(No Model.)

2 Sheets—Sheet 1.

# J. W. CLARK.

## BOOK SIGNATURE PERFORATOR.

No. 547,420. Patented Oct. 8, 1895.

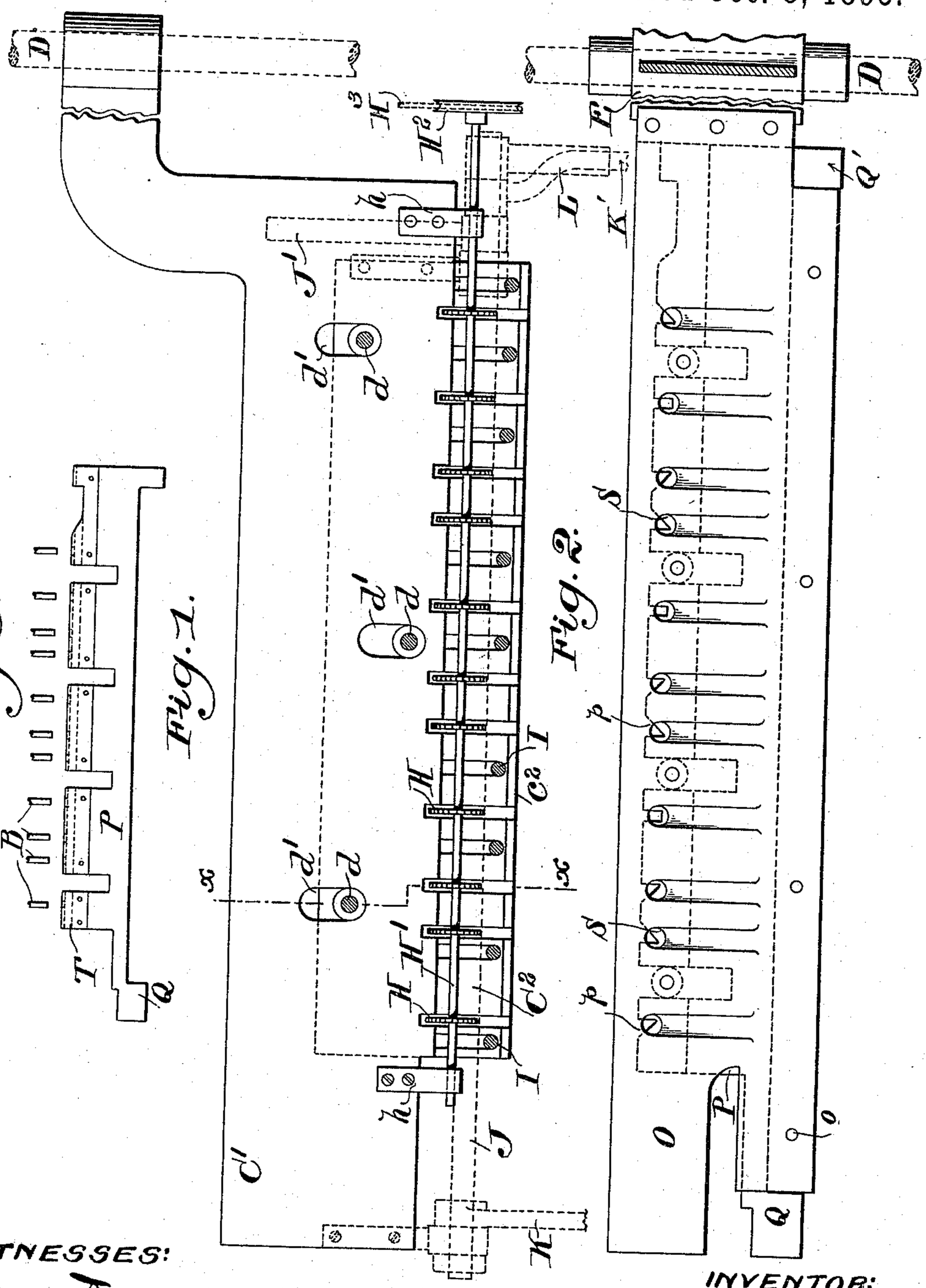


Fig. 1.




Fig. 3.

Fig. 2.

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Attorney

(No Model.) 2 Sheets—Sheet 2.

# J. W. CLARK.

## BOOK SIGNATURE PERFORATOR.

No. 547,420. Patented Oct. 8, 1895.

Fig. 4.

