

1,289,673.

S. COOPER.
PAPER BOX MACHINE.
APPLICATION FILED APR. 16, 1915.

Patented Dec. 31, 1918.
6 SHEETS—SHEET 1.

Fig. 14.

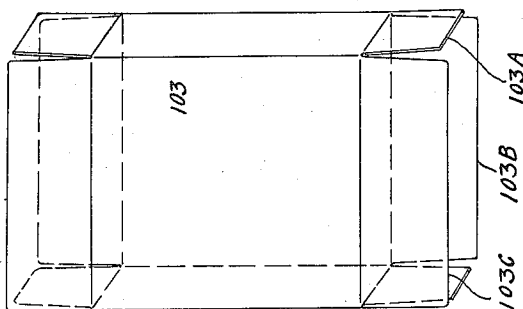
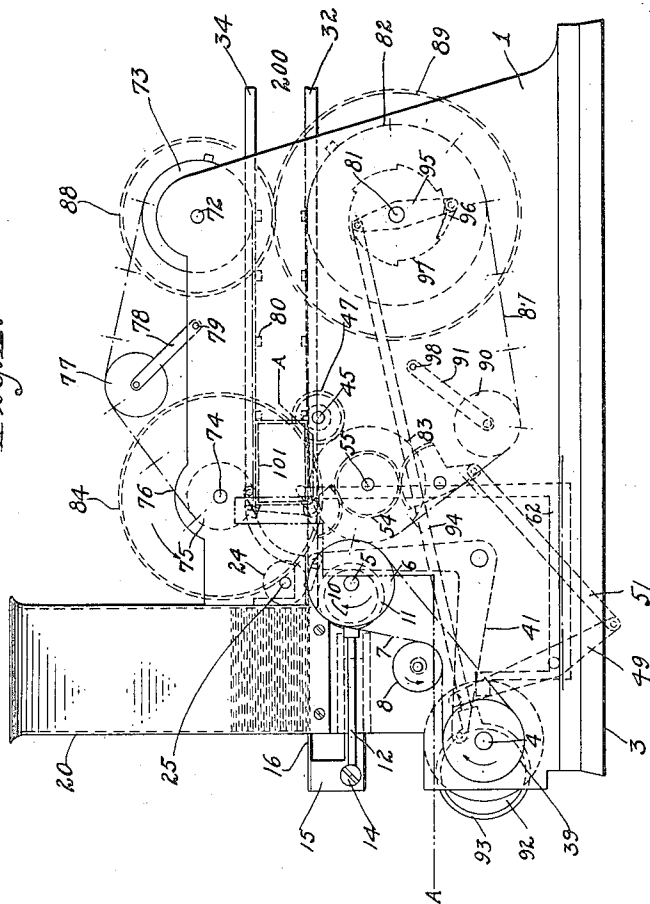


Fig. 1.



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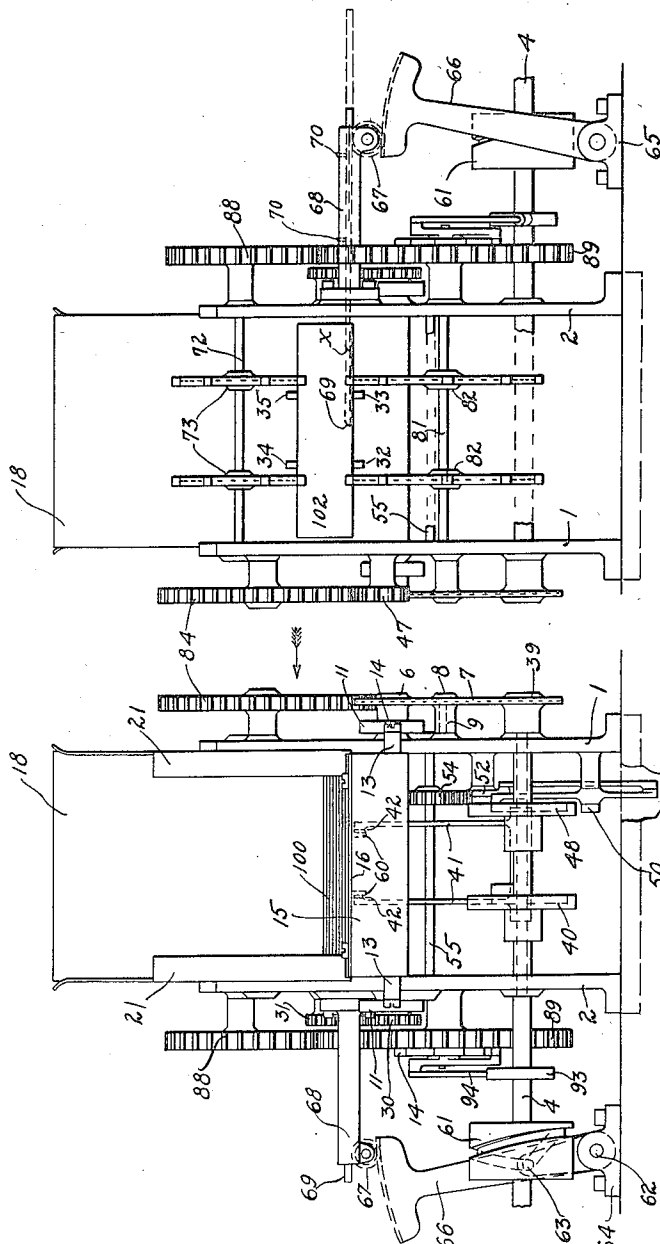


