

FOLDING SHIPPING CRATE.
APPLICATION FILED JULY 29, 1907.

Patented Oct. 12, 1909.
3 SHEETS—SHEET 1.

Fig. 1. A perspective view of a rectangular frame structure. The structure consists of a main rectangular frame with a central partition. The frame is composed of multiple parallel members connected by cross-members. The central partition is a smaller rectangular frame within the main one. Diagonal bracing is shown in the central partition, with lines labeled 16 and 17. Various parts are labeled with numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. The diagram shows a complex arrangement of lines and joints, representing a mechanical or structural assembly.

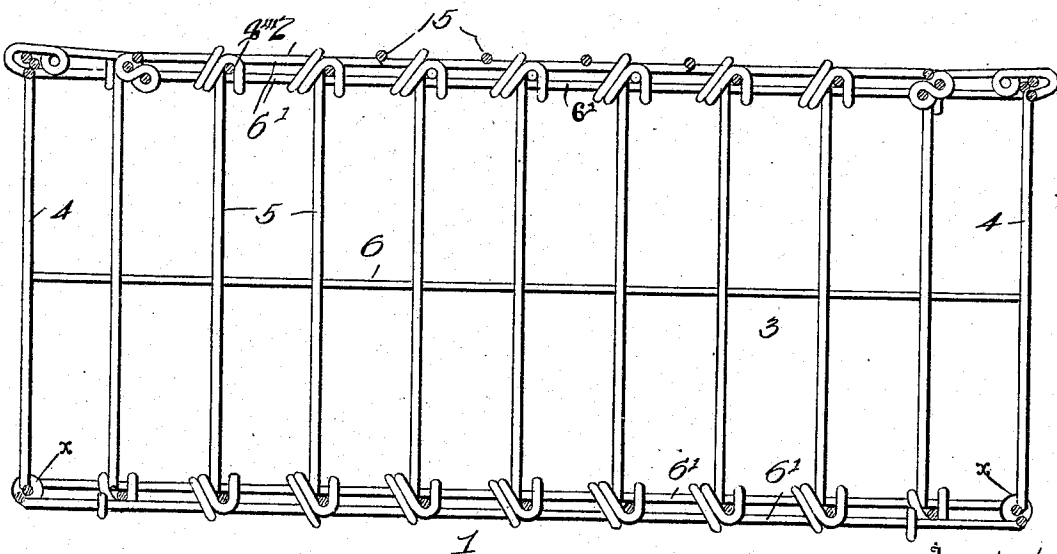


Fig. 2.

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936,735.

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3 SHEETS—SHEET 2.

Fig. 3.

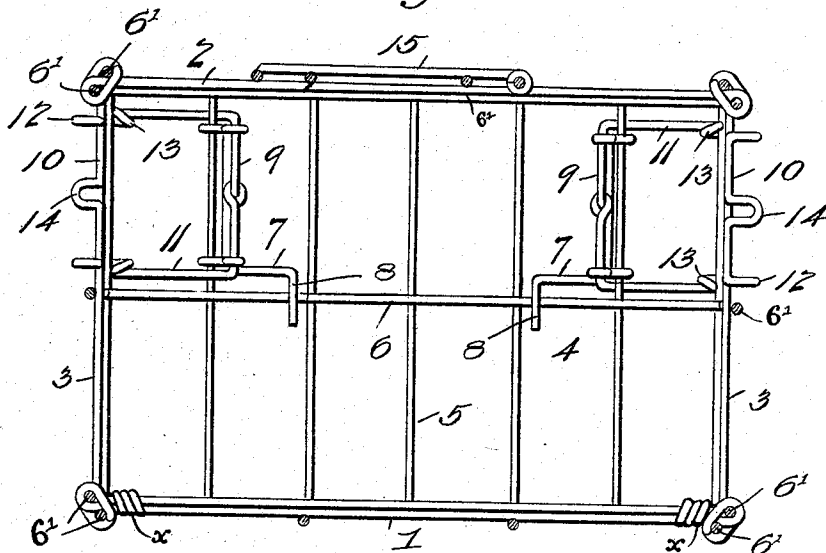


Fig. 4.

