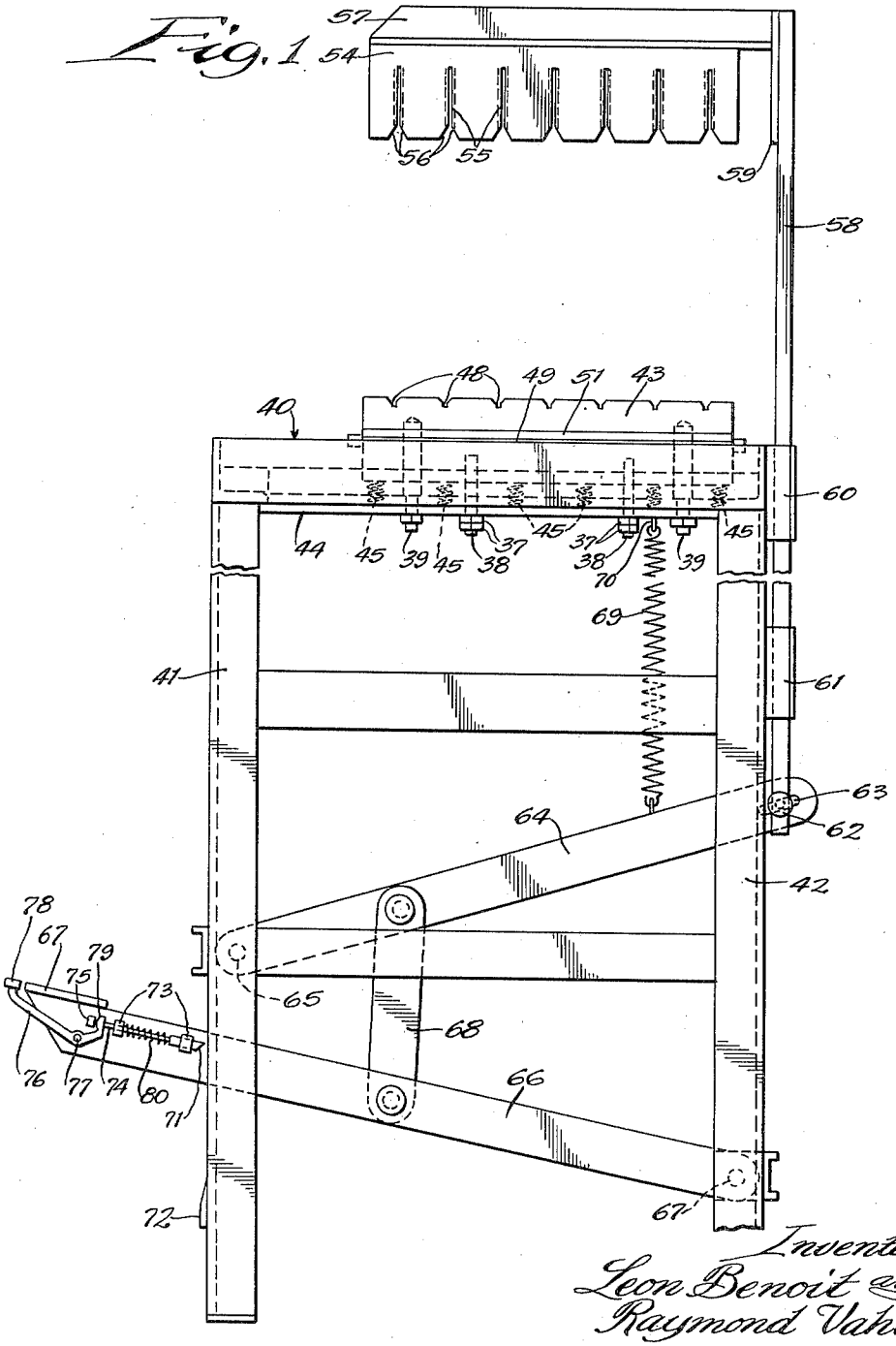
April 25, 1950 L. BENOIT ET AL 2,505,703

