J. M. JOHNSON.
FOLDING BOX.
APPLICATION FILED MAY 31, 1907.

900,173. **Patented Oct. 6, 1908.**

3 SHEETS—SHEET 1.

Fig. 1.

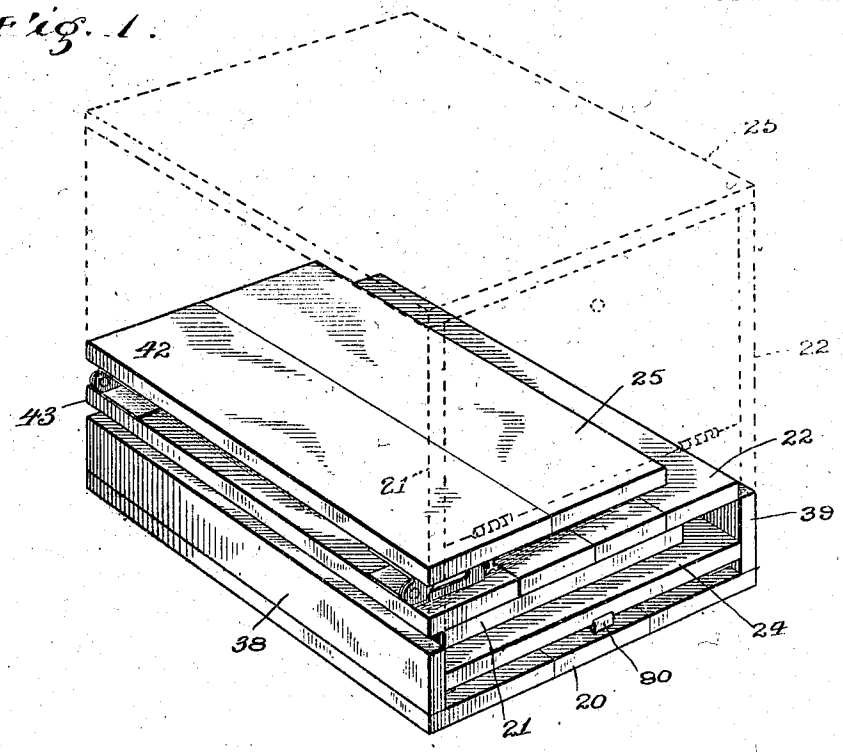


Fig. 2.

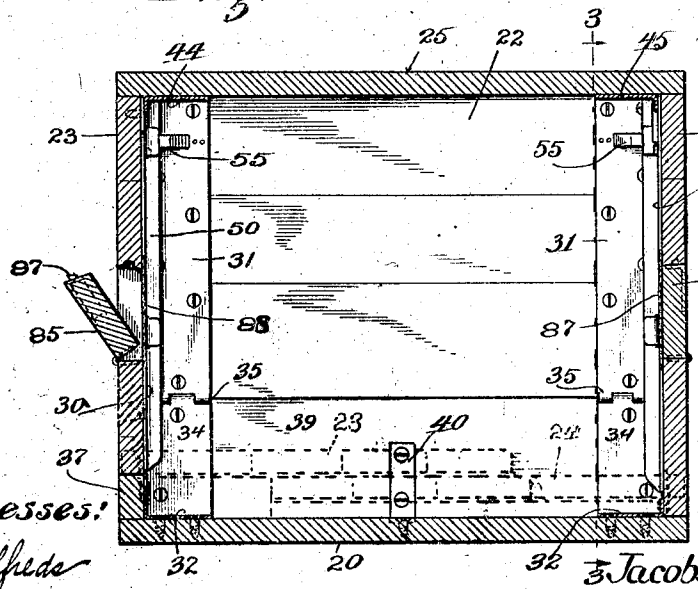
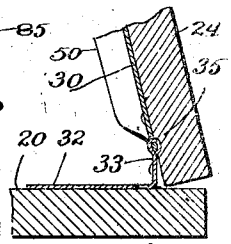


Fig. 15.



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3 SHEETS—SHEET 2.

Fig. 3.

