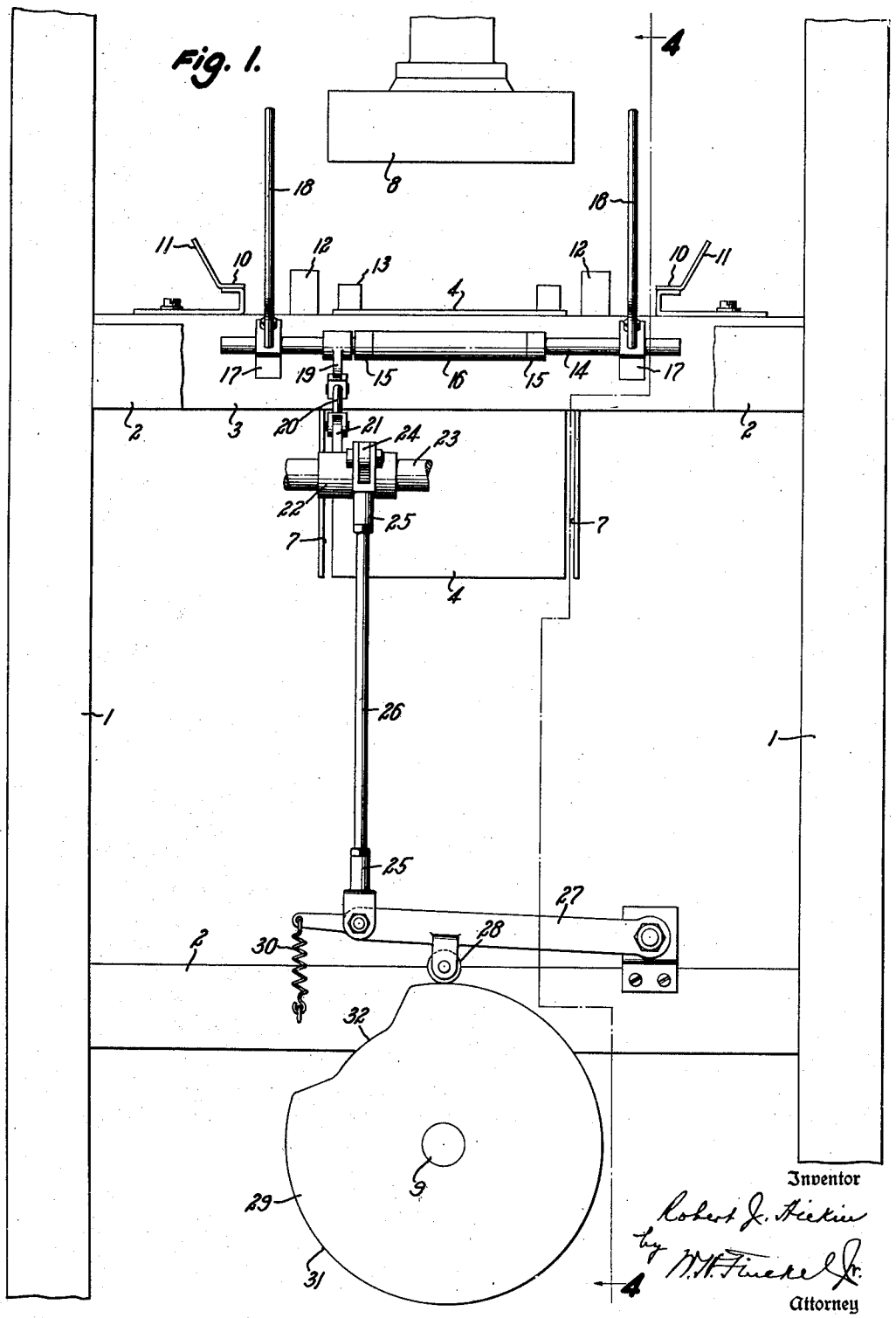
July 27, 1954 R. J. HICKIN 2,684,616

CARTON BLANK SETTING-UP MECHANISM

Filed May 2, 1951 3 Sheets-Sheet 1

Fig. 1.