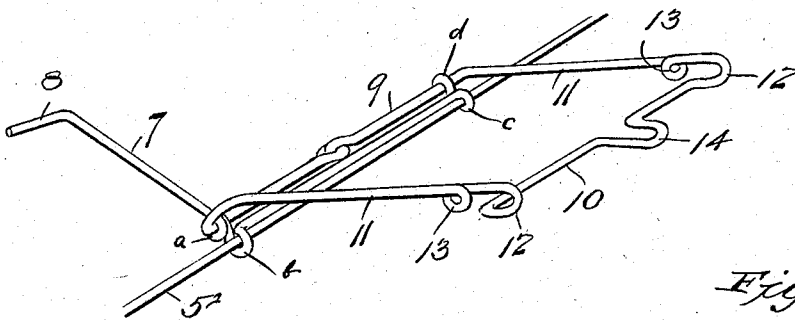


Fig. 5.

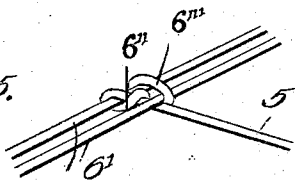
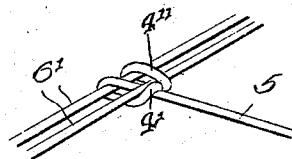


Fig. 6.



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3 SHEETS—SHEET 3.

Fig. 7.

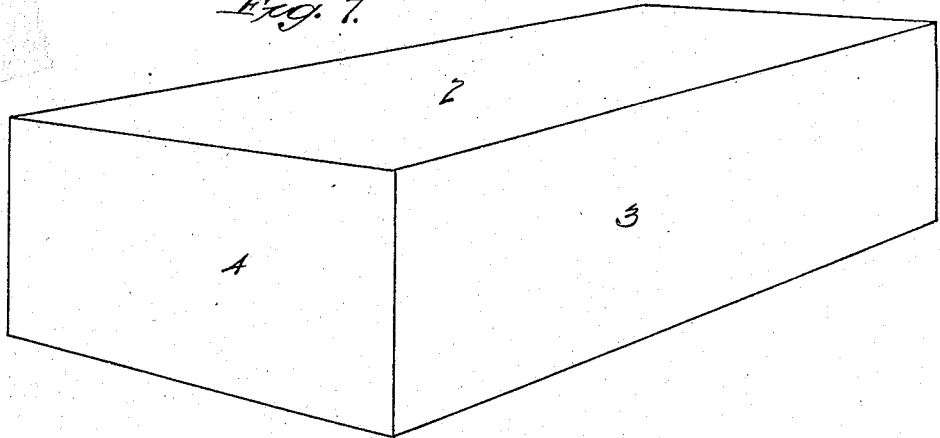


Fig. 8.

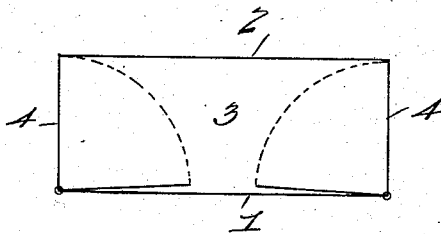


Fig. 9.

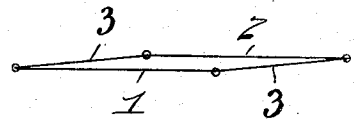


Fig. 10.

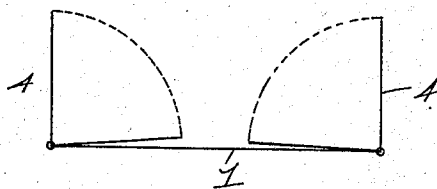
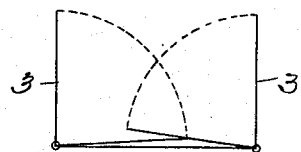


Fig. 11.