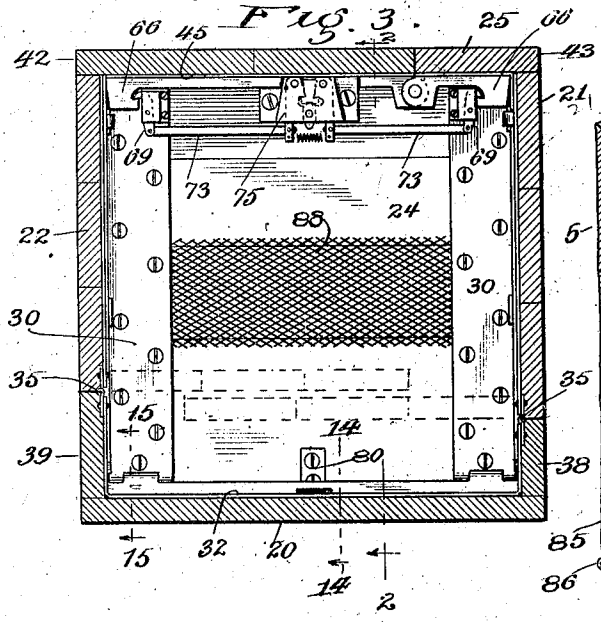


Fig. 4.

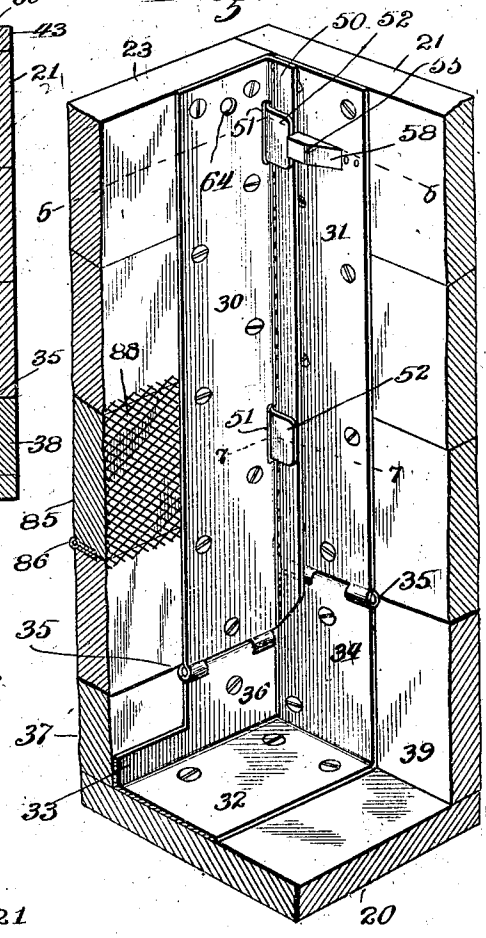


Fig. 5.

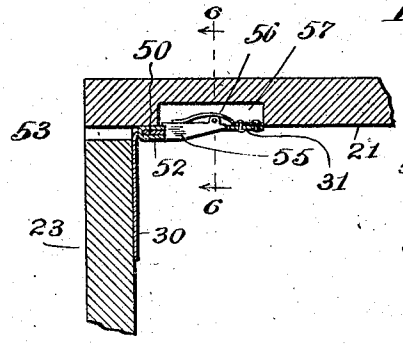


Fig. 6

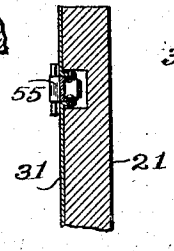


Fig. 8.

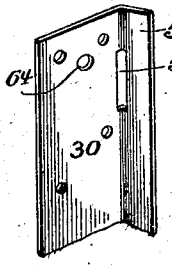


Fig. 9.

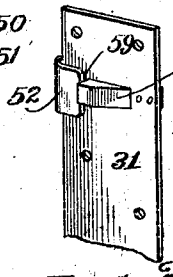
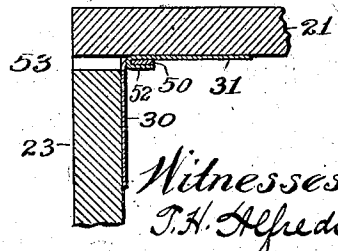


Fig. 7.



