

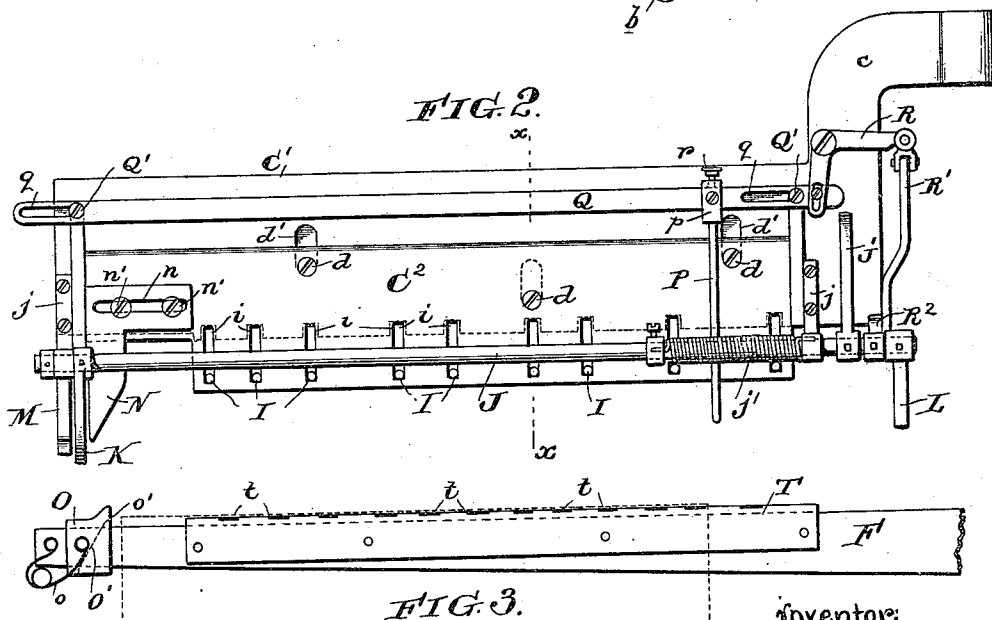
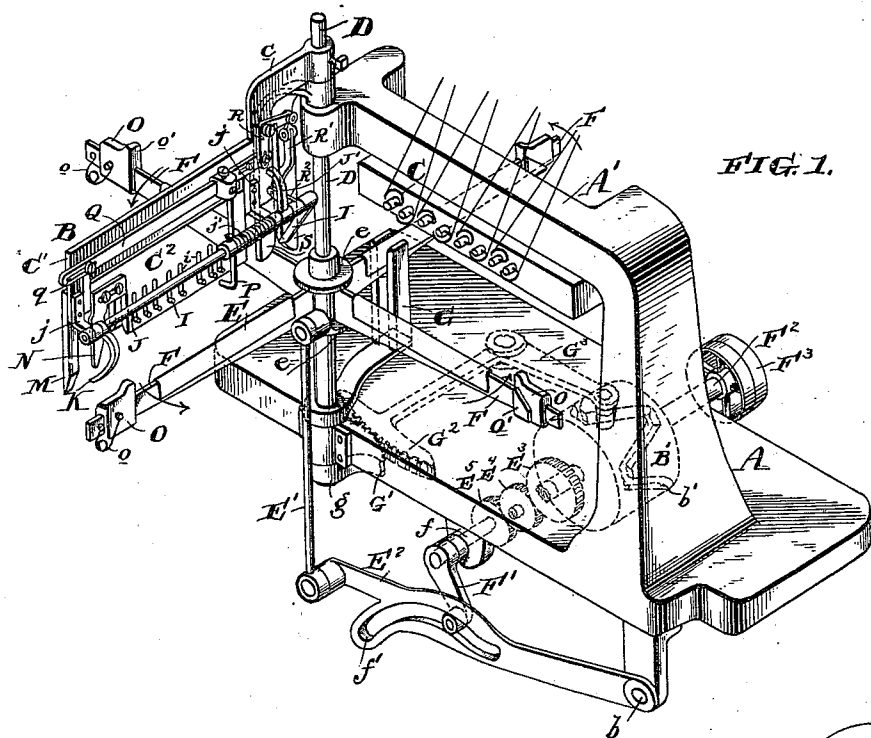
(No Model.)

2 Sheets—Sheet 1.

J. W. CLARK.
BOOKBINDING MACHINE.

No. 472,011.

Patented Mar. 29, 1892.



