

(No Model.)

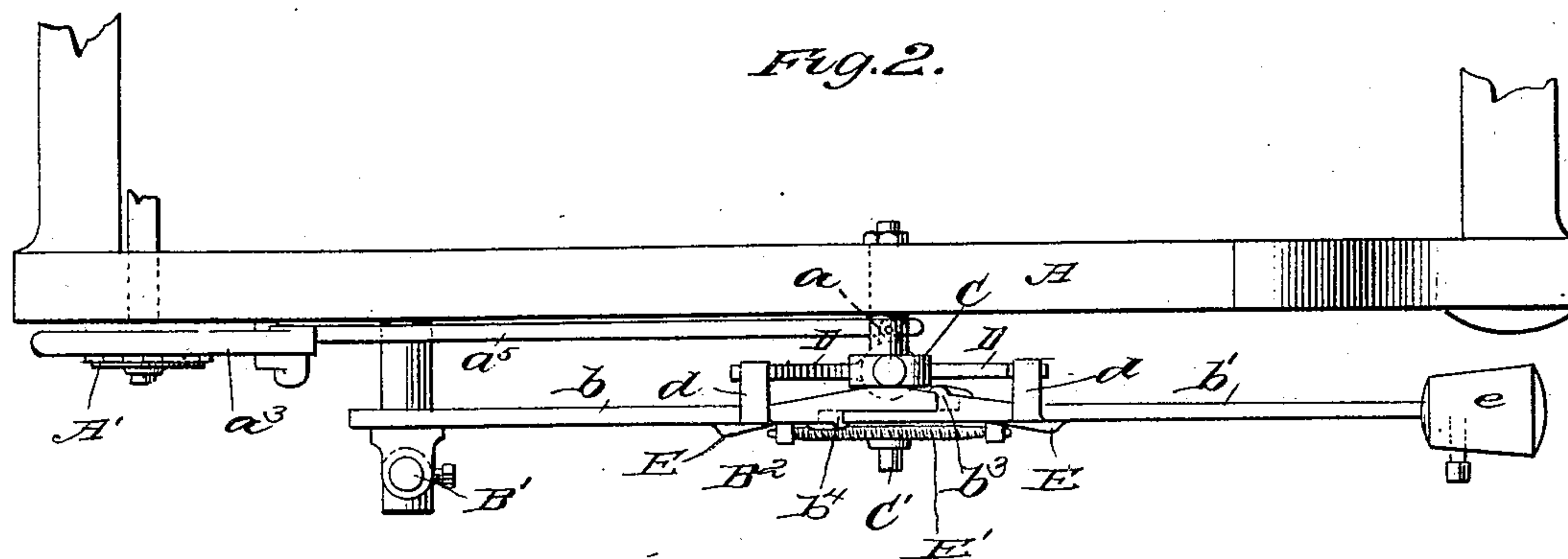