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3 SHEETS—SHEET 3.

Fig. 10.

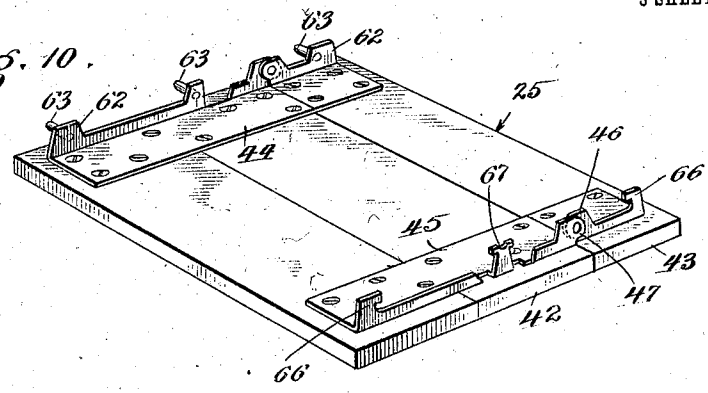


Fig. 11.

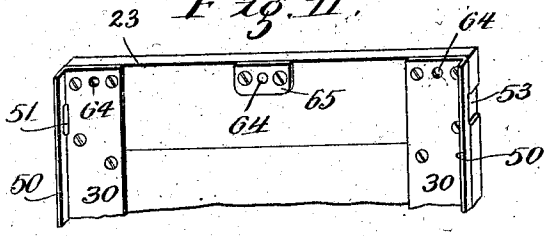


Fig. 13

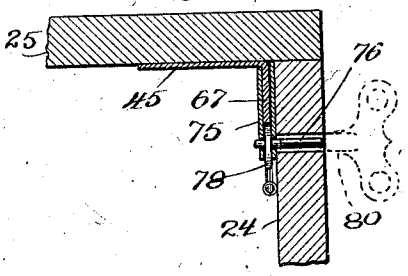


Fig. 12.

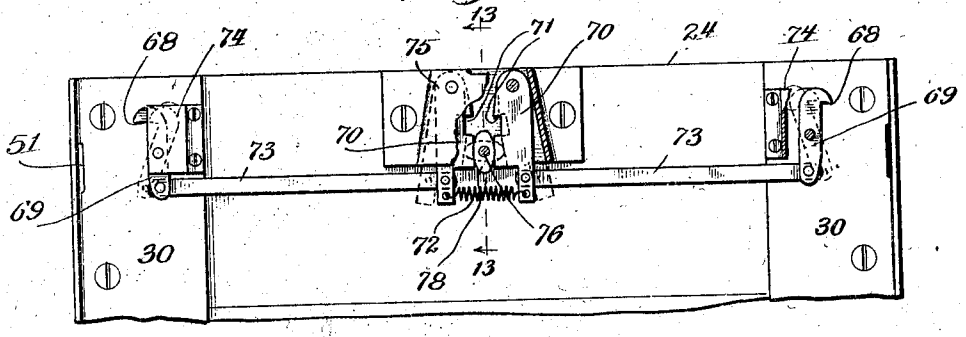
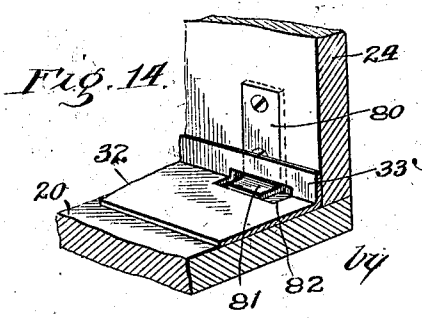


Fig. 14.



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BEST AVAILABLE COPY

UNITED STATES PATENT OFFICE.

JACOB M. JOHNSON, OF EDGERTON, WISCONSIN.

FOLDING BOX.

No. 900,173. Specification of Letters Patent. Patented Oct. 6, 1908.

Application filed May 31, 1907. Serial No. 376,663.