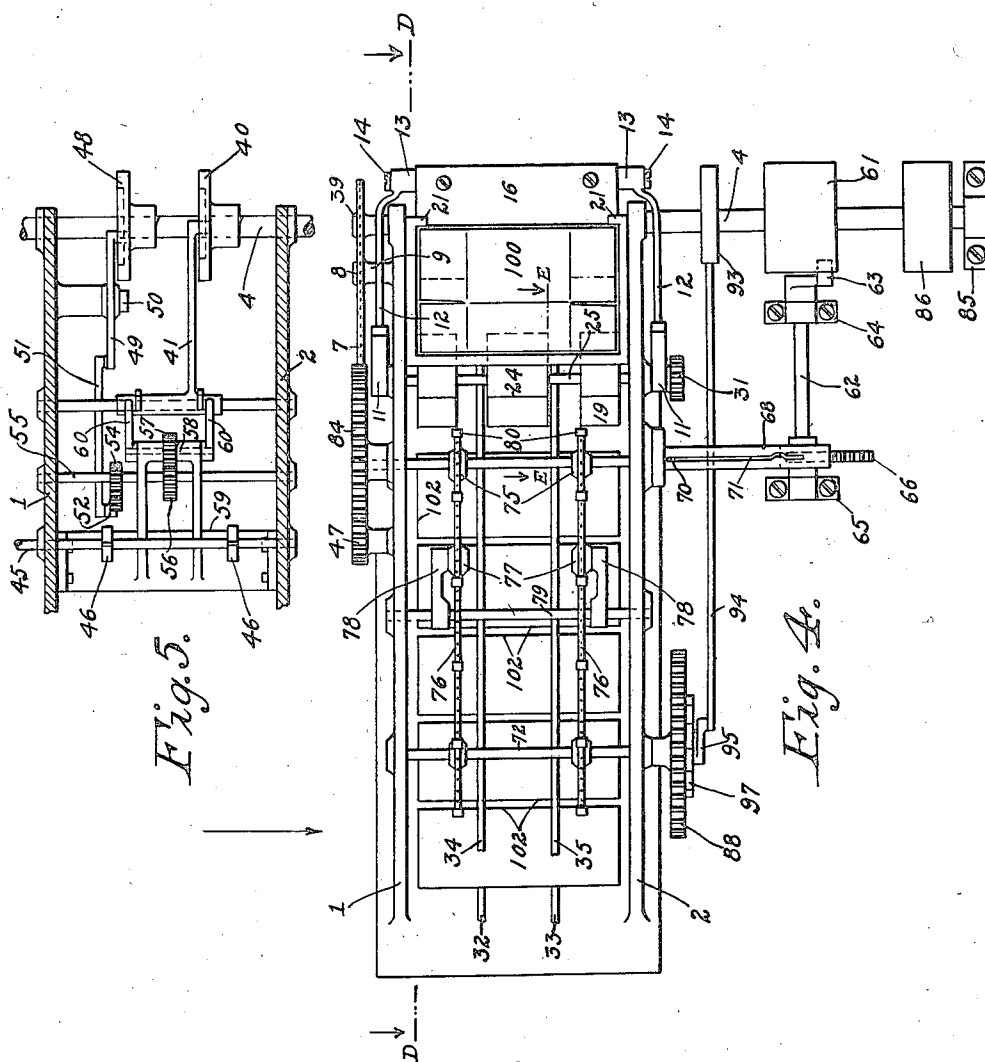
Fig. 3.

Fig. 2.

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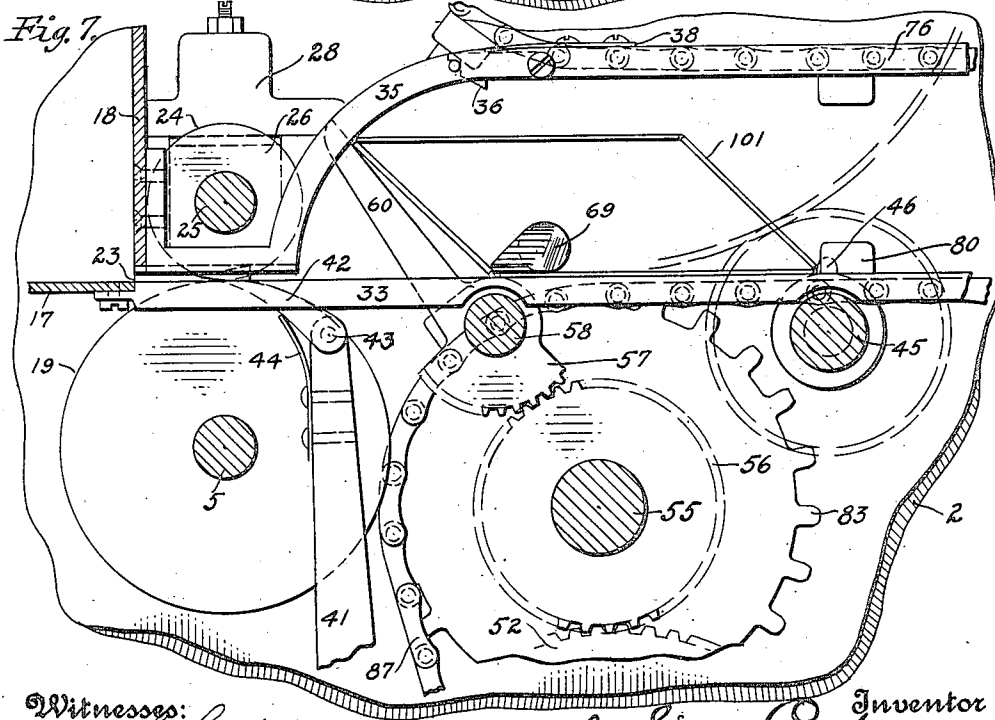


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Patented Dec. 31, 1918.
6 SHEETS—SHEET 4.

