

C. B. ALEXANDER.
PAPER PUNCH.
APPLICATION FILED JULY 27, 1912.

1,170,133.

Patented Feb. 1, 1916.

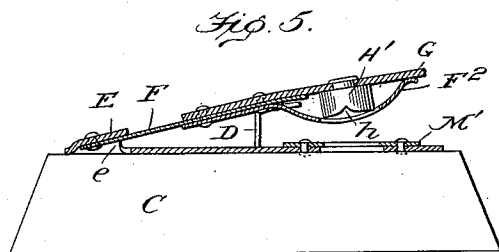
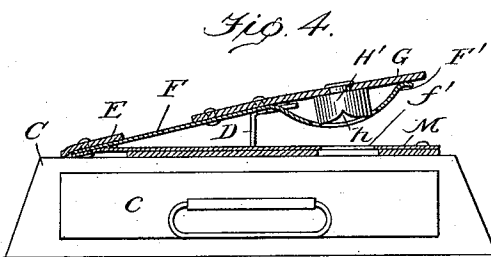
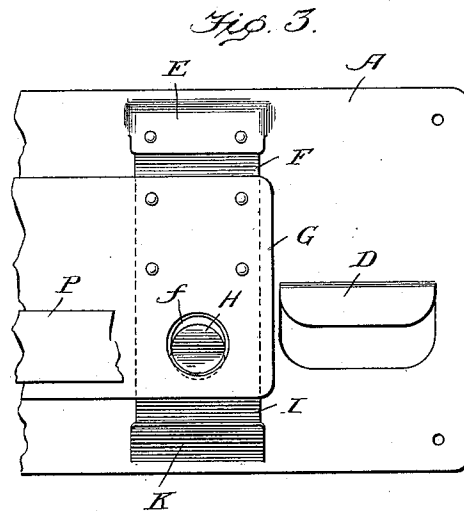
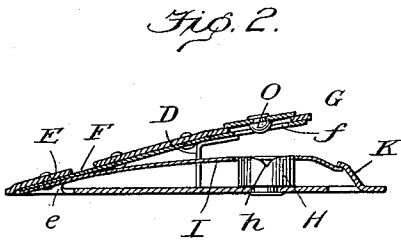
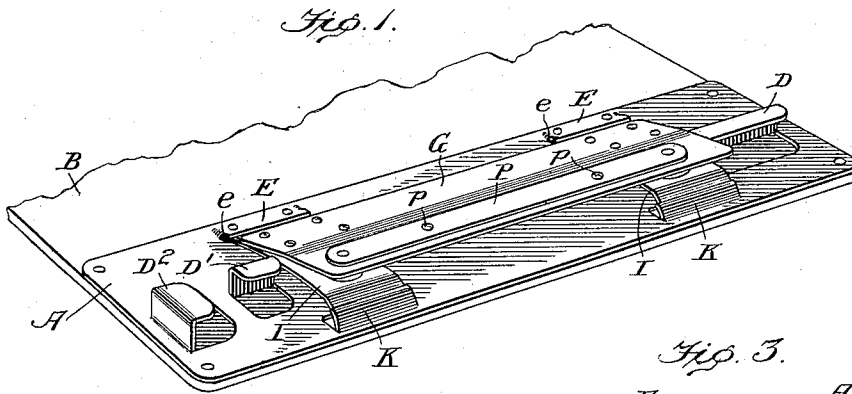


Fig. 8
Witnesses
H. B. Brown.
Marguerite B. Brandell

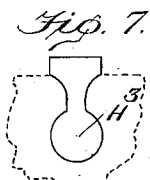


Fig. 6.
Inventor
C. B. Alexander
By *Chambers & Chambers*
his Attorneys

UNITED STATES PATENT OFFICE.

CLINTON B. ALEXANDER, OF WASHINGTON, DISTRICT OF COLUMBIA.

PAPER-PUNCH.

1,170,133.

Specification of Letters Patent.

Patented Feb. 1, 1916.

Application filed July 27, 1912. Serial No. 711,840.

To all whom it may concern:

Be it known that I, CLINTON B. ALEXANDER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Paper-Punches; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to punches for forming an aperture or a plurality of apertures in sheets of paper to facilitate the filing of the same in modern loose leaf binders, the objects of the invention being to provide an exceedingly simple compact punching device which may, if desired, be secured to one of the backs of the loose leaf binder, without materially increasing the bulk of the binder itself.

