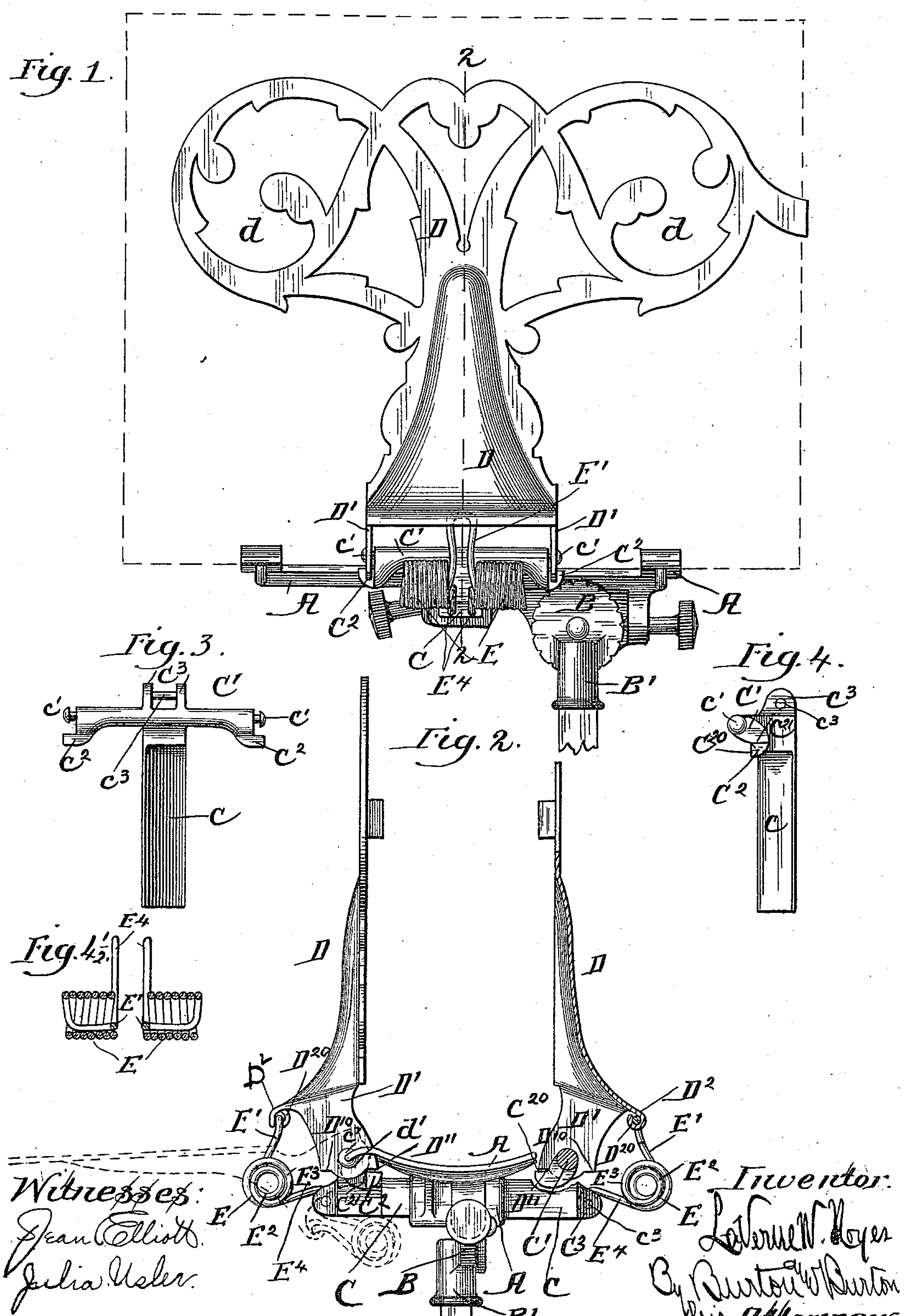
(No Model.) 3 Sheets—Sheet 1.

LA VERNE W. NOYES.

BOOK HOLDER.

No. 440,816. Patented Nov. 18, 1890.



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Julia Usler.

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his Attorneys

(No Model.) 3 Sheets—Sheet 2.

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Fig. 13.

