Feb. 19, 1929. 1,702,602

J. GERRITSON ET AL

PRINTING ATTACHMENT FOR PAPER BOX MACHINES

Filed Oct. 28, 1924 3 Sheets-Sheet 1

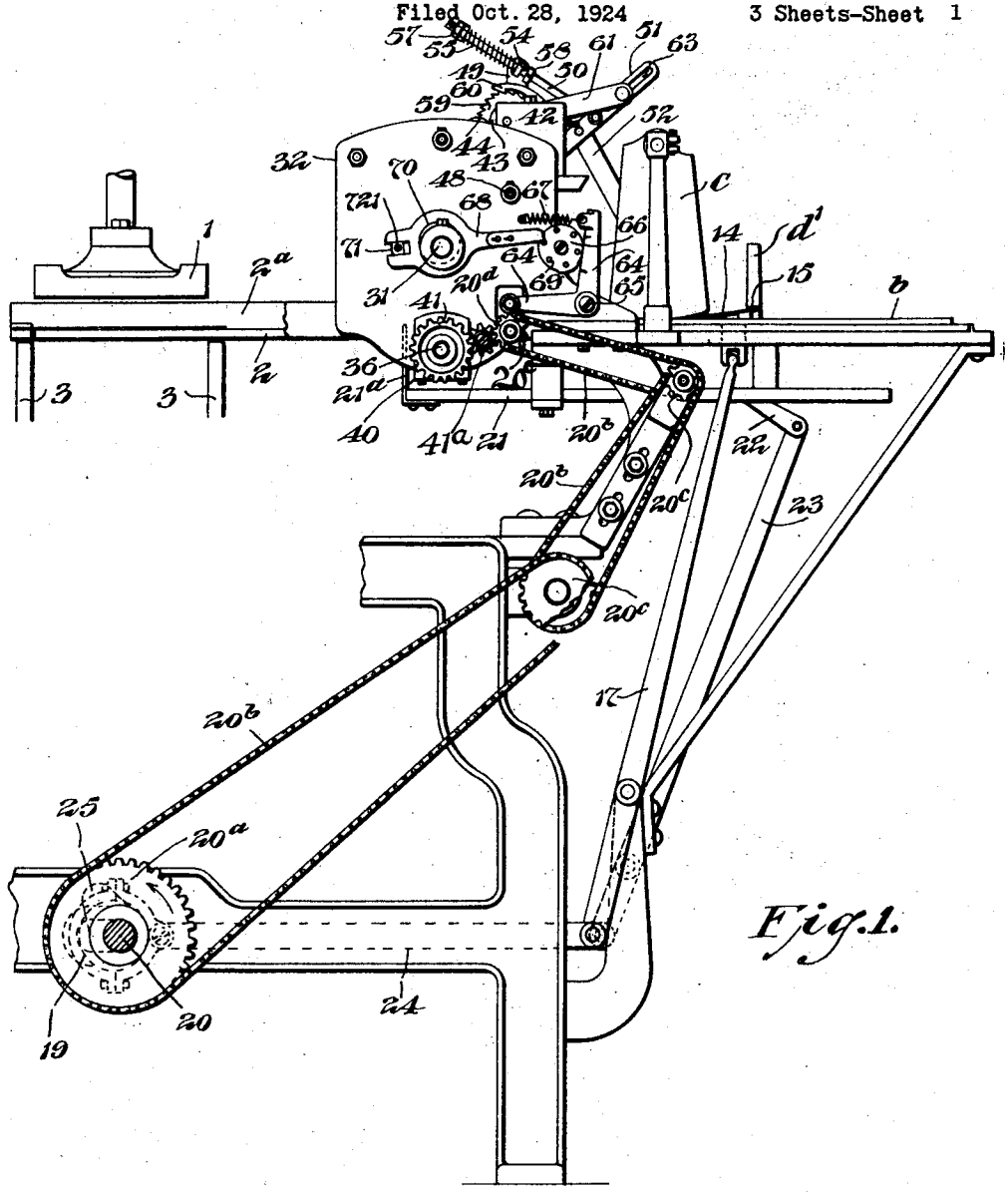


Fig. 1.