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FOLDING SHIPPING-CRATE.

936,735.

Specification of Letters Patent.

Patented Oct. 12, 1909.

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To all whom it may concern:

Be it known that we, JAMES B. PORTER, EDWIN BURDETTE JENKINS, and EDMUND STEYTLER, all citizens of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Folding Shipping-Crate, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to folding shipping crates, the object of the present invention being to produce a crate for general shipping purposes, which, while constructed wholly of wire, is made in such a way that it is self bracing throughout and capable of being subjected to severe strains without liability of being broken down, mashed and injured; at the same time the crate may be easily folded and collapsed so as to occupy a minimum amount of space while in storage or while being returned to the shipper for use again.

With the above and other objects in view the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination and arrangement herein fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a top plan view of a crate embodying the present invention, the crate being shown as set up in condition for use. Fig. 2 is a vertical longitudinal section through the same. Fig. 3 is a vertical cross section through the crate. Fig. 4 is a detail perspective view of one of the latches or clamps used at several points of the crate. Fig. 5 is a detail perspective view of one of the connecting joints between the crate top and sides. Fig. 6 is a similar view of another one of the connecting joints between the crate top and sides. Fig. 7 is a diagrammatic perspective view of the crate set up in condition for use. Fig. 8 is a diagrammatic side elevation of the crate illustrating the manner of folding in the members which ordinarily form the ends of the crate. Fig. 9 is a diagrammatic end view showing the manner of completing the folding operation. Figs. 10 and 11 are respectively side and end diagrammatic elevations illustrating the folding of a crate having the top side omitted to form an open top crate.

Under the preferred embodiment of this

invention the crate is of a six-sided construction, or in other words the crate comprises a bottom side 1, a top side 2, long sides 3, and shorter sides or ends 4, the said bottom, top, sides and ends all forming the six sides of the crate.

In carrying out the invention, each of the six sides of the crate is composed of wire fabric embodying the parallel wires 5 and the crossing stringer or bracing wires 6, the outer ones 6' of which may be termed the marginal wires, the same being coincident with and forming the outer marginal edges of the crate sides. The wires 5 and 6 are shown as crossing and intersecting each other at right angles and it will be noted that the wires 5 are arranged relatively closer together than the wires 6, the object being to provide a greater number of the wires 5, which upon the sides and ends of the crate extend vertically and thereby impart to the crate as a whole much greater weight sustaining power, while the stringer or brace wires 6 connect all of the wires 5 and prevent the bending of the wires 5 and the consequent breaking down of the crate.

At all points where the wires 5 and 6 cross and intersect, said wires are welded together, electrically by preference, so that after the welding operation is completed, each of the crate sides is in effect an integral structure without joints, splices or scarfs of any kind whatever. As the result, each of the crate sides is self braced and the bracing is of the most thorough character as there is no possibility of slippage at the crossing points of the wires of which the crate sides are composed. When the necessary number of such crate sides are brought together and connected in the manner hereinafter described, a practically indestructible crate is the result. It may here be noted that the crate may be of any desired size as the crate sides may be made of any desired dimensions and wire of any required gauge may be used in the manufacture of the fabric of which said sides are composed.

In the construction where the crate is provided with a permanent top side as in Figs. 1, 2 and 3, the top and bottom sides and the two long sides are hinged together along their longitudinal edges so that in the folding operation these four sides maintain a parallelogrammatic relation at all times. This is illustrated in the diagram, Fig. 9.

When all of the sides have been completely folded, they lie flatwise upon each other in actual contact, occupying a space in thickness equal only to the combined thickness of three crate sides. The shorter sides or ends of the crate are jointed along their lower marginal edges to the corresponding marginal edges of the bottom side of the crate and fold inward and downward upon the bottom side 1 of the crate, as indicated by dotted lines in Fig. 8, the joint being formed by extending the side marginal wires 6' of the crate bottom beyond the end wire of the bottom and coiling the same around the adjacent bottom wire of the end, as shown at *x* in Figs. 2 and 3. These shorter sides or ends are first folded in the manner shown and described and the remaining four sides are then folded upon them as above described.