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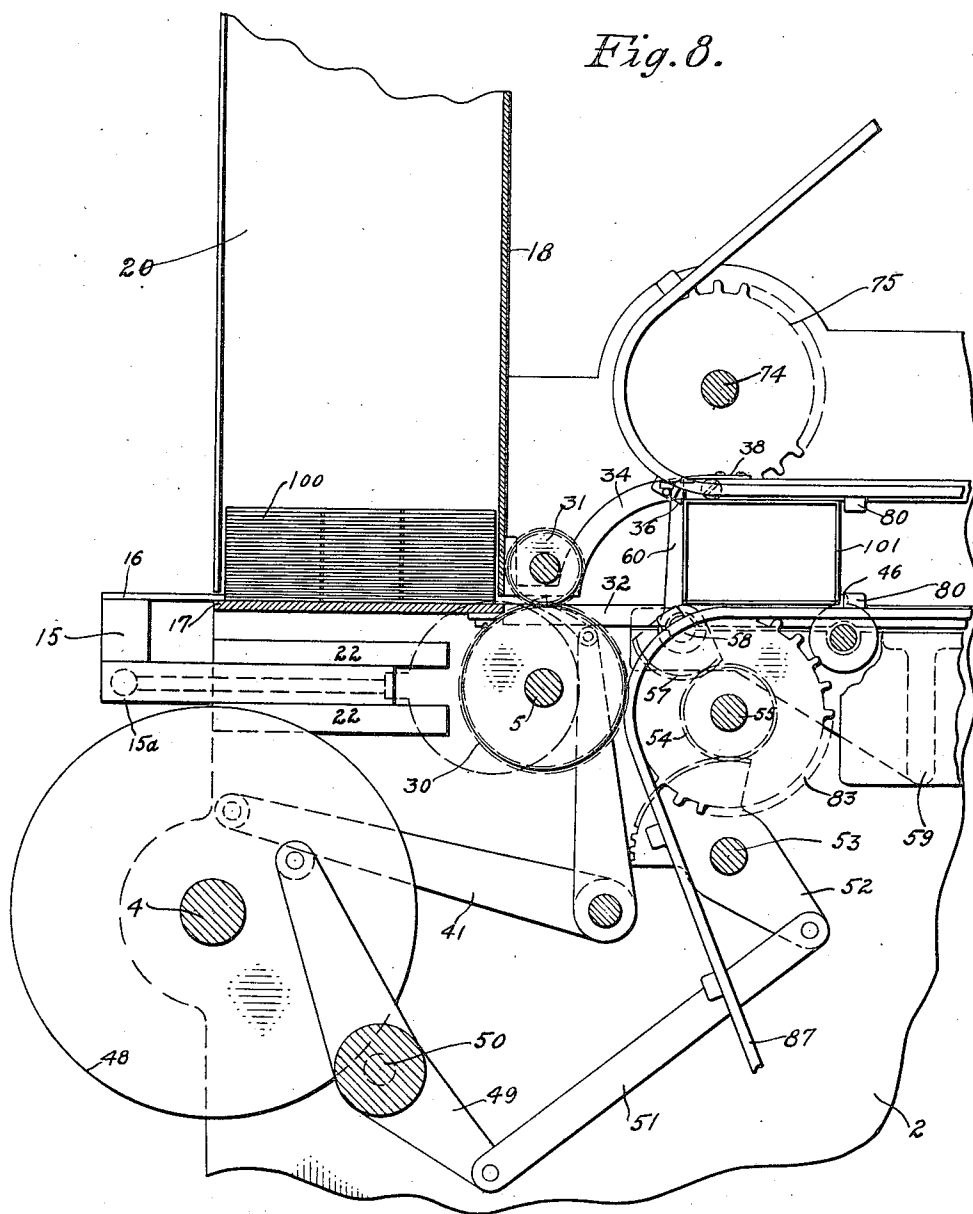


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6 SHEETS—SHEET 6.

Fig. 9.

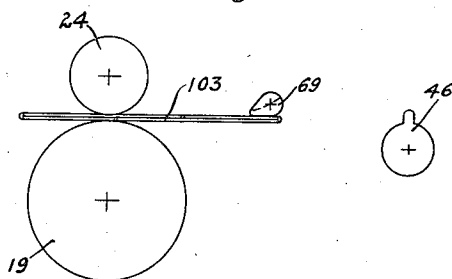


Fig. 12.

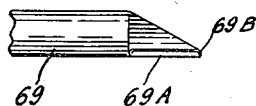


Fig. 10.

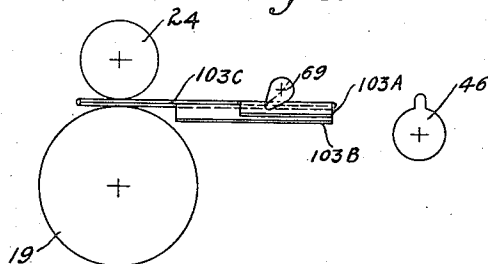


Fig. 13.

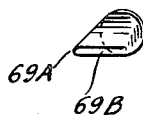
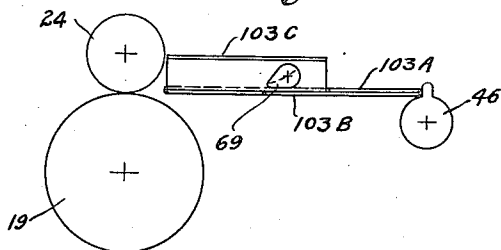


Fig. 11.



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UNITED STATES PATENT OFFICE.

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PAPER-BOX MACHINE.

1,289,673.

Specification of Letters Patent.

Patented Dec. 31, 1918.

Application filed April 16, 1915. Serial No. 21,887.

To all whom it may concern:

Be it known that I, SIMON COOPER, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Paper-Box Machines, of which the following is a specification.

This invention relates broadly to paper-box machines, and more particularly aims to provide a type of apparatus for further conforming an already partially-conformed blank.

The cardinal object thereof is to provide an embodiment wherein the working instrumentalities provided will rapidly, unerringly and with a relatively small number of operations function predeterminedly to expand and then predeterminedly to maintain expanded a normally collapsed or partially collapsed box-blank.

Other objects and aims of the invention, more or less broad than those stated above, together with the advantages inherent, will be in part obvious and in part specifically referred to in the course of the following description of the elements, combinations, arrangements of parts, and applications of principles constituting the invention; and the scope of protection contemplated will appear from the claims.

