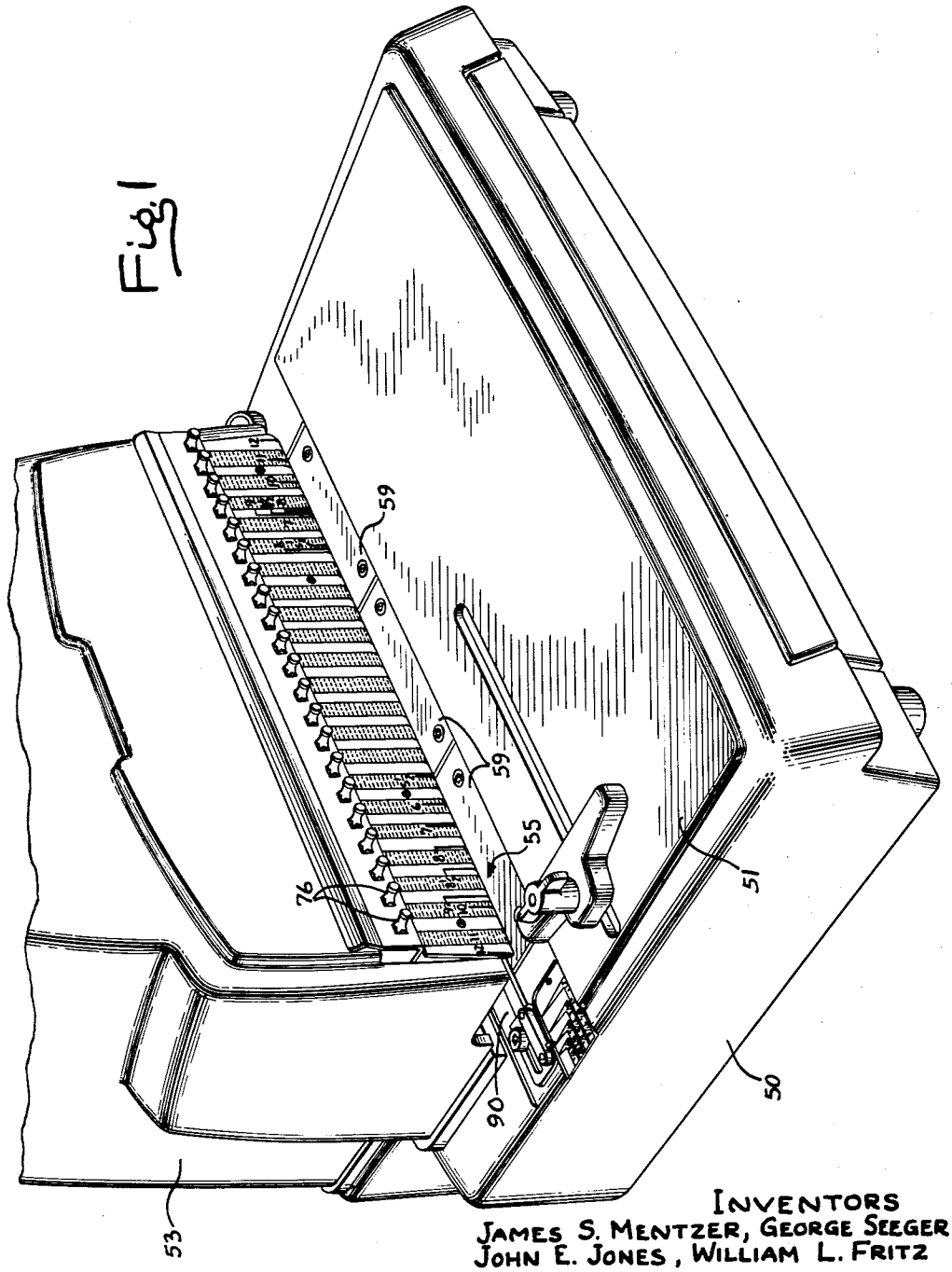
May 23, 1961 J. S. MENTZER ET AL 2,985,052