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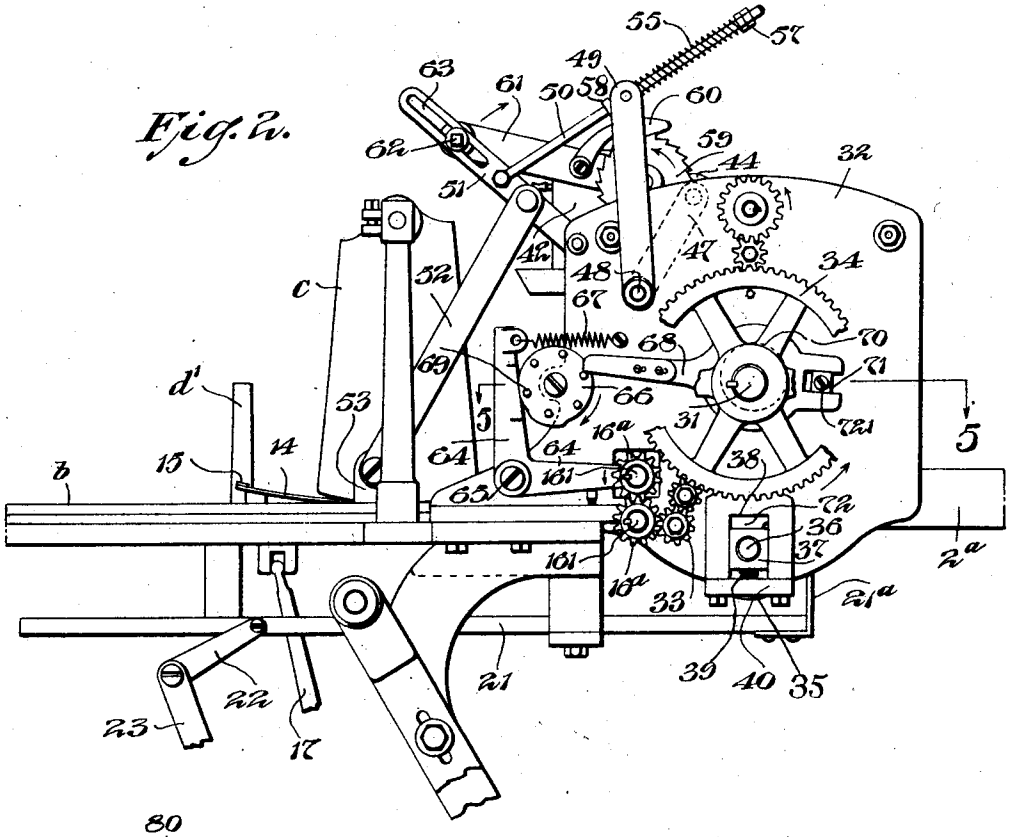
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Fig. 2.



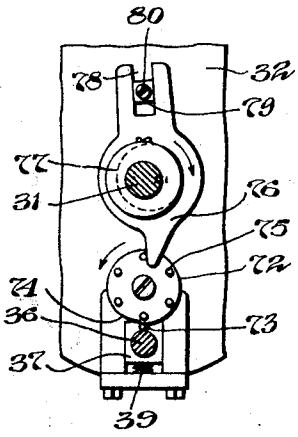


Fig. 6.

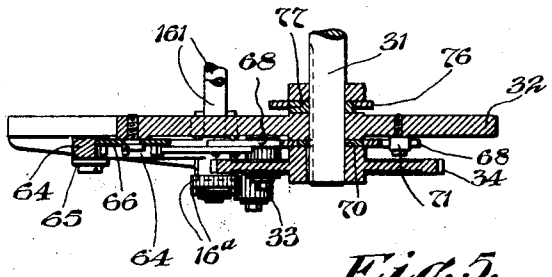


Fig. 5.