CARTON ERECTING MACHINE

Filed Dec. 5, 1945 4 Sheets-Sheet 1

Fig. 1



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CARTON ERECTING MACHINE

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Fig. 2

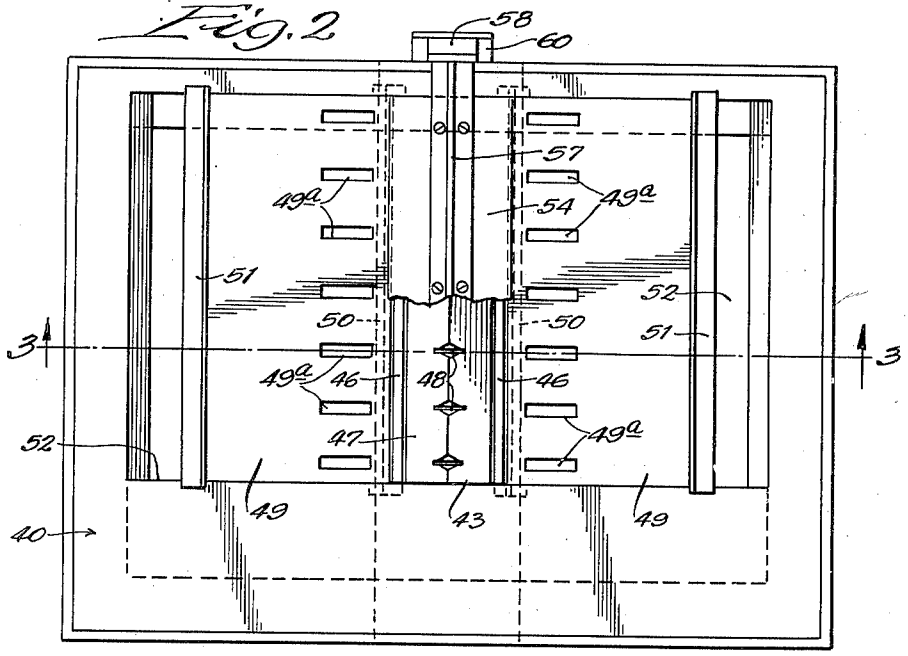
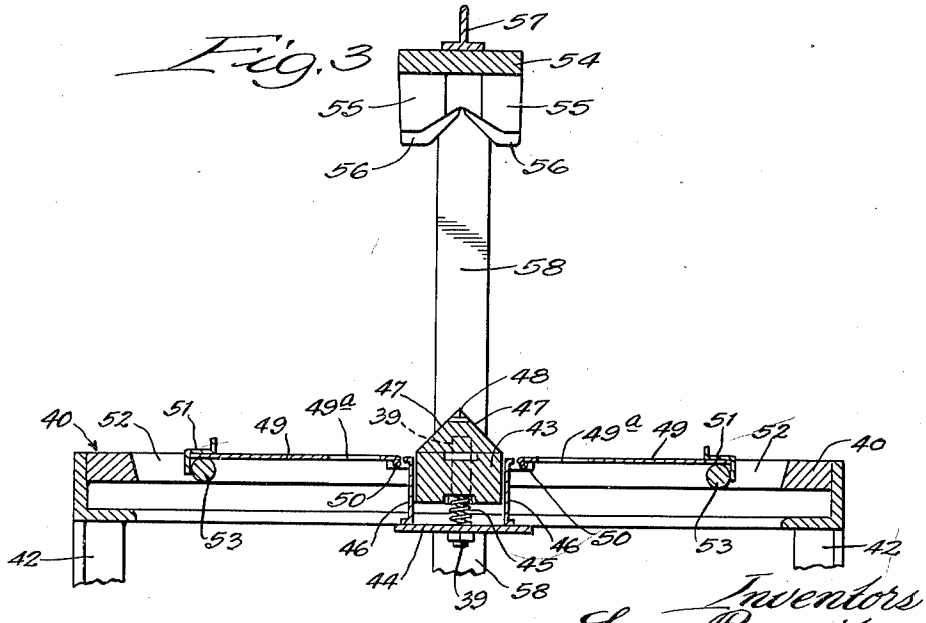