BINDING HOLE PUNCH

Filed Feb. 20, 1958 4 Sheets-Sheet 1

Fig. 1



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BINDING HOLE PUNCH

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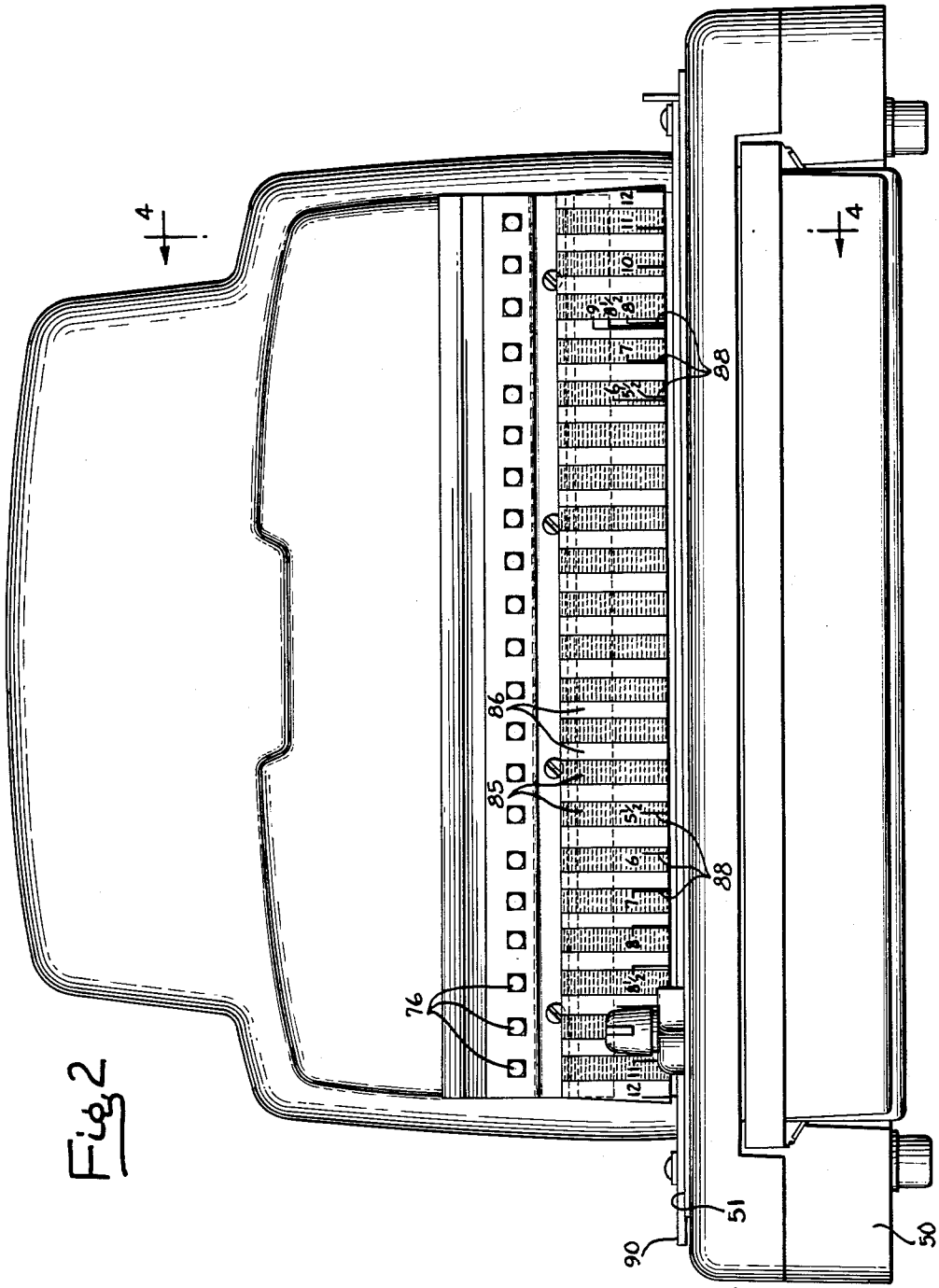