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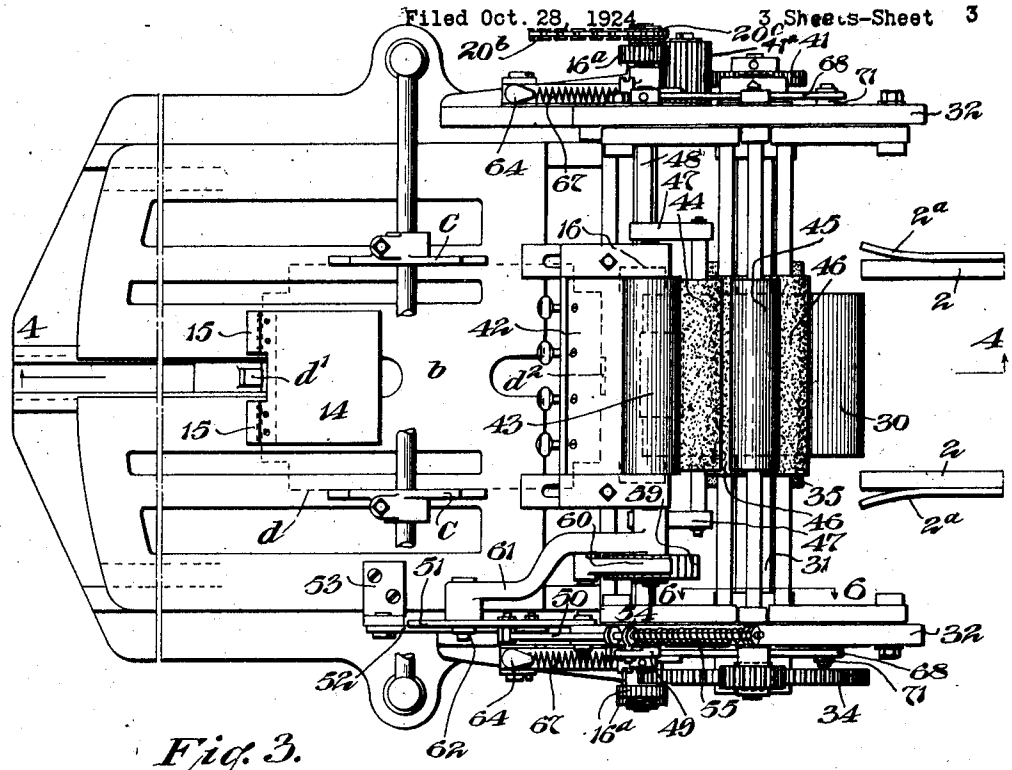


Fig. 3.

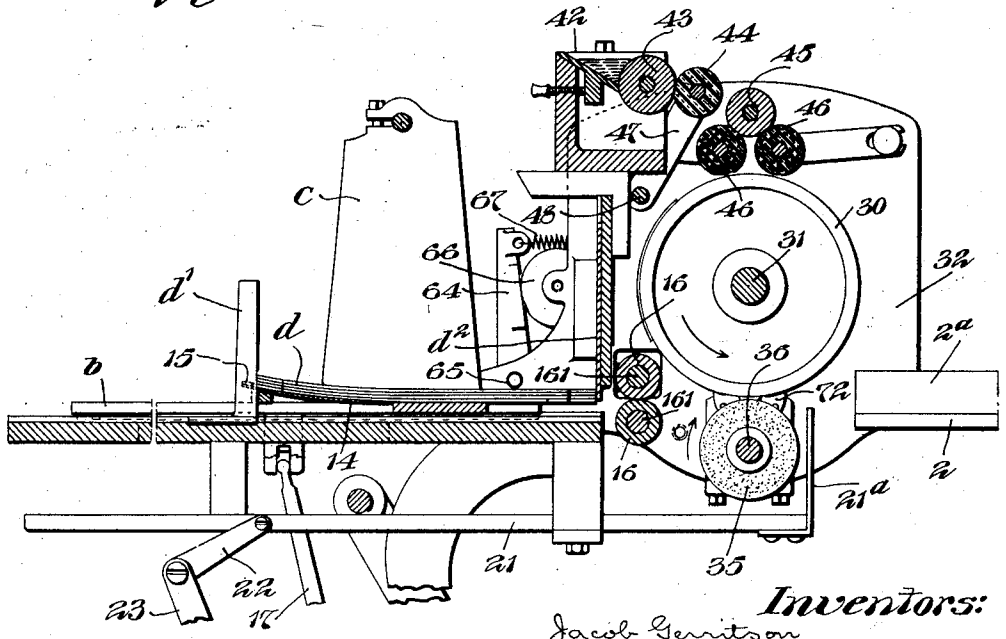


Fig. 4.

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UNITED STATES PATENT OFFICE.

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PRINTING ATTACHMENT FOR PAPER-BOX MACHINES.

Application filed October 28, 1924. Serial No. 746,310.

The invention combines, with the feeding and box forming elements of a paper box machine, devices by means of which a blank is printed as it is fed forward to the box forming elements.

