

June 16, 1953

T. R. BAKER ET AL

2,642,285

BLANK MAGAZINE FOR FOLDING BOX MACHINES

Filed Oct. 25, 1950

4 Sheets-Sheet 1

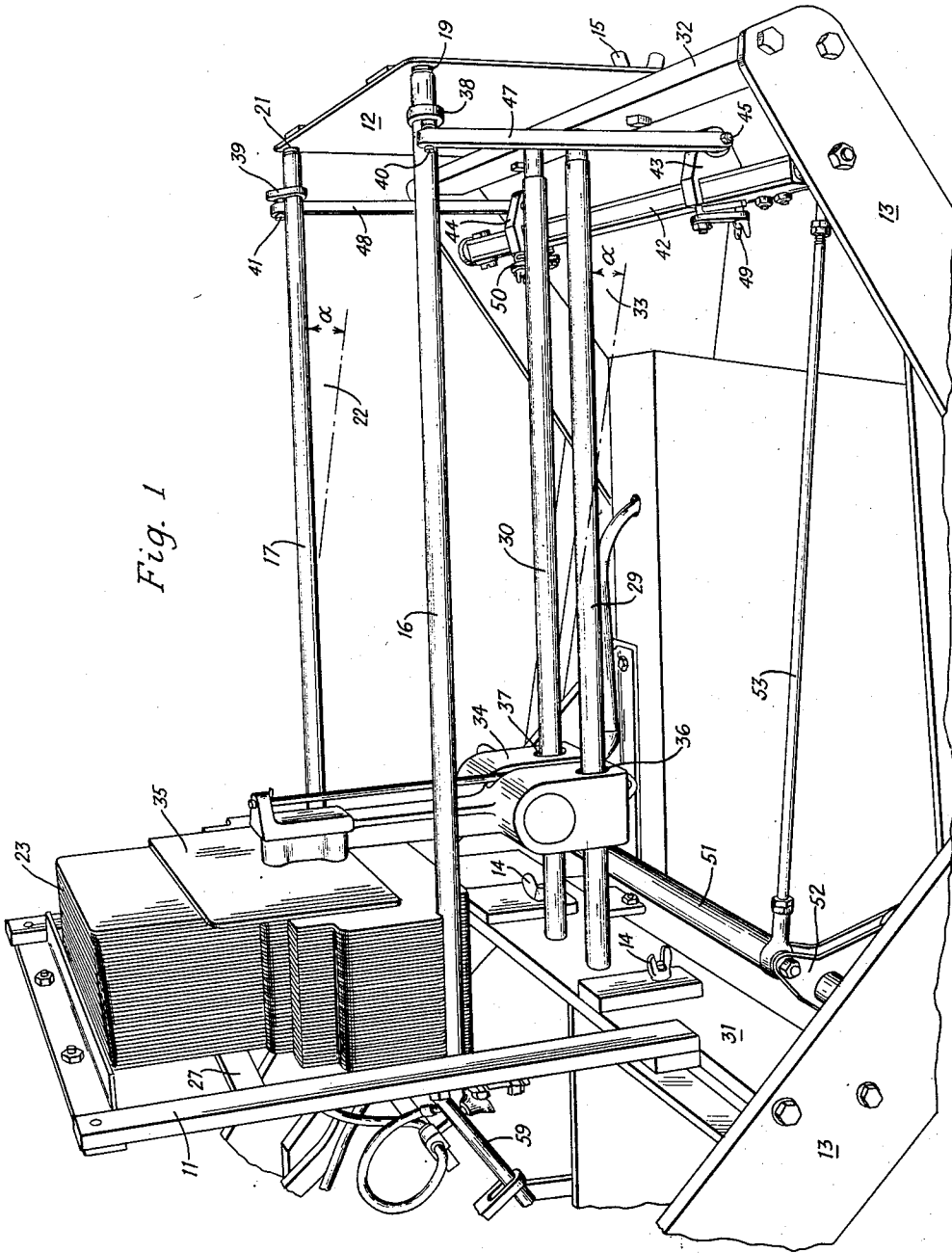


Fig. 1

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4 Sheets-Sheet 2

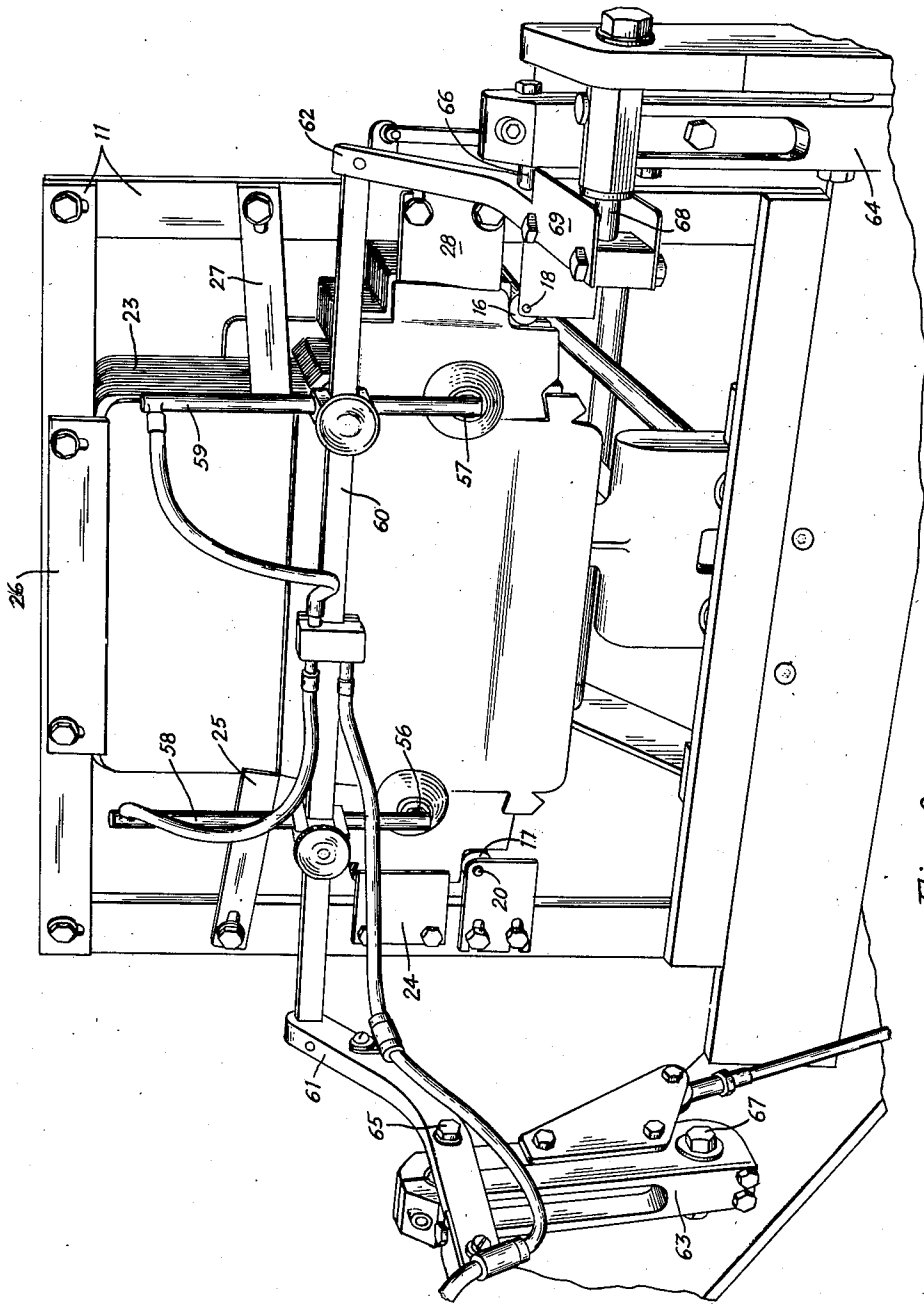