Fig 2

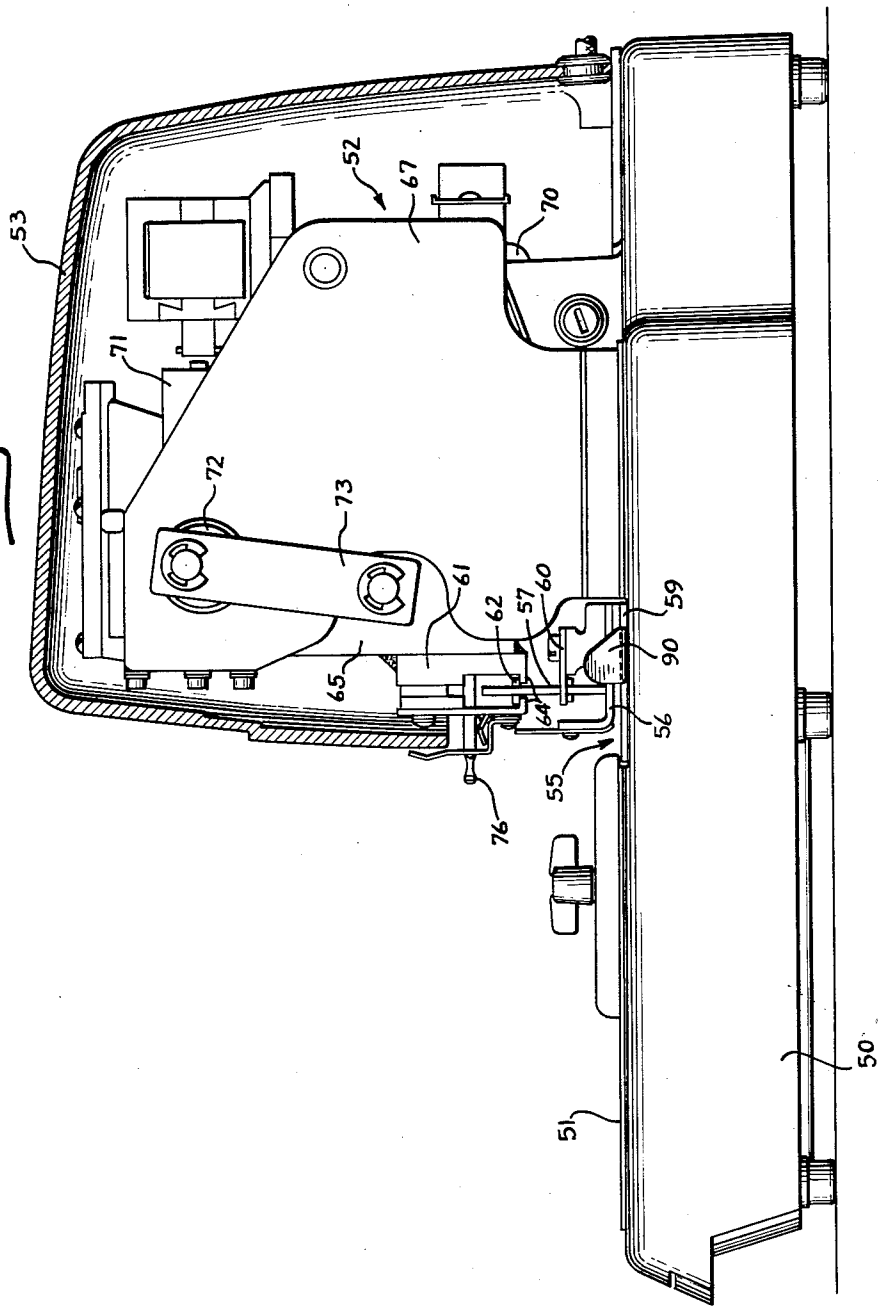
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Fig. 3