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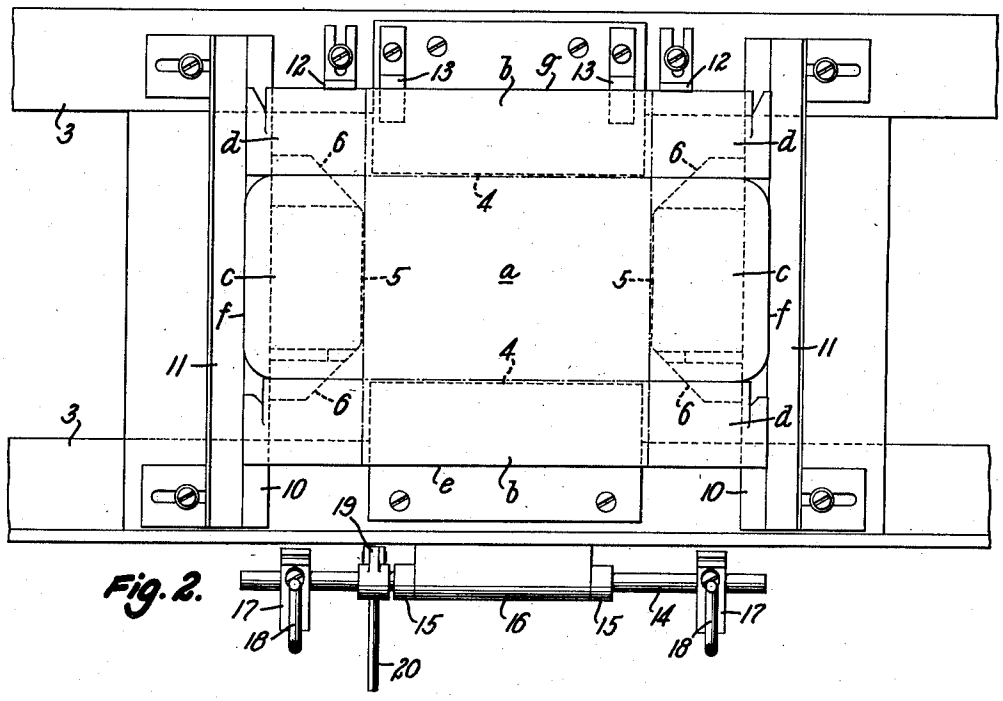


Fig. 2.

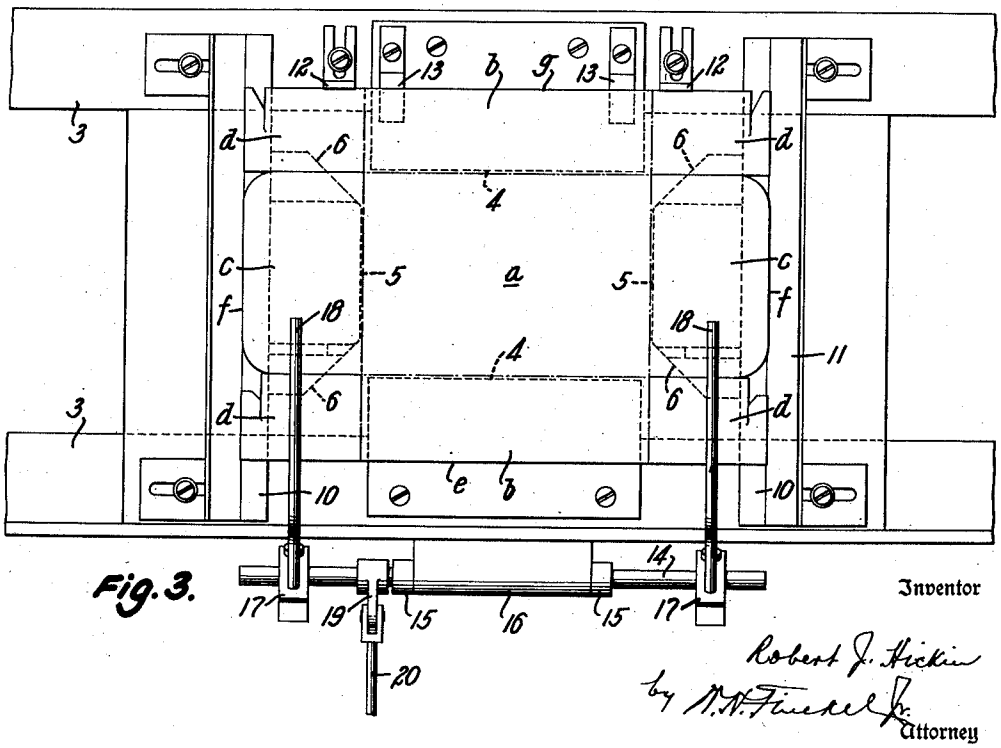


Fig. 3.

