazine. A pair of fixed uprights or supports 42, 42 are provided at the downstream end of the magazine with their lower ends being attached to the table portion 22. The supports 42, 42 cooperate to define an exit end therebetween of said secondary case magazine. The upper ends of the supports 42, 42 carry a crossmember 43 best shown in FIG. 3 which crossmember in turn carries a box beam 44 extending rearwardly with respect to the supports 42, 42 in generally parallel relationship to the table portion 22. The box beam 44 generally defines the upper wall of the secondary case magazine and slidably supports a depending pusher 46, which pusher 46 is continuously biased from the position shown in FIG. 1 toward the exit end of the secondary case magazine with a force which is relatively constant with reference to the particular position of said pusher along its path of movement. More particularly, the depending pusher 46 is carried on a slide 48, which slide is mounted for

movement toward and away from the open or exit end of the case magazine. The slide **48** is connected through a cable **50**, to a spring loaded drum **52**, which drum is rotatably supported in the crossmember **43** and comprises a commercially available device of the type which is adapted to exert a constant force not related to the angular position of the drum **52** with respect to its cable **50**. It will thus be apparent that the means for urging all of the edgewise cases toward the exit end of the secondary magazine includes not only the endless belt conveyor **28** but also the biasing means just described for urging the pusher **46** toward the right as viewed in FIGS. **1** and **2**. Finally, and still with reference to the beam **44** and its crossmember **43** defining the upper wall of the secondary case magazine, it will be appreciated that these components are adjustably mounted vertically between the upright supports **42**, **42** by means of ways **54**, **54** provided for this purpose so that the magazine can accommodate cases of various heights.

As shown in FIG. **3** the exit end of the horizontal dimension of the secondary case magazine is more particularly defined by a plurality of adjustable guides **56**, **56** which guides are mounted at spaced vertical locations on the supports **42**, **42** so that the width of the secondary magazine can be conveniently varied. As shown in FIG. **2** the exit end of the secondary case magazine also includes an adjustable shoe **58** for assuring that the cases C, C being advanced along the secondary case magazine move in accurately aligned relationship with respect to one another.

In further accordance with the present invention, escapement means is provided at the exit end of the secondary case magazines for sequentially releasing at least the endmost case from said magazine to replace the case being withdrawn from the upwardly open magazine **10** by the conventional mechanism described hereinabove. As best shown in FIGS. **2** and **3**, said escapement means comprises a generally vertically reciprocable pallet having a lower shear plate **60** for engaging the lower side edge of the case furthest downstream in said magazine as the pallet is moved vertically upwardly in response to a pressure pulse delivered to the actuator **40**. The pallet comprises a portion of the escapement means in the exit end of the secondary magazine, which pallet further includes an upper shear plate **62** engageable with the upper side edge of the aforementioned furthest downstream case. The upper shear plate **62** engages the upper side edge of this case during downward vertical movement of the pallet. The shear plates **60** and **62** are connected to one another through a pair of vertically reciprocable push rods **64**, **64**, and laterally extending angle brackets **66** and **68** respectively, connected at either end to the parallel push rods **64**, **64**. The construction of the pallet is schematically illustrated in FIGS. **4—7** inclusively with its generally vertical reciprocatory movement also illustrated with reference to the cases in the magazine including that case furthest downstream, showing the manner in which said case is ejected. The upper surface of the table portion **22** of the secondary case magazine is inclined slightly as shown and it will be appreciated that all of the cases in the magazine are urged toward the right as indicated by the arrows **70**, **70** in response to operation of the above-described belt conveyor **28** and spring biased pusher element **46**. The pallet, comprising part of the escapement means of the present invention, includes the above-mentioned push rods **64**, **64**, one of which is shown in these views, with the lower and upper shear plates **60** and **62** being fixedly connected to the push rod **64** as schematically shown. In response to reciprocation of the actuator **40** suitable mechanism is provided for moving the push rod **64** from the position shown in FIG. **4**, through that shown in FIG. **5**, to a raised position illustrated in FIG. **6**. As will be apparent from these views, the lower shear plate **60** raises the furthest downstream case C and the upper shear plate **62** subsequently engages the upper side edge of the case to move the case downwardly from the position shown in FIG. **6** so as to eject the case as shown in FIG. **7**, the line pressure of the succeeding cases in the magazine serving to force the case outwardly onto a horizontal shelf **72** carried adjacent the downstream end edge of the fixed portion of the secondary magazine structure.

