G. A. SHRAUD.

COLLAPSIBLE BOX OR CRATE.

APPLICATION FILED APR. 28, 1908.

940,371.

Patented Nov. 16, 1909.

2 SHEETS—SHEET 1.

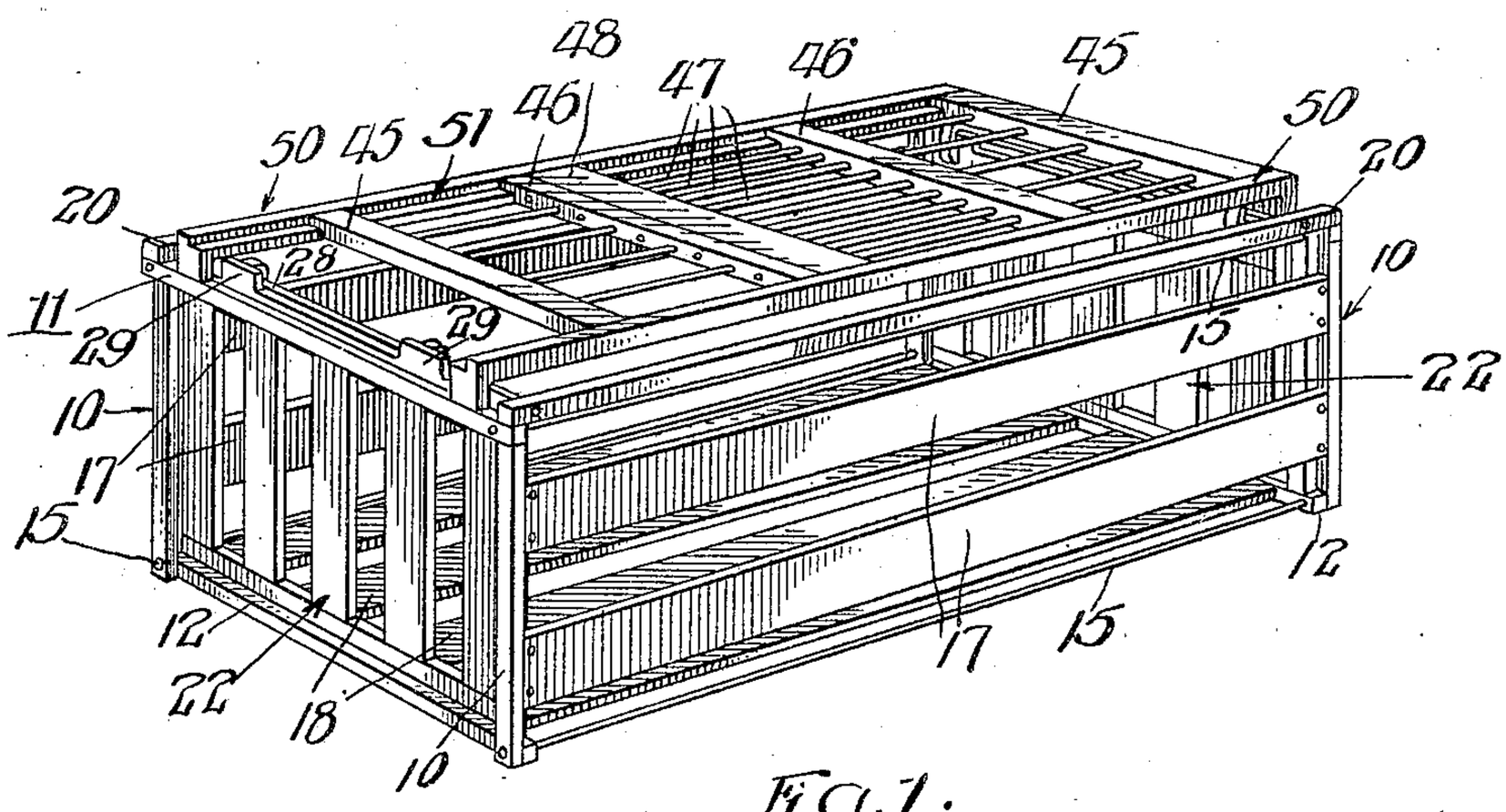


Fig. 1.