Witnesses:
Henry Dury
S. G. Yerkes.

Inventor:
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By Wm. A. [unclear]
Wm. A. [unclear]

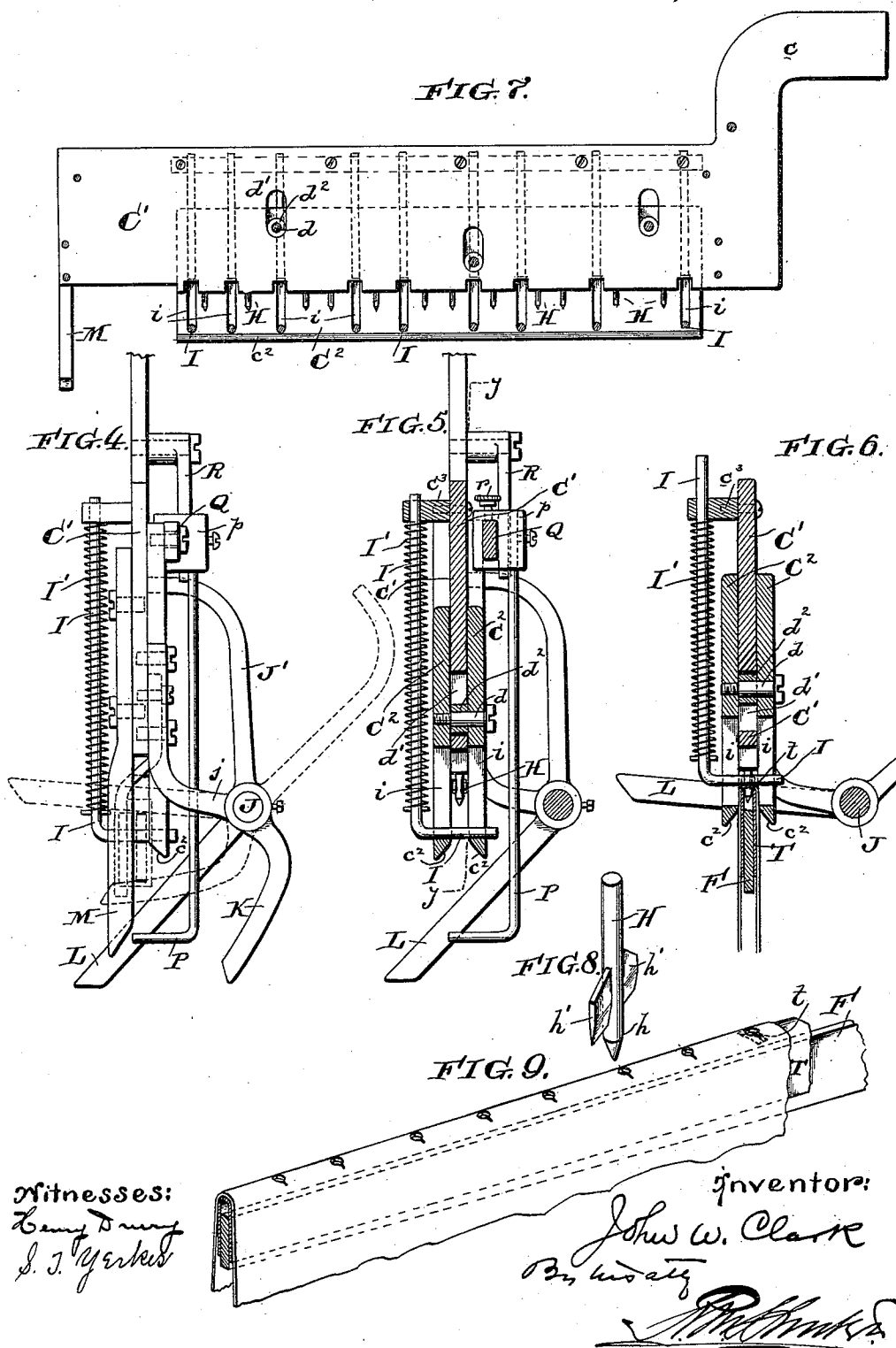
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

JOHN WALKER CLARK, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF
ONE-HALF TO MIFFLIN J. BAKER, OF SAME PLACE.

BOOK-BINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 472,011, dated March 29, 1892.

Application filed January 25, 1892. Serial No. 419,107. (No model.)

To all whom it may concern:

Be it known that I, JOHN WALKER CLARK, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Book-Binding Machines, of which the following is a specification.