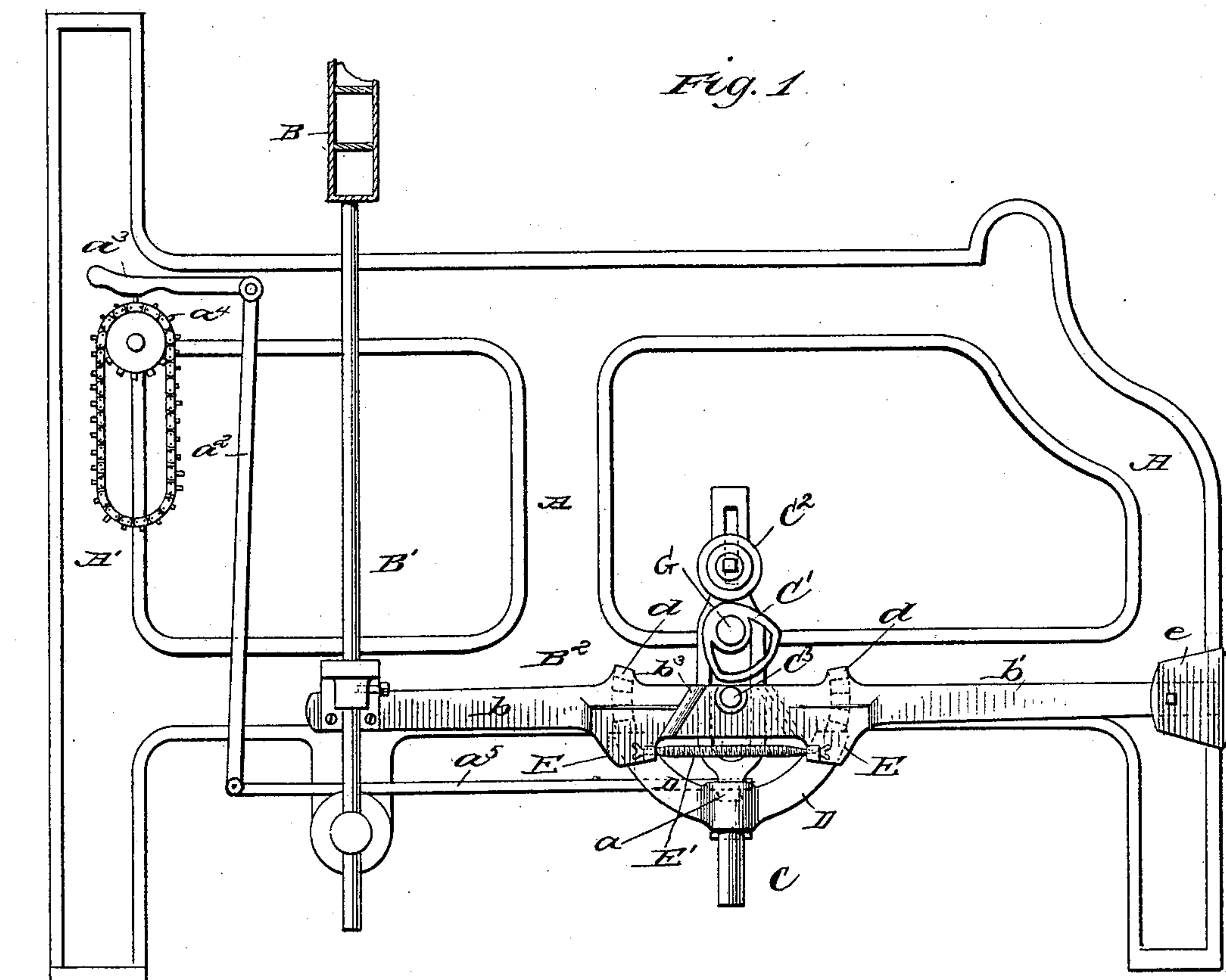
2 Sheets—Sheet 1.