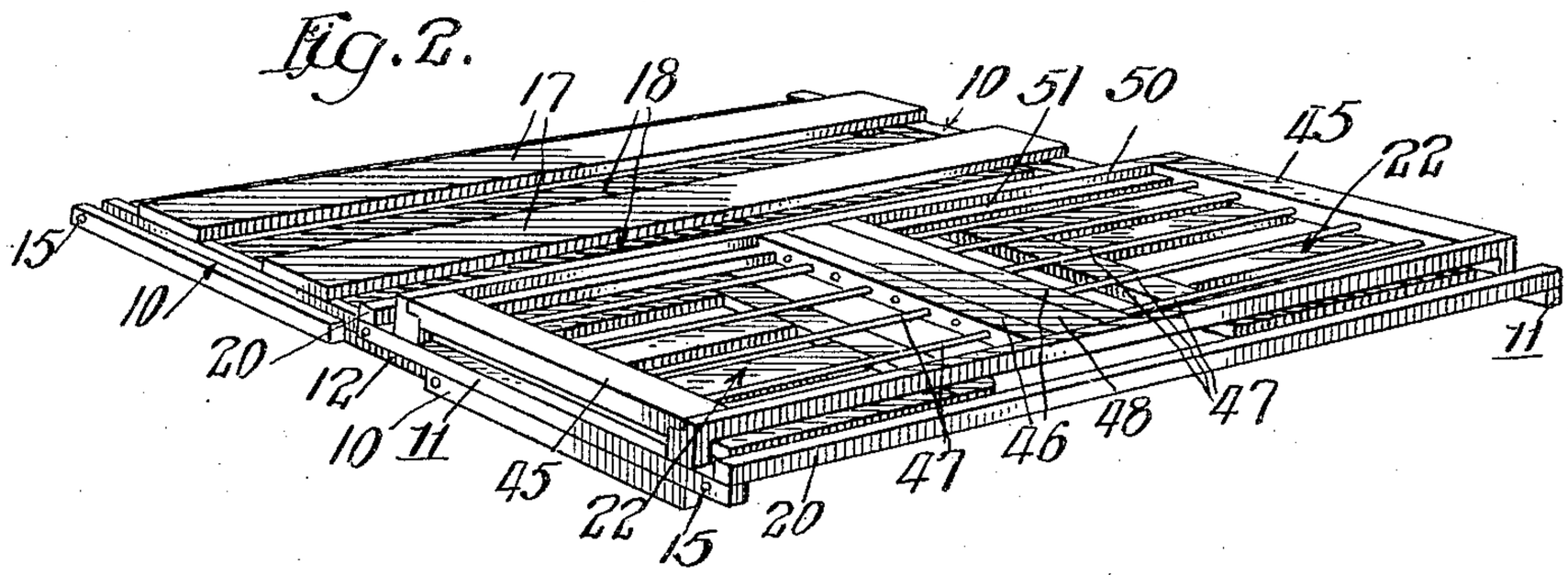


Fig. 2.

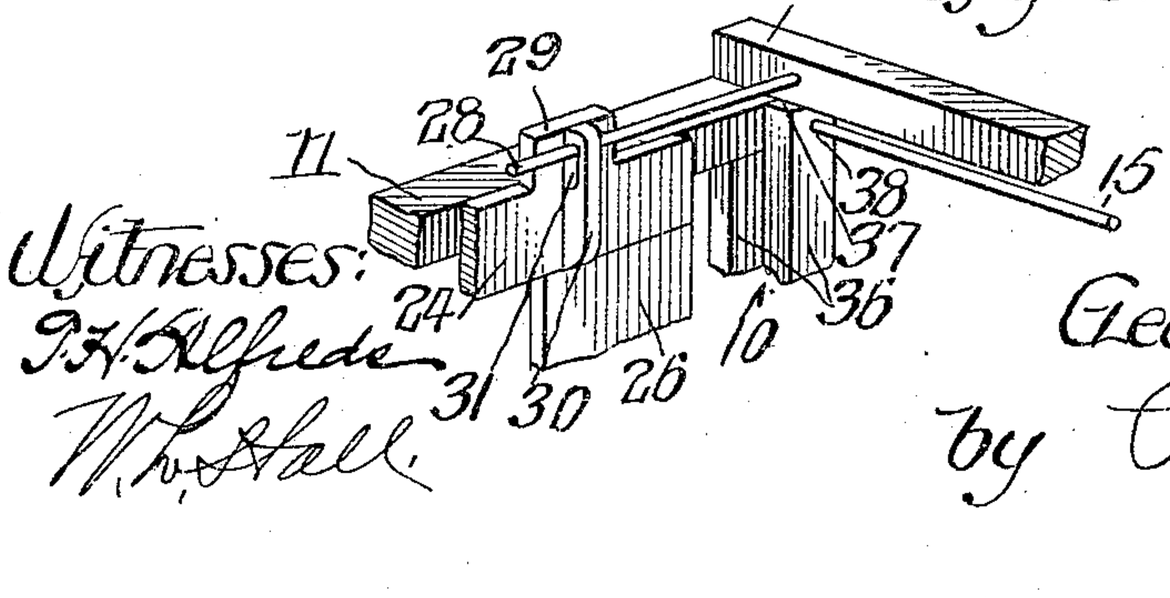


Fig. 3.