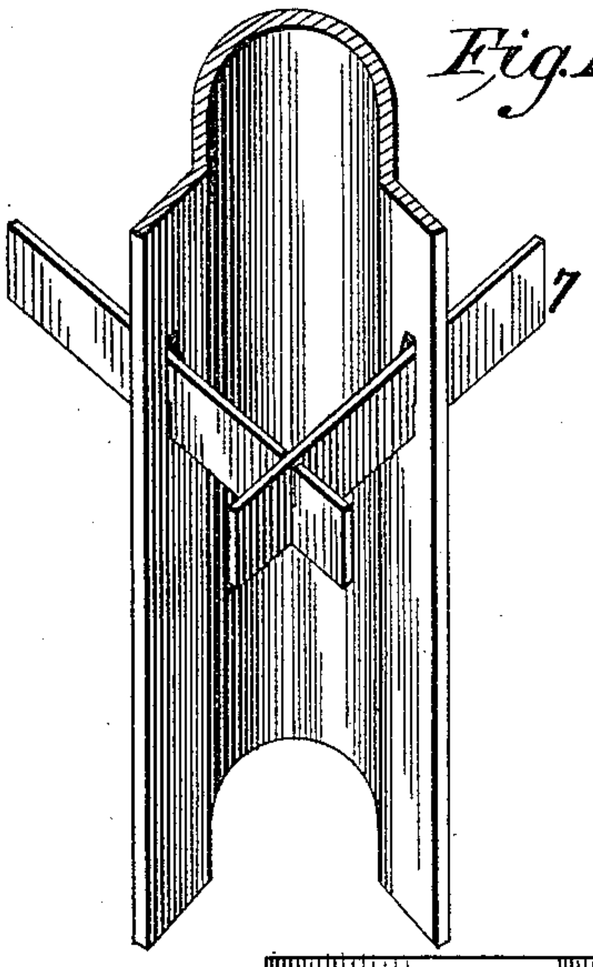

Fig. 9.

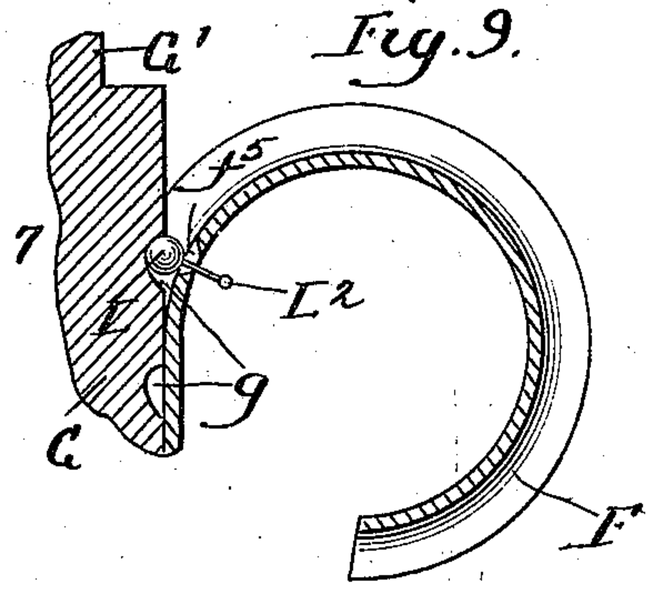

Fig. 5.

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(No Model.) 3 Sheets—Sheet 3.

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Fig. 6.