In the accompanying drawings, which are to be taken as a part of this specification, and wherein I have shown an embodiment of the invention as at present preferred, Figure 1 represents a side elevation of a carton setting up machine, constructed in accordance with my invention; Fig. 2 represents a front elevation of the machine as viewed from the left in Fig. 1; Fig. 3 is a rear elevation; Fig. 4 is a top plan view of the machine, the arrow of this figure coinciding with arrow on Fig. 2; Fig. 5 is a plan section taken on the line A—A of Fig. 1; Fig. 6 is a detail sectional elevation, taken on the line E—E of Fig. 4, of the carton working mechanism; Fig. 7 is the same as Fig. 6 with some of the parts in subsequent positions; Fig. 8 is a sectional elevation taken on the line D—D of Fig. 4; Figs. 9, 10 and 11 are diagrammatic views showing operations with reference to the flaps of the blank; Figs. 12 and 13 are views of the beveled ends of the plunger 69 shown in said Figs. 9, 10 and 11; and Fig. 14 shows a typical carton blank. Similar parts are design-

nated by the same reference characters in the several views.

Referring to Figs. 1, 2, 3 and 4, main side frames 1 and 2 are parallelly carried by the base plate 3. Journaled in the forward ends of these frames is a transverse main shaft 4, on the extreme end of which shaft is located a sprocket 39. A transverse shaft 5 (Fig. 1) has on one of its ends a sprocket 6. A sprocket chain 7 connects sprockets 6 and 39, a tension idler 8 carried on an eccentric-adjustable stud 9 arranged on side frame 1 serving to keep the sprocket chain taut.

Fastened to opposite portions of shaft 5 (each alongside but outside its adjacent frames 1 or 2), are a pair of eccentrics 10 and 10 (Fig. 1), and on each of these eccentrics is an eccentric strap 11. These straps each carry a connecting rod 12 which ends in an eye 13 (Fig. 2) and is bolted to a pusher 15 (Fig. 2) by means of a bolt 14.

Anchored to the top side of pusher 15 is a thin plate 16, approximately the thickness of a flat carton, and the inner edge of this plate rests upon a bottom plate 17 of a hopper 20 (see, for a moment, Fig. 8, wherein it will be noted that pusher 15 has a leaf 15^a, extending back between frames 1 and 2, supported by parallel guideways 22).

Hopper 20 is of the necessary dimensions to contain a stack of folded or flat cartons 100 (Figs. 2 and 8), and for purposes of loading the cartons into said hopper it is open on top and part of its front side is cut out, leaving the wings 21 (Fig. 2). The lower corners of wings 21—21 are cut away to leave clearance for the passage of pusher plate 16. Nor does a back plate 18 of the hopper quite reach to the bottom plate 17; this plate 18 is so arranged as to establish a gate the height of what is equal to the width of one flat carton as shown at 23, Figs. 6 and 7.

Immediately behind the back plate 18 is located a feed roll 24 mounted on a transverse shaft 25. This shaft is carried in sliding journals 26, one in each main frame (Figs. 6 and 7), and these journals are pressed downwardly by springs 27 in caps 28. A set screw 29 in each cap serves to regulate the pressure of these springs.

Feed roll 24 presses upon another feed roll 19 (Fig. 4) mounted on shaft 5 (Figs. 6 and 7).

Shaft 5 has fixed on it also a gear 30, which meshes with a gear 31 on shaft 25

(see Fig. 2). The pitch lines of these gears 30 and 31 correspond to the diameters of the feed rollers on their respective shafts, to the end that said rollers may rotate at the same peripheral speeds.

The feed rolls 24 are separated or spaced or cut away at points longitudinally of their supporting shaft 25 (see Fig. 4) to permit the extension of tracks 32 and 33 (see Figs. 3 and 4) to reach beyond said rolls 24 and as prolongations of plate 17 of hopper 20 (Figs. 4, 6, 7 and 8). Directly above tracks 32 and 33 are supplementary tracks 34 and 35, which for a portion of their length parallel the lower tracks, but which at their inner ends are suitably curved (see Figs. 6 and 7), and then extend in between the cut away portions of rollers 24 and make connection with the back plate 18 of hopper 20, the lower faces of the horizontal inner lengths of these tracks 34 and 35 being at a distance approximately the thickness of a folded carton above the upper faces of tracks 32 and 33, (see said Figs. 6 and 7). Each of the upper tracks 34 and 35 is suitably recessed to receive predeterminedly a pawl 36, the tooth of each of which normally extends below its associated track and is maintained in this position by means of a leaf spring 38, as shown in Figs. 6, 7 and 8.

Fastened to main shaft 4 (Fig. 1) is a cam 40 (Figs. 2 and 5); and engaging with this cam is a bell-crank lever 41 (Figs. 1, 2, 5, 6, 7 and 8), the upper end of which is bifurcated (Fig. 2) with each leg of the bifurcation carrying a pawl 42 (Figs. 2, 6 and 7). Each pawl 42 is connected to the bell-crank lever 41 by means of a pin 43 (Figs. 6 and 7) and each is maintained by a spring 44 (said Figs. 6 and 7) in a position with its nose a little above the upper surface of tracks 32 and 33.

A shaft 45 (Fig. 1) is mounted in suitable bearings in side frames 1 and 2, and said shaft has mounted thereon one or more stop-gages 46, each of which normally extends slightly above the upper surface of tracks 32 and 33 (Figs. 5, 6, 7 and 8). Shaft 45 carries gear 47 (Fig. 4) at one of its outer ends, said gear 47 meshing with a gear 84 (Figs. 1 and 4) on a shaft 74 (Fig. 1).

Fixedly mounted on main shaft 4 (Figs. 1, 5 and 8) is a cam 48, and this cam (Fig. 8) controls the upper edge of a lever 49 which is pivotally mounted on a stud 50 anchored in a boss on the inner side of side frame 1.

The lower end of lever 49 is connected to one end of a link 51 and the other end of said link engages with an offset arm of a segment gear 52 which is journaled upon a stud 53 set in side frame 1 (Fig. 8). Segment 52 meshes with a gear 54 which is fixedly mounted upon a shaft 55 hung in

frames 1 and 2 (Figs. 5 and 8). Also fastened upon shaft 55 is a gear 56 (Figs. 5, 6 and 7) which meshes with a segment 57 that is in turn fastened to a shaft 58 (Figs. 5, 6, 7, and 8). Shaft 58 is journaled in a suitable bracket 59 carried between main frames 1 and 2 and extending transversely of the axis of said shaft 58, and fixedly but spacedly mounted thereon are two parallelly mounted turning arms 60 contiguous to tracks 32 and 33.