Fig. 2

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4 Sheets-Sheet 3

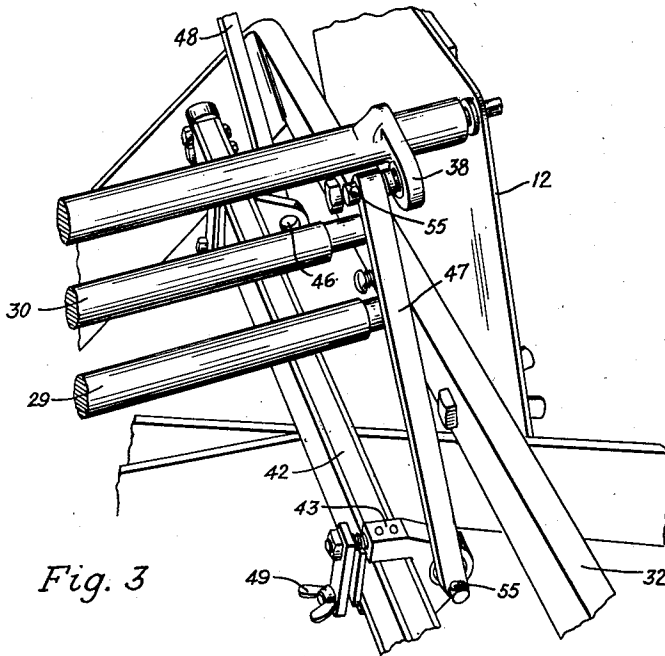


Fig. 3

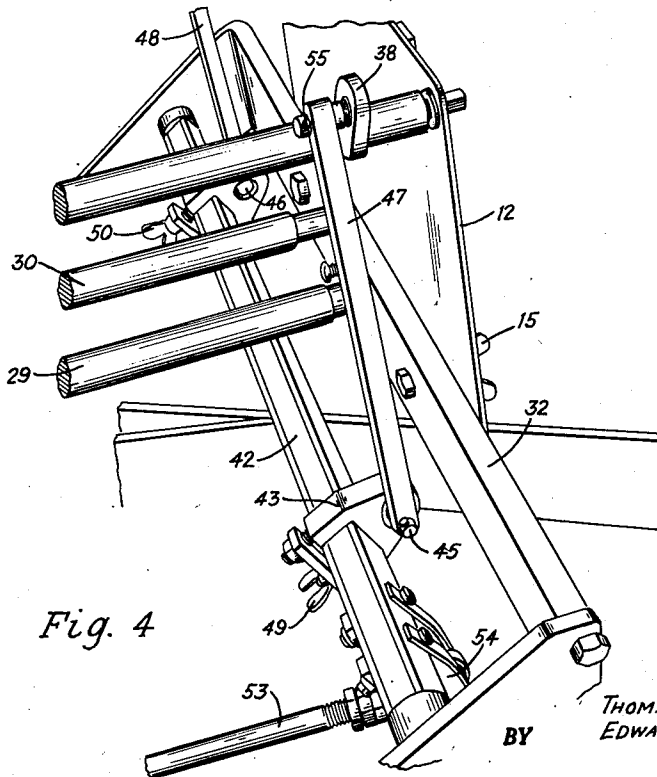


Fig. 4

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4 Sheets-Sheet 4

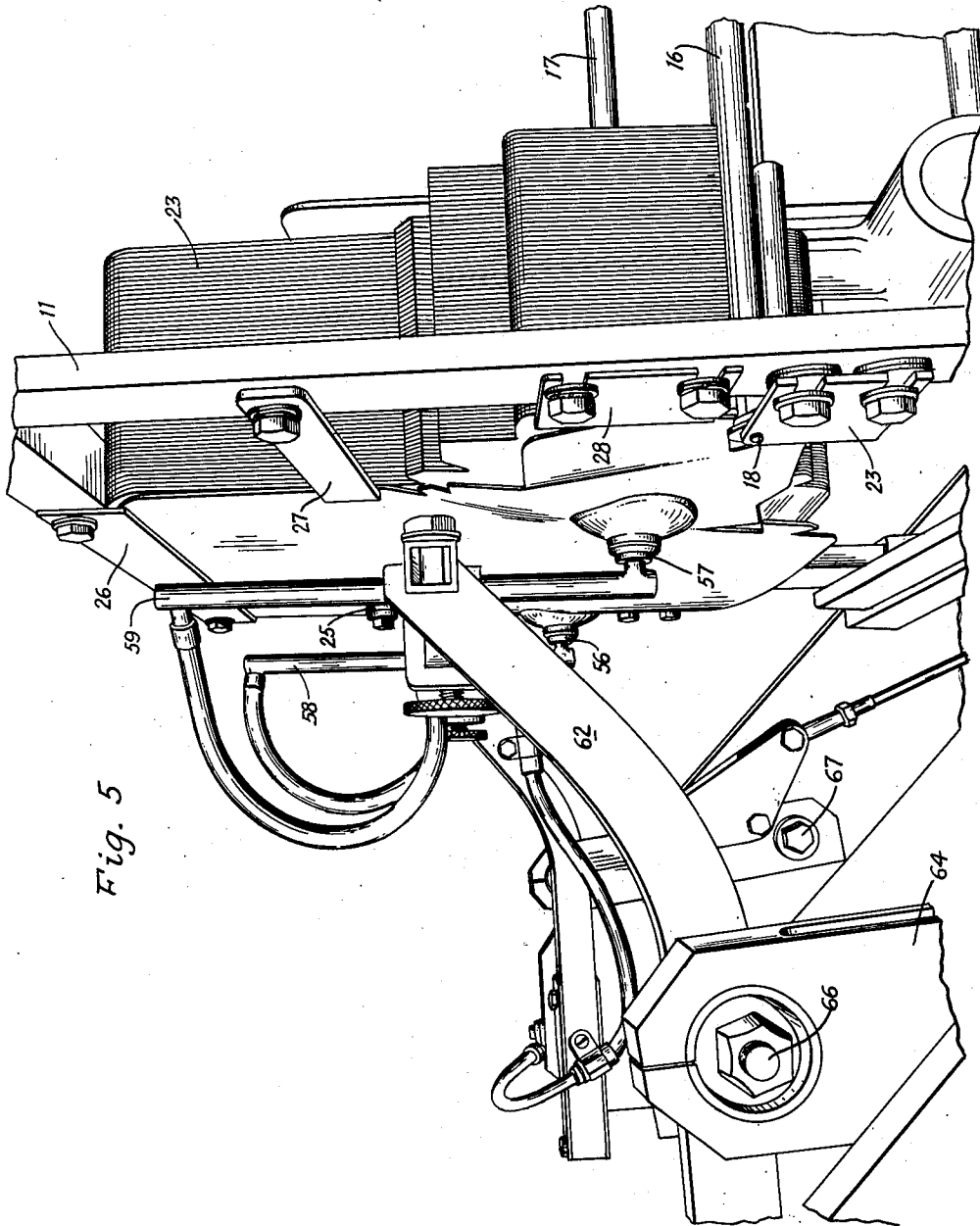


Fig. 5

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# UNITED STATES PATENT OFFICE

2,642,285

## BLANK MAGAZINE FOR FOLDING BOX MACHINES

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Application October 25, 1950, Serial No. 192,014

4 Claims. (Cl. 271-62)

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This invention relates to improvements in machines for setting up folding boxes and provides, more particularly, an improved form of magazine in which a stack of blanks may be stored and from which individual blanks are fed into the box forming section of the machine.