J. A. EVANS.

SHUTTLE BOX OPERATING LEVER FOR LOOMS.

No. 405,022.

Patented June 11, 1889.



WITNESSES:

*W. R. Davis.*  
*C. Sedgwick*

INVENTOR:

*J. A. Evans*  
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ATTORNEYS.

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Fig. 3.

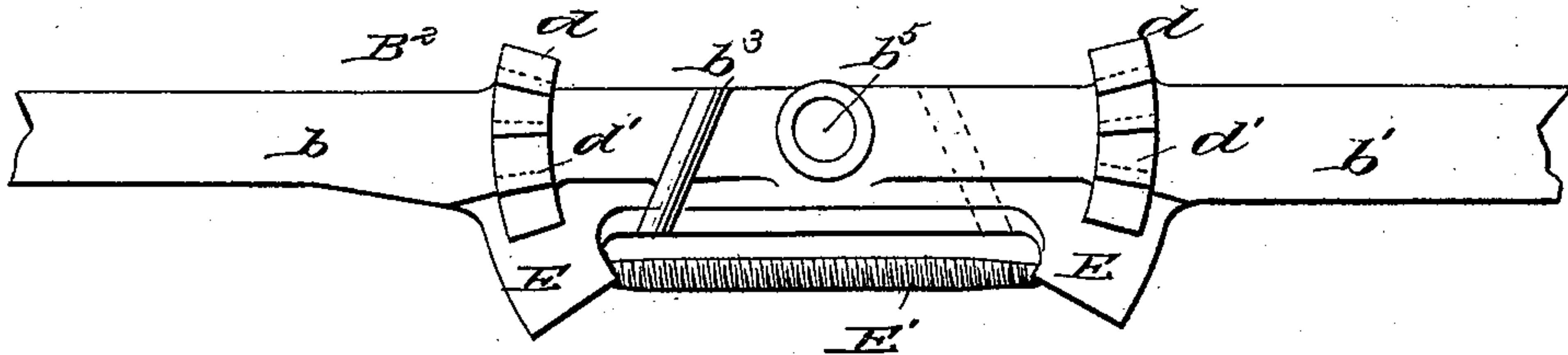


Fig. 4.

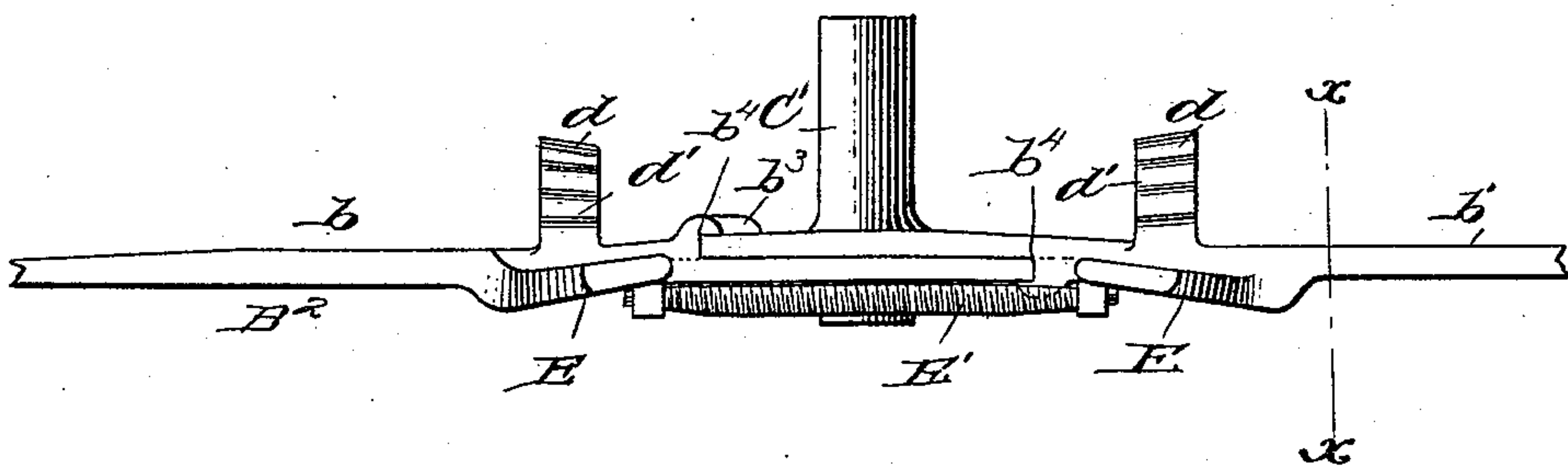


Fig. 5.