To all whom it may concern:

Be it known that I, JACOB M. JOHNSON, a citizen of the United States, and a resident of Edgerton, in the county of Rock and State of Wisconsin, have invented certain new and useful Improvements in Folding Boxes; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in folding boxes or crates of that class made of wood or like material, the walls of which are adapted to be folded upon each other to reduce the space occupied by the box when folded, and provided with means for locking the box walls in their open or set-up positions.

Among the objects of my invention is to provide a box of this nature which is arranged to be conveniently folded to occupy a minimum space; to provide locking devices by which the box walls are locked firmly together when the box is set up; to provide any improved cover or top wall for the box arranged to be firmly interlocked with the side and end walls of the box, and to provide other improvements in boxes of this character, as will hereinafter more fully appear.

As shown in the drawings:—Figure 1 is a perspective view of the box in its knock-down position, indicating in dotted lines the contour of the box when set up. Fig. 2 is a section taken on line 2—2 of Fig. 3. Fig. 3 is a section taken on line 3—3 of Fig. 2. Fig. 4 is an enlarged perspective view of one corner of the box, looking at the same from the interior thereof. Fig. 5 is a cross-section taken on line 5—5 of Fig. 4. Fig. 6 is a cross-section taken on line 6—6 of Fig. 5. Fig. 7 is a perspective taken on line 7—7 of Fig. 4. Figs. 8 and 9 are details of the cleats at the margins of the box walls, showing the manner of interlocking the same to lock the walls in their open positions. Fig. 10 is a bottom perspective view of the cover. Fig. 11 is an inner face view of one of the end walls of the box at the upper side of said end wall. Fig. 12 is an enlarged face view of the corresponding part of the opposite end wall of the box. Fig. 13 is a section taken on line 13—13 of Fig. 12, showing the cover in position. Fig. 14 is a sectional, perspective view, the section being taken on line 15—15 of Fig. 3. Fig. 15 is a detail sectional view taken on line 15—15 of Fig. 3, showing the end wall of the box partially closed.

As shown in the drawings, 20 designates the bottom wall of the box, 21 and 22 the side walls, 23 and 24 the end walls, and 25 the top wall or cover thereof. Said cover is removably connected with the side and end walls, and is provided with means for reliably locking the same in place. The walls 21, 22 are termed side walls and the walls 23, 24 are termed end walls merely for convenience in describing the arrangement and manner of mounting and interlocking said walls. It will, of course, be understood that these terms may be interchangeably used in connection with walls having the characteristics hereinafter mentioned. The said box walls are made of boards or like rigid material suitably joined together and are so constructed and interlocked as to withstand heavy internal pressure.

In accordance with one feature of my invention, the side and end walls of the box, are hinged to the bottom wall or parts rigid therewith in such manner that said walls may be folded over the bottom wall and each other, as indicated in Fig. 1, so as to occupy a minimum space when so folded. To this end the side and end walls are hinged at varying vertical distances from the bottom wall, so that when swung inwardly in horizontal positions they occupy different planes. That is to say, one wall is hinged to lie flat on the bottom wall and the others are hinged at successively higher points so that each wall lies flat on the wall last folded. Conveniently also the top wall, which is made a part separate from the other walls, comprises two members or sections that are hinged to be folded one upon the other and laid upon the other folded walls in a manner shown in Fig. 1. Referring now specifically to the manner of hinging said side and end walls to the bottom wall to enable them to be folded in the manner described, these parts are made as follows: The end walls are provided at their vertical margins with metal cleats 30 which, in the present instance, constitute the means by which the boards constituting said walls are fastened together, and the side walls are provided at their vertical margins with like cleats 31. The said cleats 31 of the side walls are set a dis-

tance inside the side margins of said walls to permit the end walls to fit at their side margins between the side walls, while the cleats 30 of the side walls extend nearly to the side margins of the latter walls. 32, 32 designate cleats which are laid upon and are attached to the bottom walls adjacent to the end margins thereof. The latter cleats are provided at their outer side margins with flanges 33 that fit against the inner faces of the end walls. They are provided at their ends with upwardly folded arms 34 which fit against the inner faces of the side walls of the box. The lower ends of the cleats 31 of the side walls of the box are hinged to the upper ends of said arms 34 by hinges 35 in a manner to permit said walls to swing inwardly. The cleats 30 of the end walls of the box are hinged to the side flanges 33 of the bottom wall cleats by like hinges 35. The cleats will preferably be made of sheet metal and the hinges formed by integral prongs on the cleats bent around the pivot pins of the hinges, as illustrated.