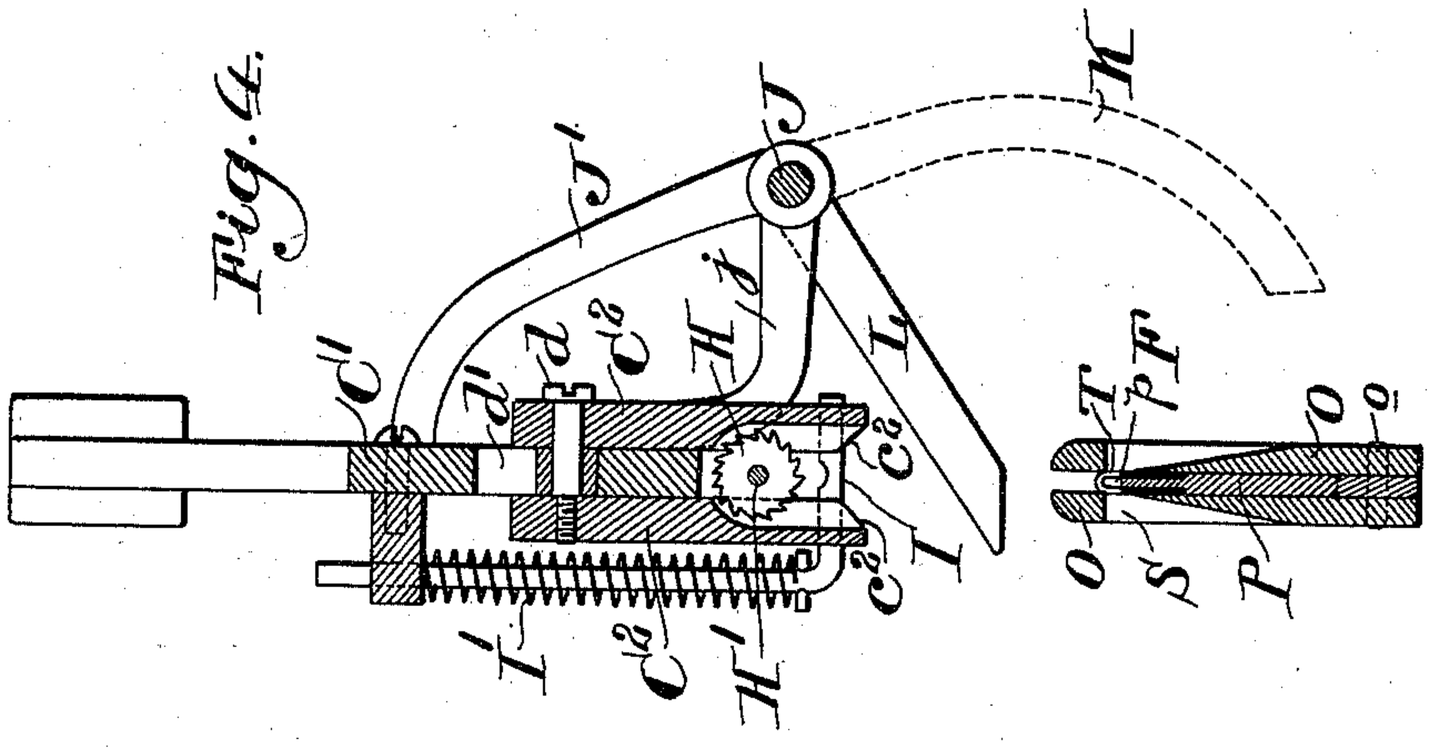



Fig. 5.