Numerous forms of magazines are in use in folding box machines. These magazines may conveniently be classified according to the position the blanks assume in the magazine.

There are firstly vertical magazines, also called hoppers, which contain a vertical stack of blanks, each blank lying substantially horizontal. The magazine is usually loaded at the top and blanks are withdrawn at the bottom. A characteristic distinction of these magazines resides in the fact that the weight of all the blanks rests on the bottommost blank; the weight being the greater, the taller the stack.

There are secondly magazines in which the individual blanks rest either in a vertical or in an inclined position. A characteristic distinction of the latter group of magazines is that the blanks rest on edge. Each blank thus supports its own weight, regardless of the number of blanks in the magazine. This is substantially true even in cases where the blanks are slightly inclined unless the angle is of the order of 45 degrees or more with respect to the vertical, in which event each blank rests, to some extent on the following blank. Nevertheless even in the case of substantial inclination of the blanks the pressure which one blank exerts on the next is not substantially influenced by the length of the stack in the magazine.

The present invention may be considered as falling within the second class of magazines.

In box forming machines operated at high speeds it is of great importance that the blanks are removed from the magazine one by one without danger of several blanks adhering together.

It is furthermore important that each of the blanks may be grasped and removed from the magazine from an accurately defined position so that the position of the frontmost blank in the magazine serves to align the blank with respect to certain box forming mechanism, making it unnecessary to realign the blank after its removal from the magazine and prior to passage into and through the box forming mechanism.

The patent to Baker and Pagendarm No. 2,624,248 dated January 6, 1953 discloses a box forming machine capable of unusually high production rates. The present invention provides

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a particularly advantageous form of magazine for a box machine of the type disclosed in the aforementioned patent, although the invention is not limited thereto, but has general application to other types of machines which require reliable feeding of single blanks from a magazine.

In the operation of high speed box machinery it was found that the feeding problems increase with the size of the blanks to be handled. More particularly it was observed that the removal of the endmost blank of a stack through a gate arresting and confining the blank in the magazine is influenced by the pressure which is exerted by the stack on the elements or projections which hold the endmost blank in its place in the gate. Tests appear to indicate that this pressure tends to vary more in the case of large blanks than in the case of small blanks, and it appears that the weight of the blank as well as the friction which each blank encounters in the magazine are important factors in this connection.

The present invention provides an improved magazine construction in which the weight of the blanks, the length of the stack, and the friction encountered by the blanks in the magazine are practically eliminated as variables, with the result of greater uniformity and reliability of operation of the machine permitting increased production rates.

The objects, features, and advantages of this invention will appear more fully from the detailed description which follows accompanied by drawings showing, for the purpose of illustration, a preferred embodiment of the invention. The invention also consists in certain new and original features of construction and combination of elements hereinafter set forth and claimed.

Although the characteristic features of this invention which are believed to be novel will be particularly pointed out in the claims appended hereto, the invention itself, its objects and advantages, and the manner in which it may be carried out may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part of it in which:

Figure 1 is a perspective side view of a magazine incorporating the present invention;

Figure 2 is a perspective view of the front end of the magazine showing also a suction feeder for removing the frontmost blank;

Figures 3 and 4 are perspective detail views

illustrating the operation of the blank supporting rods of the magazine; and

Figure 5 is a perspective view of the front end of the magazine showing removal of the frontmost blank from the magazine.

In the following description and in the claims various details will be identified by specific names for convenience. The names, however, are intended to be as generic in their application as the art will permit. Corresponding reference characters refer to corresponding parts in the several figures of the drawings.

In the drawings accompanying, and forming part of, this specification, certain specific disclosure of the invention is made for the purpose of explanation of broader aspects of the invention, but it is understood that the details may be modified in various respects without departure from the principles of the invention and that the invention may be applied to other structures than the one shown.