The main shaft 4 carries at a point beyond the main frame 2, a track-cam 61 (Fig. 2), and, engaging with this cam by means of a roller stud 63 (Figs. 2 and 4), is a rock-shaft 62 (Figs. 2 and 3). This rock-shaft is held in place by means of suitable bearings 64 and 65 (Figs. 2 and 4). Carried fixedly by rock-shaft 62 is an upstanding lever 66 (Figs. 2 and 3); and the upper end of said lever is cut into a gear segment which engages with an idler gear 67 held in place near the outer end of a sleeve 68 (Figs. 2, 3 and 4) that extends outwardly from main frame 2. A plunger 69 (Figs. 2, 6 and 7) has a portion thereof cut into a rack to engage with idler gear 67, and the same is free to slide in sleeve 68 and also rotate upon its axis to a limited extent. Said plunger has its inner end formed into a double bevel, as shown in Figs. 6, 7, 9, 12 and 13; and also carries a pin 70, to be guided by a slot 71 cut in sleeve 68, as shown best in Fig. 4.

A shaft 72 (Figs. 1, 3 and 4) is mounted in frames 1 and 2 and fixedly carries a pair of similar sprockets 73; and a shaft 74 mounted parallel to shaft 72 similarly carries a similar pair of sprockets 75. Two endless chains 76 are laid around these sprockets (see particularly Figs. 1, 6 and 7), and are kept in a taut condition by means of idlers 77 carried on arms 78 (Fig. 1) extending from shaft 79 which is held in place between frames 1 and 2 (Figs. 1 and 4). Each of these chains 76 carries equidistantly spaced thereon a plurality of lugs 80, each lug extending outwardly of the path of travel of its chain, and each lug on one of the chains being alined transversely of the machine, with a lug on the other chain as shown in Figs. 1, 3, 4, 6, 7 and 8.

A shaft 81, parallel to shaft 72 and directly underneath it (Fig. 3), is mounted in frames 1 and 2, fixedly carries a pair of similar sprockets 82. On shaft 55 are a pair of mutually similar loose running sprockets 83. Laid around each set of sprockets 82 and 83 is a chain 87. Each of these chains 87 carries equidistantly spaced thereon a plurality of lugs 80, these lugs too, extending outwardly of the path of travel of its chain and each lug on one of the chains being alined with a lug on the other chain as shown

in Figs. 1, 3, 6, 7 and 8. It will be seen, also, that each lug on a horizontal length of a chain 76 is vertically alined, but spaced from a lug on a horizontal length of a chain 87 (Figs. 6 and 7).

To keep each chain 87 in tension an idler 90 is hung from a bracket 91 in line with each chain (see Fig. 1), said brackets being held in place by a shaft 98 mounted in side frames 1 and 2.

Shaft 4 carries adjacent its extreme outer end bearings 85 (Fig. 4) a driving pulley 86.

To insure the proper travel in unison of chains 76 and 87, shaft 72 fixedly carries a gear 88 which meshes with a gear 89 fixedly carried by shaft 81 (see Fig. 1).

An eccentric 92 (Fig. 1) is fastened to shaft 4, and by means of an eccentric strap 93 (Figs. 1, 2 and 4) and a connecting rod 94, said eccentric causes a lever 95, pivoted on shaft 81, to oscillate once for each revolution of the shaft 4. The lever 95 carries a pawl 96 which engages with a ratchet wheel 97 (Fig. 1), fastened to shaft 81, and thereby causes the chains 76 and 87 to advance the space of one transverse line of alined lugs 80—80—80—80 for each full revolution of main shaft 4.

Making a temporary assumption that a lowermost blank 100 (see the stock of blanks shown in Fig. 1) has been as hereinafter described partially thrust from its normal lie in hopper 20, and referring to Fig. 9, it will be noted that while the yet flat blank is being fed forward by its engagement between the feed rolls 19 and 24, the forward edge of the blank comes underneath the plunger 69 at a time when said plunger is extending into the machine transversely of the latter only sufficiently to engage portion of the left end (relatively of Fig. 2) folding flaps of the blank (see X, Fig. 3). With a little farther travel of the blank, as in Fig. 10, the plunger 69 is predeterminedly forced partially to rotate on its axis, by reason of said plunger being predeterminedly forced farther into the machine, the cam-slot 71 coincidently acting on pin 70 to partly turn the plunger on its axis and thus depress its nose 69^A (Fig. 13) thereby to deflect the flaps 103^A and 103^B (Fig. 14) as shown in Fig. 10. The nose 69^A of the plunger is now below the plane of the undersurface of flap 103^C. Further travel of the blank results in a predeterminedly adjustment of the plunger as shown in Fig. 11; the plunger now being located between upper flap 103^C and lower flap 103^B, and the plunger nose now having been returned to its normal position by reason of the timed effect of the slot 71 upon pin 70 (Fig. 4). Figs. 12 and 13 show clearly the method of obtaining the preferably present double-beveled end on plunger 69, the edge 69^A being longitudinal with, but offset from, the

axis of the plunger and the edge 69^B being transverse to the axis but located in a horizontal plane tangent to the lowermost longitudinal edge of the plunger.

A complete résumé of the operation of the above-described embodiment of the present invention, which should largely be obvious, is substantially as follows: A quantity of flat carton blanks 100 having been put into hopper 20, with the lowermost one resting on the bottom plate of the hopper (Figs. 2, 3, 4, 6, 7 and 8), the rotation of main shaft 5 causes its eccentrics 10 and connecting rods 12 (Fig. 1) to actuate the pusher plate 16, (Fig. 8) to force the lowermost blank out of the hopper while the superimposed blanks are restrained by reason of the contracted opening 23 (Figs. 6 and 7) in the back plate 18. The thrust movement of plate 16 is sufficient to cause the flattened blank to be engaged by the continuously running feed rollers 19 and 24, (Figs. 6 and 7), which are preferably covered with rubber or other friction material. As the blank is just ready to pass beyond these feed rollers, the hindmost edge of the blank snaps beyond the breasts of the terminal teeth of the spring-biased pawls 42, the forward edge of this blank having ridden up the ramps of these teeth and subsequently the undersurface of said blank having maintained abnormally depressed said teeth. As said hindmost edge of the blank now clears said pawls, the latter function to advance the blank a further predetermined distance, due to the timed cooperation between cam 40 and bell-crank lever 41, to the end that the blank now comes to rest with its forward end resting against stop gage 46 (Figs. 6 and 7).