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Fig. 4.

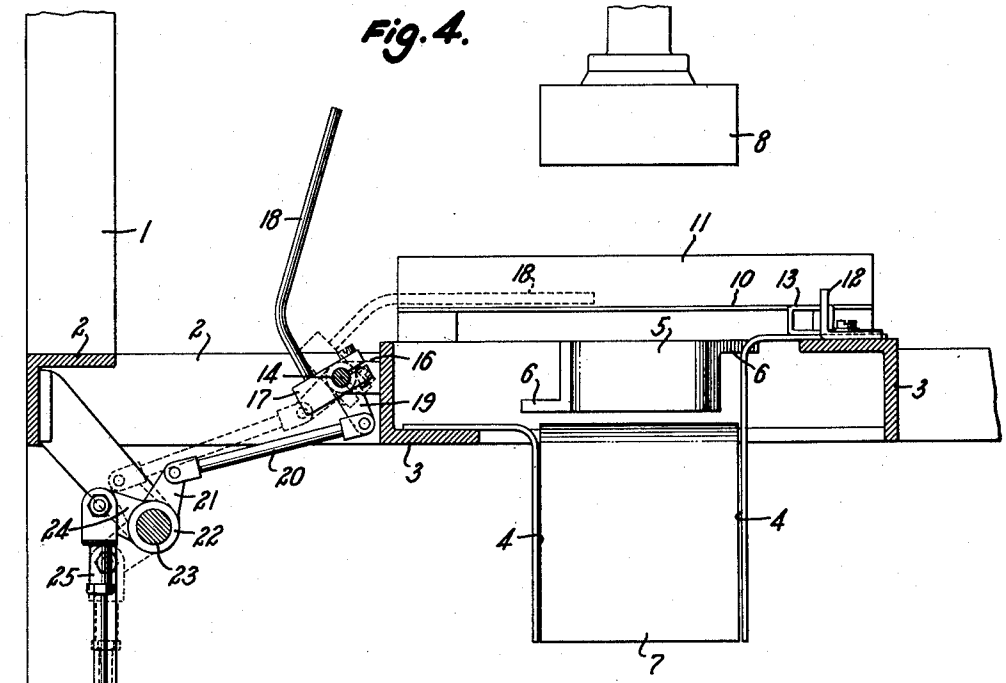
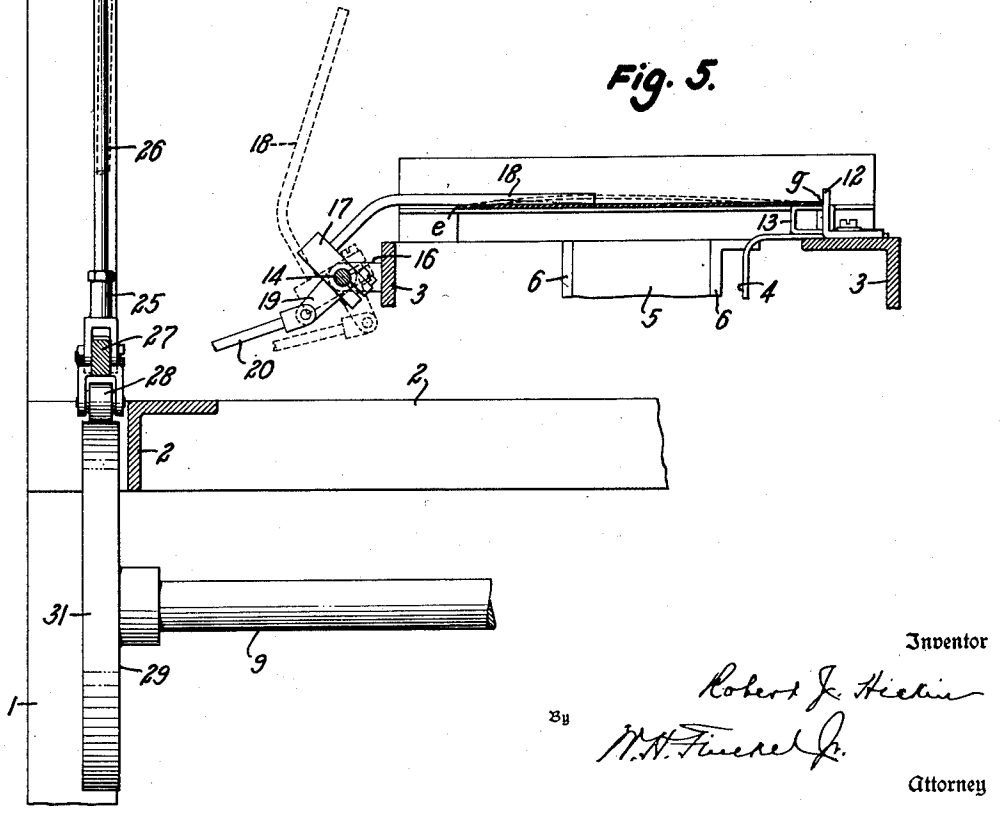