Witnesses:
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W. L. Hall.

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2 SHEETS—SHEET 2.

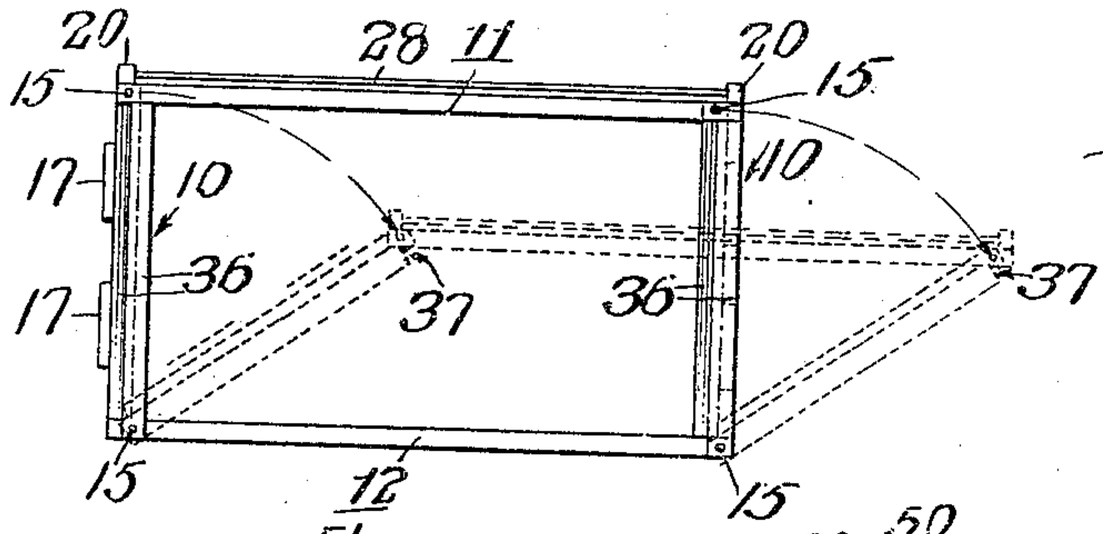


Fig. 4.

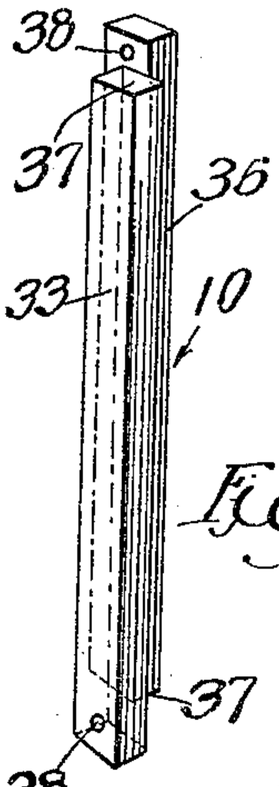


Fig. 7.

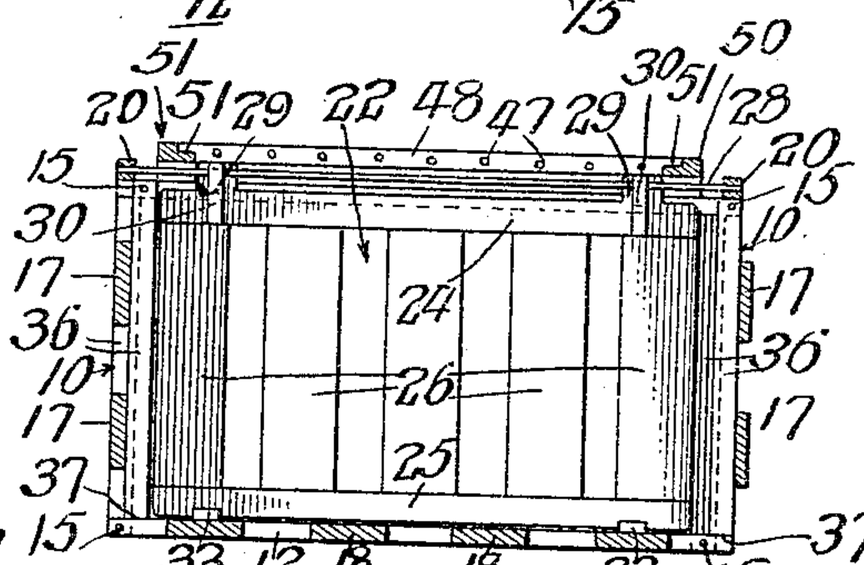


Fig. 5.