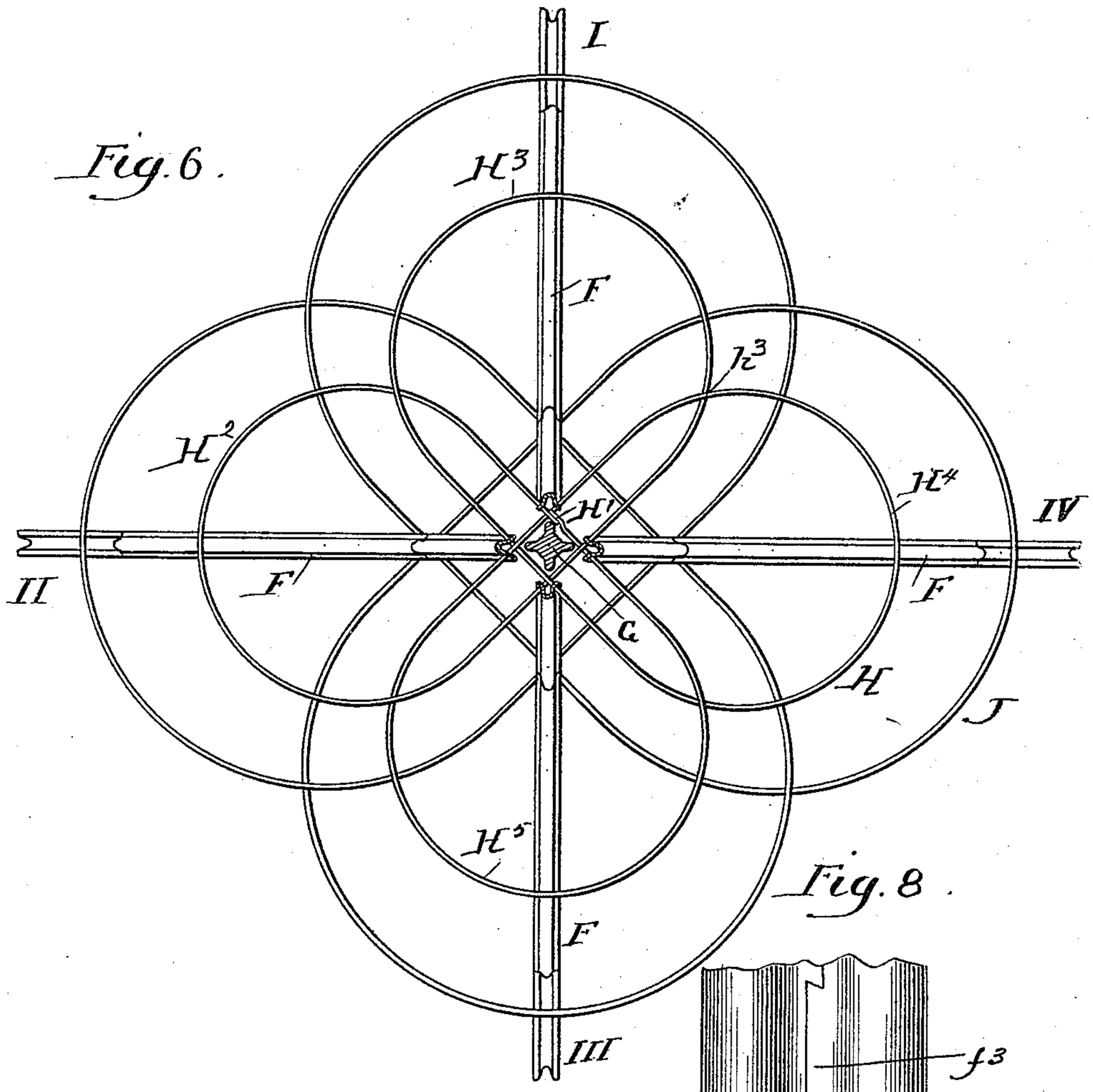

Fig. 8.

Fig. 7.

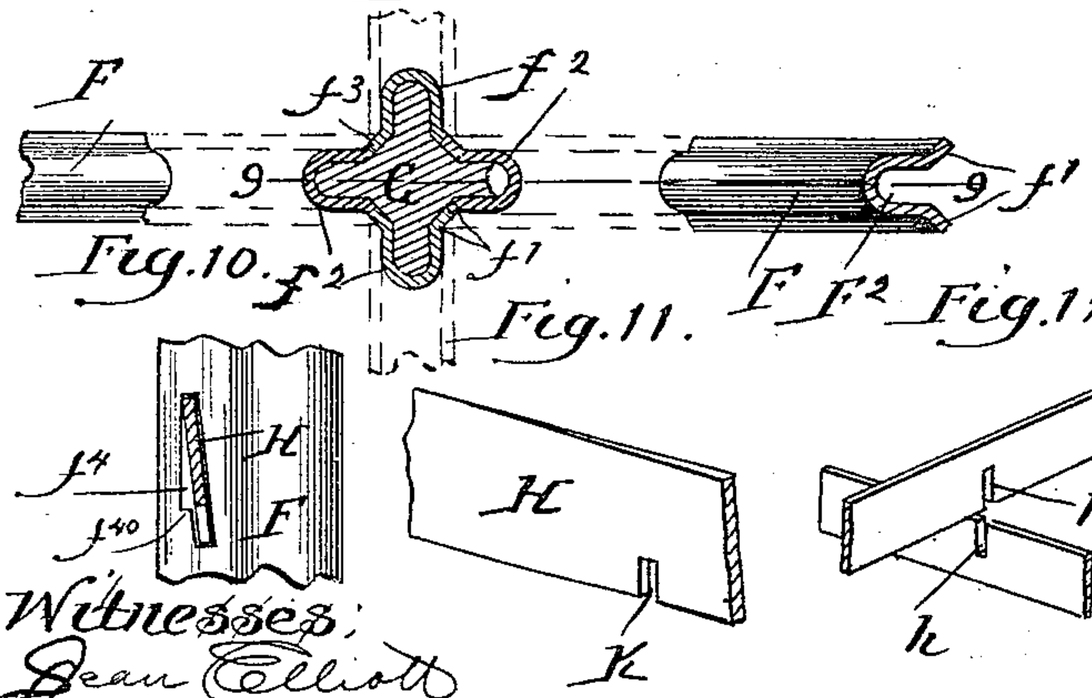

Fig. 10. Fig. 11. Fig. 12.

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UNITED STATES PATENT OFFICE.

LA VERNE W. NOYES, OF CHICAGO, ILLINOIS.