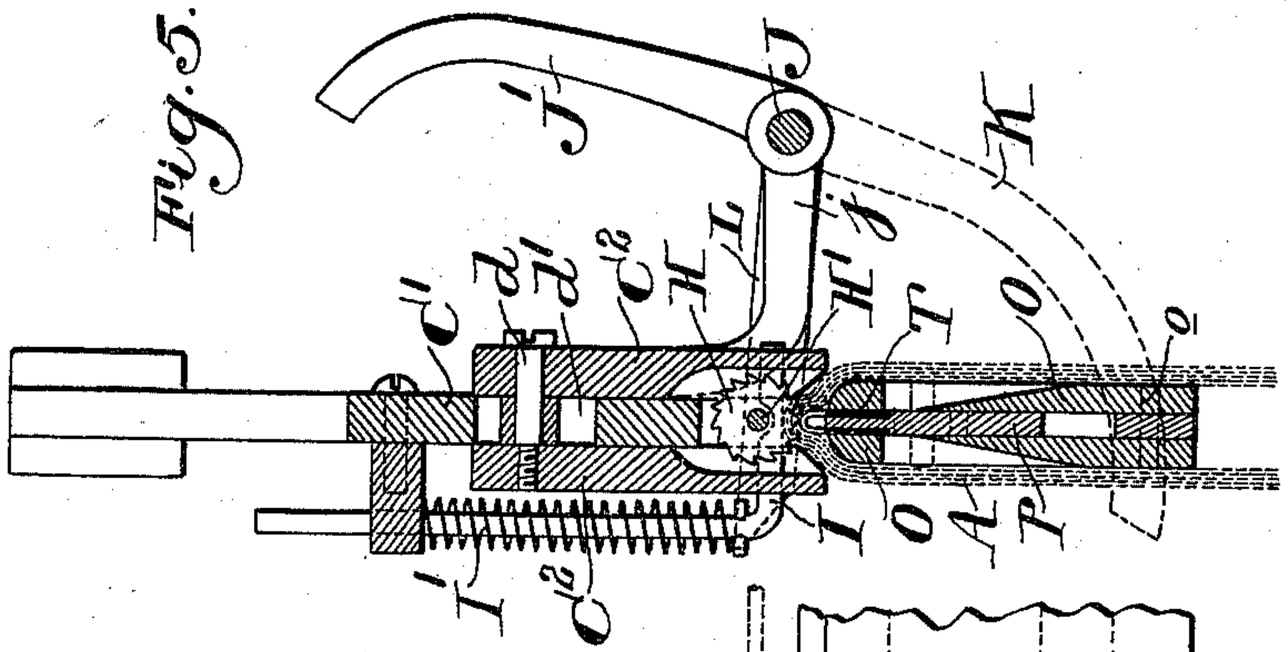
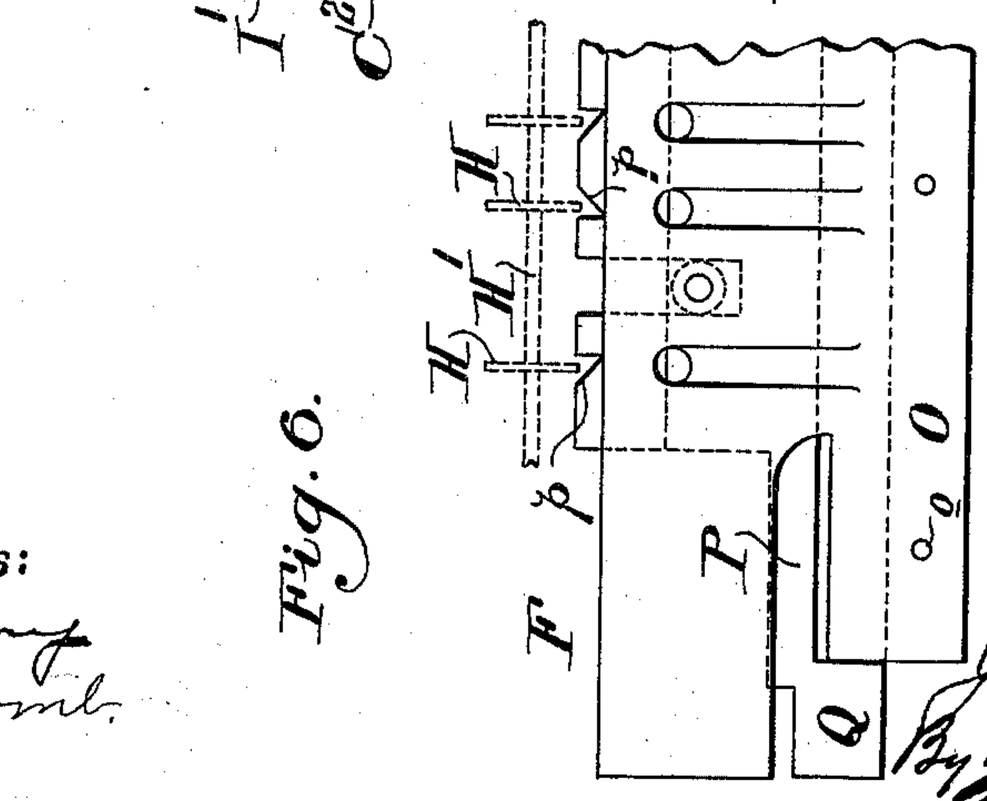



Fig. 6.

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# UNITED STATES PATENT OFFICE.

JOHN WALKER CLARK, OF PHILADELPHIA, PENNSYLVANIA.

## BOOK-SIGNATURE PERFORATOR.

SPECIFICATION forming part of Letters Patent No. 547,420, dated October 8, 1895.