The exit end of the secondary case magazine is provided with upper and lower fixed stops for normally retaining the cases in horizontally compacted edgewise relationship against the force of the pusher **46** and/or the bias created by intermittent motion of the belt conveyor **28**. The lower fixed stop **74** is mounted at each of its ends to the fixed frame of the magazine, and defines a laterally extending slot through which the lower shear plate **60** is adapted to move as described hereinabove. The upper fixed stop **76** is similarly situated with respect to the crossmember **43** to define a laterally extending slot through which the upper shear plate **62** is adapted to move as shown in FIG. **4** through **7**. As so constructed and arranged, it will be apparent that the pallet includes case engaging portions movable into and out of the path of movement of the edgewise cases in the secondary magazine for sequentially moving the case to be released in its own plane so as to clear the fixed stops **74** and **76** at the exit end of said case magazine in order to permit the line pressure of the succeeding cases in the magazine to force the furthest downstream case outwardly, whereby the said case is adapted to drop downwardly into the upwardly open magazine **10**. More specifically, the lower shear plate **60** permits the case to clear the lower fixed stop **74** so that a spring loaded guide member **80** can move inwardly beneath the lower side edge of the case C as shown in FIG. **6**. The upper shear plate **62** subsequently causes downward movement of the case to clear the upper fixed stop **76**. As the case so moves, its lower edge rides outwardly on the surface of the guide member **80**, ultimately to reach the unstable position shown in FIG. **7**. Gravity then takes over to pivot the case about its lower edge so that it falls into the primary magazine **10** as indicated in FIG. **1**.

Turning now to a more detailed description of the means for cyclically moving the pallet described above in timed relationship with the mechanism for withdrawing the lowermost case from the primary magazine **10**, FIG. **2** shows a pneumatic actuator **40** having a piston rod connected to a crank arm **82** carried on a rockshaft **84** rotatably mounted in the table portion **22** of the secondary case magazine. As best shown in FIG. **3**, the rockshaft **84** also carries a pair of arms **86**, **86** each of which is connected through an intermediate link **88**, **88** to the moveable crossmember **66** comprising a part of the pallet described above. The crossmember **66** is slidably supported on vertically arranged guides **90**, **90** provided for this purpose in the fixed frame of the secondary magazine. Slide blocks **92**, **92** are carried by the crossmember **66** for so supporting this portion of the pallet. As indicated in FIG. **1**, whenever the control unit **20** for the conventional mechanism for withdrawing cases from the primary magazine **10** actuates the cylinder **16**, a corresponding pulse is directed to the actuator **40** for causing corresponding movement of the pallet so as to eject a case from the exit end of the secondary case magazine.

In a similar manner, the upper run of the belt conveyor **28** is adapted to move incrementally so as to feed all of the cases in the secondary magazine generally horizontally toward the right and toward the exit end of said magazine in response to a similar pulse directed to the actuator **38** described hereinabove. As indicated in FIG. **3** and as shown in detail in FIG. **2**, the actuator **38** moves a crank arm **94** which in turn advances the clutch **36** through a predetermined angular displacement for causing movement of all the flat folded cases in the secondary magazine through the thickness of one such case.

I claim:

1. In a machine for erecting packing cases the improvement comprising an upwardly open magazine for storing a predetermined number of flat folded cases in a stack, means for cyclically withdrawing the lowermost case in said stack for erection, a secondary case magazine located above and to one side of said upwardly open magazine for storing folded cases edgewise, said secondary magazine including means for urging all of said edgewise cases toward one end thereof, and escape-

ment means at said one end of said secondary magazine for sequentially releasing at least the endmost edgewise case from said secondary magazine to replace the cases withdrawn from said upwardly open magazine, said escapement means comprising a generally vertically reciprocable pallet having a case engaging portion movable into and out of the path of movement of said edgewise cases for cyclically moving the case to be released in its own plane, and a first fixed stop at said one end of said secondary case magazine for normally retaining said cases in compacted relationship therein, said pallet serving to displace the case furthest downstream in said secondary magazine so that the line pressure of the succeeding cases in said secondary magazine forces said furthest downstream case in said secondary magazine outwardly whereby said case is adapted to drop downwardly into said upwardly open magazine.