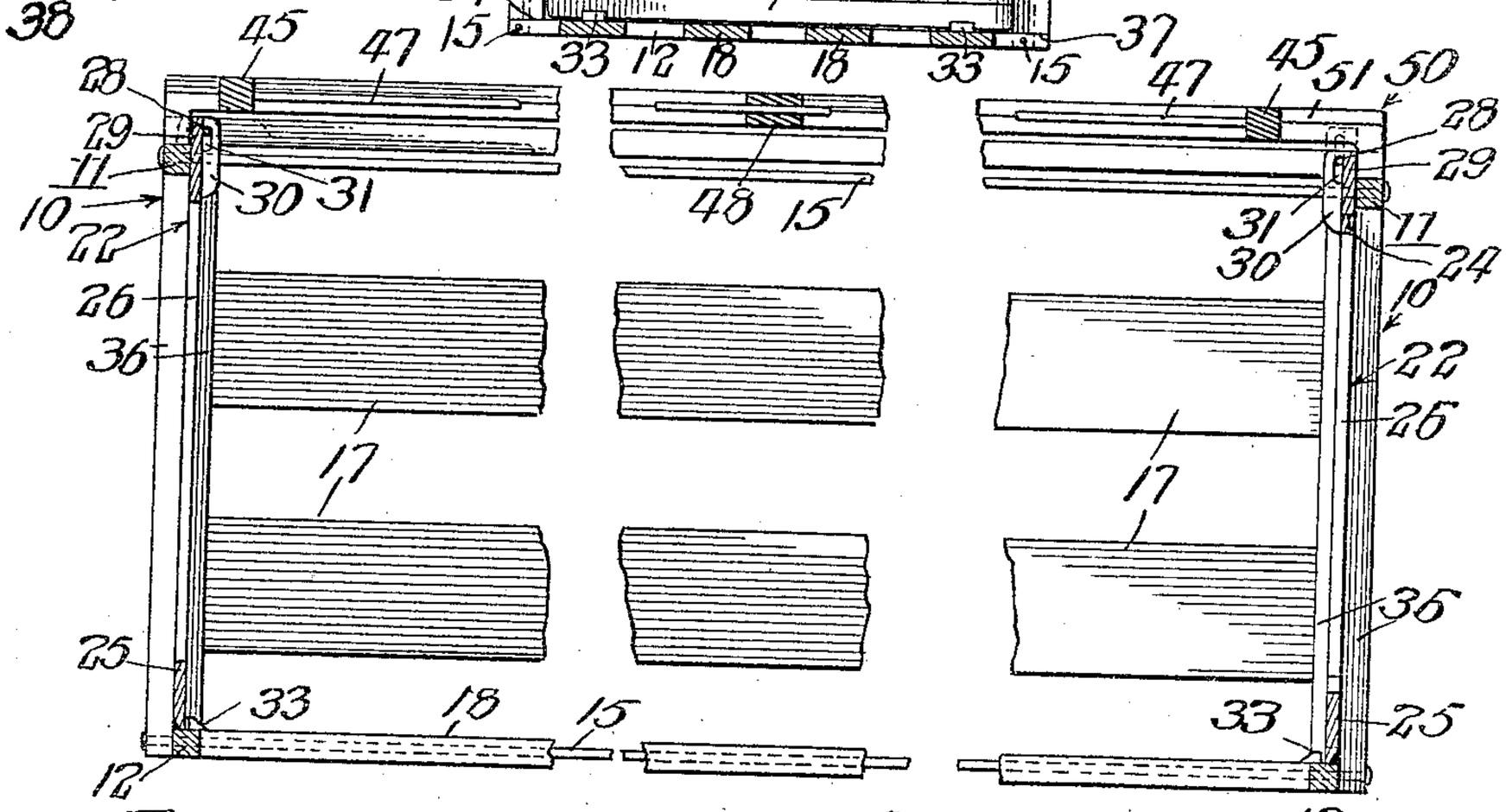


Fig. 6.

