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PAPER PUNCH

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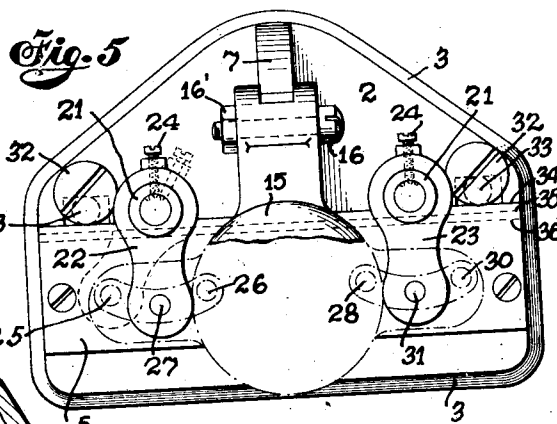
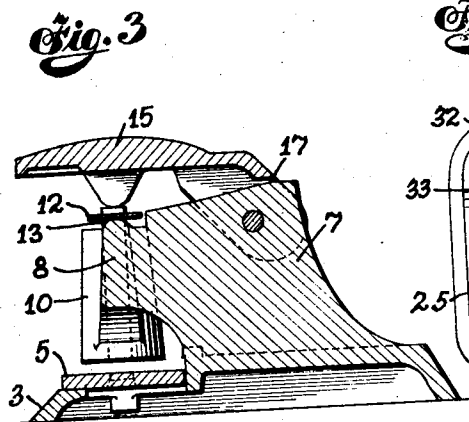
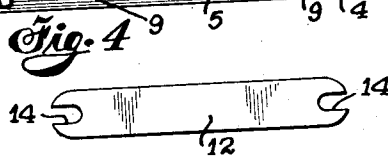
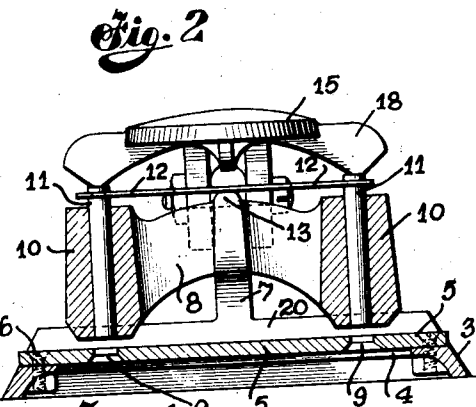
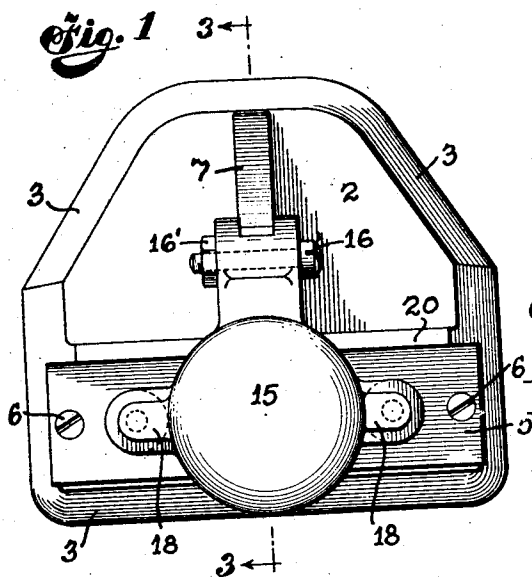


Fig. 6

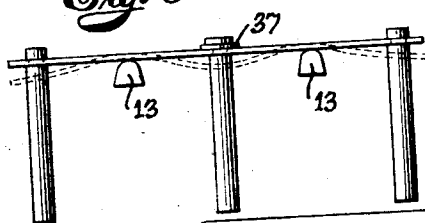


Fig. 7

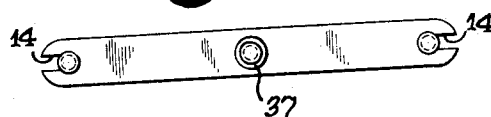


Fig. 9

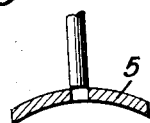


Fig. 8

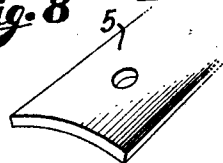


Fig. 10.

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PAPER PUNCH.

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This invention relates to means for punching paper and more particularly to means for punching sheets to prepare them for filing in suitable binders or similar devices.