A further object of the invention is to provide a structure which may be manufactured at small cost from stock materials, by simple manipulations and die work, whereby expensive hand fitting of the parts to secure proper coöperation of the punching members is largely dispensed with.

Another object of the invention is to provide a punch for the purpose specified, which is not liable to be injured or thrown out of adjustment by rough handling or treatment, to which devices of this character are subjected in use, thus insuring the formation of clean cut openings or apertures in the sheets of paper, even after the punching device has been in service for a long period.

Referring to the accompanying drawings, Figure 1 is a perspective view of a paper punch embodying the present improvements, said punch being shown attached to the back leaf of a loose leaf binder; Fig. 2 is a transverse section in the plane of one of the pairs of punching elements, with the punch member in elevation; Fig. 3 is a top plan view of the right hand end of the device illustrated in Fig. 1, with portions broken away; Figs. 4 and 5 are sectional elevations corresponding to Fig. 2, but showing slightly modified arrangements of the punch elements; Fig. 6 is an end elevation showing on a somewhat exaggerated scale the formation of the base and finger plate of corrugated stock, which is the preferred

construction but not illustrated in the other views, as it tends to confuse the illustration of the parts of the punch; Fig. 7 is a diagrammatic plan illustrating a form of punch member adapted for perforating the sheets from the edge; Fig. 8 is a detail diagrammatic plan showing on a somewhat exaggerated scale the shape of the punch and die or opening with which the punch coöperates in the preferred form of device.

Like letters of reference in the several figures indicate the same parts.

In constructing a punch in accordance with this invention it is preferred to make use of readily obtainable stock materials, consisting mainly of a proper grade of sheet metal, capable of being cut and formed in suitable dies, and tempered springs or spring metal which may be cut in suitable lengths and perforated to facilitate connection with the coöperating parts, the spring or tempered metal being utilized not only as the means for connecting the relatively movable parts, but also as the die members with which the punch members coöperate.

Referring to the accompanying drawings, the letter A indicates the base plate of the punch, and, as before stated, it may be made of plane sheet metal, as in Figs. 1 to 5, but is preferably corrugated longitudinally as shown in Fig. 6, whereby increased rigidity is secured with the use of comparatively light material. The sheet metal base is given a contour formation to suit the particular situation, where it is to be used, being preferably rectangular as shown in Fig. 1, adapting it to be secured to the back leaf B of an ordinary loose leaf binder, although it may be mounted on a base, such, for instance, as the base C, in Figs. 4 and 5, and said base may be provided with a tray c for the reception of the cuttings.

The sheet metal base A is provided with a number of projections extending above its upper surface and preferably formed by dies which cut the metal partly around suitable areas, and then offset the same, to give the desired formation to the projections. Certain of the said projections, to wit: projections lettered D, D', and D², serve as guides or gages for positioning the paper sheet to be perforated, to which end the projections D and D' face the front edge of the base A, while the projection D² is located near one end and faces the opposite

end. All of said projections are preferably provided with overhanging portions beneath which the edges of the paper will be confined when properly positioned for punching.

Near its rear or inner edge the base A is provided with a plurality of inclined projections E, the inclined faces being preferably substantially plane, but set at an angle with relation to the base plate A, the ends of said projections, however, remaining in engagement or connected with the base plate, as indicated at *e*, whereby said projections will be exceedingly rigid against any tendency to upward or downward deflection. Said projections E serve as the supports for the inner ends of tempered spring members F, which members are normally substantially straight, and attached at one end to the projections E by rivets or other suitable attaching means. They project upwardly at an angle from the base plate A, and at their outer or free ends they support and are connected by a finger plate G, permanently affixed thereon by rivets or other suitable fastening means, and adapted to be moved downwardly by pressure of the hand or fingers applied thereto.

The finger plate G and the base plate A form the supports for the cooperating punching elements, to wit: the punches and dies; thus, in the preferred construction illustrated in Figs. 1 to 3, and 6, the punches H are secured to the base plate A, and the dies are formed by an aperture in the finger plate G, or, more properly by apertures in the tempered steel spring members F, which underlie the finger plate at the punching points. Obviously the dies or apertures could be formed for cooperation with the punches H so that the cutting walls will be the walls of the finger plate, but as above stated the preferred construction has the cutting walls formed by the tempered spring members, as shown at *f*, in Figs. 2 and 3. A second or supplemental spring I attached at one end to each of the projections E serves as a clearer, the forward ends of said clearers I being confined under the rearwardly extending projections K, at the front edge of the base plate A.