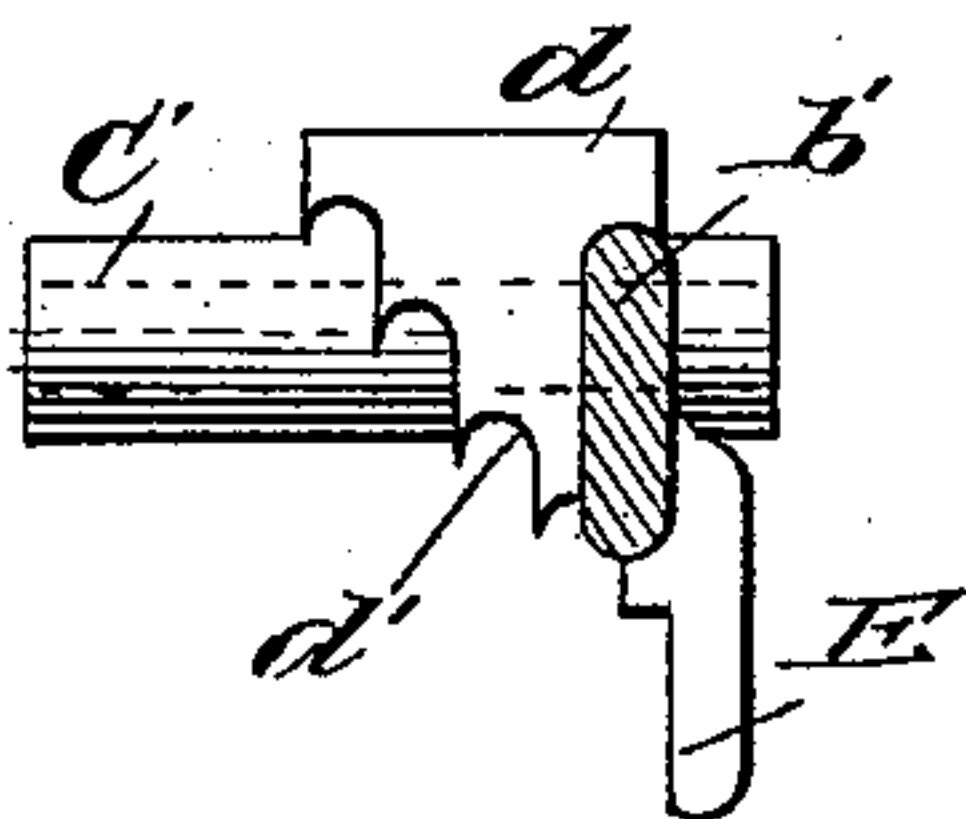
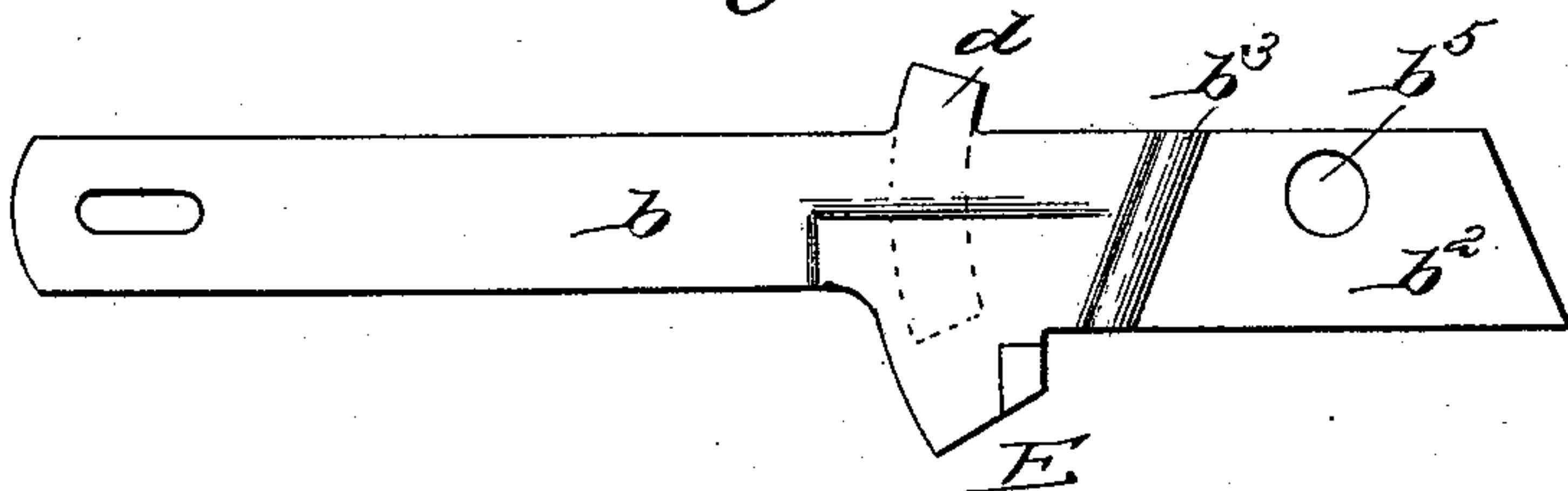