5 Heretofore it has been proposed to provide punching devices each of which has a base and a die plate carried by the base and having openings positioned in accordance with the spacing of the perforations to be made, 10 punches to cooperate with the die plate, guides for the punches, separate helical springs for holding the punches normally in raised position and for returning the punches after operation, and a comparatively 15 long lever device for actuating the punches.

It is an object of the present invention to provide simple, compact and efficient means for punching sheets at the required points.

Another object of my invention is to provide a simple, sturdy paper punching device of improved construction and of few number of parts, and a punch that has a novel and improved means for supporting and returning the punch members to their normal positions. 25

Other objects of the invention are to provide a device of this character adapted for easy assembly and disassembly, a device adapted for easy repair and replacement of parts, a 30 device in which the die plate may readily be sharpened, and a device provided with means for adjusting the depth to which paper may be inserted if desired.

These and other objects of the invention may be attained in the following manner. According to the preferred embodiment of the invention provision is made of a base having downwardly turned edge portions to hold the body thereby spaced from a support therefor having an opening across which a suitable die plate may be secured. Mounted on the base is a T-shaped member or standard having the upright portion thereof extending forwardly and the cross or top portion overlying the die plate so that punches slidably supported in such cross piece will register with the openings in the die plate. Such punches are connected with the ends of a leaf spring preferably of steel supported at its 45 center by an upward projection at the center of the cross piece of the T. This single spring serves not only to maintain the punches in raised position but to return the punches to normal position after operation thereof and the spring may also be used in 50

removing the punches from the device or in bringing them into position for insertion in the guides therefor.

To operate the punches provision is made of a handle or striking plate pivoted on the rearward portion of the T and having a substantially round portion preferably positioned centrally with respect to the die plate and lateral extensions having portions on the lower faces thereof to engage the upper ends 60 of the punches. The rounded head of the handle may be of considerable size to provide a suitable bearing surface for engagement or striking by the hand. It will be evident that, with this arrangement of the handle a very 65 compact form of the device will be obtained as there is no long extending lever required for operation. The connection between the handle and the T-shaped supporting member is such that the handle has limited upward 70 movement and it serves to prevent the punches falling out of the device when the latter is inverted. 75

According to another embodiment of the invention, provision is made of an adjustable 80 spacing or gage to determine the depth to which the paper may be inserted in the punch and of means for adjusting the distance between the guides to space the punches as required. To correspond with such changes in 85 the positions of the punches provision may be made of die plates having the openings therein spaced at different distances.

A convenient form of the punch-controlling leaf spring is one which has longitudinal 90 slots extending inwardly from the ends thereof so that these ends may cooperate with suitable grooves in the upper ends of the punches. With this arrangement the spring and the two punches may be conveniently assembled 95 and moved as a unit into position to insert the punches in the guides. It will be understood that the slots at the ends of the spring support may be extended in length to allow for adjustment of the punches, or the spring 100 may be provided with holes at different locations so that the punches may be inserted. In this last instance, I have found it satisfactory to provide washers to support the punches in the holes in the spring. Instead of having 105 two punches only, a larger number may be provided and all of these may be controlled by a single leaf spring supported at suitable positions in the intervals between the punches. The die plates may be flat and the 110

punches may have circular ends, thus producing a uniform cutting action completely around the perforations in the die plates. It may, however, be desirable to start the cut at one or more points and then carry it completely around the perforation thus giving a progressive cutting. To produce such effects use may be made of a die plate curved upwardly from its edges to its central line, or the ends of the punches may be cut away so that certain points thereof will engage the paper before others.

Other features and advantages will hereinafter appear.

In the drawings:—

Fig. 1 is a top plan view of a device embodying one form of the invention;

Fig. 2 is a sectional front elevation of the device shown in Fig. 1;

Fig. 3 is a view in section taken along the line 3—3 of Fig. 1;

Fig. 4 is a view of a leaf spring for controlling the punches;

Fig. 5 is a top plan view of a device embodying another form of the invention;

Fig. 6 is an elevational view of three punches supported by a single spring;

Fig. 7 is a top plan view of a leaf spring having three punches combined therewith;

Fig. 8 is a perspective view showing a curved die plate;

Fig. 9 is a view illustrating the operation of a punch in connection with the curved die plate of Fig. 8; and

Fig. 10 is a top plan view illustrating a resilient means such as a spring, with slots in either end for holding the punches.