Fig. 3



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CARTON ERECTING MACHINE

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Fig. 4

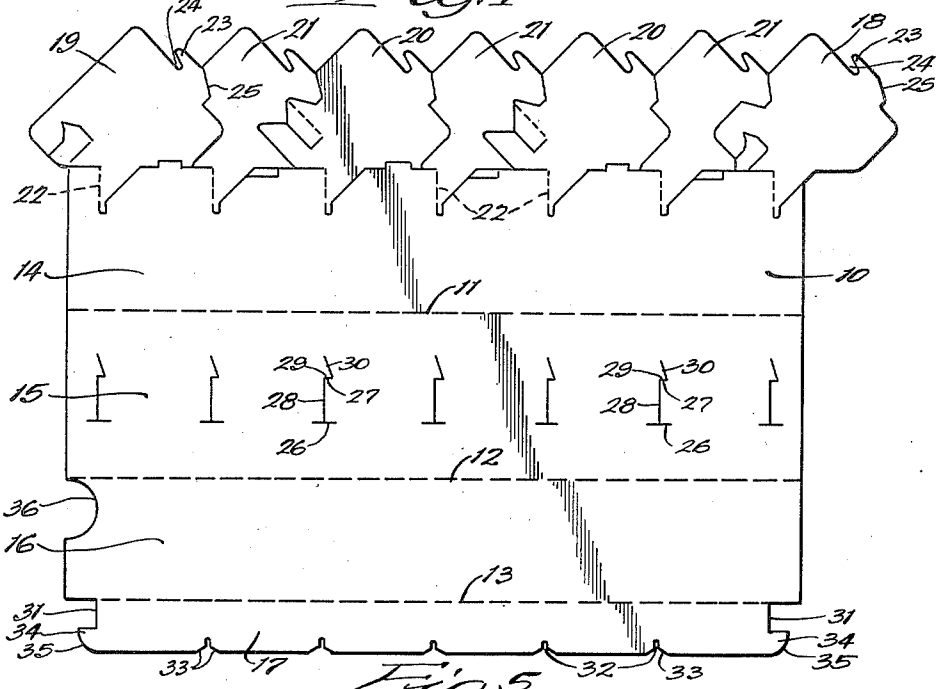
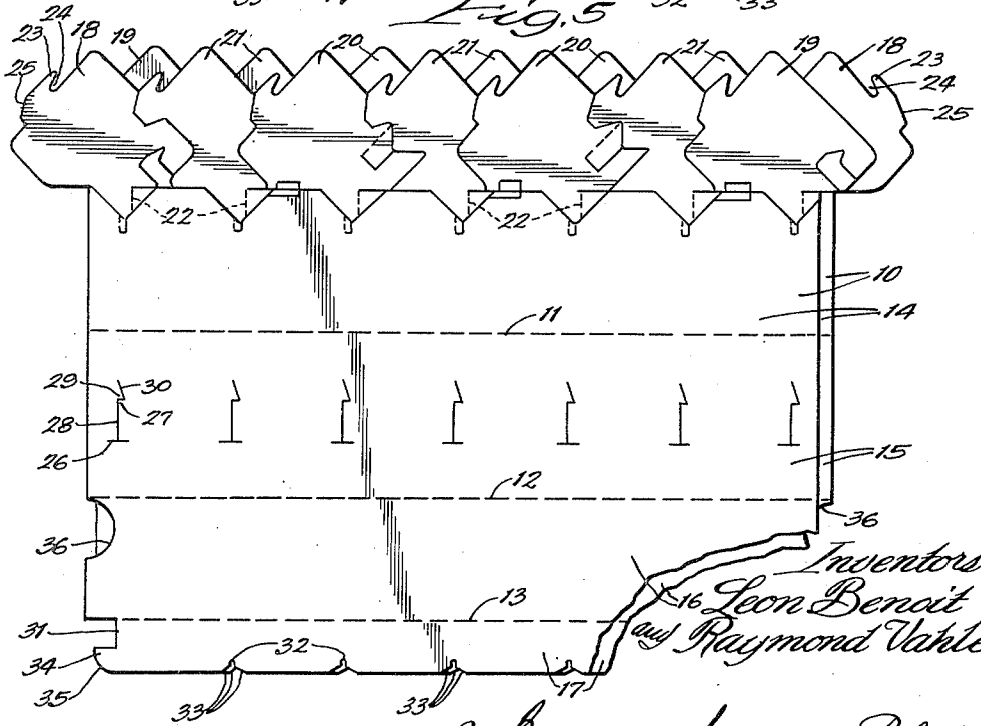