Fig. 6.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

JOSEPH A. EVANS, OF PHILADELPHIA, PENNSYLVANIA.

## SHUTTLE-BOX-OPERATING LEVER FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 405,022, dated June 11, 1889.

Application filed December 31, 1888. Serial No. 295,040. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH A. EVANS, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and Improved Shuttle-Box-Operating Lever for Looms, of which the following is a full, clear, and exact description.

My invention relates to an improvement in shuttle-box levers for drop-box looms, and has for its object to provide a yielding lever of simple and economical construction, which will admit of the loom being operated at a high speed in perfect safety, and wherein, should the lever be thrown up from any cause, instead of being lifted in the usual way, and pressure be brought to bear simultaneously on both sets of notches by the anchor-wings, the lever will yield at the center and counteract the unusual strain. The shuttle-box lever will be thrown up, as above stated, instead of being lifted in the usual way, by reason of the loom being stopped just one revolution before a skip-box lift is about to be made by the anchor, and then started again right on the said lift. Such action changes the lift of the anchor to a blow or throw on a notch of the lever, thus sending the lever up above or in advance of the anchor-wing engaged. It will thus be seen that the lever operating under such conditions is liable to be thrown past its normal destination or throw in its upward movement as it freely vibrates on its pivot. If the lever passes its normal upward throw and such movement was produced by the right-hand wing of the anchor, the shuttle-box would then drop too far down in less time than if the weighted end of the lever had been lifted in the usual way. Consequently the notches on the left-hand side of the lever in descending would meet the advancing left-hand wing of the anchor, and as the given time for the upward movement of the plunger would not be consumed the advancing left-hand wing of the anchor would catch the descending notches, and said left-hand wing by so catching would lift the lever back again, which would bring the right-hand notches in contact with the right-hand wing again, and thereby the lever would be brought to a position parallel with the frame of the loom and the anchor-wings would be both locked on both sets of notches. The plunger would

therefore be arrested in its upward movement, as before stated, and something would have to break, as the cam is bound to force its way under the plunger-ball; but under such circumstances with my improved lever the two sections will both yield simultaneously upward against the pressure of both anchor-wings and allow the cam to raise the plunger without breakage.

The invention consists in the construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the frame of the loom, illustrating the attachment of my improvement. Fig. 2 is a plan view. Fig. 3 is a rear view of the lever detached. Fig. 4 is a bottom plan view of the same. Fig. 5 is a transverse section on line *x x*, Fig. 4; and Fig. 6 is a front elevation of one section of the lever.

The prime object of the invention is to improve the box-lever of a power-loom adapted for weaving fancy fabrics by making said lever in two parts and jointing it to work as freely as a solid lever, yet yield at the center to permit both ends to go up, should the plunger be arrested in its upward movement, by reason of the anchor-wings becoming locked.

In carrying out the invention, A represents one side of the frame of a drop-box loom. B is the shuttle-box, B' the shuttle-box rod, and C is the plunger, operated by a cam C', and in the usual manner.