Fig. 5.



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CARTON BLANK SETTING-UP MECHANISM

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4 Claims. (Cl. 93—36)

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This invention relates to machines for forming or setting up paperboard cartons from the flat blanks thereof, and it has special reference to mechanism for insuring proper registry of the carton blanks with the forming members of such machines.

In machines for forming cartons from die cut carton blanks, the flat blanks are usually forced by a reciprocating plunger into and through a fixed die cavity of proper size and shape and provided with proper means for plowing the side and end wall members, and securing flaps, into appropriate erected cooperative assembly to carton form, and for proper performance of this operation it is essential that the carton blanks be accurately registered in relation to the die cavity and plunger.

As will later appear, endwise register of the carton blanks is most commonly accomplished by a feeder mechanism which deposits the blanks successively and in timed relation to the reciprocation of the plunger upon horizontal supporting and guiding rails properly adjustably located with respect to the die cavity and plunger and having upstanding guide members for engagement with the end edges of the blanks. Lateral register is accomplished by mechanism which engages one side edge of the blanks to push the blanks into register with the die cavity, and usually to push the opposite side edge of the blanks into abutting contact with stop means properly adjusted in relation to the die cavity and plunger.

Obviously, the effectiveness of these positioning means for proper endwise and lateral register of the carton blanks depends, to an appreciable extent, upon the successively fed blanks being uniform and in flat condition when they are brought into engagement with the positioning means. However, it is very difficult to keep paperboard blanks in uniform flat condition as they have a tendency to curl or warp in varying degree according to atmospheric and storage conditions, and this is particularly true of blanks made from laminated paperboard material, especially when the laminae have different physical properties. Moreover, the blanks, even when all are die cut from the same paperboard stock, do not warp or curl uniformly or in a consistent manner. In the stack of blanks in the feed hopper from which they are fed to the machine some may be flat, others slightly curled or warped and still others excessively curled or warped.

The primary object of the present invention is to provide mechanism which, in cooperation with the means for registering the successively fed blanks in relation to the die cavity and plunger

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of the setting-up machine, will function to flatten curled or warped blanks so that operation of the registering means will be effective.

To this end the invention comprises means actuated in timed relation to the successive feed of individual blanks to the horizontal supporting and guiding rails, and hence in timed relation to the reciprocation of the plunger, for forcing curled or warped blanks flat against the horizontal blank-supporting portions of such rails, thereby to insure the desired registration of the blanks with respect to the die cavity and plunger, all as will be explained hereinafter more fully and finally claimed.