As the blank is being fed forward by the feed rolls 19 and 24, the folding flaps at one end (the left-hand end relatively of Fig. 2 and the right-hand end relatively of Fig. 3) pass underneath the projecting bevel-edged plunger 69. This plunger has in the meantime, by the normal adjustment of the parts hereinabove described, to wit, the cam 61, the lever 66, the idler gear 67, etc., been advanced so that its beveled edge is in the path of travel of the folding-flaps last-mentioned, and is now about in the position shown at X in Fig. 3. Thereupon, and by means of said cam 61, said plunger is caused to move slightly in toward the center of the machine, and simultaneously the projecting pin on plunger 69 engages with the curved portion of track 71 in sleeve 68 (Fig. 4), thus deflecting the beveled edge or nose of the plunger 69 downwardly. The ensuing twisting motion of the beveled nose of the plunger causes the adjacent folding flaps of the blank to be forced out of the plane of the main body of the blank (as hereinbefore described in connection with Figs. 9 to 11 inclusive), and the further travel of the blank

permits the beveled nose of the plunger 69 to enter between the two opposite flaps 103ⁿ and 103^c as shown in Fig. 11. When the blank has traveled thus far enough to permit the plunger to lie between these two flaps the plunger is caused to move rapidly in toward the center of the machine, by means of the design of said cam 61, and thus start the opening or expansion of the blank, as best shown in Fig. 6.

The plunger 69 is so spaced from the gage stops 46 that the side-beveled edge 69^A (Fig. 13) of said plunger is on the creasing line of one corner of the blank (Figs. 6 and 7) as soon as the blank is in position against the stop gages 46, and the plunger is in its extreme position inside the blank as just described, the two turning arms 60, by means of the predetermined rocking of lever 49 (Fig. 1) due to the design of the cam 48 (Figs. 2 and 8), are caused to rotate about their shaft 58, to expand the blank first lying to the condition shown in Fig. 7 and then to the condition shown in Figs. 8 and 1; the creasing edge 100^A (Fig. 6) of the blank traversing an arcuate path which coincides with the curved portions of tracks 34 and 35 (Figs. 6, 7 and 8). It will be at this point seen that the elements comprising stop gages 46, plunger 69, turning arms 60, and the curved portions of tracks 34 and 35 co-act toward insuring a successful, rapid and unerring expansion of the blank.

While the blank is thus being formed, as described, when edge 100^A (Fig. 6) approaches its uppermost or final position, it causes the pawls 36 (Fig. 6) to recede into their aforesaid abnormally-accommodating recesses in tracks 34 and 35, and immediately after said edge 100^A has snapped beyond these pawls, the latter drop behind said edge and hold the blank in its substantially formed or open position, as best shown in Fig. 8.

Next, the chains 76 and chains 87 are caused to move forward the distance of one of the longitudinal divisions marked off by two adjacent lugs 80 on each chain; the eccentric 92, rod 94, pawl 96 and ratchet wheel 97 (Fig. 1) functioning predeterminedly to this end. And as these chains carry the lugs 80 they convey the opened blank forward and toward the discharge end 200 (Fig. 1) of the machine; the effect of this operation being that every division of the chains 76 and 77 contains one opened blank and maintains said blank open at least until it has been transported beyond the outer limits of tracks 32, 33, 34 and 35.

Inasmuch as many changes could be made in the above construction, and many apparently widely different embodiments of my invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description

or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means coöperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blanks, and means adapted to expand said blank when the same is so relocated, said means last mentioned including a latch instrumentality beyond which a creased edge of said blank is passed by said roller-feeding means.

2. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means coöperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated, said means last mentioned including a latch beyond which a creased edge of said blank is passed by said roller-feeding means and a movable support for said latch and means adapted to cause a predetermined movement of said support thereby to predeterminedly expand said blank.

3. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means coöperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated, said means last mentioned including a latch beyond which a creased edge of said blank is passed by said roller-feeding means and a movable support for said latch and means adapted to cause a predetermined movement of said support to advance the blank beyond and free from said roller-feeding means.

4. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means coöperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated, said means last mentioned including a latch beyond which a creased edge of said blank is passed by said roller-feeding means and a movable support for said latch and means adapted to

cause a predetermined movement of said support to advance the blank beyond and free from said roller-feeding means, said means last mentioned also including a predeterminedly normally located stop-gage against which another creasing edge of said blank is forced and by which further movement of said edge is predeterminedly halted when said blank is advanced, as aforesaid, free from said roller-feeding means.

5. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means cooperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated, said means last mentioned including a latch beyond which a creased edge of said blank is passed by said roller-feeding means and a movable support for said latch and means adapted to cause a predetermined movement of said support to advance the blank beyond and free from said roller-feeding means, the two means first-mentioned advancing said blank within a single predetermined plane.

6. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means cooperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated, said means last mentioned including a latch beyond which a creased edge of said blank is passed by said roller-feeding means and a movable support for said latch and means adapted to cause a predetermined movement of said support to advance the blank beyond and free from said roller-feeding means, the two means first-mentioned advancing said blank within a single predetermined plane, and a guideway for said blank extending in said plane beyond the zone of operations of said two means first mentioned.

7. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means cooperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated, said means last mentioned including a latch beyond which a creased edge of said blank is passed by said roller-feeding means and a movable support for said latch and means adapted to cause a predetermined movement of said support to advance the blank beyond and free from said roller-feeding means, the two means first-mentioned advancing said blank within a single predetermined plane, and a guideway for said blank extending in said

plane beyond the zone of operations of said two means first mentioned, said guideway including a plurality of parallel tracks located in said plane.

8. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means cooperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated, said means last mentioned including a latch beyond which a creased edge of said blank is passed by said roller-feeding means and a movable support for said latch and means adapted to cause a predetermined movement of said support to advance the blank beyond and free from said roller-feeding means, the two means first-mentioned advancing said blank within a single predetermined plane, and a guideway for said blank extending in said plane beyond the zone of operations of said two means first mentioned, said guideway including a plurality of parallel tracks located in said plane, said blank being of the type adapted to be expanded into a tubular carton having folding flaps at each end projecting beyond the terminal limits of the tube and said tracks being spaced apart a distance approximately equal to the length of said tube.

9. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means cooperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated, the two means first mentioned advancing said blank along a single predetermined plane, said blank being of the type adapted to be expanded into a tubular carton having folding flaps at each end projecting beyond the terminal limits of the tube, and the means last mentioned including a plunger normally predeterminedly located above said plane, means adapted to advance said blank beyond said roller-feeding means and toward said plunger so that one terminal set of said folding flaps will lie just below a portion of said plunger, and means adapted to cause a portion of said plunger to become abnormally depressed to predeterminedly deflect out of said plane certain of the flaps last mentioned.

10. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means cooperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated, the two means first mentioned advancing said blank

along a single predetermined plane, said blank being of the type adapted to be expanded into a tubular carton having folding flaps at each end projecting beyond the terminal limits of the tube, and the means last mentioned including a plunger normally predeterminedly located above said plane, means adapted to advance said blank beyond said roller-feeding means and toward said plunger so that one terminal set of said folding flaps will lie just below a portion of said plunger, and means adapted to cause a portion of said plunger to become abnormally depressed to predeterminedly deflect out of said plane certain of the flaps last mentioned and thereafter to cause said plunger to present a conformation carried thereby that will spread one of said certain flaps apart from another of said certain flaps.

11. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means coöperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated, the two means first mentioned advancing said blank along a single predetermined plane, said blank being of the type adapted to be expanded into a tubular carton having folding flaps at each end projecting beyond the terminal limits of the tube, and the means last mentioned including a plunger normally predeterminedly located above said plane, means adapted to advance said blank beyond said roller-feeding means and toward said plunger so that one terminal set of said folding flaps will lie just below a portion of said plunger, and means adapted to cause a portion of said plunger to become abnormally depressed to predeterminedly deflect out of said plane certain of the flaps last mentioned and thereafter to cause said plunger to present a conformation carried thereby that will spread one of said certain flaps apart from another of said certain flaps so that one of said flaps will lie above said conformation and the other will lie underneath said conformation.

12. In a machine for setting up carton blanks, the combination of thrust-feeding means, roller-feeding means, said two means coöperating to remove a carton blank from a predeterminedly located collection of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated, the two means first mentioned advancing said blank along a single predetermined plane, said blank being of the type adapted to be expanded into a tubular carton having folding flaps at each end projecting beyond the terminal limits of the tube, and the means last

mentioned including a plunger normally predeterminedly located above said plane, means adapted to advance said blank beyond said roller-feeding means and toward said plunger so that one terminal set of said folding flaps will lie just below a portion of said plunger, and means adapted to cause a portion of said plunger to become abnormally depressed to predeterminedly deflect out of said plane certain of the flaps last mentioned and thereafter to cause said plunger to present a conformation carried thereby that will spread one of said certain flaps apart from another of said certain flaps so that one of said flaps will lie above said conformation and the other will lie underneath said conformation, the means last-mentioned also including an instrumentality adapted to cause said plunger nose to advance toward the interior of the tube and carry thereinto said conformation.

13. In a machine for setting up carton blanks, said carton blanks being of the tubular type with terminal folding flaps, a plurality of fixed guides, a predeterminedly located plunger, means for advancing a blank within a single plane and over said guides with a set of said flaps extending beyond said guides until said flaps lie beneath the plunger, and means for depressing the plunger and thereby causing one of the flaps last-mentioned to pass around the top of the plunger and another of said flaps to pass around the bottom of the plunger.

14. In a machine for setting up carton blanks, said carton blanks being of the tubular type with terminal folding flaps, a plurality of fixed guides, a predeterminedly located plunger, means for advancing a blank within a single plane and over said guides with a set of said flaps extending beyond said guides until said flaps lie beneath the plunger, and means for depressing the plunger and thereby causing one of the flaps last-mentioned to pass around the top of the plunger and another of said flaps to pass around the bottom of the plunger, means for registering the carton in a predetermined position, and means, including said plunger, adapted thereupon to expand the blank.

15. In a machine for setting up carton blanks, said carton blanks being of the tubular type with terminal folding flaps, a plurality of fixed guides, a predeterminedly located plunger, means for advancing a blank within a single plane and over said guides with a set of said flaps extending beyond said guides until said flaps lie beneath the plunger, and means for depressing the plunger and thereby causing one of the flaps last-mentioned to pass around the top of the plunger and another of said flaps to pass around the bottom of the plunger, means for registering the carton in a predetermined position, and means, including said plunger,

adapted thereupon to expand the blank by the predetermined entry of said plungers within the body of the folder blank.

16. In a machine for setting up cartons, said carton being of the tubular type with terminal folding flaps, the combination of a plurality of fixed guides, means for transporting said carton along said guides, register-stops to predeterminedly locate the carton on the guides, a plunger, means for causing said plunger to deflect the top or bottom ends of the carton extending beyond the fixed guides as the carton moves forward and for causing the plunger to enter the body of the carton, a rotatable arm, and means adapted to cause said arm to cause one of the creasing edges of the carton to describe an arcuate path sufficiently to form the carton into a rectangular expanded tube, and a fixed curved guide with an arc which coincides with said arcuate path and which is so located that said creasing edge travels thereagainst.

17. In a machine for setting up cartons of the type described, means adapted to restrain one of the creasing edges of the carton so that said edge may constitute a pivot, means adapted thereupon to rotate one of the flat sides thereby to cause the four sides of the carton to assume a substantially rectangular tubular form, and means adapted to cause the means first-mentioned to return to normal location, and a latch adapted to maintain the carton in said form while the means third-mentioned is functioning, as above.