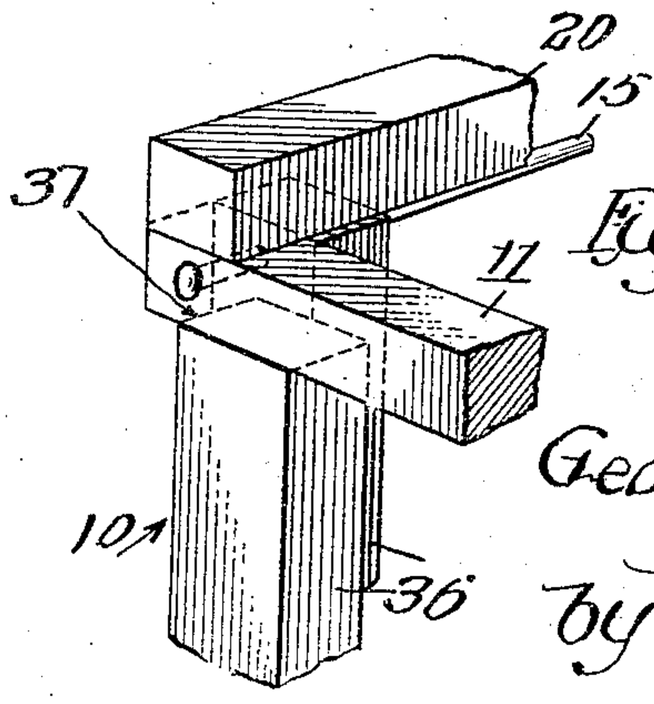


Fig. 8.

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# UNITED STATES PATENT OFFICE.

GEORGE A. SHRAUD, OF BLUE ISLAND, ILLINOIS.

## COLLAPSIBLE BOX OR CRATE.

940,371. Specification of Letters Patent. **Patented Nov. 16, 1909.**

Application filed April 28, 1908. Serial No. 429,597.

*To all whom it may concern:*

Be it known that I, GEORGE A. SHRAUD, a citizen of the United States, and a resident of Blue Island, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Collapsible Boxes or Crates; 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 numerals of reference marked thereon, which form a part of this specification.

This invention relates to improvements in folding crates designed for use in shipping merchandise, poultry and the like, and the object of the invention is to provide a simple and economical construction which possesses the required strength and rigidity when set up in readiness for use and which may be readily collapsed or knocked down to occupy a minimum space for reshipment or storage.

The invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

In the drawings:—Figure 1 is a perspective view of my improved folding crate set up in readiness for use. Fig. 2 is a perspective view of the crate when folded or collapsed. Fig. 3 is a fragmentary perspective view showing one corner of the crate, as viewed from the interior of the crate. Fig. 4 is a view, diagrammatic in its nature, illustrating the essential parts of one end of the crate and showing the manner in which it is folded. Fig. 5 is a transverse, vertical section of the crate looking toward one end thereof. Fig. 6 is an enlarged longitudinal, vertical section of the crate, partially broken away. Fig. 7 is a perspective view of one of the corner posts of the crate. Fig. 8 is a perspective view of the upper end of one of posts showing the manner of joining the side and end members of the crate thereto.

As shown in the drawings, 10, 10 designate the corner posts of the crate and 11 and 12 designate upper and lower end members, respectively, which are pivoted at their ends to the upper and lower ends of the posts. The said posts and upper and lower members form at each end of the box a rectangular end frame to the members of which are attached the side, top and bottom walls of the crate. The said top and bottom members of the end frames are pivoted to the upper and lower ends of the posts by wires or rods 15, which extend from end to end of the crate and through the overlapping parts of the end members at the corners of the crate. The pivot rods or wires 15 thus constitute, not only means by which the members of the end frames are pivoted together, but also means for connecting or binding one end frame to the other.

The side and end walls of the crate are of open construction, being composed principally of slats. The side walls of the crate comprise, as herein shown, slats 17, 17 which are attached at their ends to the corner posts and the bottom wall likewise comprises slats 18, 18 which extend between and are attached at their ends to the lower members 12 of the end frames. The top wall of the crate is composed in part of horizontal slats 20, 20 which extend between and are attached at their ends to the opposite upper members 11 of the end frames.