The drawings show an illustrative embodiment of the invention, in which embodiment the printing devices just referred to are associated with certain of the elements of a paper box machine on the order of that of United States Letters Patent No. 728,086 granted under date of May 12, 1903, upon application of C. C. Davis and E. W. Webster. Only such elements of the box machine proper are shown as are required to be shown in order to make clear the relations of the printing devices; and the corner staying devices of the said patent are omitted from the drawings.

Fig. 1 of the drawings is a view representing the said embodiment in side elevation.

Fig. 2, Sheet 2, is an elevation on a larger scale than Fig. 1 of the printing attachment and associated parts, looking at the side thereof opposite that which is shown in Fig. 1.

Fig. 3, Sheet 3, is a plan view of the parts that are shown in Fig. 2.

Fig. 4, Sheet 3, is a view in longitudinal section on line 4—4 of Fig. 3.

Fig. 5, Sheet 2, is a view in horizontal section on line 5—5 of Fig. 2.

Fig. 6, Sheet 2, is a detail view partly in section on line 6—6 of Fig. 3.

The machine that is partly shown in the drawings is one in which a previously scored and cornered blank for the cover of a box is fed from a stack or pile *d*, Fig. 4, into position to be acted upon by a forming block or former 1, Fig. 1, and is broken or bent into form by the conjoint action of said forming block or former and folding guides cooperating therewith to which reference is made hereinafter. The mechanism by which the forming block or former is moved vertically up and down is omitted from the drawings. In practice the machine usually, though not necessarily in all cases, will be equipped with stay applying mechanism by means of which stay-strips are applied to the various vertical corners or angles of a formed blank, and are subjected to the required compression for the purpose of securely uniting the said stay-strips to the meeting portions of the flanges of the blank. Stay applying mechanism is shown and described in Patent No. 728,086 aforesaid.

While in this instance the machine shown is indicated more particularly for employment for producing box covers, the invention is equally adapted for application to machines employed for the production of box bodies. Therefore, in the following description, for convenience of reference, and in order to avoid repetition, the term "box" is used in the sense of meaning either box body or box cover.

The box forming instrumentalities are typified in the drawings by the vertically reciprocating block or former 1, Fig. 1, the so-called breaking rods 2, 2, and associated side-guides 2^a, 2^a, (shown most clearly in Fig. 3), and the breaker posts 3, 3, Fig. 1, these various elements corresponding with those designated by the same reference characters in the Letters Patent aforesaid. In the working of the machine the breaking rods 2, 2, support a blank by its edges in position below the block or former 1, and by the descent of the said block or former the blank is forced down between the said breaking rods and within the enclosure formed by the breaker posts 3, 3, Fig. 1, (the latter being four in number). The said breaking rods and breaker posts act against the flanges of the blank as the blank is carried down by the block or former, to fold the flanges of the blank upward against the sides of the block or former.

The printing attachment is related properly with respect to the forming instrumentalities to effect the printing of the blanks before they arrive in position for the forming operation.

The stack or pile *d*, Fig. 4, (shown also by dotted lines in Fig. 3) of blanks which are to be fed singly to the action of the printing attachment and of the forming instrumentalities, rests in this instance upon a table *b*, between a stationary back-stop post *d'* at the outer ends of the blanks and a gauge d^2 at the inner ends thereof, the blanks being con-

fined laterally by means of transversely adjustable cheek-pieces *c*, *c*. The said cheek-pieces are spaced apart from each other to suit the width of the blanks which are placed between them upon the said table in readiness to be fed.

The precise character, etc., of the instrumentalities employed for the purpose of advancing the blanks successively from the bottom of the stack or pile is not material. In this instance the table *b* is given an in-and-out reciprocating movement and is provided with a starter constituted by a plate 14, beneath the pile or stack, having lips 15, 15, adapted to engage with the rear end of the lowermost blank, so that as the table and starter are moved inward toward the printing attachment and forming instrumentalities such blank is pushed forward as a result of such engagement and movement until the leading end of the blank is entered between a pair of feed-rolls 16, 16, Figs. 3 and 4. The said rolls are rotated to cause them, through their engagement with a blank which has been entered between them, to feed the said blank forward to the printing attachment. The table *b* and starter 14, 15, are shown as intended to be reciprocated by means of a lever 17 that is operatively combined with an eccentric 19 (Fig. 1) on a rotating shaft 20. The feed-rolls 16, 16, are shown as mounted upon shafts 161, 161, intended to be rotated by means of connections extending from the said shaft 20 to the shaft 161 of the bottom feed-roll, such connections comprising a sprocket-wheel 20^a on the shaft 20, intermediate sprocket-chains 20^b, 20^b, 20^b, and sprocket-wheels 20^c, 20^c, 20^c, the two feed-roll-shafts being geared together by means of pinions 16^a, 16^a, upon their ends. The gears 16^a, 16^a, are omitted from Fig. 1, and sprocket-wheel 20^c upon the lower feed-roll-shaft is only partially shown. At 21 is shown a reciprocating pusher having an upstanding portion 21^a which, after a blank has been discharged from feed-rolls 16, 16, and the printing attachment, upon the breaking rods 2, 2, engages with the rear end of the blank and pushes the blank farther forward on such rods into position beneath the block or plunger 1. For the actuation of the pusher 21, 21^a, it is shown as connected by a link 22 with a lever 23 having connected therewith a rod 24 that is engaged with a cam 25 on the shaft 20. The said cam advances the said pusher, which latter in practice is retracted by means of a suitable spring or weight (not shown).