In the accompanying drawings illustrating the invention, in the several figures of which like parts are similarly designated,

Fig. 1 is a fragmentary side view of a carton forming or setting-up machine of more or less conventional type with mechanism embodying the features of the invention operatively associated therewith and shown in inoperative retracted position,

Fig. 2 is a fragmentary top plan view of the bed portion of the machine, including the die cavity forming means, with a conventional carton blank superimposed thereon, parts of the mechanism of the invention being shown in the inoperative position illustrated in Fig. 1,

Fig. 3 is a view similar to Fig. 2, but showing the parts of the mechanism of the invention in operative position,

Fig. 4 is a fragmentary sectional elevation taken on the line 4—4 of Fig. 1, and showing the mechanism of the invention in inoperative (full line) position and operative (broken line) position, and

Fig. 5 is a fragmentary detail sectional elevation in part similar to Fig. 4 but illustrating the mechanism of the invention in full and broken lines, respectively, in operative and inoperative relation to a curled or warped carton blank.

As shown, the more or less conventional carton forming or setting-up machine has an open framework including upright members 1 secured in erected condition by appropriately spaced cross braces 2 and stringers 3, the latter providing a rigid bed portion to carry the members constituting the die cavity and the means for plowing the parts of the carton blanks into set up condition. These members include side wall plow plates 4, end wall plow members 5 carrying end flap plow members 6 and guide plates 7 (Figs. 1 and 4) for maintaining the end wall parts of the carton in proper associated plowed-up condition. A plunger 8 is reciprocated by drive means (not

shown) connected with a drive shaft 9 (Figs. 1 and 4).

Carton blank supporting and guiding rails 10 having upright flanges 11 are adjustably secured to the stringers 3 so that they may be located for proper endwise register of carton blanks with respect to the die cavity when such blanks are successively deposited upon them by appropriate feeding means (not shown). Lateral register of the blanks with respect to the die cavity may be afforded by adjustable stop means 12 into abutting engagement with which one lateral edge of a carton blank is pushed by a feed member (not shown) which engages the other lateral edge of the blank. In order to prevent sagging of the carton blanks intermediate their ends which rest upon the supporting and guiding rails 10—11, levelers 13 are provided having their upper, carton blank contacting surfaces substantially in the same plane as the supporting and guiding rails 10. These levelers 13 serve also to aid in the function of plowing the carton side walls into set up condition.

The parts of the machine thus far described are of rather conventional well-known form.

As representative of a type of carton blank for operation upon which the just described machine is adapted and in the manipulation of which the mechanism of the invention is effective, attention is directed to Figs. 2, 3 and 5. This particular carton blank is made, preferably by die cutting, from a flat sheet of paperboard material and is provided with appropriate cuts and folding scores defining a bottom wall *a*, side walls *b*, end walls *c*, and end securing flaps *d* formed as foldable extensions of the side walls *b*.

As hereinbefore stated, carton blanks of this and other types have a tendency to curl or warp, as shown for example in broken lines in Fig. 5, and this departure from their desired flat condition often makes difficult their automatic proper register over the die cavity for proper operation upon them of the forming members of the die cavity when they are forced into and through such cavity by the reciprocating plunger 8.

In order to insure proper register the mechanism of the present invention, now to be described, functions to flatten a curled or warped blank against the supporting and guiding rails 10, and hold it thus flattened, while the feed member (not shown) pushes against the trailing edge *e* of the blank to move it, while its end edges *f* are guided by the upright flanges 11 of the supporting and guiding rails 10, until it is laterally registered over the die cavity and preferably with its leading edge *g* evenly abuttingly contacting the stop members 12.

This mechanism of the invention, in the embodiment shown, includes a rock shaft 14 mounted in adjusted axial relation by collars 15 in a bearing bracket 16, and carrying clamped or otherwise axially and circumferentially adjustable crank arms 17 adjacent to its ends, these crank arms being provided with fingers 18 thus oscillatable with the rock shaft 14 from inoperative retracted position, as shown in full lines Figs. 1, 2 and 4, and broken lines Fig. 5, to operative depressed position, as shown in full lines Figs. 3 and 5, and broken lines Fig. 4. As will be noted by reference to Figs. 3 and 5, particularly, the fingers 18 are so arranged that, when in the operative depressed position, they will overlie and press upon the end portions of the deposited carton blanks.