In the present construction I have shown a special form of sliding door which is embodied in and constitutes part of the top wall, but it will be understood that said top wall may be otherwise constructed and that the door or doors may also be of different construction, and otherwise located. The end walls proper of the crate are composed of swinging flaps or sections, designated as a whole by 22, each being composed of upper and lower horizontal strips 24, 25 respectively and vertical slats 26 attached thereto. Said swinging ends are hinged at their upper sides to transverse rods or wires 28, 28 which extend transversely between and are mounted at their ends in the slats 20 of the top wall of the crate. As herein shown the hinged connections between said rods or wires and the swinging ends are made as follows:—The upper strip 24 of said swinging ends are formed with upwardly extending lugs or extensions 29 which rise above the adjacent upper members of the swinging ends. Applied to the inner sides of said upper strips and said lugs are short cleats or bars 30 between which and the lugs are formed pivot openings through which the pivot rods 28 extend. The said openings are

vertically elongated to permit the swinging ends to rise and fall relatively to their hinges. The said swinging ends normally lie vertically against the inner sides of the end frames, composed of the posts 10 and transverse members 11, 12, and the hinged connection thereof at the top of the crate permits them to be swung upwardly into a plane parallel with the plane of the top wall of the crate. The vertical movement of the swinging ends relatively to their hinge rods is provided in order to permit the lower or free margins of said swinging ends to pass over and in rear of locking blocks 33 fixed to the floor or bottom of the crate which lock said swinging ends in their vertical positions (Figs. 5 and 6). When said swinging ends are to be swung upwardly they are raised above the planes of said blocks, whereupon they may be swung upwardly toward the top of the crate. In order to facilitate the locking of the swinging ends in their vertical positions, the locking blocks 33 may be downwardly and inwardly inclined at their inner ends as shown in Fig. 6, or the lower margins of the swinging ends reversely inclined, thus permitting said swinging ends to ride easily over said blocks when swung into their vertical positions.

The pivotal connection between the posts 10 and the upper and lower members 11 and 12 of the end frames is such as to permit the posts and the attached side walls of the crate to swing sidewise in one direction only to fold or collapse the crate, in the manner shown and indicated in Figs. 2 and 4. The said posts and upper and lower members of the end frames are so fitted at their points of pivotal connection, as will be hereinafter described, as to prevent the posts from swinging toward the other direction. The swinging ends 22 of the crate, when in their vertical positions, extend from side to side of the crate and constitute locks which normally prevent the swinging member of the crate from swinging in the direction toward which the crate is adapted to fold at a time when the relatively pivoted parts are free or unrestrained. When the swinging ends are in their locking positions, therefore, the members of the crate are held as rigid, with respect to each other, as though said parts were permanently fastened together. By swinging the ends 22 upwardly against the top of the crate, however, the members of the crate are free to swing or pivot relatively to each other in a manner to collapse or fold the crate.

Referring now to the construction of the posts and the manner of connecting the same with the upper and lower horizontal members of the end frames, whereby said posts are free to swing in one direction only, to fold the crate, said parts are made as follows: Each of said posts consists of two wooden strips 36, 36 of equal length and width. Said posts are attached flatwise together with the end of one strip extending beyond the corresponding end of its mating strip at one end of the post, and terminating short of the opposite end of its mating strip at the other end of the post. Likewise each strip extends at one side beyond the corresponding side of the other strip. The endwise offset relation of the strips of the posts form at the ends of said posts shoulders 37, 37 adapted for contact with the upper and lower members 11 and 12, respectively, of the end frames when the crate is in its open or unfolded position. The extended ends of the strips 36 forming the posts are provided above and below said shoulder 37 with apertures 38, 38 through which the pivot rods or wires 15 extend. By reason of the lateral offset relation of said strips of the posts, said apertures 38 are located laterally out of line with said shoulder 37, or at one side thereof. The upper extended ends of the posts lie inside of the upper members 11 of the end frames, while the lower extended ends of said posts lie outside of the lower members 12 of said end frames, as clearly shown in Fig. 1, so as to bring the stop shoulder 37 at the upper and lower ends of the posts in position for contact with the said upper and lower members of the end frames.