As herein shown, the end wall 24 is hinged to the adjacent flange 33 of the bottom wall cleat substantially at the level of said bottom wall. The opposite end wall 23, which is the next end wall to be folded over the inwardly folded end wall 24, is hinged a distance above the hinge level of the wall 24, approximately equal to the thickness of said latter wall. For this purpose the flange 33 of the bottom wall cleat at this end of the box is extended upwardly at its ends to constitute arms 36 to which the hinges 35 are attached. In like manner the cleats of the side walls are hinged at successively higher points or levels to the arms 34 of the bottom wall cleats, the side wall 22 being hinged at a level above the hinges of the side wall 21 and overlying the latter side wall when said walls are folded inwardly. Thus there is formed at the lower margin of the swinging end wall 23 a fixed wall section 37, and at the lower margins of the swinging side walls like fixed wall sections 38, 39, respectively. The said wall sections are fixed rigidly to the bottom wall by the arms 34 and 36 of the bottom wall cleats, and the connection of the bottom wall with the side wall sections is further strengthened by angle pieces 40, as indicated in Fig. 2.

The lid 25 comprises two sections 42, 43 and are connected by cleats 44, 45 attached thereto by screws or the like and formed with hinge joints permitting the section 43 to be folded beneath the section 42 and fitted to the folded or collapsed walls in the manner shown in Fig. 1. The hinge joints of said cleats comprise overlapping apertured flanges 46, 46 formed on said cleats, and hinge pins 47 extending through the apertured overlapping flanges, as shown more clearly in Fig. 10.

Referring now to the devices for locking the side and end walls in their open positions, said locking means comprises interlocking parts on the cleats 30 and 31 and are made as follows: The cleats 30 of the end walls are provided on their outer margins with inwardly turned flanges 50 that fit flat against the inner faces of the marginal parts of the cleats 31 of the side walls, as shown most clearly in Figs. 4, 5 and 7. Said cleats 30 are provided at the junction of the flanges therewith with slits 51 and the cleats 31 of the side walls are provided on their outer side margins with hooks 52, 52 which engage said slits in the manner shown in Fig. 4, thus providing an interlocking connection between the adjacent walls which holds both the end and side walls from spreading outwardly relatively to each other. The said end walls are cut away in their parts adjacent to said slits 51 to form notches 53, which are in line with the slits 51 of the cleats 30, thereby facilitating the entrance of the hooks 52 into said slits when the end walls are swung outwardly, after the side walls have been swung upwardly into their open positions. In order to prevent the end walls, which are last swung into their open positions, from swinging inwardly and allowing the box to collapse, spring latches or detents 55 are located adjacent to the upper hooks 52 of each cleat 31. Each detent occupies an opening in its associated cleat and is pivoted to a plate 56 that is attached to the inner face of said cleat and occupies a recess 57 formed in the inner face of the adjacent side wall. Said detents are provided with inwardly facing inclined surfaces or approaches 58 which are engaged by the vertical margins of the end wall when swung into their upper positions, whereby the detents swing into their recesses in the side walls to allow the walls to pass the same. The detents are also formed with outwardly facing abrupt shoulders or ends 59 which face towards the ends of the hooks and the inner margins of the flanges 50 of the end wall cleats and which serve, when the detents spring inwardly behind said flanges and hooks, to prevent the end walls from swinging inwardly until said latches are pressed outwardly out of the paths of the flanges of said end wall cleats.