BOOK-HOLDER.

SPECIFICATION forming part of Letters Patent No. 440,816, dated November 18, 1890.

Application filed June 9, 1890. Serial No. 354,774. (No model.)

To all whom it may concern:

Be it known that I, LAVERNE W. NOYES, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in a Book-Holder, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates to devices for operating the folding tablets of a book-holder, and to the construction of a standard of such holder.

In respect to the first part, its purpose is to provide means by which the same spring shall operate to hold the tablets shut to clasp the book, and to hold them open to support the book.

In respect to the second part of the invention, the purpose is to provide a simple, strong, and cheaply-constructed standard, readily detachable for shipping, and adapted to be securely assembled for use without employing bolts or rivets.

It has also the further purpose of providing a novel and simple and easily-constructed book shelf or shelves on the standard below the folding holder and to make such shelf brace and strengthen the legs of the standard.

Figure 1 is a side elevation of a folding book-holder and mechanism by which it is operated without the standard. Fig. 2 is a partly sectional front elevation of the same, section being made through the supporting and operating parts of one of the parts at the line 2 2 on Fig. 1. Fig. 3 is a detail plan of one of the slides or sliding brackets upon which the tablets or supports are pivoted. Fig 4 is a side elevation of the part shown in Fig. 3. Fig. 4½ is an axial section of a modified form of tablet-operating spring. Fig. 5 is an elevation of the standard with the horizontal book-shelves thereon. Fig. 6 is a sectional plan of the same, section being made at the line 6 6 on Fig. 5. Fig. 7 is a sectional detail at the line 7 7 on Fig. 5. Fig. 8 is a side elevation of the detail shown in section in Fig. 7. Fig. 9 is a section at line 9 9 on Fig. 8. Fig. 10 is a detail sectional side elevation showing the manner in which the band which forms the horizontal book-shelves is passed into the legs of the standard, the band being shown in transverse section made immediately adjacent to the leg. Fig. 11 is a detail perspective of the part of the band adjacent to the leg, including that which passes through the leg, as seen in Fig. 9. Fig. 12 is a detail perspective of two intersecting portions of the band detached and showing in what manner they are adapted to be connected at their intersection. Fig. 13 is a detail elevation of a joint formed by the intersection of two portions of the metal band forming the book-shelf within the angle of the lips or flanges of the leg.

I will first describe the portion of the book-holder which relates to the folding tablets or book-clamps.

The style of device to which my invention is applied is one which comprises a holder or rest for the back of a book, (represented at A,) which is pivoted to the disk B at the center of the latter, and adapted to be adjusted about that center in a vertical plane to determine the inclination of the back of the book, said disk B terminating downwardly in the socket B′, by which the device is connected to a spindle at the end of the standard, hereinafter described. The book-rest A supports two horizontal slides C C, which are inserted side by side through it transversely with respect to the vertical plane of the disk B, and to said slides are pivoted the supports of the folding book-tablets or book-clamps.

The construction as thus far described in general terms is familiar.

I will now describe the features which relate to my invention.

Each of the slides C has a cross-arm C′, upon the ends of which arm the supports for the book-tablet are pivoted, the pivots being represented by the screw *c*′. At a little distance from the said pivots, respectively, are provided the lugs C^2, which constitute stops for the tablet-supports as they rock upon the pivots, said stops having two shoulders or faces C^{20} and C^{21}, which respectively stop the tablet-supports at the vertical and at the horizontal position of the tablets, as will hereinafter appear.

At the middle of the length of the cross-arm C′—that is, in line with the main slide-

arm C—two lugs C^3 C^3 on each project in a direction transverse to that of the cross-arms, and pins c^3, connecting said lugs, respectively, extending between said lugs C^3, serve as a means of attaching the springs hereinafter described, which operate upon the tablets for the purposes stated.

D D are the tablet-supports, which may be made from sheet metal stamped into the form illustrated, or may be cast.

In addition to the ornamental portion *d*, which affords means of fastening the tablets to their said supports, respectively, each of said supports comprising ears or lugs D′ D′, which stand parallel to each other in planes transverse to the plane of the tablets, and at such distance apart that they afford bearings at *d′*, by which the tablet-supports are pivoted on the pivot-screws *c′* to the slides or sliding brackets C. The ears D′ have each two shoulders D^{10} and D^{11} at opposite sides of the pivotal bearing *d′* through said lugs, said shoulders being adapted to stop upon the shoulders or faces C^{21} and C^{20}, respectively, of the stop-lugs C^2 on the bracket C, the said shoulders C^{20} and D^{11} being in contact when the tablets are vertical, and the shoulders C^{21} and D^{10} being in contact when the tablets are horizontal, the first position being shown in full line in Fig. 2, and the second position being shown in dotted line at the left-hand side in the same figure. Said tablet-supports, in addition to the said lugs D′ D′, have each a lip D^2, which projects out a considerable distance from the plane of the tablet at the middle part of the width of said support D and removed also from a plane at right angles to the plane of the tablet passing through the pivot-bearing *d′*. This lip is adapted to engage one of the operating-arms of the spring hereinafter described, and for the purpose of retaining said operating-arm against it, it has the lug D^{20}, which is adapted to be folded inwardly upon the lip through a loop, hereinafter mentioned, in the spring, and thereby retain the latter.