In the present construction the pivot rod apertures at the upper ends of the posts are located on the sides of adjacent shoulder 37 remote from the side of the crate which swings outwardly when the crate is collapsed, while the shoulder 37 and the pivot rod apertures at the lower ends of the posts are reversely located. By reason of this arrangement of the shoulders and pivot apertures of the posts, it will be manifest that said shoulders serve as stops to prevent the posts from swinging sidewise in one direction, to wit, toward the left, as shown in Fig. 4, and that said posts are free to swing sidewise in the other direction. The reversal of the relation of said shoulders and pivot apertures of the posts will permit the crate to be collapsed in the direction opposite to that indicated in Fig. 4. The lateral offset relation of the members of the posts serves, in the present construction, to bring the pivot apertures out of line with the shoulders of the posts for the purpose set forth. It is manifest, however, that this relation of said pivot apertures and shoulders may be otherwise produced.

From the foregoing it will be manifest that when the crate is in its open or set-up position and the swinging ends 22 occupy their vertical positions against the end frames of the crate, said swinging ends

serve as locks to prevent the crate from collapsing in the direction in which it is adapted to collapse, and that the stop shoulders of the posts, engaging the upper and lower frame members 11 and 12, as they do, serve as means to prevent the crate from collapsing in the opposite direction. It will also be manifest that if the swinging ends be swung upwardly parallel with the plane of the top wall of the crate, the swinging members of said crate will be free to swing in the direction indicated by the dotted arrows in Fig. 4 so as to bring the side, top and bottom walls flatwise together in the position shown in Fig. 2.

In practice, when the crate is to be collapsed or folded, it may be inverted or turned with its top wall downwardly, in which position the swinging ends of the crate are free to fall by gravity toward and upon the inverted top wall. If the locking blocks 33, before referred to, be employed, the inversion of the crate in the manner described will operate by gravity to free said swinging ends from said lugs and permit said ends to swing downwardly by gravity. When said swinging ends are thus swung downwardly against the inverted top wall, the swinging members of the crate are free to swing by gravity in a direction to collapse the crate. When the folded or collapsed crate is to be raised to its open or set-up position, it is placed in the position shown in Fig. 2 and the top wall of the crate is grasped and raised upwardly, thus swinging the side walls and the corner posts into their upright positions. When said side walls and posts are brought to their upright positions, the swinging ends swing outwardly against the end members into their vertical positions and lock the walls of the crate in their open or set-up positions.

As herein shown, the top wall of the crate consists principally of two sliding doors, each made of two transverse end members 45, 46 and parallel rods or wires 47, 47 extending between and attached at their ends to said end members. The said rods extend, between their ends, through a stationary transverse bar 48 that is attached to or constitutes part of the top wall of the crate; said bar being provided with parallel, horizontal openings through which the rods or wires of the sliding doors pass. The inner end member 46 of each door is likewise provided with parallel, horizontal openings through which the wires of the other door are adapted to pass. The said doors are mounted on two parallel horizontal rails 50, which extend between and are attached to the top members 11 of the end frames of the crate and are located one near each side of the crate. The said rails are provided on their inner or adjacent sides with grooves or ways 51 in which slide the ends of the end members of the sliding door. The transverse bar 48 through which the wires of the doors pass is attached to said side rails. It will be understood that other forms of doors, whether sliding or swinging, may be employed, and that the construction of the upper or other wall in which the doors are mounted will be correspondingly changed to accommodate the character of door employed. The said pivot rods or wires 15 serve also as means for strengthening the connection between the ends of the crate. They are herein shown as headed at their ends to properly hold the same in place and to bind the ends of the crate together. Said ends of the pivot wire may, however, be attached to the posts by other means, or if desired the ends of two adjacent wires or rods at the end of the crate may be attached together to increase the efficiency of their binding function.

Other changes in the structural detail may be made within the scope of the invention and I do not limit myself to such details except as hereinafter made the subject of specific claims.

Any suitable locking or clamping means may be employed for locking the walls of the crate together in the folded or collapsed position thereof, whereby the collapsed crate may be conveniently handled without danger of the pivotally connected members thereof swinging away from each other.

I claim as my invention:—

1. In a folding crate having side, end, top and bottom walls, corner posts to which the side walls of the crate are attached, upper and lower end frame members extending between and pivoted at their ends to the posts by means permitting the posts to swing sidewise in the direction of the planes of the end walls to collapse or fold the crate, the end walls of the crate being hinged to the top wall thereof and serving when in their normal vertical positions to lock the crate in its open position, and locking devices on the floor of the crate for locking the swinging end walls in their vertical positions, said swinging ends being freely movable vertically relatively to their hinges to clear the same of said locking devices.