Oscillation is imparted to the rock shaft 14 in timed relation to reciprocation of the plunger 8 by means of a rock lever 19 fixed on the rock shaft 14 and connected by a link 20 with one arm 21 of a bell-crank lever 22 oscillatable upon a fixed trunnion 23, the other arm 24 of the bell-crank lever 22 being adjustably connected by clevises 25 on a link 26 with a rock lever 27, Figs. 1 and 4, carrying a cam-follower roller 28 which follows a peripheral cam 29 under the influence of a biasing spring 30, Fig. 1. When the roller 28 follows the circular portion 31 of the cam 29 the rock shaft 14 will be maintained in such adjustment as to hold the fingers 18 in retracted inoperative position, Figs. 1, 2 and 5, but when the roller 28 travels in the depression 32 of the cam 29 the spring 30 will cause the fingers 18 to assume their operative depressed position to exert an adequate but resiliently enforced pressure upon the underlying carton blank, Figs. 3 and 5.

It is believed that the operation of the mechanism of the invention will be broadly apparent from the foregoing, but it may be specifically described briefly as follows: A carton blank will be taken from a stack thereof by suitable feed mechanism, such as a suction feeder (not shown) and deposited upon the supporting and guiding rails 10, being properly registered thereby endwise of the die cavity by the upright flanges 11 but probably not being laterally registered with its leading edge *g* abutting the stop means 12. The feed mechanism having receded, the cam 29 will now have rotated sufficiently to permit the cam follower roller 28 to enter the depression 32 under the influence of the biasing spring 30 whereupon the rock shaft 14 will be oscillated through the levers and linkages 27, 26, 24, 21, 20 and 19 to depress the fingers 18 into operative position so that, as shown in Figs. 3 and 5, they will press the carton blank firmly against the supporting and guiding rails 10 to remove the curl or warp from the blank and thus insure that when the feed member (not shown) is now actuated it will properly engage the trailing edge *e* of the blank to push it into correct lateral register over the die cavity. When the blank has been thus registered over the die cavity the cam 29 will have rotated through an arc sufficient to cause the follower roller 28 to rise onto the circular portion 31 of the cam surface, thus returning the fingers 18 to their retracted inoperative position, and the plunger 8 will, as it now descends, engage the bottom wall *a* of the carton blank and force it into the die cavity to plow up and assemble the side and end walls *b* and *c* and end securing flaps *d*.

It will be understood that the carton blanks may be so warped or curled as to bow upwardly, as shown in broken lines Fig. 5, or they may take a reverse warp or curl. In either case, or even when the curl or warp is longitudinal rather than lateral, the fingers 18 will serve their desired purpose inasmuch as, for proper register of the blanks over the die cavity, and hence their register with the plunger, the trailing edge *e* of the blank will be so properly flattened out as to be engageable by the feed member (not shown) which is mainly responsible for properly laterally registering the blanks.

Various changes and modifications are considered to be within the principle of the invention and the scope of the following claims.

What I claim is:

1. In a carton blank setting-up mechanism of the fixed die cavity and reciprocating plunger type, blank supporting means, longitudinal and lateral blank registering means, said supporting

and registering means being associated with said die cavity and adjusted relatively to the boundaries thereof in position to properly support and register a flat carton blank therewith, and means for insuring proper location of a warped or curled carton blank with respect to said supporting and registering means and hence with respect to said die cavity and plunger in the same manner as a normally flat blank would be so located, including intermittently actuated means for exerting pressure upon the blank to force the same flat against said supporting means for longitudinal and lateral register with said registering means just prior to engagement of the plunger with the blank.

2. Mechanism as claimed in claim 1, in which said pressing means include fingers movable into and out of contact with said blank at areas bordering said die cavity and overlying certain of said blank supporting means.

3. Mechanism as claimed in claim 2, in which the fingers are mounted upon an oscillatable shaft to which oscillation is imparted in timed relation to the reciprocation of said plunger.

4. Mechanism as claimed in claim 2, in which means are provided for yieldingly urging said fingers into pressure exerting contact with the blank, and means for positively moving said fingers out of contact with the blank, and means for effecting such yielding and positive movement of the fingers in timed relation to the reciprocation of the plunger.

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