Referring to Figure 1, the magazine comprises a gate 11 and a back plate 12 mounted on the framework 13 of the box machine which the magazine is to supply with blanks. The particular construction of the box machine is of no importance to the understanding of the invention, but reference may be had to the aforementioned Baker and Pagendam Patent Number 2,624,248 disclosing a machine in which the box forming mechanism proper comprises a die and a plunger which forces the box blank through the die. A suction feeder serves to transfer the blank from the magazine to the die, as will also become apparent from the present description.

The magazine gate 11 and the back plate 12 are removably attached to the box machine frame by wing nuts 14 and 15 and may be replaced for convenient change-over of the machine from one box or blank size to another.

Blank supporting rods 16 and 17 are pivotally supported in the front gate and the back plate at 18, 19, 20 and 21 respectively. Preferably the rods 16 and 17 are slightly downwardly inclined towards the gate 11, an angle of approximately ten degrees with respect to the horizontal being particularly advantageous. The angle of inclination  $\alpha$  is indicated in the drawing at 22.

The blank supporting rods 16 and 17 are so arranged that a stack of blanks 23 is automatically aligned with respect to the front gate when the blanks are placed on edge on the rods. As is apparent from Figure 2, the rods 16 and 17 fit the configuration of the blanks with close tolerances. In the illustrated example the rods engage cut-outs in the outer edges of the blank. It is therefore evident that the magazine can be adjusted for blanks of different size or configuration by a simple exchange of the front gate 11 and the back plate 12 for a gate and plate providing the required spacing for the rods 16 and 17.

The gate 11 is upright with respect to the rods 16 and 17 and comprises blank engaging lugs or projections 24, 25, 26, 27 and 28 which engage the frontmost blank of the stack 23 and prevent it from falling out of the gate.

Two track bars 29 and 30 are mounted in members 31 and 32 of the framework 11. The track bars are parallel to the rods 16 and 17, as indicated at 33, and support a carriage 34 of a follower 35 engaging the rearmost blank of the stack 23. The carriage runs on the track bars 29 and 30 in antifriction bearings 36 and 37, preferably of the translatory ball bearing type offering exceedingly little friction to translatory move-

ment of the carriage along the track bars 29 and 30, but preventing tilting with respect thereto.

The carriage 34 is biased towards the gate to urge the stack of blanks 23 towards the feeding mechanism later to be described.

In order to eliminate variations in the bias force which would be present in the event the force were supplied by springs, the carriage is weighted, thus tending to run down the inclined track 29, 30 towards the gate 11 with a force which is independent of the length of the stack of blanks 23.

In order to eliminate the friction which the blanks encounter on the rods 16 and 17, a rotary motion is imparted to the rods, preferably in counter-rotation. For the sake of convenience and simplified construction the rotary motion may be limited to a predetermined angle. For this purpose the rods 16 and 17 carry lugs 38 and 39 in which pins 40 and 41 are mounted in sockets of the ball type permitting slight amounts of tilt of the pins 40 and 41 with respect to the lugs 38 and 39.

A rocking shaft 42 mounted in the framework 13 carries a further pair of lugs 43 and 44 with pins 45 and 46, and connecting rods 47 and 48 engage the pins 40, 45 and 41, 46, respectively, with the result that rocking of the shaft 42 causes oscillation of the rods 16 and 17 about their axes.

In order to provide for the actuation of differently spaced rods 16 and 17 the lugs 43 and 44 are longitudinally adjustable on the prismatic rocking shaft 42 and may be clamped in place by wing nuts 49 and 50.

The rocking shaft 42 is coupled in an appropriate manner with a reciprocating element of the box machine, this being a shaft 51 in the illustrated example. The shaft 51 carries an arm 52 from which a rod 53 extends to a similar arm 54 on the rocking shaft 42.

The pins 40, 41 and 45, 46 are conveniently equipped with ball-type friction detents 55, as shown in Figure 4, permitting quick removal and attachment of the connecting rods 47 and 48 without the use of tools.

The blanks are removed from the magazine gate 11, one by one, by an appropriate feeding device, preferably of the pneumatic type.