E E are the springs which operate upon the tablets to hold them shut and open, as stated. These springs are precisely alike in construction. One of them will be described. It consists of wire which is folded at the middle point of its length to form the loop E′. Two branches of the wire thus folded are coiled in opposite direction a few turns, and then recoiled back toward each other, the returning coils being outside of and encircling the first coils, the ends of the wire being thus brought together substantially in the plane of the loop—that is, at the middle part of the completed spring—the four coils, two on each side, projecting out from the two arms of the spring, which arms consist, respectively, of the loop on one hand and the two ends of the wire on the other.

E^2 E^2 represent the first or interior coil, and E^3 E^3 the returning or exterior coils, each spring having two coils E^2 and two coils E^3.

E^4 E^4 are the ends of the wire, which may be treated as together forming one arm of the complete spring. E′ is engaged, as already described, by the lug D^{20} on the lip D^2 of the tablet-support D. The ends E^4 E^4 are suitably hooked and made to engage the pin c^3 between the lugs C^3 on the slide-bracket C. It will be observed that the tendency of all four of the coils of the spring is to resist the bringing together of the loop E′ on the one hand and the ends E^4 on the other, and to force said arms E′ and E^4 apart when they may be brought toward each other.

Considering now the parts D, C, and E, assembled in the manner described, and the part D in vertical position, as seen in Fig. 2 in full lines, the above-stated tendency of the spring being to force apart the ends of the arms, and so force apart the parts to which said parts are respectively attached—that is, the lip D^2 of the bracket D and the pin c^3 on the slide-bracket C—the effect of the spring will be to hold the tablet-support D in its vertical position, or toward that position as far as it can go, before the stops C^{20} and D^{11} colliding arrest it. These stops are so placed as to arrest it as nearly as may be at the vertical position. If, now, the tablet-support D be forcibly rocked over the pivot *c′* outward—that is, to carry the stop D^{11} away from the stop C^{20}—the spring will resist that movement until the pivotal connection of the arm E′ of the spring—viz., the bearing of the loop on the lug D^{20}—has passed inward of the line connecting the center of the pivot *c′* and the center of the pivot c^3, and that after that line has been passed the same action of the spring will tend to carry the tablet-support D still farther in the same direction—that is, toward the open position—until stopped by the collision of the stop-shoulder D^{10} against the stop-shoulder C^{21}, as seen in the dotted position of said parts on Fig. 2. The said three pivots *c′*, c^3, and D^{20} are so located that this imaginary line connecting the first two of said pivots is passed by the third pivot just before the open position is reached, so that the spring will tend to hold the tablet in said open position, as well as to hold it in closed position when it is moved toward such closed or vertical position.

Considering the particular construction of the spring E, it should be noticed that no shaft or axle is required to be passed through the coils in order to get the full benefit of their tendency to uncoil, and so perform their function. Ordinarily it will be recognized that a helical spring of several coils must be provided with a shaft or axle in order to get the full benefit of the opposite reaction of the opposite ends of the helix—that is, the tendency of said ends to react in opposite directions in planes radial to the axis of the helix—because the helix, besides the elasticity which causes its tendency to uncoil and so to move its ends circumferentially about the axis of the coil, has also a longitudinal elasticity—that is, an elasticity causing it to react to restore the

center of each coil to the original axis about which it is coiled—and the helix will bend longitudinally on account of this longitudinal elasticity, if not restrained by a shaft or axle through it or a tube encircling it, easier than it will be coiled to produce circumferential reaction.

The construction which I have adopted in the springs employed in my present invention entirely removes this difficulty and permits me to employ a helical spring of any number of coils without either axle within or journal-bearings outside of the coil to prevent it from bending longitudinally, because I bring the two arms in direct opposition to each other at the same end of the coils, so that the pressure against which those arms react in their tendency to separate cannot bend the coil longitudinally, as would be its tendency if the two points at which such pressure is experienced were not in the same transverse plane with respect to the axis of the coil. I consider the best mode of reaching this result to be that herein illustrated, wherein one end of the coil is brought back to the starting-point by another coil; but this is not the only method. On the contrary, the interior coil may be dispensed with and the wire extended uncoiled, but straight through the exterior coil from one end of said exterior coil and brought out in the vertical plane of the initial arm of the spring, as shown in Fig. 4½.