Fig. 5



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CARTON ERECTING MACHINE

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Fig. 6

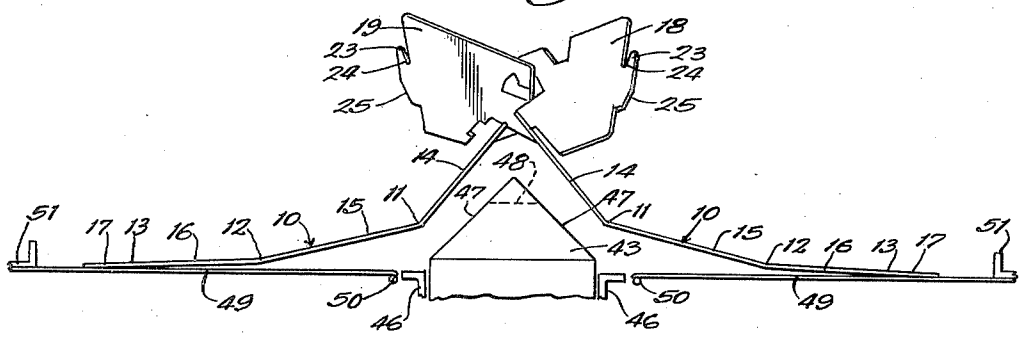


Fig. 7

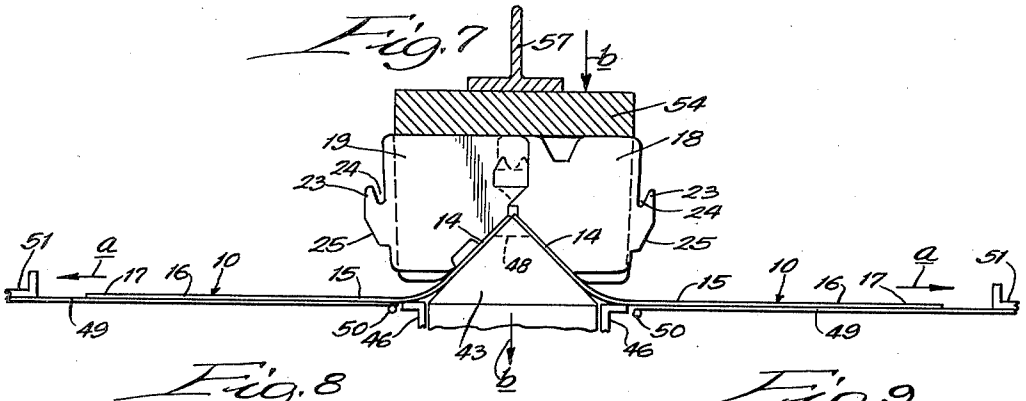


Fig. 8

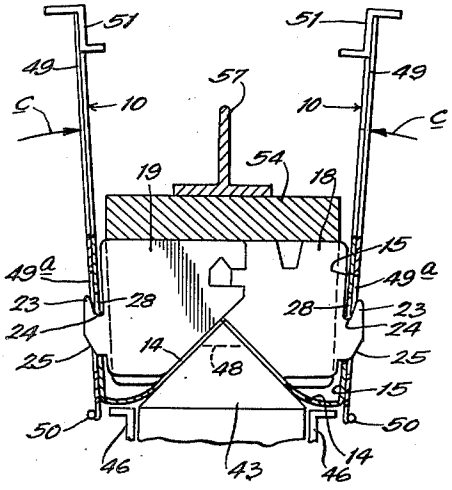
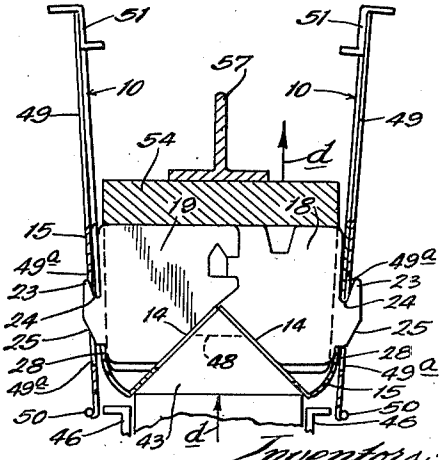


Fig. 9



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Patented Apr. 25, 1950

2,505,703

UNITED STATES PATENT OFFICE

2,505,703

CARTON ERECTING MACHINE

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Application December 5, 1945, Serial No. 632,856

11 Claims. (Cl. 93—37)

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This invention relates in general to a machine for erecting cartons of a cellular holder type adapted to contain and to protect within its cells articles such as eggs, fruits, candies and the like and it is more particularly described as a machine for assembling cellular cartons formed from a pair of blanks which are preliminarily interfitted for interlocking into a unitary structure having cells with yielding walls for holding articles contained therein.

An important object of the invention is to provide a simple machine which receives partially assembled single blanks locked into a unitary structure by end-locks which also engage the covers, the assembling being accomplished partially by hand and partially by the operation of the machine.

A further object of the invention is to provide a cellular holder or carton formed from a pair of flat blanks which occupy a minimum of space and are interfitted flatly together in partially interlocking relation convenient for packing, storage and shipment but easily separated for uniting the parts and forming a cellular carton therefrom.

Still a further object of the invention is to provide an assembling machine for a cellular carton made from a pair of blanks each having a row of flaps which are turned to form cross-walls and means for engaging each cross-wall with the side wall of the opposite blank and resiliently locking it in place.

Still a further object of the invention is to provide a machine for completing the assembly of a cellular carton which is composed of a pair of flat blanks cut and scored to provide similar interfitting parts each with flaps rotatable to form cross-walls engaging in slots of the opposite side walls, the blanks being partially assembled and the flaps interfitted to spread the cross-walls when the blanks are moved apart by manual and other means and to complete the assembly by the operation of machine die parts.

Other objects of the invention will appear in the specification and will be apparent from the accompanying drawings which illustrate a suggestive embodiment of the invention in which

Fig. 1 is a side elevation of a cellular carton erecting machine in accordance with this invention;

Fig. 2 is a top plan view of the assembly table as shown in Fig. 1 with a portion of the upper die block broken away;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

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Fig. 4 is a plan view of one of the two complementary blanks of which a carton is made;

Fig. 5 is a partially assembled view of two similar blanks with the flaps which form the cross-walls partially interlocked and in flat slightly offset reversed relation with respect to each other;

Fig. 6 is a view of the assembly table with two partially assembled blanks spread apart ready for application to the table;

Fig. 7 illustrates the position of the blanks when engaged by an upper downwardly movable die block;

Fig. 8 illustrates the positions of the blanks when the two side gates are swung upwardly carrying the outer edges of the blanks therewith; and

Fig. 9 illustrates the positions of the assembled carton and the side gates, when relative upward pressure on upper and lower die blocks is applied to engage the hooks of the blanks in the locking slots.