The printing attachment is located in position to operate upon the advancing blank intermediate the feed-rolls 16, 16, and the breaking rods 2, 2. Its construction may vary in practice. Herein, the printing element is a rotating cylinder 30 having a position above the path of the blanks as they are advanced by the feed-rolls 16, 16, toward the breaking rods 2, 2. It is mounted upon the shaft 31, the said shaft being journaled in bearings in connection with the cheeks 32, 32, of the attachment frame. The said cylinder is driven from the pinion 16^a on one end of the lower feed-roll by means of intermediate pinions 33 and a spur gear 34 which is fixed upon the corresponding end of the cylinder shaft 31. At 35, Figs. 2 and 4, is a bed-roll which backs up the blank while being printed, said bed-roll being located below the printing cylinder. Its shaft 36 is mounted in bearings 37, Fig. 2, which are movable vertically in ways 38, in connection with the cheeks 32, 32, of the printing attachment, said bearings being supported vertically by means of springs 39, Fig. 2, interposed between the bearings and the cap-plates 40, 40, at the lower ends of the said ways 38. The said springs permit the bed-roll to yield as may be necessary to accommodate the thickness of a blank passing between the printing surface of the cylinder 30 and the surface of the bed-roll. The bed-roll is rotated in unison with the printing cylinder by means of a gear 41, Figs. 1 and 3, upon one end of the bed-roll-shaft, a carrier-gear 41^a, and a gear 20^d, Fig. 1, upon the corresponding end of the shaft of the lower feed-roll 16. The printing surface is supplied with ink from a container 42 by means of a wallower-roll 43, a transfer-roll 44, a distributing-roll 45, and two ink-applying rolls 46, 46. Distributing-roll 45 is in contact with both of the applying rolls 46, 46, ink being transferred from the wallower-roll 43 to the distributing-roll by means of the transfer-roll 44 which is swung from its position shown in Fig. 4 in contact with the wallower-roll 43 into contact with the distributing-roll 45, and vice versa. To provide for this swinging movement the transfer-roll 44 is journaled in arms 47 of a rockshaft 48 having at one end thereof an arm 49 that is connected by a rod 50 to an arm 51 which in turn is connected by means of a link 52 to a lug 53 on the slide of the starter 14, so that as the starter is reciprocated inward and outward the transfer-roll 44 is correspondingly swung from a position in contact with the wallower-roll 43 in Fig. 4 to a position in contact with the distributing-roll 45, and vice versa. In order that the transfer-roll 44 may be pressed yieldingly against the wallower-roll 43, the connection between the arm 49 of rockshaft 48 and the rod 50 is effected by means of a swivel 54 carried by arm 49 and having a hole through which rod 50 extends, and an expanding spiral spring 55 threaded upon the said rod between the swivel 54 and the nuts 57 at the outer end of the rod. The spring 55 yields to accommodate any excess movement of the rod 50.

The wallower-roll is rotated intermittently by means of a ratchet 59 which is fixed upon one end of its shaft, a pawl 60 engag-

ing with the said ratchet wheel, and a carrying arm 61 for the said pawl, mounted upon the wallower-roll-shaft, and having a pin 62 which projects therefrom into a slot 63 in the arm 51. As the arm 51 is swung the walls of the said slot 63 act through engagement with the pin 62 to swing the said arm 61, and thereby actuate the pawl to cause it to rotate the wallower-roll step by step through the engagement of the pawl with the ratchet wheel 59.