It will be observed that the described action of the spring is not dependent upon its being double—that is, upon its comprising two coils upon opposite sides of the plane of the arms—but that the effect in this respect would be the same if instead of having the loop E′ the spring terminated at the middle of that loop—that is to say, the spring shown is in effect simply two independent springs made of one piece of wire, but operating precisely the same as if they were divided at the middle part of the loop.

I will now describe the construction of the standard. I make it preferably of four, though it may be made of three or a greater number, of legs F F F F, which are made of channel-iron or other metal, having the two lips f' f' of the channel diverging at an angle corresponding to the number of the legs employed—that is, when there are four legs diverging substantially at right angles. Simple "angle-iron," so called, might be employed; but for strength I prefer the form illustrated, wherein, in addition to the portion of the lips which terminates them at right angles to each other, there is a further portion f^2, forming a channel extending in the direction of a plane bisecting the angle between the terminal lips f'. Each of these legs has the straight portion F′. These straight portions are brought together lip to lip, so that they inclose between them a space which comprises a square defined by the straight portion of the lips, which make right angles with each other, and, in addition, at the four corners of such square the bays or recesses corresponding to the portion f^2 of the channel-bars. From this straight portion each of the legs F is bent outward in planes respectively bisecting the channels in said bars to form diverging legs for the standard. As an ornamental finish, also, the bars are bent outward at the top of said straight portion, as illustrated in the drawings, which may be made to serve a further purpose, as hereinafter explained. The straight portions, brought together as described, and inclosing the space defined by the inner surfaces of the channel-bars, have their edges dovetailed together, said dovetails being represented at f^3. The parts thus dovetailed may be assembled first two and two, and then the pairs may be brought together, as described, engaging the dovetails on the exposed edges of each simultaneously. When thus assembled, the two legs are keyed together and permanently retained by inserting through the space inclosed by the straight portions joined by the dovetailed edges the stem G, which may be a simple square corresponding in size to the square defined by the straight portion f' of the lips of the channel-bars; but preferably this stem is provided with ribs or beads at its angles corresponding to the channels F², so that it fills the entire space defined by the inner surfaces of the channel-bars at the straight portions dovetailed together. It will be noticed that where this center stem is inserted it operates as a perfect key, preventing the separation of the four parts by reason of the dovetail which joins their edges. At the upper end this stem terminates in a spindle G′, which enters the socket B′ in the book-rest and supports the holder and tablets thereon. The height of the book-rest and tablets may be adjusted by sliding the stem G through the dovetailed standard-legs. One or more of the edges of the stem G are notched, as shown in Fig. 9, and a ball, as a piece of shot or other hard substance L, is dropped into the furrow or channel F² at the upper and outwardly-bent portion of one or more of the channel-bar legs F, and tends to fall into the notches g on the stem, and when thus lodged locks the stem and prevents its descent. A stem L² may be provided for the ball L, which will be protruded through a slot f^5 in the leg, said slot being long enough to allow enough movement to the ball to permit it to be withdrawn by means of said stem L′ from the notch in the stem G. The stem L′ may be hooked, as illustrated, for convenience in operating it. The stem upon being raised will throw the ball out of the notch, and the ball will fall back again into another notch lower down on the stem when the upward movement of the latter ceases.

H and J are two horizontal shelves or shelf-supports, as may be preferred, which are made precisely alike, except as to size, out of band metal or metal tape rove through slots in the lips of the standard-legs F, and inter-

laced with itself in a manner which will now be described. First I will describe the slots in the lips of the standard-legs through which this metal tape is rove and the device by which it is retained therein. This construction is seen in Fig. 10, wherein f^4 represents the slot in the lip of the standard-leg. This slot comprises a parallelogramic portion which is slightly oblique, and a triangular portion adjacent to it, having one edge parallel with the edge of the lip, said parallel edge, however, being shorter than the opposite oblique edge of the slot or hole, and a shoulder f^{40} being thereby formed at the lower end of the shorter edge. The whole length of the oblique portion of the slot is the width of the band or tape forming the shelves H or J, as the case may be. At the point where this tape is designed to be passed through and lodged in the leg it is provided at the inner edge with a notch K, and the remainder of the width of the tape after deducting the depth of the notch is equal to the length of the shorter or parallel side of the slot F^4. When the tape is inserted through the slot it is necessarily given the inclination of the longer and inclined portion of that slot, but having been passed through that slot until the notch K reaches the lip the tape will straighten up, bringing its face parallel with the edge of the leg, causing the notch K to stride the shoulder f^4. Now, as the tape is folded around to form the portion of the shelf or shelf-support between said leg and the next one through which it is rove, such folding or bending being in a horizontal plane and so at right angles to the face of the tape as it stands in the straight portion of the slot, its rigidity will prevent it from being tipped over into the oblique portion to permit the notch K to become released from the shoulder F^4. This construction, therefore, insures the retention of the tape in the legs at the point in the length of said tape whereat it should intersect the leg in order to keep the structure in the desired form.