This invention relates to a holder or carton which comprises two identical or complementary blanks each having flaps which when turned at ninety degrees become the cross-walls of the opposite adjacent cellular section with hooks which engage through slots of the opposite walls thereby firmly interlocking the two sections of the carton when it is erected.

In the present invention the two carton blanks are partially assembled by placing adjacent blanks bottom to bottom in flat position with the flaps opposite each other and partially interlocking the corresponding flaps of one blank with those of the other blank and in leaving them in this position for storage and shipment until they are to be assembled into a carton and ready for use. Each blank 10 has longitudinal score lines 11, 12 and 13 dividing it into a bottom 14, a side 15, a cover 16 and cover flap 17; at the outer edge of the bottom are end flaps 18 and 19 and intermediate flaps 20 alternated with flaps 21. Each flap is hinged to the edge of the bottom section 14 by a scored hinge line 22 extending at right angles to the edge of the bottom and an adjacent inclined edge line adapted to engage the corresponding edge of the opposite flap when the flaps of opposite blanks are interfitted so that when the flap is folded thereon and turned at ninety degrees it extends outwardly or oppositely from the edge of the bottom 14 and across the bottom of the opposite section when it is formed into a carton.

At the outer edge of each flap is a hook lug 23

having a notch 24 forming the hook and an opposite wedging surface 25 at the other end for making a locking engagement.

In each side portion 15 are a plurality of side locks for engaging the hook lugs of the opposite blank, each lock comprising parallel slits 26 and 27 connected by a cross slit 28 with an angular locking tab 29 formed by a slit 30 extending angularly from one end of slit 27 to a point approximately and in line with the cross slit 28 if it were extended.

The operation of this lock construction is such that when the hook lugs of one carton section are extended and pushed through the connecting slit 28 of any of the locks of the opposite carton section, the extremity of each hook is inserted through the slit 28 and if necessary the hook is displaced longitudinally by the engagement of the inclined wedging surface 25 (see Fig. 8) with the resilient tab 29 which pushes the end of the hook beyond the slit 27 and locks yieldingly below the opposite end of the hook lug 23.

In the outer edge of the cover flap are notches 32 with inclined edges 33 adapted to set them more readily in engagement with the flaps which become the corresponding cross-wall. At the ends of the of the cover flap are recesses 31 forming locking projections 34 with opposite rounded edges 35 extending to the outer edge of the flap. At one end of each cover portion 16 is a rounded recess 36 to provide a finger engaging opening at each end of the carton when it is assembled.

In assembling two blanks for each cellular carton, the flaps 18, 21, 20 and 19 of each blank are reversely disposed face to face with respect to each other and the flaps of each blank inserted through between the flaps of the other blank and partially engaged respectively with each other so that they will lie flatly together with one blank partially offset from the other as shown in Fig. 5 when they are thus assembled and arranged together in pairs or sets. By manipulating each pair or set of carton blanks when the flaps of one are inserted between those of the other, to pull or partially spread the free portions apart, as indicated in Fig. 6, the engagement of the inclined edge line of opposite flaps tends to swing them apart upon their score lines 22 in angular relation and finally at right angles as shown in Fig. 7 if this spreading apart movement is continued. This relation and movement is utilized in assembling the cartons with a comparatively simple erecting and assembling apparatus.

A suitable apparatus for this purpose comprises a support 40 in the form of a table raised to convenient operating height by front and rear legs 41 and 42. Located centrally in the table is a lower die block 43 having a plate 44 upon which it is supported by coil springs 45 at intervals, and guided by bolts 39 which extend upwardly through the plate 44 near the ends of the block. The upward movement caused by the springs 45 is limited by bolts 38 secured into the block and projecting freely through the plate 44 with lock nuts 37 at the lower end of the bolt which engage the underside of the plate and thereby limit the upward movement of the die block. Side plates 46 are secured to the upper side of supporting plate 44 and are disposed closely at the opposite sides of the die block 43. The upper portion of the die block has opposite angular sides 47 converging in a sharp central ridge with notches 48 at intervals to receive and set the cross partitions of the carton blanks therein.

At each side of the lower die 43 is a supporting gate 49 having a hinge 50 at the inner end adjacent the block with spaced slots 49a adjacent the hinges corresponding in number and position to the notches 48 of the lower die member 43 and having an angle plate 51 at the outer end of the gate extending at the ends beyond an opening 52 in the table, in which the gate may be seated. The outer edge of this opening extends at each side beyond the outer side edge of the angle bar so that the fingers of the operator may be inserted through the opening to engage the angle bars for swinging the gates upwardly. To seat the outer ends of the gates, a cross bar 53 may be disposed across each opening 52 below the angle bar and to hold the gate extended in its lower position and to prevent engagement of the fingers between the cross bar and the angle plate. An upper die block 54 has a plurality of slots 55 spaced apart to receive the cross walls formed in the carton when they are at right angles to the side walls. Outer or under edges 56 of the slots are beveled to receive the cross-walls therein and to assist in guiding them into the slots if they are turned slightly less than at right angles to the side walls. To support the upper die block a T-iron 57 is connected at the back or upper side of the block which is secured to an upright support 58 extending downwardly at the back of the table. Near the top of the block is a gauge 59 to limit the downward movement of the block. At the back of the table and suitably secured thereto are guide blocks 60 and 61 through which the lower end of the support 58 extends for moving the upper die vertically with respect to the lower die and to engage the dies so that the notches 48 of the lower die register with the notches 55 of the upper die.