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BINDING HOLE PUNCH

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Fig. 4

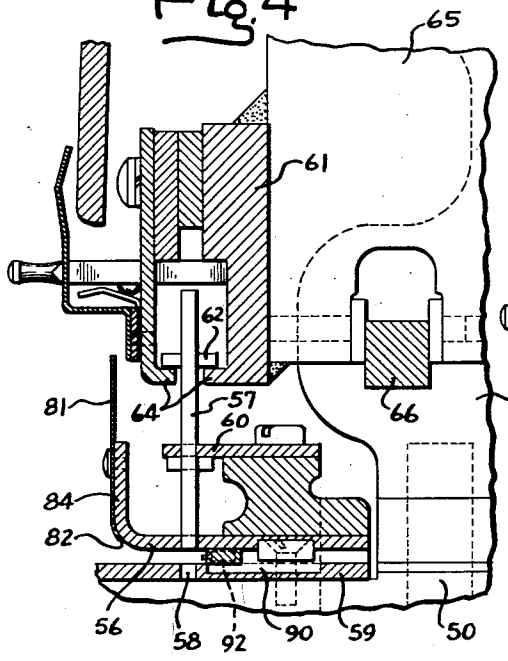


Fig. 5

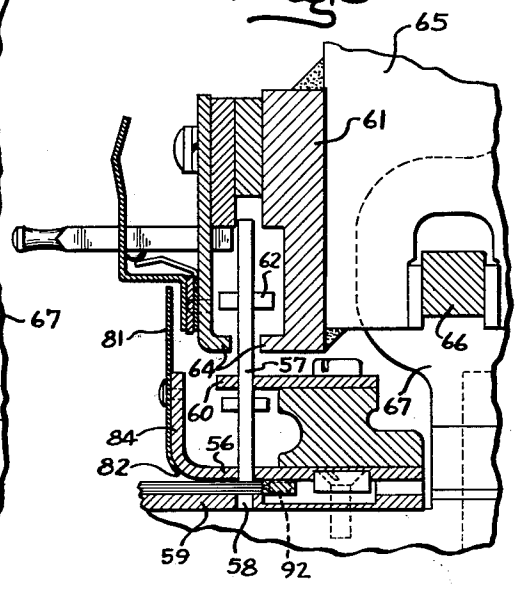
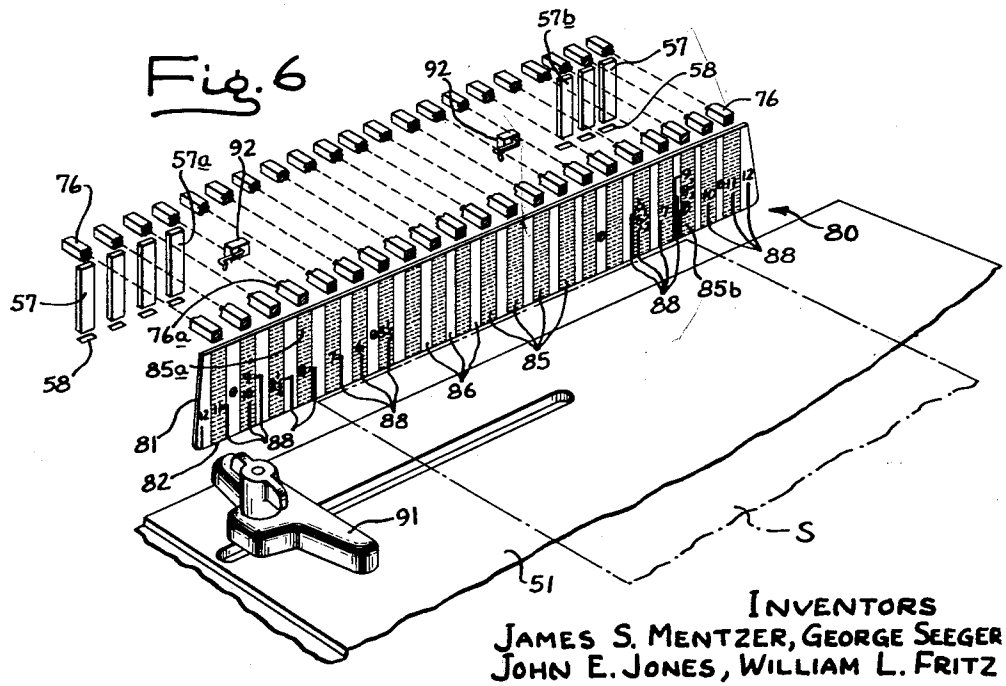