As illustrated in Figs. 4 and 5, the punches H' are secured to the finger plate G and are adapted to be depressed to cooperate with die openings in the base plate. As shown in Fig. 4, the base plate is provided with a supplemental plate M of tempered steel in which the aperture *f'* is formed, said supplemental plate M extending back and being connected to the projection E as before explained, in connection with the spring plates F and I, while in Fig. 5, a separate die plate M' is provided for forming the cutting edges to cooperate with the punch. In these modified constructions the clearer for freeing the sheet of paper from the punch is formed in

one instance by an extension F' of the spring F which is curved downwardly, as shown in Fig. 4, for the purpose, and in the other instance, by a supplemental spring member F², which is secured to the finger plate, as shown in Fig. 5, it being understood, of course, that there is a construction such as above described for each punch member of the device.

While the punches are preferably round to form circular perforations, slightly removed from the edge of the sheet of paper, they may be of the shape shown at H³, in Fig. 7, and adapted to form apertures which open out at the edge of the sheet, whereby the sheet may be filed on filing devices without being slipped into position from the ends of the posts, as will be readily understood.

In the preferred construction, the cutting faces of the punches are made with a central valley, whereby the perforations will be formed by cuts which start at opposite points on the face of the punch, said cuts terminating at opposite points, displaced 90° from the starting points. This construction will be readily understood by reference to Figs. 2, 4, 5 and 8, in which figures the transverse valley *h* is well illustrated. From Fig. 8 it will also be noted that the die opening with which the punch cooperates is slightly elongated as shown at N in a direction transverse to the length of the valley *h*, whereby a slight latitude of movement is permitted in a plane coincident with the plane of movement of the finger plate, thus the parts will accommodate themselves to the relative movement and at the same time the necessity for extreme accuracy in assembling the parts is avoided.

It will be noted that the elongation of the die opening is toward the front and rear, while the valleys in the punches extend transversely or from side to side, and as a result of this arrangement it will be observed that the initial contact of the punch with the paper occurs at the points where the greatest space exists between the punch and die, but during the initial cutting action of the punch the paper will be taut and the necessity for an accurate fit between the cutting edges is not so important. At the sides of the aperture, however, the cutting edges of the punch fit very accurately and consequently during the final portion of the cutting operation, not only is the cutting operation performed between accurately fitting or cooperating edges, but the cutting edges, due to the valleys aforesaid operate with a shearing action and will complete the cut in a clean and effective manner, thus leaving no ragged edges and reducing the liability of the punchings remaining attached to one or the other side of the openings.

While the base plate and finger plates heretofore described may be plane or of

smooth stock, as illustrated in Figs. 1 to 5, it is preferred that said parts be made of longitudinally corrugated stock, as shown on a somewhat exaggerated scale in Fig. 6, and indicated by the reference letters A² and G², respectively.

The rear portion of the finger plate and the projections E are normally in the same plane which is inclined to the base plate A. With this construction it becomes practicable to employ springs F which are straight, and therefore, there is no liability of error in assembling the parts, such as might prevent correct or accurate registration of the punch elements. In other words, by avoiding the formation of bends in the tempered steel spring members the accuracy and certainty with which the parts may be assembled is increased without increasing the expense of manufacture.

In order to retain the paper sheet in proper position and to impart tension during the initial cutting operation, the finger plate is preferably provided with supplemental retaining members which will yield upwardly but are normally in position to press against the cutting faces of the punches when the finger plate is pressed downwardly. These members may conveniently take the form of studs or projections O mounted or formed on the ends of a yielding strip P of spring metal secured to the upper face of the finger plate by rivets or fastenings p. Not only do the pressure members formed by the studs and ends of the strip P serve to impart initial tension to the sheet, during the cutting operation, but the studs or projections retain the cuttings so as to prevent them from flying about at the moment when they are severed from the sheet. Said studs O also hold the cuttings on top of the punch points in the final cutting; thus, should the cutting be made at one end of the valley before the other is completed the studs will prevent the cutting from slipping sidewise on the punch point.