To move the upper die downwardly, the lower end of support 58 is connected by a pivot 62 in a slot 63 at the upper end of a lever 64 extending rearwardly at the back of the legs 42 and mounted at its forward end upon a pivot 65 fixed with respect to the front legs 41. A pedal lever 66, is mounted upon a pivot 67 at the back of the table support and extends forwardly beyond the front legs 41 where it is provided with a platform 67 for depressing the lever. A link 68 is pivoted at one end to the lever 64 and at the other end to the other lever 66. A coil spring 69 is connected at one end to the lever 64 and at the other end to a hook 70 projecting from the supporting plate 44, which tends to hold the levers and also the support 58 and its upper die block in raised position.

To depress the upper die block, the pedal lever 66 is pressed downwardly and to hold it in downward position a spring pressed latch 71 is mounted upon the lever 66 in position to engage a fixed catch 72 at the front of the table support. This latch may be mounted in guides 73 with an extending stem 74 and an end block 75 engaged by a foot release lever 76 mounted on a pivot 77 near the outer end of the pedal lever, the tripping lever 76 having a projection 78 adjacent the platform 67 so that it may be depressed without disengaging the foot from the platform 67, the other end 79 of the lever engaging the projection 75 to withdraw the latch 71 against the tension of its spring 80 to release it from the catch 72.

With this construction the downward movement of the upper die block caused by depressing the pedal lever 66 moves the die block 54 into engagement with the lower die block 43 (with the blanks therebetween) partially depressing the lower die block against the action of the springs

45. The pedal may be locked in the downward position if desired and when released, raising the upper die block by means of its spring 69, the lower die block will be raised to the extent permitted by the limiting bolts 38. This movement is for engaging the hook lugs of the blanks with the slots in the opposite side walls as now explained.

In operation a pair of blanks disposed oppositely together with their flaps interlocked and interfitted are positioned manually on the table with the flaps uppermost and above the angular sides of the lower die member 43, the sides of the blanks being disposed outwardly and lying upon the opposite gates 49 in the positions relatively represented in Fig. 6.

The outer free extremities of the blanks as they rest upon the hinged gates 49 are moved relatively outward when the flaps are pressed downwardly by the upper die member 54, as indicated by the arrows *a* in Fig. 7. This outward movement aligns the flaps which are shown partially displaced into their crossed position in Fig. 6, to positions at right angles to the side walls as represented in Fig. 7. With the cross walls in this position the upper die block is then depressed, preferably by means of the pedal lever 66 moving the upper die block downwardly, engaging the cross walls in pairs within the slots 55 of the upper die member 54 and this movement continuing to depress the lower die block 43 as indicated by the arrows *b* in Fig. 7 and as permitted by its springs 45. In this position it will be noted that the outer extremities of the blanks are at a distance within or short of the angle plates 51 at the outer ends of the gates 49.

The gates 49 are then raised or swung upwardly upon their hinges 50 carrying with them the blanks 10, during the first movement in the direction represented by the arrow *c*. This causes the outer ends of the blanks to abut the angle plates 51 as shown in Fig. 8 thereby limiting the outward movement of the blanks and causing the hook lugs 23 to be projected through the slots 28 of the side walls of the opposite blanks, these lugs being also projected through the openings 49*a* in the gates 49. At this time the blanks are held tightly in position between the upper and lower die blocks which have been depressed as shown in Fig. 7 so that the swinging movement of the gates holds the bottoms 14 of the blanks downwardly in the position shown by Fig. 8 because of the engagement of the upper ends of the blanks with the angle bars 51.

With the gates remaining in their raised position pressure is then released upon the upper and lower die blocks causing them to rise in the direction as indicated by the arrows *d* in Figure 9 thereby carrying with them to the extent permitted by the springs 45, the intermediate clamped portions of the blanks and the projecting hook lugs 23 so that they are raised relatively with respect to the slits 28 from the position shown in Fig. 8 so that the hooked extremities of the lugs overlap outwardly beyond the side walls as shown in Figure 9.

In this position the hook lugs 23 are firmly engaged with the slits in the side walls; they are held in place by the engagement of the opposite ends of the hooked lugs and the carton is in assembled position. The lugs are freely movable in the openings 49*a* of the gates 49 and the gates are then swung downwardly to their position on top of the plate 40. The assembling operation is then complete, the upper die 54 has been removed and the assembled carton with the cover

16 and the cover flaps extending upwardly as shown in Fig. 9 are ready to receive eggs or other articles in the cells thereof.