Fig. 6



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2,985,052

BINDING HOLE PUNCH

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2 Claims. (Cl. 83—522)

The present invention relates to sheet punching apparatus of the type useful for forming binding holes in a stack of sheet material such as paper. More particularly, the present invention relates to a sheet punching apparatus of the foregoing type which includes a series of alined punches and a novel sheet positioning guide arrangement for use in alining the sheets in the apparatus so that the punches can produce a series of alined holes in them.

One object of the present invention is to facilitate the rapid and accurate positioning of sheet material in punching apparatus of the above type and to obtain the optimum desired number of holes in the sheets without mental computations or preliminary trial and error runs. Another object of the present invention is to facilitate the positioning of sheets to be punched in the apparatus so that a maximum number of holes are punched centered with respect to the sheets while avoiding the punching of incomplete holes or notches in the edges of the sheets.

A further object of the present invention is to indicate at a glance the exact position of the punches housed within punch apparatus relative to the sheets being inserted for punching. Still another object of the present invention is to enable the operator of the foregoing apparatus to visually observe the position of the sheets to be punched as they are inserted into the apparatus and thereby to guide the sheets to their selected positions for punching.

It is a further object of the present invention to provide a novel guide means enabling sheet material of various widths to be punched with a series of centered holes incident to a single inserting movement into the apparatus and without the necessity of relying upon fixed side guides or the like. It is a related object to provide in combination with the series of alined punches and the novel guide arrangement an automatic tripping arrangement responsive to the guided insertion of the sheets into the apparatus for energizing the punches.

A more detailed object of the present invention is to protect the punch mechanism against the insertion of and damage by foreign objects.

Other objects and advantages will become apparent as the following description proceeds taken in connection with the accompanying drawings wherein:

Figure 1 is a perspective view of an illustrative punch including a sheet positioning guide thereon for use in alining sheet material for punching;

Fig. 2 is a front elevation view of the punch shown in Fig. 1;

Fig. 3 is a side elevation view of the punch shown in Fig. 1, with the protective cover shown in section;

Fig. 4 is an enlarged fragmentary sectional view of a portion of the punch mechanism taken substantially in the plane of line 4—4 of Fig. 2;

Fig. 5 is a view similar to Fig. 4 and shows a punch disabled and the punch block in its lower position; and

Fig. 6 is a diagrammatic representation illustrating the

alinement of punches, disabling pins, and the sheet positioning guide means in a punch apparatus for the type shown in Fig. 1.

While an illustrative embodiment of the present invention has been shown in the drawings and will be described below in detail, it should be understood that there is no intention to limit the invention to the specific form disclosed. On the contrary, the intention is to cover all modifications, alternatives, equivalents and uses falling within the spirit and scope of the invention as expressed in the appended claims.

Turning first to Figs. 1, 2 and 3, there is shown a punch mechanism for punching a series of holes in a stack of sheet material such as paper for the subsequent reception of a binding element or the like. Although the punch mechanism will be described briefly herein, reference should be made to copending applications Serial Nos. 676,027 and 676,028 (now U.S. Patent No. 2,957,380), filed August 2, 1957, for more detailed descriptions. The mechanism shown in the drawings comprises a base 50 including a table 51 and having mounted thereon a punching mechanism 52 enclosed in a protective cover 53. At the inner end of the table 51 adjacent the punching mechanism 52 is a work receiving throat 55 defined by a hold down plate or stripper 56 closely overlying the table 51 (Fig. 3).