My invention relates to book-binding machines; and it consists of certain improvements which are fully set forth in the following specification and are shown in the accompanying drawings, which form a part thereof.

More particularly my invention relates to the signature holding and punching devices, and is designed for punching the folded signature before it is operated upon by the needles.

In punching the needle-holes great nicety of adjustment is required in order that the holes may be in exact position to receive the needles, and my invention is designed to perform this punching operation with precision, accuracy, and rapidity.

My invention is not concerned with the construction and operation of the sewing devices, which may be of any convenient and well-known construction, but relates solely to the devices for preparing the signature to be operated upon by the needles.

In carrying out my invention I employ a movable signature-holding arm with stationary punches, together with devices for guiding and centering the signature with reference to the punches when it is raised into contact therewith.

My invention relates to certain novelties of construction, arrangement, and combination of parts which are hereinafter more fully disclosed and claimed.

In the drawings, Figure 1 is a perspective view of a book-binding machine embodying my invention. Fig. 2 is a front elevation of the punch-holding device. Fig. 3 is a similar view of the signature-holding arm. Fig. 4 is an end elevation of the punch-holding devices. Fig. 5 is a vertical sectional view of the same on the line *xx* of Fig. 2 on an enlarged scale. Fig. 6 is a similar view with some of the parts omitted, showing the punches in the act of perforating the signature. Fig. 7 is a longitudinal vertical sectional view on the line *yy* of Fig. 5 on a reduced scale. Fig.

8 is a perspective view of one of the punches, and Fig. 9 is a perspective view of the signature-holding arm and punched signature.

A is the frame of the machine. A' is an arm thereof, on which are supported the punch-holding and signature-guiding devices B.

C are the sewing devices carried by the arm A'.

D is an upright shaft supported on the frame A and arm A'.

The punch-holding devices B' are preferably supported on the arm A' by means of an extension *c*, journaled upon the end of the shaft D and fastened thereto by a set-screw *a*. By this means the punch-holding devices may be readily moved to one side or removed from the machine when desired.

E is a collar loosely journaled upon the shaft D and free to reciprocate thereon. This collar E carries the signature-holding arms F between disks *e e*. There are preferably four signature-holding arms, so arranged that while one is in line with the punching devices B another is in line with the sewing device C. The collar E, with the arms F, may be reciprocated or raised and lowered by any convenient mechanism. I prefer to employ a connecting-rod E', connected at one end with the collar E and at the other end with a lever E², pivoted to the main frame, as at *b*. This lever E² is reciprocated by means of a crank F', carried by a shaft *f* and working in a curved slot *f'* of the lever E². The shaft *f* is rotated from the main shaft F² through gears E³ E⁴ E⁵.

F³ is the belt-wheel for driving the shaft F². By this mechanism it will be seen that the collar D and arms F will be intermittently raised and lowered upon the shaft D.

G is a jaw carried by an extension-sleeve *g*, journaled upon the shaft D.

G' is a toothed segment fixed to the sleeve *g* and gearing with a toothed segment G² upon the end of a bell-crank G³, journaled to the main frame A.

B' is a drum upon the shaft F², having a cam-groove *b'*, in which a roller upon one end of the bell-crank G³ works. The rotation of the drum B' will rock the bell-crank G³ and, through the segments G' and G², will rock the sleeve *g* and its jaw G. The jaw is located

under the arms F, and when the arms are in their lowest position one of the arms will fit within the jaw G, as shown in Fig. 1. When the arms F are thus lowered and the sleeve *g* and its jaw G are rocked, as heretofore described, the arms and their collar E will be rotated a corresponding distance, so as to move one arm F from under the punching devices B to a position under the sewing devices C, while another arm F is moved under the punching devices. When the arms F are raised through the lever E², as heretofore described, the arm F, previously held by the jaw G, will be rocked back to its normal position to receive the next arm F when the arms are again lowered.

The punching devices C consist of an intermediate piece C', which carries the extension *c*, and therefore has a fixed relation, and the two outer movable parts C² C², which are connected together by bolts or screws *d*, extending through vertical slots *d'* in the piece C'. The outer pieces C² C² may thus move vertically upon the piece C'. I prefer to provide the bolts *d* with anti-friction rollers *d*², working in the bolts *d*. The lower ends of the pieces C² C² extend a distance below the edge of the intermediate piece C' and are preferably beveled, as shown at *c*².