These assembling machines are simple in construction and operation, they do not have any complicated parts, operations or machinery, and although an operating pedal has been shown the upper die member might also be moved intermittently by a motor or other suitable source of power. As herein explained the preliminary assembling, the positioning of the blanks on the table, the transverse positioning of the cross walls, the operation of the folding gates, and the removal of the erected carton blank are preferably effected by manual means.

Any terms herein indicating directions such as up, down, vertical, horizontal, and the like, are employed in a descriptive or relative sense, and not as a limitation.

We claim:

1. A machine for erecting cellular cartons of the type comprising two similar flexible sheet blanks having flaps hinged along one edge and extensible at right angles from one blank within the other blank to form transverse walls, and the ends of the flaps having hook lugs to engage corresponding slits in the side walls of the other blank; said machine comprising a lower die member with hinged gates extending outwardly therefrom to form a support for the blanks, the gates having openings therein corresponding to the hooks and slits of the blanks, an upper die member, transverse slots to engage the cross walls of the blanks in extended position, means for moving the upper die member downwardly to engage a pair of extended blanks positioned on the lower die member, and the gates being movable upwardly to raise the side walls of cartons to engage the hook lugs of opposite blanks and insert them through the slots of the walls of the opposite blanks through the openings of the gates.

2. A machine for erecting cellular cartons of the type comprising two similar flexible sheet blanks each having flaps along one edge oppositely inter-engaged in flat position and extensible by spreading the blanks apart into cross wall relation at right angles to the remainder of the blank with hook lugs at the ends of the flaps and locking slits in the side walls of the blanks, said machine comprising a lower die member with flat receiving gates hinged at the sides thereof, the gates having openings corresponding to the hook lugs, an outer engaging means for the ends of the carton blanks, an upper die member having slots for engaging the cross walls of the blanks and means for moving the upper die member to engage blanks between it and the lower die member with the cross walls in extending position, means mounting the lower die member for a limited resilient movement when the blanks are engaged by the upper die member, the gates being movable upwardly upon their hinges to swing the side walls of the blanks upwardly, the outer ends of the blanks contacting said engaging means for pressing the inner ends of the blanks downwardly when the gates are swung upwardly with the blanks and the swinging movement of the gates causing the hook lugs of one blank to extend through the locking slits of the other blank, and means for releasing the die members for movement and engaging the hook lug extremities with the locking slits.

3. A machine for erecting cellular cartons of the type comprising two similar flexible sheet

blanks each having flaps hinged along one edge placed oppositely together and inter-engaging the flaps in flat condition for folding them into cross walls by spreading the blanks apart, said machine comprising a lower die member extending angularly upward with hinged gates at the sides thereof, the gates having openings to receive the ends of the cross walls and projections at the ends of the gates for engaging the outer free ends of the blanks, an upper die member having slots therein for engaging the cross walls in transverse position on the lower die member, means for moving the upper die member downwardly into engagement with the blanks in position on the lower die member, means for resiliently mounting the lower die member for a limited downward movement when engaged by the upper die member, the gates being movable upwardly on their hinges, contacting the outer ends of the blanks thereon for holding the blanks in raised position to register the openings of the gates with the extremities of the cross walls, and the die members being movable upwardly to engage the ends of the cross walls in the slits of the carton side walls while maintaining the extremities of the side walls in engagement with the projections at the ends of the gates.

4. A machine for erecting cellular cartons of the type comprising two similar flexible sheet blanks each having flaps hinged along one edge placed oppositely together and inter-engaging the flaps in flat condition for folding them into cross walls by spreading the blanks apart and having hook lugs at the outer edge of each flap insertable through a connecting slit in the wall of the opposite blank, said machine comprising a lower die member extending angularly upward with hinged gates at the sides thereof, the gates having openings to receive the hook lugs and projections at the ends of the gates for engaging the outer free ends of the blanks, an upper die member having slots therein for engaging the cross walls in transverse position on the lower die member, means for moving the upper die member downwardly into engagement with the blanks in position on the lower die member, means for resiliently mounting the lower die member for a limited downward movement when engaged by the upper die member, the gates being movable upwardly on their hinges contacting the outer ends of the blanks thereon for holding the blanks in raised position to register the openings of the gates with the hook lugs of the side walls, and the die members being movable upwardly to engage the hook lugs of the cross walls in the slits of the carton side walls while maintaining the free ends of the side walls in engagement with the projection at the ends of the gates.

5. In a machine for erecting cellular cartons of the type comprising two flexible sheet blanks each having flaps hinged along one edge with connecting slits in the wall of the blanks and hook lugs in the ends of the flaps, the flaps being extensible at right angles to the edge and within the other blank to form the transverse cross walls, said machine comprising a pair of dies movable together with a pair of blanks and having cross walls extended between them, means at the sides of the dies for swinging the outer ends of the blanks upwardly, projections at the outer ends of said means for engaging the extremities of the side walls of the blanks to hold the locking slits in alinement with the ends of the hook lugs and pressing the lugs through the slits, means for moving the die members relatively to said means for engaging the extremities of the hook lugs with the extremities of the locking slits while maintaining the side walls in fixed relation.