2. The combination defined in claim 1 wherein said pallet includes a lower shear plate for engaging a lower side edge of said downstream case during upward vertical movement thereof to raise the same above said first fixed stop, said pallet further including an upper shear plate engageable with the upper side edge of said downstream case during downward vertical movement of said pallet, and an upper fixed stop aligned with said first fixed stop for normally retaining said cases in compacted relationship in said secondary magazine, said upper shear plate serving to move the upper side edge of said downstream case downwardly past said upper fixed stop so that the line pressure of the succeeding cases in said secondary magazine forces said furthest downstream case outwardly.

3. The combination defined in claim 2 wherein said escapement means further includes guide means associated with said lower fixed stop and movable into and out of the open end of said horizontal magazine for deflecting said downwardly moving lower side edge of said case outwardly with respect to said lower fixed stop during downward movement of said pallet.

4. The combination defined in claim 3 wherein said case guide means further includes a fixed shelf against which the lower side edge of said case is adapted to drop after being guided past said lower fixed stop whereby said case pivots about its lower side edge and enters said upwardly open magazine in a flat folded substantially horizontal position.

5. The combination defined in claim 1 wherein said means for urging all of said edgewise cases toward one end of said secondary magazine comprises an endless belt conveyor having an upper run for engaging the lower side edges of said folded cases in said secondary magazine, drive means for said belt conveyor, said drive means being intermittently operable in timed relationship with reciprocable movement of said pallet to advance all of said folded cases toward said one end of said secondary magazine.

6. The combination defined in claim 1 wherein said means for urging all of said cases toward said one end of said secondary magazine comprises a case engaging pusher slidably supported in said secondary magazine for movement toward and away from said open end thereof, and biasing means for urging said pusher toward said one end with a force which is relatively constant with reference to the particular position of said pusher along its path of movement.

7. The combination defined in claim 5 wherein said means for urging all of edgewise cases toward said one end of said secondary magazine further includes a depending case engaging pusher slidably supported in an upper wall of said secondary magazine for movement toward and away from said open end thereof, and biasing means for urging said pusher into contact with the rearmost case in said secondary magazine for advancing all of said folded cases toward said open end with a force which is relatively constant with reference to the particular position of said rearmost case in said secondary magazine.

8. The combination defined in claim 7 wherein said pallet includes a lower shear plate for engaging a lower side edge of said downstream case during upward vertical movement thereof to raise said case above said first fixed stop, said pallet further including an upper shear plate engageable with the upper side edge of said downstream case during downward vertical movement of said pallet, and an upper fixed stop aligned with said first fixed stop for normally retaining said cases in compacted relationship against the bias of said pusher and belt, said upper shear plate serving to move the upper side edge of said downstream case downwardly past said upper fixed stop so that said case is urged outwardly by said pusher and belt.

9. In a machine for erecting packing cases, and including an upwardly open magazine for storing a predetermined number of flat folded cases in a stack, the improvement comprising a secondary case magazine located above and to one side of said upwardly open magazine for storing folded cases edgewise on a lower wall thereof, means for urging all of said edgewise blanks toward an exit end of said secondary magazine, stop means at said exit end, means for cyclically withdrawing the lowermost case in said stack for erection, escapement means at the exit end of said secondary magazine for cyclically moving the endmost edgewise blank in its own plane so that the line pressure of the cases in said secondary magazine cyclically releases said endmost case to drop downwardly into said upwardly open magazine.

10. The combination defined in claim 9 wherein said escapement means comprises a reciprocable pallet having a blank engaging portion movable into and out of the path of movement of said edgewise blanks for cyclically moving a blank to be released in its own plane, and a shelf for engagement by the lower edge of the released blank to permit pivotal downward movement thereof about its lower edge as said blank drops toward said upwardly open magazine.