In order to punch a spaced row of holes along on one inserted edge of a sheet positioned in the throat 55, the punch mechanism includes a series of reciprocable punches 57 alined over a corresponding series of die openings 58 (Fig. 4) formed in die plates 59 secured to the table 51 underneath the stripper 56. The punches are driven vertically and reciprocate into and out of the die openings for performing their punching functions in the conventional manner. To guide the punches in their vertical movement they are slidably fitted through alined apertures formed in both the stripper 56 and in a second plate 60 that is fixed above the stripper.

The entire series of punches is supported and actuated by a block 61 extending transversely across the apparatus and over the throat and dies. Each of the individual punches 57 is suspended within its respective guide apertures by means of a projecting pin 62 carried therein and itself supported upon a pair of interned opposed ledges 64 forming a part of the punch block 61.

Mounting the punch block 61 for vertical movement is a pair of spaced slides 65, one of which is shown in Figs. 4 and 5. The slides are formed with opposite legs which straddle and reciprocate relative to a cross bar fixed between upright support plates 66 mounted on the base 50.

Suitable means are provided for reciprocating the punch blocks 61 to effect a punching operation. One means which can be employed comprises an electric motor 70 drivingly connected to the slide 65 supporting the punch block 61 through a gear box 71 driving a crank shaft 72 journaled on the frame and coupled to the slide 65 by a connecting rod 73. In order to prevent the punches from continuously reciprocating when the motor is energized, a one revolution gear clutch (not shown) is imposed in the driving train between the power output of the gear case 71 and the crank shaft 72. Governor means (not shown) are desirably provided to trip the clutch and cause a single revolution of the crank shaft only after the motor has been energized long enough to reach a predetermined operating speed.

For the purpose of selectively engaging or disengaging any desired ones of the series of punches to prevent those punches from producing holes in an inserted sheet, the punches 57 are mounted for lost motion movement relative to the block 61 and there is provided a removable blocking pin 76 for each punch (Figs. 4 and 5).

Lost motion movement of the punches is provided by forming the punch block with a longitudinal slot or groove 77 extending along and directly above the series of punches 57. Overlying each punch 57 is a corresponding blocking pin 76 slidable between a withdrawn position allowing a punch to remain idle when the punch block is reciprocated and a blocking position preventing lost motion punch movement and causing the punch to operate when the punch block is moved downwardly. In this manner selective operation of each individual punch in the series of punches is obtainable.

In accordance with the present invention, there is provided for positioning sheet material in the punch a novel sheet positioning guide 80. This guide, in cooperation with the foregoing described apparatus for punching a series of alined holes in a sheet of material, facilitates rapid and accurate punching of the optimum number of holes for binding, without cutting the edges of the sheet or of slightly larger sheets to be used as covers. To this end, the sheet positioning guide illustrative of the present invention includes indicia for indicating, to the operator of the apparatus as he places the paper therein, the exact position of the series of punches within the apparatus and indicia for guiding the positioning of a sheet S to be punched so that complete holes are punched as close as possible to the edges of the sheet and so that slightly larger cover sheets can be likewise punched.

The sheet positioning guide 80 comprises as shown in the drawings, an elongated plate or strip 81 mounted on the front of the apparatus and having its lower edge 82 overlying and closely spaced from the sheet supporting table. To mount the plate 81, the stripper 56 is formed with a plurality of upwardly extending arms 84 on its forward edge to which arms the guide plate 81 is screwed or otherwise fastened. Although the sheet positioning guide strip is preferably formed of aluminum strip because of the lightness of the material and because of the desirably natural metallic coloring, it could as well be formed from other strip material such as plastics or metals.