According to the embodiment of the invention shown in Figs. 1 and 2, the device comprises a stand having a base 2 spaced above by means of downwardly turned flange portions 3 and having at its front an opening 4 over which is placed a die plate 5, preferably of steel, and which may be secured in position by suitable means such as screws 6. The stand also includes a T-shaped member or standard 7 having a rearward portion supported by the base 2 and extending forwardly to the cross member 8 which is positioned above the die plate 5. The die plate is provided with suitable openings 9 positioned to determine the desired location of the perforations in the sheets to be perforated, and the cross member 8 is provided with cylindrical guideways 10 in register with the openings 9 and designed to receive punches 11 to cooperate with the die plate 5. These punches 11 are normally held in raised position (Fig. 2) by any suitable means preferably by a leaf spring 12 resting on an upward projection 13 of the cross member 8. The spring is provided at its ends with slots 14 to receive reduced portions of the punches 11, such reduced portions of the punches 11 being obtained by forming circular grooves

of slightly greater width than the thickness of the leaf spring. It will be evident that the punches 11 and leaf spring 12 may be assembled conveniently and then brought into position with the punches immediately above the guide-ways 10 and be lowered into the same thereby providing simple assembly.

To depress the punches 11 provision is made of a handle or striking plate 15 having forked extension to embrace the part of the T-shaped member and connected therewith by means of a pivot, usually in the form of a bolt 16 secured in position by a nut 16', the arrangement being such that the upward movement of the handle 15 is limited by the engagement of a stop portion 17 thereon with the upper edge of the member 7. The central portion of the handle 15 is substantially circular and so formed as to provide an extended surface for engagement by the hand. Extending laterally from the central portion of the handle 15 are arms 18 forming a substantially flat arch provided with downwardly-extending portions to engage the upper ends of the punches 11. At the rear edge of the die plate opening 4 there is a guide or gage 20 to determine the extent of insertion of the sheet beneath the punches.

Thus in my preferred form disclosed in Figs. 1 to 4, I have shown a simple, sturdy and very satisfactorily operating punching device which consists of a few number of parts that are automatically maintained in assembled position. This preferred punching device is of compact form and occupies very small space and does not have an extended lever which is usual with punches heretofore manufactured. An additional advantage is that the die plate may be sharpened if desired without removing the same from the punch, although it is a simple operation to remove the plate to recondition the openings 9. It will also be noted that with this preferred type of punch the striker plate 15 has its center located back of the front edge of the base or it may be said that the center is between the front and rear edges of the base so that upon striking the plate 15 or pushing the same down to form the holes in the paper there is no danger of the punch "tipping over." Further, the simplicity of the single supporting and returning means for the punches is particularly beneficial in the normal operation of the punch, and such construction materially facilitates assembling and disassembling the small number of parts.

It is often usual in the construction of paper punching devices to provide means for adjusting the distances between the punches. I have herein disclosed one form of adjusting means as illustrated in Fig. 5.

Referring particularly to this figure the base is provided with the standard 7 which extends forwardly to provide a portion similar

to portion 13 in Fig. 3 to support a leaf spring. Such construction having been above described and being of purely mechanical nature has not been illustrated in this figure. 5 The preferred form for disclosing the adjustability herein is shown as providing two standards 21 upon which are mounted adjustably two guides 22 and 23. Set screws 24 are provided to maintain the guides 22 and 10 23 in desired locations and if desired other means may be employed to accomplish this purpose. The dotted lines on the left of Fig. 5 illustrate a position of guide 22 so that the punch therein will engage perforation 25 15 in the die plate. Likewise this guide may be moved so that it will permit the punch to enter perforation 26. The normal position of this guide is as shown in full lines so that the punch will enter perforation 27. Perforations 28, 30 and 31 are formed in the die plate 5 and are similar to perforations 25, 26 and 27 and are employed for the adjustments of guide 23. It will be noted by reason of this simple form to provide adjustment that 25 for instance guide 23 may be maintained in its normal position while guide 22 may be positioned in any one of the three perforations 25 to 27. Thus it will be observed that several combinations of different distances between the punches may be readily obtained. 30