18. In a machine for setting up cartons of the type described, means adapted to restrain one of the creasing edges of the carton so that said edge may constitute a pivot, means adapted thereupon to rotate one of the flat sides thereby to cause the four sides of the carton to assume a substantially rectangular tubular form, and means adapted to cause the means first-mentioned to return to normal location, and a latch adapted to maintain the carton in said form while the means third-mentioned is functioning, as above, and conveyer chains with lugs or extensions adapted to engage with said carton in said form to maintain the same in said form.

19. In a machine for setting up cartons of the type described, means adapted to restrain one of the creasing edges of the carton so that said edge may constitute a pivot, means adapted thereupon to rotate one of the flat sides thereby to cause the four sides of the carton to assume a substantially rectangular tubular form, and means adapted to cause the means first-mentioned to return to normal location, and a latch adapted to maintain the carton in said form while the means third-mentioned is functioning, as above, and conveyer chains with lugs or ex-

tensions adapted to engage with said carton in said form to maintain the same in said form, and means adapted predeterminedly to cause a movement of said conveyer chains to transport the forward carton.

20. In a machine for setting up a carton of the type described, an expanding device, means including a pusher, feed rolls and a movable latch for feeding the collapsed carton to the operating zone of the said device, and means adapted to cause said device to enter between the folding flaps of the carton and then to partially expand the carton by entering between the sides thereof.

21. In a machine for setting up a carton of the type described, an expanding device, means including a pusher, feed rolls and a movable latch for feeding the collapsed carton to the operating zone of the said device, and means adapted to cause said device to enter between the folding flaps of the carton and then to partially expand the carton by entering between the sides thereof, said device including a plunger that has a thrust as well as a rotative movement.

22. In a machine for setting up a carton of the type described, an expanding device, means including a pusher, feed rolls and a movable latch for feeding the collapsed carton to the operating zone of the said device, and means adapted to cause said device to enter between the folding flaps of the carton and then to partially expand the carton by entering between the sides thereof, said device including a beveled plunger.

23. In a machine for setting up a carton of the type described, an expanding device, means including a pusher, feed rolls and a movable latch for feeding the collapsed carton to the operating zone of the said device, and means adapted to cause said device to enter between the folding flaps of the carton and then to partially expand the carton by entering between the sides thereof, said device including a plunger that has a thrust as well as a rotative movement, said plunger being a rod-like member having an offset beveled terminal nose.

24. In a machine for setting up cartons, a stock magazine having an extended bottom support, means for feeding the undermost carton from a stack onto said extension, fixed guides on said extension, means for blocking up the carton while in said fixed guides, and a conveyer adapted to engage with the expanded carton and to feed it expanded out of the machine.

25. In a machine for setting up cartons, a stock magazine having an extended bottom support, means for feeding the undermost carton from a stack onto said extension, fixed guides on said extension, means for blocking up the carton while in said fixed guides, and a conveyer adapted to engage with the expanded carton and to feed it ex-

panded out of the machine, said blocking means including a plunger which is adapted to enter the carton and engage the same so that a creasing edge of the carton may act
5 as a pivot in the expanding of the carton.

26. In a machine for setting up cartons, a register-stop, means for locating a carton against said register-stop, means adapted to partially expand the carton and thereupon
10 to clamp into fixity one of the creasing edges of the carton so that the latter may constitute a turning pivot, means adapted to rotate one of the sides of the carton around said pivot, and guiding means for
15 a free edge of said rotating side thereby to assist in the expansion of the carton.

27. In a machine for setting up cartons, a register-stop, means for locating a carton against said register-stop, means adapted to
20 partially expand the carton and thereupon to clamp into fixity one of the creasing edges of the carton so that the latter may constitute a turning pivot, means adapted to rotate one of the sides of the carton around
25 said pivot, and guiding means for a free edge of said rotating side thereby to assist in the expansion of the carton, and a latch beyond which said free edge is snapped thereby to maintain said carton in its ex-
30 panded condition.

28. In a machine for setting up cartons, a register-stop, means for locating a carton against said register-stop, means adapted to partially expand the carton and thereupon
35 to clamp into fixity one of the creasing edges of the carton so that the latter may constitute a turning pivot, means adapted to rotate one of the sides of the carton around said pivot, and guiding means for a free
40 edge of said rotating side thereby to assist in the expansion of the carton, and a latch beyond which said free edge is snapped thereby to maintain said carton in its expanded condition, and conveyer means
45 adapted to receive said carton as thus ex-

panded and to remove the same from said latch and thereafter to further transport said carton while maintaining the same expanded.

29. In a machine for setting up cartons, 50 the combination of thrust-feed means, roller-feed means, said means cooperating to remove a carton-blank from a predeterminedly located pile of blanks and to predeterminedly relocate said blank, and means adapted
55 to expand said blank when the same is so relocated, said means including a latch-instrumentality beyond which a creasing edge of said blank is snapped thereby thereafter predeterminedly to maintain expanded said
60 blank.

30. In a machine for setting up cartons, the combination of thrust-feed means, roller-feed means, said means cooperating to remove a carton-blank from a predeterminedly
65 located pile of blanks and to predeterminedly relocate said blank, and means adapted to expand said blank when the same is so relocated while maintaining a portion of said blank in said relocation, said means
70 including a latch-instrumentality beyond which a creasing edge of said blank is snapped thereby thereafter predeterminedly to maintain expanded said blank.

31. In a machine for setting up cartons, 75 the combination of thrust-feed means, roller-feed means, said means cooperating to remove a carton-blank from a predeterminedly located pile of blanks and to predeterminedly relocate said blank, and means adapted
80 to expand said blank when the same is so relocated, said means including a latch-instrumentality beyond which a creasing edge of said blank is snapped thereby thereafter predeterminedly to maintain expanded said
85 blank, said creasing edge being the edge of said blank which with the same collapses to the rearmost one thereof.

In testimony whereof I affix my signature.
SIMON COOPER.