Application filed December 20, 1894. Serial No. 532,436. (No model.)

*To all whom it may concern:*

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

A part of my improvements relates to the employment of cutters for the purpose of perforating the signature when it is brought in contact with them. Heretofore punches have been employed which have been brought in contact with the signature upon its supporting-arm, and in Letters Patent No. 472,011, granted to me on the 29th of March, 1892, I have shown a construction employing stationary punches with a movable signature-supporting arm which is lifted to the punches. In the present invention I propose to use rotating or moving cutters, which may be either carried by a stationary frame, to which a movable signature-supporting arm is raised, or upon a movable frame moved to a stationary signature-supporting arm.

My invention also relates to improvements in the signature-supporting arm whereby a more clean puncture or cut may be obtained and the clogging of the recesses or dies with particles of paper may be avoided.

In the drawings, Figure 1 is a front elevation of a cutter-frame having the front plate removed. Fig. 2 is a front elevation of a signature-supporting arm embodying my improvements in the construction thereof. Fig. 3 is a front elevation, on a reduced scale, of part of the signature-supporting arm, illustrating a modification thereof. Fig. 4 is a vertical sectional view on a line corresponding with the line $x\,x$ of Figs. 1 and 2 of a cutter-frame and signature-supporting arm, illustrating my improvements. Fig. 5 is a similar view showing the signature-arm raised to the cutter-frame; and Fig. 6 is a front elevation of a portion of the signature-arm, illustrating the position thereof while the cutters are operating.

The particular construction of the cutter-supporting frame is not material to my invention. I prefer, however, to employ the construction shown, in which the frame consists of the intermediate plate C′ and the two outer removable plates $C^2$ and $C^2$, connected together, through the slots $d'$ in the plate C′, by pins $d$. The plates $C^2$ are thus separated slightly and are movable up and down upon the plate C′. The lower edges of the plate $C^2$, which, when in the lowest position, extend beyond the lower edge of the plate C′, are adapted to receive the fold of the signature between them. These edges may be beveled, as shown at $c^2$. Movable fingers I, projecting through slots in the plates $C^2$ and normally depressed by springs I′, may be employed to press upon the fold of the signature and free it from the cutters or perforating devices after it has been operated upon. F is the signature-supporting arm which carries the signature A when it is acted upon by the perforating or cutting devices. These parts are fully described in my Letters Patent No. 472,011, previously mentioned, to which reference may be had for further details. In that patent the perforating-frame is shown provided with punches adapted to act upon the fold of the signature when it is lifted by the signature-arm.

I shall first describe that part of my invention which relates to the perforating devices. Instead of the punches fixed in the punch-frame, I employ movable cutters adapted to act upon the folded edge of the signature when brought in contact therewith. In the drawings I have shown these cutters as a series of serrated disks H, carried upon a shaft H′, extending between the plates $C^2$ and under the edge of the plate C′. The shaft H′ is shown journaled in suitable bearings $h$, carried by the frame C′. The shaft H′ may be rotated in any convenient manner, as by the band-wheel $H^2$ and band $H^3$ from shafting. So far as this part of my invention is concerned, it is immaterial whether the arm which carries the cutter is stationary and the signature-supporting arm movable, as in my patent, No. 472,011, or whether the signature-supporting arm is stationary and the cutter-frame movable, as the invention resides in the employment of movable cutters, which act upon the paper with a cutting action, in lieu of punches, which are forced through the paper either by pressing the punches upon the signature or vice versa. The action of punches forces the edge of the paper about the perforation inward, and this tends to make a lump on the inside of the signature-fold adjacent

to each puncture. By employing movable cutters which act upon the edge of the paper with a cutting action a clean cut or opening may be formed for the needles. While it is preferable to cut out and entirely remove a small portion of the paper, so as to expose a clean hole or perforation for the passage of the needles, that is not absolutely necessary, and a simple slit or cut may be formed, if desired. I therefore do not mean to limit my invention to that particular form of cutters shown, nor to the special means for operating them. Any other form of movable cutters may be employed, with suitable means to operate them, to act upon the folded edge of the signature with a cutting action, as distinguished from the punching operation now employed.

Another part of my invention relates to improvements in the construction of the signature-supporting arm, designed to assist the perforating or cutting devices in the formation of a clean opening for the needles.

My improved signature-supporting arm consists of two parts, movable with reference to one another, one of the parts being adapted to be moved up to support the inner edge of the signature-fold while the needle-holes are being formed. My preferred method of constructing this improved signature-supporting arm is as follows:

O is the outer portion of the arm, consisting of two plates united together, as by pins or screws *o*.