The cover or top wall of the box is held in place by interlocking connections between parts carried by the cleats 44, 45 thereof and two opposite walls of the box, the end walls, as herein shown. In the present instance, the cover cleat 44 is formed with lugs 62, 62 in which are mounted outwardly extending rigid pins 63, 63 which fit within apertures 64, 64 formed in the cleats 30 of one end wall and a centrally located plate 65 attached to the inner face of said end wall near its upper margin, as shown in Fig. 11. The cover

cleat 45 at the other end thereof is provided with two side undercut lugs 66, 66 and with an intermediate lug 67 formed with oppositely disposed spurs. The outermost lugs, or those at the end of the cover cleat, are adapted to engage the hooked ends 68 of swinging latch levers 69, 69 carried by the adjacent end wall near the top thereof. The intermediate locking lug 67 enters between two swinging latch levers 70, 70, located intermediate the swinging levers 69 and are provided on their adjacent margins with notches forming shoulders 71, 71 which are adapted for engagement by the oppositely extending spurs of said intermediate lug. The said intermediate latch levers 70 are hinged at their upper ends to the end wall and are normally held in their locking positions by a spiral contractile spring 72 which is attached at its opposite ends to the lower ends of said intermediate latch levers. The side and intermediate latch levers are connected by two connecting bars 73, 73, each of which is pivoted to the lower end of one of the side latch levers and at its other end to the lower end of the adjacent intermediate latch lever, whereby said latch levers may be operated simultaneously to release the locking lugs of the top wall or cover. The side latch levers are inclosed by casings or housings 74, 74 which are open at their upper sides to receive the side locking lugs of the cover and the intermediate latch levers are likewise inclosed by a housing 75 having an opening at its top to receive the intermediate locking lug of the cover.

The means herein shown for releasing the locking lugs of the cover comprises a rock-shaft 76 that is rotatively mounted in bearing apertures in the inner and outer walls of the housing 75 inclosing said intermediate latch levers, and is provided with an oblong head 78 that normally rests with its side or flat faces against the inner or adjacent margins of said levers below the locking shoulders 71 thereof. When said head occupies this position, as shown in Fig. 12, the intermediate latch levers, as well as the side latch levers, are held in their locking positions by the spring 72. When the head is rotated, it acts to spread said locking levers and permit the release of the intermediate locking lug 67. The spreading of said intermediate locking levers acts, through the medium of the connecting bars 73, to swing the upper hooked ends of the side latch levers in their unlocking positions, as indicated in dotted lines in Fig. 12, thereby simultaneously releasing the side and intermediate locking lugs of the cover. The said rock-shaft 76 occupies a suitable recess in the end wall and is rotated to unlock the cover by means of a key 80 having an axial socket arranged to fit the angular outer end of the shaft. It will be obvious from the foregoing that the cover may be readily placed on the box when the side and end walls are in their open positions by first introducing the pins 63 into the sockets 64 and thereafter pressing the lugs 66, 67 through the openings in the cases or inclosures 74 and 75 and into engagement with said locking latches.

It will be observed from an inspection of Figs. 1 and 10 that the flanges of the cover cleat, on which is formed the cover locking lugs, is cut away in such manner that the cover sections may be folded flat together and in such manner as to conceal and inclose the intermediate locking lug and one of the side lugs. Thus protection is afforded against the contact of said lugs, when the cover is folded, with parts or objects which they might mar or injure.

In order to prevent the end walls of the box from swinging too far outwardly and thus placing objectionable stress on the end wall hinges, said walls are provided at their lower margins, intermediate the side margins thereof, with plates 80, 80 having lugs 81 that are adapted to fit into notches 82 formed in the flanges 33 of the bottom wall cleats 32, as most clearly shown in Figs. 3 and 14. The parts are so arranged that the lugs 81 of said plates engage with said flanges when the end wall is opened to its outermost position, thus relieving the hinges of said end wall of injurious strain.

By reason of the rigid attachment of the stationary fixed wall sections 37, 38 and 39 to the arms of the bottom wall cleats, and the hinging of the lower ends of the side and end wall cleats to said arms, and also the interlocking connection of the side and end wall cleats in the manner described, the said bottom, end and side walls are connected together in such manner as to resist great internal pressure tending to force said walls outwardly. The connecting of the side and end wall cleats 30 and 31 with the arms of the bottom wall cleats in the manner described, and the interlocking connection of the cover cleats with the end wall cleats, establishes a continuous metal connection entirely around the interior of the box such as to afford a reliable connection of great strength between said walls.