I will now trace the course of the tape forming the shelf H from beginning to end, commencing at the end marked H′. This end is inserted through a slot in one of the legs numbered I on Fig. 6. A notch K being provided at a very short distance from that end, which, being suitably lodged, as described, in the slot of that leg, holds that end while the tape is bent around and the other end rove through the slot in the opposite leg III, the bow between said legs, it will be observed, passing outside of and above the intervening leg II. The notch K being properly lodged in the leg III, the tape passes next through a similar notch in leg IV. It will be seen that these two legs at this point are but a short distance apart, and the tape having its notches lodged securely in both of them, binds them together positively, so that they can be spread only by tearing the tape or the leg at the lodgment of the former in the latter. From the lodgment of the tape in the leg IV another bow is made passing outside of and above the leg I and over the first bow H^2 of the same tape and through the proper slot in the lip of the leg II, lodgment being effected by the engagement of the notch K on the shoulder f^4, as in the other instances. At the point where the bow H^3 crosses above the bow H^2 the two are notched together in a familiar manner, a notch h being made half-way through each, each tape being lodged in the notch of the other, and this mode of connection at the intersections of the tape is followed throughout the remainder of the construction, which may be understood without special mention of that fact, the only point to be observed being which bow of the tape is the upper one at said intersections, respectively, which will be mentioned as the description proceeds. From the intersection and lodgment of the tape in the leg II it extends directly across to the remote lip of the adjacent leg III and is passed through and lodged therein, and thence folded into the bow H^4, passing outside of and above the leg IV, and intersecting the bow H^3 at h^3, H^4 being lodged above H^3, thence passing through the other lip of the leg I, and thence intersecting the end portion H, said end portion being lodged above the running tape at that point, said tape thence passing through the remote lip of the leg II and then formed into the bow H^5, which passes outside of and above the leg III and around through the remaining lip of the leg IV, said bow in this course intersecting the bow H^2 and the bow H^4, H^2 being lodged above H^5, and H^5 being lodged above H^4. From the lodgment last mentioned of the tape in the lip of the leg IV said tape intersects the former portion of it, which extends between the remote lips of the legs III and IV, being lodged under said portion, and thence extending and being joined to the first end. Considering now the four bows H^2 H^3 H^4 H^5, which constitute the shelf or shelf-support H, it will be observed that they form four ties, binding firmly together the four legs of the standard, thereby adding to the strength of the junction formed by the dovetails upon the abutting edges of the lips of said channel-bars, that each of said bows where it intersects the adjacent bows is lodged above one of them and below the other.

The construction of the shelf or shelf-support J is precisely similar to that of the shelf or shelf-support H, and since the legs have diverged farther by the time the level of this shelf is reached the portions of the tape forming said shelf, which extends straight from leg to leg, and tie them together, are longer, but otherwise act in precisely the same manner, and inasmuch as the shelf J is or may be located well toward the lower ends of the legs, where they rest upon the floor, (being preferably about two-thirds of the distance down from the top of said legs,) there remains only a small portion, preferably about one-

third of the length of the legs, which is liable to spring or spread. By this means the two shelves H and J very greatly stiffen the standard and add to the efficiency of the entire structure, besides serving their principal or prime purpose of shelves or supports for shelves. Even without the engagement of the band with the legs by means of the notch K on the shoulder f^4, as described, since the intersecting plies of the band are engaged with each other within the angle formed by the two lips of the channel-bar leg and quite near to said lips, and by passing through the opposite legs are held at an angle to each other, which is comparatively fixed, even allowing for the possibility of slight spreading of said legs, the legs cannot spread without great violence to the band—that is, without bending it sharply, which cannot be done without sufficient force to disrupt the structure.

I claim—

1. In a book-holder, in combination with the tablet-support and an arm to which it is pivoted, a spring pivotally connected to the tablet-support and to the said arm and reacting to separate said points of connection, the angular distance between the radial planes from the axis of the pivot to the spring-connections, respectively, being less than the range of the rocking movement of the tablet from closed to open position, substantially as set forth.

2. In a book-holder, in combination with the tablet-support and an arm to which it is pivoted, a spring pivotally connected to the tablet-support and to its supporting-arm and reacting to separate the points of connection, the connection to the tablet-support being farther from the pivot than the other, whereby the rocking of the tablet-support over the pivot may carry said more distant connection outside of and past the other connection, substantially as and for the purpose set forth.