When mounted in place, the sheet positioning guide strip is positioned with its lower edge close enough to the table so as to enable the operator to locate quickly the position of the paper relative to the punches. Additionally, the strip of metal itself serves admirably as a shield, guarding the series of punches against damage by the insertion of foreign objects and guarding the operator against inadvertent contact with the punch mechanism.

For purposes of indicating to the operator of the punching apparatus the exact position of the punches hidden within the cover of the apparatus, the plate is formed with indicia means 85 having the configuration of vertical stripes corresponding to a projection of the punches 57 onto the plate. As shown in Fig. 6, these vertical stripes extend transversely the width of the plate and are generally vertical when the plate is mounted in place on the apparatus. Suitable indicia means 86 are present and are in contrast to the punch indicia 85 for indicating the spaces between the punches so that upon observing the indicia on the plate, the operator is appraised of the relative position of both the punches and the spaces between them.

Means are included on the guide plate for use in positioning the sheet to be punched in the apparatus so that complete holes are punched as close as possible to the edges of the sheet without actually cutting the edges. One illustrative means is shown in Fig. 6 and comprises indicia 88 superimposed on the punch and space indicia 85, 86 on the guide plate and corresponding to nominal sheet widths between which indicia a sheet S can be positioned. These sheet positioning indicia are alined relative to the punches so that the desired maximum number of holes can be punched in a sheet for receiving a binding and these holes will be punched as close as possible to the sheet edges without actually cutting them, it being desirable to leave a minimum margin of about ⅛" to prevent the binding from tearing out of the sheet.

Cutting of the edges is prevented by using the punch indicia 85 as a visual guide for indicating which of the punches 57 should be disengaged by pulling the corresponding pin 76 so as to leave engaged those punches which will contact the sheet completely within its edges. By terminating the sheet width indica 88 on adjacent punch indicia 85 corresponding to those punches likely to cut the edges of the sheet and possible larger cover sheets, a clear visual indication is given to the punch operator of those punches which should be disengaged. For example, should a sheet S of paper 8 inches wide be inserted into the machine for punching and subsequent binding, as illustrated in Fig. 6, the operator will aline the sheet S between the sheet indicia marks 88 labeled "8." It can now be seen that the paper will fall slightly short of the punches 57*a* and 57*b* on either edge, as indicated by punch indicia 85*a* and 85*b*, although these punches should be disengaged to prevent cutting the edges of a slightly larger cover sheet. Accordingly, the numeral 8 appears on the punch indicia corresponding to the punches which are to be disengaged by pulling the appropriate pins 76*a* and 76*b*. Similarly, if the sheet to be punched measures 10 inches, it can be seen that when that size sheet is inserted in the apparatus its edges would be notched by the punches corresponding to the punch indicia on which the number 10 appears. Accordingly, these punches are disengaged by pulling the appropriate pins directly above the punch indicia.

The punch is provided with an adjustable work positioning back stop 90 that is shiftable laterally in the machine and provided with cam means to vary its effective back stopping position in accordance with this lateral setting.

To further assist in positioning the work, an adjustable slide guide 91 is mounted on the table and provided with a thumbscrew effective for locking the guide in any desired adjustable position.

For energizing the motor to operate the punch, either a foot switch (not shown) is employed or, alternatively, inserted sheet operated switches can be provided in the throat of the machine. To insure that paper is square with the throat and thus the punches, a pair of spaced switches 92, both of which must be actuated by the leading edge of the inserted paper sheet, are mounted on the back stop at the rear of the throat and are connected in series with each other. These paper switches are also desirably connected in parallel with the foot switch so that either means can be used to operate the mechanism.