To provide for automatic separation of the feed-rolls 16, 16, at the beginning of the feed-movement of the starter, to facilitate the insertion of the leading end of a blank between the pair of rolls as the blank is fed toward such rolls, the shaft of the upper feed-roll is mounted in bearings in connection with horizontally extending arms 64, 64, of bell-cranks which are pivotally mounted at 65, 65, upon the cheeks 32, 32, of the printing attachment, the upwardly extending arms of the said bell-cranks being engaged by the cam shaped peripheries of disks 66, 66, which are pivotally mounted upon the said cheeks 32, 32. The said upright arms of the bell-cranks are held in contact with the peripheries of the said disks by means of contracting spiral springs 67, 67. The said springs tend to depress the top feed-roll toward the bottom feed-roll. The cam disks 66, 66, are rotated in proper time relation with respect to the cylinder 30, in this instance by means of levers 68, 68, each of the said levers having one end thereof extended into position for engagement with pins 69, 69, projecting outwardly from the corresponding disks 66, and each lever being engaged intermediately with an eccentric 70 upon the cylinder shaft 31, while the other end of the lever is slotted and fits a block 71 that is mounted pivotally at 721 upon the corresponding cheek 32. The revolution of the eccentrics produces a combined endwise and swinging movement of the levers 68, 68, causing them to laterally engage with and disengage from the pins 69, 69 of the cam disks, and in doing so to act after the fashion of pawls to rotate the said cam disk step by step. In the case of the illustrated embodiment, in order to get the proper relative speed of the printing cylinder, it is arranged to make six revolutions of the said cylinder to every blank-feed movement. The pins upon the cam disks are therefore six in number, so that each action of the levers 68 rotates the cam disks one-sixth of a revolution, and the noses of the said cam disks are proportioned to cause the feed-rolls to be separated during one revolution of the cylinder-shaft 31 and to remain closed together under the action of the springs 67, 67, during the remaining six revolutions of the cylinder shaft.

The bed-roll 35 is moved downward to keep its periphery out of contact with the periphery of the cylinder while no blank is between them by means of cam disks 72, Fig. 6, engaging peripherally with studs 73 carried by the bearings 37 of the bed-roll-shaft 36. The peripheries of the cam disks 72 are shaped to hold the bearings and bed-roll down except when one portion of the periphery of each cam disk is presented to studs 73, such portion having a notch 74 permitting the bed-roll to be raised by the action of its springs 39. The cam disks are in this instance arranged to be rotated step by step through the engagement of pins 75 on the disks by levers 76 engaged by eccentrics 77 on cylinder shaft 31, the said levers being slotted at 78 and the slotted portions being fitted to blocks 79 which are pivoted at 80 upon the cheeks 32 so as to provide for a combined sliding and swinging movement of the levers 76. The general action of the levers 76 in connection with the cam disks 72 resembles that of the levers 68 and cam disks 66.

By means of the described combination, each blank taken from the stack *d*, Fig. 4, is automatically printed during the feed movement from said stack into position in relation to the forming instrumentalities to be acted upon by the latter.

What is claimed as the invention is:—

1. A box machine comprising, in combination, means for forming a blank into box-shape, a support for a stack of box-blanks, a reciprocating blank-feeder, and blank-printing devices located between the stack and the forming means including a printing-cylinder making a plurality of revolutions to every blank-feed movement.

2. A combined printing and box-making machine comprising, in combination, a support for a stack of individual box-blanks, means for advancing individual blanks successively from the said stack and feeding each blank separately to the printing devices, printing devices, including a rotating printing cylinder making a plurality of revolutions to each box-feed and box-forming cycle, certain thereof being idle revolutions occurring during the box-forming operations, and a bed-roll which is separated from said printing cylinder during the said idle revolutions, and box-forming mechanism comprising a reciprocating former and breaker-devices cooperating with such former, said former and said breaker-devices receiving between them the printed blank delivered from the printing devices.

3. A box machine comprising means for forming box-blanks into box-shape, a support for a supply of individual prepared box-blanks, and combined feeding and printing mechanism by which successive individual blanks from the said supply respectively are fed with a continuous feed-movement through

the printing mechanism to the box-forming means, being thereby successively printed simultaneously with such feed-movement, the printing elements of the said mechanism including a printing cylinder making a plurality of revolutions to each blank-feed and box-forming cycle, certain thereof being idle rotations occurring during the box-forming operations, and a bed-roll which is separated from said printing cylinder during the said idle revolutions.

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