The plunger C is provided with a longitudinal slot in the upper end, in which a spindle is adjustably secured by a nut (not shown in the drawings) screwed on its inner end, engaging the inner face of the plunger, and upon said spindle a ball C<sup>2</sup> is held to revolve, adapted for contact with the cam C', which is secured to the projecting end of a counter-shaft G, said shaft being made to extend through a body-slot in the plunger. By adjusting the plunger-ball C<sup>2</sup> up or down the movement of the plunger is regulated. Upon the lower end of the plunger the anchor-wings D are held to freely vibrate, the said anchor-wings



being lifted by the said plunger. The hub of the anchor-wings is provided upon the inner side with a horizontal stud  $a$ , (shown in dotted lines, Fig. 2,) from which a pin is downwardly projected. The said pin is made to enter a slot in the inner end of the connecting-bar  $a^5$ , the outer end of which is connected to the lower end of an angle-lever  $a^2$ , pivoted at its angle to the upper portion of the loom-frame, as best shown in Fig. 1, the horizontal arm  $a^3$  of said lever being adapted for contact with the pins  $a^4$  of the pattern-chain  $A'$ .

The shuttle-box lever  $B^2$  is centrally pivoted upon a dead-spindle  $C^3$ , extending horizontally outward from the frame  $A$  through a longitudinal slot formed in the plunger.

The shuttle-box lever is constructed in two equal sections  $b$  and  $b'$ , and the inner end of each section is beveled from the top downward and outward, as illustrated at  $b^2$  in Fig. 6. In the front face of one section  $b$  and in the rear face of the other section  $b'$  a surface recess  $b^4$  is produced at the beveled end, the transverse wall of which recess is inclined in a direction opposite to the beveled end, as is also best illustrated in Figs 4 and 6. The said inclined wall of the recess is struck up and carried in direction of the transverse wall to form a lip  $b^3$ .

In uniting the sections of the lever  $B^2$  the recessed faces are brought in contact and the beveled ends in contact with the inclined wall of the recess  $b^4$  of the opposing section, as best illustrated in Figs. 3 and 4, in which position they are normally held by the overlapping lips  $b^3$ . Midway between the beveled end of the section and the inclined wall of the surface recess an aperture  $b^5$  is made, through which the dead-spindle  $C^3$  projects. Between the center of each lever-section and the beveled end a slightly-curved projection  $d$  is formed upon the inner face at a right angle to the axis, as best shown in Figs. 3, 4, and 5, and the inner inclined edge of the said projection is provided with stepped notches  $d'$ , the upper wall of which notches is preferably circular and the outer wall perpendicular, as best illustrated in Fig. 5. The notches  $d'$  are so arranged that the upper notch will be located at the inner end of the projection and the lower notch at the intersection with the body of the sections.

A vertical ear  $E$  is formed upon the lower edge of each lever-section, and a tension-spring  $E'$  is attached, respectively, to the approaching ears when the lever-sections are united. The outer end of the lever-section  $b$  is attached to the shuttle-box rod  $B'$ , and the equivalent end of the section  $b'$  is provided with a weight  $e$ , firmly secured thereto.

The spring  $E'$  is of sufficient tension only to prevent the jointed lever-sections from yielding upon the sudden starting of the loom in making a skip-box lift.

The weight of the shuttle-box upon the lever-section  $b$  is sufficient to keep the said section normally in alignment with the opposing

section, and the weight  $e$  serves the same purpose for the section  $b'$ . It will thus be observed that normally the two sections of the lever act as one straight lever.

The plunger, as represented in Fig. 1, is down. As the counter-shaft  $G$  revolves, which it does continuously while the loom is in operation, the cam is also revolved, and the swell of the cam passing under the plunger-ball raises the plunger, whereupon the ball rides upon the cam, the plunger being permitted to fall by gravity. The plunger and the attached anchor-wings are thus given an up-and-down movement with every revolution of the shaft independent of the connections with the pattern-chain.

In illustrating the operation of a loom with my attachment, if the loom is provided, for instance, with four shuttle-boxes, numbered from the top 1, 2, 3, and 4, the studs or pins in the pattern-chain are made in three sizes. If it is desired to use a color in the first box, a blank space in the chain must be brought under the horizontal arm  $a^3$ , as the plain chain represents the first box. If a color in the second box is needed, the smallest-sized stud is secured in the next link of the chain. The chain is thus built with different-sized studs here and there, according to the different colors required to make up the pattern of the cloth.