6. A carton erecting machine for cellular cartons of the class described having a lower die member with gates hinged at each side thereof to receive a pair of interlocked carton blanks on top thereof, each gate having spaced openings adjacent the hinge and outer projecting means to engage the outer free edge of a blank thereon, means mounting the lower die member for a limited downward yielding movement, an upper die member having transverse slots to engage extended cross walls of a carton having connecting hook lugs projecting from the sides thereof to register with the openings of the gates, means for moving the upper die member downwardly to receive the cross walls of the blank and to engage and confine the blanks between it and the lower die member and also to depress the blanks and the lower die member, the gates being rotated upwardly about their hinges to move the side walls of the carton upwardly at the sides of the die members and to contact the outer ends of the blanks with the projecting means of the gate for holding and extending the sides of the carton in fixed position with the openings of the gates registering with the extremities of the slots of the upper die member, and means for raising the die members while holding the gates in fixed position for locking the ends of the cross members of the blanks in the side walls thereof.

7. A carton erecting machine for carton blanks having interlocking hinged flaps comprising a lower die member having means mounting it for a limited resilient downward movement, a pair of gates hinged at the sides of the die member to receive a pair of interlocked carton blanks on top of them and the die member, an upper die member having transverse slots for receiving carton cross walls, means for moving the upper die member downwardly to engage and confine blanks between it and the lower die member when the lower die member is moved downwardly, said means comprising a support extending downwardly from one end of the upper die member, the gates being swingable upwardly with the carton blanks therein, a guide for the support of a lever connected to the lower end of the support, spring means engaging the lever and tending to hold the die member in raised position, and a pedal connected to the lever having means for holding it and the upper die member in its depressed position.

8. An erecting machine for cartons each comprising a pair of similar blanks with interlocking flaps, comprising a lower die member and means mounting the lower die member for a limited resilient downward movement, a pair of gates hinged in fixed location at opposite sides of the die member to receive a pair of carton blanks with interlocked flaps on top of them and the die member, an upper die member movable to engage cartons on the lower die member and to press them downwardly with the lower die member and with respect to the gates, the gates being swingable upwardly with the carton blanks thereon, means connected to the upper die member for moving it and the lower die member downwardly together, said means comprising an operating pedal, a latch for engaging the pedal in its lowermost position, foot releasing means for the latch and means for returning the upper die member to its raised position.

9. An erecting machine for cartons of the class described, a supporting table, a lower die member and spring means mounting it centrally of the table for limited downward movement, and the table having an opening at each side of the die member, a gate hinged in fixed position at each side of the die member, a projecting means extending along the outer edge of each gate but terminating short of the adjacent edge of the opening to provide for finger hold engagement of the outer end of the gate, an upper die member, means connected to the rear end of the upper die member and extending downwardly at the back of the table for moving the upper die member in a vertical position and to engage the lower die member, leaving the upper die member unobstructed at its front end for the application of carton blanks and the removal of erected cartons, lever means for operating the upper die member and pressing it against the lower die member, a releasable catch means for the lever means, and spring means connected to the lever means for returning the upper die member to its raised position above the upper ends of the gates and for allowing the free removal of an erected carton.

10. In a machine for setting up cartons from a pair of assembled blanks, each having flaps hinged along one edge with hook lugs at the outer edges and apertured slits in opposite walls engaged by the lugs, and the flaps extensible at right angles to the edge and within the other blank to form cross walls, a pair of coplanar hinged supports in spaced relation to receive thereon a pair of assembled blanks, a die block having a notched acting face disposed between the coplanar supports and a second die block having a notched acting face complementary to that of the first die block for receiving therebetween the several pairs

of turned flaps on the assembled blanks, and means for moving one die block relatively from and toward the other whereby to parallelize the flaps therebetween, the hinged supports being apertured and when swung through nearly 90°, acting to advance the slitted blank portions over the hook lugs projecting from the flaps while receiving the hook lugs within their own apertures.

11. In a machine for setting up cartons from a pair of assembled blanks as described, a pair of coplanar hinged supports in spaced relation whereon to receive a pair of assembled blanks, a die block having a notched acting face disposed between coplanar supports, a second die block having a notched acting face complementary to that of the first die block for receiving therebetween the several pairs of turned flaps on the assembled blanks, means for moving one die block relatively toward and from the other to parallelize the flaps therebetween, the hinged supports being apertured and when swung through nearly 90° acting to advance the slitted blank portions over the hook lugs projecting from the flaps while receiving the hook lugs within their own apertures, and means for moving the two die blocks in the same direction whereby to shift the positions of the hook lugs lengthwise of the blank slits with which they are engaged.

LEON BENOIT.
RAYMOND VAHLE.

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