2. A folding crate comprising end frames consisting of corner posts to which the side walls of the crate are attached, and upper and lower transverse frame members extending between the posts to which the top and bottom walls of the crate are permanently attached, horizontal pivot rods extending between the end frames at the corners thereof and constituting a binding connection between said frames and serving as pivots between said posts and transverse frame members of each end frame, said posts

being provided near their pivoted ends with upwardly facing shoulders which engage said transverse frame members to prevent the posts swinging sidewise in one direction, while permitting them to swing sidewise in the other direction to collapse the crate, and swinging ends hinged at their upper sides to the crate and extending between the side walls thereof to lock the crate in its open position.

3. A folding crate having corner posts to which the side walls of the crate are attached, upper and lower transverse members extending between and pivotally connected at their ends to the upper and lower ends of the posts to which the top and bottom walls of the crate are attached, said posts each being provided at its upper and lower ends with shoulders which engage said transverse frame members, the pivotal axes between each end of each post and the end of the adjacent transverse member being located out of line with or at one side of the shoulder at said end of the post, the parts being arranged to permit the posts to swing sidewise in one direction only to permit the crate to collapse, and means operating to normally lock the crate in its open position.

4. A folding crate having corner posts to which the side walls of the crate are attached, upper and lower transverse members extending between and pivotally connected at their ends to the upper and lower ends of the posts to which the top and bottom walls of the crate are attached, said posts each comprising two strips of equal length fixed flatwise together, each strip extending at one end of the post beyond its mating strip to provide oppositely facing shoulders at the ends of the posts for contact with said pivotally connected transverse members, the extended ends of the posts beyond said shoulders being provided laterally at the sides of the shoulders with pivot apertures through which and the ends of the transverse members extend the pivots by which said parts are pivotally connected, and means for locking the crate in its open position.

5. A folding crate having corner posts to which the side walls of the crate are attached, upper and lower transverse members extending between and pivotally connected at their ends to the upper and lower ends of the posts to which the top and bottom walls of the crate are attached, said posts each comprising two strips of equal length fixed flatwise together, each strip extending at one end of the post beyond its mating strip to provide oppositely facing shoulders at the ends of the posts for contact with said pivotally connected transverse members and each strip of each post extending laterally beyond its mating strip, each strip of each post being provided beyond the end of its mating strip with a pivot aperture through which and the adjacent end of one of the transverse members extends the pivot by which said parts are pivotally connected, and means for locking the crate in its open position.

6. A folding crate having corner posts to which the side walls of the crate are attached, upper and lower transverse members extending between and pivotally connected at their ends to the upper and lower ends of the posts to which the top and bottom walls of the crate are attached, said posts each comprising two strips of equal length fixed flatwise together, each strip extending at one end of the post beyond its mating strip to provide oppositely facing shoulders at the ends of the posts for contact with said pivotally connected transverse members and each strip of each post extending laterally beyond its mating strip, each strip of each post being provided beyond the end of its mating strip with a pivot aperture through which and the adjacent end of one of the transverse members extends the pivot by which said parts are pivotally connected, the upper extended ends of the posts at each end of the crate lying on one side of the upper transverse member and the lower extended ends of the posts lying on the opposite side of the lower transverse member.

7. A folding crate comprising end frames consisting of corner posts to which the side walls of the crate are attached and upper and lower frame members extending between the posts to which the top and bottom walls of the crate are attached, pivot rods or wires extending between said end frames at the corners thereof and constituting a binding connection between said frames and serving as pivots between said posts and frame members of each end frame, pivot rods or wires extending transversely across the top of the crate near the ends thereof, and end sections hinged at their upper sides thereto to swing toward and from the top wall and adapted to normally lie against the end frames transversely between the side walls to lock the crate in its open position, and means for automatically locking said end sections in the latter position, permitting them to be automatically released.

8. A folding crate comprising end frames consisting of corner posts to which the side walls of the crate are attached upper and lower frame members extending between the posts to which the top and bottom walls of the crate are attached, pivot rods or wires extending between said end frames at the corners thereof and constituting a binding connection between said frames and serving as pivots between said posts and frame members of each end frame, pivot rods or wires

extending transversely across the top of the crate near the end thereof, end sections hinged at their upper sides thereto to swing toward and from the top wall and adapted to normally lie against the end frames transversely between the side walls to lock the crate in its open position, locking devices for locking said swinging end sections in their vertical positions, said end sections having free vertical movement relatively to said hinge rods or wires to automatically free said end sections of said locking devices.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 16th day of March A. D. 1908.

GEORGE A. SHRAUD.

Witnesses:

W. L. HALL,

G. R. WILKINS.