The illustrated feeding device comprises two suction cups 56 and 57 whose arms 58 and 59 are adjustably mounted on a prismatic bar 60. The bar 60 is secured to arms 61 and 62. The arms 61 and 62, in turn, are pivoted to levers 63 and 64 at 65 and 66. The levers 63 and 64 swing about pivots of which one is visible at 67 and the movement of the arms 61 and 62 with respect to the levers 63 and 64 is further controlled by a roller 68 engaging a guideway 69 on one of the levers.

As a result a complex translatory and swinging motion is imparted to the suction cups 56 and 57. The individual phases of this complex motion are of no particular moment in considering the present invention, except that it may be stated that during the initial stage of the motion a blank is withdrawn from the gate past the retaining projections of the gate in a direction in which the blank remains substantially parallel to the stack of blanks. This is illustrated in Figure 5. Thereafter, the blank is swung through an arc and deposited by the suction cups on the box forming mechanism proper (not shown).

Since the blank is accurately aligned in the

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gate, since the cups hold the blank positively and without slipping, the position, in which the blank is finally deposited by the cups, bears a precisely defined relation to its prior position in the gate, and no realignment is necessary.

The operation of the improved magazine is evident from the following description.

Blanks are placed edgewise on the rods 16 and 17 after withdrawal of the follower 35 for a distance sufficient for insertion of the necessary number of blanks. The follower is then released and urges the blanks towards the gate with constant force. The blanks, regardless of number, are supported on the rods 16 and 17 without friction, and without vibration, due to the constant oscillation of the rods.

When the machine is to be adjusted for blanks of a different configuration or size, the front gate 11 and the back plate 12 are exchanged for others of appropriate size, and the lugs 43 and 44 as well as the feeder cups 56 and 57 are moved to, and clamped in, appropriate new positions.

The invention thus provides an improved blank magazine which is vibration-free and practically frictionless resulting in substantially constant pressure of the frontmost blank on the retaining projections or members of the gate.

What is claimed is:

1. A blank magazine for storing and feeding a stack of flat box blanks in a folding box machine, the magazine comprising, a pair of rods for edgewise supporting a stack of blanks; a front member for arresting and retaining the frontmost blank in a predetermined position for removal; a follower for engaging the rear-most blank of the stack and urging it towards said front member; and means for imparting to the rods an oscillatory motion about the respective rod axes.

2. A blank magazine for storing and feeding a stack of flat box blanks in a folding box machine, the magazine comprising, a pair of rods for edgewise supporting a stack of blanks; a gate member upright with respect to said rods for arresting and retaining the frontmost blank of the stack in a predetermined position for removal; a follower for engaging the rear-most blank of the stack, said follower being mounted for movement parallel to said rods and biased

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towards said gate member; and means for imparting an oscillatory motion to said rods about their respective axes, the direction of oscillation of one rod being opposed to the direction of oscillation of the other rod.

3. A blank magazine for storing and feeding a stack of flat box blanks in a folding box machine, the magazine comprising, a pair of substantially horizontal rods for edgewise supporting a stack of blanks; a gate member upright with respect to said rods for arresting and retaining the frontmost blank of the stack in a predetermined position for removal; a follower for engaging the rear-most blank of the stack, said follower being mounted for movement substantially parallel to said rods and biased towards said gate member; and means for oscillating said rods about their axes in opposite directions

4. A blank magazine for storing and feeding a stack of flat box blanks in a folding box machine, the magazine comprising, a pair of parallel rods for edgewise supporting a stack of blanks, said rods being inclined about ten degrees with respect to the horizontal; a gate member upright with respect to, and located at the lower end of, said rods for arresting and retaining the frontmost blank of the stack in a predetermined position for removal; a follower for engaging the rear-most blank of the stack, said follower being mounted for movement substantially parallel to said rods and biased towards said gate member by gravity; and means for oscillating said rods about their axes in opposite directions.

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