3. In a book-holder, in combination with a tablet-support and an arm to which it is pivoted, a spring comprising two arms in divergent planes and a torsional portion about the angle of said planes, said arms being connected to the tablet-support and to the supporting-arm of the same, respectively, said torsional portion being unrestrained except by the connection of its ends, as described, whereby it is free to revolve about the pivotal connection of said spring to the arm to which the tablet-support is pivoted, substantially as set forth.

4. In combination with the tablet-support D and the arm C, to which it is pivoted, a coiled spring having its two arms reacting away from each other about the axis of the coil, connected the one to the tablet-support and the other to the said supporting-arm, the coiled spring being at the opposite side of the plane in which the two connections of the spring-arms lie from the pivot of the tablet-support, the connection of the spring to the tablet-support being farther from the pivot than the other connection, so that it will pass outside of the latter as the tablet-support rocks, substantially as and for the purpose set forth.

5. In a book-holder, in combination with the tablet-support and the arm to which it is pivoted, a spring reacting between them to fold the tablets together, said spring consisting of a helical coil having the wire from one end returned within the coil to the other end, whereby the two ends of the spring are located and react away from each other in the same plane transverse to the axis of the coil, substantially as set forth.

6. In a book-holder, in combination with the tablet-support and the arm to which such support is pivoted, a spring connected to the said pivotally-connected parts and tending to fold the tablets together, said spring consisting of a wire coil in two helices—one within the other—the wire from the final end of the outer coil being returned to the initial end by way of the inner coil, whereby the wire forms diverging arms in substantially the same plane transverse to the axis of the coil at the same end thereof and caused to react away from each other about the axis of the coils by the torsional elasticity of both the coils, substantially as set forth.

7. In a book-holder, in combination with a tablet-support and the arm to which it is pivoted, a spring reacting between said pivoted parts to fold the tablets, said spring consisting of a wire looped at the middle and having both branches coiled from said loop outward in helices and thence inward in helices encircling the first, respectively, and terminating with its two ends in substantially the transverse plane of the loop, substantially as and for the purpose set forth.

8. In a book-holder, a standard comprising legs formed of channel-bars assembled edge to edge and having the abutting edges of said bars dovetailed together for a portion of their length and bent divergent at the limit of said abutting and dovetailed portions, and the stem inserted as a key in the space inclosed by said dovetailed bars, whereby the dovetails are retained in connection, substantially as set forth.

9. In a book-holder, in combination with the legs of the standard, book-shelves or shelf-supports formed of metal bands folded into bows or loops, one encircling each leg and rove through apertures in each of the other legs, all said bows or loops standing in the same horizontal plane and being notched together at their intersections outside the legs, substantially as set forth.

10. In a book-holder, in combination with the legs of the standard, book-shelves or shelf-supports formed of metal bands folded into bows or loops, one encircling each leg and rove through apertures in each of the other legs, all said bows or loops standing in the same horizontal plane and being notched together outside the legs, each bow being lodged

above one and below the other of the adjacent bows at said intersection, substantially as set forth.

11. In a book-holder, in combination with the standard comprising divergent legs joined together at the upper part, a shelf or shelf-support formed of metal bands folded in loops or bows, all in substantially the same horizontal plane and corresponding to the number of the legs, one loop or bow inclosing each leg and rove through apertures formed in each of the other legs below the point where they commence to diverge, being notched into each other where they intersect, substantially as set forth.

12. In a book-holder, a standard comprising legs joined together at the upper part and diverging downward, and a book-shelf or shelf-support made of metal bands folded into loops or bows, one of said bows encircling each leg and rove through apertures formed in each of the other legs below the point at which they commence to diverge, the metal band having notches wherein the substance of the legs may lodge at the points where said band is rove through them, whereby said bands constitute ties connecting the legs horizontally, and at the same time form shelves or a support for shelves, substantially as set forth.

13. In a book-holder, in combination with the standard having legs connected together by a metal band rove through apertures in said legs, said metal band having notches K, and the apertures in said legs which receive said band having one side oblique to the plane of the band, said oblique side being as long as the width of said band, and having the opposite side in the plane of the band for a distance equal to the width of the band less the depth of said notch, whereby the shoulder or offset f^4 is formed, adapted to lodge in the notch when the band assumes its normal position, substantially as and for the purpose set forth.

14. In combination with the channel-bar legs, the band rove through apertures in the two lips of such channel-bars and intersecting within the angle between such lips and notched together at such intersection, substantially as set forth.

In testimony whereof I have hereunto set my hand, at Chicago, Illinois, in the presence of two witnesses, this 3d day of June, 1890.

LA VERNE W. NOYES.

Witnesses:
IVA GIFFEN,
JOHN BELL.