A box made in accordance with my invention may be used for a variety of purposes where strength and durability is required, and where it is desirable that the box be folded in a small compass when not in use. A peculiarly valuable adaptation of the box is its use as a container of merchandise during transportation in instances where it is desired to return the boxes to the original point of shipment for refilling and reshipment. The small compass in which the parts of the box may be conveniently folded highly commends the box to this use. Said box possesses peculiar properties of value when

used in connection with the shipment of partially cured leaf tobacco from the curing sheds of tobacco plantations to the manufacturers. In this use of the box, the tobacco is packed therein and under considerable pressure in a partially cured condition or state and allowed to remain within the box, either at the point of shipment or in the warehouse of the manufacturer during the sweating stage of the curing process. By reason of the great strength of the box the tobacco may be maintained therein under the heavy pressure desired during this stage of the curing process, and is amply protected from the elements and may be conveniently handled. When using the box for this purpose it is desirable to provide means for ventilating the tobacco within the box during the sweating stage thereof. Provision for this purpose is made by the use of horizontally swinging doors 85, 85 located in opposite walls (the end walls as herein shown) of the box, which are swingingly connected with the box walls by hinges 86 to swing outwardly. Said doors are provided with spring latches 87 by which they are locked in place. If desired, a wire netting 88 may be stretched across the openings closed by the doors 85 on the inner faces of said walls to prevent the contents of the box being injured by contact with exterior objects when the doors are open.

I claim as my invention:—

1. A folding box comprising a bottom wall, upright side and end walls, vertical metal cleats attached to the inner faces of the side and end walls and extending from top to bottom thereof at their vertical margins, thin metal cleats attached flatwise to the upper face and at opposing marginal parts of the bottom wall inside the planes of the adjacent upright walls and provided with integral arms to which the lower ends of the side and end cleats are hinged, and integral interlocking parts on the margins of the cleats of the side and end walls inside the upright walls constructed to lock the latter walls rigidly together in their open positions, the hinged connections between the arms of the bottom wall cleats and the cleats belonging to the various side and end walls being located at different vertical distances from the bottom wall, whereby said side and end walls may swing inwardly and lie flat upon each other and the bottom wall.

2. A folding box comprising a bottom wall, upright side and end walls adapted to swing over the bottom wall, thin metal cleats fixed flatwise to and extending continuously across the upper face of the bottom wall at opposite marginal parts thereof inside the planes of the adjacent upright walls, vertical metal cleats fixed to the inner sides of the side and end walls at their vertical margins and hinged at their lower ends to arms integral with said bottom wall cleats and interlocking connections between the side and end wall cleats inside the box for locking said walls in their open positions.

3. A folding box comprising a bottom wall, upright side and end walls adapted to fold over the bottom wall, a top wall, thin metal cleats fixed flatwise to the upper face of the bottom wall at opposite marginal parts thereof inside the planes of the adjacent upright walls and provided at their ends with upright integral arms, vertical metal cleats fixed to the inner sides of the side and end walls at the vertical margins thereof and hinged at their lower ends with the upright arms of said bottom wall cleats, marginal interlocking connections between the cleats of the upright walls at each corner of the box, metal cleats extending across opposite marginal parts of the cover and fixed to the lower sides thereof and interlocking connections between said cover cleats and the upper ends of the cleats of opposite upright walls of the box, all of said cleats and interlocking parts being contained within the box.

4. A folding box comprising a bottom wall, side and end walls adapted to be folded flat one over the other upon the bottom wall, vertical cleats fixed to and extending from top to bottom of the side and end walls at their vertical margins and contained wholly within the angles formed between adjacent side and end walls and directly connected at their lower ends to parts fixedly attached to the bottom wall, and inwardly turned integral hooks on the cleats of two opposite walls of the box, the cleats of the other two opposite walls being provided within the box with slits adapted to be engaged by said hooks for locking said walls in their open positions.