Wherever any two of the crate sides are connected by a hinge joint, a special form of hinge is used. Such hinge, however, is not a separate affair but is formed out of portions of the crate sides themselves and is therefore an integral part of the crate sides as will appear. The nature and construction of this connecting hinge joint may be understood by reference to Figs. 1, 2, 3, 5 and 6, in which it will be observed that some form of connection occurs at the end of every wire 5. To accomplish the desired result each of the wires 5 is extended beyond or outside of the marginal wires 6 so that it may be wrapped or coiled around the adjacent marginal wires 6 of the two sides to be hinged together. The end marginal wire 5' of the top side is extended at both ends beyond the marginal wires of the top side as best shown in Fig. 1, and coiled or wrapped one or more times around the adjacent marginal wire of the adjoining side as shown at 5'' to form a pivotal bearing for the corresponding marginal wire 6' of the adjoining side. This is done at all four corners of the top side as seen in Fig. 1, thus, at once forming a hinge connection between the top and the two long sides of the crate. Each of the two ends of the next wire 5 is then carried around the marginal wire 6' of the adjacent side as shown in Fig. 5, then upward between the two adjacent marginal wires 6', as shown at 6'', over itself, then down again between said marginal wires, under the marginal wire of the crate side and thence over and around both of the adjacent marginal wires of the top and side as at 6'''. In making the connection just described it will be observed that the projecting end of the wire 5 is bent so as to lie between the two marginal wires and hold them apart, and further that in wrapping the wire as described, it straddles the adjacent upper end portion of the corresponding wire 5 of the crate side. Two

very important results are thus obtained, first, the marginal wires 6' of adjoining sides are held apart a suitable distance, at all times, to permit the crate to be folded in the manner described, and second, the crate top and sides, thus hinged together are prevented from slipping or moving longitudinally of each other by the straddling feature described. Both of these expedients aid materially in the bracing of the completed crate by holding the connected crate sides in a certain fixed relation to each other. It will be noted that the construction and arrangement last described is used at both sides of the crate.

The second wire 5 from each end of the crate is treated in a different manner and likewise all of the intermediate wires 5. Such second wire from the end is wrapped around the marginal wire 6' of the adjacent crate side as shown in Fig. 6, then carried upward over itself as at 4' behind or within the marginal wire of the top side and thence around both marginal wires as at 4'', and in so wrapping or coiling the wire, the upright wire 5 of the crate side is straddled as shown at 4''' in Fig. 2. It will thus be seen that the marginal wires 6' of any two sides of the crate, where the hinge joint occurs, are held apart a certain distance and also prevented from moving farther apart by the series of wrappings and that these numerous wrappings described are integral portions of the crate sides.

Figs. 3 and 4 disclose the means whereby the marginal wires of the longer and shorter sides of the crate are connected and braced, when the crate is set up, the said means consisting of a plurality of latches or clamps. Each of said latches or clamps is composed of wire and under the preferred embodiment of the invention said latch is of open rectangular form as clearly illustrated. One end of a piece of wire is bent to form the latch operating handle 7, (see Fig. 4) said handle having an angular end or hook 8; the inner end of the handle is then wrapped around the inner cross bar 9 of the latch as at *a*, then around one of the wires 5' as at *b*, then extending along said wire 5', it is wrapped again around the wire 5' as at *c* and finally around the inner cross bar 9 of the latch, thus connecting the latch by a hinge joint with the said wire 5', the latter being ordinarily the one next to the marginal wire 6' of the crate side to which the latch is connected. Adjacent to the outer cross bar 10 of the latch, the side bars 11 of said latch are recurved, as shown at 12 to form hooks of sufficient size to take in both marginal wires of the sides to be connected by the latch, as shown in Figs. 1 and 3, and hold said marginal wires securely and tightly together as in a clamp. Just back of the hooks 12, the side bars 11 are bent or