In summary, when a stack of sheets of paper, for example, are to be punched for binding, a sheet of paper of the size to be punched is placed on the table and centered between the appropriate sheet size indicia. The operator then disengages the indicated punches which would notch the edges of the sheets or sheet covers. The apparatus is then turned on and is ready for use. During the insertion, the operator visually alines the paper between the proper indicia. When the paper is inserted completely within the throat and both the paper sensitive switches are closed, thus assuring that the paper is completely against the back stop, the punch operates automatically to cut the desired binder holes in the paper. If the paper is of an odd size not given on the sheet indicia scale, the operator need merely aline the paper visually between the next larger sheet width indicia and disengage those punches which would strike the edge of the paper. Then, using the punch indicia as guides, the paper is inserted within the throat for punching.

The novel sheet positioning guide serves a number of desirable purposes. It enables the operator to determine exactly and without trial and error test runs the location of the punches relative to the paper being punched. Further, it enables the operator to obtain the optimum number of holes for a given size sheet of paper. Also, it visually indicates which of the punches are likely to notch

the edge of the paper so that the operator can disengage those punches by pulling the appropriate pin corresponding to the punch as indicated. Further, the vertical punch indicia serve as guides for odd sizes of paper as they are inserted into the throat of the punch.

Another advantage gained by use of the above described guide is in aligning cover sheets for punching. The guide is initially used in determining the number of punches and location thereof for the sheets which are to be bound in a cover. Reference to the scale **88** then indicates the size of the sheets and, thus, the size of the cover. The cover, of course, normally is larger and overhangs the main body of sheets on the top, bottom, and right hand margins. The guide can then be used for centering the cover by positioning it with respect to the punches used for the sheets as determined by the punch indicia **85**. Thus, for 8½ x 11 sheets the guide locates the sheets for punching an odd number of holes. Using the same indicia **85** on the guide for centering the coverstock immediately tells the operator the proper location so that the covers are centered for punching the same number of holes.

We claim as our invention:

1. In a punching mechanism having a table for supporting sheet material to be punched along one end edge, a series of alined uniformly spaced punches and corresponding dies, a stripper above the dies and table defining therewith a throat for receiving the sheet material for punching, and means for individually disengaging the punches, a sheet material positioning device comprising means for alining the end edge of the paper within the throat in parallel relation with the punches, first indicia means immediately in front of the throat for visibly indicating the position of the punches, a plurality of pairs of second indicia means superimposed on said first indicia means for locating the side edges of the sheet material relative to the punch indicating first indicia means so that the sheet material will be alined for punching the maximum number of holes in the sheet material while maintaining a minimum spacing between the holes and the side edges to prevent the sheet from being excessively weakened, said pairs of second indicia means each having a different spacing corresponding in spaced apart distance to a selected width of sheet material, and means associated with each of said pairs of indicia for distinguishing each pair and for indicating in cooperation with said first indicia means which of the punches indicated thereby would cut the side edges of the sheet material when the material is alined with the punches and between the selected pair of second indicia means so that the indicated punches can be rendered inoperative by the disengaging means.

2. In a punching mechanism having a table for supporting sheet material to be punched along one end edge, a series of alined uniformly spaced punches and corresponding dies, a stripper above the dies and table defining therewith a throat for receiving the sheet material for punching, and means for individually disengaging the punches, a sheet material positioning device comprising means for alining the end edge of the paper within the throat in parallel relation with the punches, first vertical elongated indicia means on the mechanism in front of the punches and terminating immediately above the throat for visibly indicating the position of the punches, a plurality of pairs of second vertical indicia means superimposed on said first indicia means and also terminating immediately above the throat for locating the side edges of the sheet material relative to the punch indicating first indicia means so that the sheet material will be alined for punching the maximum number of holes in the sheet material while maintaining a minimum spacing between the holes and the side edges to prevent the sheet from being excessively weakened, said pairs of second indicia means each having a different spacing corresponding in spaced apart distance to a selected width of sheet material, and means associated with each of said pairs of indicia for distinguishing each pair and for indicating in cooperation with said first indica means which of the punches indicated thereby would cut the side edges of the sheet material when the material is alined with the punches and between the selected pair of second indicia means so that the indicated punches can be rendered inoperative by the disengaging means.

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