The stud under the lever in Fig. 1 is the smallest-sized stud corresponding to the second shuttle-box. When the said stud is brought up to engagement with the horizontal arm  $a^3$ , that arm is raised and consequently the body of the angled lever is moved forward to the left. The angled lever thus moved will draw upon the anchor-wings and the said anchor will be revolved a distance corresponding to the height of the chain-stud under the arm  $a^3$ . This move of the anchor-wings will place the left-hand wing directly under the second notch  $d'$  of the main lever projection  $d$ , (counting downward,) so that when the plunger comes up the said left-hand wing will catch on the said notch, and thereby raise the shuttle-box up one box, bringing the second box in proper position. If the next link of the pattern-chain is not provided with a stud, the chain-lever will drop the exact distance it was raised, and the anchor-wings will be revolved back again, so that the right-hand wing will be under the fourth notch of the right-hand lever projection, and the said wing engaging said notch when the plunger comes up and raises the weight  $e$ , causing the shuttle-boxes to lower one box. The weight  $e$  is now up to its full height and the shuttle-boxes down to their lowest pitch.

It will be readily observed by reference to Fig. 5 that each notch upon the projections  $d$  is stepped from the bottom outward. Counting the said notches upward, the distance of the extension of each notch corresponds to the size of the respective operating-stud upon the pattern-chain.



Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the anchor and shuttle-boxes of a drop-box loom, of the shuttle-box lever constructed in two sections centrally united to swing simultaneously upward by a yielding connection, substantially as set forth.

2. The combination, with the anchor and shuttle-boxes of a drop-box loom, of the shuttle-box lever above the anchor and constructed in two sections pivoted together on a fixed pivot projecting from the loom-frame to swing upward simultaneously when both sections are struck at the same time by said anchor, and operating as a single part when one section at a time is struck, substantially as set forth.

3. The combination, with the anchor and shuttle-boxes of a drop-box loom, of a shuttle-box lever constructed in two sections pivoted together and to the loom-frame by a single pivot or stud projecting from said frame above the anchor to permit of their simultaneous vertical movement, and a spring connecting the two sections below and at opposite sides of their pivotal point, substantially as set forth.

4. The combination, with the anchor and shuttle-boxes of a drop-box loom, of the shuttle-box lever constructed in two sections overlapped at their inner ends, provided with aligning apertures in said ends, and each having a series of stepped notches for the anchor to engage, a fixed pivot or stud projecting from the loom-frame through said apertures in the overlapped ends of the lever-sections to permit them to swing simultaneously upward, each section having a projection or lip engaging the inner end of the opposite section to hold the two sections in horizontal alignment, and a spring connecting the two sections below and

at opposite sides of the pivot, substantially as set forth.

5. The combination, with the anchor and shuttle-box of a drop-box loom, of a shuttle-box lever consisting of two sections having beveled inner ends, a surface recess upon the inner face of one section and the outer face of the other, which recesses are provided with an inclined transverse wall, a lip formed upon each section projecting over the recess, a spring adapted for attachment to the several sections, and a projection integral with each section having notches stepped therein, substantially as shown and described.

6. In a drop-box loom, a shuttle-box lever constructed in two sections overlapped at their inner ends, a pivot uniting said overlapped ends and adapted to be connected to a loom-frame, the two sections each having a projection engaged by the end of the opposite section when the two sections are in alignment and permitting the upward swing of both sections on the pivot, and a spring uniting the two sections below the pivot and holding them normally in line with each other to operate as a single part, substantially as set forth.

7. In a drop-box loom, a shuttle-box lever consisting in the two sections *bb'*, overlapped at their inner inclined ends and provided with pivot-apertures *b<sup>5</sup>*, stepped projections *dd* on their inner sides, inclined surface recesses *b<sup>4</sup>* on the outer faces of each section for the inclined end of the opposite section to engage, and projections *E*, the spring *E'*, secured at its ends to said projections, and the weight *e* on the section *b'*.

JOSEPH A. EVANS.

Witnesses:

FRANK P. BEAL,  
WILLIAM MCQUAID.