H are a series of punches carried by the intermediate piece C' and projecting beyond the lower edge thereof. These punches are preferably formed with the perforating-point *h* and the cutting-wings *h'* *h'*.

I are fingers projecting through vertical slots *i* in the plates C² C² and normally depressed by springs I'. The upper ends of the fingers I may move through lugs *c*³ of the stationary plate C'.

J is a rock-shaft journaled longitudinally in small brackets *j* upon the piece *c'* and maintained in normal position by a spring *j'*.

J' is a stop carried by the shaft J and adapted to rest against the piece C' to maintain the shaft J in position against the action of the spring.

K is a curved depending arm carried by the shaft J and adapted when the shaft J is rocked to be moved under the lifted arm F.

L is a downwardly-inclined arm carried by the rock-shaft J and arranged in the path of the arms F when the same are raised.

M is a depending cam-piece on the end of the piece C', adapted to act upon the end of an arm F to guide it between the beveled edges *c*² of the punching devices B.

N is a depending arm-piece carried by one of the pieces C² and adjustable longitudinally thereon by the slot *n* and screws *n'*.

O is a movable piece upon the outer end of each arm F, retracted by a spring *o* and having an edge *o'* adapted to act upon the outer edge of the signature and adjust it longitudinally upon this movable piece O in an inclined cam-face O', which is acted upon by the depending cam-piece N when the arm is raised and moved longitudinally thereby.

P is a depending finger carried by the bar Q upon the punching devices B and extending below the lower edge thereof, adapted to act upon the inner edge of the signature when carried by the arm F. The bar Q is movable longitudinally on the pins Q' in the slots *q*, and is reciprocated by the bell-crank lever R through the connection R' with the crank R², carried by the rock-shaft J and moving with it, so that upon each movement of the rock-shaft J through the action of the ascending arm F upon the inclined arm L the bar Q is reciprocated so as to move the finger P away from the edge of the signature.

Immediately previous to the punching operation the signature is adjusted longitudinally in the arm F by the piece O, as has been heretofore described; but after the signature has been punched and the arm F commences to descend the finger P moves back and acts upon the edge of the signature to move it longitudinally upon the arm F, so that it will be brought adjacent to the movable piece O, (which has meanwhile been retracted by its spring *o*), so as to be again acted upon by the piece O when the arm F ascends to the sewing devices by a similar cam action upon the piece O at the sewing devices.

As the construction of the sewing devices is not a part of my invention this construction is not shown.

The finger P may be adjusted upon the bar Q to suit different sizes of signatures by means of a slide *p* and set-screw *r*.

S, Fig. 1, are guides projecting down from the arm A', between which one of the arms F is guided while the arm in advance is being raised to the punching devices. This insures that arm being brought in proper line with the punching devices, so that its end will properly strike the cam M and be guided between the pieces C² C². The arms F may be provided with a metal piece T to support the folded edge of the signature projecting beyond the arm and provided with recesses or slots *t* to admit the punches H.

In the operation of the apparatus the folded signatures are placed upon the arm F, and the jaw G rotates, as heretofore described, bringing one of the arms with its folded signature under the punching devices and the next arm immediately below the guides S S. The collar *g* is then lifted, and the arm F is carried up into the punching devices, being guided between the parts C² C², as heretofore described. Through the action of the cam-piece N and movable piece O the signature is properly centered upon the arm, and as it rises it passes between the beveled edges *c*² *c*² of the parts C² C², and is carried positively up against the punches H, carrying with it the parts C² C² and the finger I, which rest upon the folded edges of the signature adjacent to the punches. The folded edge is thus forced up against the stationary punches, which pass through the paper into the recesses or slot *t*.

During this operation the finger P has been moved away from the inner edge of the signature, as heretofore described. While the arm F is being raised, the arm K is moved under the outer edge of the arm F, as is shown in dotted lines in Fig. 4, and acts to lift and support the outer end of the arm. After the folded edge of the signature has been punched, the arms begin to descend, the arm K moving back, and the fingers I, pressing upon the edge of the signature adjacent to the punches H, readily free the paper from the punches and prevent tearing. As the arm continues to descend, the finger P moves forward against the edge of the signature and moves it longitudinally upon the arm toward the movable piece O, so as to be in a position to be acted upon thereby when the piece O is again moved forward, as described. Meanwhile the jaw G has been restored to its normal position, and when the collar *g* reaches its lower position the succeeding arm to the one previously acted upon enters the jaw and the collar *g* and arms F are rotated, as before. This brings the arm with the signature just punched under the sewing devices C and a new arm under the punching devices, and when the collar *g* is again lifted the previously-punched signature is operated upon by the sewing devices while a new signature is punched, as before. The next rotation brings the punched and sewed signature from the sewing devices, when it is removed and an unpunched signature is substituted.