The forward portion of the finger plate is, as shown, preferably bent at a slight angle with relation to the rear portion, the object being to make the punches and dies meet squarely or in such relation that the initial cutting will occur simultaneously at the front and rear edges of the punches. The construction also prevents distortion of the plate should the pressure not be applied centrally thereto, and tends to cause it to move down evenly and to cooperate with the punches correctly, should the pressure be applied at one end or the other.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States, is:

1. A paper punch embodying a substantially flat sheet metal base plate having

projections on its upper side inclined to the plane of the base, parallel substantially straight transversely extending spring members permanently secured at one end to the projections, a finger plate mounted on the ends of the spring members, and cooperating punches and dies on the base and finger plate adapted to be brought together by the depression of the finger plate to form apertures in an interposed sheet.

2. A paper punch embodying a sheet metal base plate, parallel flat springs secured at one end permanently to the base plate, a finger plate extending longitudinally of the base plate and mounted on and connecting the flat spring members, cooperating punches and dies carried respectively on the base and finger plates and adapted to be brought together by the depression of the finger plate, and paper gages on the base plate shaped from the metal of said plate.

3. A paper punch embodying a sheet metal base plate having spaced inclined projections on its upper side, two spring members permanently secured at one end to each projection, extending therefrom in the general direction of inclination of said projections and having punch apertures formed therein, a finger plate mounted on and connecting the upper spring members and punches permanently mounted in position to cooperate with said apertures, one of each pair of said spring members forming clearers for discharging the perforated paper from the punches.

4. A paper punch embodying a sheet metal base plate having oppositely arranged projections on its upper side and located respectively near the front and rear edges of the plate, pairs of spring members permanently secured to the projections at the rear edge of the plate and one member of each pair having its forward end loosely confined beneath the projection at the front edge of the plate, a finger plate permanently mounted on the free ends of the other members of the pair, and punches mounted on the base plate in position to enter apertures in the spring members and finger plates respectively.

5. A paper punch embodying a sheet metal base plate, having upwardly extending projections near its opposite ends, parallel pairs of spring members permanently secured at their rear ends to the inner faces of the rear edge projections on the base plate, the lower members of said pairs being bowed upwardly and having their forward ends confined loosely beneath the front edge projections of the base plate, a finger plate permanently mounted on and connecting the upper members of the pairs of spring members, there being aligned apertures in the spring members and finger plate, and punches per-

manently mounted on the base plate in position to enter said apertures to perforate a sheet interposed between the members of said pairs of spring members.

5 6. In a paper punch, the combination with a base and a die member movable angularly toward and from said base, and having its aperture elongated in the plane of movement, of a punch member having its cutting
10 face provided with a central valley extending transversely with respect to the plane of movement of the die member, whereby the cutting edges are inclined in opposite direction with respect to each other.

15 7. In a paper punch, the combination with punch and die members movable relatively to each other in the arc of a circle, the die member having its aperture elongated radially with respect to the axis of movement
20 and the punch member having its cutting face formed with a transverse central valley, whereby the cutting edges are caused to operate with a shearing cut and the initial cutting is effected at the ends of the elongated aperture.

25 8. In a paper punch, the combination with coöperating die and punch members, the die member having its aperture elongated and the punch member having its cutting face
30 provided with a central valley extending transversely of the major axis of the aperture in the die member.

35 9. In a paper punch, the combination with coöperating, relatively movable punch and die members, the die member having its aperture elongated and the punch member having its cutting face provided with a central valley extending transversely of the major axis of the aperture in the die mem-

ber, and a yielding clearer surrounding the 40 punch member.

10. In a paper punch, the combination with a longitudinally corrugated base plate having upwardly extending projections thereon, of a finger plate adapted to lie normally in substantially the same plane as said projections, spring members connecting the
45 finger plate and base plate, and coöperating punch and die members on the base and finger plate, substantially as described. 50

11. A punch for paper embodying a corrugated sheet metal base plate having upwardly extending projections thereon, a finger plate adapted to lie normally in substantially the same plane as said projections, flat
55 spring members arranged in parallelism and connecting the finger and base plates, whereby they may be moved toward and from each other, and coöperating punch and die members on the base and finger plates, respectively, with interposed yielding punch clearer
60 members substantially as described. 65

12. In a paper punch, the combination with a base plate having upwardly extending projections thereon, a finger plate
65 adapted to lie normally in substantially the same plane as said projections, parallel flat spring members connecting the finger and base plates, coöperating punches and dies on the base and finger plates, respectively, and
70 yielding pressure members carried by the finger plate and coöperating with the cutting faces of the punch members, to hold the cutting during the punching operation.

CLINTON B. ALEXANDER.

Witnesses:

THOMAS DURANT,
ALEXANDER S. STEWART.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."