In various forms of satisfactory paper punches it may be desirable to obtain adjustment for the position or extent to which the paper may be inserted in the punch, thereby providing different margins for the punched holes. In this instance, I have disclosed simple screws 32 of cam formation having the stems 33 of the screws located as shown in dotted positions. Any means may be provided for movement by the rotation of these cams 32 so that the paper may be inserted into the punch only to the extent desired and as illustrated for example by lines 43, 25 and 36. It is usual in such cam formed screws to provide side way movement so that the adjustment may be properly obtained and provision, therefore, is shown in dotted lines about the dotted lines 33. The stems 33 cooperate with the base and frictionally hold the screws in position. As this construction is simple in its particular form and is within the scope of mechanical skill, there is only an outline made. It will be understood, however, that it is my intention to provide some form of means for permitting adjustment for the amount or extent of insertion of the paper in the punch. 45 50 55

In punches which provide adjustment for the width or distances between the punches the spring holding and returning means may be formed in any desired manner, and I prefer to provide various holes in the spring and to insert the punches in these openings and provide them with washers 37, as illustrated, for instance, in Fig. 7 to maintain the punches 60 65 in openings. This is a simple form of arrangement and will be readily appreciated by reference also to Fig. 6 which shows the center punch held by means of the washer 37. Also, if desired, the spring holding and returning means may take the form illustrated in Fig. 10 wherein slots are provided near each end and running longitudinally of the spring, for receiving and supporting the punches. The middle or central opening may 70 75 be provided and used when there are three punches. With the use of such a spring holding and returning means the punches may move along the slots so as to permit the guides 22 and 23 to be moved to their several adjusting positions. 80

In some forms of punching devices it may be desirable to provide more than two punches and I have shown in Figs. 6 and 7 the use of three punches supported and operated by a single leaf spring. In such instances, there will be provided two slots 14. In these figures the middle punch is shown as being supported in the leaf spring by means of the washer 37 as has been above described. 85 90 It will be noted that the two end punches are supported by reason of being inserted in the slots formed in the ends of the spring as described in connection with the holding of the punches illustrated in Figs. 1 to 4 inclusive. It is to be understood, however, that if desired holes may be provided instead of the slots. If desired two leaf springs may be employed with slots in the ends thereof. In such an instance, the middle punch would be 100 held by both springs.

In both of the forms of punches illustrated in Figs. 1 and 5, it may be desirable to arrange the punch or die plate so that the paper may be cut progressively instead of being cut throughout the full periphery at the same time. To provide such progressive cutting I have illustrated in Figs. 8 and 9 a curved form of die plate 5 so that when a flat ended punch begins to engage die plate 5 it will 105 110 only cut at two points and will then progressively continue until the paper is cut throughout the periphery of the punch as will be noted in Fig. 9. The same result may be obtained by using a flat die plate and by cutting 115 a groove through the end of the punch so that the end is contoured to provide engagement with the paper at different points of the punch at the beginning and will then operate to progressively cut the paper. 120

In prior punch devices, each punch is normally held in raised position by a helical spring which also serves to return the punch after operation thereof. The single leaf spring of the present invention serves also as 125 a support or holder for use in withdrawing the punches from the guides in which the punches may be assembled or from assembling the punches before they are inserted in the guides. Another advantage of the leaf 130

springs is that, if they become bent in one direction they may readily be turned over and used as before.

Another advantage of the device results from the use of the short handle or striking plate disclosed herein which enables the device to be made in very compact form. This handle is so associated with the base as to prevent the punches and leaf springs in the device from falling out and as to be easily removable for various purposes such as removal and replacement of the punches and springs.

It will be seen from the foregoing disclosures and detailed descriptions that I have provided a very simple and compact form of punch which is sturdy, and as designed there is a small cost of production or manufacture and so that assembly of the parts once completed will automatically be maintained, and so that the striking portion of the punch is maintained within the confines of the base. The adjustable features of the punch are readily provided without material modification of the parts of the punch and in addition the single supporting means which also operates to return the punches to normal position forms an advantageous part to the invention.

It will be understood that while I have herein described in detail a particular embodiment of my invention for purposes of full disclosures, and some detailed features which I am specifically claiming for a special advantage, many changes and modifications may be made in the particular construction and arrangement of parts without departing from the broad scope of my invention which is outlined in the sub-joined claims.

Having thus described my invention, I claim:

1. In a paper punching device, a base, a die plate assembled therewith, a plurality of punches adapted to cooperate with said die plate to punch holes in paper, a standard associated with said base, said standard being constructed to guide said punches, and a single member for supporting said punches and for returning said punches to normal position after operation.