P is an intermediate plate located between the outer plates O and having freedom of movement between them. Normally the upper edge of the intermediate plate P, which may be provided with suitably-located notches or die-recesses *p* to receive the cutters or punches, is below the upper edges of the plates O, as shown in Fig. 4. The inner end of the signature-arm F is supported, and when a movable arm is employed may be moved in any suitable manner, as by a collar E, loosely journaled on a shaft D, and by means of suitable devices the collar E, with the signature-arms, may be raised and lowered to bring each arm F in succession to the puncturing-frame. When an arm F is thus lifted, the movable plate P is raised, so that its upper edge projects slightly above the upper edge of the plate O, as shown in Figs. 5 and 6. It then braces the fold of the signature on the inner side and firmly supports it while the puncturing devices are operating.

For the purpose of elevating the plate P when the signature-arm is raised I prefer to employ the curved depending-arms K K′, carried by the ends of a rock-shaft J, which is journaled in suitable bearings *j*, carried by the puncturing-frame. These arms K K′ are adapted, when the signature-arm F is lifted, to pass under the outer end of the signature-arm and strike the ends or projections Q Q′ of the movable plate P in the manner shown. When the arms K K′ are rocked, their outer ends are pressed against the projections Q Q′ of the plate P and thus force the plate upward in the manner described.

The arm K may be operated in the manner described in Letters Patent No. 472,011, heretofore referred to, by means of an arm L, carried by the rock-shaft J and arranged in the path of the rising signature-arm F, so as to be struck and moved thereby. By this movement of the arm L the shaft J will be rocked and the arms K K′ will be moved into contact with the ends Q Q′ of the plate P. J′ is a stop-arm carried by the rock-shaft J and adapted to strike the face of the frame $C^2$ to limit the movement of the arms K and L.

So far as my improved signature-supporting arm having the movable supporting or bracing plate is concerned, it is manifestly immaterial whether my improved movable cutters for perforating the sheet be employed or the old fixed punches, and in Fig. 3 I have shown my improved signature-arm used with punches B. The upper edge of the movable plate P is preferably formed of an attached U-shaped metal strip T.

To prevent particles of detached paper produced by the puncturing or cutting operations becoming lodged in the die recesses or spaces between the movable plate P and the plate O, I prefer to form the latter with openings S, located adjacent to the recesses or notches in the plate P. Such particles of paper as may be carried down in the notches or recesses *p* may thus pass out through the openings S.

So far as my improvements in the construction of the signature-supporting arm are concerned, it is not necessary that they be employed in a movable arm with a stationary cutter-frame.

I do not limit myself to the minor details of construction shown, as it is apparent that they may be varied without departing from my invention.

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

1. A signature perforating device for bookbinding machinery, consisting of a frame having two parallel plates, between which the fold of the signature is received, and a series of movable cutters located between said plates and adapted to act upon the signature fold with a cutting action.

2. A signature perforating device for bookbinding machinery, consisting of a frame having two parallel plates, between which the fold of the signature is received, a longitudinal shaft journaled between said plates, and a series of cutters carried by said shaft.

3. A signature supporting arm for bookbinding machinery, composed of two relatively movable parts, and means to move one part relatively to the other to project its edge beyond the edge of the other part, for the purpose of bracing the inside of the fold of the signature.

4. A signature supporting arm for book-

binding machinery, provided with a movable bracing piece adapted to be projected beyond the supporting edge of the arm for the purpose of bracing the inner edge of the folded signature.

5. A signature supporting arm for book-binding machinery, consisting of the body portion O, and the movable bracing piece P, the piece P normally having its edge below the edge of the body portion O.

6. A signature supporting arm for book-binding machinery, consisting of a body portion O provided with apertures S in the sides, and the movable bracing pieces P having notches or recesses *p* in its upper edge adjacent to the apertures S in the portion O.

7. The signature supporting arm for book-binding machinery consisting of two outer plates adapted to support the folded signature upon their upper edges, and an intermediate bracing piece adapted to be projected beyond the supporting edges of the two outer plates.

8. In a book-binding machine, the combination with a signature perforating arm, of a movable signature supporting arm provided with an independently movable signature bracing piece, and actuating devices controlled by the movable signature supporting arm for operating upon the independently movable bracing piece thereof and lifting it when the signature supporting arm is raised to the perforating arm.

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

J. WALKER CLARK.

Witnesses:
ERNEST HOWARD HUNTER,
C. H. NEWCOMB.