5. A folding box comprising a bottom wall, side and end walls adapted to be folded flat one over the other upon the bottom wall, vertical cleats fixed to and extending across the side and end walls at their vertical margins and contained wholly within the angles formed between adjacent side and end walls and directly connected at their lower ends to parts fixedly attached to the bottom wall, inwardly turned integral hooks on the cleats of two opposite walls of the box, the cleats of the other two opposite walls being provided with slits adapted to be engaged by said hooks for locking said walls in their open positions, and means engaging the margins of said slitted cleats for locking said hooks from disengagement with the slitted cleats.

6. A folding box comprising a bottom wall, side and end walls adapted to be folded flat one over the other upon the bottom wall, vertical cleats fixed to the inner sides of the side and end walls at their vertical margins

and contained wholly within the angles formed between adjacent side and end walls and directly connected at their lower ends to parts fixedly attached to the bottom wall, the cleats of two opposite walls being provided within the box with inwardly turned flanges adapted to fit flat against the adjacent cleats of the other walls, said flanged cleats being provided with slits, and inwardly turned hooks on the other cleats engaging said slits, the ends of said hooks lying against the inner faces of said flanges.

7. A folding box comprising a bottom wall, side and end walls adapted to be folded flat one over the other upon the bottom wall, vertical cleats fixed to the inner sides of the side and end walls at their vertical margins and connected at their lower ends with the bottom wall, the cleats of two opposite walls being provided within the box with inwardly turned flanges adapted to fit flat against the adjacent cleats of the other walls, said flanged cleats being provided with slits, hooks on the other cleats engaging said slits, the ends of said hooks lying against the inner faces of said flanges, and spring pressed detents mounted on the cleats carrying said hooks for holding the slitting flanges engaged with said hooks.

8. The combination with two walls meeting at an angle, of parallel cleats attached to and extending across the inner sides of adjacent marginal parts of said walls, one of said cleats being provided within the angle formed between the meeting walls with an inwardly turned longitudinal flange which fits flat against the longitudinal marginal part of the other cleat, and provided at the junction of the flange with the cleat with a slit, and an inwardly turned hook on the other cleat adapted to extend through said slit for interlocking engagement with said flange.

9. The combination with two walls meeting at an angle, of cleats attached to the adjacent marginal parts of said walls, one of said cleats being provided within the angle formed between said meeting walls with a flange which fits flat against the other cleat, and at the junction of the flange with the cleat with a slit, a hook on the other cleat adapted to extend through said slit for interlocking engagement with said flange, and a detent mounted on said latter cleat having a shoulder opposing the margin of said slitted flange.

10. The combination with two walls meeting at an angle, of cleats attached to the adjacent marginal parts of said walls, one of said cleats being provided within the angle formed between said meeting walls with a flange which fits flat against the other cleat, and at the junction of the flange with the cleat with a slit, a hook on the other cleat adapted to extend through said slit for interlocking engagement with said flange, and a detent mounted on said latter cleat having a shoulder opposing the margin of said flange, the wall bearing said flanged cleat being provided in line with the slit with a notch, for the purpose set forth.

11. In a folding box, the combination with the bottom wall and upright side and end walls meeting at an angle at the corner of the bottom wall, of a metal cleat attached to the upper face of the bottom wall inside of the plane of the adjacent upright wall and provided at its end with two upright integral arms, one rising from the side margin and the other from the end margin of the cleat, and cleats attached to the side and end walls at the meeting margins of the latter and hinged to said arms.

12. In a folding box, the combination with the bottom wall and upright side and end walls meeting at an angle at the corner of the bottom wall, of a metal cleat attached to the upper face of the bottom wall and provided at its end with two upright integral arms, one rising from the side margin and the other from the end margin of the cleat, and cleats attached to said side and end walls at the meeting margins of the latter, said latter cleats having marginal interlocking engagement and hinged at their lower ends to said arms.

In testimony that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 25th day of May A. D. 1907.

JACOB M. JOHNSON.

Witnesses:

GEORGE R. WILKINS,
DOROTHY E. MARMON.