2. In a paper punching device, a base, a die plate assembled therewith, a plurality of punches adapted to cooperate with said die plate to punch holes in paper, a standard associated with said base, said standard being constructed to guide said punches, a single member for supporting said punches and for returning said punches to normal position after operation, and a striking handle positioned to bear directly on said punches.

3. In a paper punching device, a base, and a T-shaped standard comprising a central portion connected at its rear with the base and a transverse portion at the forward end of the central portion, said transverse portion being provided with guides for punches.

4. In a paper punching device, a base having at its front an opening across which a die plate is to be placed, said opening being provided with die plate supporting means around said opening, and a T-shaped standard comprising a central portion connected at its rear with the base and having a transverse portion at the forward end of the central portion overlying the die plate opening and being provided with guide-ways for punches to cooperate with a die plate on said support.

5. In a paper punching device, a base, a standard connected with the base at the rear and having at its forward end a transverse portion provided with guide-ways for punches, punches inserted in said guide-ways from above, and a striking handle overlying said punches and pivoted on said standard, the striking handle and standard being so formed as to limit the upward movement of the handle and thereby prevent removal of the punches.

6. In a paper punching device, a base, a standard connected with the base and having a portion thereof provided with guide-ways for punches, punches inserted in said guide-ways, and a leaf spring supported on said standard and having its ends connected with said punches to hold the same normally in their retracted positions.

7. In a paper punching device, a base, a standard connected with the base at the rear and having at its forward end a transverse portion provided with guide-ways for punches, punches inserted in said guide-ways, and a leaf spring connected with said punches for holding them normally in retracted position and supported on said transverse portion between said punches.

8. In a paper punching device, a base, a standard connected with the base and having a portion thereof provided with guide-ways for punches, punches inserted in said guide-ways, spring means for supporting the punches, and a striking handle pivoted on said standard and comprising a circular plate for engagement by the hand and positioned with its center substantially over the center line of the punches.

9. In a paper punching device, a base, a standard connected with the base at the rear and having at its forward end a transverse portion provided with guide-ways for punches, punches inserted in said guide-ways from above, and a striking handle overlying said punches and pivoted on said standard, the striking handle and standard being so assembled as to limit the upward movement of the handle and thereby prevent removal of the punches, and arms extending from said striking handle over said punches.

10. In a paper punching device, a die having a plurality of aligned openings, an element spaced from said die and having a plurality of guide-ways to be placed in register

with said openings, punches in said guide-ways, and a leaf spring supported between said punches, said leaf spring and the punches being so formed that the punches may be assembled with the spring and supported thereby for insertion in the guide-ways or withdrawal therefrom.

11. In a paper punching device, a die having a plurality of openings, an element spaced from said die and having a plurality of guide-ways to be placed in register with said openings, punches in said guide-ways and having reduced portions at the upper ends thereof, and a leaf spring supported between said punches and having openings to embrace the reduced portions of said punches so that in addition to controlling the punches in the ordinary operation of the device the spring may serve as a support for the punches for withdrawing the same from the guide-ways.

12. In a paper punching device, a base, a die plate having aligned punch openings and curved downwardly on each side of the line through the centers of said punch openings, a member spaced above said die plates and having guide-ways in register with said openings, and punches in said guide-ways adapted to cooperate with the die plate and to start the cuts at the high points of the die plate openings and then carry the cuts completely around said openings.

13. In a paper punching device, a base, a die plate assembled therewith, a plurality of punches, means associated with said base for guiding said punches, and a leaf spring en-

gaging said punches for supporting them and for returning them to their normal positions.

14. In a paper punching device, a base provided with an opening at its forward end, a die plate positioned over said opening, a standard associated with said base and extending forwardly over said die plate, a plurality of punches guided by said standard, means associated with said standard for supporting said punches, and a striking plate supported by said standard and having the center of the striking portion back of the front edge of said base.

15. In a paper punching device, a base provided with an opening, a die plate secured to said base over said opening and being provided with holes in predetermined positions to receive punches, a standard carried by said base and constructed to extend over said die plate, said standard being provided with punch guiding portions, a plurality of punches adapted to be placed in said guide portions and in alignment with the openings in said die plate, a single leaf spring having notches in its ends for receiving and holding said punches and being positioned on a portion of said standard to thereby support said punches, and a striking plate pivoted to said standard and adapted to extend forwardly to engage said punches, said striking plate having a rounded portion the center of which falls in a line drawn between the openings in said die plate.

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