While I prefer the details of construction shown, it is apparent that they may be modified in many ways and are therefore not to be taken as limitations of my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. A signature-perforating device for book-binding machines, consisting of a series of stationary punches and movable guiding and centering plates arranged on each side of the punches to receive the signature between them.

2. A signature-perforating device for book-binding machines, consisting of the intermediate stationary plate C', carrying the punches H, fixed with relation thereto, and the outer movable plates C² C², between which the signature is received.

3. A signature-perforating device for book-binding machines, consisting of a series of stationary punches, movable plates C² C², arranged on each side of the punches, and movable fingers I, extending transversely between said plates.

4. A signature-perforating device for book-binding machines, consisting of the stationary intermediate plate C', carrying the punches H, fixed with reference thereto, the outer movable plates C² C², connected together and movable upon the stationary plate and provided with slots *i i*, and the movable fingers I, extending transversely through the slots *i i*.

5. In a book-binding machine, the combination of a rotary and vertically-movable sig-

nature-supporting arm with a series of stationary punches located above said arm, whereby the arm may be rotated to a position under the punches and may then be raised to force the folded edge of the signature positively upon the punches.

6. In a book-binding machine, the combination of a rotary and vertically-movable signature-supporting arm with a series of stationary punches located above said arm and a guide to guide and center the arm when lifted to the punches.

7. In a book-binding machine, the combination of a frame carrying a series of punches, a vertically-movable signature-supporting arm adapted to be raised to said punches, a movable signature-adjusting piece carried by the arm, and a cam-piece upon the frame, adapted to operate said signature-adjusting piece.

8. In a book-binding machine, the combination, with a punch-carrying frame, of a vertically-movable signature-holding arm adapted to be raised to the punch-carrying frame, a movable signature-adjusting piece carried by one end of the arm, a cam carried by the frame to operate said signature-adjusting piece, a depending signature-adjusting finger carried by the other end of the frame, a cam-arm carried by the frame and adapted to be operated by the signature-holding arm when raised, and connections between said cam-arm and adjusting-finger to operate it.

9. In a book-binding machine, the combination of a punch-carrying frame carrying the cam-piece N, a vertically-movable signature-supporting arm F, a movable spring-retracted signature-adjusting piece O upon one end of the arm, having a cam-face *o*, adapted to be operated upon by the cam-piece N when the arm F is raised.

10. In a book-binding machine, the combination of a punch-carrying frame, the rock-shaft J, carried thereby, having the cam-arm L and the supporting-arm K, and a vertically-movable signature-supporting arm adapted when it is raised to operate the cam-arm L and move the supporting-arm K under the raised signature-supporting arm.

11. In a book-binding machine, the signature-supporting arm F, provided with a longitudinal supporting-piece T, having a series of transverse slots or openings *t*.

12. In a book-binding machine, the combination of a series of stationary punches, sewing devices arranged at an angle with reference thereto, a shaft, a series of signature-supporting arms loosely journaled upon said shaft, and power devices to intermittently rotate said arms and raise and lower them, whereby while one arm is raised to the stationary punches another is raised to the sewing devices.

13. In a book-binding machine, the combination of a series of stationary punches, sewing devices arranged at an angle with refer-

ence thereto, a shaft, a series of signature-supporting arms loosely journaled upon said shaft, a guide to guide the arms in their vertical movements, and power devices to intermittently rotate said arms and raise and lower them, whereby while one arm is raised to the stationary punches another is raised to the sewing devices.

14. A signature-perforating device for book-binding machines, consisting of the intermediate slotted plate C', having a series of punches H, and the outer plates C² C², united together through the slots of the plate C' and movable upon the plate C'.

15. A signature-perforating device for book-binding machines, consisting of the interme-

diated slotted plate C', having a series of punches H, the outer plates C² C², united together through the slots of the plate C' and movable upon the plate C', and a series of movable fingers located adjacent to the punches H and between the plates C² C².

16. A punch for book-binding, consisting of the body H, having the point h and the lateral wings h'.

In testimony of which invention I have hereunto set my hand.

J. WALKER CLARK.

Witnesses:

ERNEST HOWARD HUNTER,
S. T. YERKES.