coiled to form back stops or shoulders 13 which engage the adjacent marginal wire. The marginal wires are thus clamped and confined between the hooks 12 and the shoulders 13 and all relative movement between the adjoining crate sides prevented. The wrappings or coilings of the wire from which the handle 7 is formed are so made and related to each other and to the wire 5 to which the latch is connected that the pivots formed thereby pass by each other in pressing the handle 7 inward to place, thus rendering the latch self locking. To unlock the latch the handle 7 must be forced outward to carry such pivot points again past each other. This is also productive of a cam or wedging action which operates to force the hooks and shoulders 12 and 13 into and out of engagement with the marginal wires of the crate sides. The extension 8 is adapted to be forced under the adjacent portion of one of the stringer or brace wires 6, as shown in Fig. 3, acting thereby as an additional safeguard to prevent the possible jarring loose of the latch. The latch may also be provided with a projecting lip 14 which acts as a stop shoulder for the vertical corner wires and a brace for the crate. It will be understood that a number of such latches are employed, for example, one at each corner of the crate to connect the marginal wires of the longer and shorter sides of the crate, and one at each end of the top side of the crate to connect the shorter crate sides or ends to the top side. A thoroughly braced crate is the result.

In a six sided crate an opening is ordinarily left, preferably in the center of the top side, as shown in Fig. 1. This may be accomplished by cutting out or omitting portions of the wire of which the fabric is composed. In connection with such opening which may be of any desired size, a door or closure 15 is employed. This, like the rest of the crate, is preferably composed of a section of wire fabric of the kind heretofore described, the end portions of some of the wires of which are coiled one or more times around one of the wires of the top of the crate as shown in Figs. 1 and 3. The end cross bar at the free end of the door or closure is so disposed as, when closed, to reach beyond the adjacent wire of the top, and in connection with said door or closure one or more latches 16 are employed. Each of said latches is composed of a piece of wire having one end coiled or wrapped as at 17 around one of the wires of the top side of the crate, thus forming a pivotal connection between the latch and the crate. At an intermediate point the latch 16 passes over the marginal wire of

the door or closure. It then extends across under the next wire of the door and at the same time over the adjacent wire 5 of the top of the crate. At its free end the latch 16 is deflected to form an angular lip or hook 18 adapted to be caught under the adjacent stringer or brace wire 6 of the crate top, thus preventing any possibility of the accidental displacement and consequent release of the latch and the door closure.

We claim:—

1. A folding shipping crate of meshed wire fabric, the four main sides of which are permanently attached and hinged together and the ends of which are hinged to one of the sides and adapted to fold between the sides, each side and end embodying marginal wires, latches fulcrumed on the marginal wires and adapted to clamp adjoining side and end marginal wires together, and latch operating levers adapted to interlock with the wire fabric to retain the latches in clamping position.

2. A folding shipping crate of meshed wire fabric, the four main sides of which are permanently attached and hinged together and the ends of which are hinged to one of the sides and adapted to fold inward between the sides, the sides and ends embodying marginal wires, certain of the crate sides having the crossed fabric wires thereof extended outside of and beyond the marginal wires and passed around and also between the two adjacent parallel marginal wires of the adjoining crate sides to form a hinged connection by which the sides are attached to each other and the marginal wires held apart.

3. A folding shipping crate of meshed wire fabric the four main sides of which are permanently attached and hinged together and the ends of which are hinged to one of the sides and adapted to fold inward between the sides, the sides and ends embodying marginal wires, certain of the crate sides having the crossed fabric wires thereof extended outside of the marginal wires and passed around the marginal wire of the crate side adjacent thereto and also bent to straddle the fabric wires of said adjacent side to prevent relative endwise movement of said marginal wires.

In testimony whereof we affix our signatures in presence of two witnesses.

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EDWIN BURDETTE JENKINS.
EDMUND STEYTTLER.

Witnesses:

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